State of Hawai`i
DEPARTMENT OF LAND AND NATURAL RESOURCES
Division of Forestry and Wildlife
Honolulu, Hawai`i 96813

June 20, 2011

Chairperson and Members
Natural Area Reserves System Commission
State of Hawai`i
Honolulu, Hawai`i

NARS Commission Members:

SUBJECT: REQUEST FOR APPROVAL OF PROPOSED UPGRADES BY HAWAIIAN VOLCANO OBSERVATORY (HVO) FOR THEIR DATA RADIO REPEATER LOCATED IN MAUNA KEA ICE AGE NATURAL AREA RESERVE (NAR) FOR RELAYING VOLCANO AND EARTHQUAKE MONITORING DATA; TO PERMIT LOCATION OF UPGRADE TO NEW ADJACENT SITE IN THE NAR, FOLLOWED BY REMOVAL OF OLD EQUIPMENT FROM ORIGINAL SITE.

BACKGROUND:
The mission of the Hawaiian Volcano Observatory (HVO) is to monitor Hawaiian volcanoes and earthquakes to provide information with which the public and public agencies can mitigate those hazards. The site of this seismographic station was chosen when the entire summit was under lease to the University of Hawai`i as the Mauna Kea Science Reserve. The station is now within Maun Kea Ice Age Natural Area Reserve (NAR); the proposed upgrade is going to be on an adjacent site, which triggers a special use permit.

STAFF ANALYSIS:
Staff of Hawaiian Volcano Observatory (HVO), are in the process of reviewing their various sites for future equipment upgrades and to comply with current conservation district rules. In 2009, HVO was awarded $3.3 M for a significant monitoring upgrade and a critical part of that upgrade is the installation of a digital backbone telemetry network to faithfully return all monitoring data to HVO for data analysis. A critical part of this upgrade of equipment and services is an upgrade of the HVO repeater installations within Mauna Kea Ice Age Natural Area Reserve (NAR) which monitor and transmit data on all the seismically active volcanoes on the island. Because HVO will be upgrading instruments to all-digital, the strategy is to install the new equipment just to the west of the current equipment (site MK01), insure its effective operation, before removing the current equipment so that there is no chance of missing any important activity on any of the active volcanoes.

On May 16, 2011, an archaeological field inspection of the proposed site was conducted by Holly McEldowney, archaeologist with the Division of State Parks and Mary Anne Maigret, archaeologist with Pu`uhonua o Honaunau National Historic Park, to determine if any historic properties could be affected by the project. Kevan Kamibayashi, HVO staff member, showed those participating in the inspection all current and proposed project locations as well as routes used to construct and routinely maintain the present, and proposed installations. NO archaeological sites, features, or objects were identified in the area of the current or proposed installations and within 100 feet of these locations. Neither the installation site nor the antenna are visible from the Humu`ula Trail which is located to the west of the project area but is hidden by a drop in topography. There no indications of burial sites were found on the cinder cones located immediately upslope or down slope of the project area.

RECOMMENDATION:
That the NARS Commission approve this permit application to upgrade the seismic station by first relocating to a new, adjacent site, determine that it is running, and then remove old equipment form original site. This will allow for a smooth, safe transition to the new digital equipment without any interruption in the very important monitoring safety net. Further, it is recommended that the NARS Commission recognizes the existence of this new site and supports access for future routine maintenance, and that it be recommended to the Board of Land and Natural Resources subject to terms and conditions specified by the NARS Commission and Staff.

Respectfully submitted,

BETSY HARRISON GAGNÉ, Executive Secretary
NARS Commission

Attachments: USGS-HVO letter dated June 8, 2011
Summary Filed Inspection Report dated June 13, 2011

United States Department of the Interior

U.S. GEOLOGICAL SURVEY
Hawaiian Volcano Observatory
Post Office Box 51
Hawaii National Park, Hawai'i 96718-0051

IN REPLY REFER TO:

To: Betsy Gagne, Lisa Hadway
DLNR, Mauna Kea Ice Age NAR

From: Jim Kauahikaua
Scientist-in-Charge
USGS Hawaiian Volcano Observatory
PO Box 51
Hawai'i National Park, HI 96718

Subject: Proposed upgrades to Hawaiian Volcano Observatory data radio repeater on Mauna Kea for relaying volcano and earthquake monitoring data

Date: June 8, 2011

The Hawaiian Volcano Observatory (HVO), the oldest of five volcano observatories operated by the U.S. Geological Survey, has a Congressional mandate to provide accurate and timely warnings of earthquake and volcano hazards in the state of Hawaii. To that end, HVO operates extensive geophysical monitoring instrument networks on the active volcanoes in Hawai□i – Kīlauea, Mauna Loa, Hualālai, Haleakalā, and Mauna Kea - and freely exchanges seismic data with the Pacific Tsunami Warning Center (PTWC) to support their detection of tsunamgenic earthquakes.

In 2009, HVO was awarded $3.3M for a significant monitoring upgrade and a critical part of that upgrade is the installation of a digital backbone telemetry network to faithfully return all monitoring data to HVO for analysis. The digital backbone telemetry network is designed as a ring to which all data is transmitted. The advantage of a ring design is that there are two communication paths to each hub of the ring so that, if one path should fail, communication will not be lost. This is the topology of Hawai□i County's police/fire radio network for which we are co-locating several radio hubs around south Mauna Loa. All instrument sites are planned to be upgraded by September 30, 2011. The digital telemetry backbone was contracted to Pacific Wireless with HVO securing any necessary permits.

A critical part of this upgrade of equipment and services is an upgrade of our repeater installations within the Mauna Kea Ice Age Natural Area Reserve (NAR). The repeaters transfer volcano and earthquake monitoring data from our sites on Hualālai, the west flank of Mauna Loa, and Mauna Kea to HVO for analysis.

Our current installation is composed of two installations separated by 45 m (145 ft) just within the eastern boundary of the NAR at the 11,855 foot elevation. The easternmost installation is 930 ft WSW from nearest point in the Mauna Kea access road and 250 ft W of the nearest access box in the underground power/fiber conduit.

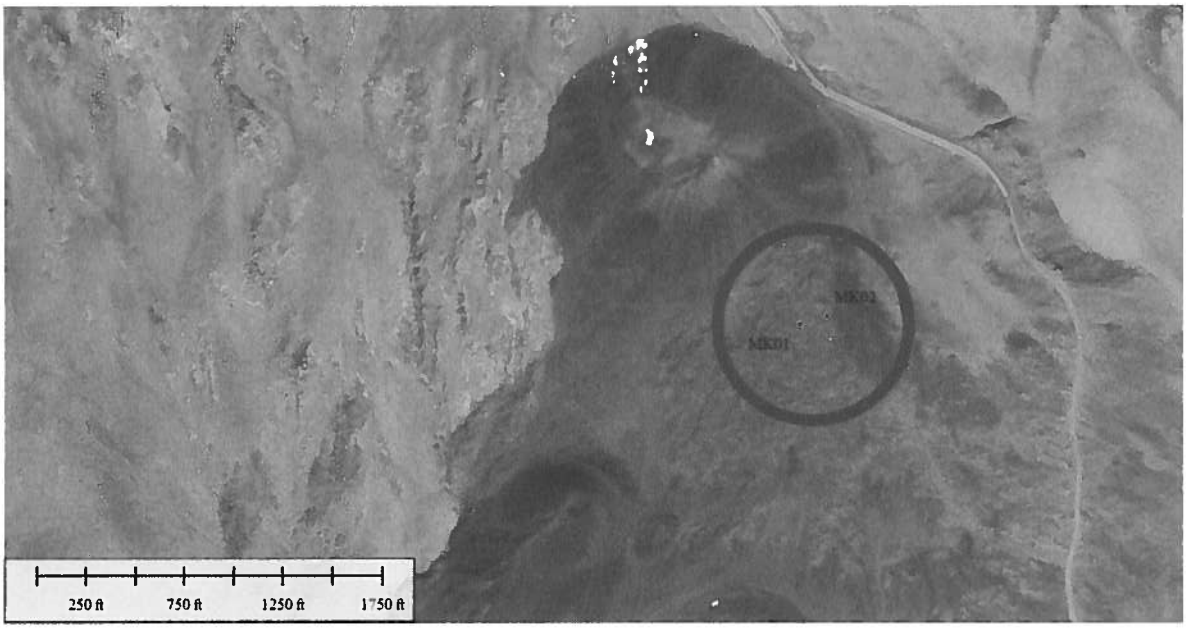


Figure 1. Map showing the location of HVO's two current radio repeater installations.

Each of the two current installations consists of small antennas on a 10 ft mast with solar panels and batteries connected to radios and the antennas (in plastic cases in lower left of figure 2).

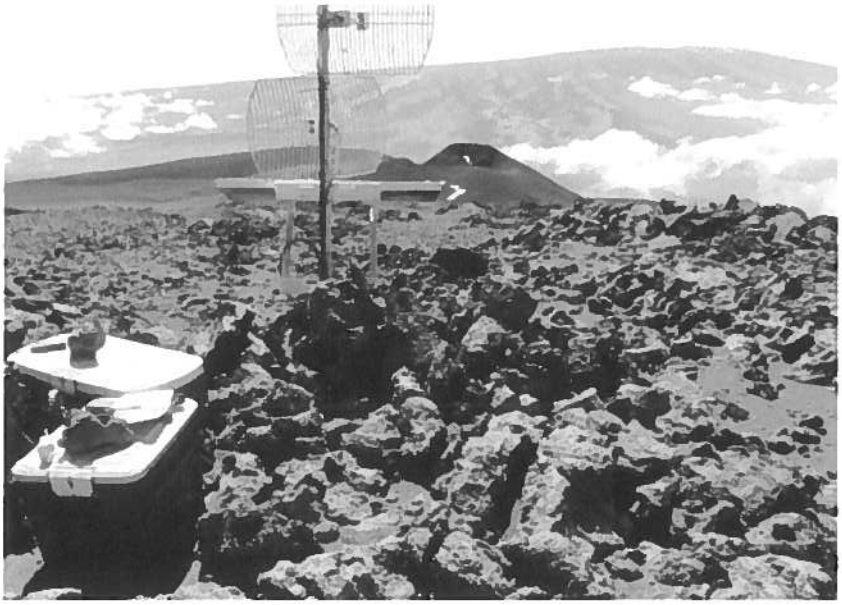


Figure 2. One of the current radio repeater installations (MK01).

We are currently using a mixture of analog and digital data telemetry to bring back to HVO our monitoring data from all sites on Hawai□i Island. The existing radio repeater within the Mauna Kea Ice Age NAR uses all digital radios.

The coordinates of the two existing sites are 19.78957 N, 155.45818 W (MK02) and 19.78945 N,

155.45858 W (MK01). These two sites are about 145 feet apart.

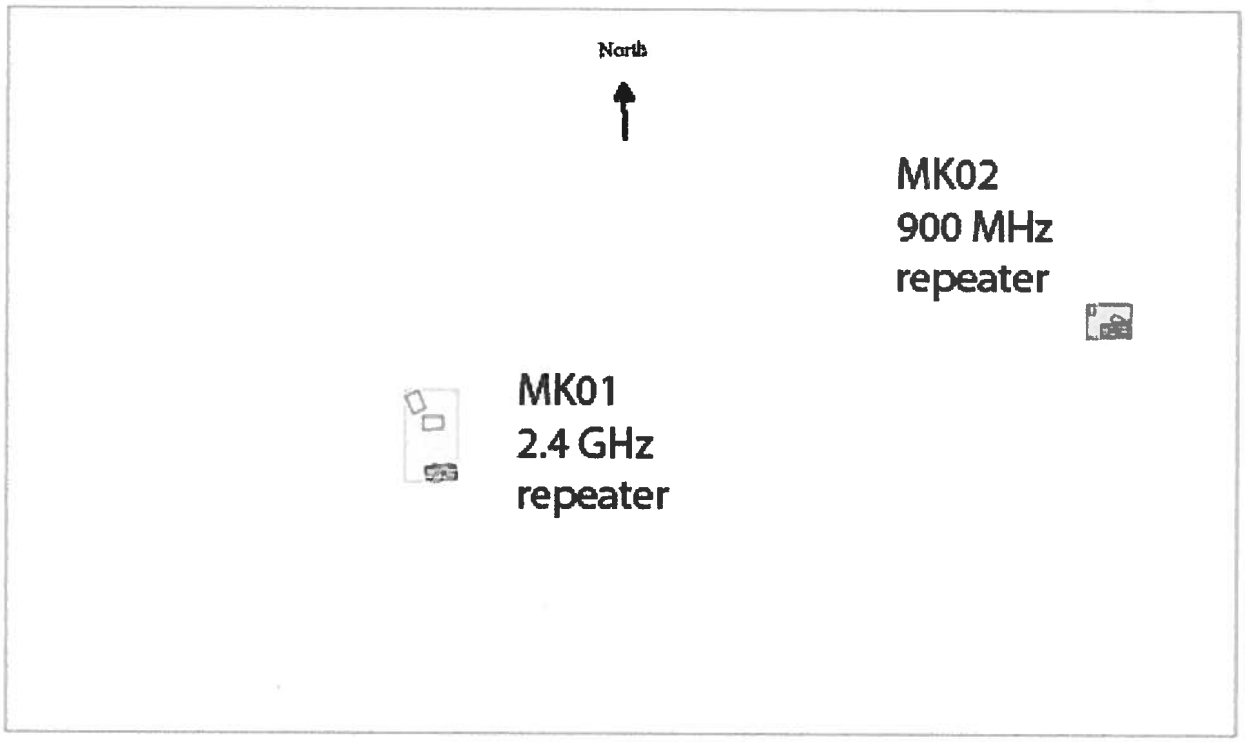


Figure 3. Existing Site layout is about 425 square feet. Figure portrays an area of about 280 feet EW by 150 ft NS.

Because we are now upgrading all of our monitoring instruments to use only digital radio telemetry, we need to upgrade the Mauna Kea repeater capacity to bring additional data back to HVO. This will require a bit more equipment but it should not increase our footprint substantially on Mauna Kea.

The upgraded site will consist of two parts - one hub of our 7-hub digital backbone telemetry ring and last-mile radios receiving data signals from sites on Mauna Loa and Hualālai. The hub was designed and will be installed by Pacific Wireless, our contractor, under HVO supervision.

Our strategy is to install the new equipment just to the west of the current equipment (site MK01), then remove the current equipment reusing only one antenna mast. Some of the on-site work will be done using a contractor who will be overseen directly by an HVO staff member.

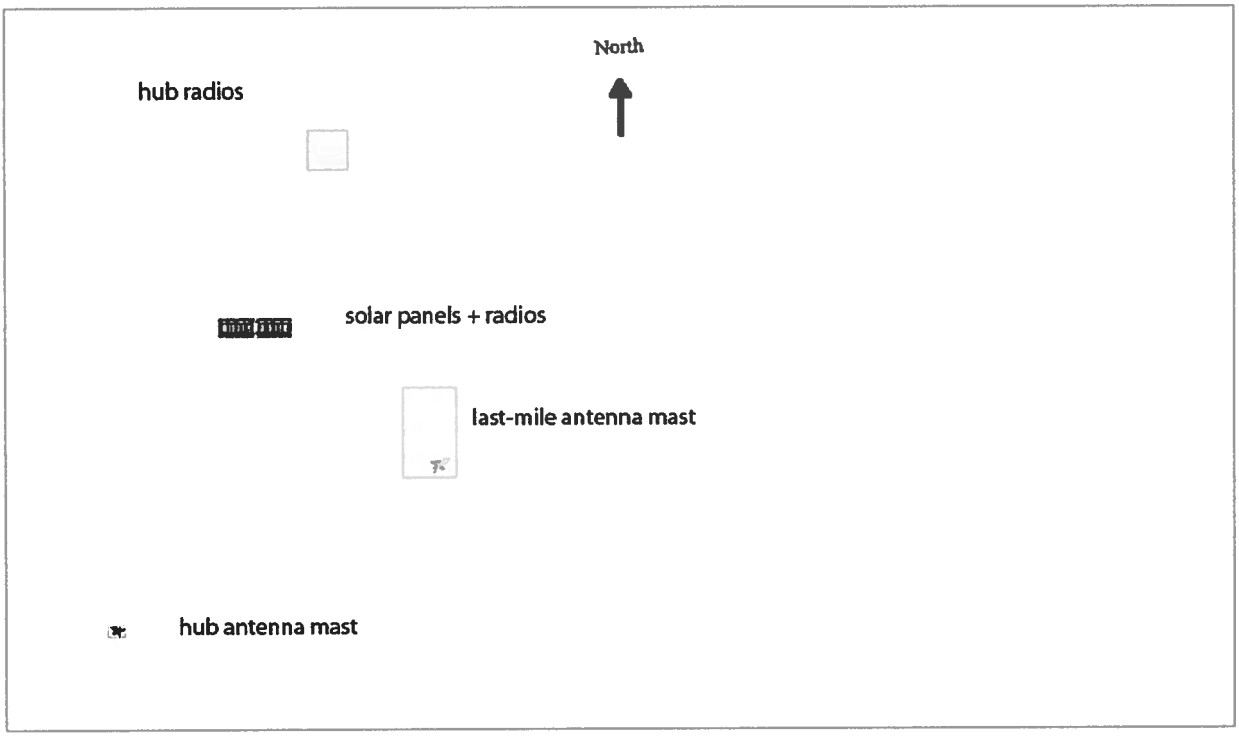


Figure 4. Upgrade layout occupies 230 square feet. Only the antenna mast within the blue rectangle will be reused. Figure scale is identical to that in Figure 3.

The solar panel installation will consist of 8 panels mounted in an aluminum frame tilted toward the south with the frame held up by six vertical stainless steel pipes. Each of the northern-most pipes will be 10 ft long with the lower 3 ft concreted into the ground. The southern-most pipes will be no taller than the height of the south edge of the solar panels. The support provided by these pipes is necessary to withstand high winds and snow and ice loads. The final solar panel array will be approximately 4 ft wide by 16 ft long.

The radios and other electronics will be contained in two heavy-duty plastic. The necessary batteries and charge controllers will be housed in another four heavy-duty plastic. All cases will be placed beneath the solar panel array to minimize our overall footprint.

June 13, 2011

Memorandum:

To: Betsy Gagne, Executive Secretary
Lisa Hadway, Natural Area Program Manager, Hawaii Island
Natural Area Reserves System

From: Holly McEldowney, Archaeologist
Division of State Parks

Subject: Summary of Field Inspection, Upgrade of Radio Telemetry Installation for Volcano and Earthquake Monitoring, Mauna Kea Natural Area Ice Age Natural Area Reserve.

The following is a brief summary of the archaeological field inspection that MaryAnne Maigret and I conducted of the radio telemetry installation upgrade proposed by the Hawaiian Volcano Observatory in the Mauna Kea Natural Area Ice Age Natural Area Reserve. I will try to prepare a more detailed report by the end of the week. I hope this is sufficient for your staff report.

Note I have also included a map prepared by Pacific Consulting Services, Inc. (PCSI) showing the distribution of the archaeological sites and find spots identified by during the archaeological inventory surveys they conducted of the Mauna Kea Ice Age Natural Area Reserve and the Mauna Kea Access Road Management Corridor.

Here is the summary:

On May 16, 2011, Holly McEldowney, archaeologist with the Division of State Parks, and MaryAnne Maigret, archaeologist with Pu'uhonua o Honaunau National Historic Park, conducted an archaeological field inspection of the existing telemetry equipment and locations of the proposed upgraded transmitters. The purpose of the inspection was to determine if any historic properties could be affected by the project. This includes historic properties that could be directly affected by installation of the transmitters or their routine maintenance as well as those historic properties that could be indirectly affected by the visual impact of the installation. Kevan Kamibayashi of the Hawaiian Volcano Observatory showed those participating in the inspection all current and proposed project locations as well as the routes used to construct and routinely maintain the installation.

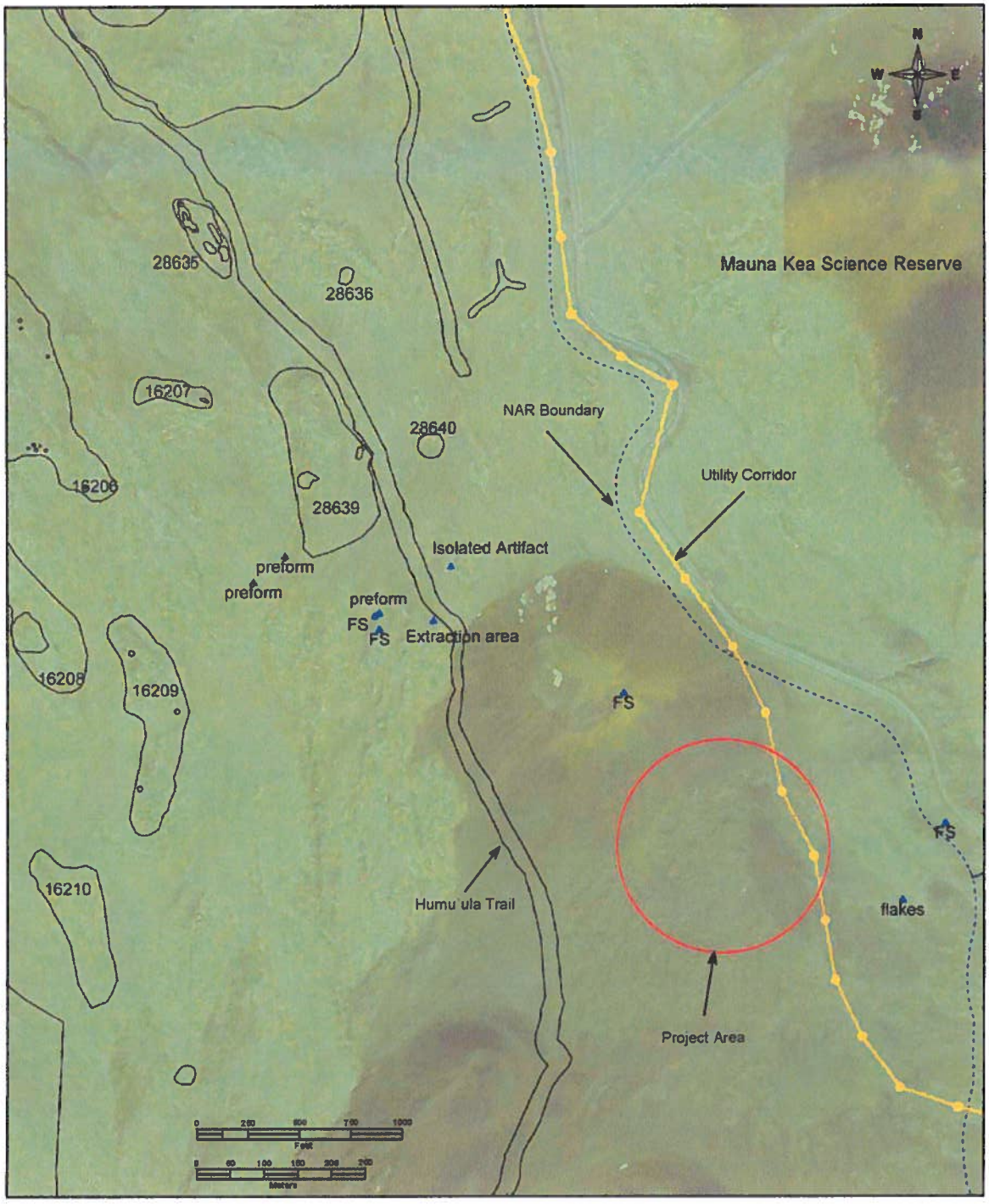
No archaeological sites, features, or objects were identified in the area of the current or proposed installations and within 100 feet of these locations. In addition to the systematically inspected areas, the archaeologist also examined nature features in the vicinity that, from a distance, resembled man-made features, particularly the uprights of native Hawaiian shrines that are prevalent in the summit region of Mauna Kea. Based on pervious surveys of the summit region, it was possible that native Hawaiian shrines,

adze-manufacturing workshops, isolated artifacts or flakes related to adze manufacturing, temporary enclosures, or historic campsites could be present given their occurrence within the summit region at comparable elevations. None of the features generally associated with these activities or these site types were seen at the project site, in the proposed staging areas, or on the routes used to access the installation.

These results are consistent with those of the archaeological inventory survey conducted of the Mauna Kea Ice Age Natural Area Reserve in 2009 by Pacific Consulting Services, Inc (PCSI). The area of the proposed telemetry installation was included in the 2009 inventory survey which also found no historic properties in the area. This is apparent in draft site distribution maps prepared of the survey results that show the locations of all sites and individual find spots identified during the survey. This absence of archaeological features is probably explained by the rough lava in the project area which, unlike much of the terrain to the north and west, was spared the impact of glacial activity. The glacial activity created ground surfaces that were easier to traverse and also distributed the fine-grained basalt preferred for adze manufacture. Much of the use of Mauna Kea's summit region focused on these other kinds of geological surfaces.

Portions of the Mauna Kea Adze quarry are visible from the proposed telemetry installation so, presumably, it is possible that the installation's antenna could be seen from some of the quarry sites. In 1962, the Mauna Kea Adze Quarry was listed on the National Register of Historic Places and was designated a National Historic Landmark. The portion of the quarry from which the antenna is potentially visible is that surrounding the pit crater located directly below Pu'u Ko'oko'olau and the slope which extends below the crater to an elevation of about 11,600 feet. Given the very small size the antenna and its relatively low height, it is very unlikely that it would be noticed from the adze quarry by the casual observer.

Note that neither the installation site nor the antenna are visible from the Humu'ula Trail which is located to west of the project area but is hidden by a drop in topography. Also, no indications of burial sites were found on the cinder cones located immediately upslope or downslope of the project area during the PCSI survey.



Distribution of Archaeological Sites and Individual Find Spots Relative to the Area Surrounding the Proposed Radio Telemetry Installation Upgrade. Note that no sites and find spots, including materials generated during the adze-making process, shrines, or probable burial sites at or near the current and upgraded telemetry installation.