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OFC. OF ENVIRONMENTAL
QUALITY CONTROL

Hawai'i Electric Light
1200 Kīlauea Avenue
Hilo, HI 96720
June 9, 2017

Director
Office of Environmental Quality Control
Department of Health, State of Hawai'i
235 South Beretania Street, Room 702
Honolulu, HI 96813

Dear Director:

With this letter, Hawai'i Electric Light hereby transmits the draft environmental assessment for the Upgrade and Relocate Power Lines between Kīlauea Switching Station and Volcano Substation situated at 9-8-001 to 9-9-001, in the Ka'ū district on the island of Hawai'i for publication in the next available edition of the Environmental Notice.

Enclosed is a completed OEQC Publication Form, two copies of the DEA, an Adobe Acrobat PDF file of the same, and an electronic copy of the publication form in MS Word. Simultaneous with this letter, we have submitted the summary of the action in a text file by electronic mail to your office.

If there are any questions, please contact Ronald D. Mangaoang at (808) 969-0255.

Sincerely,

Ronald D. Manaoang
Customer Engineer
Customer Engineering Division

RDM:rd
Enclosures

17-537

NEPA Action EA/EIS
Publication Form

UPGRADE AND RELOCATE POWER LINES BETWEEN KĪLAUEA SWITCHING STATION AND VOLCANO SUBSTATION (DEA)

Island: Hawai'i Island
District: Ka'ū
TMK: 9-8-001 to 9-9-001
Permits: Federal Rights-of-Way, State Department of Transportation Rights-of-Way, Special Use Permit (HVNP)
Applicant or Proposing Agency: Hawai'i Electric Light
1200 Kīlauea Ave, Hilo, Hawai'i 96720
Approving Agency: Hawai'i Volcanoes National Park
Consultant: Big Island Natural Resources Assistance, LLC.
P.O. Box 754, Volcano, Hawai'i 96785
volcanoplantguy@gmail.com
Status: 30 day public review & comment period from June 23, 2017 to July 24, 2017. Please send comments in writing to the consultant (mailing address above).

Summary

This project will replace, relocate and reconductor approximately 10 miles of aged and deteriorated overhead facilities to the highway; improving the safety and reliability of the line.

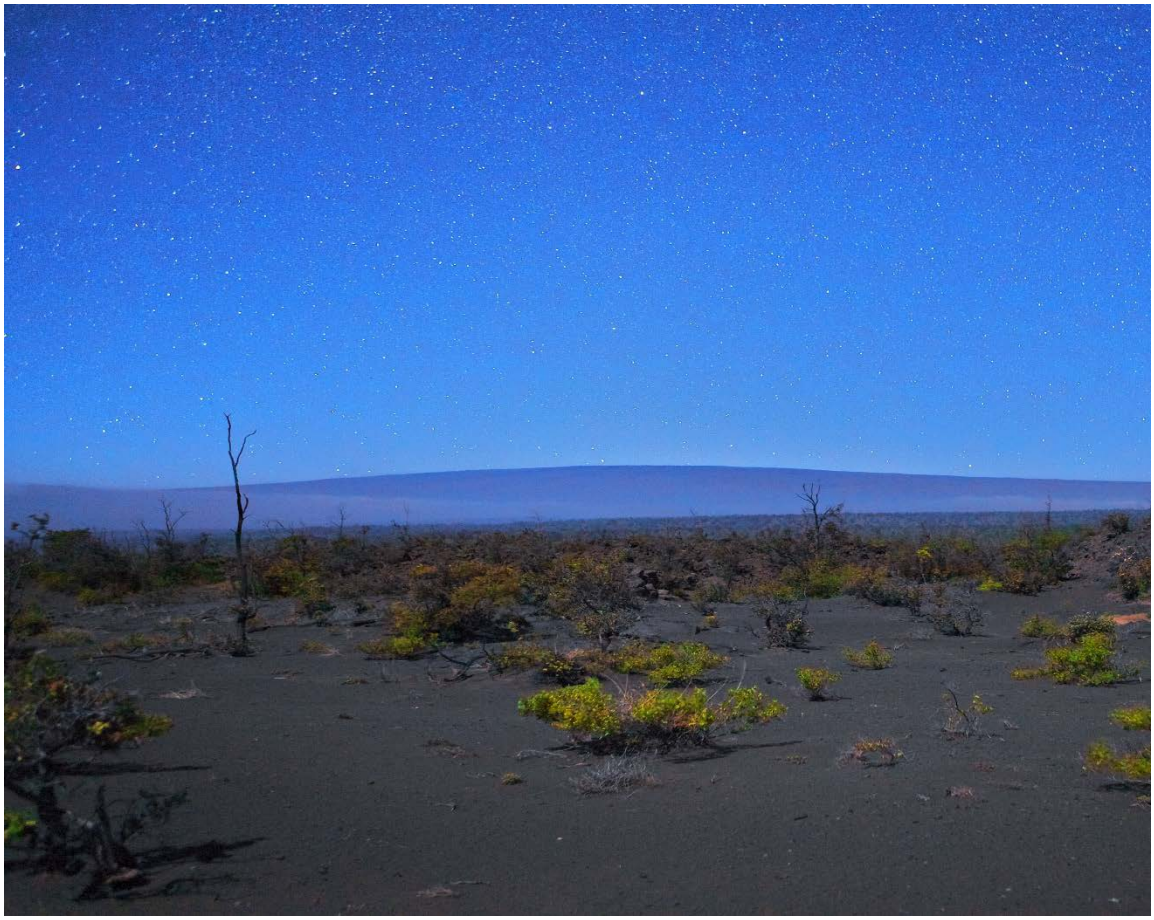
DRAFT
ENVIRONMENTAL ASSESSMENT

UPGRADE AND RELOCATE POWER LINES BETWEEN KĪLAUEA SWITCHING STATION AND VOLCANO SUBSTATION HAWAIʻI VOLCANOES NATIONAL PARK

May 8, 2017

Prepared by Big Island Natural Resources Assistance, LLC, P.O. Box 754, Volcano, Hawaiʻi 96785
(binaturalresourcesassistance@gmail.com)

Prepared for Hawaiʻi Electric Light, 1200 Kīlauea Ave, Hilo, Hawaiʻi 96720



An early evening view of the Mauna Loa summit and ridgelines from near the Footprints interpretive area, Hawaiʻi Volcanoes National Park. *Photo courtesy of Jesse Tunison.*

SUMMARY

Hawai‘i Electric Light proposes to upgrade and relocate the power poles and transmission wires in Hawai‘i Volcanoes National Park between the Kīlauea switching station and the Volcano substation. The Kīlauea switching station is located just outside the park's Ka‘ū entrance on Highway 11, and the Volcano substation is located near the park's Kīlauea Visitor Center. The primary purpose of the project is to develop additional electrical transmission capacity and sufficiently supply power from the Kīlauea switching station to the growing communities of the upper Puna District. An ancillary purpose of the project is to establish accessible electrical infrastructure that can be efficiently and safely repaired and maintained. An additional benefit of the project is the installation of internet and telephone lines to the new power pole alignments to help complete the internet and telephone communication network for the Island. The project is needed because higher capacity wires are required for transmission of current and future electrical demand. In addition, nearly one-half of the existing poles were installed over 60 years ago; many are deteriorating and need to be replaced. Because the current alignments of poles and wires are located 50 feet to one-half mile from Highway 11, all without road access, maintenance and repairs are impeded and often unsafe to carry out. The purpose and need for the project are described in Chapter 1 of the Environmental Assessment (EA). In Chapter 2 of the EA, three action alternatives, plus a no action alternative, were developed to implement the project. One action alternative relocated the alignment of poles and transmission wires adjacent to the roadway along the Mauna Loa side of Highway 11. A second action alternative placed the alignment adjacent to the Kīlauea side of Highway 11 to the Nāmakanipaio substation and on the Mauna Loa side from there to Pi‘i Mauna Drive. A third action alternative included alternating the alignment twice between the Mauna Loa and Kīlauea sides of Highway 11 to protect scenic portions of the viewsheds of these two volcanoes. The no action alternative would maintain the current alignment without relocation or upgrading of poles and wires. The three action alternatives would utilize the installation of 50-55 foot poles (42-47 foot above grade), larger diameter transmission wires on a horizontal crossbar at the top of the pole, and the attachment of two communication wires at approximately 20-22 feet above ground level. Distribution wires, attached on a horizontal crossbar 10 feet below the transmission wires, would be located in the alignment between Nāmakanipaio Campground and Pi‘i Mauna Drive. All of the to-be-abandoned pole and wire alignments, including the alignment between Kilauea Military Camp and the Volcano substation, near the Sulphur Banks area, would be removed. Additional alternatives were considered but dismissed because of unacceptable impacts to park resources or financial costs. These included undergrounding the alignment, locating the new alignment under the existing alignment or a new alignment well away from the highway, or connecting to an existing alignment outside the park and then connecting to the Nāmakanipaio substation along the Mauna Loa Road. In Chapter 3 of the EA the alternatives expressed in the EA, including the no action alternative, were analyzed for their impacts on geology and soil, vegetation, wildlife, rare plant and animal species, soundscapes, viewsheds, and archeological resources, following a detailed description of the resources to be analyzed. Mitigation measures, designed to protect park resources during the implementation of all alternatives, are listed in Chapter 2. The analysis of the alternatives indicated that, with implementation of required mitigation measures, impacts on geological, biological, and cultural resources were very similar for the three action alternatives. However, it was determined that the action alternative which prescribed alternating the alignment twice between the Mauna Loa and Kīlauea sides of Highway 11 had the least impact on park viewsheds, and was concluded to be the preferred alternative to be implemented.

CONTENTS

CHAPTER 1. PURPOSE AND NEED

INTRODUCTION: PROJECT BACKGROUND

Hawai‘i Electric Light’s (HEL’s) island-wide network of electrical transmission lines extends across Hawai‘i Volcanoes National Park (HVNP) in two locations. One set of lines crosses approximately 1.5 miles of the Mauna Loa Strip area of the park, between 4,600 and 4,900 foot elevation. Another much longer set of poles and transmission wires loosely parallels the Hawai‘i Belt Highway (State Highway 11). This alignment extends from near the Hilo side entrance of HVNP to the Ka‘ū side entrance, through the Kīlauea Visitor Center and the Kilauea Military Camp (KMC). Historical maps in the national park archives indicate that the western part of the line was extended from KMC in the early 1950s as part of a rural electrification program, bringing electric power to Ka‘ū residents. Of course, some poles and wires in this alignment have been replaced over time because of age and deterioration. However, much of the alignment is original, including poles and the small diameter copper transmission wires.

There is also a gap in the island-wide communication network, including internet and telephone service, between the Nāmakanipaio area of the national park and the community of Pāhala. Communication wires are conspicuously absent from the poles paralleling Highway 11 in the park between Nāmakanipaio and Pāhala, due to the short pole height. The current undertaking, with the cooperation of partners Hawaiian Telcom and Oceanic Time Warner Cable, affords an opportunity to help close this gap

BACKGROUND OF THE PARK

Hawai‘i Volcanoes National Park is a 333,086 acre park which includes large portions of the summits and rift zones of two of the most active volcanoes in the world, Mauna Loa and Kīlauea. The park was established in 1916 because of its accessible volcanic scenery and its value for research of geological processes.

The park is visited year-round by an average of over 1.8 million people per year. Park visitors are primarily attracted by opportunities to see volcanic activity and recent volcanic landforms. The number above only includes visitors who enter the park through the formal entrance fee station, off Highway 11; it does not include the relatively high volume of intra-island vehicular traffic along the Highway 11 corridor through the park.

Park visitors are also attracted to the highly varied biological resources of HVNP. Extending from the coast line to the summit of Mauna Loa near 13,700 foot elevation, and with rainfall ranging from less than 20 inches to nearly 200 inches per year, the park includes seven highly distinct ecological zones. These include coastal strand, coastal grasslands, mid-elevation dry shrublands and woodlands, rain forest, montane mesic shrublands, woodlands, and forest, as well as subalpine and alpine ecosystems. The native plants and animal of these Hawaiian ecosystems consist of nearly all endemic species, unique to the Islands. HVNP has actively managed park ecosystems by fencing out introduced ungulates, controlling invasive plants, and restoring native species, thereby offering visitors opportunities to explore and enjoy a broad diversity of native species and ecosystems.

Hawai‘i Volcanoes National Park also offers its visitors a window into the past six hundred years of human activity and occupation of the landscape. Native Hawaiians lived in the lowlands of Kīlauea Volcano, in the area now within HVNP, for at least 500 years prior to the establishment of the park in 1916, and made forays into higher elevations to collect adze materials, young seabirds, or other resources. Evidence of human activity can be found, for example, in the widespread archeological remains of house sites and agricultural features including excavated pits, rock mulch mounds, or agricultural field systems, largely in the park lowlands. Later, in the 19th and early 20th centuries, adventurers, scientists, philanthropists, and early park development left their mark on the landscape. This can be observed in the numerous historic roads and trails that cross the landscape as well as historic shelters, cabins, houses, and utility infrastructure.

PURPOSE AND NEED

The primary purpose of the project is to provide additional electrical transmission capacity to sufficiently supply power from the national park area, specifically the Kīlauea switching station (located just outside of the park’s Ka‘ū entrance on Highway 11), to the growing communities and electrical demand of the upper portion of the Puna District. Currently, Hawai‘i Electric Light is systematically replacing poles and upgrading power lines from Kurtistown, working upslope to Volcano and HVNP. An ancillary purpose of the project is to establish accessible electrical infrastructure that can be efficiently and safely repaired and maintained. An additional benefit of the project is to help complete the internet and telephone communication network for the Island.

The existing or current power pole and electrical transmission wire alignment between KMC and the park’s Ka‘ū entrance on boundary was initially constructed in the early 1950s. The HEL database/inventory of power poles in the national park indicates that 75 of the poles to be removed in the project area were manufactured in 1952, 1953, or 1956. The remainder of the poles to be removed were manufactured in 1966 or later. A recent inspection of the condition of the poles in HVNP revealed that nine poles in the park were found to be deteriorated to the point of needing immediate replacement; implementation of this recommendation has been put on hold pending the completion of the EA. Failure of a pole near mile marker (MM) 34 in 2012 required the emergency construction of a bulldozer path to the pole from Highway 11. Not only have poles failed in the past, but fixtures attaching the transmission lines to the crossbars or top of the pole have failed because of aging or rotting wood. The failure of a fixture near the Hilo entrance of the park caused a power outage in 2013. In short, because of age and widespread deterioration, resulting in past outages, the poles are in need of a systematic replacement.

Existing transmission wires are inadequate to sufficiently supply power needed. The current electrical wires are small diameter (1/4 or 1/5 inch). Respectively, these copper conductors can carry only 220 or 170 amps of electricity per wire (phase) under normal conditions. This contrasts with higher capacity transmission wires in upgraded portions of HEL's Island grid; these much larger diameter wires can carry 515 amps per wire (phase).

The distance of the current alignment from Highway 11 and the lack of a service road beneath this alignment impedes the efficient, timely, and safe maintenance and repair of poles and wires. Working from a truck-mounted bucket is not possible. Currently, workers, carrying tools and equipment, must first hike out from Highway 11 to the alignments that are 50 feet to one-half mile away from the highway, across lava flows, and then climb poles to repair or maintain lines. Over four miles of the alignment require repair workers to walk on ʻaʻā lava from the highway to the poles and wires. Emergency repairs at night are particularly challenging and hazardous.

The existing 40 foot poles (approximately 30-35 feet above grade or ground level) are inadequate for installing telephone and internet lines; taller poles would be required. Communication lines currently encircle Hawaiʻi Island except for the link between the Nāmakanipaio area in HVNP and the town of Pāhala, 12 miles west of the park's Kaʻū entrance. When outages occur along existing internet and telephone lines, all residents on the Island beyond the break in service are affected. Service cannot continue on the communication lines in the reverse direction through Kaʻū because of the absence of communication wires from the Nāmakanipaio area to Pāhala. Completing the circle of communication lines on the Island will add redundancy to the system, permitting alternate routing and preventing loss-of-service when lines go down in other locations on the Island.

Objectives in Taking Action

The specific objectives of the project are to be addressed by all proposed action alternatives. The objectives are based on the purpose of the proposed project and the park's purpose and significance, as well as Federal legislation and National Park Service (NPS) management policies.

1. Increase electrical capacity to provide sufficient power to the upper Puna area.

2. Make poles, wires, transformers, and other facilities accessible by repair vehicles for timely and efficient repair and replacement, and for the safety of workers.

3. Help complete the island-wide communication grid by installing internet and telephone communication lines between the Kaʻū entrance and KMC.

4. Remove old poles, wires, and other infrastructure from abandoned alignments with minimal disturbance to the natural and cultural resources of the park.

5. Prevent the introduction of invasive species during the construction process, especially Rapid ʻŌhiʻa Death (ROD) fungus, little fire ants, and Argentine ants (see Appendix 2 for a cross listing of common and scientific names).

6. Minimize the impacts of new poles and wires on the viewsheds of the park and adjacent lands.

7. Avoid damage to cultural resources identified in surveys of the existing and proposed alignments during installation of new poles, wires, and other infrastructure and removal of old poles and wires.

8. Minimize damage to native vegetation bordering Highway 11 and along existing alignments.

9. Prevent damage to rare plant species and plant species of special concern to the park identified in surveys of the existing and proposed alignments.

10. Protect endangered bird species, including ʻio (Hawaiian hawk), nēnē (Hawaiian goose), ʻuaʻu (Hawaiian petrel), ʻakeʻake (band-rumped storm-petrel), as well as a listed plant species of concern, Kīlauea naupaka, from impacts during construction of the project and as a result of the new alignment.

11. Protect roosting endangered ʻōpeʻapeʻa (Hawaiian hoary bat) during vegetation clearing and construction.

PROJECT AREA LOCATION

The project area is located almost entirely within Hawaiʻi Volcanoes National Park (Figures 1 and 2); transmission wires may cross state land for approximately 100-150 feet between the Kīlauea switching station and park lands. Broadly speaking, the project area includes park lands within one-half mile of Highway 11**,** between the Kīlauea switching station just outside the park's Kaʻū entrance and the Volcano substation, located at the park's rainshed/maintenance area, just west of the Kīlauea Visitor Center. Old poles and wires to be removed lie with 50 feet to one-half mile away from Highway 11 and include the current alignment between KMC and the Volcano substation. The new potential pole alignment areas in the project area lie within 20 feet of the solid white line between the travel lane and the paved shoulder on Highway 11, from the Kīlauea switching station to Piʻi Mauna Drive.

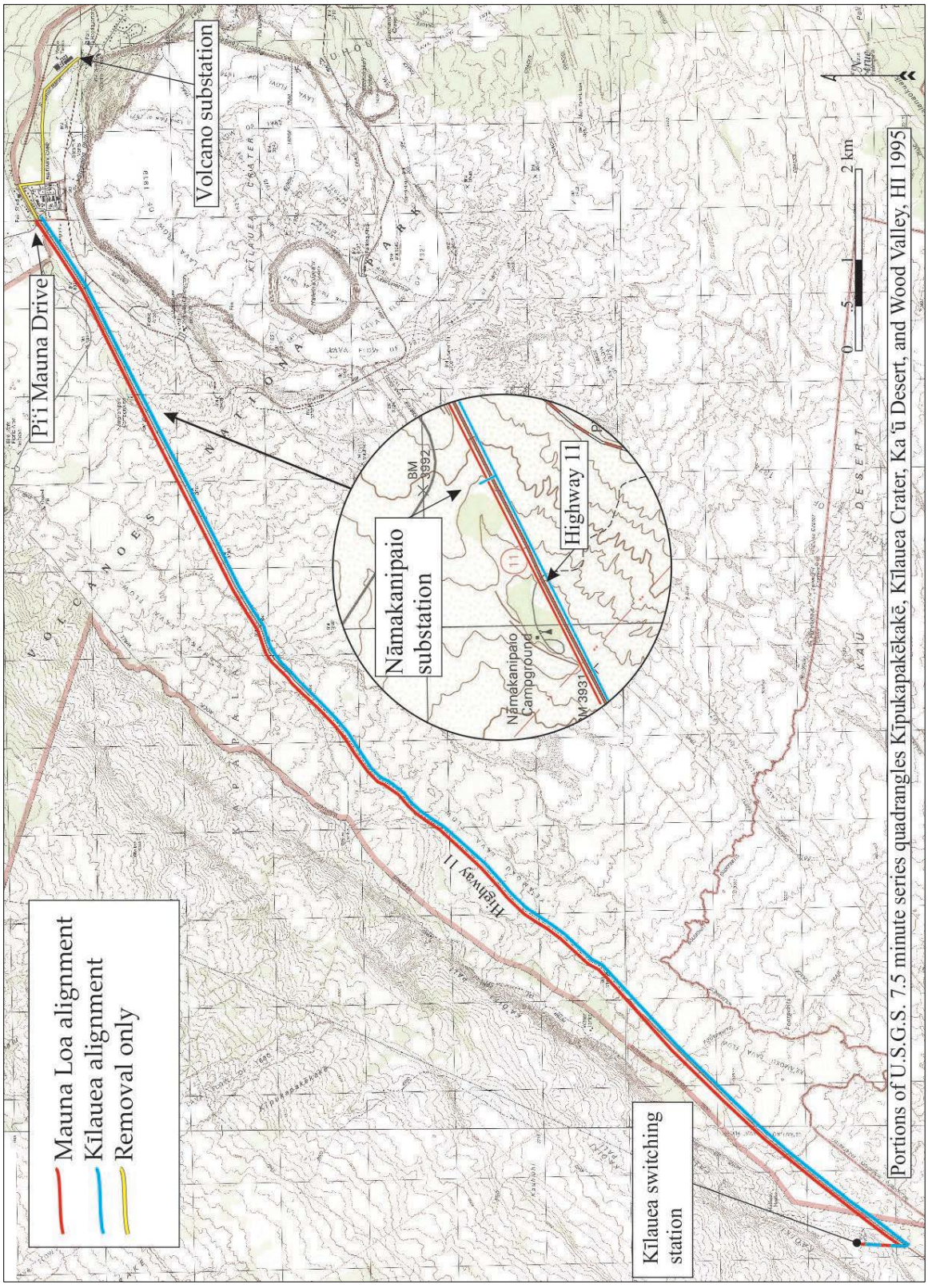


Figure 1. Mauna Loa and Kīlauea alignment alternatives.

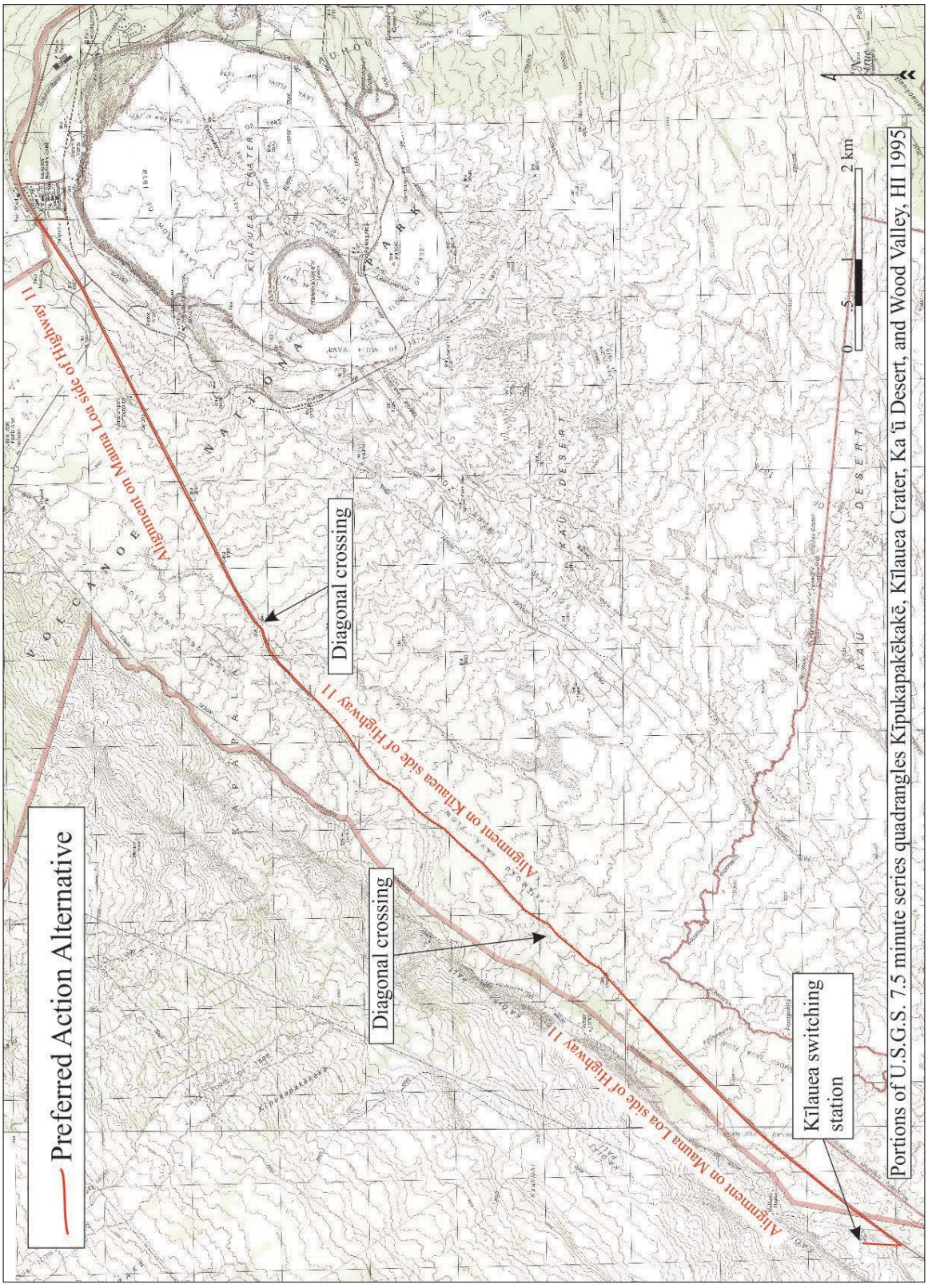


Figure 2. Preferred Action Alternative.

SCOPE OF THE ENVIRONMENTAL ASSESSMENT

This Environmental Assessment (EA) outlines four project alternatives, including a no action alternative and three action alternatives, one of which is the preferred alternative. It describes existing conditions in the project area, and it analyzes impacts of each alternative on the human and natural environment. The EA was prepared pursuant to the National Environmental Policy Act (NEPA) of 1969 (42 United States Code (USC) 4341 et seq.), as amended in 1975 by Public Law (PL) 94-52 and PL 94-83. Additional guidance includes NPS Director's Order (DO) 12 (NPS 2015a) which implements Section 102(2) of NEPA and the regulations established by the Council on Environmental Quality (40 Code of Federal Regulations (CFR) 1500-1508). The project must comply with requirements of NEPA as well as other legislation that governs land use, natural and cultural resource protection, and agency policies on federal land and specifically in a national park area. For these reasons, the EA was prepared following NEPA guidelines, specifically those articulated in NPS DO-12 (NPS 2015a) and implemented in national park areas.

A related future project is to upgrade and replace poles and transmission wires to park facilities at the Kīlauea summit. These include Kīlauea Visitor Center, Volcano House, park housing and administrative offices, the research/resource management center, and the rainshed maintenance facility. Currently, electricity is supplied to these facilities from lines entering the park from Volcano Village near the Hilo entrance or from the alignment between KMC and Pi'i Mauna Drive. The future related project would also involve removal of wires and poles to be abandoned. This project is still in the preliminary planning phase and not within the scope of the current EA.

RELATED LAWS AND MANAGEMENT GUIDELINES

Federal Legislation

The NPS Organic Act of 1916 (16 USC I, 2-4) and the General Authorities Act (16 USC Ia-8) direct the National Park Service to conserve the scenery, natural and historic objects, and wildlife; and to provide for the enjoyment of those resources in such a manner to leave them unimpaired for future generations. The Redwood Act of 1978 (16 USC Ia-I) explicitly applies the NPS Organic Act to all NPS units. This legislation also mandates that the authorization of management activities in parks shall be construed and the protection, management, and administrations of these areas shall be conducted in light of the high public value and integrity of the national park system and shall not be exercised in derogation of the values and purposes for which these various areas have been established.

The 1916 enabling legislation establishing Hawai'i Volcanoes National Park (PL 95-635) directs the Secretary of Interior *to make and publish such rules and regulations as he may deem necessary and proper for the care and management of the same. Such regulations shall provide for the preservation from injury of all timber, birds, mineral deposits, and natural curiosities or wonders within said park, and their retention in their natural condition as nearly as possible.*

Section 106 of the National Historic Preservation Act (NHPA) of 1966 (as amended) requires consultation with the Hawai'i State Historic Preservation Office (SHPO) for projects that may affect cultural resources. Specifically, the head of any federal agency having direct or indirect jurisdiction over a proposed federal or federally assisted undertaking in any State or the head of any federal department or independent agency having authority to license any undertaking, prior to the approval

of the expenditure of any federal funds on the undertaking or prior to the issuance of any license, must take into account the effect of the undertaking on any district, site, building, structure, or object that is included in or eligible for inclusion in the National Register of Historic Places (NRHR). It also requires that the federal agency afford the Advisory Council on Historic Preservation a reasonable opportunity to comment with regard to the undertaking. Section 106 consultation procedures are articulated in 36 CFR Part 800 and delineated in the 2008 Programmatic Agreement signed by the NPS, the National Conference of State Historic Officers, and the Advisory Council on Historic Preservation. Section 106 consultation was initiated with the Hawai‘i State Historic Preservation Officer by letter from HVNP in June, 2015.

The federal Endangered Species Act of 1973 requires review and consultation with the U.S. Fish and Wildlife Service (USFWS). Proposals or plans containing actions potentially affecting species identified by the USFWS as endangered or threatened species (T&E), as well as in some cases candidate or proposed T&E species, are submitted to the USFWS for their review and recommendations. Informal consultation with USFWS has been taking place from the outset of the project, and a formal Section 7 letter was submitted in March, 2017.

Guidance from NPS Management Policies, Director's Orders, and Reference Manuals

NPS Management Policies 2006 include direction for preserving and protecting cultural and natural resources, processes, and values (NPS 2006). NPS Management Policies 2006 provide guidance for park managers in implementing current laws, executive orders, and regulations to manage natural and cultural resources in the national park system. The National Park Service also provides more detailed written guidance to help managers make day-to-day decisions. These include Director's Orders (DOs) for cultural and natural resource management and related Reference Manuals (RMs) (NPS 2015a), specifically RM-28 or Cultural Resource Management Guideline (NPS 2015c) and RM-77, Natural Resource Management Reference Manual (NPS 2015d). The NPS Management Policies 2006, Director's Orders, Reference Manuals, Cultural Resource Management Guideline, and Natural Resource Management Reference Manual will be referenced in the selection of impact topics to be addressed, the selection of alternatives, and the analysis of impacts.

Purpose and Significance of Hawai‘i Volcanoes National Park

Hawai‘i Volcanoes National Park was established in 1916 because of its accessible volcanic scenery and its value for research of geological processes. Park purpose and significance have been most recently articulated in the draft General Management Plan (NPS 2016) as follows:

Park Purpose. Hawai‘i Volcanoes National Park protects, studies, and provides access to Kīlauea and Mauna Loa, two of the world's most active volcanoes, and perpetuates endemic Hawaiian ecosystems and the traditional Hawaiian culture connected to these landscapes.

Park Significance. Hawai‘i Volcanoes National Park protects and interprets the largest and most continuously active shield volcanoes in the U.S., and provides the best physical evidence of island building processes that continue to form the 2,000 mile long Hawaiian archipelago.

Hawai‘i Volcanoes National Park’s active volcanoes serve as a living laboratory for scientific investigations that began over a century ago and continue to advance global understanding of volcanic processes.

Hawai‘i Volcanoes National Park provides access to two of the most active volcanoes in the world and an opportunity to understand and appreciate the distinctive geology and natural and cultural adaptations to the land.

Hawai‘i Volcanoes National Park protects, restores, and studies unique and diverse ecosystems and endemic species that are the result of 30 million years of evolution on an isolated environment characterized by its active volcanic landscape and wide climate variation.

Hawai‘i Volcanoes National Park encompasses the largest and most ecologically diverse designated wilderness in the Pacific Islands.

Hawai‘i Volcanoes National Park embraces the Native Hawaiian spiritual significance of this landscape and interprets related cultural traditions.

Hawai‘i Volcanoes National Park encompasses sites, structures, objects, and landscapes that document over 600 years of human life and activities on an active volcanic landscape.

ENVIRONMENTAL ISSUES AND IMPACT TOPICS

Scoping and Public Participation

Scoping is designed to be an open process to gather early input in the NEPA process, particularly to identify environmental issues and alternatives in the EA. Since the project is almost completely within HVNP, an initial scoping meeting for the proposed project took place between national park management, resource specialists and facilities maintenance staff, Hawai‘i Electric Light project engineers, along with representatives from Hawaiian Telcom and Oceanic Time Warner Cable, on May 9, 2014, in the very early stages of the project. The primary purpose of the meeting was to identify purpose and need, resource issues, and possible alternatives. Follow-up scoping sessions between Hawai‘i Volcanoes National Park and Hawai‘i Electric Light, often with representatives from Hawaiian Telcom and Oceanic Time Warner Cable present, to clarify final details of the proposed project took place from August, 2015 to April, 2017. The park was represented by an Interdisciplinary Team (IDT) comprised of HVNP staff members from environmental protection, cultural resources management, natural resources management, and facilities maintenance. Hawai‘i Electric Light was represented by the lead project engineer, accompanied by HEL staff implementing project construction and contracting. ASM Affiliates was contracted by Hawai‘i Electric Light to conduct a cultural resource survey of the project areas and prepare cultural resource compliance documents. Big Island Natural Resources Assistance, LLC, was subcontracted by ASM Affiliates to prepare the Environmental Assessment.

Public scoping on purpose and need and environmental issues occurred from June 25, 2015 to July 25, 2015. A scoping letter was mailed to the congressional delegation, local non-government organizations, and individuals who are currently on the national park’s mailing list and live within specific zip codes that may be most impacted by the project. This letter briefly outlined the purpose

and need for the project and the project areas, and requested comments on the proposal as the EA was being prepared. Two reviewers recommended undergrounding the wires. Two other reviewers expressed concern about the impacts on park scenery, without providing specific recommendations. A final comment expressed approval of installing the communication lines to complete the island-wide network.

Issues and Impact Topics to be Evaluated

NEPA requires an early and open process for determining the scope of issues to be addressed and for identifying the significant issues related to a proposed action (40 CFR 1401.7). Issues in this context are problems, opportunities, or concerns about current and future management goals, objectives, and strategies related to relocating and upgrading electrical lines and installing communication lines or impacts that might occur if a plausible range of potential action alternatives or a no-action alternative were implemented. Issues were identified by the park IDT during internal park scoping sessions and by public external scoping. The purpose of identifying issues in the scoping stage of the NEPA process is to help frame reasonable preliminary alternative actions. The issues/impact topics identified below are analyzed in detail in Chapter 3, Affected Environment/Environmental Consequences.

Geology and Soils. According to the NPS Management Policies 2006, 4.8, the NPS will preserve and protect geologic resources and features from adverse effects of human activity, while allowing natural processes to continue (NPS 2006). These management policies also state that the NPS will strive to understand and preserve the soil resources of park units and to prevent, to the extent possible, the unnatural erosion, physical removal, or contamination of the soil, or its contamination of other resources. Drilling holes for placement of new poles and anchors will disturb soil and affect existing soil structure, as well as penetrate the underlying basaltic substrate. The surface rock and soil substrate may also be impacted in the removal of the distal ends of old poles to be removed from the site. There is also some potential for penetrating lava tubes with drilling activity.

Vegetation. NPS Management Policies 2006, 4.4.1, require that parks maintain and restore their natural abundance and diversity of native plants and plant communities (NPS 2006). The project area supports minimally disturbed native shrubland and woodland vegetation with little invasive species incursion, as well as small stands of mesic and wet forest. Activities involved in drilling holes and erecting poles, as well as removing poles from abandoned alignments, will impact native vegetation, at least in localized areas. Removing native vegetative cover and disturbing soil may facilitate the spread of invasive species. Pruning or felling trees to create space around poles and away from wires has the potential to alter the narrow stands of ʻōhiʻa woodland paralleling Highway 11. This disturbance could degrade the highly native shrub and herbaceous understory of these stands.

Wildlife. NPS Management Policies 2006, 4.4.1, require that parks maintain and restore the natural abundance and diversity of native animal species and animal communities (NPS 2006). Native wildlife in Hawaiʻi, in the absence of a suite of native mammals other than one species of bat, consists of native birds and invertebrates. The shrublands, woodlands, and forests of the project area are highly dominated by native plants and thus provide habitat for native invertebrates and birds. Impacts to native vegetation may impact wildlife habitat and thus native wildlife populations.

Special Status Species. NPS Management Policies 2006, 4.4.2.3, mandates that parks protect and attempt to recover all species listed under the Endangered Species Act that occur or previously occurred

within a national park (NPS 2006). ʻIo, the endangered Hawaiian hawk is occasionally observed in portions of the project area. Construction activities along the Highway 11 corridor may impact the endangered Hawaiian goose, nēnē, which utilize some areas near the highway for foraging and/or nesting. Bird strikes on utility lines have been shown to cause injury and mortality to seabirds on Kauaʻi, moving between high elevation nesting areas and open ocean foraging habitat. ʻUaʻu (Hawaiian petrel) nest in the subalpine and alpine areas of the park, and based on limited data have been shown to fly over the project area. ʻŌpeʻapeʻa (Hawaiian hoary bat) are known to roost during the day in areas near the project area. Five small populations of a plant species of concern, Kīlauea naupaka, occur near the proposed alignments along Highway 11.

In addition to special status species recognized by the USFWS, other species in the park may be rare in the park or in the project area or be culturally significant. These species of special concern will be identified by consulting with HVNP Natural Resource Management staff. Species of special concern will be protected from impacts because of their significance in the flora or fauna of the park. All identified species of special concern in the project area are plants; potential impacts will be addressed in Chapter 3 under the **VEGETATION** resource topic.

Soundscapes. Natural soundscapes are the audio equivalent of the natural scenic qualities of a national park. NPS Management Policies 2006, 4.9, require parks to preserve, to the greatest extent possible, the natural soundscapes of parks (NPS 2006). Examples of natural sounds making up the soundscape of the project include wind blowing through vegetation, rain falling, and the vocalizations of insects and birds. The project will result in localized and temporary increased noise levels, e.g., from augers or pneumatic drills, tampers, vehicles, and helicopters. No change in the park soundscape will occur in the long-term, after the project is completed.

Viewsheds. A viewshed is an area that is visible from a specific location. Inferring from the use of the term "scenery" in the 1916 Organic Act (NPS enabling legislation), viewsheds are fundamental resources of national park areas: [The National Park Service] shall promote and regulate the use of the Federal areas… by such means and measures as conform to the fundamental purpose of the said parks, monuments, and reservations, which purpose is to conserve the scenery [bold added] and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations. From Highway 11, between Nāmakanipaio and the park's Kaʻū boundary, there are broad views of Mauna Loa Volcano to the northwest, and the park's Kaʻū Desert to the southeast. The pole alignments are currently 50 feet to as much as one-half mile distant from the highway, cross the highway twice, and thus alternate in the viewsheds. The poles have just one set of three, small diameter wires near the top of the pole, without distribution wires and communication wires for eight of the nearly nine and one-half miles of the project area. The wires are set on poles approximately 40 feet above grade. The proposed power line alignments closer to and paralleling Highway 11, taller poles, and the addition of communication wires have the potential to impact viewsheds of Kīlauea and Mauna Loa Volcanoes.

Archeological Resources. The National Historic Preservation Act, as amended in 1992 (54 U.S.C. 300101 seq.), NEPA, NPS Organic Act, NPS Management Policies 2006, DO-12: Conservation Planning, Environmental Impact Analysis, and Decision-making, and NPS-28: Cultural Resources Management Guideline require consideration of impacts on archeological resources, which are defined by DO-28 as the physical evidence of past human activity, including evidence of the effects of that activity on the environment (NPS 2006, NPS 2015a, NPS 2015c). A survey of existing and proposed

alignments in compliance with Section 106 of the NHPA will be used for evaluation of impacts on archeological resources for this EA. Archeological resources within the proposed utility corridors include a variety of features related to Precontact Period resource procurement, the early development of the national park, transportation networks through the park, and telecommunications in the Kaʻū District. Some of these archeological features are eligible for listing on the National Register of Historic Places.

Impact Topics Considered but Dismissed from Further Consideration.

The following impact topics were not analyzed in this EA and are dismissed from further evaluation for one or more of the following reasons:

► They do not exist in the analysis area, or

► They would not be affected by the proposal or alternatives, or the likely impacts are not reasonably expected, or

► Through the application of mitigation measures, there would be minor or less impacts from the proposal or other alternatives, and there is little or no controversy on the subject or reasons to otherwise include the topic.

Park Management and Operations. The project will have no or negligible effect on the operation or management of the park. For this reason, this topic is dismissed from further analysis.

Visitor Use and Experience. The project will have no or negligible effect on visitor use of the park. Potential long-term impacts on visitor experience are directly related to viewsheds and in the short-term, soundscapes. Viewsheds may be altered in the long-term by relocation of the pole and wire alignments. Soundscapes may be temporarily impacted by construction noise, especially by drilling holes for new power poles. Impacts on visitor experience will be addressed in the context of viewsheds and soundscapes, under these resource topics. For these reasons and to avoid redundancy of analysis, the impact topic of Visitor Use and Experience is dismissed from further analysis.

Lightscapes. In accordance with NPS Management Policies 2006, 4.10, the National Park Service strives to preserve natural, ambient lightscapes, which are natural resources and values that exist in the absence of human caused light (NPS 2006). The proposed action would not change or add to existing lighting in the park and thus the effects of the proposed action on lightscapes would be none or negligible; therefore, this topic is dismissed from further analysis in this document.

Air Quality. The Clean Air Act of 1963 (42 USC 7401 et seq.) provides special protection for air resources and air quality related values associated with NPS units. Section 118 of the Clean Air Act requires a park unit to meet all federal, state, and local air pollution standards. Hawaiʻi Volcanoes National Park is a designated Class I air quality area. The project would result in only short-term, localized, negligible-minor increases in emissions from machinery during the construction phase; there would be no impacts to long-term air quality once completed; therefore, this topic is therefore dismissed from further analysis.

Water Resources, Wetlands, and Floodplains. The project area is located on the porous, young volcanic surfaces of Mauna Loa and Kīlauea Volcanoes. Although in some pāhoehoe areas with ash deposits heavy rains in the past have left subtle signs of infrequent, short-term, and localized surface drainage, there is no permanent surface water--springs, streams, and lakes--in the project area; also, the water table is located more than 1,000 feet below the surface. The impact on water resources, wetlands, and floodplains will be none or negligible and therefore this impact topic is dismissed.

Wild and Scenic Rivers. The purpose of designating a river as Wild and Scenic is to protect its free flow, water quality, and *outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural or other similar values* (16 USC 1271). The designated rivers and others eligible for this designation must be managed to avoid impacts on the values for which they were designated (NPS Management Policies 2006, 2.3.1.9 (NPS 2006)). There are no designated wild and scenic rivers or rivers eligible for this designation in the analysis area, or in fact, any kind of surface water; therefore this topic is dismissed from further consideration.

Prime and Unique Farmlands. The Farmland Protection Policy Act of 1981, as amended, requires federal agencies to consider adverse effects to prime and unique farmlands that would result in the conversion of these lands to non-agricultural uses. Prime or unique farmland is classified by the U.S. Department of Agriculture's Natural Resources Conservation Service. Prime farmland is defined as soil that particularly produces general crops such as common foods, forage, fiber, and oil seed; unique farmland produces specialty crops such as fruits, vegetables, and nuts. The project area does not contain prime and unique farmlands; therefore this topic is dismissed from further analysis.

Ethnographic Resources. National Park Service DO-28: *Cultural Resource Management* defines ethnographic resources as any site, structure, object, landscape, or natural resource feature assigned traditional legendary, religious, subsistence, ceremonial, or other significance in the cultural system of a group traditionally associated with it (NPS 2015a). The decision to call resources "ethnographic" depends on whether associated peoples perceive them as traditionally meaningful to their identity as a group and the survival of their lifeways. According to DO-28 and Executive Order 13007 on sacred sites, the NPS should try to preserve and protect ethnographic resources (NPS 2015a). The volcanic landscape, the summits of Kīlauea and Mauna Loa, and the vegetation connect the Hawaiian people to the park. As such, the Kīlauea summit area is rich with ethnographic resources related to Pelehonuamea and her family. A small portion of the utility corridor that would be removed passes near the summit area north of the steaming vents area and the Sulphur Banks. Ethnographic resources will not be affected by the proposed removal of the poles and lines in this area; therefore this impact topic is dismissed from further analysis.

Cultural Landscapes. According to DO-28: *Cultural Resource Management*, 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 (NPS 2015a). NPS Management Policies 2006 section 5.3.5.2 states: *…cultural landscapes will preserve significant physical attributes, biotic systems, and uses when those uses contribute to historical significance.* One of the park's identified cultural landscapes, the Crater Rim Historic District, includes a portion of the utility corridor that would be removed north of the Steaming Bluff and Sulphur Banks area. Although most of these poles were installed in the early 1950s, removal will not affect any contributing element of this historic district. For this reason, this impact topic will be dismissed from further analysis.

Historic Structures. The NHPA, as amended in 1992 (16 USC 470 et seq.), NEPA, NPS Organic Act, NPS Management Policies 2006, DO-12: *Conservation Planning, Environmental Impact Analysis, and Decision-making*, and NPS-28: *Cultural Resource Management* requires consideration of impacts on cultural resources, including historic structures, either listed in, eligible, or potentially eligible to be listed in the National Register of Historic Places (NPS 2006, NPS 2015a). The process and documentation required for preparation of this EA will be used to comply with Section 106 of the NHPA, in accordance with section 800.8(3)(c) of the Advisory Council on Historic Preservation regulations (36 CFR Part 800). With implementation of required mitigating measures, there will be no or negligible impacts to the few historical structures in the Area of Potential Effect (APE), such as the steam bathhouse east of KMC or remnants of a trash incinerator in the Nāmakanipaio area. Therefore this resource topic is dismissed from further analysis.

Wilderness. In Hawai‘i Volcanoes National Park, a total of four disjunct units comprising 123,100 acres, are designated wilderness. An additional 121,000 acres, all in the 2003 Kahuku acquisition, have been determined to be eligible for wilderness designation. The project area does not include either designated wilderness or lands determined to be eligible for future wilderness designation. The closest wilderness boundary is approximately one-quarter mile from the project area, from the Ka‘ū entrance to east of the parking area for the Ka‘ū Desert trailhead. The remainder of the project area is one to several miles from designated wilderness. Consequently, there will be no direct impacts on wilderness resources. Auditory impacts of construction will be short-term and potential impacts on wilderness will be analyzed in the context of soundscapes. For these reasons, wilderness as an impact topic is dismissed from further analysis.

Indian Trust Resources. Secretarial Order 3175 requires that any anticipated impacts to Indian trust resources from a proposed project or action by the Department of the Interior agencies be explicitly addressed in environmental documents. The federal Indian trust responsibility is a legally enforceable fiduciary obligation on the part of the United States to protect tribal lands, assets, resources, and treaty rights. It represents a duty to carry out the mandates of federal law with respect to American Indian and Alaska Native tribes. There are no Indian trust resources in Hawai‘i Volcanoes National Park. The lands comprising the park are not held in trust by the Secretary of the Interior for the benefit of Indians due to their status as Indians. For these reasons, this topic is dismissed from further analysis in this document.

Environmental Justice. Executive Order 12898 (*Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* – February 11, 1994) requires all agencies to incorporate environmental justice into their missions by identifying and addressing disproportionately high and adverse human health or environmental effects of their programs and policies on minorities and low-income populations or communities. The proposed actions in this plan would not disproportionately affect any group because of race or income, and would not have disproportionate health or environmental effect on minorities or low-income populations or communities as defined in the Environmental Protection Agency's (EPA's) *Final Guidance for Incorporating Environmental Justice Concerns in EPA's NEPA Compliance Analysis – April 1998*. Because the actions would not have any disproportionate effects, this topic is dismissed from further analysis.

Socioeconomics. Council on Environmental Quality regulations for implementing the National Environmental Policy Act, 40 CFR 1500, direct economic analyses of federal actions that will affect

local or regional economies. The policies and rationale associated with the retention of socioeconomic impacts for evaluation as an impact topic are found in 1.4.7.1 NPS Management Policies 2006 pertaining to gateway communities (NPS 2006). The proposed action would have no or negligible effect on land use, local business or other agencies. Implementation of the actions proposed in this plan would not increase or decrease the local or regional workforce or revenues for local businesses or governments. The proposed actions would not result in any unacceptable impacts, and the proposed actions are consistent with NPS Management Policies 2006. Because these effects are negligible or less in degree and would not result in any adverse unacceptable impacts, this topic is dismissed from further analysis in this document.

Climate Change and Energy Resources. Recent reports by the U.S. Climate Change Science Program, the National Academy of Sciences, and the United Nations Intergovernmental Panel on Climate Change provide evidence that climate change is occurring and could accelerate in the coming decades. While climate change is a global phenomenon, it manifests differently depending on regional and local factors. Increasing average temperatures have been documented for Hawai‘i, particularly at higher elevations. Climate change models for Hawai‘i predict increasing severity and frequency of *El Niño* drought events and changes in the mean elevation level of the inversion layer. The proposed project would result in negligible or no changes to the energy requirements or greenhouse emissions; therefore, this topic is dismissed from further evaluation.

CHAPTER 2. ALTERNATIVES

INTRODUCTION

On federal lands, NEPA requires a careful, complete, and analytical study of the impacts of proposals that have the potential to affect natural, cultural, and human environments. Such a study also includes consideration of alternatives to that proposal, well before any decisions are made. The alternatives described below are based on key natural and cultural resource issues of the project. Because the project is almost entirely on National Park Service lands, the alternatives of the proposal are based on federal legislation, the purpose and significance of Hawai‘i Volcanoes National Park, and NPS Management Policies and Directors Orders. Alternatives were developed collaboratively by HEL project managers and an interdisciplinary team of HVNP cultural and natural resource specialists, along with the national park's facilities engineer and environmental protection specialist. In addition, public input on alternatives was also considered, based on comments received in public scoping prior to preparation of the Draft Environmental Assessment.

DESCRIPTION OF ALTERNATIVES

No Action Alternative

A no action alternative would leave poles and wires in the current alignment, 50 feet to one-half mile from Highway 11, from the Kīlauea switching station to Pi‘i Mauna Drive and also to the Volcano substation at the park's rainshed/maintenance facility, without creation of road access to or under the alignment. Pole height and the configuration and diameter of wires would remain the same. Based on need, there would inevitably be replacement of deteriorated poles and wire, typically in a piecemeal fashion.

Kīlauea Side Alignment Action Alternative

In this alternative (Figure 1), poles and wires would be located along the highway margin, primarily on the Kīlauea side of Highway 11, from the Kīlauea switching station to the Nāmakanipaio substation. The alignment of poles and wires would cross Highway 11, northwest to the substation at this point. The alignment would be located along the Mauna Loa side of the highway from the Nāmakanipaio substation to Pi‘i Mauna Drive.

Mauna Loa Side Alignment Action Alternative

In this alternative (Figure 1), poles and lines would be located along the roadway margin, along the north or Mauna Loa side of Highway 11, from the Kīlauea switching station to the Nāmakanipaio substation and then to Pi‘i Mauna Drive.

Preferred Action Alternative: Alternating Alignment to Protect Viewsheds

The preferred alignment of poles and wires will alternate between the Mauna Loa and Kīlauea sides of Highway 11, replicating the placement of the current alignment from the park's Ka‘ū entrance to Pi‘i Mauna Drive (Figure 2). The preferred alignment will be located on the Mauna Loa side of the highway from the Kīlauea switching station for approximately three miles, then crossing to the Kīlauea side of the Highway 11 between mile markers (MMs) 36 and 37. After crossing the roadway, the

alignment will follow the Kīlauea side of Highway 11 for approximately three miles, crossing back to the Mauna Loa side between MMs 33 and 34. It remains on the Mauna Loa side of Highway 11 to the Nāmakanipaio substation and Piʻi Mauna Drive, a distance of approximately three and one-half miles. Similar to the current or existing alignment, the two highway crossings will be oriented on the diagonal, rather than at 90 degrees to the roadway. Relocating and upgrading of poles and wires between the park's Kaʻū entrance and a point near MM 33 would take place in the first phase or year of the project. Relocation and upgrading of poles and wires between MM 33 and Piʻi Mauna Drive would be carried out in a second phase and probably second year of the project.

ACTIONS COMMON TO ALL ACTION ALTERNATIVES

In all action alternatives**,** the alignments will be located adjacent to the Highway 11 roadway. The distance of the poles from the solid white line delineating the traffic lane from the adjacent paved shoulder will be approximately 20 feet. The distance from the edge of the pavement will typically vary from approximately 14 to 17 feet, mostly depending on the width of the paved shoulder. Poles may be located closer to the pavement margin in some locations such as in turns of the alignment.

The three action alternatives, including the preferred alternative, involve installing the same configuration of poles, wires, and anchors. Approximately 185 new, pressure-treated 50-55 foot poles (about 45 above grade) will be installed, on average 200-300 feet apart in most areas of the new alignments adjacent to Highway 11 from the Kīlauea switching station at the park's Kaʻū entrance to Piʻi Mauna Drive. Pole height and location may depend on local topography. For example, where the topography drops abruptly away from the road edge, taller poles may be needed to maintain height above grade. In long stretches of level ground, shorter poles may be used.

Three, 0.66 inch diameter, non-insulated, braided aluminum transmission wires will be installed near or at the top of the poles. The two outer wires will be fastened with porcelain insulators near the ends of 8 foot horizontal crossarms attached approximately two feet below the top of the pole; the center wire will attached to an insulator at the top of the pole.

Anchors/deadman and guy wires will be installed to stabilize a small number of poles to distribute the horizontal stress/load caused by the overhead wires and the angle between adjacent wire spans, e.g, where the direction of the alignment changes. Vertical depth of the anchors will vary between 7-9 feet below grade. These anchors are to be located approximately 5-35 feet away from the center of the pole. Anchor depth and distance will also depend on local topography.

Distribution wires will be installed in all alternatives only between Nāmakanipaio Campground and Piʻi Mauna Drive. The smaller diameter distribution wires will be installed to porcelain insulators on 8 foot crossarms, approximately 10 feet below the upper crossarms.

Two black, insulated communication wires, for telephone and internet, will be attached to the poles at approximately 20-24 feet above grade, from the Kaʻū entrance of the park to at least the Nāmakanipaio substation, and probably to Piʻi Mauna Drive. The communication wires will be one-half to one inch diameter from the Kīlauea switching station to the Nāmakanipaio substation and one-half inch to one and one-half inch diameter between the Nāmakanipaio substation and Piʻi Mauna Drive, depending on the degree existing wires are consolidated with new wires.

For the three action alternatives, all poles and wires will be removed from the alignments to be abandoned between the Kīlauea switching station and Piʻi Mauna Drive. In addition, all existing poles and wires would be removed between KMC and the Volcano substation, located approximately one-quarter mile west of Kīlauea Visitor Center, at the national park's rainshed facility. Removal of poles and wires here will be deferred to a later phase of the overall project. Abandoned poles will be left in the ground and cut off at three feet above grade; the distal or cut-off end will be removed from the site by helicopter. In some cases, poles may be cut at ground level.

A one-half mile long, separate alignment for communication wires is currently located adjacent to Highway 11 between KMC and Nāmkanipaio Campground. The alignment consists of 23 poles and alternates once between the Kīlauea and Mauna Loa sides of the highway. The communication wires from this alignment will probably be moved to the new poles on the north side of Highway 11. The old poles supporting communication wires will be cut near or at ground level and be removed by helicopter.

MITIGATION FOR ALL ACTION ALTERNATIVES

The mitigation measures below will be implemented to protect natural and cultural resources in all alternatives.

1. Follow all invasive species prevention standard operating protocols (SOPs) developed by HVNP (Appendix 4), including measures to reduce the risk of introducing the Rapid ʻŌhiʻa Death (ROD) fungus, little fire ants, and Argentine ants. Particular care must be taken when trimming trees to minimize or avoid injury to ʻōhiʻa as much as possible to reduce the risk of spreading ROD.

2. Implement all mitigation measures for listed species developed through Section 7 consultation with USFWS. Mitigation measures required include the following:

A. No trees taller than 15 feet may be removed or trimmed between June 1 and September 15 to protect ʻōpeʻapeʻa (Hawaiian hoary bat), except with prior Park approval. Following approval, thermal imaging just prior to cutting is required.

B. Construction will be restricted or prohibited in areas of nesting and brooding nēnē (Hawaiian goose), as necessary. Avoid work in known nesting and brooding areas from October – March. These areas include Quarry Road to the South end of project (Kaʻū switching station), approximately 0.8 miles; the Nāmakanipaio substation to MM 34, approximately 2 miles; and the Nāmakanipaio substation to Piʻi Mauna Drive, approximately 2 miles.

C. Collaboration between the park and Department of Land and Natural Resources (DLNR) will continue to protect federally and state listed or rare species immediately outside the park's Kaʻū entrance.

D. Construction will be prohibited within 2,000 feet of nesting ʻio (Hawaiian hawk) to protect this endangered species.

E. Strike deterrents (e.g. FireFly HW) will be required on the transmission lines along the entire new alignment to reduce the likelihood of nēnē, ʻuaʻu (Hawaiian petrels), or ʻakeʻake (band-rumped storm petrels) from striking wires. HEL will be responsible for regular monitoring, maintenance, and replacement in the future.

F. Forest bird surveys, preferably also using a thermal imaging scanner, will need to be completed on all trees that will be impacted, just prior to trimming or removal.

G. ʻIo and other large birds will be protected from electrocution by providing proper spacing of wires and adequate protection against grounding on power poles.

3. All staked pole locations and construction easements will be surveyed by an archeologist and biologist prior to construction. Pole locations will be moved if archeological features are vulnerable to impact. Pole locations will also be moved if special status plant species or plant species of special concern may be impacted.

4. Archeological monitors will be required during all ground disturbing activities to protect cultural resources.

5. Biological monitors may be necessary in specific areas or during specific times of year. Biological monitors will mark any sensitive resources that are to be avoided during construction.

6. If lava tubes are encountered during drilling, the archeological and biological monitors will determine if protective measures need to be taken.

7. Heavy equipment may only travel on the existing roadway. No metal-tracked vehicles will be allowed. No vehicle use may occur between poles off the existing road surface (i.e., no travelling parallel to highway).

8. All new pole locations will be accessed in the most direct path from the existing roadway to the pole location (perpendicular access route from pole to road). The excavator will proceed only as far as necessary to auger holes and will exit the construction easement by reversing over the route used to enter the easement. The temporary construction easement for the excavator will be 15 feet from the edge of the pavement and 20 feet wide.

9. If a pole or anchor location cannot be reached by the excavator's boom and auger, e.g., because of a guard rail, terrain features, or unacceptable impacts, these holes will be dug with a portable drill.

10. The excavator will be used only to drill holes, with no grubbing or clearing of vegetation, and no digging, filling, and removal of spoils.

11. Abandoned poles will be cut at three feet above grade and the upper (cut) section will be removed.

12. Cut poles will be removed by helicopter to reduce ground disturbance and potential impact to natural and cultural resources. Removal will be coordinated with NPS to avoid sensitive times of year for listed species.

13. Rock, gravel, and sand spoils excavated from the holes drilled for the new poles and all other unused construction materials will be removed and properly disposed of.

14. No night work will be allowed to protect night-flying animals.

15. No barbed wire may be used at facilities unless bird strike deterrents are employed at close spacing.

ALTERNAIVES AND ACTIONS CONSIDERED BUT DISMISSED

Additional alternatives were considered but dismissed because they did not meet the objectives of the project or were unfeasible because of impacts or costs. Running the lines underground would require an 8-10 foot wide shallow trench to provide the requisite separation of the high voltage transmission wires. This alternative was dismissed because of the unacceptable extensive impacts on geology, soil, vegetation, wildlife, viewsheds, and archeological resources from constructing a continuous trench of this width, with little opportunity for mitigation. It was also dismissed because of the cost, estimated by HEL to be at least eight times greater than running the lines above ground. The cost of undergrounding, beyond that of above-ground construction, would be borne by the land owner, in this case the National Park Service.

Other alternatives addressed reducing visual impacts by removing the alignment well away from Highway 11. One option considered was to utilize the existing alignment outside the park on Kapapala Ranch from the Kīlauea switching station to park lands on the Mauna Loa Road at 4,600-4,900 foot elevation and beyond. This alternative alignment was dismissed because several miles of new road would need to be constructed in the park to connect transmission wires from that existing alignment to the Nāmakanipaio substation or the proposed alignment would have to be located adjacent to the Mauna Loa Road for several miles.

Another alternative considered but dismissed was installing new poles and wires on the current alignment inside HVNP. Installing and maintaining poles and wires would require construction of a permanent road, accessible to HEL vehicles, along the current alignment where no road currently exists. This alternative was dismissed because of its unacceptable level of impacts on geological, soil, vegetation, wildlife, and archeological resources throughout its length. In addition, it would impact park viewsheds because the new maintenance road under the lines would be visible from Highway 11 for much of its length through the project area. For most of the same reasons above, a final alternative considered but dismissed was to construct a new alignment inside the park but well away from Highway 11.

ENVIRONMENTALLY PREFERRED ALTERNATIVE

In addition to identifying the preferred alternatives in its NEPA documents, NEPA guidelines require the identification of the environmentally preferred alternative. The environmentally preferred alternative is “the alternative that causes the least damage to the biological and physical environment; it also means the alternative which best protects, preserves, and enhances historic, cultural, and natural resources” (40 CFR 1500-1508).

Based on the analysis of impacts of the alternatives in Chapter 3, the alternative that causes the least damage to and best protects and enhances natural and cultural resources is the preferred alternative, “Alternating Alignment to Protect Viewsheds.” All action alternatives are very similar in the scope and quality of impacts on resources in the project area, including geology and soil, vegetation, wildlife, special status species, soundscapes, and archeological resources. With implementation of prescribed mitigating measures, impacts to these resources can be largely avoided or they are short-term. The preferred alternative not only protects these natural and cultural resources of the project area, it best protects the most scenic portions of the viewsheds of Mauna Loa and Kīlauea Volcanoes.

CHAPTER 3. AFFECTED ENVIRONMENTS AND ENVIRONMENTAL CONSEQUENCES

INTRODUCTION

This chapter characterizes the affected environments of the project and analyzes impacts to national park resources and visitors. It is organized by the impact topics identified in Chapter 1: Geology and Soils, Vegetation, Wildlife, Special Status Species, Soundscapes, Viewsheds, and Archeological Resources. First, each affected resource is described, particularly those aspects that could be impacted by the alternatives proposed. Sufficient detail is given to provide context for understanding potential impacts and a baseline understanding for analyzing changes in the resources following implementation of the alternatives.

A description of the affected environment of a resource is immediately followed by an evaluation of the environmental consequences of the alternatives on that resource. The environmental consequences portion of each impact topic analyzes both beneficial and adverse impacts that could result from implementing the alternatives described in Chapter 2. The analysis also includes, specific to each impact topic, a summary of relevant laws and policies, methods used to analyze impacts, definitions of impact intensity, and an analysis of cumulative effects if relevant.

GENERAL METHODS FOR ANALYZING IMPACTS

In this EA, the impact analyses and conclusions were based on the scientific literature, when available. It was also based on information and insights provided by HVNP cultural and natural resource specialists and research biologists from the U.S. Geological Survey-Biological Resources Division, Kīlauea Field Station, located in HVNP, as well as comments provided by the public in scoping.

The effects are based on analysis of the following factors for each impact topic:

Type: Determine if the impact would be beneficial or adverse.

Intensity: Identify the intensity of the effect as negligible, minor, moderate, or major, as defined in the following sections for each resource topic. The intensity level is only determined for adverse effects, not for beneficial effects.

Duration: Analyze duration of impact independently for each resource. Depending on the resource, impacts may last for the project period or other time period.

- *Short-term* impacts are temporary or transitional impacts associated with project activities.

- *Long-term* impacts are typically those effects that would last several years or more or would be permanent.

Context: Determine the context or setting within which an impact would occur.

- *Local impacts* would generally occur within the immediate vicinity of the proposed project/activity.

- *Regional impacts* would occur on surrounding lands and/or in adjacent communities.

Impact: Consider and examine the following types of impacts for all proposals and alternatives.

- *Direct Impact:* effects caused by an action and occur at the same time and place as the action.

- *Indirect Impacts:* effects caused by the action and occur later or farther away, but are still reasonably foreseeable.

- *Cumulative Impacts:* effects in conjunction with past, present, or reasonably foreseeable future actions.

THRESHOLDS FOR IMPACT ANALYSIS

The intensity and duration of impacts vary by resource. Therefore, definitions of intensity--negligible, minor, moderate, or major--are provided separately for each impact topic. Clarification of the terms commonly used to characterize duration, typically short-term and long-term, will be provided for each impact topic or effect, if necessary. Definitions of intensity and duration were formulated through the review of existing laws, policies, and guidelines, and with assistance from resource specialists from the national park and other agencies or organizations.

CUMULATIVE IMPACTS ANALYSIS

The Council on Environmental Quality (CEQ) regulations for implementing NEPA requires the assessment of cumulative impacts in the decision-making process for federal actions. A cumulative impact is described in the CEQ, Regulation 1508.7, as follows:

A "cumulative impact" is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

Cumulative impacts are considered for both the no action and the action alternatives in the analysis of environmental consequences on park resources.

GEOGRAPHIC ANALYSIS AREA

The geographic area for the analysis includes those areas proposed in the alternatives for new electrical and communication wire alignments, plus those areas in which the current alignment is to be removed (Figures 1 and 2). The proposed new alignments extend from the Kīlauea switching station at the park's Kaʻū entrance to Piʻi Mauna Drive, the access road to the Volcano Golf and Country Club

Estates subdivision. The width of the area analyzed includes a 50 foot corridor adjacent to and on either side of Highway 11.

The geographic analysis area for the existing alignments to be abandoned are also 50 foot corridors, centered on the current alignments. These alignment are located at varying distances away from Highway 11, from 50 feet to one-half mile, between the park's Kaʻū entrance and Piʻi Mauna Drive. It also includes a one mile long alignment to be removed between KMC and the Volcano substation. This substation is located at the national park's rainshed facility, one-quarter mile west of the Kīlauea Visitor Center.

Adjacent areas may be included in the analysis if impacts on resources potentially expand beyond the 50 foot wide corridors of the narrowly defined project area. For example, the geographical analysis area for impacts on soundscapes and viewsheds is inherently much broader. For soundscapes it includes all adjacent areas that could be impacted by the sounds of equipment or aircraft used to install or remove poles and wires. For viewsheds, the geographical analysis area includes all scenery or areas within view of Highway 11.

NPS GUIDELINES ON IMPAIRMENT OF NATIONAL PARK RESOURCES

In addition to determining the environmental consequences of implementing the preferred and other action alternatives, *NPS Management Policies 2006* section 1.4 (NPS 2006) requires a determination that no implementation of any actions would impair a park's resources and values. The fundamental purpose of the national park system, established by the 1916 NPS *Organic Act* and reaffirmed by the 1970 NPS *General Authorities Act* and the 1978 *Redwood Act,* is conservation of park resources and values. NPS managers must always seek ways to avoid, or to minimize to the greatest degree practicable, adverse impacts on cultural and natural resources and park values. However, these laws also afford park managers discretion to allow impacts to occur when this is necessary and appropriate to fulfill the express purposes of the park. That discretion is constrained by the statutory requirement that the National Park Service must leave resources and values unimpaired unless a particular law directly and specifically provides otherwise. The prohibited impairment is any impact that, in the professional judgment of the responsible NPS manager, would harm the integrity of park resources or values, including the opportunities that otherwise would be present for the enjoyment of those resources or values (NPS 2006). Whether an impact has such a result depends on the particular resources that would be affected; the severity, duration, and timing of the impact; the direct and indirect effects of the impact; and the cumulative effects of the impact in question combined with other impacts.

As further noted in *NPS Management Policies 2006*, section 1.4.7 (NPS 2006), in addition to the above potential environmental consequences, NEPA compliance on National Park Service lands must also take into consideration consultations required under Section 106 of the National Historic Preservation Act, relevant scientific information, pertinent information from subject matter experts, and results of related civic engagement and public involvement activities. The Superintendent's determination of non-impairment for the alternative selected, following consideration of all public review comments, will be provided as an attachment to the approved decision document (anticipated to be a "Finding of No Significant Impact").

GEOLOGY AND SOILS

Affected Environment

The project area largely occurs on relatively recent lava flows of Mauna Loa and Kīlauea Volcanoes (USGS 1996; USGS 2003). Nearly one-half of the proposed and existing alignments occurs on the 400-750 year old Keamoku ʻaʻā flows, from near MM 34 to near MM 39 on Highway 11. The Keamoku flows erupted from a fissure on the northeast rift zone of Mauna Loa. These ʻaʻā flows overlie slightly older pāhoehoe flows that erupted from the Observatory Vent near Uwēkahuna Bluff close to the present day Hawaiian Volcano Observatory and NPS Jaggar Museum. The pāhoehoe flows of the Observatory Vent are located both at the southwestern edge of the project area between MM 38 and MM 39 to the park's Kaʻū entrance, as well as northeast of the Keamoku ʻaʻā flows near MM 34 to the eastern edge of KMC. Similar aged flows, possibly from the Observatory Vent, occur in the alignment from KMC to the Volcano substation.

Well over one-half of the project area occurs on largely exposed pāhoehoe and ʻaʻā flows, with minimal ash soil cover. The young lava flows in the project area are fully blanketed by relatively deep soil and dense vegetation only between KMC and the Volcano substation. The soil here developed from ash and rock deposited by explosive eruptions of Kīlauea Caldera, mostly between approximately 1500 to the last major event in 1790, following the collapse of Kīlauea summit and the formation of the summit caldera. Ash deposits become thinner and more discontinuous toward the west, with greater distance from the source at Kīlauea Caldera. There is a thin layer of ash soil covering all but higher exposed surfaces such as the top of pāhoehoe tumuli in the project area between Piʻi Mauna Drive and MM 32. West of MM 33 the basaltic substrate is partly to mostly exposed, increasingly so toward the west. On pāhoehoe, ash tends to accumulate in low spots or against north and east facing rock exposures, having arrived from explosive eruptions originating from the caldera to the northeast. Ash deposits are noticeably less extensive on the ʻaʻā flows because of the more porous nature of this texture of lava.

Besides the highly visible record of explosive eruptions of Kīlauea's summit from 1500-1790 on the surface of the pāhoehoe and ʻaʻā flows in the project area, there are also indicators of the 1924 eruption (USGS 2011). These violent eruptions have deposited not only blankets of ash particles (less than 2 mm in diameter) but also larger tephra particles. Deposited tephra includes rocks 2-64 mm in diameter called lapilli. One type of lapilli, called accretionary lapilli, are found locally on the surface of large rocks or ash deposits in the area. Accretionary lapilli are spherical balls of volcanic ash formed within an eruptive ash cloud by the addition of concentric layers of moist ash around a central nucleus. Large tephra, lava bombs which are rocks more than 64 mm in diameter, are conspicuously scattered on the surface of the ash and exposed pāhoehoe. Larger angular bombs, some over one-half meter in diameter, are found in the upper portions of the project area, and are most noticeable on pāhoehoe east of the Keamoku ʻaʻā flows.

Lava tubes are undoubtedly present beneath the surface of the pāhoehoe flows in the project area. In addition to their intrinsic value as geological features, some lava tubes in Hawaiʻi contain human remains and other cultural artifacts. Also, some lava tubes in the Hawaiian Islands support an endemic fauna of cave-adapted invertebrates dependent on very high, constant relative humidity and total darkness. Impacts to cultural and natural resources in lava tube caves, including mitigation to protect these resources, will be addressed in the Archeological and Wildlife impact categories.

Relevant Policy

The Service will protect geologic features from the unacceptable impacts of human activity while allowing natural processes to continue. The term "geologic features" describes the products and physical components of geologic processes. Examples of geologic features in parks include rocks, soils, and minerals . . . caves and . . . dramatic or unusual rock outcrops and formations (NPS Management Policies 2006, 4.8.2 (NPS 2006)).

The Service will actively seek to understand and preserve the soil resources of parks, and to prevent, to the extent possible, the unnatural erosion, physical removal, or contamination of the soil or its contamination of other resources . . . Management action will be taken by superintendents to prevent or at least minimize adverse, potentially irreversible impacts on soil (NPS Management Policies 2006, 4.8.2.4 (NPS 2006)).

*The Service will manage caves in accordance with approved cave management plans to perpetuate the natural systems associated with the caves, such as karst and other drainage patterns, air flows, mineral deposition, and plant and animal communities. Wilderness and cultural resources and values will also be protected (*NPS *Management Policies 2006*, 4.8.2.2 (NPS 2006)).

Environmental Consequences

Methodology. Understanding the potential effects of installing and removing power poles and wires on geological features, soils, and lava tube caves was based on direct observation of similar operations in alignment placements on other parts of Hawai'i Island, discussions with HEL project engineers, and consultation with USGS geologists at Hawaiian Volcano Observatory.

Thresholds of change for the intensity of an impact are also based largely on discussions with local resource specialists and are defined as follows:

Negligible: The impact is not detectable or measurable and causes very little or no physical disturbance, compaction, or unnatural erosion when compared to unaffected areas nearby.

Minor: The physical disturbance of geological features and soils is detectable in highly localized and highly separated areas.

Moderate: The impact is readily apparent and has measurable effects of physical disturbance on geological features and soils, with physical disturbance to geological features and soil in large areas or highly numerous small areas spaced close together.

Major: The impact is readily apparent and has severe and widespread effects on physical disturbance, on geological features and soils.

Intensity of impacts above was addressed for surface geological features and soil. The possibility of permanent or long-term impacts on lava tubes resources will be avoided through mitigation prescribed in Chapter 2.

Impacts of the No Action Alternative. Impacts on geological and soil resources would largely result from the drilling of holes for new poles, and to a much lesser degree, from removal of abandoned poles from the project area. Because poles and wires would be replaced individually or in only a piecemeal fashion in the existing alignments, few holes would need to be drilled in the short-term. Impacts on rock features would be long-term. Impacts on soil resources may be long-term or in some cases, short-term; soil resources, over time, acted on by wind and water may eventually stabilize or even return to a previous configuration. As a result, the no action alternative would have minor and direct adverse impacts on geological and soil resources; these impacts would be localized but both short-term and long-term.

Cumulative Impacts. Over time, however, an increasing number of the aging poles would need to be replaced and installed, *involving* the drilling of additional holes. This would result in minor-moderate, direct adverse impacts to geological and soil resources. Impacts on geological resources would be long-term; impacts on soil resources would be long-term or short-term. Emergency repairs may require construction of temporary roads, but this would require park approval and would be infrequent.

Conclusions. The no action alternative, when combined with cumulative impacts, may have minor-moderate, short-term to long-term, direct, adverse impacts on geological and soil resources.

Impacts of the Action Alternatives, Including the Preferred Alternative. The impacts of the three action alternatives, including the preferred alternative, on geology and soils are essentially the same. For this reason, the impacts of the three action alternatives are characterized together in the following analysis. Impacts to geological resources and soils will result mostly from the drilling of holes in which to place the poles. Each hole to be bored is approximately three feet in diameter. There will be additional superficial disturbance to geological features and soils in the immediate area around the dug hole, an approximately 10 X 10 foot square, centered on the hole. This disturbance will result from the movement of machinery, trampling of workers, deposition of fill material, and the accumulation and removal of spoils from the dug hole.

Guy wires are needed for a small subset of poles, located typically in a change of the direction of the alignment. Pounding anchors for guy wires will result in surface disturbance to geological and soil in a very small area, less than four square feet on the surface.

Impacts to geological features and soil may also result from the driving of the excavator from the highway toward the pole site within the construction easement allowed by HVNP. The permitted construction easement is 15 feet perpendicular from the pavement edge and 20 feet wide. On ʻaʻā surfaces, the lava blocks or clinkers may be fragmented or displaced beneath the weight of the two tracks of the excavator, probably to a depth of 6-12 inches. On the more solid and continuous pāhoehoe, there will be more shallow fragmentation of surface "lava sculpture" features such as the undulating texture of ropey pāhoehoe. The tracks of the excavator may also disturb and displace ash soil deposits, if present.

However, in most pole sites, there will be minimal driving of the excavator across undisturbed lava surface beyond the highway shoulder. There is often a 1-6 foot wide disturbed gravel or grassy shoulder beyond the edge of the paved shoulder. In addition, the auger is mounted on the excavator at the end of a 20 foot long boom. The center of the holes to be drilled is approximately 14 feet from the

pavement edge in over half of the project site, within the reach of the boom-mounted auger. The excavator will need to drive further into the construction easement away from the pavement margin in the sites where the paved shoulder is only three feet wide and the holes are typically 16-17 feet from the pavement edge. The boom is capable of accessing pole sites on slopes above and below the highway margin, although slopes reduce the distance reachable by the auger. Therefore, drilling holes on steep slopes may require further penetration of the excavator into the construction easement.

In all cases, mitigation measures require the excavator to be driven the most direct route to pole sites and only as far as necessary to drill holes. Mitigation measures also require that excavators back out of the construction easement along their pathway into the site, rather than turning and heading out, impacting additional lava and soil within the easement. Mitigation measures also prohibit movement of the excavator from site to site, parallel to the highway. Finally, mitigation measures require the use of a portable drill, if drilling cannot be done with an excavator within the construction easement.

Potential impacts to geological and soil resource will occur mostly in the new 185 pole sites. Assuming at each site, a 10 X 10 foot disturbed area around each pole and a 15 X 20 foot construction easement, impacts to geological features and soil could potentially occur in a total of 1.7 acres of park land. However, impacts are expected in only a portion of each pole site and a smaller portion of each construction easement because of mitigation measures.

On the pāhoehoe substrate of the project area, there is a remote possibility of penetrating into lava tubes while drilling holes. Lava tubes are formed when flowing surface material cools and solidifies, insulating molten, flowing material below the surface, which drains away leaving a continuous cavity, sometimes extending for miles. Besides direct damage to the natural geological integrity of the lava tubes, these holes must be promptly plugged to prevent changes in humidity and light conditions in the lava tube that may affect endemic, cave-adapted organisms and protect cultural remains if present. Mitigating measures require that biological or archaeological monitors on-site will determine what measures need to be taken if lava tubes are penetrated by construction activities. More likely, small cavities, typically minor voids found at the base of pāhoehoe tumuli will be encountered; penetrating these requires no mitigation for biological resources, although cultural remains, if discovered, may require protection.

In summary, the action alternatives, including the preferred alternative would have minor-moderate, direct, mostly long-term, adverse impacts to geological and soil resources.

Cumulative Impacts. No cumulative impacts are expected.

Conclusions. The action alternatives, including the preferred alternative, would have moderate, direct, short-term and long-term, adverse impacts to geological and soil resources.

VEGETATION

Affected Environment

The analysis of impacts on vegetation emphasizes native vegetation, including common, uncommon, and rare native plant species, which are to be protected and preserved, as directed by NPS Management Policies 2006 (NPS 2006). The analysis of impacts on rare native plants recognized by the USFWS or the Hawai‘i State DLNR as endangered, threatened, candidate endangered, proposed endangered, or species of concern, will be addressed in the Special Status Species impact topic.

Most of the project area is located in the leeward environment of the park, west of Kīlauea summit, with modest to low rainfall. Consequently, the vegetation of the project area is largely characterized by dry ‘ōhi‘a shrubland and woodland. The shrubland vegetation is dominated by short, scattered ‘ōhi‘a trees and native shrubs, mostly pūkiawe and ‘a‘ali‘i, along with the less common native shrubs, ‘ūlei, ‘ākia, and the occasional ‘ōhelo. The dry ‘ōhi‘a shrublands dominate the driest environments of the project area, from the park’s Ka‘ū entrance to around MM 32, including the porous substrate of the Keamoku ‘a‘ā flows and pāhoehoe substrate west and east of the Keamoku flows. The shrublands are almost exclusively dominated by native plants, with very minor cover of the invasive sedges and grasses found on scattered deposits of ash soil.

Dry ‘ōhi‘a woodlands occur within the project area in more moist environments and/or with more extensive and deeper soil than dry ‘ōhi‘a shrublands. They are largely found east of MM 31 to Pi‘i Mauna Drive. Dry ‘ōhi‘a woodlands transition into dry ‘ōhi‘a shrublands between MM 31 and MM 32. Near Nāmakanipaio Campground, on deeper soil with slightly greater rainfall, the dry ‘ōhi‘a woodlands transition into closed, mixed ‘ōhi‘a-koa forest.

Dry ‘ōhi‘a woodlands are dominated by the same suite of native woody plant species as the dry ‘ōhi‘a shrublands. The woodlands can be distinguished by taller, more closely spaced ‘ōhi‘a and greater abundance and density of larger native shrubs. Herbaceous native plant cover is also much higher, including scattered patches of the native bunchgrasses kāwelu and hairgrass, along with native sedges. Invasive grasses, particularly broomsedge, beardgrass, and molasses grass, form small, discontinuous patches on ash deposits.

The stands of dry ‘ōhi‘a woodland in the project area differ from the more extensive stands of dry ‘ōhi‘a woodland near Hilina Pali and Chain of Craters Roads and other leeward areas of HVNP. Most of the latter stands of dry ‘ōhi‘a woodland have a nearly continuous understory of the fire-promoting invasive grasses, broomsedge, beardgrass, and molasses grass. Repeated wildfires carried by these grasses have greatly diminished the abundance of native trees, shrubs, and grasses in dry ‘ōhi‘a woodlands in these areas (Dantonio et al. 2011; Tunison et al. 1995). However, the dry ‘ōhi‘a woodlands in the project area have minimal soil in most areas. They thus support relatively sparse cover of these invasive, fire-promoting grasses. The dry ‘ōhi‘a woodlands in the project area, therefore, have little history of fire, and are dominated by relatively intact, stands of native trees, and understory native shrubs and herbaceous plants.

Small stands of dry ‘ōhi‘a woodland located immediately along Highway 11 in the project area are especially intact, with few invasive plant species and a relatively high diversity of native plant species. Irrigated by runoff from the crowned roadway, these narrow bands of ‘ōhi‘a trees are much

taller here than in the adjacent shrublands or woodlands. Māmane trees, and in some locations iliahi (sandalwood) trees, grow among the ʻōhiʻa in this well-watered environment. Often there is just a single, irregular row of taller ʻōhiʻa adjacent to the road, especially on ʻaʻā. However, when the ʻōhiʻa form a closed canopy with several rows of trees away from the road, the native shrub understory is often dense or closed. Irrigated by runoff from the highway, but with little ash soil, the herb layer below the native shrubs is typically dominated by native grasses, sedges, lilies, ferns, and rushes; invasive grasses are noticeably scarce. Stands like these adjacent to Highway 11, with greater native plant biodiversity and the near absence of invasive plant species, are uncommon in the dry ʻōhiʻa woodlands of the park.

Rainforest vegetation, representative of the dry margin of this vegetation type, occurs in much of the project area from near KMC to the Volcano substation. The overstory is dominated by closed to open ʻōhiʻa, with dense understory cover of matted uluhe fern near the Volcano substation and dense understory stands of invasive species including strawberry guava, Himalayan raspberry, and faya tree, towards KMC.

There are three native plant species of special concern in the project area because of their rarity in this environment or in HVNP and because of their potential vulnerability to the impacts of project construction: hōʻawa, pāwale , and iliahi or sandalwood. One individual of the very uncommon tree species in HVNP, hōʻawa, is found near a pole site in a well-watered stand of taller ʻōhiʻa woodland near MM 39. Over 15 individuals of a small shrub, pāwale, are found on ʻaʻā, clustered just near MM 35 and MM 36. Pāwale, not uncommon on recent pāhoehoe flows in wet environments, is very uncommon in this region of the national park, except for this location in the project area. Scattered individuals of iliahi occur in the transition from wet forest to mesic woodland in HVNP and a number of individuals are thus found in this transitional environment between Piʻi Mauna Drive and Nāmakanipaio area. The five small clusters in the project area of a USFWS plant species of concern, Kīlauea naupaka, will be addressed in the Special Status Species impact topic.

Relevant Policy

National Park Service policies require protection of native plants, plant communities, and ecosystems on park lands.

The National Park Service will maintain as parts of the natural ecosystems of parks all plants and animals native to park ecosystems . . . by

- *preserving and restoring the natural abundances, diversities, dynamics, distributions, habitats, and behaviors of native plant and animal populations and the communities and ecosystems in which they occur . . .*
- *minimizing human impacts on native plants, animals, populations, communities, and ecosystems, and the processes that sustain them* (NPS Management Policies 2006, 4.4.1.1. (NPS 2006)).

Environmental Consequences

Methodology. Impacts on vegetation, including impacts on the three native plant species of special concern, are addressed below in a relatively detailed fashion. These are related to the impacts on native wildlife and also affect, in part, impacts on viewsheds.

Determining the potential effects of installing and removing power poles and wires on vegetation is based on understanding the potential effects of soil and vegetation disturbance on the ecology of plant species found in the project area. These patterns are elucidated in published park plant inventories (Higashino et al. 1988), feral animal exclosure studies (Loope and Scowcroft 1985; Belfield 1998), alien plant species removal research results (D'Antonio et al. 1998), and studies in HVNP on the effects of wildland fire on dry ʻōhiʻa woodland (D'Antonio et al. 2011; Tunison et al. 1995). Natural resource specialists in HVNP and research biologists at the Kīlauea Field Station of USGS in the national park provided information about the effects of vegetation clearing. The extent and patterns of vegetation clearing were clarified by the HEL Project Forester. Thresholds of change for intensity levels address only adverse impacts on native plant species and plant communities. The intensity levels are largely based on discussions with local resource specialists and are defined as follows:

Negligible: No or barely detectable impacts to native vegetation, including injury and loss of cover.

Minor: Impacts on native vegetation would be detectable in numerous scattered sites, but would not result in a long-term loss of cover or biomass that would cause a population decline.

Moderate: Impacts on native vegetation would be detectable in numerous scattered sites and with a measurable loss of native plant cover and biomass in those scattered sites, but would not impact in the long-term, overall populations in the area.

Major: Impacts on native vegetation would be detectable throughout the affected area with significant loss of native plant cover and biomass which would impact the populations and plant community and a detectable decline or loss of the populations of the species of special concern.

Impacts of the No Action Alternative. Loss of native plant cover would occur primarily from drilling activities and felling of trees around the holes to be drilled for installing replacement poles. Lesser impacts would also occur in conjunction with removal of old poles. Construction disturbance would enhance the spread of invasive species in those locations. Because poles and lines would be replaced individually or in only a piecemeal fashion in the existing alignments, there would a limited number of holes drilled as needed, new poles erected, old poles removed, and short stretches of new wire pulled into place. In addition, the likelihood of affecting multiple numbers of individuals of the three species of special concern would be very low. Therefore, the minor and direct adverse impacts on vegetation resources of the no action alternative would be short-term and localized.

Cumulative Impacts. Over time, however, an increasing number of the aging poles would need to be replaced, involving the drilling of holes and disturbance of soil around the hole sites. Pruning of vegetation away from wires would be needed indefinitely; these are considered to be long-term impacts because of their repeated nature. In addition, pruning of ʻōhiʻa results in wounds and greater vulnerability to infection by the ROD fungus. Likewise, over time, there is a greater likelihood of impacts and loss of species of special concern. Cumulative impacts of the no action alternative would

therefore have minor-moderate, direct, short-term to long-term, localized to widespread, adverse impacts on vegetation resources. Emergency repairs may require construction of temporary roads, but this would require park approval and is not considered in this analysis.

Conclusions. The no action alternative, when combined with cumulative impacts, would have minor-moderate, direct, short-term to long-term, localized, adverse impacts on vegetation resources and species of special concern.

Impacts of the Action Alternatives, Including the Preferred Alternative. The three action alternatives are expected to have similar impacts on vegetation and plant species of special concern and are therefore analyzed together. Damage to native plants and loss of native plant cover will take place mostly at pole sites during drilling operations and to a lesser extent in the construction easements with movement of the excavator into position to auger holes. Additionally, damage to native plants and loss of native plant cover will occur during pole installation, felling and removal of abandoned poles, and pruning of trees under the new wires.

Trees rooted within 5-10 feet of a hole augered to install a new pole would be felled, per HEL standard clearing protocols. Native shrubs and herbaceous plants will be impacted at and near the augered hole site by trampling of workers, drilling and tamping operations, depositing and removing of spoils, and placing of fill material. Impacts may occur in as much as a 10 X 10 foot square centered on the augured hole. More trees may need to be felled adjacent to new pole holes sites and construction easements within the closed ʻōhiʻa/koa stands east of Nāmakanipaio Campground. More trees may also be affected in the narrow stands of dry ʻōhiʻa woodland that occur on the well-watered margins of Highway 11.

Damage, loss of cover, or mortality of native shrubs and herbs may also occur in the 15 X 20 foot construction easement beneath the tracks or chassis of the excavator as it is positioned to auger holes and returns to the pavement. However, in most pole sites, there will be minimal driving of the excavator across vegetated lava surfaces beyond the highway shoulder. There is often a 1-6 foot disturbed gravel or grassy shoulder beyond the edge of the paved shoulder. In addition, the auger is mounted at the end of a 20 foot long excavator boom. The center of the holes to be drilled is approximately 14 feet from the pavement edge in most of the project site, within the reach of the boom-mounted auger. The excavator will need to drive further into the construction easement away from the pavement margin in those sites where the paved shoulder is only three feet wide and the holes are about 16-17 feet from the pavement edge. The boom is capable of accessing pole sites on slopes above and below the highway margin, although slopes reduce the distance reachable by the boom and auger. Drilling holes on steep slopes may require further penetration of the excavator into the construction easement.

In all cases, mitigation measures require the excavator to be driven the most direct route to pole site and only as far a necessary to drill holes. The excavators are required to back out of the construction easement along their pathway into the site, rather than turning and heading out, impacting additional lava and soil resources within the easement. Mitigation measures prohibit movement of the excavator from site to site, parallel to the highway. Finally, mitigation measures require the use of a portable drill, if drilling cannot be done with an excavator from within the confines of the construction easement.

Potential impacts to vegetation resources may occur in the 185 new pole sites. Including at each site, 100 square foot site around each pole and a 15 X 20 foot construction easement, impacts to native

vegetation may potentially occur in a total of 1.7 acres of park land. However, impacts are definitely not expected throughout the full construction areas around each pole site and in only a small portion of the construction easements.

Many of the impacts on native plants in the pole sites and construction easements may be short-term, with long-term recovery. The native shrub species are capable of resprouting if not grubbed from the site. ʻŌhiʻa and koa are capable of resprouting from the trunk or root collar, if cut near ground level, without further disturbance. There will undoubtedly be recruitment of native plants from seed in these sites which will be left largely undisturbed after the construction project is completed and are mostly free of invasive grasses.

Some trees adjacent to Highway 11 may need to be pruned or felled to provide access for installing poles in predrilled holes away from the road. Installation will be carried out from the edge of the roadway, using a truck-mounted "cherry picker" which lifts poles laterally from the roadway to the pre-drilled holes. Trees in the path of the laterally lifted poles are pruned or occasionally felled, if the "cherry picker" cannot maneuver the pole above or around them. Mostly ʻōhiʻa will be impacted, along with some koa between Nāmakanipaio and Piʻi Mauna Drive. Greater impacts are expected on pāhoehoe substrate where the stands of trees along the highway edge are taller, more continuous along the highway, and spread further from the roadway into the adjacent woodland or scrubland vegetation. Little pruning or felling will be needed in the fringe of trees along Highway 11 on the Keamoku ʻaʻā flows. Here the trees along the well-watered road margin are shorter and form less continuous and narrower forest patches than on the pāhoehoe.

Generally, 10 feet of clearance is needed below the wires, although less with ʻōhiʻa and koa limbs located laterally of the wires. A tree touching the wires could result in a short and power interruption. Little pruning of trees would be needed between Nāmakanipaio Campground and around MM 39 near the Kaʻū boundary of the park. Trees are relatively short here, especially on the Keamoku ʻaʻā flows, well below the transmission lines located at approximately 40 feet above the grade. Selective pruning would be required to provide clearance around the transmission and distribution wires, in areas with taller trees, east of Nāmakanipaio Campground and immediately east of the Kaʻū entrance. Trees in the alignment would not be cut at the base but pruned just above a major lateral branch, below the height to provide the requisite clearance. Loss of tree cover will be minimized by restrict the pruning and felling of trees to the degree absolutely necessary.

No vegetation cutting is required to install wires on the poles. These wires are pulled along the crossarms from one end of the alignment, not pulled up from the ground along the length of the alignment. Communication wires are also installed by pulling from pole to pole at the destination height, rather than from the ground. Tree pruning required for the electrical wires will typically provide adequate vegetative clearance for the communication lines.

Localized injury and temporary loss of native plant cover may also result from the felling of abandoned poles. In addition, damage to native plants may also occur during rigging and removing felled poles by helicopter. Felling poles and removing poles in the one-half mile of alignment between KMC and the Volcano substation would result in temporary damage to the open canopy of native ʻōhiʻa trees and the nearly continuous subcanopy of uluhe fern. Impacts would occur within 30-40 feet of the poles. Slow-growing ʻōhiʻa trees could take a number of years to recover their former stature or

biomass. Uluhe would recover vegetatively from adjacent portions of the widespread colonies in which they grow; cover would be restored within several years.

Mitigation measures should protect the three species of special concern, hōʻawa, pāwale, and iliahi. Individuals near the pole sites or construction easements will be identified with flagging tape, and their locations will be communicated to field crews. Biological monitors will be on site when construction takes in or near the locations of the species of special concern. One stake site was moved to protect a young individual of iliahi.

In summary, the short-term, localized impacts of the action alternatives on vegetation resources, including the preferred alternative, would have adverse, minor-moderate, direct, mostly short-term, localized adverse impacts to native vegetation in the project area and negligible impacts on plant species of special concern.

Cumulative Impacts. Impacts on vegetation are anticipated in the future in that follow-up clearing of vegetation away from the wires would be required as vegetation recovers or impinges on the wires following storm damage and random tree failures. In addition, pruning of ʻōhiʻa results in wounds and greater vulnerability to infection by the ROD fungus. Because ʻōhiʻa is a very slow-growing tree species and the main species to be addressed by a future clearing program, follow-up clearing will generally be needed only at lengthy intervals. Follow-up treatments are considered to result in long-term impacts because of their repetitive nature. Cumulative impacts would therefore have minor-moderate, direct, localized, short-term to long-term, adverse impacts on vegetation.

Conclusions. The action alternatives, including the preferred alternative, when combined with expected cumulative impacts, would have adverse, moderate, direct, short-term and long-term, localized adverse impacts to native vegetation in the project area and negligible impacts on plant species of special concern.

WILDLIFE

Affected Environment

Native wildlife in Hawaiʻi consists of the one terrestrial native mammal, native birds, and native invertebrates. The endangered native mammal, ʻōpeʻapeʻa (Hawaiian hoary bat), as well as the endangered native birds, nēnē (Hawaiian goose), ʻuaʻu (Hawaiian petrel), ʻakeʻake (band-rumped storm-petrel) and ʻio (Hawaiian hawk) will be addressed in the impact topic of Special Status Species.

The native birds observed in the project area were the common forest birds typically found in mid-elevation and upland native woodland and forest habitat in the park: ʻapapane, ʻōmaʻo, and Hawaiʻi ʻamakihi (Pratt et al. 2009). ʻApapane, the most abundant native forest bird in the Islands, are primarily associated with the canopies of ʻōhiʻa trees, as well as potentially the small number of koa and māmane trees in the project area. Their primary food source is ʻōhiʻa nectar but they forage for nectar on other species and glean over foliage of a number of species for insects and spiders. ʻŌmaʻo is associated with a wide variety of trees and shrubs, and primarily depends on fleshy fruits; they may also glean or fly-catch arthropods. Hawaiʻi ʻamakihi occurs in a wide variety of forest and shrub communities, typically foraging for arthropods in the terminal branches of woody plants, but also relies on nectar from a variety of species.

ʻApapane, ʻōmaʻo, and Hawaiʻi ʻamakihi were uncommon in the project area, especially in the dry ʻōhiʻa shrublands. This observation is based on incidental bird sightings during the surveys for rare plant and other visits to the project area, conducted primarily in late January-May, 2015. The low abundance of native birds was confirmed by local resource specialists familiar with bird populations in the park (T. Pratt, pers. comm. a). The low biomass and productivity of vegetation, as well as the scarcity of tall trees to provide nesting sites well above mammalian predators, help explain the low density of native birds (T. Pratt, pers. comm. b). This area is marginal forest bird habitat used by species whose populations are centered elsewhere. It is probably most important as a seasonal food source for mobile species. One ʻōmaʻo was heard associated with the narrow fringe of degraded, remnant rainforest between KMC and the Volcano substation, where there are scattered native trees and shrubs with fleshy fruits. In the subalpine and alpine of Mauna Loa, ʻōmaʻo have adapted to a shrubland habitat, feeding on the fruits of low-growing shrubs and even nesting on the ground; they appear not to have made this transition in the mid-elevation, dry ʻōhiʻa shrublands of the project area, even though the native plant species composition is highly similar. The few Hawaiʻi ʻamakihi heard were mostly associated with the mixed ʻōhiʻa/koa forest stands near Nāmakanipaio.

The project area was not systematically sampled or searched for native arthropods. In addition, no formal inventories have specifically focused on this area of the national park. However, inventories of arthropods associated with native plant host species, either for forage or habitat, have been conducted in HVNP and other areas of Hawaiʻi Island in environments similar in terms of plant species, elevation, and climate to those of the project area (Swezey 1954; Gagne 1979; Gruner 2004). Therefore, in lieu of direct observations on-site, general inferences about the arthropod communities of the project area can be made, based on the commonality of plant species present, elevation, and climate.

Swezey (1954) collected and identified insects associated with common native trees and shrubs in the Hawaiian Islands, including nearly all the woody plant species that are also found in the project area. He worked intensively in Hawaiʻi Volcanoes National Park, particularly at Kīlauea summit, Kīpuka Puaulu, and on the Mauna Loa Strip area. More broadly, on Hawaiʻi Island, Swezey identified 34 species of insects, mostly natives, associated with māmane, 18 species associated with pūkiawe, 10 with ʻaʻaliʻi, seven with ʻūlei, and seven with iliahi. Gagne (1979) inventoried arthropods associated with host ʻōhiʻa and koa trees along two elevational transects in HVNP from the alpine at 8,200 foot elevation to the coast. He found 68 canopy arthropods associated with ʻōhiʻa in dry ʻōhiʻa woodland at approximately 2,500 foot elevation in a climatically similar, leeward site on Kīlauea near Hilina Pali Road. A rich fauna of arthropods (77 species) was found to be associated with koa in nearby, slightly more upland habitat with a similar amount of rainfall (Gagne 1979).

There are also undoubtedly many native species of soil and litter arthropods, as well as generalist herbivore and predator species, e.g., spiders, not associated with native plant species (R. Peck, pers. comm. b). In addition, there may be other native invertebrates in addition to arthropods, e.g., native snails (N. Yeung, pers. comm.) and tardigrades (waterbears) which occur in mesic or even dry habitats. Finally, there may be cave-adapted native invertebrates present in some lava tube caves. No surveys of the project area have been conducted for these groups of invertebrates.

The only special status species of invertebrates known from the project area are one or possibly two native bees in the genus *Hylaeus* (K. Magnacca, pers. comm). These will be addressed in the impact topic of Special Status Species.

Relevant Policy

National Park Service policies require protection of native wildlife species as well as native communities and ecosystems on park lands.

The National Park Service will maintain as parts of the natural ecosystems of parks all plants and animals native to park ecosystems . . . by

- *preserving and restoring the natural abundances, diversities, dynamics, distributions, habitats, and behaviors of native plant and animal populations and the communities and ecosystems in which they occur . . .*

- *minimizing human impacts on native plants, animals, populations, communities, and ecosystems, and the processes that sustain them* (NPS Management Policies 2006, 4.4.1.1. (NPS 2006)).

Environmental Consequences

Methodology. An understanding of native bird distributions and potential impacts of the project were developed through published literature (Pratt et al. 2009) and consultation with USGS Wildlife Biologists (T. Pratt, pers comm. a, b, and c). The focus of the following analysis of potential impacts on arthropods was based on inferred arthropod species associations with plant species of the project area. These indirect effects on arthropods would result from a predictable direct impact on vegetation. The relationship of plant species and associated arthropods is key to the analysis, with an understanding that some arthropods, e.g., predaceous spiders, are not associated with plant species hosts. These relationships were elucidated in studies by Gagne (1979), Gruner (2004), Swezey (1954), and Daly and Magnacca (2003). An understanding of the relationship between habitat and arthropods was also revealed by consulting with USGS Entomologists stationed at the USGS Kīlauea Field Station in HVNP (R. Peck, pers. comm. a and b).

Thresholds of change of intensity levels are partly based on discussions with local resource specialists and are defined as follows:

Negligible: Detectable or inferable short-term impacts to some species may occur in a few very scattered sites, but without measurable changes in abundance of bird or arthropod populations.

Minor: Detectable or inferable short-term impacts to species presence or abundance may occur in scattered sites, but without quantitatively measurable changes in abundance of bird and invertebrate populations.

Moderate: Impacts on native wildlife species would be short-term, detectable or inferable, measureable, and widespread in some areas of the alignments, affecting both bird and invertebrate populations.

Major: Long-term impacts on native wildlife species would be detectable or inferable, measureable, and widespread, affecting both birds and invertebrate populations.

Impacts of the No Action Alternative. Because poles and wires would be replaced individually or only in a piecemeal fashion in the existing alignments, there would a limited number of holes drilled as needed, new poles erected, old poles removed, and short stretches of new wire pulled into place. As a result, there would be scattered, localized, and short-term direct mortality to invertebrate species and loss of soil, litter, and vegetative habitat for invertebrate and bird species. Consequently, these minor and direct, adverse impacts on wildlife resources would be short-term and localized.

Cumulative Impacts. In the long-term, however, an increasing number of the aging poles would need to be replaced and installed, involving the drilling of additional holes, replacement of stretches of wire, and removal of old poles. The repetitive nature of pole replacement will result in long-term impacts. As a result, the cumulative impacts would not only have minor, direct, adverse but also long-term impacts on bird and invertebrate species and indirect impacts through the loss of habitat.

Conclusions. The no action alternative, even when combined with reasonably foreseeable future impacts, would have minor, direct and indirect, short-term and long-term, localized, adverse impacts on wildlife species and indirect impacts on wildlife habitat.

Impacts of the Action Alternatives, Including the Preferred Alternative. The three action alternatives, including the preferred alternative, are expected to have similar direct impacts on native bird and invertebrate faunas, as well as indirect impacts by altering their habitats. These would result largely from construction activities at the immediate new pole locations and within the construction easement between the highway and the new pole sites, and also in the abandoned pole alignments during the felling and removal of old poles.

Direct impacts on invertebrates would result from the disturbance of construction activities. Temporary loss of native plant cover, thus loss of wildlife habitat, will occur in the new alignments, primarily associated with disturbance at the new pole sites and also in the construction easement between the pole sites and the highway. Trees located within 5-10 feet of a new pole site would be felled, per HEL standard clearing protocols. In addition, occasionally tree limbs along the road edge may need to be pruned to maneuver the poles with a cherry picker to the hole sites for installation. Some wildlife habitat will also be reduced, at least periodically, beneath and adjacent to the new wires, with pruning to achieve the proper clearance from ʻōhiʻa and koa branches. More trees, including māmane and iliahi, may need to pruned in taller, denser stands in the closed ʻōhiʻa/koa stands east of Nāmakanipaio Campground and near the Kaʻū entrance of the park. Some trees may also be affected in the narrow stands of dry ʻōhiʻa woodland that occur on the well-watered margins of Highway 11. There will be less loss of vegetative cover and wildlife habitat on the Keamoku ʻaʻā flows where vegetation is sparse and discontinuous. In any case, all of the tree species in the project area typically resprout from the root collar when felled.

A temporary reduction of biomass and cover of native vegetation, including that of native trees, shrubs, and herbaceous plants, and thus of wildlife habitat, can be expected around pole installation sites. Impacts on native vegetation and wildlife habitat may occur within the 10 X 10 foot square centered around the drilled holes and in limited portions of the 15 X 20 foot construction easement impacted by the excavator. Also in these sites, there will be a temporary reduction in vegetative litter on the ground and disturbance of soil, resulting in direct impacts on invertebrates in these sites as well as temporary loss of soil and litter habitat.

Localized injury and temporary loss of tree and shrub based wildlife habitat would occur in alignments to be removed by the felling of old poles to be taken away from the site. In addition, localized injury and cover loss may also occur during rigging and removing felled poles by helicopter. Felling poles and removing poles in the one-half mile of alignment between KMC and the Volcano substation would result in temporary damage to the open canopy of native ʻōhiʻa trees and the nearly continuous subcanopy of uluhe fern.

Drilling may potentially penetrate lava tubes that may support endemic, cave-adapted invertebrates. Besides direct damage to the natural geological integrity of the lava tubes, these holes must be promptly plugged to prevent changes in humidity and light conditions in the lava tube that may affect endemic, cave-adapted organisms. Mitigating measures require that the biological monitor on-site will determine what measures need to be taken to restore the specialized lava tube habitat if penetrated by construction activities.

It is not possible to readily quantify the loss of wildlife habitat from vegetation disturbance, pruning, or tree felling. However, based on the types of impacts to vegetation, and the wide spacing between pole sites, it can be inferred that impacts will be occurring on an extremely small proportion of the vegetation present in the project and surrounding areas. It seems reasonable to conclude then that wildlife habitat will be degraded in an extremely small proportion of the area. Moreover, wildlife habitat will recover as vegetation recovers.

Electrocutions are not anticipated for native forest bird species because of the wide spacing of the wires and adequate amount of wire insulation. Also, few injuries from birds striking electrical wires are anticipated because of their light weight and small size (F. Bonaccorso, pers. comm. a).

In summary, the short-term, localized impacts of the action alternatives on wildlife resources, including the preferred alternative, would have minor-moderate, direct and indirect, localized, mostly short-term, adverse impacts on wildlife resources.

Cumulative Impacts. Impacts on vegetation and thus wildlife habitat are anticipated in the future with periodic pruning of vegetation away from the wires. Felling and trimming of ʻōhiʻa during initial construction or routine trimming may make them more vulnerable to ROD infection and reduce amount of wildlife habitat available. Therefore, cumulative impacts are expected to have minor-moderate, direct and indirect, long-term, adverse impacts to wildlife resources.

Conclusions. The action alternatives, including the preferred alternative, when combined with cumulative impacts, would have minor-moderate, direct and indirect, mostly short-term, localized adverse impacts to wildlife resources.

SPECIAL STATUS SPECIES

Special status species are those species recognized by the U.S. Fish and Wildlife Service and/or the Hawaiʻi Department of Land and Natural Resources as endangered, threatened, candidate threatened or endangered, or proposed threatened or endangered, as well as those species identified by the USFWS as a species of concern. A species of concern is a rare species on a list maintained by the Honolulu Office of Ecological Services, USFWS, about which not enough is known to prepare a formal listing package. Current information about these species suggests that they are rare or even very rare.

Affected Environment

An endangered mammal species, ʻōpeʻapeʻa (Hawaiian bat), and two endangered bird species, ʻio (Hawaiian hawk) and nēnē (Hawaiian goose), currently utilize habitat in portions of the project area. Another endangered bird species, ʻuaʻu (Hawaiian petrel), may transit through the area, as does possibly a USFWS candidate endangered seabird, ʻakeʻake (band-rumped storm-petrel). A USFWS plant species of concern, Kīlauea naupaka, grows near the potential new alignments along Highway 11. At least one species of native bees, in the genus *Hylaeus*, currently utilizes habitat in the broader ecosystems of the project area (K. Magnacca, pers. comm.). All species of *Hylaeus* are classified by USFWS as species of concern.

ʻŌpeʻapeʻa. ʻŌpeʻapeʻa is an endangered, insectivorous, endemic subspecies of the much more widespread hoary bat and the only native land mammal in the Hawaiian Islands. ʻŌpeʻapeʻa are habitat generalists but appear to be most abundant in mesic to dry mature forest with high canopy cover (Pratt et al. 2011; M. Gorresen at al. 2013). ʻŌpeʻapeʻa tend to breed in the summer months (June 1-September 15) in the coastal lowlands and migrate to higher elevations during the winter, non-breeding season. Females are pregnant May-June and nursing pups July-August; pups fledge late August-September 15 (F. Bonaccorso, pers. comm. b).

Bats were detected in the project area during surveys conducted in 2005 (Fraser et al. 2007). They were found once in two locations between 3,250 and 3,500 foot elevation on the Keamoku ʻaʻā flows in repeated surveys of four bat sampling stations along Highway 11, near the location of the proposed new pole alignments. ʻŌpeʻapeʻa likely visit other locations in the project area outside the sampling stations located along the highway.

ʻŌpeʻapeʻa concentrate foraging at dusk and early dark hours, particularly on the edges of forest. They may also fly over closed canopy when traveling from one site to another. Lactating female ʻōpeʻapeʻa and their offspring, typically twins, roost in trees during the day. The non-volant (flightless) pups remain in the roost trees at night while the mothers forage, returning to the roost trees to nurse their young. The nursing roost trees characteristically tend to be large, with dense foliage and widely spreading, horizontal branches (F. Bonaccorso, pers. comm. c; Gorresen et al. 2013).

ʻIo. ʻIo is an endangered raptor feeding largely on birds and rodents, particularly rats. ʻIo are found in a wide range of habitats on Hawaiʻi Island from agricultural lands with trees to open savanna but most often are associated with closed native ʻōhiʻa forest. The breeding season for ʻio is mostly March to June, and ʻio typically build large, readily noticed, nest platforms high in branches of large-statured ʻōhiʻa, and occasionally utilize other tall tree species (Pratt et al., 2009; Gorresen et al. 2008).

ʻIo are uncommon in most of the project area, particularly the dry ʻōhiʻa shrublands on the Keamoku flows (Gorresen et al. 2008). Generally, they tend not to utilize dry, open habitats with short-statured vegetation (M. Gorresen, pers. comm.). The openness of the habitat and paucity of prey base, both rodents and birds, may account for their low numbers (P. Banko, pers. comm.). ʻIo have been detected at low frequency in dry ʻōhiʻa woodlands and forest near Piʻi Mauna Drive (T. Pratt, pers. comm. a). They are more commonly observed in native rainforest on the east rim of Kīlauea Caldera, and can be expected to occur occasionally in the degraded rainforest and gaps between KMC and the Volcano substation (M. Gorresen, pers. comm.). If nesting occurs in the project area or vicinity, it would probably occur in the closed forest. It should be noted that the low numbers of ʻio noted in the

project area (M. Gorresen, pers. comm; T. Pratt pers. comm. a) are based on the incidental observations of wildlife biologists; a systematic survey of the existing project area was not conducted.

Nēnē. The population of the endangered nēnē at HVNP is approximately 250 birds, representing a gradual but steady increase resulting from active recovery efforts beginning in the mid-1970s. An important focus of the recovery program is extensive monitoring of population trends, including distribution and habitat utilization patterns. Recovery management emphasizes controlling predators, e.g. mongooses and feral cats, minimizing the impacts of humans on nēnē, and improving nesting, brooding and foraging habitat. All of these efforts are carried out with the goal of supporting a wild, self-sustaining population (K. Misajon, pers. comm. b). Nēnē may pass in and out of the park, typically onto state and private lands. Therefore, wildlife biologists at HVNP work in conjunction with Hawai‘i DLNR on nēnē issues outside the park boundaries.

Nēnē would be most vulnerable to the impacts of the project during their lengthy nesting and brooding seasons (K. Misajon, pers. comm. b). Nēnē usually nest from October through January; nesting is followed by brooding, November through May. During brooding or gosling rearing, the non-flying offspring walk with the parents between nesting, foraging and roosting habitats. Brooding is followed by flocking, June through August, when nēnē families aggregate in large groups in productive forage areas. Young nēnē remain with their parents until the following nesting season.

Nēnē utilize various habitats in the project area including pāhoehoe substrate with dry ‘ōhi‘a shrublands and woodlands as well as grassy edges and adjacent pastures for foraging, nesting, and brooding. They fly across parts of the project area daily through much of the year. They walk their offspring through parts of the project area during the breeding season. There is minimal nēnē activity on the Keamoku ‘a‘ā flows from MM 34 to approximately MM 39.

‘Ua‘u. The endangered ‘ua‘u is a seabird that lives most of its life on the open ocean, foraging for squid, fish, and crustaceans. About 60 pairs of Hawaiian petrels are thought to nest and fledge young from April into December in small burrows or rock crevices within the mostly barren subalpine and alpine lava flows of Mauna Loa, upslope or mauka of the terminus of the park’s Mauna Loa Road. The small population on Mauna Loa has been characterized, in comparison to populations on other Hawaiian Islands, as appearing to be “perilously close to extinction” (KESRP 2015). Adults commute between the ocean and their high elevation nesting area and open ocean foraging areas, but it is not known specifically at what height they fly or what routes individuals take.

HVNP conducts various recovery actions for ‘ua‘u during the breeding season. Control of introduced mammalian predators, including feral cats, is conducted to protect this vulnerable ground nesting species. Nest survey and follow-up reproductive outcome monitoring occurs annually to document trends. A predator-proof exclosure fence has recently been constructed around the most active colony and protects over 600 acres of nesting habitat. In order to prevent bird strikes, this fence is equipped with deterrent devices to alert ‘ua‘u of the fence when flying to and from the colony.

‘Ake‘ake. ‘Ake‘ake (band-rumped storm-petrel) is listed as endangered by the Hawai‘i DLNR and as a candidate endangered species by USFWS. There is little information about ‘ake‘ake in Hawai‘i Volcanoes National Park. What is known is that their range appears to overlap with ‘ua‘u within the subalpine zone (K. Misajon, pers. comm. c). This is inferred from routinely heard auditory signs and

the occasionally found, predated carcass. No ʻakeʻake nests have been documented in the Hawaiian Islands (KESRP 2015).

Kīlauea Naupaka. In January-May, 2015, surveys for rare plants were conducted in potential pole alignments on both sides of Highway 11 from Piʻi Mauna Drive to the park's Kaʻū entrance. A 50 foot wide corridor from the pavement edge was searched. Rare plant surveys were also conducted in a 50 foot wide corridor centered beneath the existing pole alignments from the park's Kaʻū boundary to Piʻi Mauna Drive, as well as from KMC to the Volcano substation. No formally listed threatened or endangered, candidate or proposed threatened or endangered species were found. However, five small clusters of a USFWS species of concern, Kīlauea naupaka, were located.

Each multi-stemmed cluster, probably each representing a single individual, occupied less than 100 square feet. All five clusters were located 45-50 feet or greater from the edge of the pavement of Highway 11 between MM 32 and MM 34. Distributed sparsely in the Hilina Pali Road area and the Kaʻū Desert of HVNP, this USFWS species of concern is highly uncommon in Hawaiʻi Volcanoes National Park and in the Hawaiian Islands. The project area does not intersect any designated critical plant habitat (S. McDaniel, pers. comm.).

***Hylaeus* Species.** Several species of native bees in the genus *Hylaeus* occur throughout the broader ecosystems in which the project is located. *Hylaeus* bees tend to be habitat generalists and are associated with a wide range of native plant species in the national park. Informal survey work revealed that *Hylaeus* tend to be uncommon or absent near Highway 11, perhaps because of predation by ants, presence of predator wasps, and other unknown factors (K. Magnacca, pers. comm.). However, *Hylaeus difficilis* has been collected near the Kaʻū Desert Trailhead (K. Magnacca, pers. comm.).

Relevant Policy

According to NPS Management Policies 4.4.2.3 (NPS 2006) *The Service will survey for, protect, and strive to recover all species native to national park system units that are listed under the Endangered Species Act. The Service will fully meet its obligations under the and the Endangered Species Act to both proactively conserve listed species and prevent detrimental effects on these species. To meet these obligations, the Service will*

- *cooperate with both the U. S. Fish and Wildlife Service and the NOAA Fisheries to ensure that NPS actions comply with both the written requirements and the spirit of the Endangered Species Act. This cooperation should include the full range of activities associated with the Endangered Species Act, including consultation, conferencing, informal discussions, and securing all necessary scientific and/or recovery permits;*

- *undertake active management programs to inventory, monitor, restore, and maintain listed species' habitats; control detrimental nonnative species; manage detrimental visitor access; and reestablish extirpated populations as necessary to maintain the species and the habitats upon which they depend;*

- *manage designated critical habitat, essential habitat, and recovery areas to maintain and enhance their value for the recovery of threatened and endangered species;*

- *cooperate with other agencies to ensure that the delineation of critical habitat, essential habitat, and/or recovery areas on park-managed lands provides needed conservation benefits tothe total recovery efforts being conducted by all the participating agencies;*

- *participate in the recovery planning process, including the provision of members on recovery teams and recovery implementation teams where appropriate;*

- *cooperate with other agencies, states, and private entities to promote candidate conservation agreements aimed at precluding the need to list species; and*

- *conduct actions and allocate funding to address endangered, threatened, proposed, and candidate species.*

The National Park Service will inventory, monitor, and manage state and locally listed species in a manner similar to its treatment of federally listed species to the greatest extent possible. In addition, the Service will inventory other native species that are of special management concern to parks (such as rare, declining, sensitive, or unique species and their habitats) and will manage them to maintain their natural distribution and abundance.

The Service will determine all management actions for the protection and perpetuation of federally, state, or locally listed species through the park management planning process, and will include consultation with lead federal and state agencies as appropriate.

Environmental Consequences

Methodology. Understanding the potential effects of alternative actions on special status species in the project area was based on discussions with HVNP natural resource specialists and USGS-Kīlauea Field Station wildlife biologists with expertise in the threats, distribution, status, and management requirements for the special status species found in the project area. The analysis focused on the direct impacts of construction and finished pole and wire alignments as well as the indirect impacts on habitat for special status species. The intensity levels below are based partly on discussions with local resource specialists and are defined as follows:

Negligible: There would be no observable or measurable impacts on special status species or impacts would be within natural fluctuations of disturbance or behavior.

Minor: Impacts on special status species may be detectable or inferred. Occasional responses to disturbance by some individuals could be expected, but without interference to factors affecting populations levels.

Moderate: Impact on special status species population size and structure would be detectable. Frequent responses to disturbance and loss of habitat would be expected, with minimal impacts on population size or demography of some species expected.

Major: Impacts on special status species would be detectable and readily measureable. Frequent responses to disturbance and loss of habitat would be expected with effects on population levels and demography affecting population viability or sustainability.

Impacts of the No Action Alternative. Because poles would be replaced individually or in only a piecemeal fashion in the existing alignments as they age or deteriorate, there would be a limited number of holes drilled, new poles erected, and old poles removed, as well as short stretches of wire replaced, as needed. Mitigation measures articulated in Chapter 2 for protecting ʻōpeʻapeʻa, ʻio, nēnē, ʻuaʻu, ʻakeʻake, and naupaka kuahiwi would be implemented during localized pole and wire replacement. As a result, construction activities resulting in minor, direct, and adverse impacts on special status species and indirect impacts on the special status species habitats would be localized and short-term.

Cumulative Impacts. In the long-term, however, an increasing number of the aging or deteriorating poles would need to be replaced and new poles would need to be installed. This involves the impacts of drilling holes, installing poles, replacing stretches of wire, and removing old poles. These activities would also result in scattered, localized disturbance of special status species and their native plant community habitats. The repetitive nature of pole replacement over time would constitute a long-term impact. Consequently, the direct, minor, adverse impacts on special status species and the indirect impacts on their habitat would be localized and long-term.

Conclusions. The no action alternative, even when combined with cumulative impacts, would have negligible-minor, short-term as well as long-term, highly localized, direct and indirect, adverse impacts on special status species, as well as indirect impacts on special status species habitat.

Impacts of the Action Alternatives, including the Preferred Alternative. *ʻŌpeʻapeʻa.* Because of their low mass and small body size, there is relatively low probability of injury to bats flying into wires and a very low probability of electrocution (F. Bonaccorso, pers. comm. a). Disturbance impacts from construction activities to foraging, non-breeding bats are also unlikely because of temporal differences. Bats do not begin foraging until dusk, after construction work has finished for the day. Mitigation measures prohibit construction work at night. Non-reproductive bats generally have alternative roosts and will relocate if disturbance should occur near or at roost trees (F. Bonaccorso, pers. comm. c).

From approximately June 1-September 15, construction activities have the potential to disturb lactating females and their non-volant pups roosting together during daylight hours in trees in and near the project area. Sustained noise from drilling and tamping operations and pruning or felling of trees would be especially disruptive. The non-volant pups remain in the roost trees at night while their mothers forage, returning to the roost trees to nurse their young. Nursing roost trees characteristically tend to be large, with dense foliage and widely spreading, horizontal branches. These features make them confidently recognizable by wildlife biologists with significant experience in ʻopeʻapeʻa field biology. No potential roosting trees were found in a survey conducted by Frank Bonaccorso of USGS, Kīlauea Field Station, along the possible alternative alignments adjacent to Highway 11 from KMC to the park's Kaʻū entrance (F. Bonaccorso, pers. comm. a). Moreover, more than half of the project area is located above the elevation at which nursery roosting occurs. The highest elevation a lactating female detected on Hawaiʻi Island was at 3,200 foot elevation. The project area extends from approximately 2,800 to 4,000 foot elevation. Finally, mitigating measures stipulate that no trees taller than 15 feet may be removed or trimmed between June 1 and September 15 to protect ʻōpeʻapeʻa (Hawaiian hoary bat), except with prior Park approval. Following approval, thermal imaging just prior to cutting is required.

ʻIo. With the implementation of mitigation measures, no impacts on ʻio are expected from the construction activities of the project. In the project area, there is potential for ʻio to nest between the Nāmakanipaio and the Volcano substation (Gorresen, pers. comm.). Portions of this area supports closed forest, characteristic nesting habitat for ʻio. There may be greater potential for nesting in the forested stretch of alignment to be abandoned between Mauna Loa Road and Piʻi Mauna Road and between KMC and the Volcano substation because these alignments are more distant from the highway. Proposed construction activities in this area include removal of poles and wires by felling poles with a chain saw and removal of the distal ends by helicopter. Impacts include noise and disturbance of vegetation. Potential impacts will be avoided by a mitigating measure requiring surveys of the alignment and adjacent forested areas for ʻio nests, prior to tree work. If nests are located, construction activities would be delayed until nesting and fledging are completed.

There is also little potential for impacts on ʻio from the presence of new power poles and wires. Striking power poles or wires and electrocutions are threats to some large birds. However, these are not mentioned as mortality factors for ʻio, due to the smaller wingspan (Pratt et al. 2009) and have not been observed as a problem for this species by wildlife biologists most familiar with ʻio populations status, distribution, and threats (M. Gorresen, pers. comm.). In any case, mitigating measures provide for the protection of ʻio and other large birds by requiring proper spacing of wires and safeguards against grounding on power poles.

Nēnē. Vehicle strike is currently an important mortality factor for nēnē in portions of the project area along Highway 11. However, vehicle strike is not an anticipated impact of the project. There will be a negligible increase in traffic because of construction. Moreover, much of this increase will be at low speeds, construction vehicles slowly maneuvering into place along the edge of the roadway.

There is potential for construction activities to affect nēnē during their lengthy breeding season. The noise from drilling holes, tamping fill, felling to-be-abandoned poles, helicopter removal of the distal ends of these poles, along with other less noisy construction activities such as installing poles and wires, may disturb nesting and brooding nēnē, depending on the proximity of the nest or brooding area to the noise. In addition, the presence of construction workers and vehicles may disturb nēnē. Both noise and human activity could frighten birds away from their preferred routes to brooding areas and food resources, affecting the success of breeding and population size. Moreover, these kinds of disturbance could persist in the same sites, at least intermittently, for several weeks or even months. The only way to mitigate impacts from noise and human activity on nēnē in their preferred nesting and brooding areas within the project area is to defer construction in those sites during those times, if monitoring reveals nēnē presence and activity in the area.

ʻUaʻu. There is an undetermined potential for Hawaiian petrel strikes on the wires to be installed between Kīlauea switching station and Piʻi Mauna Drive. ʻUaʻu strikes with utility lines on Kauaʻi have been documented as a threat to this species (KESRP 2015). Unpublished, limited, telemetry data indicate that some flights between nesting colonies and the open ocean traverse the project area (K. Misajon, pers. comm. a). ʻUaʻu fly at varying heights when moving between inland nesting areas and foraging areas at sea (A. Raine, pers. comm.). However, it is not known at what heights they would be flying in the project area. They often fly low to the ground in their nesting areas, and ungulate control fences constructed in this area and the predator-proof exclosure fence are now equipped by the park with bird strike deterrents. Mortality from strikes has been documented in the park along fences not equipped with strike deterrents. A systematic study of strikes on powerlines in the park, either the cross-

island alignment at approximately 4,500 foot elevation on the Mauna Loa Strip or the existing pole and wire alignment between the Kīlauea switching station and Piʻi Mauna Drive, has not been carried out. A Hawaiian petrel carcass was found, near the Saddle Road, below the cross-island powerlines near Saddle Road (K. Misajon, pers. comm. b). However, the presence of carcasses beneath and near lines is not considered a reliable indicator of bird strikes (A. Raine, pers. comm.). Injured or killed birds may land well away from the wires, be hidden by dense vegetation, or be scavenged by non-native mammals. Other techniques, such as the use of song meters, are much more reliable in indicating the occurrence of bird strikes (A Raine, pers. comm.). Mitigation measures to minimize potential impact to ʻuaʻu for this project include strike deterrents along the entire relocated alignment in the park.

ʻAkeʻake. The potential for strikes for ʻakeʻake is unknown. There is a possibility that they may fly through the project area, moving between potential nesting areas and foraging ranges at sea. However, there is no information on flight paths. Mitigation measures are the same as those for ʻuaʻu.

Kīlauea Naupaka. There is low potential for impacts on this species. There are just five multi-stemmedclusters of this shrubs, and the closest of these clusters are located 45 feet from the pavement margin; poles will be installed approximately 14-17 feet from the pavement edge. In addition, the biological monitor will conspicuously flag the clusters of Kīlauea naupaka plants and be on site when construction activities are taking place nearby.

Hylaeus Species. Construction activities and relocated poles and wires will minimally impact native bees. They appear to be highly uncommon in the areas adjacent to Highway 11 (K. Magnacca, pers. comm.). Disturbance at and near the widely scattered new pole sites and construction easements, as well as the scattered pruning and felling of ʻōhiʻa and koa should have little impact on extent of the host vegetation in the project area. Also, it is unlikely that they would be disturbed by noise.

Cumulative Impacts. The only cumulative impacts on special status species are occasional trimming of vegetation below the powerlines or infrequent replacement of poles or sections of wire.

Conclusions. Adverse, minor, short-term to long-term, localized direct and indirect impacts are anticipated, if prescribed mitigation measures are implemented. There is no quantifiable difference in impacts on special status species, whether the poles are located on the Mauna Loa or Kīlauea sides of the Highway 11. There are no substantive differences in quality and quantity of impacts when cumulative impacts are also considered.

SOUNDSCAPES

Affected Environment

The NPS defines a soundscape as the "total acoustic environment of an area" (NPS 2009). The natural soundscape includes all the natural sounds occurring in a park, as well as the physical capacity to transmit these natural sounds. However, it excludes human-caused or anthropogenic sounds, unless significant as a cultural resource of a park area (NPS Management Policies 2006, 4.9) (NPS 2006). The natural quiet that occurs in the absence of human-caused sound is defined as the "natural ambient" sound level of a park.

Some common natural sounds occurring widely in the HVNP soundscape are surf action at the shoreline, winds spilling across volcanic flows or rustling vegetation, birds calling and singing, rain falling on vegetation, and crickets and other insects vocalizing. Some of the park's most notable natural sounds include those related to volcanic activity such as the hissing and crackling of new lava flows, the sloshing sound of lava spatter, clinking of glass-like surfaces of active lava flows, booming methane explosions or, more rarely, the roar of fountaining events. The most common natural sounds in the project area are winds moving through vegetation and over the volcanic land forms, as well as insects and birds vocalizing.

Noise, as defined here, is unwanted or intrusive human-generated sound in a soundscape. Noise can adversely affect park resources and values such as natural soundscapes, wildlife, wilderness, and visitor experience. Examples of noise at HVNP are cars, buses, motorcycles, helicopters, fixed wing aircraft, mechanized equipment (e.g. leaf blowers, chain saws), electronic devices (e.g. cell phones), recorded music players, and people yelling (Lawson et al. 2008). The most common source of background noise in the project area is the sound of motor vehicles on Highway 11, much more frequent during the daylight hours.

Away from roads and developed areas, the diversity of natural environments in Hawai‘i Volcanoes National Park provides a rich and varied array of natural sounds, largely free of human-generated noise. The natural and existing ambient sound levels at HVNP were measured in 2002/2003 at 22 sampling sites within the nine sampling zones thought to represent the most widespread sound environments of the park (USDOT-FAA 2006). These acoustic sampling areas largely match the natural ecological zones or broad ecosystems of the park. The project area lies almost entirely within two broad acoustic sampling zones. These include the dry *Sparsely Vegetated Sampling Area*, dominated by low scattered native ‘ōhi‘a scrub or nearly barren, recent lava flows. Locations in the Ka‘ū Desert within the *Sparsely Vegetated Sampling Area* also have some of the quietest natural soundscapes in HVNP (USDOT-FAA 2006). Also included in the project is the arid *Dry Ōhi‘a Woodlands Sampling Area* located on the leeward slopes of Kīlauea. Wind blowing through low trees and shrubs and over volcanic landforms is the dominant natural sound in these acoustic sampling areas. The natural ambient sound levels in these two zones, in the absence of human-caused noise near Highway 11, are among the lowest in HVNP (USDOT-FAA 2006).

Relevant Policy

Natural soundscapes are recognized by the National Park Service as an integral park resource to be valued and protected. Direction for management of natural soundscapes is articulated in NPS Management Policies 2006, 4.9 (NPS 2006):

The Service will restore to the natural condition wherever possible those park soundscapes that have become degraded by unnatural sounds (noise), and will protect natural soundscapes from unacceptable impacts . . .Using appropriate management planning, superintendents will identify what levels and types of unnatural sound constitute acceptable impacts on park natural soundscapes. The frequencies, magnitudes, and durations of acceptable levels of unnatural sound will vary throughout a park, being generally greater in developed areas. In and adjacent to parks, the Service will monitor human activities that generate noise that adversely affects park soundscapes, including noise caused by mechanical or electronic devices. The Service will take action to prevent or minimize all noise that through frequency, magnitude, or duration adversely affects the natural soundscape or other park

resources or values, or that exceeds levels that have been identified through monitoring as being acceptable to or appropriate for visitor uses at the sites being monitored.

Environmental Consequences

Methodology. Evaluating the impacts of human generated sounds or noise was based mostly on an understanding of construction methods and types of machinery to be used for installing or removing poles and wires. The geographic area of analysis was defined more broadly for the soundscapes impact topic because the anticipated construction noise, plus the cumulative noise impacts of vehicular traffic on Highway 11, could potentially extend well beyond the narrow zone of existing and potential pole alignments adjacent to or nearby Highway 11. An understanding of potential noise impacts from construction activities was developed in consultation with Hawai‘i Electric Light project engineers. Thresholds of change for determining the intensity of an impact are defined as follows:

Negligible: Natural sounds are audible and almost always discernible. When human-generated sound (noise) is present, it is at very low levels, temporary, and rarely audible at a distance.

Minor: Natural sounds are audible and usually discernible. Noise associated with proposed construction activities is occasionally present in localized areas. When present, noise is measurable but at low levels, temporary, and occasionally audible at a distance. High noise levels may occur, but would be brief in duration.

Moderate: Noise of proposed construction activities is frequently present in localized areas and occasionally in more than one area. When present, it is at medium to high levels that mask natural sounds briefly near the source, and may be audible at a distance. High noise levels may persist for several hours per day for two or three months.

Major: Noise of proposed construction activities is consistently present in multiple and widespread areas. When present, it is usually at high levels that mask natural sound for extended periods near the source and are noticeably audible at a distance where noise may also mask natural sounds. High noise levels may persist for several hours per day for many months.

Impacts of the No Action Alternative. Under the no action alternative, the existing alignments of poles and wires would be maintained. To do so, poles and wires would be replaced individually or only in a piecemeal fashion within the existing alignments, based on need. This pattern of replacement would result in localized and short-term direct, minor adverse impacts on the park soundscape.

Cumulative Impacts. In the long-term, however, an increasing number of aging poles and stretches of wire would need to be replaced, involving the drilling of holes, installation of new poles, and removal of old poles. Emergency repairs may require construction of temporary roads, but this would require park approval and would be infrequent.

Other current actions that may contribute to the noise of construction activities of the project include the sounds of vehicular traffic on Highway 11 between the Ka‘ū entrance and Pi‘i Mauna Drive. The noise from vehicular traffic primarily affects the areas adjacent to and nearby the highway. Helicopter air tours and the relatively infrequent administrative use of helicopters by park staff would contribute to human generated noise more broadly in the relatively quiet *Sparsely Vegetated Sampling*

Area and the *Dry Ōhi‘a Woodlands Sampling Area*s in which almost all of the project area is located. The noise impacts of pole and wire replacement, vehicular traffic, and aircraft over flights results in moderate, direct, localized and widespread, short-term and long-term, adverse noise impacts on the park soundscape.

Conclusions. Under the no action alternative, in the short-term, with just occasional pole replacement, there will be direct, minor, highly localized, and direct adverse impacts to the natural soundscapes of the park. The no action alternative, when combined with cumulative impacts, may have moderate, localized and widespread, short-term and long-term, direct adverse impacts on the park's natural soundscapes.

Impacts of the Action Alternatives, Including the Preferred Alternative. Impacts on soundscapes would be highly similar for the three action alternatives, including the preferred alternative. All alternatives involve construction of new pole and wire alignments at approximately 14-17 feet from the edge of the pavement on the Kīlauea or Mauna Loa sides of Highway 11 or on alternating sides of the road, from the park's Ka‘ū entrance to Pi‘i Mauna Drive. The three alternatives also include removal of existing pole and wire alignments.

By far, the most intense and prolonged source of noise is the sound of an auger boring holes in the thin-soiled volcanic substrate in order to install new poles. Other fairly intense sources of noise include the use of hydraulic tampers to tamp fill around the holes after installing poles and helicopters to remove the cut-off ends of poles from the site. Portable pneumatic rock drills may be used to dig a small number of holes in sites not accessible to the auger mounted on the boom of the excavator. At one meter distance pneumatic drills have recorded decibel ratings of 130, similar to a jet flying overhead at about 330 feet (USDOT-FAA 2006). Each hole dug with a portable pneumatic drill will require approximately two days to complete. Pole installation will probably be carried out in a localized fashion but preparation of these pole sites may occur at times in more than one location simultaneously. When there are multiple sources of noise, then impacts on the soundscape will be more widespread, over multiple sites.

The noise generated from the use of augers and pneumatic drills and tampers will undoubtedly carry well beyond the alignment sites in many locations. The adjacent terrain is typically level or even lower than the new alignment area along the roadway area. In addition, the vegetation is scattered and low-growing in most of the project and surrounding areas. Sound levels have been shown to carry long distances across open lava terrain (USDOT-FAA 2006). Therefore, noise is expected to carry from the construction areas along the roadway to surrounding areas.

Noise will also be generated from activities to remove the existing pole and wire alignments. Intense, localized noise will be generated when chain saws are used to cut the poles to be removed at three feet above the ground. Localized noise will also be generated by low-flying and hovering helicopters used to remove the distal ends of cut poles from the existing alignments.

In summary, installing new poles and wires, along with removal of existing alignments, will result in moderate, localized, short-term, direct adverse impacts on the park soundscape.

Cumulative Impacts. Other current actions that will contribute to the noise of construction activities of the project include the sounds of vehicular traffic on Highway 11, in addition to regular

helicopter air tours and occasional administrative use of helicopters. These sources of noise will result in results in minor-moderate, direct, localized and widespread, short-term and long-term, adverse noise impacts on the park soundscape.

Conclusions. The impacts of construction noise, when combined with the cumulative impacts of vehicular and aircraft traffic, will have moderate, localized to widespread, short-term and long-term, direct adverse impacts on the park soundscape.

VIEWSHEDS

Affected Environment

A viewshed is defined as an area of scenic or cultural value that is visible from a specific location. The viewsheds within the geographical analysis area of the EA broadly include all scenery or areas within view of Highway 11 between Piʻi Mauna Drive and the park's Kaʻū entrance, including views of lands outside HVNP. Viewsheds from Highway 11 are experienced by park visitors almost exclusively from moving vehicles; there is just one paved, unsigned, and little-used viewing area on the north side of this stretch of Highway 11. The perception of viewsheds varies with the direction of travel, due to the natural forward-facing perspective involved.

The viewsheds to the Kīlauea side of Highway 11 include near views of relatively young pāhoehoe and ʻaʻā flows with open or sparse native ʻōhiʻa woodlands and shrublands, as well as scattered, forested kīpuka. The viewsheds in most areas also include distant views of down-sloping lava flows punctuated by subtle to prominent volcanic land forms, including cones and a low volcanic shield. Between MM 33 and MM 34, and intermittently to MM 35, the views open up to a line of cones two miles distant, along the Kaʻū Desert Trail, as well as views of Puʻu Koaʻe and Cone Crater, associated with the Twin Pit Craters. These cones or puʻu project on the horizon, above the sparse and low-statured vegetation on gently down-sloped lava flows. The gas plume above the lava lake in Halemaʻumaʻu Crater and the summit of Kīlauea Volcano at Uwēkahuna are prominent, especially from vehicles driving to the east, toward the summit. Between MMs 36 and 37 and the park's Kaʻū entrance, there are intermittent views of the gently inclined Mauna Iki shield. Finally, below MM 39, far to the southeast are glimpses of another set of prominent cones, the Kamakaiʻa Hills, as well as Puʻukou and Yellow Cone. In contrast to the distant views from MMs 33-39, between Piʻi Mauna Drive and MM 33, particularly driving to the west, the viewshed is highly constricted, visible only to 100 yards or as much as one-half mile by upward-sloping terrain and fairly tall woodland vegetation.

The viewsheds to the Mauna Loa side of Highway 11 are much broader and extend a greater distance, to the summit of Mauna Loa and its gently sloped ridgelines created by the southwest and northeast rift zones. This viewshed if formally recognized. Highway 11 in HVNP is designated by the State Department of Transportation as a Hawaiʻi Scenic Byway with signing that states "Hawaiʻi Scenic Byway—The Slopes of Mauna Loa." Between Piʻi Mauna Drive and Nāmakanipaio Campground, there are intermittent glimpses of the upper portion of the summit and ridgelines between gaps in the trees. Between Nāmakanipaio Campground and MMs 36-37, especially below MM 34, the views include not only the summit and ridgelines but also the gently sloped, sparsely vegetated ʻaʻā and pāhoehoe flows extending miles from the highway and ending in steeply sloped pastureland or densely forested national park lands. Above the pastures and forest, leading to the summit and ridgelines are views of forests, shrublands, and ultimately the barren slopes of the north flank of Mauna

Loa Volcano. Between MMs 36-37 and the park's Kaʻū entrance, the distance across sparsely vegetated younger flows to steeply sloped pastureland is much shorter. These features obstruct expansive views of the north-facing lower slopes of Mauna Loa; only the upper portions of the summit and of the volcano and upper ridgelines are visible.

The viewshed for the pole and wire alignment to be removed between KMC and the Volcano substation is located mostly on the margin of park rainforest in this area. This viewshed is perceived from the Steaming Bluff overlook and parking lot and portions of Crater Rim Drive and Crater Rim Trail, and the Sulphur Banks Trail. As many as seven power poles can be seen from the Steaming Bluff area, three of which are quite prominent.

Relevant Policy

Although NPS Management Policies 2006 do not specifically address the management of viewsheds in parks, they characterize viewsheds as natural resources to be preserved and protected.

Natural resources, processes, systems, and values found in parks include

- *physical resources such as water, air, soils, topographic features, geologic features, paleontological resources, and natural soundscapes and clear skies, both during the day and at night*

- *physical processes such as weather, erosion, cave formation, and wildland fire*

- *biological resources such as native plants, animals, and communities*

- *biological processes such as photosynthesis, succession, and evolution*

- *ecosystems highly valued associated characteristics such as scenic views [bold added] (NPS Management Policies 2006, 4.0 (NPS 2006)).*

In addition, protection of park scenery is explicitly addressed in the 1916 NPS Organic Act: *The fundamental purpose of the said parks, monuments, and reservations, which purpose is* ***to conserve the scenery*** *[bold added] and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations.*

Environmental Consequences

Methodology. Determining the impacts of the alternatives on viewsheds was based on an evaluation of the extent of the visual intrusion of pole and line alignments on scenic features observable from Highway 11.

Negligible: Visitors would notice no changes to the scenic views and visual resources in the Mauna Loa and Kīlauea viewsheds.

Minor: Changes in valued scenic views and visual resources would be detectable but would not appreciably affect critical characteristics of the Mauna Loa and Kīlauea viewsheds. Visitor satisfaction would remain stable.

Moderate: Some critical characteristics of the valued scenic views and visual resources of the Mauna Loa and Kīlauea viewsheds would be impacted. Visitor satisfaction would begin to decline.

Major: Multiple critical characteristics of the valued scenic views and visual resources of the Mauna Loa and Kīlauea viewsheds would be impacted. Visitor satisfaction would markedly decline.

Impacts of the No Action Alternative. The no action alternative would leave the poles and wires in the current alignment, 50 feet to one-half mile from the highway, without creation of road access to or under the alignment. Under the no action alternative, poles and wires would be replaced individually or only in a piecemeal fashion within the existing alignments, based on need. Pole height and the configuration and diameter of wires would remain the same. The poles are approximately 40 feet above grade, with three, small diameter, black transmission wires on a crossbar at the top of the pole. From Nāmakanipaio Campground to Pi‘i Mauna Drive, there are three distribution wires on a horizontal crossbar about 10 feet below the transmission wires. Emergency repairs may require construction of temporary roads, but this would require park approval and would be infrequent.

The current alignment, alternating between the south and north sides of Highway 11, affects less than one-half of the viewshed of Kīlauea and nearly two-thirds of the viewshed of Mauna Loa. The current alignment crosses over Highway 11 between MMs 33-34 and also between MMs 36-37. The poles and wires are located on the Kīlauea side of the highway between the two crossover points above for approximately three miles, impacting the Kīlauea viewshed to the south. The pole and wires of the existing alignment is located on the north or Mauna Loa side of the highway between the park’s Ka‘ū entrance and MMs 36-37and also from Pi‘i Mauna Drive to MMs 33-34. These two segments total approximately six and one-half miles. The alignment on the Mauna Loa side of the highway impacts the viewshed of Mauna Loa summit and ridgelines in these two alignment segments.

The alternating configuration of the existing alignment or no action alternative permits unobstructed distant views of the Mauna Loa summit and ridgelines for approximately three miles. The absence of wires on the Mauna Loa side of the highway is optimally centered on the relatively young and sparsely vegetated Keamoku ‘a‘ā flows, without tall-statured stands of trees to block the view. Also, this area does not have steep pasture or forest-covered slopes close to the highway; these potentially obstruct views of all but the upper most portion of the summit and ridge lines.

On the Kīlauea viewshed, the alternating configuration of poles and wires provides intermittent extensive views of Mauna Iki and distant cones or pu‘u near this shield, as well as limited unobstructed views of Kīlauea summit, the lava lake plume, and cones along the Ka‘ū Desert Trail and associated with the Twin Pit Craters.

The long-term impacts of the no action alternative may have direct, widespread, and minor-moderate adverse impacts on viewsheds. Construction activities of the piecemeal pattern of replacing poles and wires in the existing alignment would result in similar intensity localized, short-term impacts on the viewsheds.

Cumulative Impacts. In the long-term an increasing number of aging poles and stretches of wire would need to be replaced. However, with no change in alignment or pole and wire specifications, cumulative impact of the no action alternative would also have long-term, direct, widespread, and moderate adverse impacts.

Conclusions. The no action alternative, when combined with cumulative impacts, may result in long-term, direct, moderate, and adverse impacts on park viewsheds when observed from Highway 11 between the Kaʻū entrance and Piʻi Mauna Drive. Construction activities would result in short-term, localized impacts.

Impacts of the Kīlauea Side Alignment. In this alternative, the poles and wires will be largely located on the Kīlauea side of Highway 11. They cross the highway from the Mauna Loa side to the Kīlauea side of the highway near the Kīlauea switching station. From there the poles and wires remain on the Kīlauea side of Highway 11 for over eight miles until opposite the Nāmakanipaio substation. The poles typically 14-17 feet from the edge of the pavement. The wires will cross back over Highway 11 from Kīlauea to the Mauna Loa side across from Nāmakanipaio substation and then, on the same side, to Piʻi Mauna Drive.

Impacts to the viewsheds will result from the placement of a continuous line of power poles and wires adjacent to the highway. The poles and wires will affect the viewshed looking away from the highway at right angles as well as looking down the highway in the direction of travel. The poles will be approximately 45 feet above the ground level. In areas where the terrain drops abruptly away from the road, the poles will be higher to maintain a consistent and safe height of the wires. Throughout the alignment there will be three transmission wires attached to a horizontal, eight foot crossbar attached very close to the top of the pole. The transmission wires are relatively thick, 0.6 inches in diameter braided aluminum, and not covered or insulated. Initially, they will be silver in color and relatively more noticeable than black, insulated wires; over time they will oxidize to a darker color. Two black, insulated communication wires, for internet and phone service, will be located at approximately 20-24 feet above grade the entire distance of the alignment. Between Nāmakanipaio Campground and Piʻi Mauna Drive there will also be three distribution wires and a single neutral wire located on a crossarm approximately 10 feet below the upper transmission wires.

Locating the alignment on the Kīlauea side of Highway 11 protects almost all of the viewshed of Mauna Loa summit and ridgelines from visually obtrusive poles and wires located along the highway, when viewed from the highway between the Kaʻū entrance and the Nāmakanipaio substation. However, in contrast, the Kīlauea side alignment of poles and wire impacts eight miles of the viewshed of Kīlauea Volcano. This viewshed includes downward sloping views on sparsely vegetated pāhoehoe and ʻaʻā flows to near the coast, and volcanic landforms projecting on the horizon. These features include the Kamakaiʻa Hills, Mauna Iki shield, cones near the twin pit craters and along the upper Kaʻū Desert Trail, and the summit of Kīlauea including Uwēkahuna and the plume from the lava lake in Halemaʻumaʻu Crater. As a result, the Kīlauea side alignment may result in long-term, direct, widespread, and moderate-major adverse impacts on the viewshed of Kīlauea. In addition, there may be short-term, localized visually intrusive impacts during the construction period.

Cumulative Impacts. In the long-term, damaged or aging poles and stretches of wire would need to be replaced. However, with no change in alignment or pole and wire specifications, cumulative impact of the Kīlauea side alignment alternative may also have long-term, direct, widespread, and

major adverse impacts on viewshed resources, along with visually intrusive short-term, localized impacts of pole and wire replacement activities.

Conclusions. The Kīlauea side alignment alternative, when combined with cumulative impacts, may have moderate, direct, long-term, and widespread adverse impacts on the viewshed resources of HVNP observed from Highway 11 between Nāmakanipaio area to the Kaʻū entrance. There would also be visually intrusive short-term, localized impacts of pole and wire replacement activities

Impacts of the Mauna Loa Side Alignment. In this alternative, the poles and wires will be located entirely on the Mauna Loa side of Highway 11, from the Kīlauea switching station to Piʻi Mauna Drive. The poles and wires will be located approximately 14-17 feet from the edge of the pavement, from the Kīlauea switching station to the Nāmakanipaio substation and Piʻi Mauna Drive.

Impacts to the viewsheds will result from the placement of a continuous line of power poles and wires adjacent to the highway. The poles and wires will affect the viewshed looking away from the highway at right angles as well as looking down the highway in the direction of travel. The poles will be approximately 42-47 feet abovegrade. In areas where the terrain drops abruptly away from the road, the poles will be higher to maintain a consistent height of the wires. Throughout the alignment there will be three transmission wires attached to a horizontal, eight foot crossbar attached very close to the top of the pole. The transmission wires are relatively thick, 0.6 inches in diameter braided aluminum, and not covered or insulated. Initially, they will be silver in color and relatively more noticeable than the typical black wires; over time they will oxidize to a darker color. Two black, insulated communication wires, for internet and phone service, will be located at approximately 20-24 feet above grade the entire distance of the alignment. Between Nāmakanipaio Campground and Piʻi Mauna Drive there will also be three distribution wires and a single neutral wire located on a crossbar approximately 10 feet below the upper transmission wires.

The Mauna Loa side alignment protects the viewshed of Kīlauea Volcano for nearly nine and one-half miles, between the Kaʻū entrance and the Piʻi Mauna Drive. Features of the viewshed are downward sloping views to near the coast and projecting volcanic landforms on the horizon. These include the Kamakaiʻa Hills, Mauna Iki, cones near the twin pit craters and along the upper Kaʻū Desert Trail, and the summit of Kīlauea including Uwēkahuna and the plume from the lava lake in Halemaʻumaʻu crater. In contrast, the Mauna Loa side alignment of poles and wires impacts views for nine and one-half miles of the southeast-facing slopes, ridgelines, and summit and ridgelines of Mauna Loa Volcano. As a result, the Mauna Loa side alignment may have long-term, direct, widespread, and moderate adverse impacts on the Mauna Loa viewshed resources of HVNP, when observed from Highway 11 between Piʻi Mauna Drive to the Kaʻū entrance. In addition, there will be short-term, localized visually intrusive impacts during the construction period.

Cumulative Impacts. In the long-term, damaged or aging poles and stretches of wire would need to be replaced. However, with no change in alignment or pole and wire specifications, cumulative impact of the Mauna Loa side alternative would also have long-term, direct, widespread, major adverse impacts on the viewshed resources, along with visually intrusive short-term, localized impacts of pole and wire replacement activities.

Conclusions. The Mauna Loa side alignment alternative, when combined with cumulative impacts, may have long-term, direct, widespread, moderate impacts on the viewshed resources of

HVNP observed from Highway 11 between Pi‘i Mauna Drive and the Ka‘ū entrance. There may also be visually intrusive short-term, localized impacts of pole and wire replacement activities.

Impacts of the Preferred Alternative, an Alternating Alignment. In this alternative, the alignment will alternate between the Kīlauea and Mauna Loa sides of Highway 11, replicating the orientation of the current alignment of poles and wires along the highway. The preferred alignment is located on the Kīlauea side of the highway for approximately three miles, between MMs 33-34 and MMs 36-37. The poles and wires are located on the Mauna Loa side of Highway 11 from the Kīlauea switching station to MMs 36-37 and also from MMs 33-34 to the Nāmakanipaio substation, and then on to Pi‘i Mauna Drive.

Similar to the current alignment, the two highway crossings will also be on the diagonal, rather than at 90 degrees to the roadway, especially when viewed from the direction of travel. Diagonal crossings may have less visual impact than crossings at right angles to the highway.

Impacts to the viewsheds will result from the placement of a continuous line of power poles and wires 14-17 feet from the edge of the highway pavement. The poles and wires will affect the viewshed looking away from the highway at right angles as well as looking down the highway in the direction of travel. The poles will be approximately 42-47 feet above the ground level. In areas where the terrain drops abruptly away from the road, the poles will be higher to maintain a consistent height of the wires. Throughout the alignment there will be three transmission wires attached to a horizontal, eight foot crossbar attached very close to the top of the pole. The transmission wires are relatively thick, 0.6 inches in diameter braided aluminum, and not covered or insulated. Initially, they will be silver in color and relatively more noticeable than the typical black; over time they will oxidize to a darker color. Two black, insulated communication wires, for internet and phone service, will be located at approximately 20 and 24 feet above ground the entire distance of the alignment. Between Nāmakanipaio Campground and Pi‘i Mauna Drive there will also be three distribution wires and a single neutral wire located on a crossbar approximately 10 feet below the upper transmission wires.

Short-term impacts to the immediate viewshed near the highway will result from clearing of and damage to vegetation in the 15 X 20 foot construction easement and the new pole sites. Some trees may need to be felled to maneuver poles to the hole site and trees will be cut if within 5-10 feet of the pole. Also, trees and large shrubs may need to be cleared in the construction easement if they block access of the excavator to the pole site. Shrubs and herbaceous plants will be crushed under the tracks of the excavator. Shrubs will be pruned and uprooted under the low chassis of the excavator. Impacts on the immediate vegetative landscape would be the similar in extent for the north alignment, and the alternating alignment. All of these impacts will be relatively short-term. Tree species in the site typically resprout after felling and most of the native shrubs and herbaceous plants can recover vegetatively over time, as well as become established from seed. The distance of poles from the paved roadway margin will be 14-17 feet, depending on the width of the paved shoulder. The lower portions of poles may be partially hidden by vegetation, particularly near the base and after plants recover from initial disturbance.

The alternating alignment, which follows the existing alignment, protects portions of the viewsheds of Mauna Loa, while impacting other portions of the viewshed of this volcano. The absence of poles and wires on the north side of the road between MMs 33-34 and MMs 36-37 permits nearly unobstructed views of Mauna Loa summit, ridgelines, and full southeast-facing slopes from grade to

over 13,000 foot elevation. This three mile stretch of Highway 11 is located on the relatively recent Keamoku ʻaʻā flows. The vegetation is sparse on these flows, without the lines of taller, view-blocking trees along the margin of the highway. In addition, the Keamoku flows are gently sloped for several miles, from the highway to the base of the steeper slopes of Mauna Loa. This allows unobstructed or full views of the vegetated to bare south-facing slopes of Mauna Loa below the summit and ridgelines.

In contrast, poles and wires of the preferred will impact the viewshed of Mauna Loa for approximately six and one-half miles along Highway 11. These include views from Highway 11 from the park's Kaʻū entrance for approximately three miles to MMs 36-37. However, the views from about half of this segment of the highway are obstructed in part by taller trees on pāhoehoe near the margin of the roadway. In addition, the views of the lower slopes of Mauna Loa are distracted by steep, pasture or forested slopes within a mile of the highway. The summit and ridgelines are apparent but the full southeast-facing slope are partly blocked from view. The portion of the viewshed from Piʻi Mauna Drive to just west of Nāmakanipaio Campground are also obstructed by taller trees and forest on pāhoehoe. From a moving vehicle, intermittent glimpses of the tops of the summit and ridgelines are available through gaps in the trees.

The preferred alternative alignment protects the viewsheds of Kīlauea for about six and one-half miles along Highway 11, while impacting it for approximately three miles. The absence of poles and wires between MMs 36-37 and the park's Kaʻū entrance allows unobstructed views of Kīlauea including views along downward-sloping, sparsely vegetated lava flows to near the coastline in places. Volcanic landforms such as the low and broad Mauna Iki shield and the Kamakaiʻa Hills occupy the distant horizon. The absence of poles and wires protects the Kīlauea viewshed from Piʻi Mauna to MMs 33-34, the point at which the alignment switches over from Mauna Loa side of the highway to the Kīlauea side. The viewshed in most of this area is quite shallow, 100 foot to one-half mile views of lava flows with sparse ʻōhiʻa woodland and scrub vegetation, although the plume above the lava lake rises up on the horizon. Distant cones along the Kaʻū Desert Trail and associated with the Twin Pit Craters, as well as the summit at Uwēkahuna and the plume above the lava lake in Halemaʻumaʻu Crater become visible near MM 33, east of the point on the highway where the poles and wires cross over to the Kīlauea side.

The placement of new poles and wires on the Kīlauea side of the highway from MMs 33-34 to MMs 36-37 will impact the viewshed of Kīlauea. Some of the most distant and expansive views of Kīlauea are available in much of this area. Although distant views are intermittent, they include the summit at Uwēkahuna, the plume above the lava lake, the cones along Kaʻū Desert Trail, cones association with the Twin Pit Craters, the shield at Mauna Iki, and other prominent landforms.

In summary, the preferred alternative/alignment protects the most naturally unobstructed, distant, and expansive views of Mauna Loa Volcano. It also protects nearly two-thirds of the viewshed of Kīlauea Volcano, although the preferred pole and wire alignment will intrude on portions of the most distant and expansive views of Kīlauea. The most distant and expansive views of both volcanoes are available from the same stretch of Highway 11, on the Keamoku lava flows, from around MM 33 to MM 36. Locating the poles and wires for three miles on the Kīlauea side of the highway does intrude on a portion of the most distant views of Kīlauea, including prominent landforms on the horizon. However, similar views are available for over one-half mile east of the proposed alignment of poles and wires on the south side of the road. As a result, the preferred alignment and alternative may have long-term, direct, widespread, and minor-moderate adverse impacts on the viewshed resources of

HVNP, when observed from Highway 11 between Piʻi Mauna Drive to the Kaʻū entrance. In addition, there will be short-term, localized visually intrusive impacts on viewshed during the construction period.

Cumulative Impacts. In the long-term, damaged or aging poles and stretches of wire will need to be replaced. However, with no change in alignment or pole and wire specifications, cumulative impact of the north alignment alternative may also have long-term, direct, widespread, minor-moderate adverse impacts on the viewshed resources, along with visually intrusive short-term, localized impacts of pole and wire replacement activities.

Conclusions. The preferred alternative, including cumulative impacts, may have long-term, direct, widespread, and minor-moderate adverse impacts on viewshed resources, along with visually intrusive short-term, localized impacts of pole and wire replacement activities.

Impacts of the Removal of Poles and Wires from KMC to Volcano Substation. This activity is a component of all three action alternatives, including the preferred alternative. The impacts on viewsheds of removing the alignment from KMC to the Volcano substation are evaluated separately here because the viewshed and impacts of proposed actions are distinctly different from the other action alternatives involving the construction of alignments between the park's Kaʻū entrance and Piʻi Mauna Drive.

Removal of the poles and wires from this alignment segment, visible from a prime visitor use area in the park at Steaming Bluff, will directly benefit the natural quality of this largely forested viewshed. Consequently, this proposed action may have long-term, direct, localized, and minor beneficial impacts on the viewshed resources of the Steaming Bluff and Sulphur Banks area, albeit with visually intrusive short-term, localized impacts of pole and wire removal activities.

Cumulative Impacts. There are no cumulative impacts once the poles and wires are removed.

Conclusions. This proposed action may have long-term, direct, localized, and minor beneficial impacts on the viewshed resources of the Steaming Bluff and Sulphur Banks area, albeit with visually intrusive short-term, localized impacts of pole and wire removal activities.

ARCHEOLOGICAL RESOURCES

Affected Environment

Archeological resources are the physical evidence of past human activity, including evidence of the effects of that activity on the environment (NPS 2006; NPS 2015c). The Area of Potential Effects was comprised of a 50 foot wide corridor adjacent to both the Kīlauea and Mauna Loa sides of Highway 11 from the park's Kaʻū entrance to Piʻi Mauna Drive. In addition, surveys were completed for a 50-foot wide corridor centered on existing utility lines to be abandoned near Highway 11 and between KMC and the Volcano substation. Archeological fieldwork conducted by ASM Affiliates of Hilo, Hawaiʻi resulted in the identification and recording of 10 new archeological sites in the APE (Barna 2015). The fieldwork also encountered five sites previously recorded by Hawaiʻi Volcanoes National Park. The 15 sites surveyed consist of 226 individual features.

Most of the sites recorded during the ASM Affiliates inventory date to the Historic Period, largely associated with the historic Peter Lee Road, alignments of the historic Kaʻū-Volcano Road, borrow pits

associated with road construction, and telecommunications lines associated with the historic road alignments. Although the APE is largely above the upper elevational limit of Hawaiian settlement, and there are no signs of permanent Hawaiian occupation, there is evidence of Pre-contact or early Historic resource extraction.

The Peter Lee Road, constructed in the 1880s to transport Volcano House guests by carriage between the landing at Punaluʻu on the Kaʻū coast to the summit of Kīlauea, crosses the potential and existing utility line corridors at five locations, totaling about 300 lineal feet within the APE. Approximately 10 feet wide, the historic road fabric is easily recognizable, typically surfaced with gravel and small cobbles and lined with raised curbstones; one short road segment is partially paved with asphalt leading from Highway 11 to the Kapapala Ranch.

The historic Kaʻū-Volcano Road remnants included five segments that total nearly a mile in the potential utility corridors adjacent to the current highway. Construction of the Kaʻū-Volcano Road, begun in the first decade of the twentieth century, was completed in the 1920s and replaced by Highway 11 in the early 1950s. The current surface of the Kaʻū-Volcano Road varies from largely intact asphalt in one segment to broken up gravel with remnants of asphalt cover in other locations.

In addition to these longer roads, there is a short remnant of an unnamed, two-track road with equipment scars in the bedrock. This crosses the existing pole and wire alignment from north to south between the Kaʻū entrance and the long, paved segment of the Kaʻū-Volcano Road that intersects with Highway 11. The location of the two-track road coincides with the Halfway House Trail, which may have its origins in the Historic Period. Finally, the Uwēkahuna-Bird Park road trace crosses through possible utility corridors, in addition to the existing utility corridor, all east of the Nāmakanipaio substation. This road trace consists of the obliterated alignment of a road built in the early 1930s to connect the Mamalahoa Highway and Crater Rim Drive to Kīpuka Puaulu. Thirty-five to 40 feet wide and paved with native stone, it is now largely obscured by vegetation. A culvert crosses the road trace in the potential utility corridor north of Highway 11. A metal pipe, with narrow ditches on either end is still present. One lava rock headwall is partly intact.

Three archeological sites, representing quarrying activities associated with historic road construction, are located in the proposed utility corridors adjacent to Highway 11. One site, consisting of a partially mined cinder outcrop accessed by a foot path, is located west of Nāmakanipaio Campground on the Mauna Loa side of the highway. Most of the features of this site lie just outside this APE corridor. A second site, a borrow pit complex consisting of five mechanically-dug features, lies on either side of the mostly paved section of the historic Kaʻū-Volcano Road between the park boundary with Kāpapala Ranch and Highway 11. These features are largely located inside the existing pole and line alignment to be dismantled along this historic paved road segment. The borrow pits were thought to have been excavated not only during the 1954 construction of Highway 11 but possibly before, based on previous survey work and the age of bottles found in dumps at the site. A third quarry site is associated with the historic Kaʻū-Volcano Road between the park's Kaʻū entrance, to just west of Nāmakanipaio Campground. This wide spreading site consists of over 180 features, including 164 hand-dug borrow pits, 15 paths, and three rock cairns. These features are concentrated in six clusters located in the APE along both the Mauna Loa and Kīlauea sides of the highway corridor where the terrain is easily accessible from the road elevation.

Remnants of the historic telephone alignment paralleling the Kaʻū-Volcano Road are found in the APE from the abandoned Kaʻū park entrance along the Kāpapala Ranch boundary to Nāmakanipaio Campground. This widespread site consists of 15 features, mostly round, wooden, cut-off pole stubs, post holes, and strapping, but also a crossbar with a tangle of copper wire attached, an insulator, and a short trail from the highway to a former pole location. Most of the features are located in the corridor along Highway 11, with one pole stub located in the existing pole alignment near the former Kaʻū entrance.

Small rubbish scatters of recent origin are fairly common near Highway 11, as expected. However, older bottle and can scatters are associated with historic highway construction alignments; these may have been deposited by workers or early tourists. ASM Affiliates recorded a rubbish scatter consisting of ceramic bowl fragments in the existing pole corridor. The proximity of this bowl to a power pole suggests it was dropped by someone working on or inspecting the pole; alternatively, it may have been dropped by someone travelling on a nearby trail. This nearby trail may date to the Precontact or Historic Period.

Other historic archeological sites in the APE appear to be associated with early park development. Remnants of a trash incinerator were found in the corridor south of Highway 11 in the Nāmakanipaio area. The base of the incinerator, made from basalt cobbles bonded by concrete, along with fire bricks, a fire grate, and an ash discharge chute are surviving elements. The type of fire bricks used in the incinerator was manufactured in the late 1920s and early 1930s. The bricks and the similarity of design with the incinerator built by Civilian Conservation Corps (CCC) near the parks research and resource management facility suggests that the historic incinerator may have been built by the CCC.

The poured concrete foundation of a four chamber, 16 X 16 foot steam bathhouse, along with large piping entering the structure, was found in the existing pole and line alignment to be removed between the Sulphur Banks and KMC. Numerous active steam vents occur in this area. This historic steam bathhouse, along with another documented steam bathhouse nearby, are thought to have been constructed in the 1920s by the U.S. Army at KMC for their guests.

Other sites found in the APE, including a trail, lithic quarries, and a shelter for temporary habitation may indicate early Historic or Precontact resource extraction. The Keʻāmoku Cross Trail transits the existing alignment and occurs in the corridors south and north of Highway 11 for varying lengths. Two features containing scatters of basaltic flakes and assayed large basalt rocks were located in the north and existing corridors in the Nāmakanipaio area. These lithic scatter features are elements of a 1,200 acre site containing multiple scatters and worked basalt ejecta from the 1790 eruption. An L-shaped alignment of placed rocks located in the corridor south of Highway 11 in the Nāmakanipaio area resembles temporary shelters used traditionally by Native Hawaiians. In the absence of associated features, its use and context is uncertain. It could have used by individuals procuring nearby lithic material, or it may be associated with road construction or even military exercises during WWII.

Relevant Policy

National Park Service policy requires protection of archeological resources on park lands from human-caused environmental impacts.

The National Park Service will protect, preserve, and foster appreciation of the cultural resources in its custody and demonstrate its respect for the peoples traditionally associated with those resources through appropriate programs of research, planning, and stewardship (NPS Management Policies 2006, 5.0 (NPS 2006)).

The National Park Service will employ the most effective concepts, techniques, and equipment to protect cultural resources against . . . environmental impacts . . . without compromising the integrity of the resources (NPS Management Policies 2006, 5.3.1 (NPS 2006)).

Environmental Consequences

Methodology. ASM Affiliates conducted an archeological study of the proposed utility line corridors in the project area and the utility line corridor to be abandoned (Barna 2015). From January-March, 2015, ASM Affiliates field crews systematically surveyed 50 foot wide corridors along each margin of Highway 11 from the Kīlauea switching station to Pi‘i Mauna Drive, along with a 50 foot wide corridor centered under the existing pole/line alignments to be removed. The corridors comprised approximately 178 acres of HVNP. Archeological resources in potential and existing utility line corridors were documented in detail with descriptions and photographs in the archeological study prepared by ASM Affiliates for compliance with Section 106 of the National Historic Preservation Act (Barna 2015). In addition, portions of this area had been previously surveyed by national park archeologists, with reports in HVNP files. Thresholds of change for determining the intensity of an impact are defined as follows:

Negligible: The effects on archeological resources would be at the lowest levels of detection, barely measurable without any perceptible consequences, either beneficial or adverse.

Minor: The effects on cultural resources would be perceptible or measurable, but would be slight and localized within a relatively small area. The action would not affect the character or diminish the character-defining features of an archeological site, and it would not have a permanent effect on the integrity of any such resources.

Moderate: The effects would be perceptible and measurable. The action would change one or more character-defining features of an archeological resource, but would not diminish the integrity of the resource to the extent that its National Register of Historic Places eligibility would be entirely lost.

Major: The effects would be perceptible and measurable. The action would change one or more character-defining features of an archeological resource, and would diminish the integrity of the resource to the extent that its NRHP eligibility would be entirely lost.

Impacts of the No Action Alternative. Under the no action alternative, the existing alignment of poles and wires would be maintained. To do so, poles and wires would be replaced in a piecemeal fashion within the existing alignments, based on need. Potential impacts may be almost entirely avoided by mitigating measures prescribed to be implemented for the action alternatives, including planning to locate poles away from archeological features, monitoring of all ground disturbing activities by an archeological technician, and by cutting and removing abandoned poles without dragging them across the ground. Assuming implementation of mitigating measures, construction activities of the no action

alternative may have negligible, direct, localized, long-term, and adverse impacts on archeological resources.

Cumulative Impacts. In the long-term, an increasing number of aging poles and stretches of wire would need to be replaced, involving the drilling of holes, installation of new poles, removal of old poles, and continued control of encroaching vegetation. Potential impacts would be avoided by mitigating measures to be implemented for the action alternatives. As a result, construction activities of the no action alternative may have no or negligible, direct, localized, long-term, and adverse impacts on archeological resources. Emergency repairs may require construction of temporary roads, but this would require park approval, would be infrequent and would avoid any archeological features.

Conclusions. The no action alternative, even when combined with cumulative impacts, may have no or negligible, direct, localized, and adverse impacts on archeological resources, if mitigating measures are implemented.

Impacts of the Action Alternatives, Including the Preferred Alternative. Archeological resources in the APE are highly vulnerable to the impacts of the construction activities of the project. All archeological features and sites surveyed, including roads, trails, borrow pits, lithic and rubbish scatters, a rock alignment, and culvert headwalls, along with the concrete steam bathhouse foundation and incinerator, lie on the surface of the ground, where construction activities are focused. In addition to the two lithic quarry features, the borrow pits, as well as large portions of the trails and historic roads, are made up of loose rock, cobbles, and gravel and thus readily vulnerable to ground disturbance.

The greatest potential source of impact to archeological resources in the APE includes all the activities involved in drilling three foot diameter holes for the electrical poles. Sources of disturbance include the augering of the hole, the depositing of spoils from the drilled hole, the trampling and walking of workers, and the placing of fill material on site for future tamping around the new pole. The clearing and pounding of holes for anchors may also disturb archeological resources. These impacts can be minimized or avoided by locating pole sites away from archeological features.

Archeological features may potentially be impacted beneath the tracks of the excavator moving within the construction easement. However, in most pole sites, there will be minimal driving of the excavator beyond the highway shoulder because the auger is mounted at the end of a 20 foot boom. There is often a 1-6 foot disturbed gravel or grassy shoulder beyond the edge of the paved shoulder. The center of the holes to be drilled is approximately 14 feet from the pavement edge in over half the project sites, within the reach of the boom-mounted auger. The excavator will need to drive further into the construction easement away from the pavement margin in the sites where the paved shoulder is only three feet wide and the holes are about 17 feet from the pavement edge. The boom is capable of accessing pole sites on slopes above and below the highway margin, although slopes reduce the distance reachable by the auger. Therefore, drilling holes on steep slopes may require further penetration of the excavator into the construction easement. Excavator track impacts on archeological resources can be minimized or avoided by the presence of an archeological monitor on site in vulnerable areas to guide the pathway of the excavator or drill these holes with a portable drill.

The possibility of penetrating lava tubes, although remote, may occur with the drilling of holes. This may pose a risk to archeological resources placed in the caves, such as artifacts of daily living or burials. Mitigating measures require that the archaeological monitor on site will determine what

measures need to be taken to protect archeological resources if lava tubes are penetrated by construction activities

Removal of abandoned poles may also potentially impact archeological resources. If they are currently located inside a feature, the surface may be disturbed by workers cutting the poles. In addition, felled poles may impact features when they are cut and land on the ground or when they are manipulated and lifted in their removal from the site by helicopter.

Essentially all of the potential impacts of the project on archeological resources, described above, will be avoided through the implementation of the mitigation measures stipulated in Chapter 2. In addition, Hawai‘i Electric Light will mark tentative sites for new poles and ASM Affiliates resource specialists will inspect the marked locations for sensitive resources. Pole locations will be moved if unacceptable resource damage would occur. In addition, mitigation measures also require that archaeological monitors be present during ground disturbing construction activities to protect potentially unknown archeological resources. Poles to be abandoned will not be dug out of the ground but cut-off at three feet above grade. The distal ends of abandoned poles will not be dragged across the ground but removed by helicopter or possibly boom truck if close enough to the highway.

When all mitigation measures are implemented, the action alternatives, including the preferred alternative, may have negligible-minor, direct, long-term, localized, and adverse impacts on archeological resources.

Cumulative Impacts. Cumulative impacts include the expectation that poles and wires may need to be maintained and replaced in the future. In addition, vegetation will need to be pruned indefinitely and kept away from the lines and poles. If the mitigation measures in Chapter 2 are implemented, then cumulative impacts would also have negligible-minor, direct, long-term, localized, and adverse impacts on archeological resources.

Conclusions. If the mitigation measures above are implemented, then the action alternatives, including the preferred alternative, even when combined with cumulative impacts, would have negligible-minor, direct, long-term, localized, and adverse impacts on archeological resources.

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APPENDIX 2. COMMON AND SCIENTIFIC NAMES USED

HAWAIIAN/ENGLISH COMMON NAME	SCIENTIFIC NAME
ʻAʻaliʻi	*Dodonaea viscosa*
ʻAkeʻake (Band-rumped storm-petrel)	*Ocenanodroma castro*
ʻĀkia	*Wikstroemia phillyreifolia*
ʻApapane	*Himatione sanguinea*
Argentine ant	*Linepithema humile*
Beardgrass	*Schizachyrium condensatum*
Broomsedge	*Andropogon virginicus*
Faya tree	*Morella faya*
Hairgrass	*Deschampsia nubigena*
Hawaiʻi ʻamakihi	*Hemignathus virens*
Himalayan raspberry	*Rubus ellipticus*
Hōʻawa	*Pittosporum terminalioides*
Iliahi (sandalwood)	*Santalum paniculatum*
ʻIo (Hawaiian hawk)	*Buteo solitarius*
Kāwelu	*Eragrostis variabilis*
Kīlauea naupaka	*Scaevola kīlauea*
Koa	*Acacia heterophylla* (formerly *Acacia koa*)
Little fire ant	*Wasmannia auropunctata*
Māmane	*Sophora chrysophylla*
Native Bees/*Hylaeus* bees	*Hylaeus* spp.
Molasses grass	*Melinis minutiflora*
Nēnē	*Branta sandvicensis*
ʻŌhelo (ʻŌhelo ʻai)	*Vaccinium reticulatum*
ʻŌhiʻa (ʻŌhiʻa lehua)	*Metrosideros polymorpha*
ʻŌmaʻo	*Myadestes obscurus*
ʻŌpeʻapeʻa (Hawaiian hoary bat)	*Lasiurus cinereus senotus*
Pāwale	*Rumex skottsbergii*
Pūkiawe	*Leptechophylla tameiameiae*

Rapid ʻŌhiʻa Death (ROD) fungus	*Ceratocystis spp.*
Strawberry guava	*Psidium cattleianum*
ʻUaʻu (Hawaiian petrel)	*Pterodroma sandwichensis*
ʻŪlei	*Osteomeles anthyllidifolia*
Uluhe	*Dicranopteris linearis*

APPENDIX 3. ACRONYMS AND ABBREVIATIONS USED

APE	Area of Potential Effects
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CCC	Civilian Conservation Corps
DO	NPS Director's Order
EA	Environmental Assessment
EPA	Environmental Protection Agency
ESA	Endangered Species Act
IDT	Interdisciplinary Team
SHPD	State Historic Preservation Division
HEL	Hawai‘i Electric Light
HVNP	Hawai‘i Volcanoes National Park
KMC	Kilauea Military Camp
MM	Mile Marker
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NRHP	National Register of Historic Places
NPS	National Park Service
PL	Public Law
RM	NPS Reference Manual
ROD	Rapid ‘Ōhi‘a Death
SOPs	Standard Operating Procedures
USGS	U.S. Geological Survey
T&E Species	Threatened and Endangered Species
USC	United States Code
USFWS	U.S. Fish and Wildlife Service

APPENDIX 4. HAWAI‘I VOLCANOES NATIONAL PARK INVASIVE PEST PREVENTION STANDARD OPERATING PROCEDURES (SOPs)

This document lists protocols for preventing the introduction of harmful invasive pests including coqui, ants, weeds, and Rapid ‘Ōhi‘a Death fungus into Hawai‘i Volcanoes National Park. It is the project leader’s, contractor’s, or concessioner’s responsibility to ensure compliance with these protocols.

1. All work vehicles, machinery, and equipment must be clean and free of debris prior to entering the park:

a. Vehicles, machinery, and equipment must be thoroughly pressure washed and visibly free of mud, dirt, plant debris, frogs and frog eggs, insects and other debris. A hot water wash is preferred. Areas of particular concern include bumpers, grills, hood compartments, areas under the battery, wheel wells, undercarriage, cabs, and truck beds.

b. The interior and exterior of vehicles, machinery, and equipment must be free of rubbish and food. The interiors of vehicles and the cabs of machinery must be vacuumed clean. Floor mats will be sanitized with a solution of >70% isopropyl alcohol or a freshly mixed 10% bleach solution.

c. All work vehicles, machinery, and equipment may be subject to inspection.

d. Any vehicles, machinery, and equipment that do not pass inspection will be turned away.

e. Vehicles, machinery, and equipment leaving the park for any reason must be cleaned prior to reentry into the park, and may require re-inspection at the park’s discretion.

2. Inspection of work vehicles, machinery, and equipment for invasive ants prior to entering the park, or in a predetermined location in the park:

a. In addition to visual inspection for plant debris, insects, soil, frog and frog eggs, testing for invasive ants is part of the inspection prior to entry into the park or at a predetermined location in the park. To expedite the process, make sure vehicles, machinery, equipment, and staging areas used are clean as described in (1) above.

b. Test for invasive ants by placing chopsticks baited with a dab of peanut butter and jelly for 30 minutes to 1 hour throughout the equipment being tested. About 6 chopsticks will be used to test most personal vehicles and trucks, larger vehicles and heavy machinery may require up to 10-20 baits. Baits will be placed in the shade, inside the cab, engine compartment, and truck bed if applicable. Please note baits are only good for detection and do not control ants, and the bait will not be left in the vehicle for over 1 hour as this may attract ants from beyond the area of concern.

c. Any ants found will be collected, bagged and labeled for identification, and the equipment will not be allowed to enter the park until it is sanitized and re-tested following a resting period. Infested vehicles will be sanitized following recommendations by the Hawaii Ant Lab (http://www.littlefireants.com/) or other ant control expert and in accordance with all State and Federal laws. Control records will be required to confirm treatment. Treatment is the responsibility of the equipment or vehicle owner.

d. Gravel, building materials, or other equipment such as portable buildings will also be tested, using the same method as above, however, baited chopsticks will be placed every 10-20 feet

around the area, in the shade, and the immediate surrounding area will be searched for 2 minutes for ants. These monitoring stations must be left out for 1 hour, and any ants found will be collected for identification. The vehicle base yard and quarries may also be tested using these methods if deemed necessary by the park.

e. The park reserves the right to conduct additional tests for ants at any time during the course of the project.

3. Base yards and staging areas inside and outside the park must be kept free of invasive pests:

a. Base yards and staging areas may be inspected for invasive pests at the beginning of the project.

b. Pest control records may be requested anytime at the park's discretion.

c. Project vehicles or equipment stored outside of a base yard or staging area, such as a private residence, should be kept in a pest free area. Such vehicles or equipment may be subject to additional inspection as described in (1d) above and will be turned away if infested.

4. All cutting tools must be sanitized to prevent Rapid Ōhia Death (ROD):

a. All cutting tools, including machetes, chainsaws, and loppers must be sanitized to remove visible dirt and other contaminants prior to entry into the park, and when moving to a new project area in the park. Tools may be sanitized using a solution of >70% isopropyl alcohol or a freshly mixed 10% bleach solution. One minute after sanitizing, you may apply an oil based lubricant to chainsaw chains or other metallic parts to prevent corrosion.

b. Only dedicated tools and chainsaws will be used to sample known or suspected ROD infected trees.

c. Vehicles, machinery, and equipment must be cleaned as described in (1) above.

5. Imported firewood:

a. All firewood imported into the park must be sourced from a park approved site free of ROD, invasive weeds, coqui and ants.

<u>Scheduling an inspection for a park approved project:</u>

Projects may be required to provide their own trained inspectors and to document records of inspection. Requests for inspections should be made via email to david_benitez@nps.gov and should include the park project lead and contracting officer. Requests must be made a minimum of 3 business days prior to inspection. We may be unable to accommodate requests made on shorter notice, though you may contact the following staff via email to try to arrange an inspection. Please make sure to also copy your park project lead on this correspondence: