

#12

**AN INVENTORY SURVEY AT THE SITE OF THE PROPOSED
KILAUEA MIDDLE EAST RIFT ZONE (KMERZ), WELL SITE #2
TMK: 1-2-03, ISLAND OF HAWAII
MARCH 1991**

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March, 1991

INTRODUCTION AND PHYSICAL SETTING

At the request of True Mid Pacific Geothermal, Archaeological Consultants of Hawaii, Inc. has conducted an inventory survey at the site of the proposed Kilauea Middle East Rift Zone (KMERZ), Well Site #2, TMK: 1-2-10:3. The Principal Investigator was Joseph Kennedy M.A., assisted by Jacob Kaio, Field Supervisor and field crew Mark Borrello B.A., Michael O'Shaughnessy B.A., and Randy Adric. This report supercedes all previous reports submitted to the Historic Preservation Section of the Department of Land and Natural Resources.

In addition to 100% surface coverage of the 400 x 400 foot well pad itself, 100% surface coverage of a substantial buffer zone was also completed.* This buffer zone was established by the Department of Land and Natural Resources, Historic Preservation personnel and extends 1000 feet east and west of the well site and 500 feet north and south of the well site.

This proposed well site and buffer zones are located on the Kilauea Middle East Rift Zone, Island of Hawaii (see maps Figure #1 and Figure #2). The subject property features an extremely rugged topography and an unusually thick vegetative profile which combine to present some of the most difficult survey areas in the state. A thick mat of stony muck rests on what appears to be alternating a'a and pahoehoe and is covered with very dense uluhe, 'ie'ie, hapu'u, guava, ohi'a and a number of additional plants, vines and grasses. The area surveyed is comprised of bog and swamp, dominated by a mixed mesic-type rainforest of 'ohi'a, hapu'u, Kilauea hepyotis, and assorted epiphytic vegetation such as mosses, ferns, and 'ala'alawainui. The majority of 'ohi'a appears to be stunted, probably a result of the boggy conditions. Included to a lesser degree are akala, guava, waiawi, 'ie'ie, maile, mamaki, kolea, assorted gingers (mostly 'awapuhi), occasional fleabane, bamboo, orchid, iris and lobelia.

* Three small areas along the southern boundary of the buffer zone were not examined due to extremely hazardous topographic conditions.

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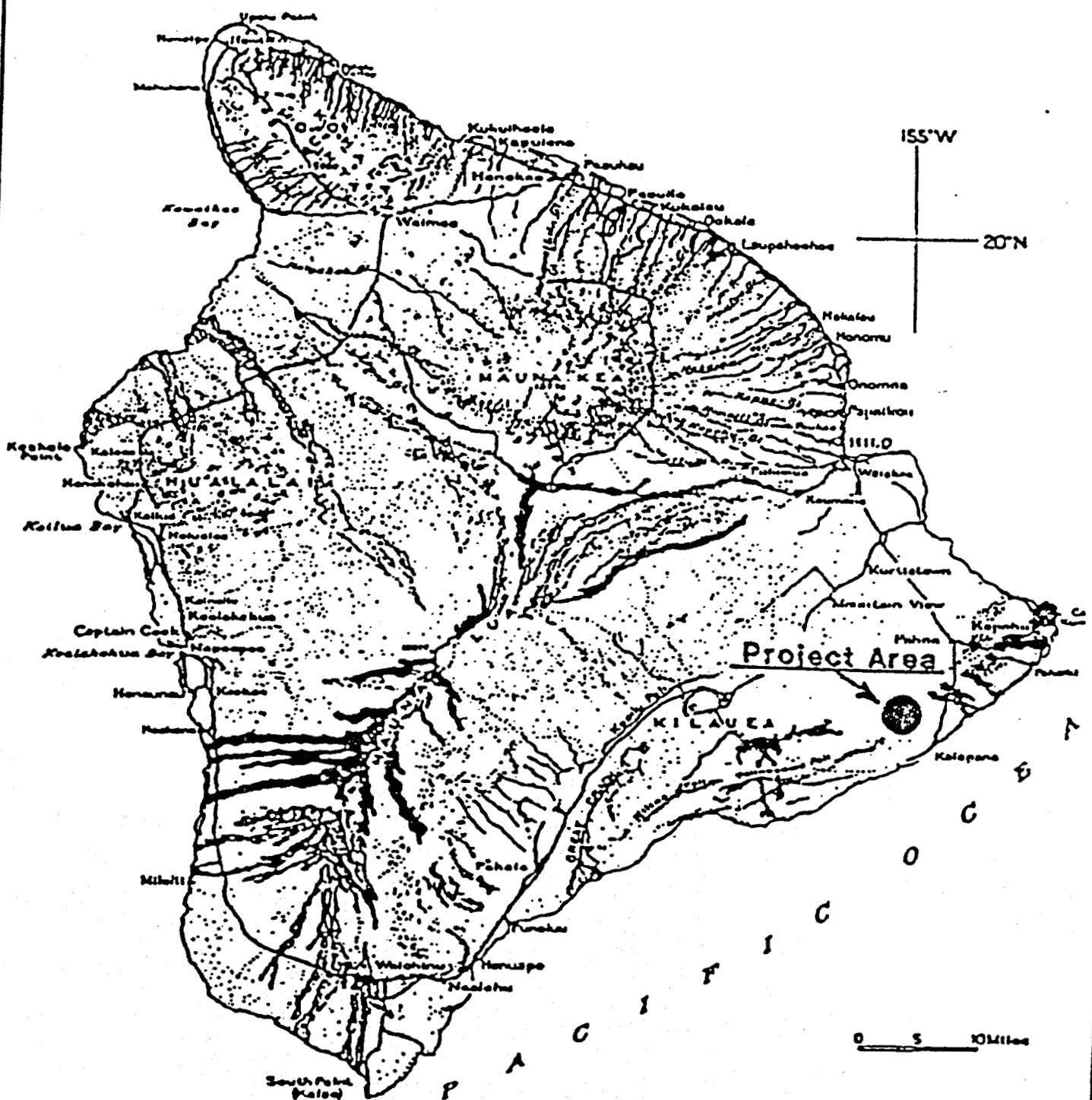


Figure 1. Project Area Map
(from Macdonald and Abbot 1970: 288)

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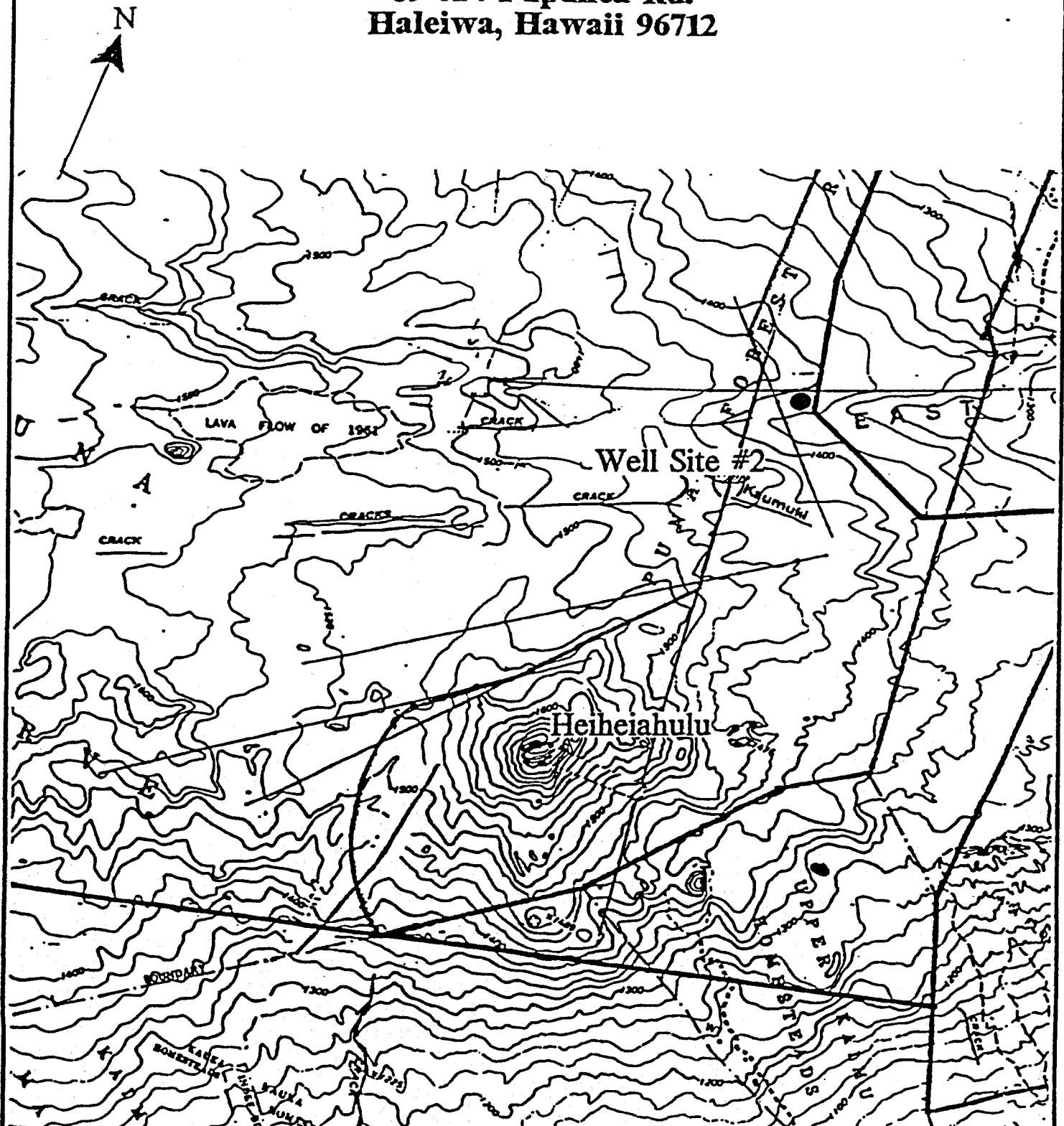


Figure 2.
Location Map Well Site #2

The roadway bulldozer push (approximately 25 feet on either side) consists mostly of fleabane, mamaki, 'akala, bamboo orchid, iris, guava, a species of melastoma candida, and other exotics. The reader may wish to refer to the numerous and recently completed botanical studies of this area for a more complete listing.

The land mass appears to be mostly pahoehoe, deduced indirectly by the smoothness of the surface and poor drainage conditions of this surface. Small outcrops of a'a were also observed. The pahoehoe is covered with either mud and water, mosses, or a mixture of all three. The mud, soil, and decayed vegetation occurred at a depth of approximately one foot. The mud areas have all been used extensively by pigs, as is evidenced by rooting digging, and chewed hapu'u. In areas in which there are fallen 'ohi'a and/or hapu'u, there are few, if any, caves of any consequence or size. Another observation was the lack of birds. We encountered only a few cardinals, a few finches or sparrows (limited visibility hampered identification). Notably absent is the presence of mongoose.

PURPOSE OF WORK

A variety of archaeological sites may be expected in the vast forest lands where True/Mid-Pacific Geothermal Venture proposes to conduct its geothermal exploration activities. Although the sites' distribution generally will be sparse and although most project activities may well miss any sites that may exist there, it is important to have adequate plans to identify historic sites in order to avoid them or else mitigate any impacts to them.

Special identification problems exist in forest lands, and for this reason an archaeological research design for archaeological survey methods was required under CDUA HA-1830 as part of an archaeological plan. This document was prepared by the author on May 28, 1989 and later amended by the Department of Land and Natural Resources, Historic Preservation Program personnel.

PREHISTORIC AND EARLY HISTORIC LAND USE IN THE PROJECT AREA AND ANTICIPATED HISTORIC SITES

Historic and archaeological research in this area as well as in other similar environmental zones on Hawaii Island, indicate that prehistorically such areas were used for:

1. Forest product exploitation. Bird feathers, timber, vines, etc. were collected in the forests at or near worksites, and campsites were nearby. These sites may be scattered around some portions of the project area, in low densities for any one point in prehistory.
2. Burial. These sites are expected to be focused in certain areas.
3. Major inland trails across many ahupua'a and associated campsites. These sites should be focused in linear corridors.
4. Agriculture in the seaward-most reaches. These sites may tend to be fairly dense but they will again be in a small, seaward portion of the project area.

Archaeologically, the sites should have the following characteristics:

1. Forest exploitation sites. Probably there will be no surface stone architecture (huts and shelters likely were simply pole and thatch). Some campsites will be in caves. Each site may be a small scatter of flaked stone, broken tools, food remains (bone, shell), and firepits. If repeated use occurred, then the density of remains would be greater. Such campsites are documented in caves in forest areas. Such cave campsites have yielded a great deal of important information on the age of use of an area, on birds and plants collected, etc. Campsites and exploitation sites have yet to be documented in open-air context, and in such cases, they are expected to primarily be subsurface, buried sites.
2. Burials. Burials in forest areas have been identified in two forms --burials in caves (often caves also used as campsites) and in stone platforms and pavings on cinder cones. These sites contain important information on age of permanent occupation in an area, on social organization, on health, on demography. Additionally, they are highly significant sites culturally for native Hawaiians.

3. Trails. Trails in forest areas are expected to be extremely difficult to identify, as worn paths and cuts through the forest will have been covered over by later sediments and by forest regrowth. On bare a'a flows, there will be some visible features -- e.g., crushed paths, stepping stones. Campsites along the trails should have firepits, food remains, and some scattered artifacts. Some campsites may have been in caves, but others will have been open-air camps, and may have no surface architecture and be buried like the forest exploitation camps. Trails and their associated campsites can tell us a great deal about the nature of different time periods of travel across regions. Trails also provide information on items being carried or exchanged.
4. Agricultural sites. These sites commonly have some kind of stone-work --small oval clearings lined with stones, small terrace lines, walls, etc. These sites contain important chronological information on permanent settlement of an area, population expansion, and agricultural expansion.

SITE IDENTIFICATION PROBLEMS

Common archaeological surface survey (labelled reconnaissance survey, intensive survey, etc.) can identify cave sites used for forest exploitation and/or burial, can identify agricultural sites, and can identify trails on bare a'a flows. However, cave sites are only expected in older pahoehoe areas, not on a'a flows and not in recent pahoehoe areas. Platform and paving burial sites are expected to be restricted to cinder cones. Agricultural sites will be at lower, seaward elevations in areas with soil. This means that a'a flows and recent pahoehoe flows are not expected to include sites unless there is a visible trail remnant.

The open-air sites in forest areas -- trail sites (and their associated camps) and forest exploitation sites (not in caves) -- will likely be subsurface. They will also be small. Common surface survey will not be able to identify these sites when they are subsurface. These sites are expected in soil areas within kipuka, and on old pahoehoe flows, and on older a'a flows lacking rough surfaces. These sites may be surface remains on bare lava, in kipuka, on old pahoehoe flows and on older a'a flows lacking rough surfaces - in such cases, common surface survey could identify them, however, it appears unlikely that these sites will be found on the surface. They are not anticipated on rough a'a flows (except rare trails) or on recent pahoehoe or a'a flows. The above problems indicate two special conditions for site identification;

1. Some areas appear not to need survey. -- e.g., rough a'a flows and recent lava flows (post 1880 flows whether pahoehoe or a'a); these areas need to be identified and be clearly marked off as areas needing no archaeological work.

2. Soil areas may contain subsurface exploitation and trail related sites. Special archaeological approaches need to be devised for these areas to try and identify these sites.

BACKGROUND PREPARATION: FINDINGS

1. Check of historic and archaeological literature. The historic literature (Holmes 1985) shows no recorded trails in the project area. The Wilkes route of 1840 (see map Figure #3) passes to the south of the project area and the Kaimu Trail, approximately .75km to the south, skirts south of Heiheiahulu. The existence of the existing Kaimu Trail lowers the probability of an additional trail passing through the study area but increases the possibility that the area was accessed prehistorically.

Previous archaeological surveys done in the general area include Bonk (1990) Haun and Rosendahl (1985) and two previous surface examinations of this well site and vicinities by the author in 1990. Bonk did not locate cultural materials, Haun and Rosendahl identified possible prehistoric Hawaiian burial structures and remnant cultigens of ki, and kukui. The structures were located on the southeast summit of Heiheiahulu located to the southeast of the project area.

2. Identification of older bare pahoehoe flows, soil covered pahoehoe and a'a flows, kipuka and cinder cones and the project area. Holmes' (1985) map of lava flows (see map Figure #4) indicates that the project area is at the north extreme of an 1800's flow with a 750 to 1,000 BP flow north of the site. A recent 1961 flow occurred approximately 1 km to the west of the site. There is just one cinder cone in the vicinity which is located well outside the project area to the north.

3. Identification of cultigens. No aerial photographs were made available to us and hence we cannot offer any aerial interpretations of vegetation areas. However, we did not observe any cultivated plants such as banana, ki, or kukui in the research area.

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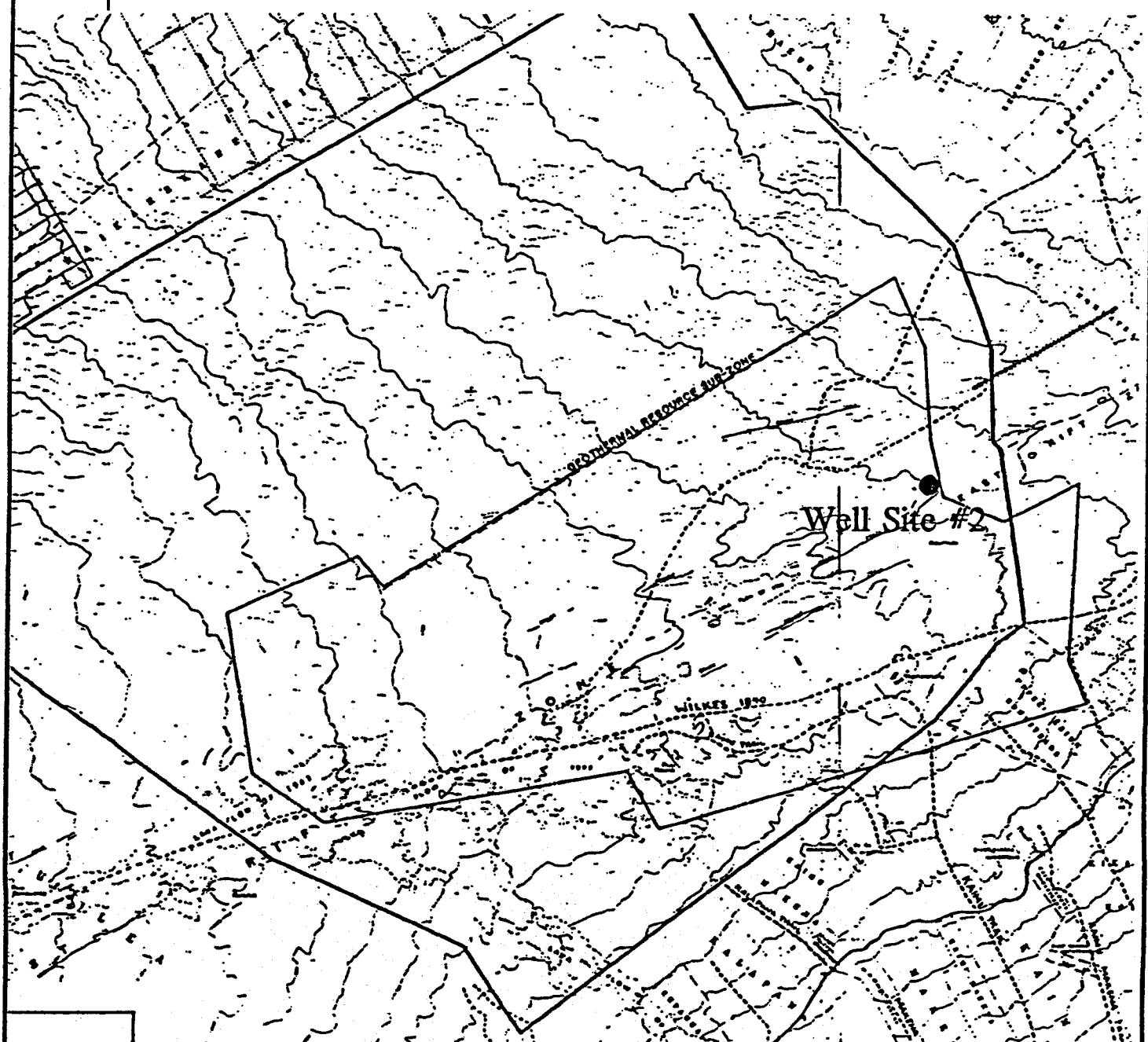


Figure 3.
Trail Location Map
(from Bonk, 1988)

Trails -----

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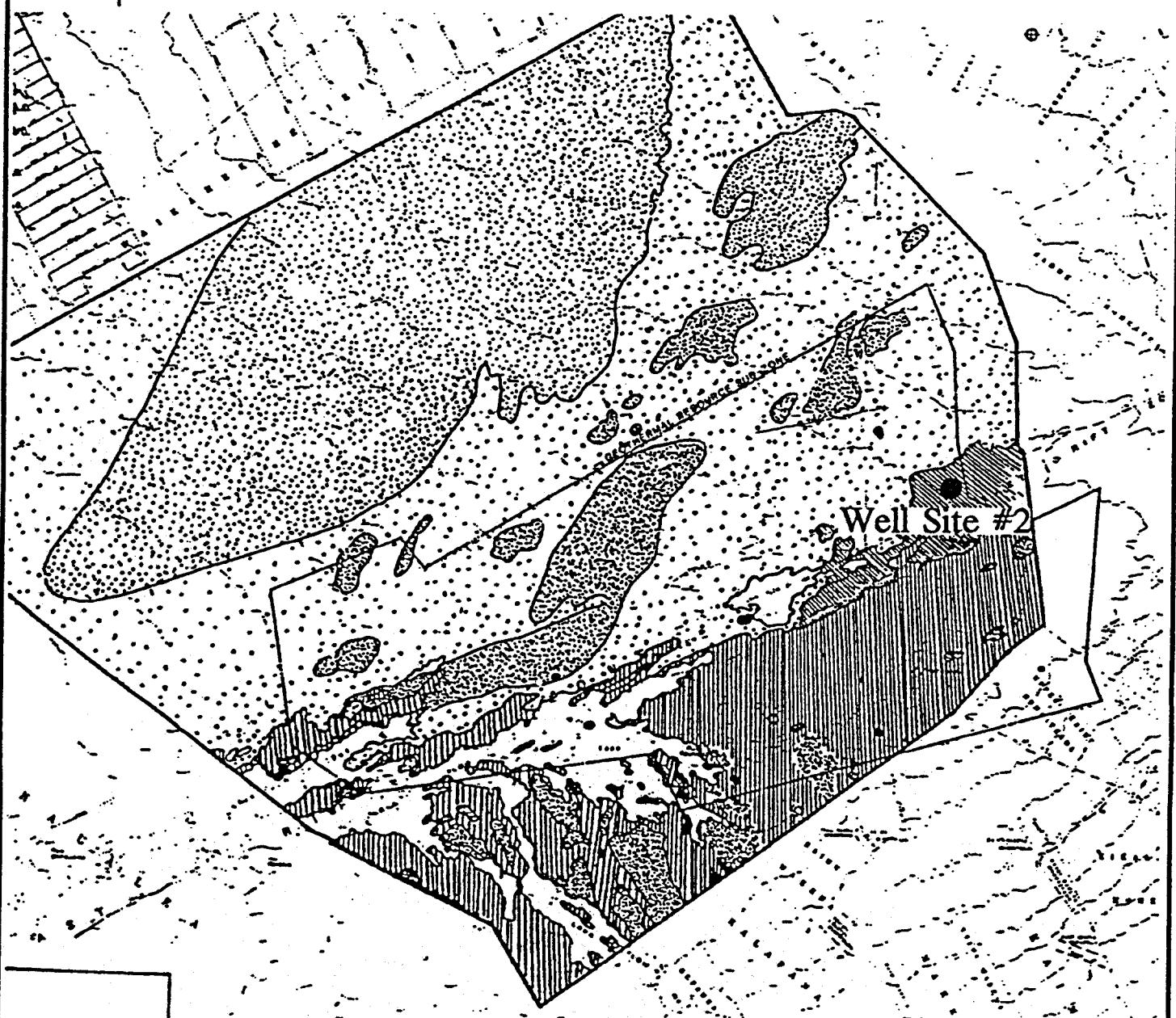


Figure 4.
Map of Lava Flows 1800 Flows
(from Bonk, 1988)

|||||

700-1000 BP Flows |||||

ARCHAEOLOGICAL SURFACE SURVEY: FINDINGS

1. Caves. The pahoehoe portions of the subject property featured numerous inflated dome type caves - in every case, these were found to be very shallow and devoid of any cultural indications. The largest of these inflated dome type caves observed was no more than 2 meters wide, approximately 3/4 meter high and 2 meters in depth. In comparison, the smallest cave observed was 1/2 meter wide by 1/2 meter high and 1 meter deep. A single, larger cave was encountered in the buffer zone. This measured roughly 12X15 feet and was eight feet high. It should be pointed out that a cave lacking cultural material is not considered an archaeological site. There was no cultural material encountered in any of the lava domes or in the single larger cave and therefore none of these geologic formations should be misinterpreted as sites.

The property also features a number of cracks. The smallest being one foot wide, three feet long and two feet deep. The largest is roughly 100 feet long, twenty feet wide with depths ranging between 25 and 40 feet. There is a cave entrance at the bottom of the largest crack, however, the area is very unstable, with loose, rotting rock and debris making even a rappelling exercise treacherous to the point of foolishness. There were no cinder cones within the project area.

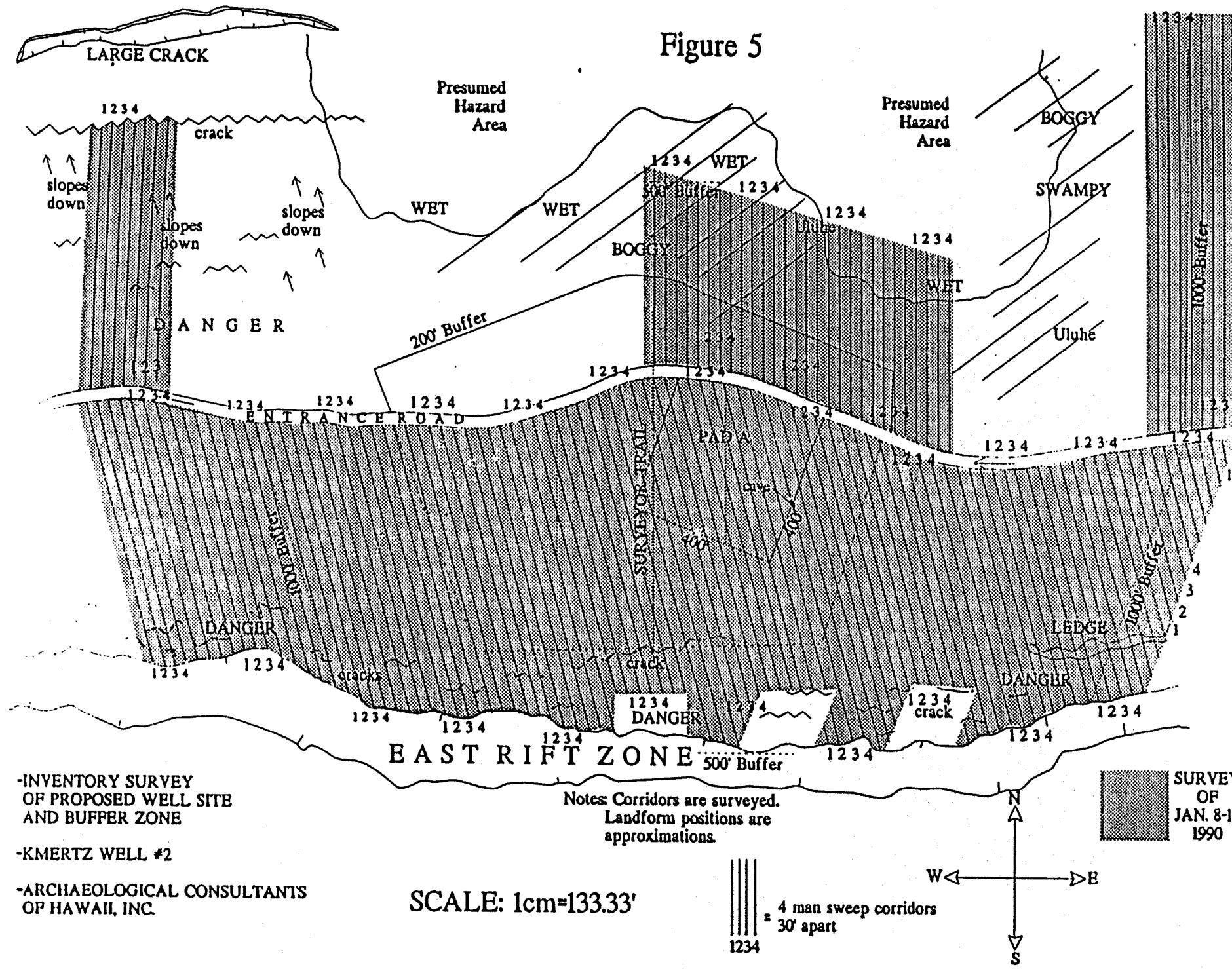
2. Kipuka Pahoehoe. There were no kipuka observed within the boundaries of the project area.

3. Trails. The Kaimu trail and the Wilkes expedition trail passed east-west approximately 3/4 to 1km to the south of the project area. The proximity of the Hawaiian trail suggests that an additional trail paralleling this one would be unlikely. However, the proximity may have increased the likelihood of prehistoric access to the project area.

4. Inventory Survey: Methodology. An intensive inventory survey was completed for the well pad as well as the buffer zone. A survey team, consisting of the four individuals mentioned previously, spaced roughly 30 feet apart, conducted a series of north/south compass transects sweeps across the entire property (see map Figure #5) -save three small areas along the southern boundary where entry was deemed too dangerous. These four individuals worked ten hours a day for six days to complete the survey.

It is estimated that 100% of the property was covered. While extremely thick vegetation limited visibility, survey crew members were in constant visual and radio contact with each other and it is our opinion that it is highly unlikely that any surface features or cave entrances were overlooked.

Figure 5



FINDINGS IN GENERAL

Based on the direct observation of surface conditions along the sweep framework corridors, and on the evaluation of understory and canopy type along the periphery of these corridors, we conclude the following:

Mud, water, and thick accumulations of rotting vegetation prevented, in most cases, any direct contact with bare lava surfaces. The similarity between understory and canopy along the sweep corridors and that which was observed within an approximate 100' periphery leads us to conclude that surface conditions are the same in these outer areas as they are where we could see them directly. Therefore, the percentage of the study area underlain by pahoehoe and a'a, apparent differences in flow age and the distribution of these differences cannot be determined at this time.

The large cracks described earlier presented a hazard in all the corridor areas thus far established. However, in both the vicinity of the rift zone and the entire northwestern section of the buffer zone, deep cracks, steep slopes, and obscuring vegetation presented such extreme hazard that additional sweep corridors could not be established. The flatter northeast section of the buffer zone, as was determined from observations off the northeast corridor and the midsection probe, revealed the swaggiest conditions encountered over the entire property, and plans for additional corridors were similarly abandoned.

No cultural indicators were located within the buffer area.

FINDINGS FOR WELL SITE AREA #2

No cultural indicators were located within the well site impact area. There were no sightings of any cultigens such as ki, banana, kukui, within the well site area.

DISCUSSION AND RECOMMENDATIONS

The prediction and identification of temporary forest shelter sites used hundreds of years ago by small groups such as bird feather collectors will be extremely difficult. The

illusory temporary campsites in this upland forest area can be expected to be either buried, random, or so lacking in diagnostic materials that archaeological identification and data recovery may be impossible or impractical unless camp sites used seasonally over many years are encountered. Hypothetically, two types of campsites may be possible in this area, a short term, one-time-used camp site or campsites which were set up along established travel routes and used year after year.

Presumed campsites have been found in lava tubes in forested areas on Campbell Estate Land. However, because no campsites have been identified, to date, in upland forests, our predictive model continues to be based on a shallow data base.

Archaeological monitoring of soil covered areas after initial grading and grubbing. We feel that a need for some form of monitoring during initial phases of grubbing and grading is important. Monitoring is recommended because of the known presence of lava tubes in the general area.

In addition, Archaeologists will be "on-call" if the 7-1/2 inch drill bit hits an "air void" indicating the possible presence of a cave. At that time, work will stop, the drill bit removed to facilitate the insertion of a fiber optic device to examine the void for cultural materials.

Also, as a special effort to try and identify subsurface remains of trail and forest exploitation, campsites and forest exploitation working areas, this monitoring should occur. It shall only be done in soil areas. The cuts made during grubbing and grading will be inspected to see if these sites can be identified.

The highest likelihood for locating and identifying campsites in the project area will be during the monitoring of vegetation clearing and earth moving. The presence of features such as developed stratigraphic layers, perishable midden accumulations (charcoal and lithic debris) and foundation outlines, should they exist within the project area, will best be tested during this next phase. In this case, standard excavation methods will be applied.

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