National Park Service
U.S. Department of the Interior

Bandelier National Monument
New Mexico

Bandelier National Monument

Replace Frijoles Canyon Section of Primary and Secondary Electrical Systems Environmental Assessment

PMIS 190519

DOCUMENT NO. 315/123528

MAY 2014

United States Department of the Interior"
National Park Service

Bandelier National Monument
Los Alamos, New Mexico
Replace Frijoles Canyon Section of Primary and Secondary Electrical Systems
Environmental Assessment

May 2014

Located approximately 50 miles northwest of Santa Fe, New Mexico, Bandelier National Monument (the monument) occupies a total of approximately 33, 000 acres in northern New Mexico, among a landscape dominated by mesas and canyons. The monument was established to preserve "certain prehistoric aboriginal ruins upon public lands of the United States, within the Santa Fe National Forest, in the State of New Mexico, [that] are of unusual ethnologic, scientific, and educational interest" (1916 Presidential Proclamation No. 1322: 39 Stat. 1794). Evidence of human presence dating back more than 11,000 years is preserved in the monument, including cliff dwellings and petroglyphs.

The National Park Service (NPS) is exploring options for replacing the existing primary and secondary electrical systems in Frijoles Canyon. The purpose of the replacement is to provide the monument with a reliable electrical system that complies with county and federal regulations, is readily and easily serviceable, and is generally inconspicuous on the landscape. Primary electrical service, provided by the Los Alamos County Department of Public Utilities (LAPU), currently enters the monument through the Los Alamos National Laboratory (LANL) property line, near the Entrance Road to Frijoles Canyon, and generally follows Entrance Road into the canyon bottom.

This environmental assessment (EA) evaluates three alternatives: a no action alternative and two action alternatives. The action alternatives include one option that involves burying new utilities, in conduit, along Entrance Road through trenching (NPS Preferred Alternative); and one option that involves horizontal directional drilling (HDD) from the mesa top to the Frijoles Canyon developed area, and trenching within the Frijoles Canyon developed area, to install new utilities. This EA analyzes the potential impacts these alternatives would have on the natural, cultural, and human environment. As described in this document, implementation of the NPS Preferred Alternative would result in a variety of impacts, both short-term and long-term. The NPS Preferred Alternative would have no impact on geology and geohazards. Over the short-term, there would be minor adverse impacts on soils, cultural landscapes, and monument operations and infrastructure. There also would be moderate adverse impacts over the short-term on visitor use and experience. All of these short-term impacts would be associated with trenching and installation of the new primary and secondary electrical systems associated with the NPS Preferred Alternative.

Over the long-term there would be potential negligible, adverse impacts on the cultural landscape and minor, adverse impacts on soils, vegetation, and archeological resources. Implementation of the NPS

Preferred Alternative would result in beneficial, long-term impacts on visitor use and experience and monument operations and infrastructure.

For Further Information Contact: Jason Lott, Superintendent
Bandelier National Monument
15 Entrance Road
Los Alamos, NM 87544-9508
(505) 672-3861 x502

Note to Reviewers and Respondents:
If you wish to comment on this EA, you may post your comments electronically at http://parkplanning.nps.gov/band or you may mail comments within 30 days to the address above. In conjunction with collecting comments on the potential impacts the project may have on the human environment, NPS is also soliciting comments or concerns regarding the effects that the project may have on historic properties in accordance with section 106 of the National Historic Preservation Act. If you wish to comment in accordance with section 106 you may do so through the process outlined above. Whether you comment on the website or through the mail, if you include your address, phone number, e-mail address, or other personal identifying information, you should be aware that your entire comment – including your personal identifying information – may be made publicly available at any time. While you can ask us in your comment to withhold personal identifying information from public review, we cannot guarantee that we will be able to do so.

CONTENTS

LIST OF FIGURES

LIST OF TABLES

ACRONYMS AND ABBREVIATIONS

AIRFA	American Indian Religious Freedom Act
AMSL	above mean sea level
APE	area of potential effect
ARPA	Archaeological Resources Protection Act of 1979
Bandelier CCC Historic District/National Historic Landmark	Bandelier National Monument Civilian Conservation Corps Historic District
BMP	best management practice
CBA/VA	Choosing by Advantage/Value Analysis
CCC	Civilian Conservation Corps
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
DDT	Dichlorodiphenyltrichloroethane
DO	Director's Order
EA	environmental assessment
FONSI	finding of no significant impact
FR	Federal Register
FTE	full-time equivalent
FY	fiscal year
HDD	horizontal directional drilling
LA	Laboratory of Anthropology
LAPU	Los Alamos County Department of Public Utilities
LANL	Los Alamos National Laboratory
MOA	memorandum of agreement
the monument	Bandelier National Monument
National Register	National Register of Historic Places
NEC	National Electrical Code
NEPA	National Environmental Policy Act
NESC	National Electrical Safety Code
NMED	New Mexico Environment Department
NMFS	National Oceanic and Atmospheric Administration National Marine Fisheries Service
NMGF	New Mexico Department of Game & Fish
NPFA	National Fire Protection Association
NPS	National Park Service
NRCS	[U.S. Department of Agriculture] Natural Resources Conservation Service

NVC	National Vegetation Classification
NVCS	National Vegetation Classification Standard
PEPC	[National Park Service] Planning, Environment, and Public Comment
PL	public law
RV	recreational vehicle
SHPO	State Historic Preservation Office
USACE	U.S. Army Corps of Engineers
USC	United States Code
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey

1

PURPOSE AND NEED

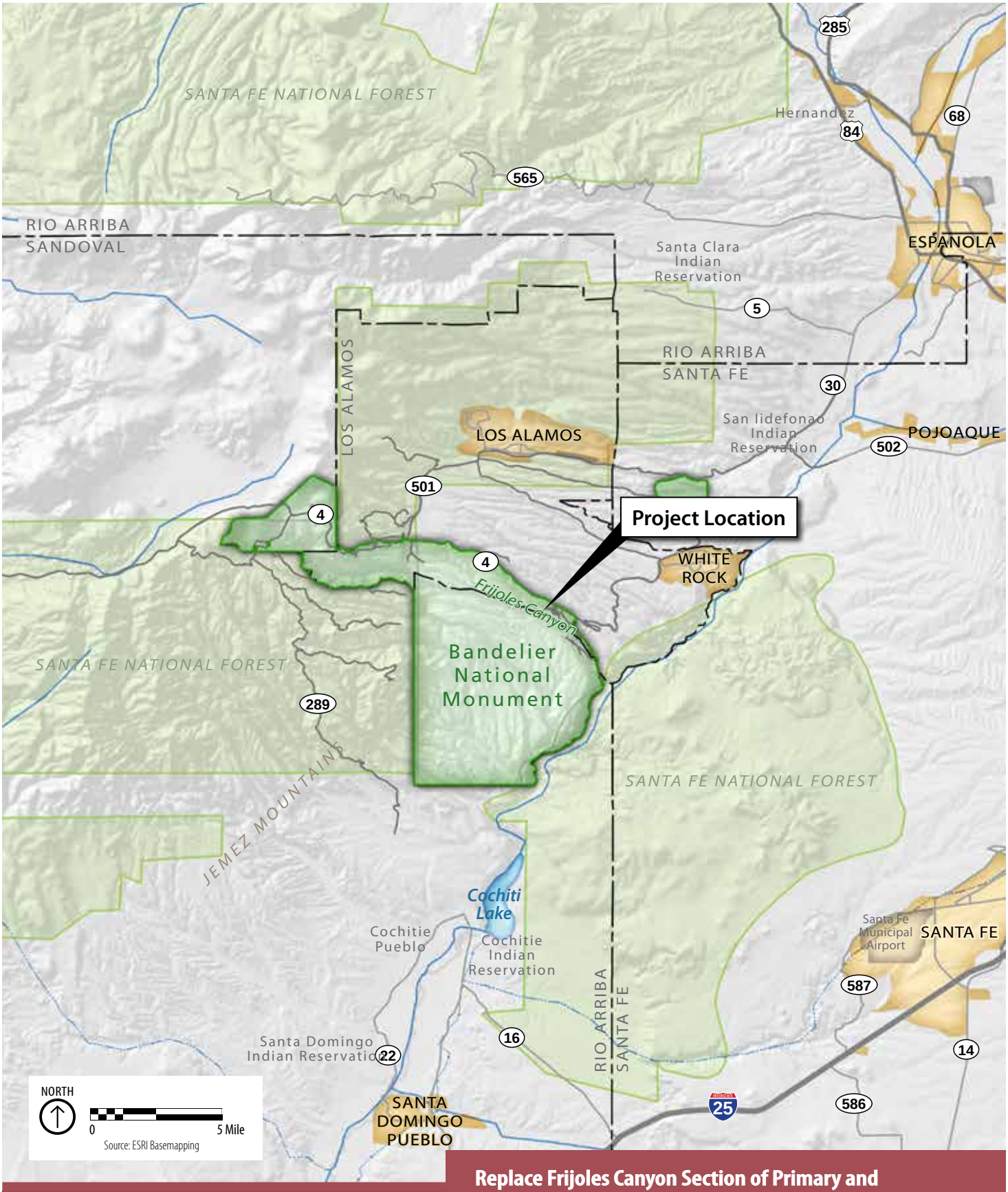
INTRODUCTION

Located approximately 50 miles northwest of Santa Fe, New Mexico, Bandelier National Monument (the monument) occupies a total of approximately 33,000 acres in northern New Mexico, among a landscape dominated by mesas and canyons. The monument was established to preserve "certain prehistoric aboriginal ruins upon public lands of the United States, within the Santa Fe National Forest, in the State of New Mexico, [that] are of unusual ethnologic, scientific, and educational interest" (1916 Presidential Proclamation No. 1322: 39 Stat. 1794). Evidence of human presence dating back more than 11,000 years is preserved in the monument, including cliff dwellings and petroglyphs. Figure 1 shows the monument's location in relation to Santa Fe and the communities of Los Alamos and White Rock.

The National Park Service (NPS) is exploring options for replacing the existing primary and secondary electrical systems in Frijoles Canyon. The purpose of the replacement is to provide the monument with a reliable electrical system that complies with county and federal regulations, is readily and easily serviceable, and is generally inconspicuous on the landscape. Primary electrical service, provided by the Los Alamos County Department of Public Utilities (LAPU), currently enters the monument through the Los Alamos National Laboratory (LANL) property line, near the Entrance Road to Frijoles Canyon, and generally follows Entrance Road into the canyon bottom (figures 2a and 2b).

This environmental assessment (EA) evaluates three alternatives: a no action alternative and two action alternatives. This EA analyzes the potential impacts these alternatives would have on the natural, cultural, and human environment. This document has been prepared in accordance with the National Environmental Policy Act of 1969 (NEPA), as amended (42 United States Code [USC] 4332[2] [C]), the implementing regulations of the Council on Environmental Quality (CEQ) (40 Code of Federal Regulations [CFR] 1500–1508.9), the Department of the Interior NEPA regulations (43 CFR Part 46), and NPS Director's Order #12: *Conservation Planning, Environmental Impact Analysis and Decision-Making* and its accompanying handbook (NPS 2001).

Compliance with 36 CFR 800 section 106 is being completed by NPS separately from and concurrent with the NEPA process. Applicable cultural resource information, including potential impacts associated with the proposed alternatives, is documented in this EA but does not constitute section 106 compliance.



Replace Frijoles Canyon Section of Primary and Secondary Electrical Systems - Environmental Assessment

National Park Service
U.S. Department of the Interior

Bandelier National Monument

FIGURE 1

Regional Overview

Point of Connection to LANL Overhead Electrical

Fire Lookout Tower

Entrance Road

Frijoles Canyon Developed Area (see Figure 2b)

Powerhouse

Monument Headquarters

Visitor Center

Stonehouse Road

Lower Housing Area

13KV Switch

Maintenance Complex

MONUMENT BOUNDARY

Corral/ Stable Area

Frijoles Creek

Agoyo Lane

Entrance Road

LEGEND

- Existing Direct Bury Electrical Study Area A
- Existing Direct Bury Electrical Study Area B
- Existing Overhead Electrical Study Area D
- Existing Direct Bury Electrical Study Area F
- Existing Direct Bury Electrical Study Area G
- 13KV Switch
- 100- year Post Fire Floodplain
- 500-year Post Fire Floodplain

NORTH

0 400 Feet

National Park Service
U.S. Department of the Interior

Bandelier National Monument

Replace Frijoles Canyon Section of Primary and Secondary Electrical Systems - Environmental Assessment

FIGURE 2a

Project Area - Existing Primary Electric System

Replace Frijoles Canyon Section of Primary and Secondary Electrical Systems - Environmental Assessment

National Park Service
U.S. Department of the Interior

Bandelier National Monument

FIGURE 2b

Existing Secondary Electrical System, and 100- and 500-year Floodplain in Frijoles Canyon Developed Area

PURPOSE OF AND NEED FOR ACTION

The purpose of this EA is to provide the monument with reliable electrical systems that comply with county and federal regulations, are readily and easily serviceable, and are inconspicuous on the landscape.

The project is needed because many components of the monument's current primary and secondary electrical systems require updates in order to comply with code requirements related to visitor and employee safety, have exceeded their 30- to 40-year life cycle, and have a high failure potential. The monument's primary and secondary electrical systems are also undersized for meeting projected future electrical system requirements and provide inadequate service levels to meet NPS requirements. These systems service the Frijoles Canyon section of the monument, including the Frijoles Canyon developed area (visitor center, concession operations, museum storage, and staff housing) and extend through the Bandelier National Monument Civilian Conservation Corps Historic District (Bandelier CCC Historic District/National Historic Landmark).

Objectives for the project include the following

- improve reliability and serviceability of the monument's primary and secondary electrical systems
- update electrical infrastructure to meet National Electrical Code and Safety requirements
- maintain the aesthetic integrity of the monument's surroundings, landscape, and architectural features
- reduce potential threats to public health, monument structures, and natural and cultural resources

BACKGROUND

Electrical service is provided to the monument by LAPU via a high-voltage overhead line that enters the monument along its northern border, at the property boundary between the monument and LANL. LAPU currently supplies 13.8KV to the high voltage portions of the monument's primary electrical system, though most of the monument's existing equipment is only rated for 13.2KV (NPS 2011a). The monument owns and operates its existing primary and secondary electrical systems and is responsible for maintenance and repair of these systems. However, the monument does not employ a dedicated power line crew or personnel qualified to maintain its primary electrical system. When routine maintenance or repairs to the primary electrical system are needed, outside personnel must be brought in to assist. These services are expensive, costing the monument thousands of dollars for each service call. LAPU has expressed an interest in owning the primary electrical system. The NPS is interested in transferring ownership of its primary electrical system to LAPU to relieve itself of future maintenance and repair responsibilities and the associated costs.

In order to transfer ownership of the monument's primary electrical system, the system must be brought up to code compliance. The monument and Los Alamos County have been collaborating regarding transfer of ownership. As part of this collaboration, the alternatives described and evaluated in this EA are based on preliminary engineering analysis developed to meet the design and specification requirements of

Los Alamos County. The County has been actively involved in the design of this project, including participation in the project Kick-off Meeting and Value Analysis Workshop.

Primary Electrical System

The monument's existing primary electrical system was installed in the 1960s and comprises approximately 3 miles of deteriorated underground and overhead medium voltage power lines extending primarily along Entrance Road from the point of connection with LANL to the Frijoles Canyon developed area (see figure 2a). The monument experienced three critical failures of its primary electrical system in 2011, resulting in a loss of electrical service for more than 21 days (combined). Since 2011, the system has continued to experience sporadic failures and it is anticipated that the frequency of outages will increase as the system continues to age/deteriorate. During the power outages, administrative services in Frijoles Canyon were disrupted, requiring temporary relocation of monument staff to other areas of the monument or their homes. Telephone systems were also affected, reducing service for much-needed emergency response systems. Frijoles Canyon does not currently have cell phone coverage; therefore, the monument relies on standard telephones to call 9-1-1 in the event of an emergency.

Further, the existing, aging, system requires updates in order to comply with code requirements related to visitor and employee safety, including the National Electrical Code (NEC), National Electrical Safety Code (NESC), National Fire Protection Association (NPFA) codes (Standards for Electrical Safety in the Workplace—NPFA 70E and Life Safety Code—NPFA 101), and LAPU standards. The existing system is not equipped to accommodate changing electric supply and demand conditions, unexpected outages, planned shutdowns for maintenance, and weather extremes. In most locations, the monument's primary and secondary electrical systems are buried at depths less than that required by code, which could be hazardous during any construction or maintenance activities that require digging/excavation near the system (NPS 2011a). The existing primary and secondary electrical systems are not in conduit, and other utilities (i.e., telephone, water, sewer) have been installed in the immediate vicinity with no separation. In addition, electrical failures often do not trip safety mechanisms within the system. As a result, infrastructure and other natural components of the landscape can become electrically charged and serve as a shock hazard for visitors and staff. Cars and buses regularly travel along Entrance Road, directly over areas where the primary electrical system has been damaged. Stray voltage also increases the potential for canyon fire, which could threaten the safety of monument staff and visitors as well as natural and cultural resources. The Las Conchas Fire of 2011 proved fire could move through the area quickly and with high intensity. That fire resulted when a tree fell on a power line on the mesa, near the Santa Fe National Forest.

Secondary Electrical System

The monument has also been experiencing problems with its secondary electrical system. The majority of the secondary electrical system was replaced in 1986 and should still be within its expected life span. However, the powerhouse and visitor center are powered by three-phase transformers with 208/120 volts of secondary voltage, less than the standard supply voltage of 240/120 volts. The monument's electrical equipment would continue to run on the 208-volt system, resulting in reduced capacity or efficiency. Further, the secondary electrical system requires repair in order to comply with code requirement; necessary repairs can be directly related to exposure of electrical infrastructure to weather events. For example, meters and/or disconnect switches frequently fall off buildings or plywood backboards on the meter racks; latches on equipment doors are broken in many areas, providing easy access to energized

parts; and unused conduit holes in disconnect switches and wireways provide easy access to energized parts. Aging meters and sub-meters are also difficult to read, and sub-metering is unclear.

Because the monument's current primary and secondary electrical systems are not within conduits, a method called "thumping" is required to locate them when repairs are needed. Thumping causes the primary and secondary electrical systems to deteriorate further and requires that Entrance Road (above the primary electrical system) be dug up to locate and repair the systems. Entrance Road is a contributing resource within the Bandelier National Monument Archeological and Historic District and the Bandelier CCC Historic District/National Historic Landmark. The overhead portions of the monument's primary electrical system occur in the canyon bottom, between the corral/stables and the Frijoles Canyon developed area. This area is part of the Bandelier CCC Historic District/National Historic Landmark, and the overhead lines obstruct historic viewsheds/cultural landscapes associated with the historic district.

Equipment associated with the monument's primary and secondary electrical systems also require replacement, including transformers, disconnects, and conduits. Although there is no evidence that the existing transformers have caused any problems to date, many are so old that replacement parts are no longer available and may not be able to be repaired if a problem occurs (NPS 2011a).

PROJECT AREA DESCRIPTION

The monument is approximately 50 miles northwest of Santa Fe, New Mexico (figure 1), Sandoval County, and near the communities of White Rock (15 miles northeast of the monument) and Los Alamos (20 miles north of the monument). The counties of Los Alamos and Santa Fe are adjacent to the north and east of the monument, respectively. The monument comprises two physically separated sections. The main section is Frijoles Canyon, and the smaller section is Tsankawi, located approximately 15 miles northeast of Frijoles Canyon. Both sections are accessed from Highway 4. The monument is primarily surrounded by the Santa Fe National Forest, although Frijoles Canyon is bordered to the north by LANL, which is operated by the U.S. Department of Energy, and the northwestern most portion of the monument is bordered by the Valles Caldera National Preserve. In addition, a number of Indian reservations are located proximal to the monument, including the Santa Domingo and Cochitie Indian Reservations to the south and the San Ildefonso and Santa Clara Indian Reservations to the north/north west.

The actions proposed in this EA are focused on the Frijoles Canyon section of the monument. The project area generally includes portions of Frijoles Canyon near and within Entrance Road, between the Fire Lookout Tower and the Frijoles Canyon developed area (figures 2a and 2b). More specifically, the project area includes the following components:

- primary electrical system
    - an approximately 15-foot wide corridor between the point of connection to LANL overhead, high-voltage electric lines and the fire lookout tower. This corridor extends approximately 200 feet between the LANL point of connection and Entrance Road, approximately 100 feet through a currently undeveloped area, and approximately 220 feet along the gravel access road to the fire lookout tower and includes an approximately 20,000 square foot area near the fire lookout tower (see chapter 2, figure 3).

- an approximately 15-foot wide, 8,650-foot long corridor, primarily within the existing footprint of Entrance Road, between the LANL point of connection and Agoya Lane.
- an approximately 1,700 foot long and 15-foot wide corridor, primarily within the existing footprint of Agoya Lane, the existing buildings along Agoya Lane, an approximately 2,550 square foot area near the intersection of Entrance Road and Agoya Lane (figure 3), an approximately 400 square foot area near the existing storage building, and an approximately 30,000 square foot area at the end of Agoya Lane (figure 5a).
- an approximately 10-foot wide corridor near Agoya Lane, centered on the existing overhead electrical lines.
- approximately 2,025 feet of the canyon wall between the fire lookout tower and the corral/stables area (figures 4a-5b).
- an approximately 1,375-foot long, 15-foot wide corridor between Agoya Lane and the powerhouse in the Frijoles Canyon developed area. This corridor follows the footprint of Entrance Road for approximately 550 feet, beginning at Agoya Lane, and then bends north toward Stonehouse Road, extending along the western side of the lower housing units and to the powerhouse (see chapter 2, figures 3 and 4a).
- an approximately 1,700-foot long, 15-foot wide corridor in the Frijoles Canyon developed area, east and north of the existing buildings, including the residences on Stonehouse Road, the powerhouse, and the visitor center (see chapter 2, figures 3 and 4a). This segment also includes the existing visitor center transformer and its immediate surrounds.

- secondary electrical system
  - an approximately 52,500 square foot area in the immediate vicinity of the structures in the Frijoles Canyon developed area, including staff housing units, the maintenance area, and the visitor center. The project area for the secondary electrical system generally follows the route of the existing secondary electrical system (figure 2b), including connections to existing buildings and associated meters, transformers, and other related equipment.

RELATIONSHIP TO OTHER PLANS AND STUDIES

A variety of plans and studies have informed and contributed to the development of alternatives for this EA. These include the *Final Master Plan* (NPS 1977), *Statement for Management* (NPS 1990), and the *Trip Report: Bandelier Electrical System* (NPS 2011a). A summary of each is provided below.

The ***Final Master Plan*** (NPS 1977) categorizes monument objectives into three broad categories: to serve the visitor, to preserve the resource, and to administer the area. The only objective identified in the "to administer the area" category is to "provide the facilities, functions, and housing needed for management of the monument." The alternatives proposed in this EA would improve the existing facilities within the monument by reducing the potential for electrical failures, thereby, improving the overall function of these facilities.

The ***Statement for Management*** (NPS 1990) was developed to identify and communicate management concerns and issues at the monument and was to be updated every two years to maintain a basis for future planning and research. This document also describes and evaluates the monument's condition and

management practices and identifies management objectives aimed at achieving the monument's purpose. One of the management objectives identified in the *Statement for Management* is "to provide for the planning necessary to improve adequacy of administrative and maintenance facilities." The actions proposed in this EA would improve the reliability of the existing electrical system, therefore, would improve the adequacy of existing monument facilities.

The ***Trip Report: Bandelier Electrical System*** (NPS 2011a) was conducted to evaluate problems with the monument's high voltage system stability. It was originally assumed that system failures were related to the flooding and wildfires that occurred in the monument in 2011. During the evaluation, the existing primary and secondary electrical systems were assessed, including necessary support equipment/infrastructure, (i.e., cabinets, fuses, transformers, generators, conduits, and disconnects). The trip report recommended that the monument transfer ownership of the electrical system to LAPU to improve opportunities for maintenance and general upkeep of the primary system and repair of the secondary electrical system associated with the residences in Frijoles Canyon.

SCOPING

Scoping is an early and open process to determine the breadth of environmental issues and alternatives to be addressed in a NEPA document. Scoping is used to identify which issues need to be analyzed in detail and which can be eliminated from in-depth analysis. It also allocates assignments among the interdisciplinary team members and/or other participating agencies, identifies related projects and associated documents, identifies permits, surveys, consultation, and other requirements, and creates a schedule that allows adequate time to prepare and distribute the EA for public review and comment before a final decision is made. Typically, both internal and public scoping is held to address these elements. Public scoping includes any stakeholder or agency with jurisdiction by law or expertise to obtain early input. The scoping process is summarized below and detailed in "Chapter 5: Consultation and Coordination."

The internal scoping process for this EA began on August 15–16, 2013, when staff from the monument, the NPS Denver Service Center and their consultants, and the LAPU conducted a project kick-off meeting at the monument. The planning team continued to meet and hold discussions throughout the planning process. Additionally, on December 3 and 4, 2013, NPS personnel conducted a Value Analysis workshop to fully review the options for the replacement primary and secondary electrical systems in Frijoles Canyon.

Public and agency scoping for this project began in October 2013 with a press release sent out to news organizations, community partners, and other potentially interested parties, stating the monument's intention to begin the EA process for the project. Scoping letters were also sent out to various agencies to solicit input on the proposed project. Copies of the responses from the agencies, if received, can be found in "Appendix A: Relevant Correspondence." The official public scoping comment period extended from October 23 until November 25, 2013. During the scoping period, the NPS encouraged the public to submit comments either through the NPS Planning, Environment, and Public Comment (PEPC) website or by mail. As part of the public scoping process, and in an effort to coordinate the public processes for NEPA and Section 106 of the *National Historic Preservation Act of 1966*, NPS also solicited comments on the presence of historic properties within the project area and how historic properties might be affected by work related to upgrading the electrical system. Two agency letters and one tribal letter were received

during the public comment period. Agency and tribal consultation is described in "Chapter 5: Consultation and Coordination," and incorporated throughout this EA as appropriate.

COMPLIANCE WITH STATE AND FEDERAL REGULATIONS

Prior to implementation of the NPS Preferred Alternative, the NPS would need to obtain appropriate local, state, and federal approval for the proposed activities, where appropriate. A list of permits, approvals, and regulatory requirements associated with the project would depend on the final design and potential phasing of construction; however, the following is a list of those items that may be required.

- approval of the plan by LAPU
- approved Erosion and Sedimentation Control Plan
- National Pollution Discharge Elimination System permit
- Los Alamos County Access, Utility, or Construction permits
- concurrence from the New Mexico State Historic Preservation Officer (SHPO) per section 106 of the National Historic Preservation Act; this may include preparation of a memorandum of agreement (MOA) or similar agreement
- concurrence from the U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) per section 7 of the Endangered Species Act

These requirements are described further in "Chapter 5: Consultation and Coordination."

PLANNING ISSUES AND CONCERNS

During the scoping process, specific considerations and concerns were identified as critical to implementation of the alternatives evaluated in this EA. The following were identified as most important to the planning and design process. Along with the purpose, need, and objectives for this project, these topics guided the development of alternatives and contributed to the selection of impact topics, as identified in the "Impact Topics Retained for Analysis" section below.

Avoid the regulatory floodplain, where possible. In recent years, Frijoles Canyon has experienced a number of floods, posing a potential risk to existing infrastructure. One transformer remains within the boundaries of the regulatory floodplain, increasing its potential for damage due to flooding; therefore, the transformer should be relocated out of the floodplain. Any proposals made in this EA should seek to avoid development within the regulatory floodplain.

Avoid archeological and other cultural resources, where possible. The monument was established to protect the thousands of archeological sites that exist within its boundaries, many of which are located in Frijoles Canyon. Approximately 3,000 archeological sites have been identified within the monument

boundaries. The depth of the archeological sites in Frijoles Canyon is unknown but thought to be shallow. Numerous cavates, or cliff dwellings used for storage, sleeping, and living areas, have been hollowed out of the sheer tuff cliffs in Frijoles Canyon. The cavates are about 12 feet deep while mesa-top archeological sites are assumed to be no more than 6 feet deep. Bedrock in the monument is primarily tuff, a soft stone that is susceptible to cracking from vibration and water transmission associated with drilling. Therefore, any proposals made in this EA should seek to avoid, to the extent practical, archeological and other cultural resources.

Minimize visual clutter. The Frijoles Canyon developed area, to which the subject electrical service is provided, is within the boundaries of the Bandelier CCC Historic District/National Historic Landmark. Overhead electrical lines and associated infrastructure (e.g., meters, transformers, cabinets), much of which is located in the immediately vicinity of the historic Civilian Conservation Corps (CCC) buildings, do not conform to the character of the historic district, detracting from the historic setting and associated cultural landscape. Therefore, any proposals made in this EA should seek to minimize visual clutter.

Closely coordinate the proposed design and construction with Los Alamos County. Primary electrical service is, and will continue to be, supplied to the monument by LAPU. LAPU would own and maintain the new electrical system. Therefore, the alternatives considered in this EA must adhere to LAPU requirements and standards, and any proposals made in this EA should seek to ensure close coordination of the proposed design and construction with Los Alamos County.

IMPACT TOPICS RETAINED FOR ANALYSIS

Impact topics for this project were identified on the basis of federal laws, regulations, and orders; *Management Policies 2006*; and NPS knowledge of resources at the monument. Impact topics that are carried forward for further analysis in this EA include

- issues raised during scoping
- site conditions
- federal laws, regulations, executive orders, NPS Management Policies 2006 (NPS 2006a), and director's orders
- staff knowledge of the monument's resources

Impact topics identified and analyzed in this plan/EA are listed below with a brief rationale for the selection of each impact topic. They include geology and geohazards, soils, vegetation, archeological resources, cultural landscapes, visitor use and experience, and monument operations. Each impact topic is further described in "Chapter 3: Affected Environment" of this document. Potential impacts on these resources from the proposed alternatives are discussed in "Chapter 4: Environmental Consequences."

Geology and Geohazards. According to NPS *Management Policies 2006*, the NPS will: (1) assess the impacts of natural processes and human-related events on geologic resources; (2) maintain and restore the integrity of existing geologic resources; (3) integrate geologic resource management into service operations and planning; and (4) interpret geologic resources for park visitors. The geologic resources of

the monument, including the canyon itself are a key part of the natural systems associated with the monument. The installation of a new subsurface primary electrical system for the monument through horizontal directional drilling (HDD) would result in disturbance to geologic resources within the project area, including increasing the potential for geohazards. Therefore, the impact topic of geology and geohazards is retained for further analysis.

Soils. NPS *Management Policies 2006* states that the NPS will strive to understand and preserve the soil resources of park units and to prevent, to the extent possible, the unnatural erosion, physical removal, or contamination of the soils, or its contamination of other resources. These policies further state "[m]anagement action will be taken by superintendents to prevent or at least minimize adverse, potentially irreversible impacts on soils." A variety of soil types exist within the monument. The alternative evaluated in this EA would include disturbance of these soils for trenching and use of HDD to install a new subsurface primary electrical system for the monument. Therefore, the impact topic of soils is retained for further analysis.

Vegetation. NPS *Management Policies 2006* and other NPS and monument policies provide general direction for the protection of vegetation. The project area includes a variety of vegetative communities categorized into two associations: Southern Rocky Mountain Pinyon-Juniper Woodland and Southern Rocky Mountain Juniper Woodland Savanna. The alternatives evaluated in this EA would result in some vegetation removal and displacement, particularly along Entrance Road in the location of proposed staging areas near the corral/stables and the fire lookout tower. Due to the arid, harsh environment throughout the monument, any vegetation removed during construction could take a substantial period of time to grow back. Therefore, the impact topic of vegetation is retained for further analysis.

Archeological Resources. The NPS defines an archeological resource as any material remains or physical evidence of past human life or activities that are of archeological interest, including the record of the effects of human activities on the environment. Archeological resources are capable of revealing scientific or humanistic information through archeological research (NPS 2002a). The monument preserves evidence of a human presence in the area dating back more than 11,000 years, including cliff dwellings and petroglyphs and extending through present day, including preserving development from the CCC period in the 1930s and 1940s. Most portions of the monument have been surveyed for archeological resources, and existing sites have been documented. A number of archeological sites are present within the project area. The alternatives evaluated in this EA include ground disturbing activities, including trenching and HDD approaches to installing a new subsurface primary electrical system for the monument in areas that may contain known and/or unknown cultural remains. In addition, bedrock in the monument, which supports many of the monument's archeological resources, is primarily tuff, a soft stone that is susceptible to cracking from vibration and water transmission associated with drilling. As such, drilling activities associates with HDD could disrupt existing archeological resources such as cavates. Therefore, the impact topic of archeological resources is retained for further analysis.

Cultural Landscapes. According to the NPS's *Cultural Resource Management Guideline* (Director's Order 28), a cultural landscape is:

> …a reflection of human adaptation and use of natural resources and is often expressed in the way land is organized and divided, patterns of settlement, land use, systems of circulation, and the types of structures that are built. The character of a cultural landscape is defined both by physical materials, such as roads, buildings, walls, and vegetation, and by use reflecting cultural values and traditions. (NPS 2002a)

The entire monument is listed in the *National Register of Historic Places* (National Register) as the Bandelier National Monument Archeological and Historic District. The alternatives evaluated in this EA have the potential to impact portions of the cultural landscape associated with the "Main Bandelier section" (Frijoles Canyon) of the historic district. Further, the Bandelier CCC Historic District/National Historic Landmark, located in Frijoles Canyon, is listed on the National Register as a National Historic Landmark and is considered part of the Frijoles Canyon cultural landscape (NPS 2006b). The alternatives evaluated in this EA would include improvements in Frijoles Canyon, within the boundaries of the historic district and cultural landscape. Therefore, the impact topic of cultural landscapes is retained for further analysis.

Visitor Use and Experience. Enjoyment of park resources and values is part of the fundamental purpose of all parks (NPS 2006a). The NPS strives to provide opportunities for forms of enjoyment that are uniquely suited and appropriate to the natural and cultural resources found in parks. The visitor experience encompasses interpretation, understanding, enjoyment, human health and safety, circulation, and accessibility. The alternatives evaluated in this EA would result in changes to some of these elements. Specifically, the potential for power outages to the visitor center would be substantially reduced, improving visitor experience. Further, replacing the monument's current primary and secondary electrical systems, in conduit would eliminate potential for infrastructure and other natural components of the landscape to become electrically charged, reducing this potential safety hazard for visitors. The replacement electrical systems also would result in changes to the visual landscape because existing overhead lines and associated electrical equipment (e.g., transformers, meter boxes, etc.) would be removed and replaced. Therefore, the impact topic of visitor use and experience is retained for further analysis.

Monument Operations. According to NPS *Management Policies 2006,* the NPS "will provide visitor and administrative facilities that are necessary, appropriate and consistent with the conservation of park resources and values." The alternatives evaluated in this EA would replace the monument's existing primary and secondary electrical systems, reducing potential for power failures and, thereby, improving monument operations. Therefore, the impact topic of monument operations is retained for further analysis.

IMPACT TOPICS DISMISSED FROM FURTHER ANALYSIS

In this section of the EA, the NPS provides a limited evaluation and explanation as to why some impact topics are not evaluated in more detail. Impact topics are dismissed from further evaluation in this EA if

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

Prime and Unique Farmland. Prime farmland is one of several designations made by the U.S. Department of Agriculture to identify important farmlands in the United States. It is important because it contributes to the nation's short- and long-range needs for food and fiber. In general, prime farmland has an adequate and dependable water supply from precipitation or irrigation, a favorable temperature and growing season, an acceptable level of acidity or alkalinity, an acceptable content of salt or sodium, few to no rocks, and permeable soils (designated as prime farmland soils). According to soils data obtained from the U.S. Department of Agriculture Natural Resources Conservation Service (NRCS), there are no prime or unique farmland soils within the project area (NRCS 2014). Therefore, the impact topic of prime and unique farmland was considered but dismissed from further analysis.

Wetlands. Executive Order 11990 *Protection of Wetlands* requires federal agencies to avoid, where possible, adversely impacting wetlands. NPS *Management Policies 2006* and Procedural Manual 77-1: *Wetland Protection* mandate that the NPS will strive to prevent the loss or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands (NPS 2006a, 2012). Wetlands generally include swamps, marshes, bogs, and other similar areas (NPS 2006a). The alternatives evaluated in this EA would not occur within any wetlands and would not result in impacts to wetland resources. Therefore, the impact topic of wetlands was considered but dismissed from further analysis.

Water Quality. NPS *Management Policies 2006* states that the NPS will "take all necessary actions to maintain or restore the quality of surface waters and ground waters within the parks consistent with the Clean Water Act and all other applicable federal, state, and local laws and regulations." The project area is in the vicinity of Frijoles Creek, but the alternatives evaluated in this EA would not be expected to result in changes to the creek's water quality. Therefore, the impact topic of water quality was considered but dismissed from further analysis.

Wildlife and Wildlife Habitat. NPS policy is to protect the natural abundance and diversity of all naturally occurring wildlife communities. NPS *Management Policies 2006*, NPS Director's Order77: *Natural Resources Management* and other NPS policies provide general direction for the protection of wildlife and wildlife habitat. The alternatives evaluated in this EA would be limited to currently developed areas including Entrance Road and the immediate vicinity of existing structures in Frijoles Canyon. Although increased noise and the presence of construction equipment and crews could temporarily disturb wildlife in the vicinity of the project area, it is unlikely that the alternatives evaluated in this EA would have long-term impacts on wildlife or wildlife habitat. Further, as detailed in the special

status species dismissal below, pursuant to the *Memorandum of Understanding between the U.S Department of the Interior, National Park Service, and the U.S. Fish and Wildlife Service to Promote the Conservation of Migratory Birds* (MOU) (appendix B), mitigation measures would be implemented during construction, including time of year restrictions (construction must occur between October 1 and February 28), to avoid impacts to migratory birds that could occur within the project area. Therefore, the impact topic of wildlife and wildlife habitat was considered but dismissed from further analysis.

Special Status Species. In addition to NPS polices and management guidelines, the *Endangered Species Act of 1973*, as amended, provides for the protection of rare, threatened, and endangered species (plant and animal). The monument provides suitable habitat for a variety of state and federally listed species know to occur in Los Alamos and Sandoval Counties. Appendix B provides a list of those species known to occur within the monument that are included in published conservation plans. Implementation of the alternatives presented in this EA would adhere to all applicable conservation plans (see appendix B). The monument would also ensure adherence to the MOU, including time-of-year construction restrictions. The USFWS publishes a list of special status species segregated by each county in New Mexico (USFWS 2012). In addition, the New Mexico Department of Game and Fish (NMDGF) publishes biennial reports on the status of each listed species. Their latest report provides details on the distribution and habitat requirements for each species (NMDGF 2012). Information from these sources compiled and species information was analyzed to determine which species are “likely” and “unlikely” to occur in the project area. In a letter dated November 14, 2013, NMDGF provided NPS with a list of species of concern known to occur in Los Alamos and Sandoval Counties (appendix A). No habitat exists in, or within a mile of, the project area for Jemez Mountain Salamander, Southwest Willow Flycatcher, Gunnison's Prairie Dog, New Mexico Jumping Mouse, or Black-footed Ferret.

Many bird species in the project area are protected by the *Migratory Bird Treaty Act*. Neotropical migrants include raptors, songbirds, and shorebirds that breed in the United States and Canada but migrate to Mexico, Central America, or South America for the winter. In New Mexico, the American peregrine falcon (*Falco peregrinus tundrius*), Mexican spotted owl (*Strix occidentalis lucida*), and bald eagle (*Haliaeetus leucocephalis*) are considered Neotropical migrants. Peak migration periods occur in May and again from September through early October. Migratory birds are of concern to resource managers because they have been experiencing severe population declines throughout North America. Nesting typically occurs from mid to late May through early August. Some birds receive special attention because of their population status and need for conservation. Two delisted species, the American peregrine falcon and the bald eagle, have the potential to be impacted by the proposed action. In particular, the project would occur within potential peregrine falcon habitat and near potential Mexican spotted owl habitat. Bald eagles are only present in the monument during the winter. They occasionally fly over the project area but rarely, if ever, land near Entrance Road. Despite the potential presence of special status bird species within or near the project area, to avoid impacts to special status birds species, pursuant to the MOU, mitigation measures would be implemented during construction, including time of year restrictions (construction must occur between October 1 and February 28), to avoid impacts to nesting American peregrine falcon or wintering bald eagles. The project will occur near potential habitat for the federally threatened Mexican spotted owl. Time-of-year restrictions will be used to ensure no effects on the species. Therefore, the impact topic of special status species was considered but dismissed from further analysis.

Floodplains. Executive Order 11988, *Floodplain Management* and NPS Director's Order 77-2: *Floodplain Management*, require an examination of impacts to floodplains and potential risk involved in placing facilities within floodplains. The vast majority of proposed work for each alternative would be landward of the 100-year floodplain. The alternatives evaluated in this EA would include a small segment of construction within the 100-year floodplain, including removal of a transformer and trenching associated with installing subsurface conduits for the monument's secondary electrical system. Components of the primary electrical system would be located landward of the 100-year floodplain. In addition, the existing visitor center transformer (see figure 2b) would be removed from within the 100-year floodplain and relocated approximately 50 feet north of the visitor center landward of the 100-year floodplain. Upon removal, the area of the existing transformer would be returned to natural grade resulting in the restoration of floodplain values. Replacement of the monument's primary electrical system would generally occur within the Entrance Road footprint located landward of the floodplain. Once the alignment for the primary electrical system leaves Entrance Road and turns north to align with Stonehouse Road, this segment would also be landward of the 100-year floodplain to the powerhouse. Further, although the design of a new secondary electrical system has not yet been determined, the majority of secondary electrical system would occur on the uphill side of the existing buildings, landward of the 100-year floodplain. The segments of the secondary electric system that would occur within the 100-year floodplain would be relatively short in linear distance, and the trenching required to replace these systems would result in a very small temporary disturbance to the overall floodplain (i.e., short-term and negligible impacts). Upon completion of installation of both systems, trenches holding buried electric lines would be backfilled and restored to natural grade resulting in no loss of floodplain storage volume. In addition, it is anticipated that this project would not impact floodplain values or increase the risk of damage to life or property from flooding. Thus, the impact topic of floodplains was considered but dismissed from further analysis. NPS Procedural Manual 77-2: *Floodplain Management* is applied, including preparation of a Statement of Findings for floodplains, if a proposed action "could adversely affect the natural resources and functions of floodplains or increase flood risk" (NPS 2004). As described above, this project would have no long-term effect on the function of existing floodplains or increase the flood risk; therefore, a floodplains Statement of Findings has not been prepared for this project.

Wilderness. The *Wilderness Act* (Public Law 88-577) defines wilderness as "an area where the earth and its community of life are untrammeled by man, where man himself is a visitor and does not remain." The intent of the act is to "secure for the American people of present and future generations the benefits of an enduring resource of wilderness." The management of wilderness areas within the national park system is guided by NPS *Management Policies 2006*, which is supplemented by Director's Order 41: *Wilderness Stewardship*. Although the monument contains approximately 23,000 acres of designated wilderness, the alternatives evaluated in this EA would not involve development in or disturbance to the wilderness. Therefore, the impact topic of wilderness was considered but dismissed from further analysis.

Air Quality. During construction, the development of the alternatives evaluated in this EA could result in a slight increase in vehicle emissions and emissions associated with HDD equipment; however, these could be quickly dissipated. It is anticipated that any noticeable short-term impacts to air quality would mostly be related to dust from trenching activities and associated vehicle/equipment use. These impacts would be minimized through the use of sediment and dust management strategies during construction (see the "Soil Disturbance and Compaction" mitigation measures section in chapter 2). Further, the monument currently maintains three air quality monitoring stations in the vicinity of the fire lookout tower. Two of

these are wet deposition samplers, part of the National Atmospheric Deposition Program (NADP), that are maintained by monument staff. The third is a modular aerosol sampler that is part of the Interagency Monitoring of Protected Visual Environments (IMPROVE) maintained by monument staff. The IMPROVE actively circulates air through filters for 24-hours every 3 days. Any short-term impacts on air quality during construction would likely be measured by one of more of these stations; therefore, the monument would be able to track these impacts. Emissions are not expected to be at a level that would contribute noticeably to greenhouse gases on a wider scale. Therefore, the impact topic of air quality was considered but dismissed from further analysis.

Soundscapes. The NPS strives to maintain or reduce existing noise impacts within the monument, so as to preserve to the greatest extent practicable the natural sounds of the monument. Natural soundscapes "encompass all the natural sounds that occur in parks, including the physical capacity for transmitting those natural sounds and the interrelationships among park natural sounds of different frequencies and volumes. Natural sounds occur within and beyond the range of sounds that humans can perceive, and they can be transmitted through air, water, or solid materials" (NPS 2006a). During construction, development of the alternatives evaluated in this EA could result in a temporary increase in noise generation due to the use of heavy equipment, especially in connection with HDD; however, in the long-term, the soundscape of Frijoles Canyon would not be altered. Therefore, the impact topic of soundscapes was considered but dismissed from further analysis.

Ethnographic Resources and Sacred Sites. Guidance for the identification of ethnographic resources is found in National Register Bulletin 38: *Guidelines for Evaluating and Documenting Traditional Cultural Properties* (NPS 2002a). Ethnographic resources are defined by the NPS as a "site, structure, object, landscape, or natural resource feature assigned traditional, legendary, religious, subsistence, or other significance in the cultural system of a group traditionally associated with it (NPS 2002a). Ethnographic resources are equivalent to the term "Traditional Cultural Property." A Traditional Cultural Property is eligible for inclusion in the National Register, "because of its association with cultural practices or beliefs of a living community that are rooted in the community's history, and which are important in maintaining the continuing cultural identity of the community" (NPS 2002a). Ethnographic resources within the project area include yucca plants along Entrance Road that have historically been, and continue to be, collected by Pueblo tribes in the vicinity of the monument. Although these ethnographic resources and at least one sacred site related to the Ancestral Pueblo presence are known to exist within the monument, those resources would not be impacted by the alternatives evaluated in this EA. Therefore, the impact topic of ethnographic resources and sacred sites was considered but dismissed from further analysis.

Historic Structures. A historic structure is defined by the NPS as "a constructed work, usually immovable by nature or design, consciously created to serve some human act" (NPS 2002a). To be listed in or eligible for listing in the National Register, a site, structure, object or district must possess historic integrity of those features necessary to convey its significance, particularly with respect to location, setting, design, feeling, association, workmanship, and materials. Although historic structures, including those associated with the Bandelier CCC Historic District/National Historic Landmark, exist within Frijoles Canyon, direct impacts to these structures are expected to be limited. Impacts to historic structures associated with viewsheds could occur as a result of the alternatives evaluated in this EA, because current overhead electrical lines would be moved underground. However, these impacts are

described in the cultural landscape discussion. Therefore, the impact topic of historic structures was considered but dismissed from further analysis.

Indian Trust Resources. Secretarial Order 3175 requires that any anticipated impacts on Indian Trust resources from a proposed project or action by U.S. Department of the Interior agencies be explicitly addressed in environmental documents. The federal Indian Trust responsibility is a legally enforceable obligation on the part of the United States to protect tribal lands, assets, resources, and treaty rights, and it represents a duty to carry out the mandates of federal laws with respect to Native American tribes. There are no known Indian Trust resources in the study area, and the lands comprising the sites are not held in trust by the Secretary of the Interior for the benefit of Indians due to their status as Indians. Therefore, the impact topic of Indian Trust resources was considered but dismissed from further analysis.

Museum Collections. The NPS defines a museum object as "a material thing possessing functional, aesthetic, cultural, symbolic, and/or scientific value, usually movable by nature or design. Museum objects include pre-contact Native American and historic objects, artifacts, works of art, archival material, and natural history specimens that are part of a museum collection" (NPS 2002a). The alternatives evaluated in this EA would not include changes to any facilities used to house the monument's collections. Replacement of the existing electrical system would reduce the potential for electrical failures that could result in the loss of power to the visitor center climate control system, threatening approximately 15,000 museum objects that are persevered there and require specific climate conditions. However, there has been no noticeable damage to the existing museum collections as a result of previous electrical failures. Therefore, the impact topic of museum collections was considered but dismissed from further analysis.

Energy Requirements and Conservation Potential. The CEQ guidelines for implementing NEPA require an examination of energy requirements and conservation potential as a possible impact topic in environmental documents (40 CFR 1502.16[e]). The NPS strives to incorporate the principles of sustainable design and development into all facilities and operations. The objectives of sustainability are to design structures to minimize adverse impacts on natural and cultural values; to reflect their environmental setting; to maintain and encourage biodiversity; to construct and retrofit facilities using energy efficient materials and building techniques; to operate and maintain facilities to promote their sustainability; and to illustrate and promote conservation principles and practices through sustainable design and ecologically sensitive use. Essentially, sustainability is living within the environment with the least impact on the environment. Although the alternatives evaluated in this EA would include replacement of the monument's primary and secondary existing electrical systems, which would likely be more efficient than the existing, dated system, this project is not expected to result in noticeable changes to energy requirements or the ability to conserve energy resources. Therefore, the impact topic of energy requirements and conservation potential was considered but dismissed from further analysis.

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 the disproportionately high and/or adverse human health or environmental effects of their programs and policies on minorities and low income populations and communities. According to the EPA, environmental justice is the "…fair treatment and meaningful involvement of all people, regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations

and policies. Fair treatment means that no group of people, including a racial, ethnic, or socioeconomic group, should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of federal, state, local, and tribal programs and policies."

The goal of "fair treatment" is not to shift risks among populations, but to identify potentially disproportionately high and adverse effects and identify alternatives that may mitigate these impacts. Environmental justice was considered but dismissed from further analysis for the following reasons:

- The NPS staff and planning team solicited public participation as part of the planning process and gave equal consideration to all input from persons regardless of age, race, income status, or other socioeconomic or demographic factors.
- Implementation of the alternatives evaluated in this EA would not result in any identifiable adverse human health effects. Therefore, there would be no direct or indirect adverse impacts on any minority or low-income population.
- The impacts associated with implementation of the alternatives evaluated in this EA would not disproportionately affect any minority or low-income population or community.
- Implementation of the alternatives evaluated in this EA would not result in any identified effects that would be specific to any minority or low-income community.

Therefore, the impact topic of environmental justice was considered but dismissed from further analysis.

This page intentionally left blank

2

ALTERNATIVES

This EA examines three alternatives: no action (alternative A) and two action alternatives (alternatives B and C). While the no action alternative provides a baseline to which the action alternatives can be compared, the action alternatives presented in this chapter have been developed to replace the monument's primary and secondary electrical systems. This chapter also describes the alternatives that were considered but dismissed from detailed analysis and identifies the NPS preferred and environmentally preferable alternatives. Impacts associated with the alternatives are summarized in this chapter and detailed in "Chapter 4: Environmental Consequences."

The alternatives presented in this chapter are the result of the findings of the 2011 *Trip Report: Bandelier Electrical System* (NPS 2011a), internal and public scoping efforts, and coordination with relevant agencies, including LAPU. The alternatives are based on preliminary engineering analysis developed to meet the design and specification requirements of Los Alamos County. The County has been actively involved in the design of this project, including participation in the project Kick-off Meeting and Value Analysis Workshop. The action alternatives were also developed in consideration of reliability of the system and protection of monument resources. The monument focused on alternatives that would provide a primary electrical system that could be constructed in generally developed areas, resulting in accessible infrastructure with the least disturbance to natural and cultural resources.

ALTERNATIVE A (NO ACTION)

Under the no action alternative, no changes would be made to the monument's existing primary and secondary electrical systems. The monument would continue to receive power from LAPU via an overhead distribution line that enters the monument through the adjacent LANL property. LAPU ownership of the electrical system would continue to end at the monument and LANL border. Specific components of the no action alternative are described in the following sections.

Primary Electrical System

As described in "Chapter 1: Purpose and Need," under the no action alternative, the primary electrical system would continue to require updates in order to comply with code requirements related to visitor and employee safety, including the following:

- National Electric Code
- National Electric Safety Code
- Standards for Electric Safety in the Workplace (NFPA70E)
- Life Safety Code (NFPA 101)

The monument's primary electrical system would remain buried directly beneath Entrance Road, not in conduit, at a depth less than that required by code. The monument's primary electrical system has also exceeded its projected life cycle and experienced a number of failures. Further, the capacity of the transformer for the visitor center would continue to be less than the standard of 240/120 volts and would remain in the 100-year floodplain.

Under the no action alternative, there would be no change to routing of the primary electrical system (figure 2a). At the LANL property boundary, the monument's primary electrical system would continue to be routed underground in an approximately 3-foot corridor to the adjacent switchgear. From this switchgear, a single phase, underground (direct-buried) feeder would continue to be routed to the fire lookout tower (see "A" on figure 2a). A second, three-phase feeder would extend from this switchgear, beneath Entrance Road, to the switchgear at the intersection of Entrance Road and Agoya Lane (see "B" on figure 2a). From the corner of Entrance Road and Agoya Lane, the primary system would continue to send a single phase feeder to the corral/stable area, where it currently transitions to overhead power lines (see "C" on figure 2a). At the corral/stable area, the electrical system splits. To the south, overhead power lines extend along Agoya Lane. To the west, a three-phase direct-buried line extends to another switchgear along Stonehouse Road (see "F" on figure 2a). From the switchgear along Stonehouse Road, underground portions of the monument's primary electrical system would continue to be routed throughout the Frijoles Canyon developed area to a series of transformers, panelboards, and a splicebox to distribute electrical service to the existing visitor, administrative/maintenance, and residential facilities in the canyon, including the powerhouse (see "G" on figure 2a). The existing primary electrical system corridor is approximately 3 feet wide and spans 11,500 linear feet within the footprint of Entrance Road between the LAPU entry point and the powerhouse. Under the no action alternative, the primary electrical system would continue to support up to approximately 40 amps, although its capacity is 155 amps. The primary electrical system would continue to be supported by six transformers, one each in the following locations:

- lower housing area (pad-mounted)
- powerhouse (pad-mounted)
- visitor center (pad-mounted)
- fire lookout tower (pad-mounted)
- corral/stables area (pad-mounted)
- Agoya Lane (pole-mounted)

Secondary Electrical System

Under the no action alternative, the secondary electrical system, most of which was replaced in 1986, would continue to support electrical service between the powerhouse and the existing facilities in the Frijoles Canyon developed area. From the powerhouse, the secondary electrical system would be routed underground to a pad-mounted transformer that feeds the powerhouse switchboard (figure 2b).

Like the monument's primary electrical system, the secondary electrical system would remain in its current condition, except for minor improvements required by LAPU and national codes. These improvements could include replacement of existing meters and/or associated disconnects, which have been damaged due to weather exposure. The capacity of the transformers for the powerhouse would continue to be less than the standard of 240/120 volts. An existing generator would continue to provide standby power to all loads connected to the powerhouse, including administration area offices, residences, concession operations, maintenance buildings, the lift station, and the visitor center, via a manual transfer switch.

Maintenance and Repair Requirements

Under the no action alternative, "thumping" would continue to be used to locate the source of future failures in the primary electrical system. Repairs to the primary electrical system would continue to require open-cut trenching and patching of the surface of Entrance Road. Because the monument would continue to own the existing electrical systems, they would also be responsible for maintenance and repair to the system.

ELEMENTS COMMON TO ALL ACTION ALTERNATIVES

Under both action alternatives (alternatives B and C), the NPS would replace the monument's primary and secondary electrical systems. Although the location of the proposed primary electrical system and the method of installation would be different, there are a variety of elements that would be implemented under each action alternative to ensure compliance with applicable code and safety requirements. These common elements are depicted on figures 3 through4b and summarized in table 1. It should be noted that a conceptual plan has not yet been developed for the secondary electrical system. It is anticipated that any improvements to or replacement of the monument's secondary electrical system would occur in the immediate vicinity of the existing system (figure 2b).

TABLE 1. SUMMARY OF ELEMENTS COMMON TO ALL ACTION ALTERNATIVES

Alternative Elements	General Concept	Requirements Addressed
Primary Electrical System		
System Ownership	The primary electrical system would be maintained and owned by LAPU	• LAPU standards
Relocation of one transformer in Frijoles Canyon developed area	A transformer currently within regulatory floodplain will be moved out of the floodplain. The transformer is currently located northwest of the visitor center and would be relocated to an easily accessible location approximately 100 to 150 feet from the visitor center switchgear.	• National Electrical Code and Safety requirements • LAPU standards
Trenching from LAPU entry point to the fire lookout tower (see "A" on figures 3 and 4a).	Trenching to install the initial segment of the primary electrical system would include an approximately 15-foot wide corridor extending 200 feet from the LAPU entrance point to Entrance Road, approximately 100 feet through a currently undeveloped area between Entrance Road and the fire lookout tower access road, and approximately 220 feet along the gravel access road to the fire lookout tower. The trenches would be approximately 4 feet deep and 18 inches wide to accommodate installation of the new conduits.	• National Electrical Code and Safety requirements • LAPU standards
Replacement of subsurface electrical cables	Existing subsurface electrical cables would be abandoned in place and replaced with new subsurface cables in conduit.	• National Electrical Code and Safety requirements • LAPU standards
Removal of existing overhead lines	The existing overhead lines along Agoya Lane would be removed and replaced with subsurface cables, in conduit (see "D" on figures 3 and 4a).	• National Electrical Code and Safety requirements • LAPU standards
Removal of existing electrical system-related infrastructure (e.g., transformer, meters, etc.)	The existing transformers, meters, and switchboxes would be removed along the length of the existing primary electrical system. This equipment would be removed under both alternatives B and C.	• National Electrical Code and Safety requirements • LAPU standards

TABLE 1. SUMMARY OF ELEMENTS COMMON TO ALL ACTION ALTERNATIVES (CONTINUED)

Alternative Elements	General Concept	Requirements Addressed
Primary Electrical System		
Trenching to install new primary electrical system in Frijoles Canyon developed area	Trenching beneath Entrance Road, in an approximate 15-foot corridor, from the corral /stables area toward the powerhouse. Approximately 8,650 feet of trenching would be required generally beneath Entrance Road from the Entrance Road/fire lookout tower access road intersection to the Entrance Road/Agoya Lane intersection (see "B" on figure 3). Approximately 1,375 linear feet of trenching would be required in a generally north direction between Entrance Road and the powerhouse. The trenches would be approximately 4 feet deep and 18 inches wide (see "F" on figures 3 and 4a). From the powerhouse, the primary electrical system would be routed approximately 1,700 feet in conduit along the east and north sides of the existing buildings in the Frijoles Canyon developed area (see "G" on figures 3 and 4a). The alignment would be sited to avoid segments of the CCC-era gutter along Entrance Road, but would cross through a small patch of junipers near the powerhouse.	• National Electrical Code and Safety requirements • LAPU standards
New transformers	A total of nine transformers would be installed along the proposed single-phase segments of the new primary electrical system as follows: • one at the fire lookout tower; • three along Agoya Lane; • two on Stonehouse Road; and three between the powerhouse and the visitor center.	• LAPU standards

TABLE 1. SUMMARY OF ELEMENTS COMMON TO ALL ACTION ALTERNATIVES (CONTINUED)

Alternative Elements	General Concept	Requirements Addressed
Primary Electrical System		
Design standards	LAPU would own and maintain the replacement primary electrical system; therefore, the system would adhere to applicable LAPU design standards, including: • all cables would be installed in conduit; • fault locators would be installed on the cables in all pad mounted switches and pullboxes; and • conduits would be installed at a depth of 36 inches below grade, or 24 inches with an 8-inch concrete cap over the conduit.	• LAPU standards
Construction Timing	Construction would occur between October 1 and February 28, in the off-peak (low visitation) period.	• MOU time-of-year restrictions • Reduce potential for impacts on visitors, monument staff, and natural resources.
Secondary Electrical System		
System Ownership	The secondary electrical system would be designed to meet LAPU codes but would be owned by the monument	• LAPU standards
Replacement of the secondary electrical lines	New secondary electrical system would be installed in the approximately location of the existing system (figure 2b).	• National Electric Code and Safety requirements • LAPU standards
Replacement of infrastructure for the secondary electrical system	The existing electrical infrastructure (meters, switchboxes, etc.) would be removed and new infrastructure would be reattached, covered, and/or masked. Digital meters would also be installed on Agoya Lane and possibly Stonehouse Road. In the Frijoles Canyon developed area, two new single phase transformers would replace the two feeders out of the powerhouse that currently power the metering racks.	• LAPU standards

TABLE 1. SUMMARY OF ELEMENTS COMMON TO ALL ACTION ALTERNATIVES (CONTINUED)

Alternative Elements	General Concept	Requirements Addressed
Primary Electrical System		
Voltage upgrades	Voltage would be changed to the standard 240/120 volts.	• National Electric Code and Safety requirements • LAPU standards
Construction Timing	Construction would occur between October 1 and February 28, in the off-peak (low visitation) period.	• MOU time-of-year restrictions • Reduce potential for impacts on visitors, monument staff, and natural resources.

ALTERNATIVE B: TRENCHING OPTION (NPS PREFERRED ALTERNATIVE)

Under alternative B, the monument's primary and secondary electrical systems would be replaced (figure 3). Components of alternative B are described below and categorized into the following subsections:

- primary electrical system
- secondary electrical system
- construction requirements

Primary Electrical System

A new medium-voltage primary electrical system would be installed underground, in conduit, using open-cut trenching along an alignment similar to that of the monument's current primary electrical system (along Entrance Road). As describe in table 1, the existing subsurface cables would be abandoned in place. Alternative B would include approximately 200 feet of trenching from the point of connection between the LAPU and monument electrical systems and Entrance Road, and an additional 320 feet to the end of the fire lookout tower access road as described in table 1 (see "A" on figure 3). The initial 200-foot segment between the LANL point of connection and Entrance Road and the 100-foot segment between Entrance Road and the access road to the fire lookout tower would be routed through a previously undisturbed corridor. Also has summarized in table 1, alternative B would require approximately 8,650 linear feet of trenching within the footprint of Entrance Road (i.e., previously disturbed soils) between the Entrance Road/fire lookout tower access road intersection and the Agoya Lane/Entrance Road intersection (see "B" on figure 3), approximately 1,375 linear feet between the corral/stables area and the powerhouse (see "F" on figure 3), and 1,700 linear feet along the east and north sides of the buildings in the Frijoles Canyon developed area, including the visitor center, administrative office, and lower housing units (see "G" on figure 3). Trenches would be approximately 4 feet deep and 18 inches wide. Conventional trenching methods would be used for installation, and manhole spacing would be approximately 500 to 600 feet, per LAPU requirements. In general, four single cables in 2-inch conduits would be installed within the trench. Three of the cables would make up a complete three-phase circuit,

while the fourth, unenergized cable would be a spare that could be energized in 30 minutes if one of the other cable segments fails. However, four segments of the primary electrical system would only include one cable in a 2-inch conduit. These four segments would be as follows:

- from Entrance Road to the fire lookout tower
- from the intersection of Entrance Road and Agoya Lane to the residence at the south end of Agoya Lane
- along Stonehouse Road
- from the powerhouse to the transformer near the visitor center

These segments would provide standard 240/120 volt power. For all segments of the primary electrical system, an empty 4-inch conduit would be installed in the trench with the new cables for the primary electrical system to provide for a future telecommunication system upgrade in the monument. Five switchgears would be installed along the alignment, including at the point of connection between the LAPU and monument electrical systems; on the monument-LANL border; at the intersection of Entrance Road and Agoya Lane; and near Stone House Road (figure 3). The switchgears would sectionalize the primary electrical system for maintenance and repair. Similarly, up to 15 pull boxes, which would further sectionalize the primary electrical system, would be placed every 500 to 600 feet along the length of the primary electrical system. In the event of a failure in the primary electrical system, LAPU officials would replace the faulty segment between pull boxes, which would take an estimated 4 to 8 hours.

Secondary Electrical System

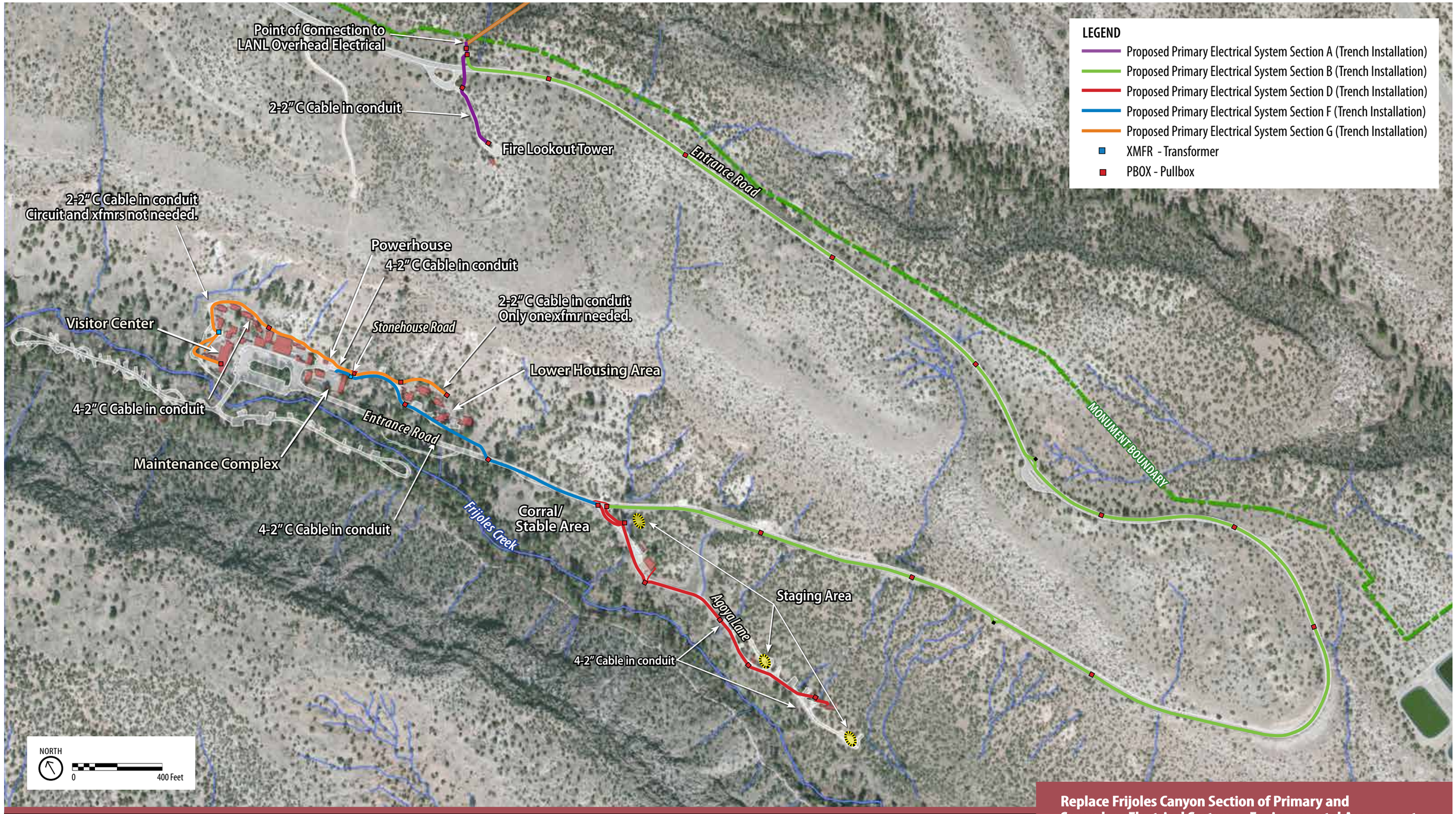
The components of the secondary electrical system would be the same under both action alternatives. Therefore, this element is described in the “Elements Common to All Action Alternatives” section above.

Construction Requirements

During construction, materials and equipment would be staged in three locations along Agoya Lane as follows:

- 102-foot by 25-foot area in the corral/stables area
- 20-foot by 20-foot area along the east side of Agoya Lane, approximately half way down Agoya Lane (near an existing storage facility)
- 112-foot by 33-foot area at the end of Agoya Lane

Traffic controls and overnight plating of excavation areas would be implemented to ensure visitor and staff safety. Once the installation of the primary and secondary electrical systems is complete, NPS would ensure pavement restoration of Entrance Road. It is estimated that construction of alternative B would take approximately 12 weeks.



National Park Service
U.S. Department of the Interior

Bandelier National Monument

Replace Frijoles Canyon Section of Primary and Secondary Electrical Systems - Environmental Assessment

FIGURE 3

Alternative B (Trenching Option) - Proposed Primary Electrical System

This page intentionally left blank

ALTERNATIVE C

Under alternative C, the monument's primary and secondary electrical systems would be replaced (figures 4a and 4b). Components of alternative C are described below and categorized into the following subsections:

- primary electrical system
- secondary electrical system
- construction requirements

Primary Electrical System

Like alternative B, this alternative would include approximately 520 feet of trenching between the point of connection between the LAPU and monument electrical systems and the fire lookout tower (see table 1 and "A" on figure 4a). However, instead of trenching, under Entrance Road ("B" on figure 3), horizontal directional drilling (HDD) would be used to make way for the new primary electrical system cables between the fire lookout tower and the corral/stables area. Using HDD, an approximately 2,025-foot bore hole would be extended through the existing bedrock from the corral/stables area up to the fire lookout tower on the mesa top (see "E" on figure 4a). Upon completion of HDD, a new medium voltage electrical cable would be installed through the bore hole. Similar to alternative B, pull boxes would be installed at 500 to 600-foot intervals along the length of the new primary electrical system. Because the length of the new primary electrical system would be shorter under alternative C, fewer pull boxes (approximately 4) would be required.

One vault, approximately 10 feet wide by 10 feet long by 10 feet deep would be installed at grade at each end of the HDD bore hole (the fire lookout tower and the corral/stables area). These vaults would anchor the new cables for the primary electrical system and provide access for future replacement and maintenance. In addition to the anchors, the new cables for the primary electrical system would be supported every 50 feet with grips that would be connected to a steel cable. The steel cable would also be anchored in the vaults but would not stretch under its own weight. These measures would help prevent the primary electrical system cables from experiencing elongation, which could result in cable failures.

Within the canyon, open-cut trenching would be used to route the new medium voltage primary electrical system from the corral/stables area approximately 1,700 feet south along Agoya Lane, and west approximately 1,375 linear feet along Entrance Road to the powerhouse (see "F" on figure 4a). An additional 1,700 linear feet of trenching would be required to installed conduits along the east and north sides of the buildings in the Frijoles Canyon developed area, including the visitor center, administrative office, and lower housing units (see "G" on figure 4a).

Three conduits would be installed within the bore hole created by HDD. Two of these conduits would contain three-phase electrical cables; one energized and one spare for use in the event of a system failure. The third conduit would be left empty and could be used at the monument's discretion, such as to install a new telecommunication system. Most of the primarily electrical system segments installed through trenching, as described above and in table 1, would also contain three-phase electrical cables; one energized and one spare for use in the event of a system failure, with one empty conduit to be used at the

monument's discretion. However, like alternative B, four of the new segments in the canyon would comprise one cable in a 2-inch conduit (figure 4a). These segments would include:

- from Entrance Road to the fire lookout tower
- from the intersection of Entrance Road and Agoya Lane to the residence at the south end of Agoya Lane
- along Stonehouse Road
- from the powerhouse to the transformer near the visitor center

These segments of the primary electrical system would provide standard 240/120 volt power. Manholes would be spaced approximately 500 to 600 feet apart along the new primary electrical system, per LAPU requirements.

Secondary Electrical System

The components of the secondary electrical system would be the same under both action alternatives. Therefore, this element is described in the "Elements Common to All Action Alternatives" section above.

Construction Requirements

The use of HDD would require a rig set up in the corral/stables area for the duration of the drilling, as well as a staging area near the fire lookout tower. The rig staging area in the corral/stables area would require a minimum area of 30,000 square feet (150 feet by 200 feet). Set up for the rig would take three to four days and would require 12 to 15 semi-trailer trucks. Typically, six or seven of the trailers would be on site in the canyon to support the drilling operations. Staging for conduit pipe near the fire lookout tower would require an area with minimum dimensions of 50 feet by 400 feet. It is estimated that the drill would operate in 12 hour shifts. When in operation the drill would produce 91, 87, or 82 decibels at a distance of 50, 100, and 150 feet from the rig, respectively. Drilling fluid would be used throughout the HDD process to create or enlarge the bore hole, to lubricate drilling and back reaming tools, and to convey soil cuttings from the bore head back to the drill rig where they are picked up by a mud pump and separated from the drill fluid so that the drill fluid can be recirculated through the system. An estimated volume of approximately 160,000 gallons of drilling fluid would be used during the construction of alternative C. It is further estimated that approximately 1,125 tons of solid material would be generated during drilling.

It is estimated that implementation of alternative C would require approximately 22 weeks of active construction. During construction, traffic controls and overnight plating of excavation areas would be implemented to ensure visitor and staff safety. Upon completion of the installation of the primary electrical system installation, NPS would ensure pavement restoration of Entrance Road

.

Point of Connection to LANL Overhead Electrical

4-2" C Cable in conduit

2-2" C Cable in conduit

Fire Lookout Tower

Conduit Pipe Staging Area (20,000 SF)

2-2" C Cable in conduit Circuit and xfmrs not needed.

Monument Headquarters Visitor Center

Powerhouse

4-2" C Cable in conduit

Maintenance Complex

2-2" C Cable in conduit Only one xfmr needed.

Lower Housing Area

Corral/ Stable Area

Frijoles Creek

4-2" C Cable in conduit

30,000 SF Rig Staging Area

Agoya Lane

2-2" C Cable in conduit

MONUMENT BOUNDARY

LEGEND

- Proposed Primary Electrical System Section A (Trench Installation)
- Proposed Primary Electrical System Section E (HDD Installation)
- Proposed Primary Electrical System Section D (Trench Installation)
- Proposed Primary Electrical System Section F (Trench Installation)
- Proposed Primary Electrical System Section G (Trench Installation)
- XMFR - Transformer
- PBOX - Pullbox

NORTH

0 400 Feet

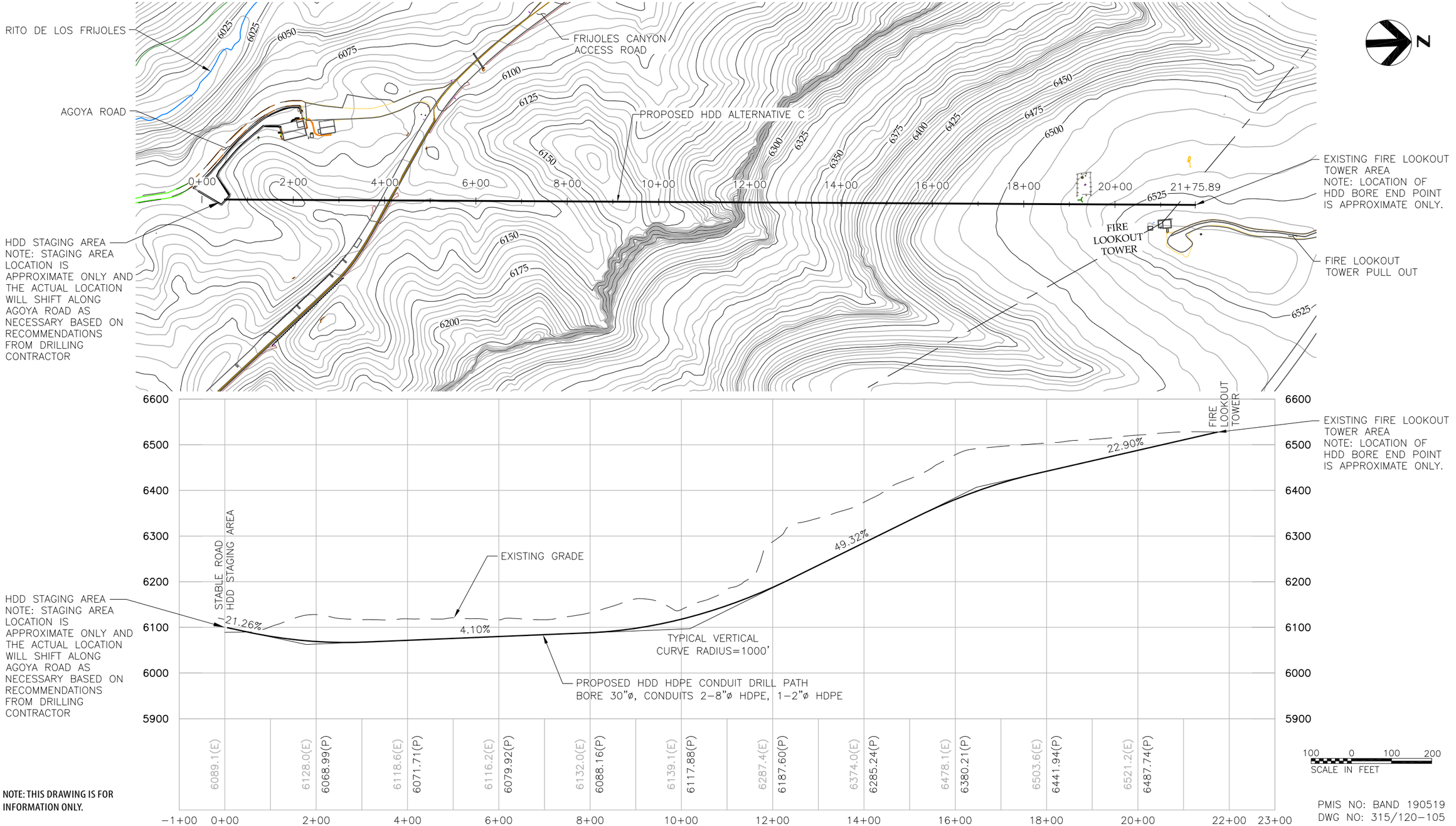
National Park Service
U.S. Department of the Interior

Bandelier National Monument

Replace Frijoles Canyon Section of Primary and Secondary Electrical Systems - Environmental Assessment

FIGURE 4a

Alternative C (HDD Option) - Proposed Primary Electrical System



NOTE: THIS DRAWING IS FOR INFORMATION ONLY.

PMIS NO: BAND 190519
DWG NO: 315/120–105

Replace Frijoles Canyon Section of Primary and Secondary Electrical Systems - Environmental Assessment

National Park Service
U.S. Department of the Interior

Bandelier National Monument

FIGURE 4b
Alternative C - Profile and Staging Areas

MITIGATION MEASURSES

To minimize environmental impacts related to the action alternatives, the NPS would implement mitigation measures whenever feasible. Most of the mitigation measures would be related to the temporary adverse impacts resulting from construction activities and the removal of materials. Although the exact mitigation measures to be implemented would depend upon the final design and approval of plans by relevant agencies, the following is a list of actions that could take place:

SOIL DISTURBANCE AND COMPACTION

- Imported fill materials shall be the minimum quantity needed, shall be from a sterile source, and shall be placed at least 2 feet below the soil surface.
- Power wash all vehicles and equipment that would travel off paved surfaces into the construction corridor. Washing would occur before vehicles and equipment are brought to the monument. Washing shall be sufficient to remove all visible plant material and soil from prior locations where vehicles and equipment have been used. NPS shall inspect vehicles and equipment for adequacy of cleaning before they are used within the monument.
- Staging area(s) (e.g., heavy and light equipment parking, construction materials, excavated material, etc.) would be located within an area that is already compacted, graded or paved.
- Drainage conditions and constructed features along the replaced electrical system would be reconstructed to stable topographic alignments at the close of construction.
- Design drawings would characterize drainage features and topography along the replacement alignment, for review by the monument's natural resource specialists. Construction documents would indicate location and extent of surface topography repairs. A storm water management plan will be included in the construction documents indicating means and methods for limiting sediment movement along trenching and construction traffic routes.
- Restrict actual soil disturbance to the width of the trench (i.e., 2 to 3 feet); do not blade or rip adjacent areas within the 10-foot work corridor.
- Excavate, lay pipe, and backfill in limited segments such that soil is replaced within 3 to 5 days of excavation.
- Subsequent to project completion, monument staff would monitor and require removal of any invasive species observed.
- Gravel and fill for construction or maintenance would be obtained from certified noxious weed-free sources. Gravel pits and fill sources would be inspected to identify weed-free sources. There would be no quarrying of construction materials from inside the monument.
- Limit introduction and enhancement of exotic plant populations by procurement of clean fill and washing equipment and vehicles used in construction projects.
- Avoid driving equipment through undisturbed areas including off established road shoulders.

- Disturbed areas would be restored to natural contours, to the extent possible, to reduce the potential for erosion.
- Best management practices (BMPs) for drainage and sediment control would be implemented to prevent or reduce nonpoint source pollution and minimize soil loss and sedimentation in drainage areas. BMPs would be included in the project specifications, would be enforced by the construction manager, and would include all or some of the following actions, depending on site-specific requirements:
  - Inspect the site regularly during construction to ensure that erosion-control measures were properly installed and are functioning effectively.
  - Minimize soil erosion by limiting the time that soil is left exposed and by applying other erosion control measures, such as erosion matting, silt fencing, and sedimentation basins in construction or demolition areas to reduce erosion, surface scouring, and discharge to water bodies.
  - Standard dust abatement measures could include the following elements: water or otherwise stabilize soils, cover haul truck, employ speed limits on unpaved roads, cover cached soils with tarps, minimize vegetation clearing, and revegetate after construction or demolition.

NATURAL RESOURCES

- Do not drive construction equipment across flowing waterways.
- Continue consultation with the natural resources staff during design and construction phases of the project, to assure that the project has sufficient advice and guidance to avoid impacts on natural resources additional to those identified in the Assessment of Effect.
- As detailed in the special status species dismissal below, pursuant to the MOU (appendix B), mitigation measures would be implemented during construction, including time of year restrictions (construction must occur between October 1 and February 28), to avoid impacts to migratory birds that could occur within the project area.
- Construction vehicles and workers would utilize existing pullouts, side-roads, and other approved locations for parking and walking to minimize disturbance to vegetation.
- Replacement electrical system alignment would avoid and limit impacts to pinyon and Ponderosa pine trees, where feasible. Where trees must be removed to allow for construction activities, trees would be flush cut no more than 6-inches above adjacent grade. Juniper and pinyon trees would be lopped, and branches will be scattered across the disturbance footprint. Removed trees would be mulched, and mulch material would be distributed across the disturbance site. Downed Ponderosa pine trees may be shifted out of the project area to allow for construction activities. At the close of construction activities, trees would be relocated across the disturbance footprint.
- Monument staff or a contractor would conduct surveys for Mexican spotted owls following USFWS guidelines (USFWS, 1995). If one or more spotted owls are detected by the surveys within ¼ mile of the work area for the proposed road work, activities would not be allowed within owl habitat until after the breeding season which ends August 31 or until concurrence is obtained from USFWS. Previous owl surveys have shown an absence of owls in the project area.

- The amount of vegetative clearing during construction activities would be minimized in order to protect the soil cover and minimize erosion risks.
- Within the ecological restoration area, the existing slash material would be removed and stored prior to construction. Disturbed areas would be restored to natural contours to the extent possible to reduce the potential for erosion. Soils would be stabilized and regraded after construction. With guidance from monument staff, slash mulch material created from vegetation removed within the disturbance footprint would be placed or replaced to protect soils and promote revegetation. Where needed, revegetation with native species would use genetic stocks originating in the monument or from plants previously removed from the construction area whenever possible.

CULTURAL RESOURCES

- Protection of Cultural Resources. Coordination with NPS cultural resources staff during design and construction phases of the project would continue to assure that the project has sufficient advice and guidance to avoid adverse effect on cultural resources. Cultural resources team members would review and comment on design phase submittals to assure that all cultural resources are avoided. During the final design phase, if there is planned adverse effect on cultural resources, then consultation with the SHPO would be resumed to achieve a design with no adverse effect.
- Protection of Archeological Resources. Boundaries of archeological sites and other sensitive resource areas located within 10 feet of work and staging areas would be marked on the ground by installing temporary fencing to avoid inadvertent trespass. This may consist of lath, string and flagging tape (a very temporary type of boundary marking) or may consist of t-posts with orange plastic fencing (a more robust and visually apparent boundary marker). The placement of the fencing would be determined in conjunction with NPS archeologists.
- Protection of Archeological Resources. Ground disturbing activities would be monitored under the direction of the monument's archeologist during the entire duration of ground disturbing activity.
- Protection of Archeological Resources. If previously undiscovered archeological resources are uncovered during construction, all work in the immediate vicinity of the discovery would be halted until the resources could be identified and documented, and an appropriate mitigation strategy would be developed in consultation with the SHPO.
- Protection of Archeological Resources. In the event that human remains, funerary objects, sacred objects, or objects of cultural patrimony are rediscovered during construction, provisions outlined in the *Native American Graves Protection and Repatriation Act* (25 USC §3001) of 1990 would be followed.
- Protection of the Cultural Landscape. Where above-ground components are needed, placement would utilize existing native vegetation or be located below sight line or within swales to minimize visual impacts. Existing above ground electrical structures would be demolished or moved as determined appropriate.
- Protection of the Cultural Landscape. The alternatives evaluated in this EA would design new above ground components for compatibility with the natural setting, responding to the scale, color, texture, non-reflectivity and natural materials established by native trees and geology that

are character-defining elements of the landscape. Visual impacts to the historic district and cultural landscape would be mitigated by painting visible system components to match the adjacent soil and vegetation and using non-reflective surfaces where possible. The contractor would be required to complete before and after photographic documentation of the project area.

- Protection of CCC Masonry Gutters. A tunnel would be excavated under the historic CCC stone gutter where necessary to move electrical system across the road. During excavation and construction activity adjacent to CCC stone gutters, the gutters would be braced and covered to protect them from construction damage. The stone gutter would be left in-tact throughout the construction activities. An NPS cultural resource specialist would be present to monitor all construction work in the vicinity of the gutter to ensure that the gutter is not damaged. To protect from machinery damage, the contractor would be required to maintain a minimum of a two foot distance unless the cultural resource specialist makes allowances for certain activities.

VISITOR AND HUMAN SAFETY

- A traffic management plan would be developed to prevent traffic congestion in the canyon and ensure parking for buses and staff on the mesa. Traffic delays affecting employees in the staff housing areas would be kept below 30 minutes except for preapproved work after normal business hours.
- Generally accepted methods to protect public health and safety while providing for visitor use and experience include, but would not be limited to:
  - Notification to travelers about site closure would be posted at Visitors Center and Entrance Station.
  - The multiple environmental benefits of the proposed action would be explained to visitors to maximize public support and understanding.
  - Any potential for vehicle traffic congestion around the site could be mitigated by the use of a slower speed limit (and accompanying signage).

MONUMENT OPERATIONS HEALTH AND SAFETY

- Coordinate activities of contractors and monument staff to minimize disruption of monument activities. Inform construction workers and supervisors about special sensitivity of monument values and resources.
- Prior to construction, conduct a meeting with concessioners, project managers and monument staff to provide information on anticipated construction schedule.
- Share information regarding implementation of the project and its effects on the roads and with the public. Distribute or post information at entrance stations, on the monument’s website, at trailheads, and visitor sites.

- Implement measures to close and or redirect trails in areas that would be affected by construction to ensure visitor and monument staff health and safety. The only trail that would be closed as part of this project is the trail that brings staff from the staff parking area at the stables to the main administrative area. Provide information on alternatives that would help hikers have access to existing trails without interfering with the work area.
- Implement a traffic and pedestrian control plan for use during construction as warranted. Include strategies to maintain safe and efficient traffic flow. The plan would minimize disruption to visitors and monument operations and ensure safety of the public, monument employees, and residents.
- Monument will conduct all construction activities in accordance with its established safety protocols.
- Implementation of reasonable measures to minimize fugitive dust emissions, such as applying water to exposed surfaces or stockpiles of dirt or covering exposed soils with tarps would occur when windy and/or dry conditions promote problematic fugitive dust emissions.

ALTERNATIVES/ELEMENTS CONSIDERED BUT DISMISSED FROM FURTHER ANALYSIS

A number of alternatives or alternative elements considered during preliminary design were ultimately not included in the action alternatives presented above. Those items, and the reasons for their dismissal, are described below.

HDD TO THE SCENIC OVERLOOK

During the alternatives development, the NPS considered a bore hole, using HDD, between the scenic overlook off Entrance Road and the corral/stables area for installation of the replacement primary electrical systems. Though this alignment was the shortest HDD option considered at 1,590 linear feet, it would result in impacts on monument resources that would be similar in nature to, but of greater intensity than, those under alternative C. However, the staging area on the mesa (at the scenic overlook) could only be oriented in a way that would cause extensive impacts to natural resources and visitor use and experience. Due to the extensive level of impact, this element was considered but dismissed.

HDD TO HELISPOT

During the alternatives development, the NPS also considered a bore hole, using HDD, between the largely unused helispot and the corral/stables area for installation of the replacement primary electrical system. This would result in adverse impacts on monument resources that would be similar in nature to, but of greater intensity than, those under alternative C. However, HDD between the corral/stables area and the helispot was dismissed because of the additional geological risk associated with its longer drilling length of 4,860 feet. Additionally, this alignment would have been cost-prohibitive in that the associated

costs would exceed those available for electrical system improvement. Due to the level of impact, technological risk, and excessive cost, this element was considered but dismissed.

HDD TO MESA TOP SERVICE ROAD

The NPS also considered a bore hole, using HDD, between a service road west of the fire lookout tower and the corral/stables area for installation of the replacement primary electrical system. This alternative would have impacts on monument resources that would be similar in nature to, but of greater intensity than, those under alternative C. However, this alignment was dismissed due to the geological risk associated with its longer drilling length of 2,850 feet. Additionally, this alignment would have been cost-prohibitive in that the associated costs would exceed those available for electrical system improvement. Therefore, due to the level of impact, technological risk, and excessive cost, this element was considered but dismissed.

HDD FROM THE CORRAL/STABLES AREA TO THE POWERHOUSE

The NPS also considered HDD for routing the primary electrical system from the corral/stables staging area to the powerhouse. However, the canyon floor's soil is unconsolidated alluvium, which is not conducive to HDD. Specifically if HDD were used, there would be a risk of the hole collapsing in on itself, making the bore hole ineffective. Additionally, this element would have been cost-prohibitive in that the associated costs would exceed those available for electrical system improvement. Therefore, due to the feasibility and excessive cost, this element was considered but dismissed.

INSTALLATION OF SIX CONDUCTORS

During consideration of the alternatives for the replacement primary system, the NPS considered the installation of six conductors within the conduit. This would allow for one active system and one spare system. It was determined that only one spare conduit would be needed, and the six conductors would result in unnecessary redundancy. Therefore, this element was considered but dismissed.

SUMMARY OF THE ALTERNATIVES

Table 2 provides a summary of the alternatives presented above.

TABLE 2. SUMMARY OF ALTERNATIVES

Alternative Component	Alternative A: No Action	Alternative B: Trenching Option (NPS Preferred)	Alternative C: Horizontal Directional Drilling Option
Elements Common to All Action Alternatives			
	Not applicable.	• ownership of the primary electrical system would be transferred to LAPU; the secondary system would continue to be owned and maintained by the monument • relocation of one transformer in the Frijoles Canyon developed area, to move it out landward of the 100-year floodplain • trenching from LAPU entry point to Entrance Road • removal of existing overhead electrical lines • removal of existing electrical system-related infrastructure, including transformers, pullboxes, and meters • trenching to install new primary electrical system in Frijoles Canyon • new transformers along the length of the primary electrical system • the new primary electrical system would adhere to applicable code requirements • replacement of the secondary electrical system • voltage upgrades	Same as alternative B.

TABLE 2. SUMMARY OF ALTERNATIVES (CONTINUED)

Alternative Component	Alternative A: No Action	Alternative B: Trenching Option (NPS Preferred)	Alternative C: Horizontal Directional Drilling Option
Primary Electrical System Improvements			
Construction Methods	Current electrical systems would not be replaced. Repairs would be made, as needed, with open-cut trenching.	Trenching would be used to replace the primary system in the following segments: • approximately 520 feet between the entry point and fire lookout tower staging area • approximately 8,650 feet along Entrance Road • approximately 1,700 feet along Agoya Lane • approximately 1,375 feet from the stables area to the powerhouse • approximately 1,700 feet from the powerhouse to the visitor center	The primary system would be replaced in the following segments: • approximately 520 feet of trenching between the entry point and fire lookout tower staging area • HDD would be used for approximately 2,025 linear feet between the staging areas at the fire lookout tower and the corral/stables • approximately 1,700 feet of trenching along Agoya Lane • approximately 1,375 feet of trenching from the corral/stables area to the powerhouse • approximately 1,700 feet of trenching from the powerhouse to the visitor center
Construction Duration	Duration would depend on the nature of needed repairs but would likely be less than one week.	12 weeks	22 weeks

TABLE 2. SUMMARY OF ALTERNATIVES (CONTINUED)

Alternative Component	Alternative A: No Action	Alternative B: Trenching Option (NPS Preferred)	Alternative C: Horizontal Directional Drilling Option
Primary Electrical System Improvements			
Infrastructure	No changes to the existing electrical infrastructure, except where repairs are required to meet code. Existing infrastructure would be maintained, including: • 3 switchgears • 6 transformers • 1 three-phase system (three cables) Entrance Road would continue to be dug up, as needed, to locate and repair failures to the primary electrical system. Upon completion of the repairs, the disturbed portion of Entrance Road would be resurfaced.	The new primary electrical system would include the following infrastructure: • 15 pull boxes • 5 switchgears • 9 transformers • 1 three-phase system (three cables), with a fourth, spare cable Where possible, infrastructure would be masked, hidden, or installed at grade. The entire affected length of Entrance Road would be resurfaced (11,200 linear feet). It is anticipated that an approximately 4-foot deep, 18-inch wide trench would be required for implementation of alternative B.	The new primary electrical system would include the following infrastructure: • 4 pull boxes • 3 switchgears • 9 transformers • 2 three-phase systems (one active, one spare) • 2 at-grade vaults Where possible, infrastructure would be masked, hidden, or installed at grade. Approximately 1,375 linear feet of Entrance Road would be resurfaced between the corral/stables area and the powerhouse. An approximately 8-inch wide segment, in a 15-foot wide corridor of Entrance Road would also be disturbed to trench from the LAPU connection point to the fire lookout tower (i.e., where the trench crosses Entrance Road).
Opportunity for Expansion	None. The current electrical system provides 208/120 volts, a nonstandard feed.	The replacement primary system would provide the standard feed of 240/120 volts, which would adequately supply all foreseeable monument needs. An empty conduit would be installed concurrent to the replacement of the primary electrical system. This conduit could be used to support future needs for the monument, such as a replacement telecommunications system.	Same as alternative B.
Secondary Electrical System Improvements			
Infrastructure	As funding becomes available, minor improvements, such as repairing infrastructure, would be made to be compliant with NEC code.	All meters and disconnect panels would be replaced.	Same as alternative B.
Implementation and Life Cycle Costs	Implementation Cost: N/A Life Cycle Cost: Varies, based on nature of needed repairs.	Implementation Cost: $3,977,000 Life Cycle Cost: $4,114,400	Implementation Cost: $4,020,000 Life Cycle Cost: $4,298,700

As described in the "Purpose of and Need for Action" section of chapter 1, four objectives have been identified for this project. The action alternatives selected for analysis must broadly satisfy each of the objectives identified for the project. Table 3 provides a summary of how each alternative meets the project objectives.

TABLE 3. SUMMARY OF PROJECT OBJECTIVES

Project Objectives Criteria	Alternative A: No Action	Alternative B: Trenching Option (NPS Preferred)	Alternative C: Horizontal Directional Drilling Option
Improves reliability and serviceability of the monument's primary and secondary electrical systems?	No, would not meet objective. There would be no improvements to the monument's primary and secondary electrical systems; therefore, there would be no improvements to the reliability or serviceability of these systems.	Yes, would meet objective. The monument's primary and secondary electrical systems would be replaced to improve reliability. The new primary electrical system cables would be installed in conduit and equipped with switchgear and pullboxes that would sectionalize the primary electrical system to improve serviceability. Alternative B would include 5 switchgears and 15 pullboxes.	Yes, would meet objective. Same as alternative B, except alternative C would include 3 switchgear and 4 pullboxes.
Updates electrical infrastructure to meet National Electric Code and Safety requirements?	No, would not meet objective. The monument's primary electrical system would continue to require updates in order to comply with code requirements related to visitor and employee safety.	Yes, would meet objective. The monument's new primary and secondary electrical systems would be designed and installed to comply with applicable code and safety requirements including LAPU standards and National Electrical Code and Safety requirements.	Yes, would meet objective. Same as alternative B.
Maintains the aesthetic integrity of the monument surroundings, landscape, and architectural features?	No, would not meet objective. Existing electrical infrastructure, including overhead electrical lines in Frijoles Canyon, would continue to be visible on the landscape. The CCC-era Entrance Road would continue to be disturbed periodically to locate and repair failures in the monument's primary electrical system. These activities also could impact that the historic retaining wall, stone gutters, and guardrails along Entrance Road.	Yes, would meet objective. The existing overhead lines in Frijoles Canyon would be removed, reducing visual impacts in those areas. The installation of pullboxes along the new primary electrical system would prevent future roadwork and the associated potential for damage to the historic retaining wall, stone gutters, and guardrails. New above-ground infrastructure for the primary and secondary electrical systems would be minimally visible on the landscape.	Yes, would meet objective. Similar to alternative B, except the HDD segment of alternative C would require limited above-ground infrastructure and only one vault at each end. As such, this alternative would have less above-ground infrastructure than alternative B.

TABLE 3. SUMMARY OF PROJECT OBJECTIVES (CONTINUED)

Project Objectives Criteria	Alternative A: No Action	Alternative B: Trenching Option (NPS Preferred)	Alternative C: Horizontal Directional Drilling Option
Reduces potential threats to public health, monument structures, and natural and cultural resources?	No, would not meet objective. The monument's primary electrical system would not be improved and therefore would continue to be a threat to public health, monument structures, and natural and cultural resources. Stray voltage from direct buried and damaged primary and secondary electrical systems would continue to have the potential to charge buildings and natural features within the monument and a fire risk within the canyon.	Yes, would meet objective. The monument's primary and secondary electrical systems would be replaced, removing damaged components and reducing potential threats to public health, monument structures, and natural and cultural resources. Further, the new cables for the primary electrical system would be installed within conduit and would not have the potential to electrically charge buildings and natural features in the monument and/or serve as a fire hazard.	Yes, would meet objective. Same as alternative B.

SUMMARY OF ENVIRONMENTAL CONSEQUENCES

Table 4 provides a summary of the environmental consequences related to each alternative. A more detailed explanation of the impacts is presented in "Chapter 4: Environmental Consequences."

TABLE 4. SUMMARY OF ENVIRONMENTAL CONSEQUENCES

	Alternative A: No Action	Alternative B: Trenching Option (NPS Preferred Alternative)	Alternative C: HDD Option
Geology and Geohazards	No impacts on geology or geohazards. Future repairs to the existing primary electrical system would not impact geological resources and would not increase potential for land or slope instability Overall Impact: No impact Cumulative Impact: No cumulative impact	Impacts would be limited to soils within the monument and there would be no impact on bedrock or other geologic resources. Construction equipment and vehicles associated with trenching could cause vibration within the project area, but it is unlikely that this vibration would be great enough to increase the potential for geohazards. This is because the soils in the project area have a low erosion potential. Overall Impact: No impact Cumulative Impact: No cumulative impact	Adverse impacts on geologic resources would generally be related to the removal of solid materials associated with HDD. These impacts would likely be small and localized. However, due to the porous nature of tuff and instability that could result from boring through tuff, coupled with vibration from HDD and the steep gradients within the project area, alternative C could increase geohazard potential in the project area. Overall Impact: Long-term minor to moderate adverse Cumulative Impact: No cumulative impact

TABLE 4. SUMMARY OF ENVIRONMENTAL CONSEQUENCES (CONTINUED)

	Alternative A: No Action	Alternative B: Trenching Option (NPS Preferred Alternative)	Alternative C: HDD Option
Soils	Temporary disturbances to soils would occur during future repair of the primary electrical system. These soils are already disturbed and heavily compacted.	Temporary soil disturbance would result from trenching and the removal of existing infrastructure (e.g., overhead lines, equipment, etc.), the majority of which would occur in previously disturbed and highly compacted soils (beneath Entrance Road). Notable exceptions include a 200 linear foot trench between the LAPU connection point and Entrance Road. This segment would require temporarily disturbance of approximately 1,200 cubic feet of soils in the ecological restoration area. In addition, approximately 100 linear feet (600 cubic feet) of soil would be temporarily disturbed to route the primary electrical system between Entrance Road and the fire lookout tower access road.	Temporary soil disturbance would result from trenching, removal of existing infrastructure, and HDD procedures. Trenching and the removal of existing infrastructure would result in disturbance to previously disturbed and compacted soils. In addition to these temporary impacts, permanent displacement of approximately 2,000 cubic feet of soils would be required for installation of the proposed vaults, to be installed on either end of the HDD alignment. Like alternative B, this alternative would require temporarily disturbance of approximately 1,200 cubic feet of soils in the ecological restoration area and an additional 600 cubic feet in an undisturbed area between Entrance Road and the fire lookout tower.
	Temporary disturbances would occur to an unknown quantity of soil during future repair of the primary electrical system.	In total, alternative B would temporarily disturb 83,679 cubic feet of soil for installation of the primary electrical system and up to 52,500 square feet of soil for the secondary electrical system.	In total, alternative C would result in the temporary disturbance of 31,779 cubic feet of soil and the permanent displacement of 2,000 cubic feet of soil for the installation of the primary electrical system and up to 52,500 square feet of the soil for the secondary electrical system.
	Overall Impact: Short-term, negligible, adverse	Overall Impact: Short-term, minor adverse	Overall Impact: Short-term, minor adverse and long-term, minor adverse
	Cumulative Impact: Long-term, minor adverse and long-term, beneficial	Cumulative Impact: Long-term, minor adverse and long-term, beneficial	Cumulative Impact: Long-term, minor adverse and long-term, beneficial

TABLE 4. SUMMARY OF ENVIRONMENTAL CONSEQUENCES (CONTINUED)

	Alternative A: No Action	Alternative B: Trenching Option (NPS Preferred Alternative)	Alternative C: HDD Option
Vegetation	Some individual plants would be affected by continued repairs to the electrical system, as needed, particularly in the ecological restoration area and the Frijoles Canyon developed area. Overall Impact: Long-term, negligible adverse Cumulative Impact: Long-term, minor adverse and long-term, beneficial	A small portion of plant populations would be impacted by construction operations, particularly in the ecological restoration area, along Entrance Road, and within the Frijoles Canyon developed area. Some plants could be impacted along Entrance Road, but construction would primarily be within the existing roadway. Construction along Agoya Lane and in the Frijoles Canyon developed area would mostly occur in currently developed and paved areas and would result in few impacts on vegetation. Overall Impact: Long-term, minor adverse Cumulative Impact: Long-term, minor adverse and long-term, beneficial	A small portion of plant populations would be impacted by construction and drilling operations, particularly in the ecological restoration area and the Frijoles Canyon developed area. Vegetation would also be removed for installation of vaults. Same as alternative B. Overall Impact: Long-term, minor adverse Cumulative Impact: Long-term, minor adverse and long-term, beneficial

TABLE 4. SUMMARY OF ENVIRONMENTAL CONSEQUENCES (CONTINUED)

	Alternative A: No Action	Alternative B: Trenching Option (NPS Preferred Alternative)	Alternative C: HDD Option
Archeological Resources	Disturbances to Entrance Road would occur periodically as repairs are needed on the existing electrical system; however, upon completion of the repairs, the road would be restored. The overall impact on archeological resources would be barely measureable, and there would be no perceptible consequences to archeological resources. Further, the archeological site's information potential would not be compromised. Overall Impact: Long-term, negligible adverse Cumulative Impact: Long-term, minor adverse and long-term, beneficial	A number of adverse impacts could occur, but could be mitigated. The replacement electrical system would be sited, to the extent feasible, to minimize impacts to archeological resources. As such, it is anticipated that any impacts to archeological resources would be confined to small areas and would not result in the loss of the site's information potential. Overall Impact: Long-term, minor adverse Cumulative Impact: Long-term, minor adverse and long-term, beneficial	Similar to alternative B. However, if HDD results in disturbance to existing cavate pueblo structures in the immediate vicinity of the alignment, there could be a noticeable loss of that site's information potential. Mitigation efforts would prevent the loss of most or all of the site and its potential to yield information important in history/prehistory. Overall Impact: Long-term, minor to moderate adverse Cumulative Impact: Long-term, minor adverse and long-term, beneficial

TABLE 4. SUMMARY OF ENVIRONMENTAL CONSEQUENCES (CONTINUED)

	Alternative A: No Action	Alternative B: Trenching Option (NPS Preferred Alternative)	Alternative C: HDD Option
Cultural Landscapes	The existing electrical infrastructure would continue to be visible on the cultural landscape along Entrance Road and within the Frijoles Canyon developed area.	New electrical infrastructure would be visible along Entrance Road. Electrical infrastructure in the Frijoles Canyon developed area would be masked or hidden, where possible.	Same as alternative B
	The patched road surface of Entrance Road and visible electrical infrastructure would detract from cultural landscapes.	Entrance Road would be resurfaced and would have a uniform appearance.	Same as alternative B.
	Continued on-cut trenching and subsequent patching along Entrance Road would be required to repair continued failures in the monument's electrical system.	Spare conduit would minimize need for future road work and disturbance to Entrance Road.	Same as alternative B.
		Open-cut trenching along Entrance Road, during construction, would adversely impact cultural landscapes near the road in the short-term.	In the short-term, drilling operations would be apparent in Frijoles Canyon and on Frijoles Mesa but would minimize impact on cultural landscapes along Entrance Road.
	Overall Impact: Long-term, minor adverse	Overall Impact: Short-term, minor adverse; long-term, negligible adverse	Overall Impact: Short-term, minor adverse; long-term, negligible adverse
	Cumulative Impact: Long-term, minor adverse and long-term, beneficial	Cumulative Impact: Long-term minor adverse and long-term beneficial	Cumulative Impact: Long-term, minor adverse and long-term, beneficial

TABLE 4. SUMMARY OF ENVIRONMENTAL CONSEQUENCES (CONTINUED)

	Alternative A: No Action	Alternative B: Trenching Option (NPS Preferred Alternative)	Alternative C: HDD Option
Visitor Use and Experience	No changes to visitor use and experience.	Trenching along Entrance Road would temporarily reduce viewsheds within the monument and could temporarily affect access and circulation along Entrance Road and the Frijoles Canyon developed area. Upon completion, the current access and circulation routes would be restored.	Similar to alternative B, except both trenching and HDD would occur during construction. Noise associated with HDD would be greater than that associated with trenching and would be more noticeable to visitors.
	The existing overhead lines and deteriorating electrical equipment would continue to be visible on the landscape in the Bandelier CCC Historic District/National Historic Landmark, reducing viewsheds in this area.	Although the existing overhead lines and deteriorating equipment would be removed, new infrastructure would be installed above grade, which would detract from viewsheds, especially within the Bandelier CCC Historic District/National Historic Landmark. The visual impact would be reduced compared to the no action alternative.	Same as alternative B.
	System failures would lead to fewer visitor services and amenities, during the failures.	A reliable, easily serviceable electrical system would provide consistent visitor use of monument services.	Same as alternative B.
	Efforts to repair the monument's electrical system would require temporary access and circulation adjustments to allow for "thumping" to locate the source of the failure and open-cut trenching along Entrance Road to make the repair.	Although future failures would be less likely than under the no action, any repair or maintenance would require work along Entrance Road which could temporarily affect access and circulation.	Future failures are less likely to impact visitors' ability to enter/exit the monument than alternative B because much of the primary electrical system would avoid visitor areas.
	Overall Impact: Short-term, moderate adverse	Overall Impact: Short-term, moderate adverse and long-term beneficial	Overall Impact: Short-term, moderate adverse and long-term beneficial
	Cumulative Impact: Long-term, beneficial	Cumulative Impact: Long-term, beneficial	Cumulative Impact: Long-term, beneficial

TABLE 4. SUMMARY OF ENVIRONMENTAL CONSEQUENCES (CONTINUED)

	Alternative A: No Action	Alternative B: Trenching Option (NPS Preferred Alternative)	Alternative C: HDD Option
Monument Operations and Infrastructure	As failures continue in the monument's primary electrical system, "thumping" and open-cut trenching to locate and repair the system would temporarily reduce ease of entering/exiting Frijoles Canyon.	Trenching operations within Entrance Road would reduce ease of entering/exiting Frijoles Canyon in the short-term. Staff, particularly those who reside within the canyon, would be exposed to prolonged construction noise during construction.	Similar to alternative B except the majority of construction would occur in the canyon under this alternative.
	System failures would lead to interruption in operations, some inability to perform typical tasks, and repair costs.	New electrical infrastructure would make the primary system easier to service and would make secondary system metering and billing simpler.	Same as alternative B.
	There would be no change to monument operations and infrastructure. Continued failures in the monument's primary electrical system would temporarily interrupt monument operations and incur substantial costs.	A reliable, easily serviceable electrical system would provide consistent visitor use of monument services. Future failures would result in no more than one day without the primary system. Standard power supply would be more compatible with monument appliances.	Same as alternative B
	Overall Impact: Short-term, moderate adverse	Overall Impact: Short-term, minor adverse and long-term beneficial	Overall Impact: Short-term, minor adverse and long-term beneficial
	Cumulative Impact: Long-term, beneficial	Cumulative Impact: Long-term, beneficial	Cumulative Impact: Long-term, beneficial

ENVIRONMENTALLY PREFERABLE ALTERNATIVE

In accordance with the Director's Order 12 Handbook (NPS 2001), the NPS identifies the environmentally preferable alternative in its NEPA documents for public review and comment (Sect. 4.5 E[9]). The environmentally preferable alternative is the alternative that causes the least damage to the biological and physical environment and best protects, preserves, and enhances historical, cultural, and natural resources. The environmentally preferable alternative is identified upon consideration and weighing by the Responsible Official of long-term environmental impacts against short-term impacts in evaluating what is the best protection of these resources. In some situations, such as when different alternatives impact different resources to different degrees, there may be more than one environmentally preferable alternative (43 CFR 46.30).

Based on the analysis of environmental consequences of each alternative presented in "Chapter 4: Environmental Consequences" and summarized in table 4 above, alternative A (the no action alternative) is the environmentally preferable alternative. Although the action alternatives would improve monument operations and infrastructure, these improvements would require adverse impacts to geology and geohazards, soils, vegetation, archeological resources, and cultural landscapes. The no action alternative would not involve new construction or any other development that could disturb existing natural and cultural resources. Implementation of each of the action alternatives would include some level of construction and the related disturbance to natural and/or cultural resources, including trenching, the use of HDD through bedrock, and the installation of pull boxes and other electrical equipment that would be visible within the cultural landscape. As such, the no action alternative is the environmentally preferable alternative. However, the no action alternative does not meet the purpose and need for this project and, as described below, alternative B has been identified as the NPS Preferred Alternative.

NPS PREFERRED ALTERNATIVE

Alternative B was identified as the NPS Preferred Alternative because it best meets the project's goals, objectives, and the purpose and need for action. This alternative scored the highest during the Choosing by Advantages/Value Analysis (CBA/VA) workshop conducted at the monument on December 3 and 4, 2013. Alternative B best protects and preserves the natural and cultural resources of the monument while providing a reliable electrical system that LAPU is readily equipped to repair. Alternative A, although the environmentally preferable alternative, would not meet the project's need. Alternative C would provide a reliable electrical system, but the HDD process would cause more adverse impacts to previously undisturbed areas, particularly geological resources and vegetation, than alternative B. Alternative B would also pose less risk of geohazards, such a landslides. Further, alternative B would pose less risk for construction because there would be less potential for encountering unknown conditions. This alternative also would have lower costs (both initial and life cycle) than alternative C, so would be more cost effective for the monument over time. Alternative B also poses less risk because it would be installed in the approximate location of the existing electrical system, which is approximately 3 feet wide and 11,500 linear feet in length along Entrance Road between the LAPU entry point and the powerhouse. Furthermore, the conditions along the electrical corridor are known. Therefore, alternative B has been identified as the NPS Preferred Alternative.

This page intentionally left blank.

3

AFFECTED ENVIRONMENT

The "Affected Environment" chapter describes the project area environment and the existing conditions for those elements of the natural, cultural, and social environment that could be affected by the implementation of the actions considered in this environmental assessment. Impacts for these impact topics are analyzed in "Chapter 4: Environmental Consequences."

GEOLOGY AND GEOHAZARDS

The entire project area is within the Bandelier Tuff geologic formation (NMGBM 2003). This formation is characterized by light gray to buff-colored tuff (Griggs 1964). The Bandelier Tuff formed as a result of the eruption of a former super volcano (now the Valles Caldera), and was later sculpted by the eruption of the Cerro Grande volcano. The project area is more specifically situated within the Parajito Plateau, the eastern fan of the Bandelier Tuff, which occurs along the east flank of the Jemez Mountains and slopes southeast toward the Rio Grande. The plateau is derived from ancient volcanic tuff, basalt, and pumice deposits and layers shaped by the geophysical processes of alluvium, colluvium, and eolian deposition to form undulating mesas with branching drainage patterns and steeply sloped, deeply incised canyons (NPS 2011b).

Frijoles Canyon and its neighboring canyons are the products primarily of water erosion, etched into a one-time smooth slope of volcanic deposits. Many of the sheer canyon walls provide good cross sections of the lava and ash deposits exposed in cliffs several hundred feet high. These cross sections reveal at their base a flow of lava or basalt, overlain by hundreds of vertical feet of Bandelier Tuff, and capped by another flow of lava forming the rim rock of the mesa top. More specifically, in ascending order, the geologic formations that make up Frijole Canyon include mafic lava flows of the Cerros del Rio volcanic field; Bandelier Tuff; followed by a second layer of Bandelier Tuff (Goff, Gardner, and Reneau 2002).

The mafic lava flow (*Cerros del Rio Volcanic Field)* dates to the Pliocene Period and is characterized by undivided flows, dikes, and associated cinder deposits of basalt, hawaiite, and mugearite from Cerros del Rio volcanic field best exposed east of the Rio Grande (Dunker et al. 1991). The first Bandelier Tuff formation (*Tewa Group* Bandelier Tuff, Otowi Member) from the Quaternary period is white to pale pink in color, comprising generally poorly welded rhyolitic ash-flow tuff. The top Bandelier Tuff *(Tewa Group*

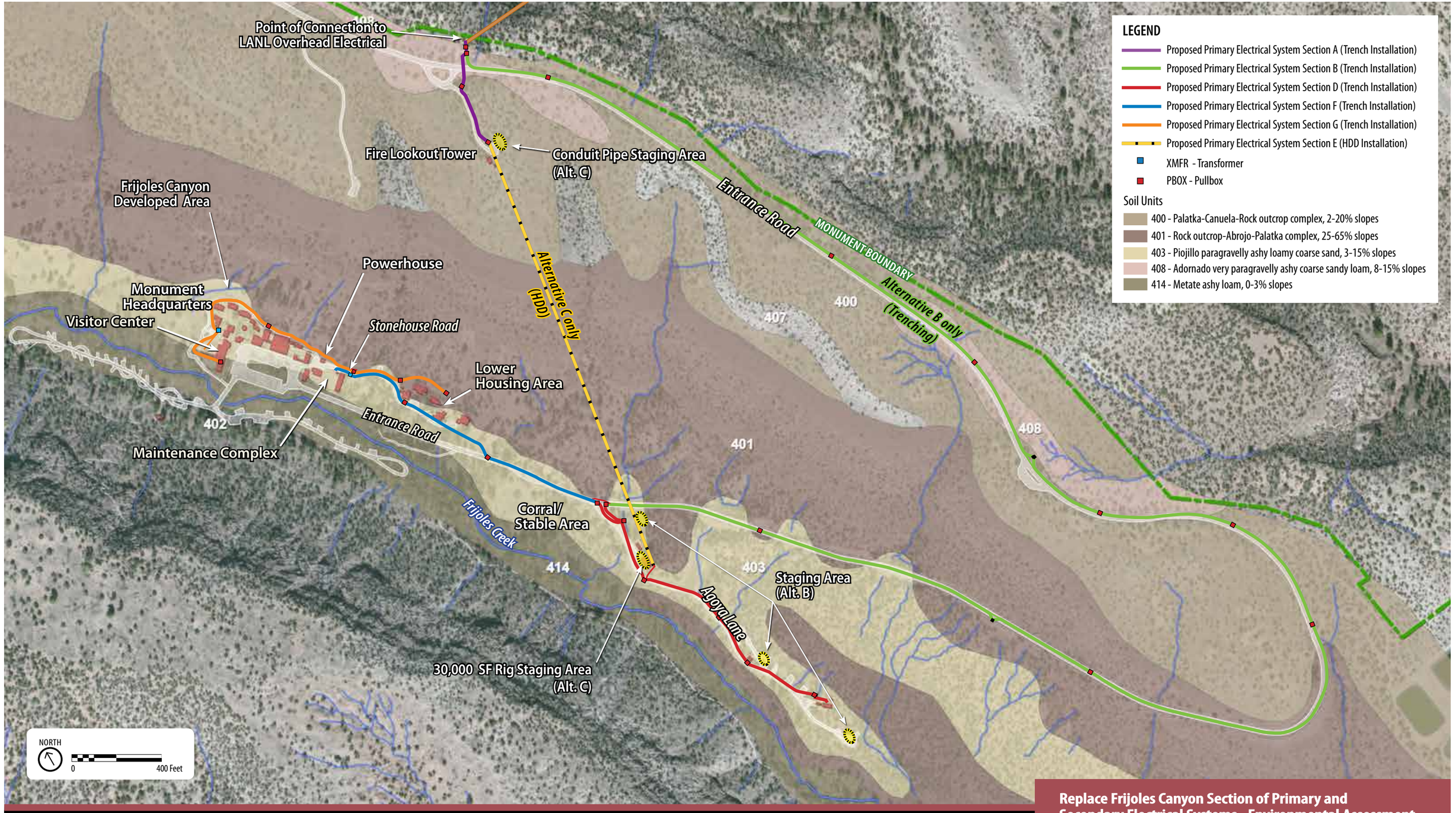
Bandelier Tuff, Tshirege Member), also from the Quaternary Period is a white to orange to pink formation welded to non-welded rhyolitic ash-flow tuff. This formation forms conspicuous orange to pink cliffs throughout the Pajarito Plateau (Reneau and Dethier 1996; Reneau 2000).

On an area scale, geohazards near the project area consist of faults that have and are occurring due to subsidence. Although not physically located within the project area, the unnamed faults of the Jemez Mountains are characterized as the structural walls of Quaternary calderas, possible collapse features (gravitationally driven slumps) that are on the margins of the calderas, and intracaldera faults that are associated with volcanic domes constructed during resurgence of the caldera floors. No detailed paleoseismic studies have been conducted on any of these faults, although most research has concentrated on the timing, petrography, geochemistry, and volcanic processes involved in the caldera eruptions. Along with the faults, steep slopes and drainage into Frijoles Canyon present geohazards. Erosion of the slopes and within the drainage channels by natural processes (i.e., water and eolian effects) creates the natural slide of rock materials creating talus piles at the base of the canyon. These talus piles have formed over many years and based on the parent material may create either stable or unstable sloped areas. Therefore, geohazards associated with the talus areas at the base of the canyon include shifting and subsidence, while the steep slopes and drainage fissures present a constant and active hazard of potential removal of soil/rock material that can expose or undermine the project.

The project area would affect the north side of the canyon, which contains gentle to moderate slopes of the surficial soils and steep slopes of bedrock. The primary surficial soils in the project area are noted in the following section of this EA and depicted on figure 5. The slopes associated with soils present in the project area range from 0 to 65%, indicative of the steep slopes that occur within the project area. However, as summarized in table 5, the soils within the project area as classified as having a generally low potential for erosion.

SOILS

The NRCS recently completed a soil survey for the monument and identified 39 soil mapping units, organized into groups based on landscape position (e.g., mesa tops, plateaus, backslope, etc.). Soils found on the Frijoles Mesa are grouped into soils of the plateaus and mesas (NRCS 2009). These soils are derived from colluvium, slope alluvium, or eolian-deposited parent materials over rhyolitic Bandelier Tuff residuum. Most of the mesa soils are identified by deeper subsoils with better developed, coarse surface horizons (sandy and gravelly loams). The soils in the project area fall into one of five general categories. Table 5 provides a summary of the dominant soil type within the project area, including the general location of each and the associated slopes and erosion index classification. The erosion index is a numerical expression of the potential of a soil to erode, considering the physical and chemical properties of the soil and climatic conditions where it is located.



Replace Frijoles Canyon Section of Primary and Secondary Electrical Systems - Environmental Assessment

National Park Service
U.S. Department of the Interior

Bandelier National Monument

FIGURE 5
Soils Map

This page intentionally left blank

The higher the index, the greater the investment needed to maintain the sustainability of the soil resource base if intensively cropped. Erosion index scores of 8 or higher are equated to highly erodible land.

The specific location of each soil type, including the percentage of the study area within each type, is included in table 5. The location of each soil type is depicted on figure 5. Additional details about each of these soil types are provided after the table.

TABLE 5. SOIL TYPES WITHIN THE PROJECT AREA

Soil Unit	Slopes (Percent)	Erosion Index Classification	Location*	Percent of Project Area (estimated)**
Adornado very paragravelly ashy coarse loam	8 to15	Class 1 – low potential for erosion	Primary electrical system (A, B) – At the entry point, along Entrance Road near the entry point, and along Entrance Road north of the scenic overlook.	8% (primary system study area only)
Palatka-Canuela-Rock outcrop complex	2 to 20	Class 1 – low potential for erosion	Primary electrical system (A, B, E) – In the vicinity of the fire lookout tower and along Entrance Road from east of the fire lookout tower to the hairpin turn in Entrance Road.	36% (primary system study area only)
Rock outcrop-Abrojo-Palatka complex	25 to 65	Class 1 – low potential for erosion	Primary electrical system (B, E) – Along Entrance Road from the hair pin turn to above the intersection with Agoya Lane.	35% (primary system study area only)
Piojillo paragravelly ashy loamy coarse sand	3 to 15	Class 2 – low to moderate potential for erosion	Primary electrical system (B, C, D, E, F, G) and secondary electrical system – Along Agoya Lane, including the corral/stables area and intermittently along Entrance Road east of the intersection with Agoya Lane.	20% of primary system study area 97% of secondary system study area
Metate ashy loam	0 to 3	None – minimal potential for erosion	Primary electrical system (G) and secondary electrical system – Adjacent to Frijoles Creek near the visitor center, including beneath the main parking lot.	1% of primary system study area 3% of secondary study area

Source: NRCS 2009

*Primary Electrical System Study Areas (see figure 5 for details)

**Percentages are based on estimated square footage within each of the soil types. The total area for the primary electrical system study area is 209,550 square feet. The total area for the secondary electrical system study area is 52,500 square feet. These square footages are for potential long-term impacts; therefore, the location of proposed staging areas has not been factored into the total square footage for the primary electrical system study area.

ADORNADO VERY PARAGRAVELLY ASHY COARSE SANDY LOAM

In addition to the location identified in table 5, the Adornado soil also occurs near the project area, in the general vicinity of the Juniper Campground parking area and the existing maintenance yard/treatment ponds where this soil type transitions to the Palatka-Canuela-Rock outcrop complex. Approximately 35% of the surface is covered with pumice fragments while the remaining soil contains the ashy coarse sandy loam to a depth of approximately 72 to 78 inches.

PALATKA-CANUELA-ROCK OUTCROP COMPLEX

This soil type is a mosaic of the Palatka ashy coarse sandy loam (15%), Canuela paragravelly sandy loam, and rock outcrop (20%) commonly found on plateaus and mesas developed from weathered residuum from rhyolitic tuff. This soil is a shallow, well drained sandy loam soil, with bedrock occurring at 6 to 25 inches.

ROCK OUTCROP-ABROJO-PALATKA COMPLEX

This soil type is a mosaic of rock outcrop (40%), the Abrojo cobbly ashy loamy coarse sand (30%), the Palatka paracobbly ashy coarse sandy loam (20%), and contrasting inclusions of Canuela soil and Piojillo soil and is commonly found on plateaus and mesas developed from weathered residuum from rhyolitic tuff. This soil varies from very shallow to very deep and is a somewhat excessively drained ashy loamy coarse sand soil, with bedrock occurring at 7 to 17 inches in the very shallow areas and more than 80 inches in the very deep areas.

PIOJILLO PARAGRAVELLY ASHY LOAMY COARSE SAND

This soil type is a very deep soil derived from slope alluvium with rapid permeability. With its moderate slopes, this soil type has the highest potential for erosion within the project area. Although the Palatka-Canuela-Rock Outcrop Complex and Rock Outcrop-Abrojo-Palatka Complex have higher slopes they have less potential for soil erosion because they are primarily composed of rock outcrops. Similarly, the paragravelly nature of the Adornado complex makes it less susceptible to erosion than the coarse sands characteristic of the Piojillo complex.

METATE ASHY LOAM

The Metate ashy loam is a very deep, somewhat poorly drained soil that occurs on floodplains along valley floors commonly vegetated with black willow, box elder, and narrowleaf cottonwood. The surface is covered with 5% gravel while the remaining soil surface is an ashy loam. The Metate soil type is susceptible to flooding and commonly maintains a seasonal high water table at 24 to 42 inches below the surface.

VEGETATION

Using the National Vegetation Classification (NVC) system, an inventory of the vegetative communities in the monument was conducted in 2011 (Comer et al. 2003; NPS 2011b). Community types at the monument vary with elevation, geologic formations, topography, and soils diversity, all of which introduce a wide variety of ecosystem and vegetation mosaics throughout the landscape.

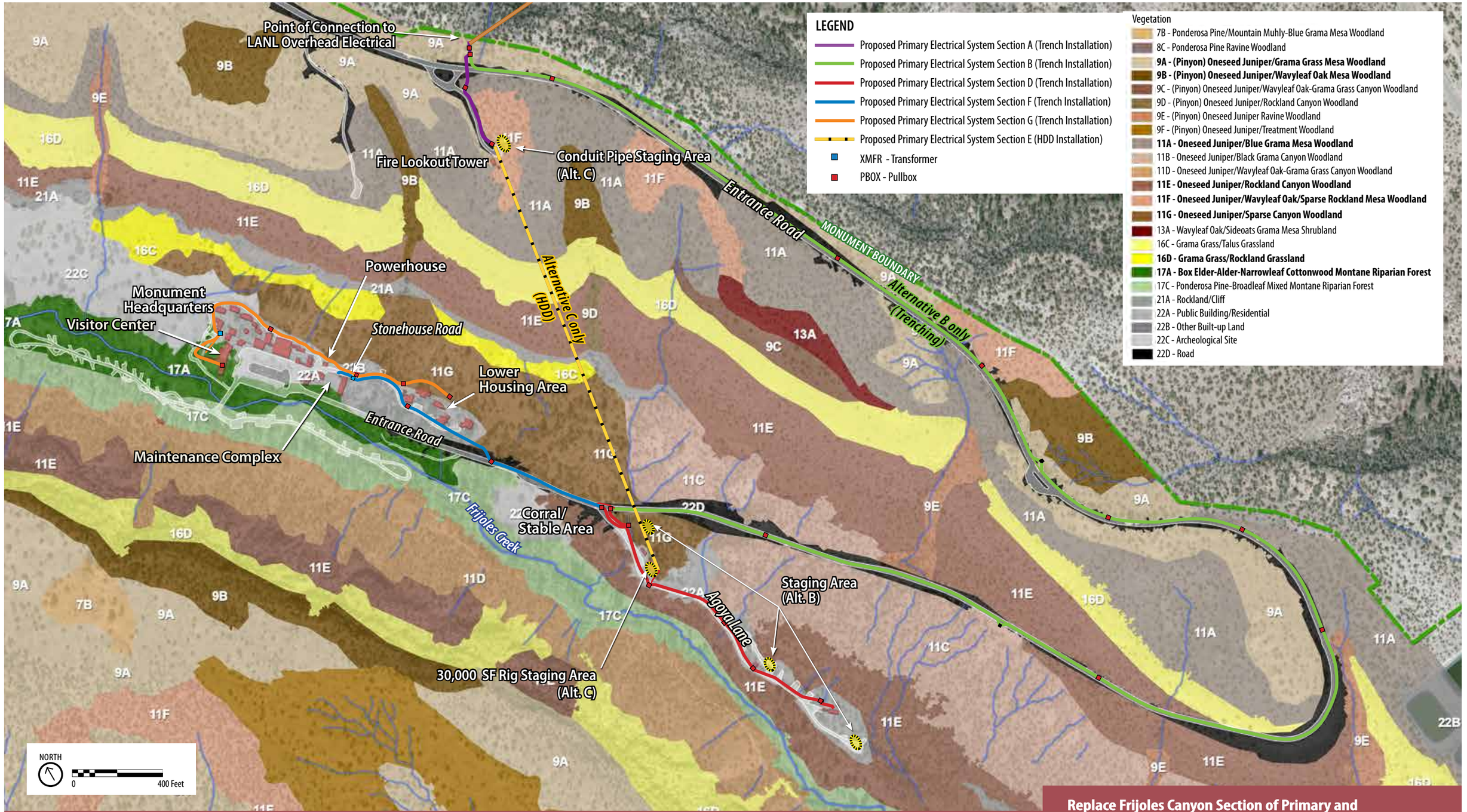
Approximately 720 species of plants occur within the monument, 20% of which are exotic or invasive species (NPS 1995b). In general, the climate and well-drained soils found in the monument make for an arid, harsh environment that influences the floral composition. Evergreens that can sustain such conditions occupy the mesas, while the canyon stream bottoms provide a higher level of species richness with a mixture of evergreens and deciduous species.

Vegetative communities within the study area are classified into four groups:

- *Southern Rocky Mountain Pinyon-Juniper Woodland* – This vegetative group is the second most dominant in the project area (after the Southern Rocky Mountain Juniper Woodland and Savanna group). Historically, this group dominated the monument's mesas and foothills, but because of an extreme drought in 2002 and 2003, the pinon pine (*Pinus edulis*) population almost entirely died off, making the oneseed juniper (*Juniperus monosperma*) the dominant species. The pinon pine is recovering slowly as is typical for the area, and sparse seedlings and saplings are present in mid to upper elevation stands. The dominance of oneseed juniper is more characteristic of the Southern Rocky Mountain Juniper Woodland and Savanna, described below (NPS 2011b).
- *Southern Rocky Mountain Juniper Woodland and Savanna* – This vegetative group is the most dominant in the project area. The savanna associations of the Southern Rocky Mountain Juniper Woodland and Savanna are found on undulating mesa tops and are characterized by open to very open canopies of oneseed juniper (10% to 60%) and grassy intercanopy spaces (5% to 50%) typically made up of blue grama (*Bouteloua gracilis*), black grama (*Bouteloua eriopoda*), and/or sideoats grama (*Bouteloua curtipendula*). The woodland associations of this vegetation group are found on steep slopes and on rocky or shallow mesa-top soils and are characterized by dominant shrub cover (up to 50%) of oneseed juniper and wavyleaf oak (*Quercus* x*pauciloba*) (NPS 2011b).
- *Southwest Plains-Mesa Grassland* – This vegetative group is dominated by short to medium-tall bunch grasses occuring at elevations ranging from 5,400 feet and 7,500 feet above mean sea level. This group exists only in a small part of the project area along the canyon wall and adjacent to of the east of Entrance Road, just below the hairpin turn. This area is sparsely vegetated with black grama and/or sideoats grama or is exposed boulder/rockland (NPS 2011b).

- *Rocky Mountain Subalpine-Montane Riparian Forest and Woodland* – This vegetative group is characterized by riparian forests at mid to lower elevations along perennial stream reaches or ephemeral reaches with near-surface ground water, and is typically dominated by broadleaf deciduous trees such as box elder, narrowleaf cottonwood, or Arizona alder (NPS 2011b). Small trees and tall shrubs found in this group include Goodding's willow, thinleaf alder, common chokecherry, bluestem willow, New Mexico olive, and coyote willow. Herbaceous vegetation of the Rocky Mountain Subalpine Montane Riparian Forest and Woodland include facultative and obligate wetland species such as smooth horsetail, common spikerush, Franciscan bluebells, spotted water hemlock, stinging nettle, and hairy willowherb.

The distribution of vegetative communities, including the approximately percentage of each within the study areas, is described in table 6. The location of each vegetation type is depicted on figure 6. Much of the study area occurs within the footprint of Entrance Road or otherwise developed areas and would have limited to no impact on vegetation. Further, the study area through the canyon wall (section "E" on figure 4a), would only impact the surface (i.e. vegetation) at its endpoints near the fire lookout tower and corral/stable area. The percentages provided in the following table include only those portions of the study area that would occur on the surface, outside of exitsing paved areaa. It is estimated that approximately 92% of the study area would be over existing paved surfaces.



Replace Frijoles Canyon Section of Primary and Secondary Electrical Systems - Environmental Assessment

National Park Service
U.S. Department of the Interior

Bandelier National Monument

FIGURE 6
Vegetation Map

This page intentionally left blank

TABLE 6. VEGETATION DISTRIBUTION WITHIN THE PROJECT AREA

Vegetation Classification	Subclassification	General Location In Project Area*	Percent of Project Area
Southern Rocky Mountain Pinon	(Pinon) Oneseed Juniper/Grama Grass Mesa Woodland (9A)	• At the connection point to the LAPU electrical system (A) • Surrounding Along the western side of the fire lookout tower access road (A) • Widespread along Entrance Road at elevations above the hairpin turn (B)	2% (primary system study area only)
	(Pinon) Oneseed Juniper/Wavyleaf Oak Mesa Woodland (9B)	• Small area north and east of Entrance Road near scenic overlook (B)	No measureable percentage of the primary system study area and not within the secondary system study area.
Southern Rocky Mountain Juniper Woodland and Savanna	Oneseed Juniper/Blue Grama Mesa Woodland (11A)	• Between Entrance Road and the fire lookout tower access road (A) • Widespread along Entrance Road (mostly between the LANL point of connection and the hairpin turn) (B)	1% (primary system study area only)
	Oneseed Juniper/Sparse Canyon Woodland (11G)	• Widespread along the east side of Entrance Road at the canyon bottom • Along the eastern side of the Frijoles Canyon developed area (F, G and secondary system study area)	3% of primary system study area 5% of secondary system study area***
	Oneseed Juniper/Rockland Canyon Woodland (11E)	• Relatively small area along both sides of Entrance Road just after the hairpin turn, extending to Agoya Lane (B)	No measureable percentage of the primary system study area and not within the secondary system study area.
	Oneseed Juniper/Wavyleaf Oak/Sparse Rockland Mesa Woodland (11F)	• Near the fire lookout tower, along the east and south sides of the fire lookout tower access road (A) • Along the eastern side of Entrance Road, above the hairpin turn (B)	No measureable percentage of the primary system study area and not within the secondary system study area.
Southwest Plains-Mesa Grassland	Grama Grass/Rockland Grassland (16D)	• Small area on the east side of Entrance Road toward the end of the hairpin turn (B)	No measureable percentage of the primary system study area and not within the secondary system study area.

TABLE 6. VEGETATION DISTRIBUTION WITHIN THE PROJECT AREA (CONTINUED)

Vegetation Classification	Subclassification	General Location In Project Area*	Percent of Project Area
Rocky Mountain Subalpine-Montane Riparian Forest and Woodland	Box Elder-Alder-Narrowleaf Cottonwood Montane Riparian Forest(17A)	• In the Frijoles Canyon developed area, along the west side of Entrance Road, adjacent to Frijoles Creek, extending north of the developed area (G and secondary system study area)	2% of primary system study area 5% of secondary system study area***

*Primary Electrical System Study Areas (see figure 6 for details):

**Percentages are based on estimated square footage within each of the soil types. The total area for the primary electrical system study area is 209,550 square feet. The total area for the secondary electrical system study area is 52,500 square feet. These square footages are for potential long-term impacts; therefore, the location of proposed staging areas has not been factored into the total square footage for the primary electrical system study area.

***The majority (approximately 90%) of the study area for the secondary electrical system is within currently developed areas, identified on figure 6 as "Public Building Residential." No disturbance to vegetation is anticipated in these areas.

In addition to the vegetative communities described above, the monument has established an ecological restoration area totaling approximately 4,000 acres on the mesa top, a portion of which overlaps the project area. The ecological restoration area has been designated to re-establish healthy, sustainable vegetative conditions within the pinon-juniper woodland and to mitigate accelerated soil erosion that threatens the cultural resources. Before the creation of the monument, the mesa top was used for agricultural purposes which resulted in accelerated rate of soil erosion. Without management intervention to actively restore the herbaceous understory and stabilize soils in degraded woodland communities, an estimated 1,900 archeological sites are considered at risk of damage or loss from erosion (NPS 2007). Parts of the project area, including the area surrounding the entry point, are within the ecological restoration area and are subject to specific mitigation measures, as outlined in "Chapter 2: Alternatives."

ARCHEOLOGICAL RESOURCES

The archeological resources of the monument are iconic, diverse, and numerous, spanning the full range of human occupation and use of New Mexico's Pajarito Plateau from Paleoindian times (approximately 12,000 years ago) to the post-World War II era, and numbering in the thousands. Their identification, study, and need for protection led to the establishment of the monument in 1916, but have also provided a basis for one of the most important regional foundations for the development of method and theory in American archeology.

Archeological resources preserved at the monument include cultural manifestations traditionally recorded as "sites"—that is, occurrences of artifacts and/or features in a concentrated, definable area—as well as "isolated occurrences" of cultural material located outside of site boundaries. Archeological sites at the monument include both PreColumbian and historic resources, and consist of artifact scatters (perhaps representing locations where stone tools were manufactured, or where historic visitors camped) as well as the remains of individual features, small structures, or even Ancestral Puebloan villages. Some traditional cultural properties identified by descendant populations are recorded as archeological sites. With the monument's archeological inventory approximately 78% complete as of 2010 when an effort was initiated to finish the survey, some 2,879 sites had been recorded and it is estimated that another 200 are

likely present (NPS 2014a). Isolated occurrences recorded at the monument range from finds of artifacts such as ground stone tools (such as manos or metates) or projectile points to historic tin cans and bottles. Archeological sites are usually evaluated for their eligibility in the National Register when they are identified and recorded. Isolated occurrences are generally not considered "eligible" to the National Register, but basic information (e.g., artifact and material type, location) is typically recorded when they are encountered on survey. Their distribution can provide useful data for a variety of archeological and cultural landscape inquiries. The entire project area has been surveyed and inventoried for cultural resources and a number of archeological sites (in addition to other cultural resources) that could be impacted by the various alternatives have been identified. Table 7, below, provides a list of the known archeological sites in the project area.

TABLE 7. ARCHEOLOGICAL SITES IN THE PROJECT AREA

Site Type	Site Type
Pueblo structure (masonry roomblock, 2 features present) w/associated artifact scatter (ceramics)	Small pueblo structure (12 rooms estimated) w/associated artifact scatter
Pueblo structures (2 masonry roomblocks, a plaza, and a kiva present) and associated artifact scatter (ceramics and lithics); aka "Rainbow House" or "Kastiatse"	Primary component is a CCC camp with an associated historic artifact scatter; a dispersed PreColumbian artifact scatter is also present
Pueblo structure (masonry roomblock, 1 feature present) w/associated artifact scatter (ceramics)	No features are present
Pueblo structure (10 rooms and one kiva estimated) and associated artifact scatter (ceramics and lithics); aka "Saltbush Pueblo"	Terrace-like soil control structure and an associated artifact scatter (ceramics and lithics); historic and/or PreColumbian use is indicated
Group of cavate pueblo structures ("Group M") and associated downslope artifact scatter	Ancestral Puebloan trail; also used in the historic period
Artifact scatter (lithics only)	CCC-era features, including Entrance Road and associated features (masonry gutters, culvert headwalls, and walls), constructed by the CCC 1933–1939
Small structure (one room) w/associated artifact scatter	A metal directional sign nailed to tree
Artifact scatter (ceramics and lithics)	A historic feature aka the "Inca Wall;" consisting of a stone platform constructed with large tuff boulders, presumably by the CCC
A ditch and berm complex dating to the CCC-era. Appears to have been created to divert surface run-off to side canyons	Burial site

Archeological sites typically recorded as habitation sites—especially "pueblos" and "field houses"—characteristic of the later phases of Ancestral Puebloan cultural tradition first drew the attention of the world to the archeological record of the Pajarito Plateau, and comprise a substantial element of the cultural resources preserved at the monument. On the Pajarito, occupational sites include a type of structural adaptation found in only a few places in the Southwest, and the world. These are "cavates," literally, habitation/use areas hollowed out of the sheer tuff cliffs that comprise a major geologic component of the Pajarito Plateau. Cavate rooms are often found in direct association with surface architectural constructions (pueblos), providing chambers in which storage, sleeping, and daily living activities occurred; evidence for ceremonial activity has also been recorded in some cavates. Cavates are

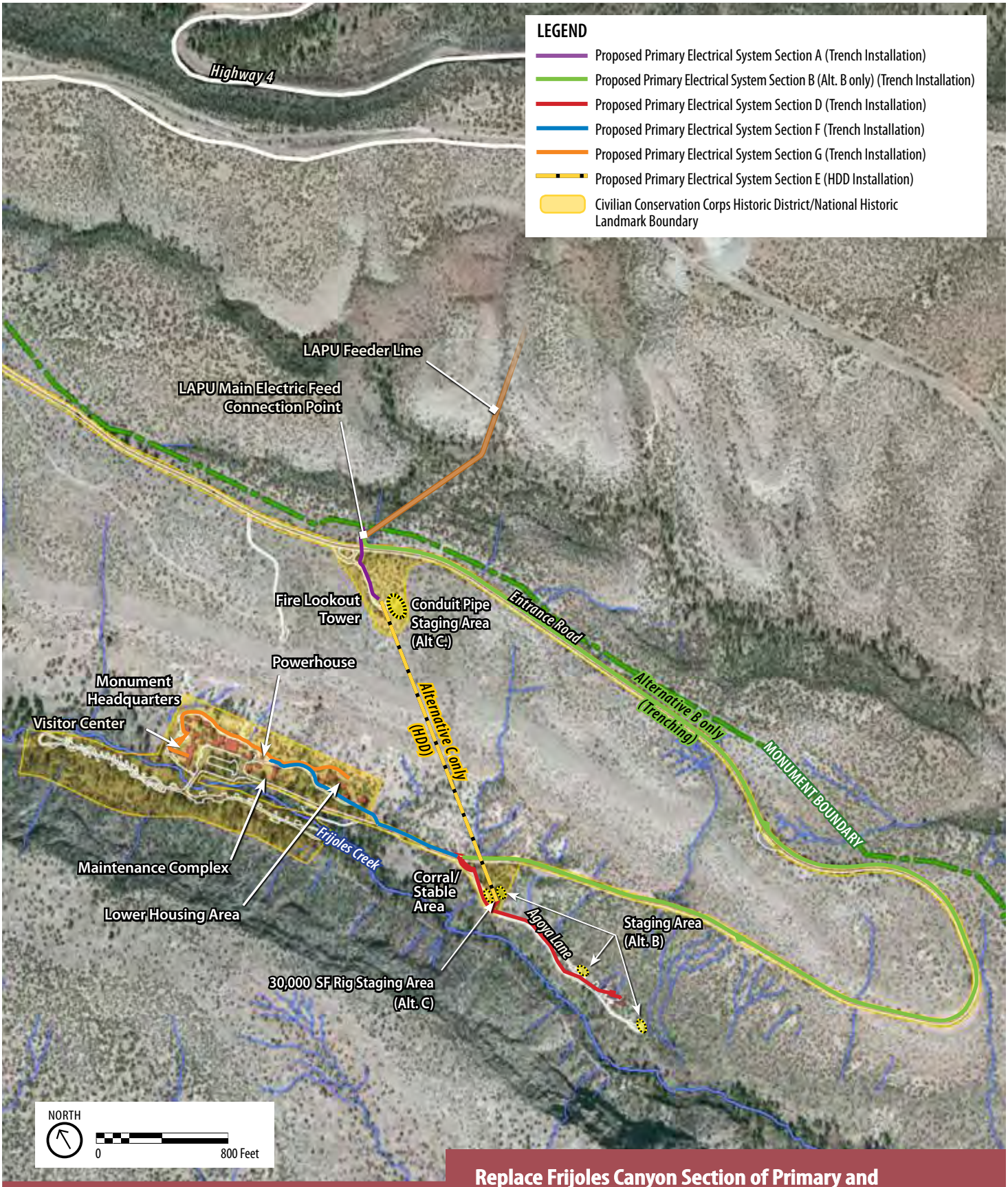
considered to be different from the "alcoves" known for cliff dwellings documented in the Greater Southwest (and elsewhere) in that they have been hollowed into the friable volcanic rock by human hands rather than the natural processes of erosion. Literally thousands of cavates have been recorded on the Pajarito Plateau, along the eastern slope of the Jemez Caldera from Tsiping (in the north) to Cochiti Pueblo (in the south). Cavates are found throughout the monument wherever the conditions favor them, but are particularly concentrated in Frijoles Canyon and at Tsankawi, where they are associated with large, Classic Period pueblos. Cavate interiors tend to provide dry "microclimates" that promote preservation of organic materials, including delicate artifacts made of fiber, feather, wood, and bone. Many cavates retain substantial portions of the plaster applied by the original occupants, and feature elaborate decorative motifs incised into the plaster as "rock art," or painted on it.

Although archeological resources represent the major subset of cultural properties at the monument, the array of cultural resources preserved includes other significant cultural properties, including historic structures built by the CCC (some of which are preserved in the Bandelier CCC Historic District/National Historic Landmark (see figure 7), and many of which are still in use) as well as traditional cultural properties and other ethnographic resources identified (and in some cases, still visited) by Native Americans. As described in "Chapter 1: Purpose and Need" ("Impacts Topics Considered but Dismissed" section), traditional cultural properties and ethnographic resources would not be impacted by the alternatives evaluated in this EA.

CULTURAL LANDSCAPES

The entire monument (Frijoles Canyon and Tsankawi sections) was listed in the National Register in 1966. In the modern era, four cultural landscapes—a designation that encompasses a variety of cultural property types and considers them in holistic sense—have been defined and are being managed at the monument. For the purposes of this EA, only the cultural landscape associated with the "Main Bandelier section" (Frijoles Canyon) of the monument is described here. The cultural landscape associated with the Tsankawi section is outside of the project area for this EA. In addition to the cultural landscape associated with the monument as a whole, the Bandelier CCC Historic District/National Historic Landmark is located in Frijoles Canyon and listed separately in the National Register. The Bandelier CCC Historic District/National Historic Landmark was listed in the National Register in 1987 (NPS 2006b). This EA considers the cultural landscape associated with the Bandelier CCC Historic District/National Historic Landmark, as the entire Bandelier CCC Historic District/National Historic Landmark in included in the project area.

Historic resources within the cultural landscape were mostly built during the CCC-era (1933 to 1941), although archeological sites, including prehispanic pueblo structures and artifact scatters with lithic and ceramic materials, are also present within the landscape. Existing archeological resources within the project area are described in the "Archeological Resources" section above. The buildings in the cultural landscape are mostly at the canyon's bottom and are associated with the Bandelier CCC Historic District/National Historic Landmark.



Replace Frijoles Canyon Section of Primary and Secondary Electrical Systems - Environmental Assessment

National Park Service
U.S. Department of the Interior

Bandelier National Monument

FIGURE 7

Bandelier National Monument Civilian Conservation Corps Historic District/National Historic Landmark

Only two of the structures within the Bandelier CCC Historic District/National Historic Landmark, the 1940 entrance station (B-26) and the 1941 fire lookout (B-30), are located at the mesa top along Entrance Road. The fire lookout is located at the end of a small access road south of Entrance Road. The buildings in the canyon bottom are reached by the long and winding Entrance Road, a contributing resource, which is accessed from Highway 4. The road, which was entirely repaved in 2004 but has since had subsequent repairs and patching, is partially bordered by original mortared stone-lined gutters, stone block guardrails, overlook areas, and numerous culverts. Throughout most of the curving roadway's length it is framed by the level lands of the mesa top, and further down into the canyon, the tuff walls interspersed with native vegetation on one side and views of the surrounding setting of White Rock (Rio Grande) Canyon and into Frijoles Canyon itself. From the canyon bottom, views of the steep cliffs of the canyon's walls are a prominent feature.

Within Frijoles Canyon, there is a main parking lot, which is surrounded by CCC-era buildings, including the visitor center and monument headquarters' offices. Staff residences, which are also from the CCC-era, are located to the southeast of the main lot and behind the administrative buildings, and there is a small maintenance area, which includes the 1938 power house, located southeast of the main lot. A former corral/stables area is located approximately 0.2 miles south of the main lot, and includes a small number of residences for NPS staff. The buildings in Frijoles Canyon are designed in the pueblo revival style by the NPS and built by the CCC in the native stone (tuff). These buildings are primarily one-story in height, designed to look like a small southwestern village grouped around three sides of a central wooded plaza. Within the complex in the canyon bottom, the buildings are connected to one another by flagstone walkways, stone walls, and stone-edged planting beds.

The monument entrance on the mesa top, including the vicinity of the entrance station and the surrounding area, is mostly sparsely wooded, with a relatively even distribution of trees and other vegetation. Only the entrance station building and monument entrance signs are visible from Highway 4. Entrance Road widens and curves slightly at the entrance station, before it curves eastward toward its winding descent into the Frijoles Canyon bottom. East of Entrance Road area is a maintenance yard (the proposed Highway 4 Lot), which already has a parking area; this area lies outside of the boundaries of the monument. The buildings in the canyon bottom are grouped by function, with the visitor center and administrative buildings fronting upon the plaza and the residential and maintenance areas behind and to the west. Mature native vegetation is characteristic of the cultural landscape in Frijoles Canyon and on the mesa top, including a riparian zone bordering Frijoles Creek in the canyon bottom, juniper–shrub grasslands and pinon-juniper woodlands, with Ponderosa Pine trees on the mesa top and at the upper areas of the canyon, although some nonnative trees and plants are now present.

VISITOR USE AND EXPERIENCE

Over the past 10 years, annual visitation to the monument has averaged 225,000 visitors per year, and in 2013, the monument received 127,533 visitors (NPS 2014b). Frijoles Canyon is the most popular area at the monument, drawing 98% of visitors to the archeological sites, trails, and visitor services within it. Visitors come to the monument for a variety of activities including guided walks, hiking, camping, cross-country skiing, bird-watching, interpretive programs, and special events. There are a number of trails within the monument, many of which are accessed in Frijoles Canyon. The most popular of these trails is the Main Loop Trail, which begins at the visitor center in Frijoles Canyon (NPS 1995b).

NPS management objectives focus on the protection of monument resources while providing an enjoyable experience for all visitors. Providing for the safe enjoyment of resources is one of the foundations of the NPS Organic Act. The current electrical system requires updates to comply with federal and local (county) code requirements related to visitor and employee safety.

Entrance Road

Entrance Road is the only route for vehicular traffic entering and exiting Frijoles Canyon. Visitors also have the option of hiking into the canyon via the Frey Trail. The existing electrical system is buried beneath more than two linear miles of Entrance Road. Repairs to the electrical system require partial closure of Entrance Road, which results in delays and traffic for visitors entering and exiting Frijoles Canyon. Construction of the alternatives proposed in this EA would occur between October 1 and February 28. This is outside of the peak visitation period for the monument; therefore, the monument would generally be experiencing lower visitation rates during the construction period (NPS 2014b). The exception is a nine day period in October during the annual Albuquerque International Balloon Fiesta. During the peak season, including during the balloon fiesta, access to the monument is currently provided via a mandatory shuttle bus system. The use of the shuttle system reduces the potential for traffic congestion along Entrance Road and within Frijoles Canyon.

Parking Areas

Traffic counts before June 2012 average less than 10,000 vehicles per month during October and around 5,000 vehicles per month for November through February (NPS 2014b). During the off-peak visitation season, the majority of visitor parking occurs in the main parking lot in the Frijoles Canyon developed area. The only other parking area which is currently accessible is by the corral/stables area. During the balloon fiesta, visitors park in a designated parking lot in the nearby community of White Rock (northeast of the monument) and ride the shuttle into Frijoles Canyon.

Facilities within the Frijoles Canyon Developed Area

The monument's electrical systems support the existing facilities in the Frijoles Canyon developed area, including the visitor center, visitor restrooms, concessions operations, and a climate-controlled storage building which houses museum objects. These facilities provide opportunities for visitors to obtain information about the monument and its history, opportunities for interactive education, as well as dining and shopping options near the monument. During electrical failures, several visitor services could be temporarily closed. Visitor restrooms are closed because the sewer lift station cannot operate, and port-a-potties are contracted. The monument's telecommunications system and radio repeater are inoperable. Climate control systems in the visitor center and the museum storage building are not available. In general, monument operations are relocated or curtailed. Although the monument has back-up generators, they are not a sustainable option and cannot provide the necessary power supply to maintain all monument functions. However, the visitor center has continued operating during past failures.

MONUMENT OPERATIONS AND INFRASTRUCTURE

As detailed in "Chapter 1: Purpose and Need," the existing primary electrical system servicing the monument comprises approximately 3 miles of a combination of underground and overhead medium voltage power lines. LAPU supplies 13.8KV of high voltage electrical service to the monument, although the existing primary and secondary electrical systems are owned and maintained by the monument. The monument's existing primary electrical system provides power to 31 facilities in Frijoles Canyon (NPS 2013). Most of the monument's existing electrical equipment is rated for voltages less than that supplied by LAPU (equipment rated for 13.2KV), potentially reducing the lifespan of that equipment. As detailed in "Chapter 1: Purpose and Need," the monument's primary electrical system requires updates in order to comply with visitor and employee safety codes including

- National Electric Code
- National Electric Safety Code
- Standards for Electric Safety in the Workplace (NFPA70E)
- Life Safety Code (NFPA 101)
- LAPU Standards

The existing electrical system in not capable of accommodating changing electricity supply and demand conditions, unexpected outages, planned shutdowns for maintenance, and/or weather extremes. The cables for the primary electrical system are not in conduit, and other utilities (i.e., telephone, water, sewer) have been installed in the immediate vicinity with no separation. Further, in most areas, the monument's existing primary electrical system is buried at depths shallower than those required by federal and LAPU codes (NPS 2011a). There are also a number of splice points where the existing cables needed to be extended or a section replaced. Splices in the system increase the potential for electrical problems such as fires and electric shock. The monument's secondary electrical system is also in need of repair. For example, disconnects are in disrepair and in many areas are pulling out of the wall and/or are lying on the ground and, similar to the primary system, many of the electrical cables are not in conduit. The existing generator that serves the Frijoles Canyon developed area, although in generally good condition, is currently undersized (NPS 2011a).

LAPU is interested in taking on the responsibility of owning and maintaining the monument's primary electrical system; however, the existing system must first be improved to meet applicable standards.

The monument's existing primary and secondary electrical systems support the visitor facilities listed in the "Visitor Use and Experience" section above as well as the fire lookout tower, monument residences, and all administrative and maintenance-related buildings. Monument operations are primarily housed in the CCC-era buildings in the Frijoles Canyon developed area, which include the visitor center and administrative offices, and food and retail areas (operated by a concessioner). A small maintenance area is also located in the Frijoles Canyon developed area, southeast of the main lot. Approximately 25 employees (and their families) reside in the staff housing units in the Frijoles Canyon developed area. The historic corral/stables area, approximately 0.2 miles south of the main lot, also includes a few residences

for monument staff. Five housing units for monument staff are also present in the Juniper area on the mesa, which was not affected by the 2011 failures.

In 2013, the monument was permitted to employ 45 full-time equivalent (FTE) staff and 10 to 15 seasonal and volunteer staff during peak visitation periods (generally the summer months). The overall operating budget for fiscal year (FY) 2014 was $3,146,510. Monument employees are grouped into one of six operational divisions: Administration (includes the Superintendent), Fire Management Program, Interpretation, Maintenance, Visitor and Resource Protection, and Resources (NPS 2005). Routine maintenance operations at the monument include campground and trail rehabilitation, roadway overlay, roadway reconditioning, bridge repair, and wastewater and water line replacement. The monument typically receives less than $500,000 annually for repair/rehabilitation of existing infrastructure and routine maintenance. In 2011, the monument spent more than $50,000 on repairs to the electrical systems, back-up power generation to maintain critical functions, and maintenance staff overtime. The monument does not currently employee staff who are qualified to maintain or repair the electrical systems. As such, when the system fails, the monument spends thousands of dollars on service calls. Additionally, the monument does not have the staff capacity to make repairs to the secondary system, which has damaged infrastructure and exposed electrical lines (NPS 2013).

This page intentionally left blank

4

ENVIRONMENTAL CONSEQUENCES

This "Environmental Consequences" chapter analyzes both beneficial and adverse impacts that would result from implementing any of the alternatives considered in this EA. This chapter also includes definitions of impact thresholds (i.e., negligible, minor, moderate, and major), methods used to analyze impacts, and the analysis methods used for determining cumulative impacts. As required by CEQ regulations implementing NEPA, a summary of the environmental consequences for each alternative is provided in table 3 which can be found in "Chapter 2: Alternatives." The resource topics presented in this chapter, and the organization of the topics, correspond to the resource discussions contained in "Chapter 3: Affected Environment."

GENERAL METHODOLOGY

The following elements were used in the general approach for establishing impact thresholds and measuring the effects of the alternatives on each resource category, and are described in the subsequent sections:

- general analysis methods as described in guiding regulations, including the context and duration of environmental effects
- basic assumptions used to formulate the specific methods used in this analysis
- thresholds used to define the level of impact resulting from each alternative
- methods used to evaluate the cumulative impacts of each alternative in combination with unrelated factors or actions affecting monument resources

The analysis of impacts follows CEQ guidelines and the Director's Order 12 handbook procedures (NPS 2001) and is based on the underlying goal of providing the monument with a reliable electrical system that is readily and easily serviceable and complies with local, county, and federal regulations and requirements. For each resource topic addressed in this chapter, the applicable analysis methods are discussed, including assumptions and impact intensity thresholds. Potential impacts of all alternatives are described in terms of type (beneficial or adverse); context; duration (short- or long-term); and intensity (negligible, minor, moderate, or major). Definitions for each of these terms are provided below.

GEOGRAPHIC AREA EVALUATED FOR IMPACTS

The geographic evaluation area varies slightly by impact topic but includes the entry point, the fire lookout tower, the area between the entry point and the fire lookout tower, Entrance Road between the entry point and the visitor center, the Bandelier CCC Historic District/National Historic Landmark, and Agoya Lane and the buildings along it (see figures 3 through 4b). The HDD drilling alignment also includes the canyon wall between the fire lookout tower and the corral/stables area.

TYPE OF IMPACT

Direct: Impacts that would occur as a result of the project at the same time and place of implementation (40 CFR 1508.8).

Indirect: Impacts that would occur as a result of the project but later in time or farther in distance from the action (40 CFR 1508.8).

Adverse: An impact that causes an unfavorable result to the resource when compared to the existing conditions.

Beneficial: An impact that would result in a positive change to the resource when compared to the existing conditions.

CONTEXT

Context is the affected environment within which an impact would occur, such as local, monument-wide, regional, global, affected interests, society as a whole, or any combination of these. Context is variable and depends on the circumstances involved with each impact topic. As such, the impact analysis determines the context, not vice versa.

Local: The impact would affect the site.
Regional: The impact would affect localities, cities, or towns surrounding the site.

DURATION

The duration of the impact is described as short-term or long-term. Duration is variable with each impact topic; therefore, definitions related to each impact topic are provided in the specific impact analysis narrative. In general, the following definitions are used to describe duration.

Short-term: Impacts that occur only during construction or last less than one year.
Long-term: Impacts that last longer than one year.

Intensity

To determine impacts, thresholds were identified to measure the change in monument resources that would occur with the implementation of each alternative. These thresholds provide the reader with an idea of the intensity of a given impact on a specific topic. The impact threshold is determined primarily by comparing the effect to a relevant standard based on applicable or relevant/appropriate regulations or guidance, scientific literature and research, or best professional judgment. Because definitions of intensity vary by impact topic, intensity definitions are provided separately for each impact topic analyzed in this document. Because levels of impact intensity definitions (negligible, minor, moderate, or major) vary by impact topic, intensity definitions are provided separately for each impact topic. Beneficial impacts are described but are not assigned a level of intensity.

CUMULATIVE IMPACT ANALYSIS METHODOLOGY

General Methodology

The CEQ regulations that implement NEPA require the assessment of cumulative impacts in the decision making process for federal projects. Cumulative impacts are defined as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or nonfederal) or person undertakes such other actions" (40 CFR 1508.7). As stated in the CEQ handbook, *Considering Cumulative Effects* (CEQ 1997), cumulative impacts need to be analyzed in terms of the specific resource, ecosystem, and human community being affected and should focus on effects that are truly meaningful. Cumulative impacts are considered for all alternatives, including the no action alternative.

The analysis of cumulative impacts was accomplished using four steps:

Step 1 — Identify Resources Affected - Fully identify resources affected by any of the alternatives. These include the resources addressed as impact topics in "Chapter 3: Affected Environment" and "Chapter 4: Environmental Consequences" of the document.

Step 2 — Set Boundaries - Identify an appropriate spatial and temporal boundary for each resource. The spatial boundaries for cumulative actions are generally the same as those for the alternatives evaluated in this EA. In some cases, the spatial boundaries of the cumulative actions extend outside of the project area, but are included because they affect resources within the project area. The temporal boundaries are approximately 10 years for past actions (although some older projects were considered if impacts are still relevant) and approximately 5 years for reasonably foreseeable future actions.

Step 3 — Identify Cumulative Action Scenario - Determine which past, present, and reasonably foreseeable future actions to include with each resource. These are described below.

Step 4 — Cumulative Impact Analysis - Summarize impacts of these other actions (x) plus impacts of the alternatives evaluated in this EA (y), to arrive at the total cumulative impact (z). This analysis is included for each resource in "Chapter 4: Environmental Consequences."

Cumulative impacts were determined by combining the impacts of the alternative being considered with other past, present, and reasonably foreseeable future actions. Therefore, it was necessary to identify other ongoing or reasonably foreseeable future projects and plans at Bandelier National Monument and, if applicable, the surrounding area. Summarized below are those actions that could affect the various resources at the monument, along with the plans and policies of both the monument and surrounding jurisdictions, which were discussed in "Chapter 1: Purpose and Need."

Past, Present, and Reasonably Foreseeable Actions

To determine the potential cumulative impacts, existing and anticipated future projects within the project area and in the surrounding area were identified. The projects and plans identified include the *Bandelier National Monument Transportation Plan/EA*, Entrance Road rehabilitation, Frijoles Mesa improvements, utility replacements and upgrades, and the impacted soil removal action.

Bandelier National Monument Transportation Plan/Environmental Assessment

The monument is preparing a transportation plan/EA to resolve the issue of insufficient available parking within Frijoles Canyon. The transportation plan/EA aims to improve visitor experience and safety, improve monument operations, and maintain and protect the densely concentrated natural and cultural resources within Frijoles Canyon. This plan/EA is scheduled for completion in 2014 and has the potential to impact soils, vegetation, archeological resources, cultural landscapes, visitor use and experience, and monument operations.

Entrance Road Rehabilitation

Entrance Road was rehabilitated from the entrance station near Highway 4 to the visitor center in Frijoles Canyon in 2003 to maintain a safe and aesthetically pleasing road for monument visitors. Rehabilitation measures included road resurfacing, rerouting of drainage pathways, resurfacing of pull-outs and overlooks, and an overlay of the main parking lot. This action impacted vegetation, cultural landscapes, and visitor use and experience.

Frijoles Mesa Improvements

In 2010, the monument conducted a variety of facility improvement projects which addressed resource impacts, deferred maintenance issues, access limitation, and safety issues at the Juniper Campground and housing and maintenance areas within the Frijoles Mesa area. Actions at the Juniper Campground included reconfiguring and upgrading campsites, repaving roads, replacing a sewer line, and installing a screening wall around the maintenance area. These improvements impacted soils, vegetation, archeological resources, cultural landscapes, visitor use and experience, and monument operations.

Utility Replacement and Upgrades

Several projects, including the gas line replacement (2012), the sewer force main replacement (2009), an electrical upgrade (2000), the force main replacement (1989) and the powerhouse upgrade (1986) have replaced and upgraded monument utilities. These actions were necessary to maintain monument operations and impacted soils, vegetation, archeological resources, and monument operations.

Impacted Soil Removal Action

Under the *Comprehensive Environmental Response, Compensation, and Liability Act of 1980,* the monument will be removing soils which were contaminated by the historical use of an insecticide called dichlorodiphenyltrichloroethane (DDT). According to the PMIS for the project, a Focused Site Investigation was conducted in 2012 and indicated the presence of two additional chemicals which are also above the New Mexico Environmental Department's established limits. This action would include the removal of soils in five contaminated areas known as "hotspots" and would have the potential to impact soils and visitor use and experience.

Cumulative Impact Contribution Methodology

In defining the contribution of each alternative to cumulative impacts, the following terminology is used:

Imperceptible: The incremental effect contributed by the alternative to the overall cumulative impact is such a small increment that it is impossible or extremely difficult to discern.

Noticeable: The incremental effect contributed by the alternative, while evident and observable, is still relatively small in proportion to the overall cumulative impact.

Appreciable: The incremental effect contributed by the alternative constitutes a large portion of the overall cumulative impact.

Duration

Similar to the impacts of the proposed alternatives, the duration of the cumulative impact is described as short-term or long-term. In general, the following definitions are used to describe duration.

Short-term: Impacts that occur only during construction or last less than one year.
Long-term: Impacts that last longer than one year.

IMPACTS ON GEOLOGY AND GEOHAZARDS

METHODOLOGY

In order to assess impacts on geology and geohazards within the project area, general descriptions of the geology of the area were reviewed. Because no project-specific geotechnical report exists, impacts and geohazards were evaluated based on the available information, including a geotechnical report for the visitor center (Yeh and Associates 2006). Predictions about short- and long-term site impacts were based on recent studies and on projects of a similar nature. Geohazard risks may occur in the monument. These geohazard risks are not in itself a resource value but an increased risk that could potentially impact the project or other resources in the project area. There is increased risk of these geohazards in areas near steep slopes, proximal to fault lines, and in areas where drainages are located. In addition geohazard risks could potentially increase in the vicinity of known hazard prone soil types. The thresholds for the intensity of an impact are defined below.

Negligible: Impacts could result in a change to geological resources or increased risk of slope and land instability, but the change would be so small that it would not be of any measurable or perceptible consequence.

Minor: Impacts could result in a change to geological resources or increased risk of slope and land instability, but the change would be small and localized and of little consequence.

Moderate: Impacts would result in a change to geological resources or increased risk of slope and land instability; the change would be measurable and of consequence.

Major: Impacts would result in a noticeable change to geological resources or increased risk of slope and land instability; the change would be measurable and result in a severely adverse impact.

DURATION

Similar to the impacts of the proposed alternatives, the duration of the cumulative impact is described as short-term or long-term. In general, the following definitions are used to describe duration.

Short-term: Effects would occur only during and shortly after a specific action such as construction. Within a year after construction, effects would be mitigated effectively by the measures or treatment described in "Chapter 2: Alternatives."

Long-term: Effects would extend more than a year beyond implementation of a specific action.

IMPACTS OF ALTERNATIVE A: NO ACTION

Impacts

Under the no action alternative, no changes to the monument's primary electrical system are proposed, except for repair of the electrical lines, as failures occur. There also would be no changes to the secondary electrical system. As shown in table 5 and figure 5, soils within the project area are classified into one of five soil types:

- Adornado very paragravelly ashy coarse loam
- Palatka-Canuela-Rock outcrocp complex
- Rockoutcrop-Abrojo-Palatka complex
- Piojillo paragravelly ashy loamy coarse sand
- Metate ashy loam

The no action alternative would continue use of the existing primary and secondary electrical systems within the monument. Future failures of the primary electrical system would require repairs, including the use of "thumping" to locate the failures. These repairs would temporarily disturb soils in previously disturbed and compacted areas (i.e., beneath Entrance Road). Repairs to the existing primary electrical system would not result in impacts on geological resources or increase portion for geohazards. This is because the soils in the project area have a generally low potential for erosion, despite slopes ranging

from 0 to 65%, and there would be no impact to the underlying bedrock (Bandelier Tuff, which, due to its porous and soft nature has a relatively high susceptibility for geohazards).

Based on this information, alternative A would have no impact on geologic resources and/or potential geohazard risks. Impacts associated with the short-term disturbances to soils are described in the "Impacts on Soils" section below.

Cumulative Impacts

Alternative A would have no new impacts on geology or geohazards and therefore would not contribute to the effects of other actions. Consequently, there would be no cumulative impacts on geology and geohazards under alternative A.

Conclusion

There would be no new impacts on geology and geohazards under alternative A. Future repairs to the existing primary electrical system would not impact geological resources and would not increase potential for land or slope instability.

IMPACT OF ALTERNATIVE B: TRENCHING OPTION

Impacts

Under alternative B, open-cut trenching would be used to replace the primary electrical system. Associated infrastructure, such as switchgears and pull boxes, would be installed on the roadside or, where possible, at grade within the roadbed. Transformers would be installed within the Frijoles Canyon developed area and proximal to the infrastructure they feed. As shown in table 5 and figure 5, soils within the project area are classified into one of five soil types:

- Adornado very paragravelly ashy coarse loam
- Palatka-Canuela-Rock outcrocp complex
- Rockoutcrop-Abrojo-Palatka complex
- Piojillo paragravelly ashy loamy coarse sand
- Metate ashy loam

In general, construction associated with alternative B would occur in previously disturbed areas. The exceptions would include an area of approximately 200 linear feet in the ecological restoration area which would require trenching to route the new electrical cables from the LAPU connection point to Entrance Road. This trenching would require the temporary disturbance of approximately 1,200 cubic feet of Adornado very paragravelly ashy coarse loam. In addition, a 100-linear-foot section of the replacement primary electrical system would be routed from Entrance Road to the fire lookout tower access road, requiring temporary removal of 600 cubic feet of Palatka-Canuela-Rock outcrop complex. These soil types both have low potential for erosion. In the canyon, approximately 275 linear feet of currently undeveloped land would also be disturbed between Entrance Road and Stonehouse Road. This area is

proximal to the staff housing, identified as the lower housing area; therefore, as likely experienced some level of disturbance. Soils in this area are classified as part of the Piojillo paragravelly ashy loamy course sand, with moderate potential for erosion. Upon completion of construction, soils would be backfilled and surface conditions stabilized.

Trenching associated with alternative B would extend to depths of up to 4 feet below grade, less than the depth to bedrock. As such geologic resources would not be impacted by alternative B and geohazards potential would not be increased. Although trenching activities would involve some level of vibration from associated vehicles and equipment, there is a low potential for geohazards such as slumping or landslides. This is because the soils in the project area have a generally low potential for erosion. The Adornado soil type is categorized as having a Class 1 erosion potential, indicating a very low potential for erosion, and is characterized by 8-15% slopes. Alternative B would not result in impacts to the underlying bedrock (Bandelier Tuff, which, due to its porous and soft nature has a relatively high susceptibility for geohazards).

Road-side installation of switchgears and pull boxes would be sited to avoid impacts on geological features as identified by monument experts. The equipment would generally be sited in previously disturbed areas proximal to Entrance Road and facilities within the Frijoles Canyon developed area. It is not anticipated that bedrock would be disrupted to facilitate installation of the electrical support equipment.

Based on this information, it is anticipated that alternative B would have no impact on geological resources or increase potential for geohazards. Impacts associated with the short-term disturbances to soils are described in the “Impacts on Soils” section below.

Cumulative Impacts

Alternative B would have no new impacts on geology or geohazards and therefore would not contribute to the effects of other actions. Consequently, there would be no cumulative impacts on geology and geohazards under alternative B.

Conclusion

There would be no new impacts on geology and no increased risk for geohazards under alternative B. It is unlikely that trenching and/or the installation of electrical support equipment (meters, transformers, pullboxes) would impact geologic resources within the project area or would increase potential for land or slope instability. Although some level of vibration would occur during construction, due to the low erosion potential of the soils within the project area, and the general compacted nature of the soils beneath Entrance Road, it is not anticipated that the project area would have increased susceptibility to geohazards during construction.

IMPACTS OF ALTERNATIVE C: HDD OPTION

Impacts

Under alternative C, HDD would be used to install the primary electrical system cable from the fire lookout tower on the mesa top to the corral/stables area in Frijoles Canyon. This drilling alignment would permanently displace approximately 19,000 cubic feet of geologic material, including tuff and lava and ash deposits. This could permanently increase geohazards potential within the project area, in the long-

term, due to the porous and instable nature of tuff. Specifically, the presence of the bore hole could increase the potential for a small-scale collapse of the tuff. In the short-term (during construction) the potential for geohazards near the project area would be greatest due to vibration associated with HDD activities. In addition to the bore hole to install the primary electrical system cables, vaults with approximate dimensions of 10 feet wide, 10 feet long, and 10 feet deep would be installed flush with the ground at both ends of the drilling alignment. Installation of each vault would require excavation and permanent displacement of approximately 1,000 cubic feet of material. At the fire lookout tower, Palatka-Canuela-Rock outcrop complex could be affected while in the corral/stables area Piojillo pargravelly ashy loam coarse sand would be impacted.

The 2,025-foot drilling alignment between the fire lookout tower and the corral/stables area is very steep and could present borehole geometry complications as the turning radius is limited by the flexibility of the conduit which would be installed. The geohazards are more likely to comprise loss of drilling fluids due to porosity of the Bandelier Tuff and potential collapse of the borehole or trenches due to the poorly cemented clasts of the Bandelier Tuff. The tuff in the drilling alignment is very porous and poorly cemented, which could result in loss of drilling fluid and borehole collapse, respectively. Finally, there is potential for loss of drilling fluid in open spaces within the rock that have resulted from faults due to subsidence.

Additionally, bedrock in Frijoles Canyon begins more than 26 feet below the surface near the visitor center (Yeh and Associates 2006). As such, the borehole could traverse above bedrock in material consisting of unconsolidated alluvium comprising gravel and sand in the canyon. Alluvium poses substantial drilling challenges because its instability could result in borehole collapse and its porosity could result in loss of circulation of the drilling fluid.

Road-side installation of switchgears and pull boxes would be sited so as to avoid impacts on geological features as identified by monument experts. This equipment would generally be sited in previously disturbed areas proximal to Entrance Road and facilities within the Frijoles Canyon developed area. It is not anticipated that bedrock would be disrupted to facilitate installation of the electrical support equipment.

In addition to the impacts to bedrock associated with HDD, alternative C would include approximately 200 linear feet of trenching through the ecological restoration area, and 100 linear feet of trenching between Entrance Road and the fire lookout tower access road, like alternative B. This trenching would require the temporary disturbance of approximately 1,200 cubic feet of Adornado very paragravelly ashy coarse loam and 600 cubic feet of Palatka-Canuela-Rock outcrop complex. In the canyon, approximately 275 linear feet of currently undeveloped land would also be disturbed between Entrance Road and Stonehouse Road. This area is proximal to the staff housing, identified as the lower housing area; therefore, as likely experienced some level of disturbance. Soils in this area are classified as part of the Piojillo paragravelly ashy loamy course sand, with moderate potential for erosion. Upon completion of construction, soils would be backfilled and surface conditions stabilized. It is not anticipated that this component of alternative C would impact geologic resources or increase potential for geohazards in the project area. Temporary impacts from soils disturbances associated with alternative C are described in the “Impacts on Soils” section below.

Under, alternative C the removal of tuff, lava deposits, and unconsolidated alluvium would increase potential for land or slope instability. This would result from the potential instability caused by the boreholes and the vibration associated with HDD, combined with the porosity and instability of the Bandelier Tuff. Therefore, alternative C would result in long-term, minor to moderate adverse direct impacts on geology and geohazards.

Cumulative Impacts

None of the past, present, or reasonably foreseeable future actions would have an impact on geology and geohazards. Therefore, alternative C would not contribute to the cumulative impact on geology and geohazards.

Conclusion

Alternative C would result in long-term, minor to moderate adverse impacts on geology and geohazards. Overall, impacts on geologic resources due to removal of solid materials, and increased risk for geohazards from the drilling process would likely be small and localized. However, due to the porous nature of tuff and instability that could result from construction of the bore hole, coupled with the vibration associated with HDD and the steep gradients within the project area, alternative C would increase the risk of geohazards in the project area and could result in changes to geological resources that could be measurable and of some consequence. These risks would be greatest during construction, related to vibration, but would also remain long-term due to the instability associated with the bore hole. No other past, present, or reasonably foreseeable future actions would have an impact on geology and geohazards, so there would be no cumulative impact.

IMPACTS ON SOILS

METHODOLOGY

In order to assess impacts on soils within the project area, information on local soil classification was gathered from the NRCS and existing topographical conditions were examined. Impacts on soils were considered for all parts of the project that could be disturbed by construction activities. Areas near the disturbance area that could experience increased exposure to exotic invasive species were evaluated. The thresholds for the intensity of an impact are defined below.

Negligible: Impacts on soils would be below or at the lower levels of detection. Any effects to soil would be slight and no long-term effects to soils would occur.

Minor: Impacts on soils would be detectable and would be small, as would the area affected. If mitigation were needed to offset adverse impacts, it would be relatively simple to implement and would likely be successful.

Moderate: Impacts on soil would be readily apparent, likely long-term, and result in a change to the soil character over a relatively wide area. Mitigation measures would probably be necessary to offset adverse impacts and would likely be successful.

Major: Impacts on soil would be readily apparent, long-term, and substantially change the character of the soils over a large area in and out of the monument. Mitigation measures to offset adverse effects would be needed, extensive, and their success could not be guaranteed.

DURATION

Similar to the impacts of the proposed alternatives, the duration of the cumulative impact is described as short-term or long-term. In general, the following definitions are used to describe duration.

Short-term: Effects would occur only during and shortly after a specific action such as construction. Within a year after construction, effects would be mitigated effectively by the measures or treatment described in "Chapter 2: Alternatives."

Long-term: Effects would extend more than a year beyond implementation of a specific action.

IMPACTS OF ALTERNATIVE A: NO ACTION

Impacts

Under the no action alternative, as shown in table 8, no changes to the monument's soils are proposed.

TABLE 8. SOIL DISTURBANCES – NO ACTION ALTERNATIVE

Disturbance	Description	Total Area
Surface Area	Within Paved Areas including Entrance Road, Agoya Lane, and Frijoles Canyon developed area	As needed
Volume	Within Paved Areas including Entrance Road, Agoya Lane, and Frijoles Canyon developed area	As needed

Future failures of the electrical systems would require repairs that would involve excavation in previously disturbed areas, both in the roadbed and in the Frijoles Canyon developed area. Repairs to the electrical system would require roadwork and patching but would not result in a change in impervious surface area. Soils in the Frijoles Canyon developed area have been disturbed by past utility work.

In addition, the transformers in Frijoles Canyon, many of which are outdated, rusted and, in some cases, not functional, would remain. These transformers would continue to rust and the underlying pads would continue to deteriorate, potentially allowing moisture and animals into the pads. Because the transformers are outdated oil-filled models, they have the potential to contain hazardous materials. If the transformers are damaged, these hazardous materials could spill out, contaminating the surrounding and underlying soils. If a spill should occur, it would be contained and NPS would follow appropriate requirements for clean-up and disposal of soils. It is anticipated that any impacts to soils would be extremely localized and short-term.

These impacts would be below the level of detection and temporary; therefore, alternative A would result in short-term, negligible adverse impacts to soils.

Cumulative Impacts

Past, present, and reasonably foreseeable future actions have and continue to contribute to the cumulative impact on soils in or around the project area. These actions include disturbances necessary to implement the Bandelier National Monument Transportation Plan/EA, Frijoles Mesa improvements, utility replacements and upgrades, and the impacted soil removal project. The Bandelier National Monument Transportation Plan/EA could result in excavation of soils and changes from construction of a new parking lot. Most of the identified cumulative actions would have resulted in short to long-term minor adverse impacts on soils from temporary land disturbance and minor increases in impervious area. Over time, improved drainage systems and removal of contaminated soils would have long-term beneficial impact on soils within the monument. The short-term negligible impact on soil from the no action alternative combined with the minor beneficial and adverse minor impacts from other past, present, and reasonably foreseeable future actions would result in a minor, adverse cumulative impact. The no action alternative would contribute an imperceptible increment to the cumulative impact on soil.

Conclusion

Alternative A would result in a short-term, negligible, adverse impact on soils. Impacts on soils would be primarily related to the temporary displacement of soils associated with continued repair of the existing primary electrical system beneath Entrance Road; although additional short-term impacts could occur if hazardous materials are released from the deteriorating transformers. The associated impacts would be at or below levels of detection. Alternative A would contribute an imperceptible adverse increment to the long-term, minor adverse and long-term, beneficial cumulative impact.

IMPACT OF ALTERNATIVE B: TRENCHING OPTION

Impacts

Impacts on soils associated with alternative B are summarized in table 9 and subsequently described in the text. Figure 5 identifies the specific soil types that would be disturbed in each segment of the primary and secondary system alignments.

TABLE 9. SOIL DISTURBANCES – ALTERNATIVE B: TRENCHING OPTION

Description	Disturbance			
	Linear Feet	Area**	Volume***	Percent (of total surface area)
Primary Electrical System*	14,595 feet	215,675 square feet	83,679 cubic feet	100%
A	520 feet	7,800 square feet	3,129 cubic feet	4%
B	8,650 feet	129,750 square feet	51,900 cubic feet	60%
C	650 feet	6,500 square feet	N/A	3%
D	1,700 feet	25,500 square feet (trenching) 6,646 square feet (staging areas)	10,200 cubic feet	12%
E	N/A	N/A	N/A	0%
F	1,375 feet	20,625 square feet	8,250 cubic feet	10%
G	1,700 feet	25,500 square feet	10,200 cubic feet	12%
Secondary Electrical System	TBD during conceptual design	52,500 square feet	TBD during conceptual design	100%
H	TBD during conceptual design	52,500 square feet	TBD during conceptual design	100%

*Primary Electrical System Study Areas (see figure 5)

**For calculations of area, it is assumed that trenching would disturb up to 15-foot wide corridors along the surface. It is assumed that the removal of the existing overhead lines along Agoya Lane (C) would disturb a 10-foot wide corridor.

***It is assumed that trenches would be approximately 18 inches wide and 4 feet deep

Under alternative B, open-cut trenching would be used to install a new primary electrical system for the monument that would be routed from the LAPU entry point to the powerhouse in the Frijoles Canyon developed area. Existing aboveground infrastructure associated with the primary electrical system would also be removed (overhead lines, transformers, switchboxes, etc.), resulting in minor temporary impacts to soils in these areas. The majority of construction associated with alternative B would occur within paved/previously disturbed areas. The burial depth of the primary system would be 36 inches or 12 inches with an 8-inch concrete cap. Depending on burial depth, soil disturbance and removal would vary. For the purposes of assessing impacts, this EA assumes a burial depth of 36 inches, requiring a 4-foot deep and 18-inch wide trench to install the monument's new primary electrical system.

Trenching from the entry point to Entrance Road would occur within the ecological restoration area, a currently undisturbed area, for approximately 200 feet. This section of the replacement primary electrical system would extend approximately 320 feet to the fire lookout tower, displacing a total of 3,120 cubic feet of soil for trenching, including 1,200 cubic feet within the Adornado complex, 600 cubic feet within undisturbed land within the Palatka-Canuela-Rock outcrop complex, and 1,320 cubic feet beneath the fire lookout tower access road within the Palatka-Canuela-Rock outcrop complex. Mitigation measures would minimize impacts in the ecological restoration area. Because the trench would occur within a narrow area and mitigation measures are likely to be successful, impacts on soils in the ecological restoration area would be generally short-term.

The trenching along Entrance Road, Agoya Lane, and within paved areas of the Frijoles Canyon developed area would disturb approximately 13,425 linear feet of soils and would temporarily disturb up

to 80,550 cubic feet of soils of varies types (see table 5). Installation of the primary system would occur in 500- to 600-foot increments, the distance between pull boxes. Installing the new system in relatively short segments would reduce potential for erosion within the trench and of stored displaced soils. In addition to trenching along Agoya Lane, alternative B would include three material staging areas along Agoya Lane. These staging areas would be located over existing pavement, to the extent practical, but could result in the temporary disturbance of up to 6,646 square feet of surficial soils of the Piojillo complex. In total, alternative B would result in the disturbance of up to 83,679 cubic feet of soils. The majority of soil disturbance under this alternative would occur in previously disturbed areas and would be covered by impervious surface after construction. Excavated soils would be stored onsite during construction, and appropriate mitigation measures, such as erosion fences, would be installed, reducing potential for long-term impacts on soils.

Some soil disturbance along the roadsides and within the Frijoles Canyon developed area would occur in connection with the primary electrical system. The primary system would enter the Frijoles Canyon developed area between two sections of the CCC gutter along Entrance Road and disturb soils along its alignment to the powerhouse. Soils along approximately 275 feet of currently unpaved land within the Piojillo complex would be disturbed during construction. Switchgears and pull boxes would be installed on the roadside or, where possible at grade within the roadbed. Transformers would be installed within the Frijoles Canyon developed area, proximal to the infrastructure they feed. Construction would take place primarily in previously disturbed areas. Overall ground disturbance would be minimized as much as feasible.

Disturbances in the Frijoles Canyon developed area would also result from installation of switchgears, roadside pull boxes, transformers, and replacement lines and infrastructure for the secondary electrical system. Although conceptual designs have not yet been developed for the replacement secondary electrical system, it is estimated that up to 52,500 square feet of soils could be disturbed. The majority of soil disturbance for replacement of the secondary electrical system would occur within Piojillo complex soils.

The existing overhead lines along Agoya Lane would be removed and replaced surface electrical cables in conduit. The removal of the existing overhead lines would result in the removal of 6,500 square feet of mostly surficial soils in the Piojillo complex. The installation of the new cables beneath Agoya Lane would require temporary disturbances to approximately 1,700 linear feet of Piojillo complex soils in this area. This segment of the primary system would be buried at a depth of up to 36 inches. The associated trench would be 4 feet deep and 18 inches wide, temporarily displacing 10,200 cubic feet of soils. Soils would be stabilized and replanted with native vegetation as soon as practicable in the construction process to ensure that soils would recover. Impacts to soils would last less than 10 years.

The soil mitigation measures outlined in “Chapter 2: Alternatives” would be incorporated in a NPS-approved soil erosion control and ecological restoration plan. These measures would minimize adverse soil erosion impacts and reestablish native vegetative cover. As a result, there would be minor, short-term adverse effects to soil. Adverse impacts would be limited to the temporary displacement of soils during construction. These impacts would be detectable, but small; therefore, alternative B would result in a short-term, minor adverse impact on soils.

Cumulative Impacts

Past, present, and reasonably foreseeable future actions have and continue to contribute to the cumulative impact on soils in or around the project area. These actions include soil disturbances related to implementation of the Bandelier National Monument Transportation Plan/EA, Frijoles Mesa improvements, utility replacements and upgrades, and the impacted soil removal project. These actions and their impacts are described under alternative A. Overall, these actions have a long-term, minor adverse and a long-term, beneficial impact on soils. The impacts of these other past, present, and reasonably foreseeable future actions, when combined with the short-term, minor adverse impacts during construction described above for alternative B, would result in long-term, minor, adverse cumulative impacts on soils. Alternative B would contribute a noticeable adverse increment to this cumulative impact.

Conclusion

Alternative B would temporarily displace up to 83,679 cubic feet of soils, mostly in the Palatka-Canuela-Rock outcrop complex and Rockoutcrop-Abrojo-Palatka complex, resulting in a short-term, minor adverse impact on soils. Adverse impacts would be related to the temporary disturbance of soils associated with construction activities and would be detectable but small. Mitigation measures, as described in "Chapter 2: Alternatives," would be implemented during construction to minimize potential for long-term impacts to soil and upon completion of the construction activities, soils would be re-stabilized. Alternative B would contribute a noticeable adverse increment to the long-term, minor, adverse cumulative impact.

IMPACTS OF ALTERNATIVE C: HDD OPTION

Impacts

Impacts on soils associated with alternative C are summarized in table 10 and subsequently described in the text. Figure 5 depicts identifies the specific soil types that would be disturbed in each segment of the primary and secondary system alignments.

TABLE 10. SOIL DISTURBANCES – ALTERNATIVE C: HDD OPTION

Description	Disturbance			
	Linear Feet	Area**	Volume***	Percent (of total surface area)
Primary Electrical System*	5,945 feet	135,925 square feet	33,779 cubic feet	100%
A	520 feet	7,800 square feet	3,129 cubic feet	6%
B	N/A	N/A	N/A	N/A
C	650 feet	6,500 square feet	N/A	5%
D	1,700 feet	25,500 square feet (trenching)	10,200 cubic feet	19%
E	2,025 feet (subsurface bedrock)	50,000 (staging areas) 200 square feet (vault installation)	2,000 cubic feet (vault installation)	37%
F	1,375 feet	20,625 square feet	8,250 cubic feet	15%
G	1,700 feet	25,500 square feet	10,200 cubic feet	19%

TABLE 10. SOIL DISTURBANCES – ALTERNATIVE C: HDD OPTION (CONTINUED)

Description		Disturbance	Description	
Secondary Electrical System	TBD during conceptual design	52,500 square feet	TBD during conceptual design	100%
H	TBD during conceptual design	52,500 square feet	TBD during conceptual design	100%

*Primary Electrical System Study Areas (see figure 5)

**For calculations of area, it is assumed that trenching would disturb up to 15-foot wide corridors along the surface. It is assumed that the removal of the existing overhead lines along Agoya Lane (C) would disturb a 10-foot wide corridor.

***It is assumed that trenches would be approximately 18 inches wide and 4 feet deep

Under alternative C, both open cut trenching and HDD would be used to install the monument's new primary electrical system. HDD would be used between the fire lookout tower on the mesa top and the corral/stables area in Frijoles Canyon, while the remaining sections of the primary system would be installed using open-cut trenching. For those sections installed through trenching, the burial depth would be 36 inches or 12 inches with an 8-inch concrete cap. Depending on burial depth, soil disturbance and removal would vary. For the purposes of assessing impacts in this EA, it is assumed that the new conduits would be buried at a depth of 36 inches, requiring a 4-foot deep and 18-inch wide trench. Like alternative B, existing above-ground infrastructure associated with the monument's new primary electrical system would be removed (overhead lines, transformers, switchboxes, etc.), resulting in minor temporary impacts to soils in these areas. In addition, the majority of trenching would occur within paved areas. Overall ground disturbance would be minimized as much as feasible. Substantial changes to land forms are not expected as part of this alternative. Excavated soils would be stored on-site during construction, and appropriate mitigation measures, such as erosion fences, would be installed.

As described under alternative B, an approximately 520 linear-foot trench would be constructed between the LANL connection point and the fire lookout tower, requiring the temporary displacement of approximately 3,120 cubic feet of soil including 1,200 cubic feet within the Adornado complex, 600 cubic feet within undisturbed land within the Palatka-Canuela-Rock outcrop complex, and 1,320 cubic feet beneath the fire lookout tower access road within the Palatka-Canuela-Rock outcrop complex. This section of trenching would include an approximately 200-foot segment through the ecological restoration area. Mitigation measures would minimize impacts in the ecological restoration area. Because the trench would occur within a narrow area and mitigation measures are likely to be successful, impacts on soils in the ecological restoration area would be generally short-term.

HDD would then be used to create a bore hole to accommodate installation of the new primary electrical system between the fire lookout tower and the corral/stables area. The boring would permanently remove approximately 2,025 linear feet of bedrock. The vaults to be installed at each end of the drilling alignment would have approximate dimensions of 10 feet wide by 10 feet long by 10 feet deep. Vaults would be installed flush with the ground at both ends of the drilling alignment. Installation of each vault would result in the permanent removal of approximately 1,000 cubic feet of displaced soils (2,000 cubic feet total) which would be moved off-site or to another area of the monument. Any soils that are displaced by the drilling process (and contaminated with drilling fluid) would be removed from the monument by the contractor and sold for use as fill. The staging areas required to install the new primary electrical system with HDD would result in short-term disturbances to approximately 50,000 square feet of soil. The drilling process would take approximately 44 days, and the staging areas would be occupied for up to

60 days. The staging area near the fire lookout tower would require a minimum area of 20,000 square feet (50 feet wide by 400 feet long), disturbing soils from the Palatka-Canuela-Rock outcrop complex. The staging area near the corral/stables area would require a minimum area of 30,000 square feet (150 feet wide by 200 feet long), requiring disturbance to Piojillo complex soil. These staging areas would be configured to overlap with roadways or other previously disturbed areas, to the extent practicable. The staging areas could cause soil compaction, airborne transport of soils in the form of dust, and potential erosion due to runoff from the staging areas. These impacts would be mitigated, to the extent practicable, by containment within the work area and with silt fencing.

Like alternative B, this alternative would include the removal/replacement of the existing overhead lines along Agoya Lane. The removal of the existing overhead lines would result in the removal of 6,500 square feet of mostly surficial soils. The installation of the new cables beneath Agoya Lane would require temporary disturbances to approximately 1,700 linear feet of previously undisturbed soils in this area. The length of Agoya Lane occurs within Piojillo complex soils. This segment of the primary system would be buried at a depth of up to 36 inches. The associated trench would be 4 feet deep and 18 inches wide, temporarily displacing 10,200 cubic feet of soils. Soils would be stabilized and replanted with native vegetation as soon as practicable in the construction process to ensure that soils would recover. Impacts to soils would last less than 10 years.

Some soil disturbance along the roadsides and within the Frijoles Canyon developed area would occur in connection with the primary electrical system. The primary system would enter the Frijoles Canyon developed area between two sections of the CCC gutter along Entrance Road and disturb soils along its alignment to the powerhouse. Soils along approximately 275 feet of currently unpaved land would be disturbed during construction of the primary electrical system. These soils are within the Piojillo complex and have a moderate potential for erosion, however, due to the close proximity of this segment to the existing buildings in the Frijoles Canyon developed area, it is likely that these soils have been disturbed and compacted to soils degree and have a lower potential for erosion than undisturbed Piojillo complex soils. Switchgears and pull boxes would be installed on the roadside or, where possible at grade within the roadbed. Transformers would be installed within the Frijoles Canyon developed area, proximal to the infrastructure they feed. Construction would take place primarily in previously disturbed areas. Overall ground disturbance would be minimized as much as feasible.

Disturbances in the Frijoles Canyon developed area would also result from installation of switchgears, roadside pull boxes, transformers, and replacement infrastructure for the secondary electrical system. Although conceptual designs have not yet been developed for the replacement secondary electrical system, it is estimated that up to 52,500 square feet of soils could be disturbed, most of which would be Piojillo complex soils.

Long-term impacts on soils would primarily be related to the permanent displacement of soils to accommodate the 10-foot by 10-foot vaults that would be installed at either end of the HDD alignment (requiring permanent displacement of approximately 2,000 cubic feet of soils). Short-term impacts would occur during construction due to the temporary displacement of soils. The soil mitigation measures outlined in “Chapter 2: Alternatives” would be incorporated in a NPS-approved soil erosion control and ecological restoration plan. These measures would minimize adverse soil erosion impacts and reestablish native vegetative cover. As a result, there would be minor, short-term adverse effects to soil. Adverse

impacts would be limited to the temporary displacement of soils during construction. These impacts would be detectable, but small; therefore, alternative B would result in a short-term, minor adverse impact on soils.

Cumulative Impacts

Past, present, and reasonably foreseeable future actions have and continue to contribute to the cumulative impact on soils in or around the project area. These actions include soil disturbances related to implementation of the Bandelier National Monument Transportation Plan/EA, Frijoles Mesa improvements, utility replacements and upgrades, and the impacted soil removal project. These actions and their impacts are described under alternative A. Overall, these actions have a long-term, minor adverse and a long-term, beneficial impact on soils. The impacts of these other past, present, and reasonably foreseeable future actions, when combined with the short-term, minor adverse impacts during construction described above for alternative C, would result in long-term, minor, adverse cumulative impacts on soils. Alternative C would contribute a noticeable adverse increment to this cumulative impact.

Conclusion

Overall, alternative C would result in disturbance to 33,779 cubic feet of soils, resulting in short-term and long-term, minor adverse impact on soils. Impacts on soils would be detectable but small. Short-term impacts (31,779 cubic feet of soil, mostly of the Palatka-Canuela-Rock outcrop complex and Rockoutcrop-Abrojo-Palatka complex,) would be related to disturbances during construction. However, because mitigation measures would be implemented, and, in most cases, soils would be stockpiled onsite and then backfilled after construction, the overall impact would be minor. The permanent removal of approximately 2,000 cubic feet (1,000 cubic feet each from the Piojillo complex and Palatka-Canuela-Rock outcrop complex) for installation of the proposed vaults at either end of the HDD alignment would be a long-term impact, but, when considered in the scale of the entire project area, a very small area of soil would be permanently removed, and there would be no resulting change in soil characteristics. Alternative C would contribute a noticeable adverse increment to the long-term, minor, adverse cumulative impact.

IMPACTS ON VEGETATION

METHODOLOGY

All available information on plants and vegetative communities potentially impacted by the electrical system replacement was compiled for this document. Impacts on native vegetative communities were considered for all parts of the project that could be disturbed by construction activities. Areas near the project area that could experience increased exposure to exotic invasive species were evaluated. Predictions about short- and long-term site impacts were based on recent studies and previous projects with similar vegetation, and duration definitions are provided below. The thresholds of change for the intensity of an impact are defined as follows:

Negligible: Individual native plants may occasionally be affected, but measurable or perceptible changes in plant community size, integrity, or continuity would not occur.

Minor: Effects on native plants would be measurable, but would be localized in a small area. The viability of the plant community would not be affected and the community, if left alone, would recover.

Moderate: A change to vegetation would occur over a relatively large area in the native plant community and would be readily measurable in terms of abundance, distribution, quantity or quality.

Major: Effects on native plant communities would be readily apparent, and would substantially change vegetation community types over a large area.

DURATION

Vegetation in the project area is sensitive to change and important to the stability of the ecosystem. Therefore, the following definitions of duration for vegetation are as follows:

Short-term: Effects would occur only during and shortly after a specific action such as construction. Within a year after construction, effects would be mitigated effectively by the measures or treatment described in "Chapter 2: Alternatives."

Long-term: Effects would extend more than a year beyond implementation of a specific action.

IMPACTS OF ALTERNATIVE A: NO ACTION

Impacts

Under the no action alternative, no changes to the monument's vegetation are proposed. Future failures of the primary and secondary electrical systems would require repairs that could result in minimal impacts to roadside vegetation. Past repairs have occurred along Entrance Road within Frijoles Canyon where the vegetation is primarily junipers with sparse grasses and herbaceous plants. Although past failures have occurred in Frijoles Canyon, it is possible that a future failure could occur near the entry point, in which case repairs would result in impacts on vegetation in the ecological restoration area. The majority of vegetation immediately adjacent to Entrance Road on the mesa top (above the hairpin turn) comprises grama grasses, and most of the larger vegetation in the ecological restoration area consists of junipers, many of which are dead. Any repairs to the secondary electrical system would result in impacts on the less dense grasses and herbaceous plants in the Frijoles Canyon developed area. Introduction of exotic plant species is not anticipated if mitigation measures are closely followed.

In addition, the transformers in Frijoles Canyon would continue to rust and the underlying pads would continue to deteriorate, potentially allowing moisture and animals into the pads. Because the transformers are outdated oil-filled models, they have the potential to contain hazardous materials. If the transformers

are damaged, these hazardous materials could spill out, contaminating any surrounding vegetation. If a spill should occur it would be contained and NPS would follow appropriate requirements for clean-up. It is anticipated that any impacts to vegetation would be extremely localized and short-term.

Because impacts would affect several individual plants in localized areas which would be a small portion of the species' population, alternative A would result in long-term, negligible adverse impacts to vegetation. Indirect impacts are not expected.

Cumulative Impacts

Past, present, and reasonably foreseeable future actions have and continue to contribute to the cumulative impact on vegetation in or around the project area. These actions include disturbances to implement the Bandelier National Monument Transportation Plan/EA, Entrance Road rehabilitation, Frijoles Mesa improvements, and utility replacements and upgrades. The Bandelier National Monument Transportation Plan/EA could result in removal of vegetation for the construction of a new parking lot. This action could have a long-term, minor adverse impact. The rehabilitation of Entrance Road involved the resurfacing of the roadway, which resulting in short-term, minor adverse impacts during construction. The Frijoles Mesa improvements resulted in short-term, negligible to minor adverse impacts during construction due to the removal of some plants for facility improvements and long-term beneficial impacts due to revegetation of disturbed areas. Past utility replacements and upgrades include the gas line replacement, the sewer force main replacement, an electrical upgrade, and the force main replacement. These actions all required construction which resulted in impacts on vegetation. As such, these projects resulted in long-term, minor impacts on vegetation. Overall, these actions would have a long-term, minor adverse and a long-term beneficial impact on vegetation. The impacts of these other past, present, and reasonably foreseeable future actions, when combined with the long-term, negligible adverse impact described above for alternative A, would result in long-term, minor adverse and long-term, beneficial cumulative impacts on vegetation. Alternative A would contribute an imperceptible adverse increment to this cumulative impact.

Conclusion

Alternative A would result in a direct, long-term, negligible adverse impact on vegetation. Impacts on vegetation from continued repairs to the existing primary electrical system would affect few individuals and a small proportion of the population. Short-term impacts to vegetation could also occur if hazardous materials are released from the existing, deteriorating transformers in Frijoles Canyon. Alternative A would contribute an imperceptible adverse increment to the long-term, minor adverse and long-term, beneficial cumulative impact.

IMPACT OF ALTERNATIVE B: TRENCHING OPTION

Impacts

Under alternative B, open-cut trenching would be used to install a new primary system between the entry point and the power house. This alignment would require construction within the ecological restoration area, along Entrance Road, along Agoya Lane, and within the CCC district. Construction equipment would be cleaned and inspected by monument experts in order to prevent the introduction or spread of exotic species.

Approximately 200 linear feet of trenching within the ecological restoration area would result in the removal of approximately 400 square feet of vegetation. It is likely that plants bordering the construction area would be damaged. Within the ecological restoration area, the monument is working to replace trees with herbaceous plants in order to restore the landscape to its condition prior to past agricultural actions. In order to foster growth of the herbaceous plants, the monument has covered the area with a layer of slash material. The majority of vegetation in the ecological restoration area is grama grasses and juniper trees, both dead and alive (see figure 6 and table 6). The contractor would remove and store the slash material during construction and would replace it after replanting the construction area with native herbaceous species. Because vegetation in the monument recovers very slowly (i.e. more than one year), this work would result in a long-term impact.

Although trenching along Entrance Road and Agoya Lane would occur within paved areas, there would be potential for damage to vegetation. Stored soils and road surface materials, particularly along Entrance Road where construction would be limited to one lane, could damage roadside vegetation. The installation of switchgears, pull boxes, and transformers would result in removal of some vegetation. Some existing switchgears and transformers would be replaced, which would minimize impacts on vegetation caused by this alternative. Similarly, areas exposed by removed infrastructure would be replanted with native species. Above the hairpin turn in Entrance Road, vegetation is primarily junipers, both dead and alive, and grama grasses (see figure 6 and table 6). The primary system would enter the Frijoles Canyon developed area between two sections of the CCC gutter along Entrance Road and disturb vegetation, which is primarily junipers and sparse grama grasses and herbaceous plants (see figure 6 and table 6), along its alignment to the powerhouse. Vegetation along approximately 275 feet of land, including a small patch of juniper trees adjacent to the powerhouse, would be disturbed during construction.

Because impacts would affect several individual plants which would be a small proportion of the species' population, alternative B would result in long-term, minor adverse impacts to vegetation.

Cumulative Impacts

Past, present, and reasonably foreseeable future actions have and continue to contribute to the cumulative impact on soils in or around the project area. These actions include disturbances to implement the Bandelier National Monument Transportation Plan/EA, Entrance Road rehabilitation, Frijoles Mesa improvements, and utility replacements and upgrades. These actions and their impacts are described under alternative A. The impacts of these other past, present, and reasonably foreseeable future actions, when combined with the long-term, minor adverse impacts resulting from construction described above for alternative B, would result in long-term, minor, adverse cumulative impacts on vegetation. Alternative B would contribute a noticeable adverse increment to this cumulative impact.

Conclusion

Alternative B would result in a long-term, minor adverse impact on vegetation. Overall, impacts on vegetation would affect few individuals and a small proportion of the population. Long-term impacts would primarily be related to the removal of vegetation in connection with trenching through the ecological restoration area. Alternative B would contribute a noticeable adverse increment to the long-term, minor adverse and a long-term, beneficial cumulative impact.

IMPACTS OF ALTERNATIVE C: HDD OPTION

Impacts

Under alternative C, HDD would be used to run the primary electrical system from the fire lookout tower on the mesa top to the corral/stables area in Frijoles Canyon. Open-cut trenching would be used to install the new system between the entry point and the staging area near the fire lookout tower and between the staging area near the corral/stables area and the powerhouse. Vaults would be installed flush with the ground at both ends of the drilling alignment and would have approximate dimensions of 10 feet wide by 10 feet long by 10 feet deep. The installation of the vaults would results in the temporary displacement of approximately 2,000 cubic feet of previously undisturbed/uncompacted soils. Overall ground disturbance would be minimized as much as feasible. This alternative would result in impacts on vegetation due to removal of plants. Construction equipment would be cleaned and inspected by monument experts in order to prevent the introduction or spread of exotic species.

As under alternative B, approximately 200 linear feet of trenching within the ecological restoration area would result in the removal of approximately 400 square feet occupied by sparse vegetation, primarily grama grasses, some herbaceous plants, and juniper trees, both dead and alive (see figure 6 and table 6). It is possible that similar plants bordering the construction area would be damaged. As under alternative B, the contractor would remove and store the slash material during construction and would replace it after replanting the construction area with native herbaceous species. Because vegetation in the monument recovers very slowly (i.e. more than one year), this work would result in a long-term impact.

Although trenching between the ecological restoration area (adjacent to Entrance Road) and the staging area near the fire lookout tower, along Agoya Lane and between the staging area near the corral/stables and the powerhouse would occur primarily within roadways or paved areas, there would be potential for damage to vegetation. Stored soils and road surface materials, particularly along Entrance Road where construction would be limited to one lane, could damage roadside vegetation. Each vault at the ends of the drilling alignment would result in the removal of vegetation on approximately 100 square feet. The installation of switchgears, pull boxes, and transformers would result in removal of some grama grasses and herbaceous plants. Some existing switchgears and transformers would be replaced, which would minimize impacts on vegetation caused by this alternative. Similarly, areas exposed by removed infrastructure would be replanted with native species. The primary system would enter the Frijoles Canyon developed area between two sections of the CCC gutter along Entrance Road and disturb vegetation, which is primarily junipers and sparse grama grasses and herbaceous plants (see figure 6 and table 6), along its alignment to the powerhouse. Vegetation along approximate 275 feet of land, including a small patch of juniper trees adjacent to the powerhouse, would be disturbed during construction.

The staging areas required to stockpile pipe for installation of the new primary system using HDD would result in impacts on vegetation. The drilling process would take approximately 44 days, and the staging areas would be occupied for up to 60 days. The staging area near the fire lookout tower would require a minimum area of 20,000 square feet (50 feet wide by 400 feet long). The staging area near the corral/stables area would require a minimum area of 30,000 square feet (150 feet wide by 200 feet long). These staging areas would be configured to overlap with roadways or other previously disturbed areas, to the extent practicable. The staging areas would be cleared of woody trees and shrubs and would likely cause damage to herbaceous ground cover. These impacts would be mitigated to the extent practicable,

and the staging areas would be replanted with native species after drilling is complete. After construction, the area would be replanted with native grasses, herbaceous plants, and woody trees, but recovery would likely take longer than one year and would result in a long-term impact.

Because impacts would affect several individual plants which would be a small proportion of the species' population, alternative C would result in long-term, minor adverse impacts to vegetation.

Cumulative Impacts

Past, present, and reasonably foreseeable future actions have and continue to contribute to the cumulative impact on soils in or around the project area. These actions include disturbances to implement the Bandelier National Monument Transportation Plan/EA, Entrance Road rehabilitation, Frijoles Mesa improvements, and utility replacements and upgrades. These actions and their impacts are described under alternative A. The impacts of these other past, present, and reasonably foreseeable future actions, when combined with the short-term, minor adverse impacts during construction described above for alternative C, would result in long-term, minor, adverse cumulative impacts on vegetation. Alternative C would contribute a noticeable adverse increment to this cumulative impact.

Conclusion

Alternative C would result in a long-tem, minor adverse impact on vegetation. Overall, impacts on vegetation would affect few individuals and a small proportion of the population. Long-term impacts would primarily be related to the removal of vegetation in connection with trenching through the ecological restoration area and disturbances to vegetation that would occur in construction staging areas. Alternative C would contribute a noticeable adverse increment to the long-term, minor adverse and a long-term, beneficial cumulative impact.

IMPACTS ON ARCHEOLOGICAL RESOURCES

METHODOLOGY

A variety of policy and planning documents have been created by the NPS to facilitate management of archeological sites and other types of cultural resources preserved in the national park system. These include: Director's Order 28 (*Cultural Resource Management*) and 28A *(Archeology*); the *Cultural Resources Management Handbook* (issued pursuant to Director's Order 28); and *Management Policies* 2006. According to Director's Order 28, archeological resources are the remains of past human activity and records documenting the scientific analysis of the remains. Cultural resource management obligations and attendant policies of the NPS derive from a suite of historic preservation and other laws, proclamations, executive orders, and regulations, including:

- *Antiquities Act of 1906* ([*An Act for the Preservation of American Antiquities*] 16 USC 431–433; 34 Stat. 225).
- *National Park Service Organic Act* (16 USC l-4; 39 Stat. 535)
- *Historic Sites Act of 1935* (16 USC 461-467; 49 Stat. 666).

- *National Historic Preservation Act of 1966* (16 USC 470 et seq.; Public Law 89-665, 96-515).
- *Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation* (48 Federal Register (FR) 44716-740), and *Standards and Guidelines for Federal Agency Historic Preservation Programs Pursuant to the National Historic Preservation Act* (63 FR 20497-508).
- *American Indian Religious Freedom Act* ([AIRFA]; 42 USC 1996-1996a; Public Law No. 95-341, 103-44; 92 Stat. 469).
- *Archeological Resources Protection Act of 1979* ([ARPA] 16 USC 470aa—470mm; PL 96-95)

In general, with respect to archeological sites, direct impacts to be considered and potentially mitigated during a construction project such as the proposed undertaking will consist of disturbances immediately deriving from construction activities such as: trenching; placement of temporary fencing that requires ground penetration; placement of equipment; driving/parking vehicles; "lay down" of material; creation of staging areas; "frac outs" of slurry, etc. Indirect impacts to sites tend to include such as increased erosion due to changes in/removal of vegetation on site surfaces, and increased exposure to visitors who may remove artifacts and/or disturb features. For each alternative below, potential direct and indirect impacts are considered in light of the specific archeological sites that would potentially be affected, on a short- or long-term basis. The potential for cumulative impacts is also considered.

For purposes of analyzing potential impacts on archeological resources, the thresholds of change for the intensity of an impact are defined as follows:

Negligible: The impact would be at the lowest levels of detection or barely measureable, with no perceptible consequences to archeological resources; an archeological site's information potential would not be compromised.

Minor: The disturbance of an archeological site, or sites, would be confined to a small area with no more than a minor amount of loss of the site's information potential.

Moderate: The disturbance to an archeological site, or sites, would not be substantial, but would result in a noticeable loss of the site's information potential.

Major: The disturbance to an archeological site, or sites, would be substantial and would result in the loss of most or all of the site and its potential to yield information important in history/prehistory.

DURATION

In general, impacts on archeological resources are considered long-term only.

IMPACTS OF ALTERNATIVE A: NO ACTION

Impacts

If no action is taken to replace the Frijoles Canyon section of the primary and secondary electrical systems at Bandelier, there will be no construction disturbances. However, the existing primary electrical system, which has exceeded its lifespan, would continue to fail. As power outages occur, sections of Entrance Road would have to be removed to access and repair the failed portion of the primary electrical system. Entrance Road has been heavily disturbed since its construction by the CCC in the 1930s, including recent re-paving and subsequent trenching to locate the cables for the monument's primary electrical system during previous power failures. Upon completion of the maintenance activities, the road would be restored and there would be no measureable impact on the archeological resource. Further, the archeological resources within the monument are well documented and protected and resources beyond the road itself would be avoided, to the extent practical, during maintenance activities. Impacts on unknown resources would be unlikely. Therefore, alternative A would result in a long-term negligible adverse impact on archeological resources.

Cumulative Impacts

Past, present, and reasonably foreseeable future actions have and continue to contribute to the cumulative impact on archeological resources in or around the project area. These actions include disturbances necessary to implement the Bandelier National Monument Transportation Plan/EA, Frijoles Mesa improvements, and utility replacements and upgrades. The Bandelier National Monument Transportation Plan/EA includes actions such as grading, excavation of soils, and vegetation removal associated with parking facility improvements. This action could have a long-term, minor adverse impact on archeological resources. The Frijoles Mesa improvements likely resulted in negligible to minor adverse impacts on archeological resources related to increased visitor use in areas of known archeological resources. Conversely, this project likely resulted in beneficial impacts on archeological resources because associated grading activities should have reduced potential for the resources to "creep" downhill as part of sheet-wash erosion. Past utility replacements and upgrades include the gas line replacement, the sewer force main replacement, an electrical upgrade, and the force main replacement. These actions all required land disturbance activities which could have resulted in long-term minor impacts on archeological resources due to the associated ground disturbance in areas of known archeological resources. The impacts of these projects, when combined with the long-term minor adverse impacts of alternative A, would result in long-term, minor, adverse and long-term beneficial cumulative impacts on archeological resources. Alternative A would contribute an imperceptible adverse increment to this cumulative impact.

Conclusion

Alternative A would result in a long-term negligible adverse impact on archeological resources. Disturbances to Entrance Road would occur periodically as repairs are needed on the existing electrical system; however, upon completion of the repairs, the road would be restored. As such, the overall impact on these archeological resources would be barely measureable, and there would be no perceptible consequences to archeological resources. Further, the archeological site's information potential would not be compromised. Alternative A would contribute an imperceptible adverse increment to the long-term, minor, adverse and long-term, beneficial cumulative impacts on archeological resources.

IMPACTS OF ALTERNATIVE B: TRENCHING OPTION

Impacts

This alternative would involve following the existing electrical systems alignment along Entrance Road into Frijoles Canyon, using conventional trenching methods for installation, down to the existing powerhouse building. The archeological resource that would be most directly affected would be the road itself. Since the existing underground alignment would be utilized; however, the impact to Entrance Road, when considered as an archaeological site, would be negligible. Entrance Road has already been impacted by installation of the existing electric system, as well as by paving and other road improvements. Alternative B could impact a total of 18 archeological sites, as listed in table 11, below. The "Archeological Resources" section of chapter 3 provides general information about the archeological sites that could be impacted by the implementation of alternative B.

TABLE 11. ARCHEOLOGICAL SITES POTENTIALLY IMPACTED BY ALTERNATIVE B

Site Type	Site Type
Pueblo structure (masonry roomblock, 2 features present) w/associated artifact scatter (ceramics)	Small pueblo structure (12 rooms estimated) w/associated artifact scatter
Pueblo structures (2 masonry roomblocks, a plaza, and a kiva present) and associated artifact scatter (ceramics and lithics); aka "Rainbow House" or "Kastiatse"	Primary component is a CCC camp with an associated historic artifact scatter; a dispersed PreColumbian artifact scatter is also present
Pueblo structure (masonry roomblock, 1 feature present) w/associated artifact scatter (ceramics)	No features are present
Pueblo structure (10 rooms and one kiva estimated) and associated artifact scatter (ceramics and lithics); aka "Saltbush Pueblo"	Terrace-like soil control structure and an associated artifact scatter (ceramics and lithics); historic and/or PreColumbian use is indicated
Group of cavate pueblo structures ("Group M") and associated downslope artifact scatter	Ancestral Puebloan trail; also used in the historic period
Artifact scatter (lithics only)	CCC-era features, including Entrance Road and associated features (masonry gutters, culvert headwalls, and walls), constructed by the CCC 1933–1939
Small structure (one room) w/associated artifact scatter	A metal directional sign nailed to tree
Artifact scatter (ceramics and lithics)	A historic feature aka the "Inca Wall;" consisting of a stone platform constructed with large tuff boulders, presumably by the CCC
A ditch and berm complex dating to the CCC-era. Appears to have been created to divert surface run-off to side canyons	Burial site

Potential impacts to archeological sites under alternative B could occur from the placement of temporary fencing that requires ground penetration within sites; the placement of construction equipment during periods of use/inactivity; driving/parking vehicles on sites; "lay down" of material on sites; creation of staging areas on sites; removal of vegetation on site surfaces; trampling and/or littering of sites by construction personnel; collection/displacement of artifacts by construction personnel; ignition of fire by construction personnel (smokers) and/or poorly maintained equipment. Vibration associated with use of

construction equipment constitutes a potential source of impact for structural sites. Any or all of these activities could lead to loss of information potential for archeological sites. It should be noted that artifact collection or displacement deriving from construction activity could take place within site boundaries, but could also impact "isolated occurrences" of archeological material as described in "Chapter 3: Affected Environment." Potential indirect impacts to existing archeological resources would be long-term, and could include increased erosion due to changes in/removal of vegetation on site surfaces.

The archeological resources within 65 feet of proposed construction disturbance areas would be the most vulnerable to adverse impacts. This would include at least seven known archeological sites such pueblos structures, cavates, artifact scatters, components of a CCC camp, and a possible burial location. Because the archeological resources within the monument are well documented, direct impacts to these resources would be avoided to the extent feasible. As described in "Chapter 2: Alternatives," during construction, mitigation measures such as monitoring would be in place to reduce potential for disturbance of existing archeological resources. Construction personnel also would be provided with specific information about the monument's policy and procedures for handling inadvertent discoveries of cultural materials, including human remains. Archeological sites located near the project area would be defined on the ground by installing temporary fencing to reduce the potential for construction personnel and/or visitors to stray into these areas. The fencing would be clearly visible and could consist of lath, string and flagging tape (a very temporary type of boundary marking) or t-posts with orange plastic fencing (a more robust and visually apparent boundary marker). The placement of the fencing would be determined by monument archeologist and would not be implemented in a manner that would "mark" the specific location of subsurface sites or render them obvious in any way.

Based on this information, overall, alternative B would result in a long-term, minor, adverse impact on archeological resources.

Cumulative Impacts

Past, present, and reasonably foreseeable future actions have and continue to contribute to the cumulative impact on archeological resources in or around the project area. These actions would be the same as those described for alternative A. The impacts of these projects, when combined with the impacts of alternative B, would result in long-term, minor, adverse and long-term beneficial cumulative impacts on archeological resources. Alternative B would contribute a noticeable adverse increment to this cumulative impact.

Conclusion

Alternative B would result in a long-term minor adverse impact on archeological resources. Although a number of direct and indirect adverse impacts could occur, these could be mitigated by careful planning and staging of the construction work, and by proactive involvement of the monument staff with members of the project construction team. Further, routing for the replacement electrical system would be sited, to the extent feasible, so as to minimize impacts to archeological resources. As such, it is anticipated that any impacts to archeological resources would be confined to small areas and would not result in the loss of the site's information potential. Alternative B would contribute a noticeable adverse increment to the long-term minor adverse and long-term beneficial cumulative impact.

IMPACTS OF ALTERNATIVE C: HDD OPTION

Impacts

Alternative C would combine conventional trenching on the mesa top from the entry point with the LANL overhead line at the monument-LANL property boundary to the fire lookout tower. At the fire lookout tower, HDD would then be used to bore through bedrock to the stables area in the bottom of Frijoles Canyon in the stables area. This HDD alignment would extend behind an existing group of cavate pueblo structures and an associated downslope artifact scatter. From the HDD rig site in the canyon, conventional trenching would continue within Entrance Road to the powerhouse. Like the other alternatives, the archeological resource that would be most directly affected would be Entrance Road. Fewer stretches of it would be impacted under this alternative, however, and since the existing underground alignment would be utilized, the impact to the road, from an archaeological perspective, would be negligible. Entrance Road has already been impacted by installation of the electric system to be replaced, as well as by paving and other road improvements. Under alternative C, fewer archeological sites (10 sites total) would be impacted (table 12). However, the nature and intensity thresholds for impacts to affected sites would be the same as under alternative B, with one exception: the cavate pueblo group behind which the HDD bore hole would be routed.

TABLE 12. ARCHEOLOGICAL SITES POTENTIALLY IMPACTED BY ALTERNATIVE C

Site Type	
Pueblo structures (2 masonry roomblocks, a plaza, and a kiva present) and associated artifact scatter (ceramics and lithics); aka “Rainbow House” or “Kastiatse”	No features are present
Pueblo structure (10 rooms and one kiva estimated) and associated artifact scatter (ceramics and lithics); aka “Saltbush Pueblo”	The monument entrance road and associated features (masonry gutters, culvert headwalls, and walls), constructed by the CCC 1933-1939
Group of cavate pueblo structures (“Group M”) and associated downslope artifact scatter	A historic feature aka the “Inca Wall;” consists of a stone platform constructed with large tuff boulders, presumably by the CCC
Artifact scatter (lithics only)	A ditch and berm complex, apparently created to divert surface run-off to side canyons
Primary component is a CCC camp with an associated historic artifact scatter; a dispersed PreColumbian artifact scatter is also present	Burial

Under alternative C, potential impacts on the archeological sites listed in table 12 include: placement of temporary fencing that requires ground penetration within sites; placement of construction equipment during periods of use/inactivity; driving/parking vehicles on sites; “lay down” of material on sites; creation of staging areas on sites; removal of vegetation on site surfaces; trampling and or littering of sites by construction personnel; collection/displacement of artifacts by construction personnel; ignition of fire by construction personnel (smokers) and/or equipment. Vibration associated with use of construction equipment constitutes a potential source of impact for structural sites, particularly the cavates near the project area. Vibration associated with alternative C would be more intense than that associated with alternative B because of the use of HDD. As such, the activities proposed alternative C could lead to loss of information potential for

archeological sites. Potential indirect impacts to the sites listed in table 12 would be long-term and would include increased erosion due to changes in, or removal of, vegetation on site surfaces.

Similar to alternative B, the archeological resources within 65 feet of proposed construction disturbance areas would be the most vulnerable to adverse impacts. This would include at least six known archeological sites such pueblos structures, cavates, artifact scatters, components of a CCC camp, a possible burial location, and an unrecorded CCC ditch and berm. Because the archeological resources within the monument are well documented, direct impacts to these resources would be avoided to the extent feasible. Of particular concern is the pueblo site directly behind the proposed HDD route. The cliff face through which the bore would proceed consists of volcanic tuff, a notoriously soft, porous, friable rock type that could be vulnerable to collapse when drilled. Even if a "frac out" did not occur during drilling, vibratory impacts to delicate plasters and other elements of the cavate structures proceeding from deployment of the HDD could be adverse, as could trenching near the base of the site along the road. As described in "Chapter 2: Alternatives," during construction, mitigation measures such as monitoring would be in place to reduce potential for disturbance of existing archeological resources. Construction personnel also would be provided with specific information about the monument's policy and procedures for handling inadvertent discoveries of cultural materials, including human remains. Archeological sites located near the project area would be defined on the ground by installing temporary fencing to reduce the potential for construction personnel and/or visitors to stray into these areas. The fencing would be clearly visible and could consist of lath, string and flagging tape (a very temporary type of boundary marking) or t-posts with orange plastic fencing (a more robust and visually apparent boundary marker). The placement of the fencing would be determined by monument archeologist and would not be implemented in a manner that would "mark" the specific location of subsurface sites or render them obvious in any way. The competence of the tuff bedrock to withstand the bore would be carefully evaluated prior to its deployment.

Based on this information, overall, alternative C would result in long-term minor to moderate adverse impacts. The intensity of this impact would primarily depend on impacts to the cavate pueblo structures near the HDD bore hole alignment. Because mitigation measures would be in place, and these sites would be monitoring during construction, it is anticipated that any disturbances to those sites would result in limited, if any, loss of the site's information potential.

Cumulative Impacts

Past, present, and reasonably foreseeable future actions have and continue to contribute to the cumulative impact on archeological resources in or around the project area. These actions would be the same as those described for alternative A. The impacts of these projects, when combined with the impacts of alternative C, would result in long-term, minor, adverse and long-term beneficial cumulative impacts on archeological resources. Alternative C would contribute a noticeable adverse increment to this cumulative impact.

Conclusion

Alternative C would result in a long-term minor to moderate impact on archeological resources. Although a number of adverse impacts could occur as discussed above, these could be mitigated by careful planning and staging of the construction work, and by proactive involvement of the monument staff with members of the project construction team. Further, routing for the replacement electrical system would be sited, to the extent feasible, so as to minimize impacts to archeological resources. Therefore, in general, it is anticipated

that any impacts to archeological resources would be confined to small areas and would not result in the loss of the site's information potential. However, if HDD results in disturbance to existing cavate pueblo structures in the immediate vicinity of the alignment, there could be a noticeable loss of that site's information potential. Mitigations efforts would prevent the loss from resulting in the loss of most or all of the site and its potential to yield information important in history/prehistory. Alternative C would contribute a noticeable adverse increment to the long-term minor adverse and long-term beneficial cumulative impact.

IMPACTS ON CULTURAL LANDSCAPES

METHODOLOGY

Cultural landscapes are the result of the long interaction between people and the land, and the influence of human beliefs and actions over time upon the natural landscape. Shaped through time by historical land-use and management practices, as well as politics and property laws, levels of technology, and economic conditions, cultural landscapes provide a living record of an area's past, as well as a visual chronicle of its history. In order for a cultural landscape to be listed on or eligible for listing in the National Register, it must possess historic integrity of those features necessary to convey its significance. The character-defining features of a cultural landscape include spatial organization and land patterns, topography, vegetation, circulation patterns, water features, structures/buildings, site furnishings, and objects.

For purposes of analyzing potential impacts on these resources, the thresholds of change for the intensity of an impact are defined as follows:

Negligible: Impact(s) is at the lowest levels of detection with neither adverse nor beneficial consequences.

Minor: Alteration of a pattern(s) or feature(s) of the landscape would not diminish the overall integrity of the landscape.

Moderate: Alteration of a pattern(s) or feature(s) of the landscape would diminish the overall integrity of the landscape. A memorandum of agreement is executed among the NPS and applicable state or tribal historic preservation officer and, if necessary, the Advisory Council on Historic Preservation in accordance with 36 CFR 800.6(b). Measures identified in the MOA to minimize or mitigate adverse impacts reduce the intensity of impact under NEPA from major to moderate.

Major: Alteration of a pattern(s) or feature(s) of the landscape would diminish the overall integrity of the landscape. Measures to minimize or mitigate adverse impacts cannot be agreed upon and the NPS and applicable state or tribal historic preservation officer and/or Advisory Council are unable to negotiate and execute a memorandum of agreement in accordance with 36 CFR 800.6(b).

DURATION

The definitions of duration for cultural landscapes are as follows:

Short-term: Effects would occur only during and shortly after construction or treatment.

Long-term: Effects would persist well beyond the duration of the construction or treatment measure, or would not be associated with a particular action such as construction or an unanticipated electrical system failure.

IMPACTS OF ALTERNATIVE A: NO ACTION

Impacts

Under the no action alternative, no changes to the monument's cultural landscapes are proposed. However, future failures of the electrical systems would require repairs that would result in impacts to the appearance of Entrance Road and could impact the historic retaining wall, stone gutters, and guardrails along Entrance Road. Although the surface of Entrance Road is currently patched and evidence of past trenching is apparent, future patching would contribute an additional adverse impact. Visible electrical infrastructure, including overhead lines, switchgears, transformers, and shut-off switches, and meters, would continue to have an adverse impact on the cultural landscapes along Entrance Road and within the Bandelier CCC Historic District/National Historic Landmark. Additionally, stray voltage from the direct buried and damaged primary electrical system would continue to increase the risk of canyon fire, which could negatively impact the appearance of the cultural landscapes.

Because impacts would be noticeable, but would not diminish the overall integrity of the cultural landscapes, alternative A would result in long-term, minor adverse impacts to cultural landscapes.

Cumulative Impacts

Past, present, and reasonably foreseeable future actions have and continue to contribute to the cumulative impact on cultural landscapes in or around the project area. These actions include the Bandelier National Monument Transportation Plan/EA, Entrance Road rehabilitation, and Frijoles Mesa improvements. The Bandelier National Monument Transportation Plan/EA could result in far fewer vehicles in Frijoles Canyon. This action could have a long-term beneficial impact to the Frijoles Canyon landscape. The rehabilitation of Entrance Road involved the resurfacing of the roadway, which resulted in short-term, minor adverse impacts during construction and short-term beneficial impacts after completion. The Frijoles Mesa improvements resulted in long-term, negligible to minor adverse impacts during construction due to the removal of some trees and changes to vegetation patterns. Overall, these actions would have a long-term, minor adverse and a long-term beneficial impact on cultural landscapes. The impacts of these other past, present, and reasonably foreseeable future actions, when combined with the long-term, minor adverse impact described above for alternative A, would result in long-term, minor adverse and long-term, beneficial cumulative impacts on cultural landscapes. Alternative A would contribute a noticeable adverse increment to this cumulative impact.

Conclusion

Alternative A would result in a direct, long-term, minor adverse impact on cultural landscapes. Overall, impacts on cultural landscapes due to visible electrical infrastructure, the appearance of Entrance Road, and the added risk of canyon fire would not diminish the overall integrity of the landscape. Alternative A would contribute a noticeable adverse increment to the long-term, minor adverse and long-term, beneficial cumulative impact.

IMPACT OF ALTERNATIVE B: TRENCHING OPTION

Impacts

Under alternative B, open-cut trenching would be used to install a new primary electrical system between the entry point and the power house. This alignment would require construction within the ecological restoration area, along Entrance Road, along Agoya Lane, and within the Bandelier CCC Historic District/National Historic Landmark. This action would result in short- and long-term impacts on the cultural landscapes.

During construction, short-term impacts on the cultural landscapes along Entrance Road and within the Bandelier CCC Historic District/National Historic Landmark would result from the presence of construction equipment and proposed improvements.

In the long-term, the construction efforts would resurface Entrance Road, remove existing visible infrastructure such as overhead lines and transformers, and install less conspicuous electrical infrastructure. The uniform appearance of Entrance Road from resurfacing could incrementally improve the appearance of the road on the cultural landscape. Compliance with LAPU standards through the installation of pull boxes also would prevent future roadwork for maintenance to the primary electrical system. However, this standard would also result in the installation of additional visible infrastructure along Entrance Road such as new pullboxes, meters, and transformers. Pull boxes would be painted in sympathetic colors and shielded from view to the extent possible to reduce impacts on the cultural landscape. The minimization of above-ground infrastructure would be in accordance with the Cultural Landscape Report treatment recommendations. Additionally, installation of an empty conduit for a future telecommunication system upgrade in the same trench as the replacement primary electrical system would minimize necessary roadwork for the new system and would therefore minimize impacts on the cultural landscape.

Despite improvements to existing impacts on the cultural landscape, infrastructure related to the monument’s primary and secondary electrical systems would continue to be visible on the cultural landscape. Because impacts could be noticeable but would be at the lowest levels of detection, with neither adverse nor beneficial consequences on the cultural landscape, alternative B would result in short-term, minor adverse impacts during construction, and long-term, negligible adverse impacts.

Cumulative Impacts

Past, present, and reasonably foreseeable future actions have and continue to contribute to the cumulative impact on cultural landscapes in or around the project area. These actions include the Bandelier National Monument Transportation Plan/EA, Entrance Road rehabilitation, and Frijoles Mesa improvements. These actions and their impacts are described under alternative A. Overall, these actions have a long-term, minor adverse and a long-term, beneficial impact on cultural landscapes. The impacts of these other past, present, and reasonably foreseeable future actions, when combined with the short-term, minor adverse impacts during construction; and long-term negligible adverse impacts described above for alternative B, would result in long-term, minor, adverse and long-term beneficial cumulative impacts on cultural landscapes. Alternative B would contribute an imperceptible adverse increment to this cumulative impact.

Conclusion

Alternative B would result in short-term, minor adverse impacts during construction, and long-term, negligible adverse impacts on cultural landscapes. Impacts on cultural landscape would primarily be related to visible electrical infrastructure and would be at the lowest levels of detection, with neither adverse nor beneficial consequences on the cultural landscape. Alternative B would contribute an imperceptible adverse increment to the long-term, minor adverse and a long-term, beneficial cumulative impact.

IMPACTS OF ALTERNATIVE C: HDD OPTION

Impacts

Under alternative C, HDD would be used to route the primary electrical system from the fire lookout tower on the mesa top to the corral/stables area in Frijoles Canyon. Open-cut trenching would be used to install the new primary electrical system between the entry point and the staging area near the fire lookout tower and between the staging area near the corral/stables area and the powerhouse. Vaults would be installed flush with the ground at both ends of the drilling alignment and would have approximate dimensions of 10 feet wide by 10 feet long by 10 feet deep. Overall ground disturbance would be minimized as much as feasible. This action would result in both short- and long-term impacts on the cultural landscapes.

During construction, short-term impacts on the cultural landscapes along Frijoles Mesa, particularly near the fire lookout tower, near the corral/stables, and within the Bandelier CCC Historic District/National Historic Landmark would result from the presence of construction equipment and proposed improvements.

Alternative C would remove existing visible infrastructure and, in general, replace it with newer, less conspicuous, electrical infrastructure; however, the new infrastructure would still be visible. Alternative C would improve the condition of Entrance Road, between Agoya Lane and the Frijoles Canyon developed area. However, because alternative C would improve less of Entrance Road than under alternative B, there are fewer associated benefits. Further, compliance with LAPU standards through the installation of pull boxes would prevent future roadwork for maintenance to the primary electrical system. However, this standard would also result in additional visible infrastructure along Entrance Road. The new above-ground infrastructure such as transformer, pullboxes, and meters would be minimally visible on the landscape. Pull boxes would be painted in sympathetic colors and shielded from view to the extent possible to reduce impacts on the cultural landscape. Additionally, installation of an empty conduit for a

future telecommunication system upgrade in the same trench as the replacement primary electrical system would minimize necessary roadwork for the new system and would therefore result in fewer impacts to the cultural landscape.

Alternative C would better minimize the installation of above-ground infrastructure than alternative B because the HDD alignment would only require at-grade vaults at either end. Though the covers of these vaults would be readily apparent, they would be installed in areas that are less noticeable to visitors. The minimization of above-ground infrastructure would be in accordance with the Cultural Landscape Report treatment recommendations. Alternative C would have less potential to impact the cultural landscape than alternative B because the majority of the replacement primary electrical system would be installed with HDD which would minimize surface construction.

Despite improvements to existing impacts on the cultural landscape, infrastructure related to the monument's primary and secondary electrical systems would continue to be visible on the cultural landscape. Because impacts could be noticeable but would be at the lowest levels of detection, with neither adverse nor beneficial consequences on the cultural landscape, alternative C would result in short-term, minor adverse impacts during construction, and long-term, negligible adverse impacts.

Cumulative Impacts

Past, present, and reasonably foreseeable future actions have and continue to contribute to the cumulative impact on cultural landscapes in or around the project area. These actions include the Bandelier National Monument Transportation Plan/EA, Entrance Road rehabilitation, and Frijoles Mesa improvements. These actions and their impacts are described under alternative A. Overall, these actions have a long-term, minor adverse and a long-term, beneficial impact on cultural landscapes. The impacts of these other past, present, and reasonably foreseeable future actions, when combined with the short-term, minor adverse impacts during construction; long-term, minor adverse impacts; and long-term beneficial impacts described above for alternative C, would result in long-term, minor, adverse and long-term beneficial cumulative impacts on cultural landscapes. Alternative C would contribute an imperceptible adverse increment to this cumulative impact.

Conclusion

Alternative C would result in short-term, minor adverse impacts during construction, and long-term, negligible adverse impacts on cultural landscapes. Impacts on cultural landscape would primarily be related to visible electrical infrastructure and would be at the lowest levels of detection, with neither adverse nor beneficial consequences on the cultural landscape. Alternative C would contribute an imperceptible adverse increment to the long-term, minor adverse and a long-term, beneficial cumulative impact.

IMPACTS ON VISITOR USE AND EXPERIENCE

METHODOLOGY

NPS *Management Policies 2006* (NPS 2006a) states that enjoyment of park resources and values by the people of the United States is part of the fundamental purpose of all parks and that the NPS is committed to providing appropriate, high-quality opportunities for visitors to enjoy parks. Past interpretive and administrative planning

documents provided background on changes to visitor use and experience over time. Anticipated impacts on visitor use and experience were analyzed using information from previous studies. For this analysis, visitor use and experience includes visitor understanding and satisfaction, site access and circulation, and visual quality. Based on these findings, the following intensity levels were developed:

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 important 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.

DURATION

The following definitions of duration for visitor use and experience are as follows:

Short-term: Effects would occur only during and shortly after construction or treatment.

Long-term: Effects would persist well beyond the duration of the construction or treatment measure, or would not be associated with a particular action such as construction or an unanticipated electrical system failure.

IMPACTS OF ALTERNATIVE A: NO ACTION

Impacts

Under the no action alternative, no changes to visitor use and experience are proposed. Future failures of the electrical systems would temporarily reduce services offered during the power outage and would require repairs that would result in impacts to the appearance of Entrance Road and visitors' ability to enter Frijoles Canyon. Visitor access to historic properties and site access and circulation in the developed area would not change. Visitors would continue to visit the monument and would be largely unaware of issues with the electrical system. However, stray voltage from the direct buried and damaged primary and secondary electrical systems would continue to have the potential to charge buildings and natural features, thereby putting visitors at risk of electric shock. Additionally, stray voltage would continue to increase the

risk of canyon fire, which could negatively impact the appearance of the monument. Views of overhead electrical lines along Agoya Lane could also impact the visual experience. The overhead lines are within the boundaries of the Bandelier CCC Historic District/National Historic Landmark, and the associated cultural landscape. Further, the deteriorating meters and disconnects associated with the monument's secondary electrical system are within the Bandelier CCC Historic District/National Historic Landmark and could reduce viewsheds for visitors in this portion of the monument., This area includes a number of visitor facilities such as the visitor center, visitor parking areas, and the main point of access for some of the most popular trails in Frijoles Canyon.

In the event of a system failure, visitors would not have access to certain services within Frijoles Canyon. Although the visitor center has continued to operate during past failures, the theatre would likely be closed. All dining and retail concessions would be unavailable. Restrooms would be replaced with port-a-potties. Because the transformer near the visitor center would not be moved out of the floodplain, the risk of failure of that transformer would increase during flood events.

Because impacts would be noticeable and visitors would likely express an opinion about the temporary conditions, alternative A would result in potential for repeated short-term, moderate adverse impacts to visitor use and experience.

Cumulative Impacts

Past, present, and reasonably foreseeable future actions have and continue to contribute to the cumulative impact on visitor use and experience in or around the project area. These actions include the Bandelier National Monument Transportation Plan/EA, Entrance Road rehabilitation, Frijoles Mesa improvements, and the impacted soil removal project. The Bandelier National Monument Transportation Plan/EA could result in a new means of entering Frijoles Canyon and fewer vehicles in the canyon. This action could have a short-term, minor adverse impact and a long-term beneficial impact on visitor use and experience. The rehabilitation of Entrance Road involved the resurfacing of the roadway, which resulting in short-term, minor adverse impacts during construction and long-term beneficial impacts. The Frijoles Mesa improvements resulted in short-term, minor adverse impacts during construction and long-term beneficial impacts due to the improvements of several aspects of the Juniper Campground. The impacted soil removal project involves the removal of soils in five areas which contain three toxic chemicals. This action could have a long-term beneficial impact on visitor use and experience removal of the contaminated soils would provide a safer environment for visitors. Further, fishing could be allowed in Frijoles Creek once it is confirmed that aquatic species are no longer impacted by the contaminants. This action could have a long-term beneficial impact on visitor use and experience because fishing could be allowed after aquatic species are no longer impacted. Overall, these actions would have a long-term beneficial impact on visitor use and experience. The impacts of these other past, present, and reasonably foreseeable future actions, when combined with the short-term, moderate adverse impact described above for alternative A, would result in short-term, moderate adverse and long-term, beneficial cumulative impacts on visitor use and experience. Alternative A would contribute a noticeable adverse increment to this cumulative impact.

Conclusion

Alternative A would result in a direct, short-term, moderate adverse impact on visitor use and experience. Overall, impacts on visitor use and experience due to risk of system failure would not diminish the overall integrity of the landscape. Alternative A would contribute an imperceptible adverse increment to the long-term, beneficial cumulative impact.

IMPACT OF ALTERNATIVE B: TRENCHING OPTION

Impacts

Under alternative B, open-cut trenching would be used to install a new primary electrical system between the entry point and the power house. This alignment would require construction within the ecological restoration area, along Entrance Road, along Agoya Lane, and within the Bandelier CCC Historic District/National Historic Landmark. This action would result in short- and long-term impacts on visitor use and experience.

During construction, short-term impacts on visitor use and experience would result from construction within Entrance Road and within the Bandelier CCC Historic District/National Historic Landmark, which would result in traffic delays and obstruction of view of the cultural landscape. As described in the mitigation measures section in “Chapter 2: Alternatives,” construction activities would occur between October 1 and February 28, which is a generally low visitation period. As a result, fewer visitors would be impacted by the partial closures of Entrance Road during construction. Because traffic delays would impact fewer visitors, the duration of the delays would likely be shorter. The exception is the annual International Albuquerque Balloon Fiesta, which occurs in the monument over 9 days in early-mid October. During this period, visitation to the monument would be greatly increased and delays along Entrance Road would likely be more prevalent. To the extent practical, construction activities in high visitor traffic areas would be minimized during the balloon fiesta. Additionally, noise from construction could impact visitor use and experience by affecting visitors themselves or by scaring away wildlife, thereby reducing viewing opportunities for visitors.

The construction efforts would result in long-term improvements to visitor use and experience through the more reliable and serviceable electrical system, resurfaced Entrance Road, and less conspicuous electrical infrastructure. Although failures of the new system would require repair work which would close one lane of Entrance Road, the failure would last no more than one day, and impacts on visitor use and experience would be negligible. The transformer near the visitor center would be moved out of the floodplain, which would further reduce the risk of failure.

The uniform appearance of Entrance Road would result in a beneficial impact on visitor use and experience. Compliance with LAPU standards through the installation of pull boxes would prevent future roadwork for maintenance to the primary electrical system. However, this standard would also result in additional visible infrastructure along Entrance Road. Pull boxes would be painted in sympathetic colors and shielded from view to the extent possible to reduce impacts on visitor use and experience. Additionally, installation of an empty conduit for a future telecommunication system upgrade in the same

trench as the replacement primary electrical system would minimize necessary roadwork for the new system and would therefore result in fewer impacts to visitor use and experience.

Because impacts would impacts during construction would be noticeable and visitors could likely express an opinion about them, but in the long term alternative B would improve visitor use and experience, this alternative would result in short-term, moderate adverse impacts during construction and long-term beneficial impacts on visitor use and experience.

Cumulative Impacts

Past, present, and reasonably foreseeable future actions that may contribute to the cumulative impact on visitor use and experience include the Bandelier National Monument Transportation Plan/EA, Entrance Road rehabilitation, Frijoles Mesa improvements, and the impacted soil removal project. These actions and their impacts are described under alternative A. Each of these actions represents beneficial impacts on visitor use and experience. The relative contribution of alternative B on visitor use and experience would be short-term, moderate, adverse and long-term beneficial. The contribution of alternative B to the cumulative impact would be noticeable and beneficial.

Conclusion

Alternative B would result in short-term, moderate adverse impacts during construction and long-term beneficial impacts on visitor use and experience. Overall, impacts on visitor use and experience due to construction methods and improved reliability of the replacement system would be readily apparent. Alternative B would contribute a noticeable beneficial increment to the long-term, beneficial cumulative impact.

IMPACTS OF ALTERNATIVE C: HDD OPTION

Impacts

Under alternative C, HDD would be used to route the primary electrical system from the fire lookout tower on the mesa top to the corral/stables area in Frijoles Canyon. Open-cut trenching would be used to install the new primary electrical system between the entry point and the staging area near the fire lookout tower and between the staging area near the corral/stables area and the powerhouse. Vaults would be installed flush with the ground at both ends of the drilling alignment and would have approximate dimensions of 10 feet wide by 10 feet long by 10 feet deep. Overall ground disturbance would be minimized as much as feasible. This action would result in short- and long-term impacts on visitor use and experience.

During construction, short-term impacts on visitor use and experience would result from construction within Entrance Road and within the Bandelier CCC Historic District/National Historic Landmark which would result in traffic delays and obstruction of view of the cultural landscape. While visual impacts would exist for a shorter time period under this alternative, the drill rig and several semi-trucks would have a greater impact on the viewsheds in Frijoles Canyon. Long-term visual impacts under this alternative would be both less beneficial because Entrance Road would not be resurfaced and less obtrusive because less electrical infrastructure would be installed. Noise from construction and drilling could impact visitor use and experience by affecting visitors themselves or by scaring away wildlife,

thereby reducing viewing opportunities for visitors. Noise impacts would last longer under this alternative and therefore would be greater than noise impacts under alternative B. Further, as outlined in the mitigation measures section of "Chapter 2: Alternatives," construction activities would occur between October 1 and February 28, which is generally a low visitation period. As a result, fewer visitors would be impacted by the partial closures of Entrance Road during construction. Because traffic delays would impact fewer visitors, the duration of the delays would likely be shorter. The exception is the annual International Albuquerque Balloon Fiesta, which occurs in the monument over 9 days in early-mid October. During this period visitation to the monument would be greatly increased and delays along Entrance Road would likely be more prevalent. To the extent practical, construction activities in high visitor traffic areas would be minimized during the balloon fiesta.

The construction efforts would result in long-term improvements to visitor use and experience through the more reliable and serviceable electrical system and less conspicuous electrical infrastructure. Although failures of the new system would require repair work which would last no more than one day while the redundant system is activated, and impacts on visitor use and experience would be negligible. The transformer near the visitor center would be moved out of the floodplain, which would further reduce the risk of failure.

Because impacts would be noticeable during construction and visitors could likely express an opinion about them, and in the long term alternative C would improve visitor use and experience, this alternative would result in short-term, moderate adverse impacts and long-term beneficial impacts on visitor use and experience. Adverse impacts would be less than under alternative B, and beneficial impacts would be greater than under alternative B.

Cumulative Impacts

Past, present, and reasonably foreseeable future actions have and continue to contribute to the cumulative impact on visitor use and experience in or around the project area. These actions include the Bandelier National Monument Transportation Plan/EA, Entrance Road rehabilitation, Frijoles Mesa improvements, and the impacted soil removal project. These actions and their impacts are described under alternative A. Overall, these actions have a long-term, beneficial impact on visitor use and experience. The impacts of these other past, present, and reasonably foreseeable future actions, when combined with the short-term, moderate adverse impacts during construction and long-term beneficial impacts described above for alternative C, would result in long-term beneficial cumulative impacts on visitor use and experience. Alternative C would contribute a noticeable beneficial increment to this cumulative impact.

Conclusion

Alternative C would result in short-term, moderate adverse impacts during construction and long-term beneficial impacts on visitor use and experience. Overall, impacts on visitor use and experience due to construction methods and improved reliability of the replacement system would be readily apparent. Alternative C would contribute a noticeable beneficial increment to the long-term, beneficial cumulative impact.

IMPACTS ON MONUMENT OPERATIONS

METHODOLOGY

Impact analyses are based on the current description of monument operations presented in this document. As noted above, monument operations include the ability to maintain the infrastructure used in the operation of the monument, provide adequate electrical service, and meet emergency protocol in order to adequately protect and preserve vital resources and provide for an effective and safe visitor experience. The evaluation of impacts to monument operations included a consideration of the following:

- Service level: The current secondary system does not provide a standard level of service.
- Ability to respond to emergencies: During times of failure in 2011, the monument spent more than $50,000 on emergency response and repairs including running generators, renting port-a-potties, protecting sensitive museum displays, etc.
- Maintenance requirements: Monument staff and funding cannot support the task and costs associated with the aging system. Past failures have used large portions of the maintenance budget.

The thresholds of change for the intensity of this impact are defined as follows:

Negligible: Monument operations would not be affected, or the effects would be at low levels of detection and would not have an appreciable effect on monument operations.

Minor: The effect would be detectable and likely short-term, but would be of a magnitude that would not have an appreciable effect on monument operations. If mitigation was needed to offset adverse effects, it would be simple and likely successful.

Moderate: The effects would be readily apparent, likely long-term, and would result in a substantial change in monument operations in a manner noticeable to staff and to the public. Mitigation measure would be necessary to offset adverse effects and would likely be successful.

Major: The effects would be readily apparent, long-term, would result in a substantial change in monument operations in a manner noticeable to staff and the public and be markedly different from existing operations. Mitigation measure to offset adverse effects would be needed, would be extensive and their success could not be guaranteed.

DURATION

The definitions of duration for monument operations are as follows:

Short-term: Effects would occur only during and shortly after construction or treatment.

Long-term: Effects would persist well beyond the duration of the construction or treatment measure, or would not be associated with a particular action such as construction or an unanticipated electrical system failure.

IMPACTS OF ALTERNATIVE A: NO ACTION

Impacts

Under the no action alternative, no changes to monument operations are proposed. Future failures of the electrical systems would temporarily interrupt the ability of monument staff to perform their day-to-day tasks and serve visitors. The monument would incur substantial costs to repair to the electrical system and maintain basic functions with back-up generators. Concessioners' businesses would suffer due to closures during power outages. Staff who reside in Frijoles Canyon would continue to be inconvenienced by power outages. Further, as failures continue in the monument's primary electrical system, "thumping" and open-cut trenching along Entrance Road to locate and repair the source of failure would temporarily reduce ease of entering/exiting Frijoles Canyon. This could particularly affect staff who live in Frijoles Canyon and emergency vehicles. Additionally, maintenance of the primary and secondary electrical systems would continue to be insufficient, and damage to both systems would be more likely during construction projects. For example, the transformers in Frijoles Canyon would continue to rust and the underlying pads would continue to deteriorate, potentially allowing moisture and animals into the pads and making them more susceptible to damage. Because the transformers are outdated oil-filled models, they have the potential to contain hazardous materials. If the transformers are damaged, these hazardous materials could spill out, contaminating the surrounding area. It is anticipated that any release of hazardous materials would be localized, but would require monument staff to contain and clean-up the release.

Because impacts would be temporary but readily apparent, alternative A would result in potential for repeated short-term, moderate adverse impacts to monument operations.

Cumulative Impacts

Past, present, and reasonably foreseeable future actions have and continue to contribute to the cumulative impact on monument operations in or around the project area. These actions include the Bandelier National Monument Transportation Plan/EA, Frijoles Mesa improvements, and utility replacements and upgrades. The Bandelier National Monument Transportation Plan/EA could result in a beneficial impact on monument operations through less staff time spent directing traffic and managing monument capacity. The Frijoles Mesa improvements resulted in long-term beneficial impacts due to improvements to a maintenance facility. Past utility replacements and upgrades include the gas line replacement, the sewer force main replacement, an electrical upgrade, and the force main replacement. These actions all resulted in long-term beneficial impacts on monument operations. Overall, these actions would have a long-term beneficial impact on

monument operations. The impacts of these other past, present, and reasonably foreseeable future actions, when combined with the short-term, moderate adverse impact described above for alternative A, would result in short-term, moderate adverse and long-term, beneficial cumulative impacts on monument operations. Alternative A would contribute a noticeable adverse increment to this cumulative impact.

Conclusion

Alternative A would result in a direct, short-term, moderate adverse impact on monument operations. Overall, impacts on monument operations due to risk of system failure would not result in an extended, substantial change to monument operations. Alternative A would contribute a noticeable adverse increment to the long-term, beneficial cumulative impact, meaning that although the cumulative impact would continue to be beneficial, the impacts of alternative A would lessen the overall benefits.

IMPACT OF ALTERNATIVE B: TRENCHING OPTION

Impacts

Under alternative B, open-cut trenching would be used to install a new primary electrical system between the entry point and the power house. This alignment would require construction within the ecological restoration area, along Entrance Road, along Agoya Lane, and within the Bandelier CCC Historic District/National Historic Landmark. This action would result in short- and long-term impacts on monument operations.

LAPU would own and maintain the monument's primary electrical system after its installation. The transfer of ownership would benefit the monument by strengthening monument relationships with Los Alamos County and reducing the monument's annual maintenance costs. The new primary and secondary electrical systems would have less potential for failures; therefore, the monument operations budget would not suffer from repeated, costly electrical system failures as it has in recent years. Further, the county has specialized staff who could respond quickly to a failure, the monument would not have to hire outside maintenance support.

During construction, short-term impacts on monument operations would result from construction within Entrance Road and within the Bandelier CCC Historic District/National Historic Landmark which would result in traffic delays. Additionally, noise from construction could impact monument operations by exposing staff to prolonged construction noise. Construction within Frijoles Canyon could impact air quality. BMPs would be used to reduce potential for impacts on air quality.

Although failures of the new system would require repair work which would close one lane of Entrance Road, the failure would not likely last more than one day, and impacts on monument operations would be negligible. The relocated transformer near the visitor center would be less susceptible to flood damage and would its risk of failure would be reduced. Monument facilities, including staff housing, would experience fewer power outages and would sustain less damage from faults. Similarly, the new system would provide a standard power supply of 240/120 volts, and monument appliances would sustain less wear.

Because adverse impacts would be limited to the construction period and the lasting impact would be an improvement to monument operations, alternative B would result in short-term, minor adverse impacts during construction and long-term beneficial impacts on monument operations.

Cumulative Impacts

Past, present, and reasonably foreseeable future actions have and continue to contribute to the cumulative impact on monument operations in or around the project area. These actions include the Bandelier National Monument Transportation Plan/EA, Frijoles Mesa improvements, and utility replacements and upgrades. These actions and their impacts are described under alternative A. Overall, these actions have a long-term, beneficial impact on monument operations. The impacts of these other past, present, and reasonably foreseeable future actions, when combined with the short-term, minor adverse impacts during construction and long-term beneficial impacts described above for alternative B, would result in long-term beneficial cumulative impacts on monument operations. Alternative B would contribute a noticeable beneficial increment to this cumulative impact.

Conclusion

Alternative B would result in direct short-term, minor adverse impacts during construction and long-term beneficial impacts on monument operations. Overall, impacts on monument operations due to reduced risk of system failure would result in an overall improvement to monument operations. Most notably, the reduced failure risk would reduce the monument's associated maintenance costs. Alternative B would contribute a noticeable beneficial increment to the long-term, beneficial cumulative impact.

IMPACTS OF ALTERNATIVE C: HDD OPTION

Impacts

Under alternative C, HDD would be used to run the primary electrical system from the fire lookout tower on the mesa top to the corral/stables area in Frijoles Canyon. Open-cut trenching would be used to install the new primary electrical system between the entry point and the staging area near the fire lookout tower and between the staging area near the corral/stables area and the powerhouse. This action would result in short- and long-term impacts on monument operations.

LAPU would own and maintain the monument's primary electrical system after its installation. The transfer of ownership would benefit the monument by strengthening monument relationships with Los Alamos County and reducing the monument's annual maintenance costs. The new primary and secondary electrical systems would have less potential for failures; therefore, the monument operations budget would not suffer from repeated, costly electrical system failures as it has in recent years. Further, the county has specialized staff who could respond quickly to a failure, the monument would not have to hire outside maintenance support. The latter beneficial impact would be less than under alternative B because Los Alamos County does not currently have experience with HDD. This alternative would also be substantially more costly to construct than alternative B.

During construction, short-term impacts on monument operations would result from construction within Entrance Road and within the Bandelier CCC Historic District/National Historic Landmark which would

result in traffic delays. However, impacts from these delays would be much less than under alternative B. Construction across Entrance Road and to the staging area near the fire lookout tower would result in reduced and inconvenient access to Frijoles Canyon and the fire lookout tower. Additionally, noise from construction could impact monument operations by exposing staff to prolonged construction noise.

Although failures of the new system could require repair work which would close one lane of Entrance Road, the failure would not likely last more than one day, and impacts on monument operations would be negligible. Repairs to the system segment installed through HDD would also result in very short outages and negligible impacts on monument operations. The relocated transformer near the visitor center would be less susceptible to flood damage and would its risk of failure would be reduced. Monument facilities, including staff housing, would experience fewer power outages and would sustain less damage from faults. Similarly, the new system would provide a standard power supply of 240/120 volts, and monument appliances would sustain less wear.

Because adverse impacts would be limited to the construction period and the lasting impact would be an improvement to monument operations, alternative C would result in short-term, minor adverse impacts during construction and long-term beneficial impacts on monument operations.

Cumulative Impacts

Past, present, and reasonably foreseeable future actions have and continue to contribute to the cumulative impact on monument operations in or around the project area. These actions include the Bandelier National Monument Transportation Plan/EA, Frijoles Mesa improvements, and utility replacements and upgrades. These actions and their impacts are described under alternative A. Overall, these actions have a long-term, beneficial impact on monument operations. The impacts of these other past, present, and reasonably foreseeable future actions, when combined with the short-term, minor adverse impacts during construction and long-term beneficial impacts described above for alternative C, would result in long-term beneficial cumulative impacts on monument operations. Alternative C would contribute a noticeable beneficial increment to this cumulative impact.

Conclusion

Alternative C would result in direct short-term, minor adverse impacts during construction and long-term beneficial impacts on monument operations. Overall, impacts on monument operations due to reduced risk of system failure would result in an overall improvement to monument operations. Alternative C would contribute a noticeable beneficial increment to the long-term, beneficial cumulative impact.

5

CONSULTATION AND COORDINATION

Director's Order 12 requires the NPS to make "diligent" efforts to involve the interested and affected public in the NEPA process. This process helps to determine the important issues and eliminate those that are not; allocate assignments among the interdisciplinary team members and/or other participating agencies; identify related projects and associated documents; identify other permits, surveys, consultations, etc. required by other agencies; and create a schedule that allows adequate time to prepare and distribute the environmental document for public review and comment before a final decision is made. This chapter documents the scoping process for the EA, identifies future compliance needs and permits, and includes the list of preparers for the document.

THE SCOPING PROCESS

The scoping process is initiated at the beginning of a NEPA project to identify the range of issues, resources, and alternatives to be addressed in the EA. Typically both internal and public (including agency) scoping is conducted to address these elements. State and federal agencies were also contacted to uncover any additional planning issues and to fulfill statutory requirements, as described in the following sections. The planning process for this project was initiated during the internal scoping efforts, which began in August 2013. This process introduced the purpose of and need for the project as well as the preliminary alternatives.

INTERNAL SCOPING

The internal scoping process for this project began on August 15-16, 2013, when staff from the monument, the NPS Denver Service Center and their consultants, and the LAPU conducted project kick-off meetings at the monument. During the meetings, the group toured the project area to view the route of the existing electrical system and identify areas of specific concern. The team discussed the purpose of and need for the project and planning issues that should be considered during development of this EA. The team also established roles and began discussions on impact topics and alternatives. The planning team continued to meet and hold discussions throughout the planning process. Additionally, on December 3 and 4, 2013, NPS personnel conducted a Value Analysis workshop to fully review the options for the replacement primary and secondary electrical systems in Frijoles Canyon. During the Value Analysis, the study team conducted a Choosing by

Advantages evaluation to weigh the different options and identify the NPS Preferred Alternative presented in "Chapter 2: Alternatives" of this EA.

PUBLIC SCOPING

The NPS sent out a press release on October 23, 2013 announcing the public scoping period for this EA. An announcement about the public scoping period was also posted on the NPS PEPC website. The public scoping comment period extended from October 23 until November 25, 2013 to solicit input on the project. Two agency letters and one tribal letter were received during the public comment period. Agency and tribal consultation is described in the following sections and incorporated into this EA as appropriate. Comments were accepted via mail, email, and on the NPS PEPC website.

AGENCY, TRIBAL, AND ORGANIZATION CONSULTATION

Scoping letters were sent to the following agencies, tribes, and organizations to notify them of the project and to solicit input: USFWS, U.S. Army Corps of Engineers, SHPO, New Mexico Environment Department (NMED), New Mexico Department of Game and Fish, Los Alamos County Council, Los Alamos County Administrator, Los Alamos County Department of Community and Economic Development, Los Alamos County Office of Emergency Management, Sandoval County Commissioners (District 5), Los Alamos Chamber of Commerce, Los Alamos Department of Public Utilities, Los Alamos Meeting and Visitor Bureau, Santa Fe City Council, and Santa Fe County Commissioners (District 1). Responses received to date have been incorporated throughout this EA, as appropriate. Consultation completed in accordance with section 106 of the *National Historic Preservation Act* and section 7 of the *Endangered Species Act* is summarized below.

SECTION 106 OF THE NATIONAL HISTORIC PRESERVATION ACT

Section 106 of the *National Historic Preservation Act* requires federal agencies to take into account the effects of their undertakings on historic properties. This EA evaluates impacts on cultural resources according to NPS *Management Policies 2006*. The NPS has engaged in ongoing consultation during project development with the monument's Cultural Resources Management (CRM) team. Consultation has included developing georeferenced polygons of cultural sites along and near the route of the NPS Preferred Alternative, to assure that the design is developed to avoid all known cultural resources. Additionally, CRM team consultation has included developing design criteria for proposed above ground features in the cultural landscape, to minimize the prominence of these new additions to the landscape through selecting appropriate locations and controlling color and reflectivity. The NPS intends to complete section 106 consultation with the New Mexico Office of Historic Preservation using the Standard Review Process outlined in the *Programmatic Agreement Among the National Park Service, the Advisory Council on Historic Preservation, and the National Conference of State Historic Preservation Officers for Compliance with Section 106 of the National Historic Preservation Act* per 36 CFR Part 800.

In addition, although section 106 compliance for this project is being carried out separately by the NPS and is not included in this EA, the public review processes for NEPA and section 106 have been coordinated in

compliance with Advisory Council on Historic Preservation and CEQ guidance. Public input in accordance with section 106 was solicited in conjunction with scoping for this EA, and the public was notified that they may comment on how the alternatives may affect historic properties as part of the public review process of this EA. In letters dated October 22, 2013, NPS notified the SHPO and the six Pueblo tribes listed below of the project and invited participation in the scoping process. These letters also initiated section 106 consultation for the project. Tribal consultation completed to date is summarized below in the "Tribal Consultation" section. On November 20, 2013, the SHPO responded to the monument, stating their interest in working with the NPS on this project. Applicable cultural resource information, including potential impacts associated with the proposed alternatives is documented in this EA but does not constitute section 106 compliance.

SECTION 7 OF THE ENDANGERED SPECIES ACT

The *Endangered Species Act* mandates that all federal agencies consider the potential impacts of their actions on species listed as threatened or endangered in order to protect the species and preserve their habitats. In letters dated October 22, 2013, NPS invited the USFWS and NMDGF to participate in scoping for the project and formally initiated consultation regarding listed or proposed threatened or endangered species or critical habitats that might occur in the project vicinity. In a response letter dated November 14, 2013, NMDGF provided NPS with a list of species of concern known to occur in Los Alamos and Sandoval Counties. Potential impacts to these species were evaluated during the planning process for this EA. It is unlikely that the alternatives evaluated in this EA would impact any of the species listed by NMDGF and; therefore, the impact topic of special status species was considered but dismissed from further analysis (see "Chapter 1: Purpose and Need"). The NPS will provide the USFWS and NMGF with copies of the EA and, prior to signing the Finding of No Significant Impact (FONSI), will continue to coordinate with them to acquire concurrence regarding the potential to impact federally threatened or endangered species.

TRIBAL COORDINATION

October 23, 2013, scoping/consultation letters were sent to the six Pueblo tribes with interests in the project area, notifying them of the project, formally initiating section 106 consultation, and requesting input. Letters were sent to the Pueblo of Cochiti, Pueblo of San Felipe, Pueblo of San Ildefonso, Pueblo of Zuni, Pueblo of Santo Domingo, and Pueblo of Santa Clara. In a response letter dated November 21, 2013, the Pueblo de San Ildefonso requested that the NPS "consider alternatives that would not disturb the land past the current condition" (see "Appendix A: Relevant Correspondence"). The monument will provide the tribes with a copy of this document and will continue to consult with them as the project moves forward.

FUTURE COMPLIANCE NEEDS/PERMITS

Implementation of the NPS Preferred Alternative would require that the NPS abide by applicable laws and regulations. NPS will continue to consult with the SHPO and tribes throughout the life of the project. Hazardous materials generated during project construction would be disposed of according to EPA regulations. The contractor also will consult with the appropriate authority having jurisdiction in the study area to ensure the proper permits are in place prior to any development activities.

Prior to any ground disturbance, the proper authorities will obtain all necessary permits and approvals including:

- approval of the plan by LAPU
- approved Erosion and Sedimentation Control Plan
- National Pollution Discharge Elimination System permit
- Los Alamos County Access, Utility, or Construction permits
- concurrence from the New Mexico SHPO per section 106 of the *National Historic Preservation Act*; this may include preparation of a MOA or similar agreement
- concurrence from the USFWS and NMFS per section 7 of the *Endangered Species Act*

LIST OF PREPARERS AND CONTRIBUTORS

This document was prepared by Vanasse Hangen Brustlin, Inc., in coordination with Dr. Elizabeth Oster and staff from HDR, Inc., with input from staff at the monument, NPS Denver Service Center, and NPS Intermountain Regional Office. The roles of key staff are listed in the following tables.

PREPARERS

Vanasse Hangen Brustlin, Inc.		
Kimberly Threlfall	Project Manager	Guidance of the National Environmental Policy Act process; document preparation; document review; and project management
Tricia Wingard	NPS Program Manager	Guidance of the National Environmental Policy Act process and document review
Mariah Murphy	Junior Environmental Planner	Document preparation
Tim Davis	Senior Environmental Scientist	Natural resources review and analysis
Jim O'Brien	Senior Environmental Scientist	Natural resources review and analysis
Rita Walsh	Senior Preservation Planner	Cultural resources review and analysis
Margaret Beavers	Environmental Scientist	Graphics and Geographic Information System analysis
Jemez Mountains Research Center, LLC		
Elizabeth Oster	Archeologist	Cultural resources review and analysis
HDR, Inc.		
Bob Rogers	Project Manager (Alternatives Development)	Alternatives development
Terry McArthur	Senior Design Engineer	Alternatives development
Kevin Thernes	Electrical Engineer	Alternatives development

CONTRIBUTORS AND REVIEWERS

Bandelier National Monument	
Jason Lott	Superintendent
Barbara Judy	Chief of Resources
Rory Gauthier	Archeologist
NPS Denver Service Center	
Andrea Vaughn	Project Manager
Douglas Denk	Project Specialist
Connie Chitwood	Natural Resource Specialist
Margo Brooks	Cultural Resource Specialist
Intermountain Region Office	
Cheryl Eckhardt	Environmental Compliance Specialist

PUBLIC REVIEW

This EA will be on formal public and agency review for 30 days and has been distributed to a variety of interested individuals, agencies, and organizations. It also is available on the internet at http://parkplanning.nps.gov/band. In conjunction with collecting comments on the impacts the project may have on the human environment, NPS is also soliciting comments or concerns regarding the effects that the project may have on historic properties in accordance with section 106 of the *National Historic Preservation Act*. If you wish to comment in accordance with section 106 you may do so through the process outlined above.

This page intentionally left blank

REFERENCES

Comer, P., D. Faber-Langendoen, R. Evans, S. Gawler, C. Josse, G. Kittel, S. Menard, M. Pyne, M. Reid, K. Schulz, K. Snow, and J. Teague.

2003 *Ecological Systems of the United States: A Working Classification of U.S. Terrestrial Systems*. NatureServe, Arlington, Virginia.

Council on Environmental Quality, Executive Office of the President

1997 *Considering Cumulative Effects Under the National Environmental Policy Act*

Dunker, K., Wolff, J., Harmon, R., Leat, P., Dicken, A., and Thompson, R.

1991 *Diverse Mantle and Crustal Components in Lavas of the NW Cerros del Rio Volcanic Field, Rio Grande Rift, New Mexico.* Contributions to Mineralogy and Petrology, v. 108, p. 331-345.

Goff, Fraser, Gardner, Jamie N., and Steven L. Reneau

2002 *Preliminary Geologic Map of the Frijoles Quadrangle, Los Alamos and Sandoval Counties, New Mexico*. U.S. Geological Survey, National Cooperative Geologic Mapping Program in cooperation with the New Mexico Bureau of Geology and Mineral Resources.

Griggs, Roy L.

1964 *Geology and Groundwater Resources of the Los Alamos Area New Mexico* (with a section on Water Quality by John D. Hem). Geological Survey Water-Supply Paper 1753. Prepared in cooperation with the Atomic Energy Commission.

HDR, Inc.

2013 *100% Predesign Report*. Replace Frijoles Canyon Section of Primary and Secondary Electrical Systems.

Hewett, Edgar L.

1916 The Proposed National Park of Cliff Cites. *Papers of the School of American* Archeology, No. 34. Archeological Institute of America.

Mindeleff, Cosmos

1896 Aboriginal Remains in the Verde Valley, Arizona. In *Thirteenth Annual Report of the Bureau of American Ethnology*, J. W. Powell, ed., pp. 179-261. U.S. Government Printing Office, Washington, D.C.

National Park Service (NPS)

1977 *Final Master Plan*. Bandelier National Monument. New Mexico.

1985 National Historic Landmark nomination, Bandelier National Monument CCC Historic District.

1990 *Statement for Management*. Bandelier National Monument.

1995a *Resources Management Plan*. Bandelier National Monument.

1995b *Draft Development Concept Plans* and *Finding of No Significant Impact for the Frijoles Canyon and Tsankawi*. Bandelier National Monument, New Mexico.

2001 *Director's Order 12 Handbook: Conservation Planning, Environmental Impact Analysis, and Decision-making*. NPS Office of Policy.

2002a Director's Order #28: *Cultural Resource Management*.

2002b *The Historic Period at Bandelier National Monument*. Intermountain Cultural Resources Management, Professional Paper No. 63.

2004 *Procedural Manual 77-2: Floodplain Management*. Available at: http://www.nature.nps.gov/rm77/floodplain.cfm. Accessed March 2014.

2005 Frijoles and Alamo Headquarters Public Access Project Environmental Assessment/Assessment of Effect. Bandelier National Monument. 123pp.

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

2006b *Cultural Landscape Inventory: Frijoles Canyon, Bandelier National Monument*.

2007 *Final Ecological Restoration Plan and Environmental Impact Statement.* Bandelier National Monument. Los Alamos and Sandoval Counties, New Mexico. July 2011.

2011a *Trip Report: Bandelier Electrical System*. Bandelier National Monument. Los Alamos, New Mexico.

2011b Vegetation Classification and Map: Bandelier National Monument. Natural Resource Technical Report NPS/SCPN/NRTR-2011/438.

2013 PMIS for the Replace Frijoles Canyon Section of Primary Electrical System project at Bandelier National Monument.

2012 *Procedural Manual 77-1: Wetland Protection*. Available at: http://www.nature.nps.gov/water/wetlands/assets/docs/DO_77-1_PROC_MANUAL_2012_Revision_FINAL.pdf. Accessed January 2014.

2014a Completing the Archeological Inventory. Bandelier National Monument website. Available at http://www.nps.gov/band/parkmgmt/completing-the-archeological-inventory.htm. Accessed January 6, 2014.

2014b NPS Stats Website. Annual Park Visitation Report. Available at: http://www.nature.nps.gov/stats/. Accessed December 2013.

Natural Resources Conservation Service (NRCS), U.S. Department of Agriculture

2009 Special Project Soil Survey of Bandelier National Monument.

2014 *Custom Soil Resource Report for Sandoval County Area, New Mexico, Parts of Los Alamos, Sandoval, and Rio Arriba Counties: Bandelier Electrical Systems.* Generated on January 9, 2014.

New Mexico Institute of Mining and Technology, New Mexico Bureau of Geology and Mineral Resources (NMBGM)

2003 *Geologic Map of New Mexico. Prepared by Peter Scholle. Published in cooperation with the U.S. Geological Survey.*

Patterson, Mark A.

1996 *Bandelier National Monument Visitor Study: Summer 1995*. Report 76. Visitor Services Project, Cooperative Park Studies Unit, University of Idaho.

Price, L. Greer, ed.

2010 *The Geology of Northern New Mexico's Parks, Monuments, and Public Lands*. Socorro, New Mexico. New Mexico Bureau of Geology and Mineral Resources.

Reneau and Dethier

1996 *Pliocene and Quaternary History of the Rio Grande, White Rock Canyon and Vicinity, New Mexico, in* (Goff, F., Kues, B. S., Rogers, M. A., McFadden, L. D., and Gardner, J. N., eds.), The Jemez Mountains region: New Mexico Geological Society Forty-Seventh Annual Field Conference Guidebook, p. 317-324.

Reneau, S. L.

2000 *Stream Incision and Terrace Development in Frijoles Canyon, Bandelier National Monument, New Mexico, and the Influence of Lithology and Climate*. Geomorphology, v. 32, p. 171-193.

Toll, H. Wolcott

1995 *An Analysis of Variability and Condition of Cavate Structures in Bandelier National Monument*. Contribution #3 of the Bandelier Archeological Survey, Anthropology Program, Department of the Interior, National Park Service. US Government Printing Office, Washington, D.C.

United States Department of Agriculture

2013 Topographic Map for the USGS Los Alamos Quadrangle. Available online at http://sar.lanl.gov/topo_maps/35106/data/f35106e1.tif. Accessed November 2013.

United State Fish and Wildlife Service (USFWS)

1995 *Recovery Plan for the Mexican Spotted Owl (Strix oddidentalis lucida)*. U.S. Department of the Interior, Fish and Wildlife Service, Southwestern Region. December 1995.

Yeh and Associates, Inc.

2006 *Final Geotechnical Evaluation Report*. Bandelier Visitor Center – Rehabilitation. Bandelier National Monument, New Mexico. Prepared for DHM Design Corporation, Denver, CO.

APPENDIX A: RELEVANT CORRESPONDENCE

GOVERNOR
Susana Martinez

ACTING DIRECTOR AND SECRETARY
TO THE COMMISSION
R.J. Kirkpatrick

DEPUTY DIRECTOR
Daniel E. Brooks

STATE OF NEW MEXICO
DEPARTMENT OF GAME & FISH

One Wildlife Way, Santa Fe, NM 87507

Post Office Box 25112, Santa Fe, NM 87504

Tel: (505) 476-8000 | Fax: (505) 476-8123

For information call: (888) 248-6866

www.wildlife.state.nm.us

November 14, 2013

D. Jason Lott, Superintendent
National Park Service
Bandelier National Monument
15 Entrance Road
Los Alamos, NM 87544-9508

RE: Bandelier National Monument Electrical System; NMDGF No. 16073

Dear Mr. Lott:

In response to your letter dated 22 October 2013 regarding the above referenced project, enclosed is a list of species of concern that occur in Los Alamos and Sandoval counties. Other sources of information are listed below.

Included below are sources of additional information:

1. For Biota Information System of New Mexico (BISON-M) species accounts, searches, and county lists go to bison-m.org.
2. For the Department's Habitat Handbook Project guidelines go to wildlife.state.nm.us/conservation/habitat_handbook/index.htm.
3. For custom, site-specific database searches on plants and wildlife go to nhnm.unm.edu, then go to Data, Free On-Line Data, and follow the directions.
4. For state-listed plants contact the New Mexico State Forestry Division at (505) 476-3334) or nmrareplants.unm.edu/index.html.
5. For the most current listing of federally listed species **always** check the U.S. Fish and Wildlife Service at (505) 346-2525 or fws.gov/southwest/es/NewMexico/SBC.cfm.

We look forward to the opportunity to review and comment on the EA in spring 2014 once it becomes available. If you have any questions, please contact me at (505) 476-8114 or kenneth.cunningham@state.nm.us.

Sincerely,

Kenneth K. Cunningham, Assistant Chief
Ecological and Environmental Planning Division

Enc.: 2
cc: USFWS NMES Field Office

NEW MEXICO WILDLIFE OF CONCERN
SANDOVAL COUNTY

For complete up-dated information on federal-listed species, including plants, see the US Fish & Wildlife Service NM Ecological Services Field Office website at http://www.fws.gov/southwest/es/NewMexico/SBC.cfm. For information on state-listed plants, contact the NM Energy, Minerals and Natural Resources Department, Division of Forestry, or go to http://nmrareplants.unm.edu/. If your project is on Bureau of Land Management, contact the local BLM Field Office for information on species of particular concern. If your project is on a National Forest, contact the Forest Supervisor's office for species information. E = Endangered; T = Threatened; s = sensitive; SOC = Species of Concern; C = Candidate; Exp = Experimental non-essential population; P = Proposed

Common Name	Scientific Name	NMGF	US FWS	critical habitat
Rio Grande Cutthroat Trout	Oncorhynchus clarki	s	C	
Rio Grande Chub	Gila pandora	s		
Rio Grande Silvery Minnow	Hybognathus amarus	E	E	Y
Jemez Mountains Salamander	Plethodon neomexicanus	E	C	
Brown Pelican	Pelecanus occidentalis	E		
Neotropic Cormorant	Phalacrocorax brasilianus	T		
Bald Eagle	Haliaeetus leucocephalus	T		
Northern Goshawk	Accipiter gentilis	s	SOC	
Common Black-Hawk	Buteogallus anthracinus	T	SOC	
Peregrine Falcon	Falco peregrinus	T	SOC	
Mountain Plover	Charadrius montanus	s	SOC	
Yellow-billed Cuckoo	Coccyzus americanus	s	C	
Mexican Spotted Owl	Strix occidentalis lucida	s	T	Y
Burrowing Owl	Athene cunicularia		SOC	
Black Swift	Cypseloides niger	s		
Broad-billed Hummingbird	Cynanthus latirostris	T		
Costa's Hummingbird	Calypte costae	T		
Southwestern Willow Flycatcher	Empidonax traillii extimus	E	E	Y
Loggerhead Shrike	Lanius ludovicianus	s		
Gray Vireo	Vireo vicinior	T		
Baird's Sparrow	Ammodramus bairdii	T	SOC	
Sprague's Pipit	Anthus spragueii		C	
Western Small-footed Myotis Bat	Myotis ciliolabrum melanorhinus	s		
Yuma Myotis Bat	Myotis yumanensis yumanensis	s		
Little Brown Myotis Bat	Myotis lucifugus carissima	s		
Occult Little Brown Myotis Bat	Myotis lucifugus occultus	s		
Long-legged Myotis Bat	Myotis volans interior	s		
Fringed Myotis Bat	Myotis thysanodes thysanodes	s		
Long-eared Myotis Bat	Myotis evotis evotis	s		
Spotted Bat	Euderma maculatum	T		
Pale Townsend's Big-eared Bat	Corynorhinus townsendii pallescens	s	SOC	
Big Free-tailed Bat	Nyctinomops macrotis	s		
Goat Peak Pika	Ochotona princeps nigrescens	s	SOC	
Gunnison's Prairie Dog (prairie)	Cynomys gunnisoni	s		
Gunnison's Prairie Dog (montane)	Cynomys gunnisoni	s	C	
New Mexican Jumping Mouse	Zapus hudsonius luteus	E	C	
American Marten	Martes americana origenes	T		
Black-footed Ferret	Mustela nigripes		E	

NEW MEXICO WILDLIFE OF CONCERN
SANDOVAL COUNTY

For complete up-dated information on federal-listed species, including plants, see the US Fish & Wildlife Service NM Ecological Services Field Office website at http://www.fws.gov/southwest/es/NewMexico/SBC.cfm. For information on state-listed plants, contact the NM Energy, Minerals and Natural Resources Department, Division of Forestry, or go to http://nmrareplants.unm.edu/. If your project is on Bureau of Land Management, contact the local BLM Field Office for information on species of particular concern. If your project is on a National Forest, contact the Forest Supervisor's office for species information. E = Endangered; T = Threatened; s = sensitive; SOC = Species of Concern; C = Candidate; Exp = Experimental non-essential population; P = Proposed

Common Name	Scientific Name	NMGF	US FWS	critical habitat
Wrinkled Marshsnail	Stagnicola caperata	E		
Socorro Mountainsnail	Oreohelix neomexicana	s		

NEW MEXICO WILDLIFE OF CONCERN
LOS ALAMOS COUNTY

For complete up-dated information on federal-listed species, including plants, see the US Fish & Wildlife Service NM Ecological Services Field Office website at http://www.fws.gov/southwest/es/NewMexico/SBC.cfm. For information on state-listed plants, contact the NM Energy, Minerals and Natural Resources Department, Division of Forestry, or go to http://nmrareplants.unm.edu/. If your project is on Bureau of Land Management, contact the local BLM Field Office for information on species of particular concern. If your project is on a National Forest, contact the Forest Supervisor's office for species information. E = Endangered; T = Threatened; s = sensitive; SOC = Species of Concern; C = Candidate; Exp = Experimental non-essential population; P = Proposed

Common Name	Scientific Name	NMGF	US FWS	critical habitat
Rio Grande Chub	Gila pandora	s		
Jemez Mountains Salamander	Plethodon neomexicanus	E	C	
Bald Eagle	Haliaeetus leucocephalus	T		
Northern Goshawk	Accipiter gentilis	s	SOC	
Peregrine Falcon	Falco peregrinus	T	SOC	
Yellow-billed Cuckoo	Coccyzus americanus	s	C	
Mexican Spotted Owl	Strix occidentalis lucida	s	T	Y
Burrowing Owl	Athene cunicularia		SOC	
Broad-billed Hummingbird	Cynanthus latirostris	T		
Southwestern Willow Flycatcher	Empidonax traillii extimus	E	E	Y
Loggerhead Shrike	Lanius ludovicianus	s		
Gray Vireo	Vireo vicinior	T		
Western Small-footed Myotis Bat	Myotis ciliolabrum melanorhinus	s		
Long-legged Myotis Bat	Myotis volans interior	s		
Spotted Bat	Euderma maculatum	T		
Pale Townsend's Big-eared Bat	Corynorhinus townsendii pallescens	s	SOC	
Big Free-tailed Bat	Nyctinomops macrotis	s		
Goat Peak Pika	Ochotona princeps nigrescens	s	SOC	
Gunnison's Prairie Dog (montane)	Cynomys gunnisoni	s	C	
Black-footed Ferret	Mustela nigripes		E	

DEPARTMENT OF THE ARMY
ALBUQUERQUE DISTRICT, CORPS OF ENGINEERS
4101 JEFFERSON PLAZA NE
ALBUQUERQUE, NM 87109-3435

REPLY TO
ATTENTION OF

November 4, 2013

Regulatory Division

SUBJECT: No Permit Required – Action No. SPA-2013-00490-ABQ, NPS, Bandelier NM, Electrical System Replacement, Frijoles Canyon, Sandoval County, NM

Mr. D. Jason Lott
National Park Service
Bandelier National Monument
15 Entrance Road
Los Alamos, NM 87544-9508

Dear Mr. Lott:

I am writing this letter in response to your request for a determination of Department of the Army permit requirements for the proposed National Park Service (NPS), Bandelier National Monument (Bandolier NM), Electrical System Replacement, Frijoles Canyon, Sandoval County, New Mexico located at approximately latitude 35.77425N, longitude -106.266662W, in Sandoval County, NM. The proposed project will replace the existing deteriorating primary and secondary electrical systems at the Bandelier National Monument. We have assigned Action No. SPA-2013-00490-ABQ to this project. Please reference this number in all future correspondence concerning the project.

Based on the information provided, we have determined that a Department of the Army permit is not required since the proposed project does not involve a regulated activity (i.e., the proposed project is limited to trenching in uplands). This determination is based upon the information provided to us by you which indicates that the proposed project will not discharge any dredged or fill materials into waters of the United States. If a new route other than the ones proposed in your October 22, 2013 letter is developed which will impact jurisdictional waters of the United States, it is your responsibility to notify the Corps of Engineers for a new determination.

If you have any questions, please contact me at 505-342-3284 or by e-mail at William.M.Oberle@usace.army.mil. At your convenience, please complete a Customer Service

Survey on-line available at http://per2.nwp.usace.army.mil/survey.html.

Sincerely,

William M. Oberle

William M. Oberle
Project Manager

United States Department of the Interior

NATIONAL PARK SERVICE
Bandelier National Monument
15 Entrance Road
Los Alamos, NM 87544-9508

9 7989

IN REPLY REFER TO:
D5015(BAND)

OCT 22 2013

Jeff Pappas, PhD.
New Mexico Historic Preservation Division
Department of Cultural Affairs
Bataan Memorial Building
407 Galisteo Street, Suite 236
Santa Fe, NM 87501

Dear Dr. Pappas:

The National Park Service (NPS) has initiated the planning process to complete an Environmental Assessment (EA) for the replacement of the Frijoles Canyon section of primary and secondary electrical systems at Bandelier National Monument. The purpose of the proposed action is to provide the Monument with a reliable electrical system that is readily and easily serviceable and complies with Los Alamos County and federal regulations.

The Monument's current electrical system, which is approximately 50 years old, has exceeded its anticipated life cycle of 30-40 years and is in need of replacement. Further, the existing lines were direct buried (not installed within a conduit) making them difficult to locate and repair. In 2011, the primary electrical system experienced three critical failures along Entrance Road, resulting in damage to both the electrical lines themselves and the road. Additionally, the transformer between the primary and secondary electrical systems is within the 100-year floodplain and could be damaged in a major flood event.

The NPS is developing alternatives that would solve these critical electrical issues for the Monument and have the potential to provide solutions to other existing or future utility issues. The NPS is considering five preliminary action alternatives for alignment of the new electrical lines (Figure 2). Four of the alignments would use horizontal directional drilling (HDD). Each of these alignments would originate near the stables area in Frijoles Canyon. Under each of these alternatives, HDD would be used to bore upward from the Canyon terminating in developed areas on top of the mesa (Alternatives B-E). The fifth alignment would involve trenching along Entrance Road (Alternative A) from the developed area in Frijoles Canyon near the Visitor Center. All alignments assume trenching in Frijoles Canyon along the road from the stable area to the developed area in the vicinity of the Visitor Center. The EA will analyze

the environmental effects of the alternatives on the human environment including natural and cultural resources at Bandelier National Monument.

The Monument is currently soliciting scoping comments from interested agencies, tribes, groups, and individuals through November 25. Information regarding the current status of this effort, including preliminary alternatives, will be made available through the NPS Planning, Environment, and Public Comment (PEPC) website at http://parkplanning.nps.gov/band.

Compliance with the National Historic Preservation Act (NHPA) of 1966, as amended, is being conducted by the Monument separately but concurrent to the EA. In accordance with section 800.2 (c)(1) of the Advisory Council on Historic Preservation's regulations (36 CFR 800), we wish to consult with you regarding the location of properties within the project area and the potential Area of Potential Effect (APE), which is currently broadly defined as the potential project area. We welcome any preliminary thoughts that you may have on the project, which we should take into account as design progresses.

We appreciate your consultation on this project and look forward to working with your agency as we move forward. If you need any additional information or should you have any questions regarding this project, please feel free to contact Park S106 Coordinator Rory Gauthier by telephone at (505) 672-3861 x702 or email (Rory_Gauthier@nps.gov).

Sincerely,

D. Jason Lott
Superintendent

cc: Andrea Vaughn, NPS-DSC
Connie Chitwood, NPS-DSC
Kimberly Threlfall, VHB

Enclosures:
Project Vicinity Map
Project Area and Preliminary Alternatives Map

BANDELIER NATIONAL MONUMENT

COMMENTS

Norman Jackson 11/20/13
or NM State Historic Preservation Officer

We look Forward to working with your staff as the project developes.

Pueblo de San Ildefonso
Office of the Governors

SI-GC13-266

November 21, 2013

D. Jason Lott
United Stated Department of Interior
National Park Service
Bandelier National Monument
15 Entrance Road
Los Alamos, NM 87544-9508

RE: **D5015(BAND)**

Dear Mr. Lott:

We are in receipt of your letter regarding the Environmental Assessment (EA) for replacement of the Frijoles Canyon section of the electrical systems at Bandelier National Monument. You have requested initial input regarding this project. In connection with this project, efforts should be directed at avoiding further disturbance of our ancestral lands. We request that you consider alternatives that would not disturb the land past the current condition.

We appreciate the opportunity to provide our initial response with respect to this project.

If you have any questions, you may contact my office at (505) 455-4101.

Sincerely,

Terry Aguilar, Governor

Cc: GC File

02 Tunyo Po · Santa Fe, NM 87506 · (505) 455-2273 · (505) 455-7351 Fax

APPENDIX B: BIRD SPECIES IDENTIFIED IN PUBLISHED CONSERVATION PLANS COVERING BANDELIER NATIONAL MONUMENT

Title: Bird Species Identifed in Published Conservation Plans Covering Bandelier National Monument.
Note: Species that have not been observed at Bandelier National Monument have been omitted.

Taxonomic Order	Standard Code	Standard Common Name	Scientific Name	US Fish and Wildlife Species of Conservation Concern (USFWS 2008)	National Partners in Flight (Rich et al. 2004). Specific to Bird Conservation Area (BCR) 16 which contains Bandelier National Monument.	Audubon WatchList for United States Bird (Butcher et al. 2007)	Intermountain West Joint Venture (Norris et a. 2005). Specific to the Jemez Mountains. Bandelier National Monument is specifically named.	State Wildlife Action Plan: Birds of Greatest Conservation Need (NMDGF 2006)	New Mexico Partners in Flight (NM PIF 2007)
			Short name >	USFWS SCC (2008)	PIF Landbird Conservation Plan (2004)	Audubon WatchList (2007)	IWJV (2005)	NM SGCN (2006)	NM PIF (2007)
150	DUGR	Dusky Grouse	*(Dendragapus obscurus)*		X		X	X	
296	TUVU	Turkey Vulture	*(Cathartes aura)*						
312	BAEA	Bald Eagle	*(Haliaeetus leucocephalus)*	X				X	
316	NOHA	Northern Harrier	*(Circus cyaneus)*					X	
324	NOGO	Northern Goshawk	*(Accipiter gentilis)*				X	X	
343	SWHA	Swainson's Hawk	*(Buteo swainsoni)*			X			X
345	ZTHA	Zone-tailed Hawk	*(Buteo albonotatus)*						
349	FEHA	Ferruginous Hawk	*(Buteo regalis)*	X		X		X	X
353	GOEA	Golden Eagle	*(Aquila chrysaetos)*	X				X	
375	PEFA	Peregrine Falcon	*(Falco peregrinus)*	X		X		X	
376	PRFA	Prairie Falcon	*(Falco mexicanus)*			X			X
477	WESA	Western Sandpiper	*(Calidris mauri)*			X			
491	STSA	Stilt Sandpiper	*(Calidris himantopus)*			X			
505	WIPH	Wilson's Phalarope	*(Phalaropus tricolor)*			X		X	
605	BTPI	Band-tailed Pigeon	*(Patagioenas fasciata)*			X		X	X
619	MODO	Mourning Dove	*(Zenaida macroura)*					X	
707	YBCU	Yellow-billed Cuckoo	*(Coccyzus americanus)*						
729	FLOW	Flammulated Owl	*(Psiloscops flammeolus)*	X	X	X			X
747	NOPO	Northern Pygmy-Owl	*(Glaucidium gnoma)*						X
758	SPOW	Spotted Owl	*(Strix occidentalis)*		X	X		X	X
801	BLSW	Black Swift	*(Cypseloides niger)*		X	X		X	
822	WTSW	White-throated Swift	*(Aeronautes saxatalis)*		X	X			X
932	BCHU	Black-chinned Hummingbird	*(Archilochus alexandri)*						X
937	CAHU	Calliope Hummingbird	*(Selasphorus calliope)*		X	X			
940	BTAH	Broad-tailed Hummingbird	*(Selasphorus platycercus)*						X
941	RUHU	Rufous Hummingbird	*(Selasphorus rufus)*		X	X			
1009	LEWO	Lewis's Woodpecker	*(Melanerpes lewis)*	X	X			X	X
1027	WISA	Williamson's Sapsucker	*(Sphyrapicus thyroideus)*		X	X	X	X	X
1029	RNSA	Red-naped Sapsucker	*(Sphyrapicus nuchalis)*		X	X	X		X
1214	OSFL	Olive-sided Flycatcher	*(Contopus cooperi)*		X	X	X	X	
1229	WIFL	Willow Flycatcher	*(Empidonax traillii extimus)*	X	X	X		X	
1233	HAFL	Hammond's Flycatcher	*(Empidonax hammondii)*				X		
1235	GRFL	Gray Flycatcher	*(Empidonax wrightii)*		X				
1236	DUFL	Dusky Flycatcher	*(Empidonax oberholseri)*		X				
1286	CAKI	Cassin's Kingbird	*(Tyrannus vociferans)*						X
1349	GRVI	Gray Vireo	*(Vireo vicinior)*	X		X	X	X	X
1352	PLVI	Plumbeous Vireo	*(Vireo plumbeus)*						X
1359	WAVI	Warbling Vireo	*(Vireo gilvus)*				X		X
1390	PIJA	Pinyon Jay	*(Gymnorhinus cyanocephalus)*	X	X	X		X	X
1395	WESJ	Western Scrub-Jay	*(Aphelocoma californica)*						X
1398	CLNU	Clark's Nutcracker	*(Nucifraga columbiana)*		X				
1454	JUTI	Juniper Titmouse	*(Baeolophus ridgwayi)*	X				X	X
1461	PYNU	Pygmy Nuthatch	*(Sitta pygmaea)*				X		
1562	WEBL	Western Bluebird	*(Sialia mexicana)*						X
1564	MOBL	Mountain Bluebird	*(Sialia currucoides)*		X				X
1623	SATH	Sage Thrasher	*(Oreoscoptes montanus)*		X			X	
1683	VIWA	Virginia's Warbler	*(Oreothlypis virginiae)*		X	X			X
1690	YWAR	Yellow Warbler	*(Setophaga petechia)*					X	
1699	BTYW	Black-Throated Gray Warbler	*(Setophaga nigrescens)*					X	X
1708	GRWA	Grace's Warbler	*(Setophaga graciae)*	X	X	X		X	X
1880	GTTO	Green-tailed Towhee	*(Pipilo chlorurus)*		X				
1907	BRSP	Brewer's Sparrow	*(Spizella breweri)*	X	X	X			
1910	BCSP	Black-chinned Sparrow	*(Spizella atrogularis)*			X			X
1914	BTSP	Black-throated Sparrow	*(Amphispiza bilineata)*						X
1935	LISP	Lincoln's Sparrow	*(Melospiza lincolnii)*				X		
1994	LAZB	Lazuli Bunting	*(Passerina amoena)*						X
2047	BUOR	Bullock's Oriole	*(Icterus bullockii)*						X
2089	CAFI	Cassin's Finch	*(Haemorhous cassinii)*	X	X	X			
	=	Note: this is for a subspecies, not for a full species							
	=	Does not occure in the park; listed here for completeness							
	=	Species had a name change since plan was written							
	=	Species is state listed							
	=	Species is federally listed or recently delisted							

Citation: U.S. Fish and Wildlife Service (USFWS). 2008. Birds of Conservation Concern 2008. United States Department of Interior, Fish and Wildlife Service, Division of Migratory Bird Management, Arlington, Virginia. 85 pp. [Online version available at <http://www.fws.gov/migratorybirds/>]	Citation: Rich, T. D., C. J. Beardmore, H. Berlanga, P. J. Blancher, M. S. W. Bradstreet, G. S. Butcher, D. W. Demarest, E. H. Dunn, W. C. Hunter, E. E. Iñigo-Elias, J. A. Kennedy, A. M. Martell, A. O. Panjabi, D. N. Pashley, K. V. Rosenberg, C. M. Rustay, J. S. Wendt, T. C. Will. 2004. Partners in Flight North American Landbird Conservation Plan. Cornell Laboratory of Ornithology. Ithaca, NY. 84pp.	Citation: Butcher, G. S., D. K. Nivern, A. O. Panjabi, D.N. Pashley, and K. V. Rosenberg. 2007. The 2007 WatchList for United States Birds. American Birds 61 (The 107TH Christmas Bird Count issue): 18-25.	Citation: Norris, S, Howe, B., Mitchusson, T.Reiser, H., Williams, S. III, Legler, R. and Garbor, G. 2005.Coordinated Implementation Plan for Bird Conservation in Western New Mexico. New Mexico Steering Committee, Intermountain West Joint Venture. 49pp.	Citation: New Mexico Department of Game and Fish. 2006. Comprehensive Wildlife Conservation Strategy for New Mexico. New Mexico Department of Game and Fish. Santa Fe, New Mexico. 526 pp + appendices.	Citation: New Mexico Partners in Flight (NM PIF). 2007. New Mexico Bird Conservation Plan Version 2.1. C. Rustay and S. Norris, compilers. Albuquerque, New Mexico.

As the nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering sound use of land and water resources; protecting our fish, wildlife, and biological diversity; preserving the environmental and cultural values of our national parks and historical places; and providing for the enjoyment of life through outdoor recreation. The department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people by encouraging stewardship and citizen participation in their care. The department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.

NPS 190519 May 2014
Document Number 315/123528