

**STATE OF HAWAII  
DEPARTMENT OF LAND AND NATURAL RESOURCES  
OFFICE OF CONSERVATION AND COASTAL LANDS  
Honolulu, Hawai'i**

File No: HA-3906  
180-Day Exp. Date: May 2, 2023

April 14, 2023

**Board of Land and  
Natural Resources  
State of Hawai'i  
Honolulu, Hawai'i**

**REGARDING:** Conservation District Use Application (CDUA) HA-3906 for  
the Hōkū Ke'a Observatory Decommissioning Project

**APPLICANT:** University of Hawai'i at Hilo and the Center for Maunakea  
Stewardship  
200 W. Kawili Street  
Hilo, HI 96720

**AGENT:** SSFM International, Inc.  
Jennifer Scheffel  
99 Aupuni Street, Suite 202  
Hilo, HI 96720

**APPROVING AGENCY:** State of Hawai'i  
Department of Land and Natural Resources  
Office of Conservation and Coastal Lands &  
Board of Land and Natural Resources

**LOCATION:** Ka'ohe, Hāmākua, Hawai'i

**TAX MAP KEY  
(TMK):** (3) 4-4-015:009 (por)

**PROJECT AREA:** 0.25 acres

**USE:** Demolition and removal

**SUBZONE:** Resource

**ATTACHMENTS:** Exhibit 1: Hōkū Ke'a Location Map  
Exhibit 2: TMK: (3) 4-4-015:009 Conservation District Map  
Exhibit 3: Historic Sites near the Hōkū Ke'a Project Area

Exhibit 4: SHPD 1/23/2023 Letter

Exhibit 5: Selections from the Hōkū Ke‘a Decommission and  
Restoration Plan

Exhibit 6: Best Management Practices (BMPs) and Other  
Measures to Minimize Impacts

ONLINE LIBRARY: [HTTPS://DLNR.HAWAII.GOV/OCCL/CURRENT-APPLICATIONS/](https://DLNR.HAWAII.GOV/OCCL/CURRENT-APPLICATIONS/)

## DESCRIPTION OF AREA/CURRENT USE

The Hōkū Ke‘a project area is on the southeastern side of the 528-acre Astronomy Precinct within the approximately 11,288-acre Mauna Kea Science Reserve (MKSР), located at the summit of Mauna Kea. MKSR lands area leased to the University of Hawai‘i (GL S-4191), and approximately 40.5-acres are currently used for the current observatories and associated infrastructure. Hōkū Ke‘a occupies approximately 0.25-acre. See **Exhibit 1**.

The Hōkū Ke‘a Observatory is a 36-inch telescope that was purchased and installed with funding from the National Science Foundation to support the University of Hawai‘i at Hilo (UH Hilo) undergraduate astronomy program and affiliated school/community outreach programs. The telescope is located in an observatory structure (dome) that was originally constructed in 1968 and was later renovated for use with Hōkū Ke‘a. The renovation and telescope replacement were conducted in accordance with Conservation District Use Permit (CDUP) HA-3406 approved by the Department of Land and Natural Resources (DLNR) on May 2, 2007. The observatory renovation was completed in 2008 and the Hōkū Ke‘a telescope was installed in 2010.

Hōkū Ke‘a is located in the Resource Subzone of the State Land Use Conservation District (**Exhibit 2**). The site is accessed via the Mauna Kea Access Road off the Daniel K. Inouye Highway, State Route 200, known locally as Saddle Road.

The principal rock type on the summit area is Hawaiite, which commonly forms clinker a‘a lava flows or cinder cones. The Hōkū Ke‘a site is interpreted to originally be an a‘a lava flow which vented in the vicinity of the site. Fill was used during the construction of the observatory. The original fill material used on the site was not documented at the time of construction. It is believed that much, or all the site fill was sourced from a Laupāhoehoe series, which covers the summit of Mauna Kea.

Materials exposed at the ground surface of the project site generally consist of cinder mixed with some volcanic ash. Based on laboratory tests, the surface materials generally consist of medium dense gravelly sands with little silt. In some areas, the surface materials are mostly gravel with very little sands and silts. Surface materials are generally dry with relatively low moisture content. There is little or no soil development and the ground surface has the appearance of a desert pavement.

The regional groundwater body below Mauna Kea’s summit is probably a dike-impounded high-level aquifer (the Waimea Aquifer System). It is “probable” because there is no direct confirmation of high-level water from drilling. The only surface water in the summit area

is Lake Waiau, which is roughly 4,500-5,000 feet to the southwest of the site. The site is miles from any coastal waters or watershed.

### Hazards

This project proposes to deconstruct and remove the observatory and restore the site to the maximum extent practicable. It will not create any new structures or infrastructure; therefore, once the project is complete, the physical structures of the site will not be susceptible to natural hazards.

The potential for renewed volcanic activity in the Mauna Kea summit region is extremely remote. Mauna Kea is considered a dormant volcano and any possible future eruptions would likely occur below the summit and not pose a threat to the Hōkū Ke'a site. The project area is located in Flood Zone D of the Federal Emergency Management Area (FEMA) flood zone maps, which is an unstudied area where flood hazards are undetermined, but possible. There is no record of any flood occurring at or near the site. Because the Hōkū Ke'a Observatory Decommissioning Project will not create any new structures or infrastructure, it is not susceptible to damage by seismic activity and will not increase the site's seismic vulnerability.

### Flora and Fauna

The Hōkū Ke'a site is located in the alpine stone desert ecosystem. This ecosystem limits the development of the plant and animal communities at the site. The plant community consists of lichens and mosses with sparsely distributed vascular plants. Twenty-six (26) species of lichens have been recorded at the summit and this includes two (2) species that are endemic to the Hawaiian Islands and twenty-four (24) species that are indigenous to Hawai'i. The application notes no lichens are known to be present at the project site.

Vascular plant life is inconspicuous and consists of widely scattered, low-stature, herbaceous plants. Two (2) native grasses, pili uka (*Trisetum glomeratum*) and Hawai'i bentgrass (*Agrostis sandwicensis*) are the most frequent species followed by the endemic fern 'Iwa 'Iwa (*Asplenium adiantum-nigrum*). Although these plant species have been identified in the Astronomy Precinct, no vascular plants have been found along or near the foundations of any of the observatories. This includes the Hōkū Ke'a project area.

Arthropods are the most common fauna present in the alpine stone desert ecosystem. Regular monitoring of arthropods, including invasive species, was started in 2002. Monitoring and conservation efforts occur year-round. The endemic Hawaiian wēkiu bug (*Nysius wekiuicola*) has been located within the vicinity of the proposed action; however, no wēkiu bugs were identified within or adjacent to the project site.

No Hawaiian seabird have been documented traversing the Mauna Kea summit; however, the U.S. Fish and Wildlife Service (USFWS) has stated that endangered Hawaiian seabirds including the 'ua'u or Hawaiian petrel (*Pterodroma sandwichensis*), 'ake'ake or band-rumped storm petrel (*Oceanodroma castro*), and 'a'o or Newell's shearwater (*Puffinus newelli*) may transit the area flying to breeding colonies. The 'ua'u or Hawaiian petrel has been discovered recently nesting near 10,000 feet elevation on Mauna Kea. None of these avian species have been identified within the project site.

The palila (*Loxiodes bailleui*) is a federal and state-listed endangered species/bird that resides in the Mauna Kea Forest Reserve at elevations between 6,000 and 9,000 feet

above mean sea level (msl). Critical habitat for the palila within the Mauna Kea Forest Reserve was designated September 22, 1997. Although the project site is not within the designated critical habitat, the application notes that the Mauna Kea Access Road traverses through the designated critical habitat area.

The USFWS has identified that the endangered 'ōpe'ape'a or Hawaiian hoary bat (*Lasiurus cinereus semotus*) are known to occur within the vicinity of the project area likely at lower elevations. No 'ōpe'ape'a have been documented at the summit of Mauna Kea, and there does not appear to be sufficient habitat for the species at or near the project site. No threatened or endangered species of flora or fauna were observed on the Hōkū Ke'a site.

#### Historic/Cultural

An archaeological literature review with field inspection and architectural evaluation, and a cultural impact assessment were prepared the Hōkū Ke'a Observatory Decommissioning Project by the applicant and their agents.

The Hōkū Ke'a Observatory Decommissioning project site is within the Mauna Kea Summit Region Historic District. There are four sites located within 500 meters of the project site: Site 50-10-23-26224 USGS marker located on the summit of Pu'u Wēkiu, Site 50-10-23-21209 possible burial, Site 50-10-23-21438 Kūkahau'ula (the summit/traditional cultural property), and Site 50-10-23-26869 the Mauna Kea Summit Region Historic District (**Exhibit 3**). There are no specific archaeological or historic features present at the Hōkū Ke'a site.

Both the Hōkū Ke'a Observatory Building and the Generator Building were built around 1968 and are over 50 years old. Neither building is evaluated as eligible for the Hawai'i State Register of Historic Places under any of the criteria established in Hawai'i Administrative Rules (HAR) §13-275-6(b).

Modern-day oral history consultants have described their knowledge concerning cultural practices in the summit region. These include Ahu and Kūahu or burials and scattering of cremated remains, piko or umbilical cord deposition in Lake Wai'au, and navigation and orienteering. Cultural activities are documented by the Mauna Kea rangers in their daily observation reports, but there is no estimate of the level of use of the summit by cultural practitioners. The applicant notes that the three (3) most visited areas of the summit are Lake Wai'au, the Adze Quarry, and Pu'u Wēkiu.

The applicant and their agents propose complete removal of all above and underground facilities as well as full restoration of the site to its pre-construction condition, to the greatest extent practicable. Therefore, the applicant states that the proposed project, and in particular its goal of restoring the site to the maximum practicable extent, would have a beneficial effect on Native Hawaiian practices.

On July 28, 2022, the State Historic Preservation Division (SHPD) requested that the Center for Maunakea Stewardship (CMS), UH Hilo that archaeological monitoring be conducted during the project. Additionally, SHPD requested that CMS, UH Hilo submit an archaeological monitoring plan (AMP) meeting the requirements of HAR §13-279-4 for review and acceptance prior to project initiation (Project No. 2022PR00168, Doc. No.

2207SN02). On January 25, 2023, SHPD notified CMS that the AMP was accepted and that the project initiation process may continue. See **Exhibit 4**.

## PROPOSED USE

The purpose of the project is to decommission and remove the Hōkū Ke‘a Observatory Building, Generator Building, and associated telecommunications and electrical infrastructure as part of the University’s commitment to reduce its footprint at the summit of Mauna Kea. CMS and UH Hilo note that the Hōkū Ke‘a telescope was intended to play a critical role in the educational mission of the UH Hilo’s Department of Physics and Astronomy; however, it did not achieve satisfactory operational performance. Therefore, UH Hilo has ceased efforts to bring it into full operation and the facility needs to be decommissioned. The decommissioning project includes full removal and partial restoration.

UH Hilo and the Office of Mauna Kea Management (now CMS) tendered its Notice of Intent (NOI) to decommission the Hōkū Ke‘a Observatory on September 16, 2015. The Hōkū Ke‘a Observatory Decommissioning project is described as follows.

The project area has been divided into two (2) sections: Area A and Area B. Area A contains the Observatory Building and Generator Buildings, as well as telecommunication and electrical infrastructure. Area B contains telecommunication and electrical infrastructure associated with the Observatory Building and Generator Buildings. CMS and UH Hilo note that Area B also contains the United Kingdom Infrared Telescope (UKIRT) observatory and utility building/lunchroom but is not included as part of the current Hōkū Ke‘a Observatory Decommissioning project. See **Exhibit 5**.

### Site Deconstruction and Removal

Site deconstruction and removal will include installation of best management practices (BMPs), Observatory Building demolition and debris removal, Generator Building demolition and debris removal, and conductor removal and partial conduit removal, and utility room electrical demolition and debris removal.

BMPs will be installed prior to any site deconstruction activities. BMPs will include a truck washdown area outside the project site, construction fence around the project site, silt fence or equivalent controls to prevent runoff from the site to adjacent area, and a construction entrance. See **Exhibit 6**.

Demolition of both the Observatory Building and Generator Building will include hazardous material remediation for lead-containing paint (LCP), interior electrical demolition, removal of telescope steel base, and building demolition. Electrical demolition within the Observatory Building will consist of removal of all existing electrical conduit, light fixtures, outlets, wiring, and equipment and wiring devices in the building. All feeders will be completely removed back to the main service and disconnected. Debris removal will include building debris, concrete pad debris, and electrical debris.

Electrical conduit and conductor removal will include toning, trenching, conduit removal, and capping. It is assumed that direct buried conduits are 18 inches under existing grade. Power and telephone cables will be removed from inside the conduits from the Observatory Building and Generator Building to their source. Conduits will be demolished from the Observatory Building to the roadway. The remaining existing conduit will be capped and remain in place. The existing transformer powers the University of Hawai'i 2.2-Meter Telescope (UH88) and will remain in place.

Electrical components associated with Hōkū Ke'a in the electrical room of the lunchroom will be removed. This includes removal of all cabling in the fiber optic panel that serves the Observatory Building, conduit above the ceiling, non-fused disconnect switch, telephone cabling and equipment, and telephone conduit. All other electrical infrastructure not associated with Hōkū Ke'a will remain in place.

#### Site Restoration

Site restoration will restore the site to a basic topography consistent with the area. Only minor grading consisting of cuts and fills of less than approximately one foot may be required to achieve design finish grades. Excavation and backfilling of existing foundations and utility lines of up to approximately two to three feet may be required.

Fill material will be granular fill including coarse to fine particles with no particles larger than three inches in diameter with a California Bearing Ratio (CBR) value of 20 or higher and a swell potential of 1% or less. Fill material will contain less than 30% particles passing the Number 200 sieve (i.e., less than 74 microns). Excavated on-site materials may be reused as a source of granular fill if they meet these requirements. Stockpiles of fill materials at other areas of Mauna Kea may also be used as a source of imported fill. Imported fill materials will be free of organics and deleterious materials and will be suitable for the intended use.

Select granular fill will be placed in eight-inch loose lifts, moisture conditioned to above the optimum moisture content, and compacted. Areas not subject to vehicular traffic will be compacted to a minimum of 85% relative compaction; areas subject to vehicular traffic will be compacted to a minimum 90% relative compaction. Moisture conditioning will be achieved by sheepfoot rollers, vibratory rollers, or other types of acceptable compaction equipment. Water tamping, jetting, or ponding will not be used.

The cut subgrades and areas to be filled will be scarified to a depth of about eight inches, moisture conditioned to above the optimum moisture content, and compacted. Areas not subject to vehicular traffic will be compacted to a minimum of 85% relative compaction; areas subject to vehicular traffic will be compacted to a minimum 90% relative compaction.

Cut slopes planned at the site exposing cinder and volcanic ash materials will be designed with a maximum slope inclination of two horizontal to one vertical (2H:1V). Permanent fill slopes constructed of select granular fill materials are also designed with a maximum

slope inclination of 2H:1V. Any fills placed on slopes steeper than 5H:1V will be benched. The fill slope face will be finished to a relative smooth and well-compacted surface. Filling operations will start at the lowest and continue up in level horizontal compacted layers in accordance with the fill placement requirements discussed above. Fill slopes will be constructed by overfilling and cutting back to the design slope ratio to obtain a well compacted slope face.

Upon completion of site deconstruction, removal, and restoration; a boulder barrier will be placed along the top of the slope on the west side of the project site. Boulders will be sourced from the opposite side of Mauna Kea Access Road near the project site. Boulders will be approximately 3.5 feet in diameter and spaced no more than six feet apart. The boulder barrier is intended to prevent visitors from inadvertently driving down the steep slope near the project site once the structures have been removed and the area restored to a more basic and consistent topography.

### **PROPOSED ACTION AND ALTERNATIVES CONSIDERED**

*(Alternative 3: Full Removal and Partial Restoration is the Proposed Action/Use)*

*Alternative 1: No Action.* Under the No-Action alternative, there would be no change to current conditions. Both the Observatory Building and the Generator Building would remain in place. In addition, all utilities would remain in place. There would be no site restoration.

The No-Action Alternative does not meet the Purpose and Need of the proposed project since it would not result in the decommissioning and removal of the facilities or be consistent with the University's commitment to reduce its footprint at the summit of Mauna Kea.

*Alternative 2: Infrastructure Capping and Partial Restoration.* The Infrastructure Capping and Partial Restoration Alternative would include the removal of the Observatory Building and Generator Building structures in Area A. The foundations for both buildings would be removed to a depth of approximately 12 inches below grade. All deeper foundation elements would remain in place and would be covered with native cinder materials. Direct bury utilities in Area A would remain in place, although electrical and communication cables within conduits would be removed from conduits. In Area B, Hōkū Ke'a related cables would be removed from conduits and conduits would be cut and capped. Electrical and communication cables would be removed from the conduit directly under the access road between Area A and Area B, but the conduit would remain in place.

Site restoration activities would occur in Area A but would be limited, consistent with "minimal" restoration level defined in the 2010 Decommissioning Plan. The existing graded area would remain for continued use for sunset viewing, snow play, hikers, and other summit activities. Native cinder would be used to backfill voids left after the partial removal of the foundations. Barriers would be erected to prevent off-road vehicle use and to demarcate the area. No site restoration activities would occur in Area B.

There are potential maintenance concerns with a portion of the building foundations and utility infrastructure remaining in place due to erosion associated with use by visitors for summit activities as well as wind erosion that could potentially re-expose the buried structures.

*Alternative 3: Full Removal and Partial Restoration.* This is UH Hilo and CMS' preferred alternative and proposed action. UH Hilo and CMS are committing to the following: complete removal of the Hōkū Ke'a Observatory Building and Generator Building in Area A, demolition of the observatory dome and generator building, foundation removal, removal of underground utilities, conductor removal in Area B, restoration in Area A to a basic topography consistent with the area, and the installation of a boulder barrier on the top of the slope. The preferred alternative and proposed action are aligned with the University's commitment to reduce its footprint at the summit of Mauna Kea.

*Alternative 4: Full Removal and Full Restoration.* Like Alternative 3, this alternative includes the full removal of the Observatory Building and Generator Building in Area A, including the foundations of both buildings. In addition, all utilities (including conduits) would be removed in both Area A and Area B. Electrical and communication cables would be removed from the conduit directly under the access road between Area A and Area B, but the conduit would remain in place.

Site restoration would occur in Area A to return the area to its original (i.e., preconstruction) conditions to the extent possible, consistent with "full" restoration level as defined in the 2010 Decommissioning Plan. This would include restoring the terrain and biological habitat. Foot and vehicle traffic would be prohibited on the restored area, and a physical barrier would be installed to prevent both vehicle and pedestrian access.

This alternative was not pursued due to concerns that full restoration may create wēkiu bug habitat in area of high use and in an area where they are not currently found, displace visitors into areas that may not accommodate such uses or could negatively impact existing or potential wēkiu bug habitat, complications with potentially removing utilities that serve existing observatories not slated for decommissioning, and difficulties with restoring the area back to historic/pre-development conditions.

*Alternative 5: Partial Removal and Partial Restoration.* The Partial Removal and Partial Restoration Alternative would include removal of the Observatory Building, foundation, and associated utilities (including conduits) in Area A. However, the Generator Building and associated conduits and utilities would remain in place. Future uses of the Generator Building are to be determined and would be for public purposes such as infrastructure maintenance, public safety, or community stewardship activities.

Site restoration activities would occur in Area A but would be limited, consistent with "minimal" restoration level defined in the 2010 Decommissioning Plan. The existing graded area would remain for continued use for sunset viewing, snow play, hikers, and other summit activities. Native cinder would be used to backfill voids left after removal of the observatory foundation and utility conduits. Barriers would be erected to prevent off-road vehicle use and to demarcate the area. No site restoration activities would occur in Area B.



Under Alternative 5, there are concerns about ownership, lease, and/or management of the remaining Generator Building. In addition, there may be code upgrades required to utilize the building for another use, such as a ranger station or first aid station for example.

## SUMMARY OF COMMENTS

The Office of Conservation and Coastal Lands referred the application to the following agencies and organizations for review and comment:

### State Agencies:

DLNR, Division of Conservation and Resource Enforcement  
DLNR, Engineering Division  
DLNR, Division of Forestry and Wildlife  
DLNR, Hawai'i District Land Office  
Office of Hawaiian Affairs

### County Agencies:

County of Hawai'i, Department of Planning  
County of Hawai'i, Department of Public Works  
County of Hawai'i, Fire Department  
County of Hawai'i, Public Works Department

### Federal Agencies:

U.S. Fish and Wildlife

In addition, this application was also sent to the nearest public libraries, the Kailua-Kona and Hilo libraries, to make this information readily available to those who may wish to review it. Additionally, the application was sent to the Hawai'i State Library Document Center as well as published in the [November 23, 2022](#), edition of *The Environmental Notice*.

Comments were received by the following agencies and individuals and summarized by Staff as follows:

### COUNTY OF HAWAI'I

#### COUNTY OF HAWAI'I FIRE DEPARTMENT

Comments: Buildings under construction, alteration, or demolition shall comply with Chapter 16 of the Hawai'i State Fire Code and Chapter 26 of the Hawai'i County Code.

Applicant's Response: Thank you for your interest and comments regarding the UH Hilo's Conservation District Use Application. Demolition activities associated with the proposed project will comply with Chapter 16 of the Hawai'i State Fire Code and Chapter 26 of the Hawai'i County Code.

Additionally, UH Hilo and their agents notified parties via U.S. mail or email of the DEA/AFONSI availability. Section 6.0 of the [Final EA](#) lists all notified parties.

## ANALYSIS

Following review and acceptance for processing, the Applicant was notified by correspondence dated October 21, 2022, that:

After reviewing the application, the department finds that:

1. The decommissioning plan for the Hōkū Ke'a Observatory Decommissioning project appears to be consistent with the Decommissioning Subplan of the Maunakea Comprehensive Management Plan, and will require a Conservation District Use Permit approved by the Board of Land and Natural Resources;
2. Pursuant to HAR, §13-5-40, a Public Hearing will not be required; and,
3. In conformance with Hawai'i Revised Statutes (HRS), 343, as amended, and HAR, 11-200.1, the University of Hawai'i, Hilo published the project's Final EA and a Finding of No Significant Impact (FONSI) in the June 23, 2022, periodic bulletin of *The Environmental Notice*.

## CONSERVATION CRITERIA

The following discussion evaluates the merits of the proposed land use by applying the criteria established in §13-5-30, HAR.

- 1) *The proposed use is consistent with the purpose of the Conservation District.*

The objective of the Conservation District is to conserve, protect, and preserve the important natural resources of the State through appropriate management and use to promote their long-term sustainability and the public health, safety, and welfare.

The project will remove the existing Hōkū Ke'a Observatory and associated facilities, and restore the site to a basic topography consistent with the area. This will have beneficial impacts to the Conservation District through improving the visual environment and the experience for visitors to the summit.

Appropriate management is outlined within the Mauna Kea Science Reserve (MKSR) Board approved Comprehensive Management Plan (CMP). Pursuant to the Decommissioning Plan (DP), a subplan of the CMP, the decommissioning of an astronomy facility in the Science Reserve is a multi-step process involving 1) a notice of intent, 2) an environmental due diligence review, 3) a site deconstruction and removal plan, and 4) a site restoration plan. The DP provides the observatory decommissioning framework on Mauna Kea. The applicant's DP appears to be consistent with the Decommissioning Subplan of the CMP.

- 2) *The proposed land use is consistent with the objectives of the Subzone of the land on which the use will occur.*

The project site is in the Resource Subzone. The objective of this subzone is to ensure, with proper management, the sustainable use of the natural resources of those areas. The proposed project is an identified land use within the subzone: P-8 STRUCTURES AND LAND USES, EXISTING (B-1) *Demolition, removal, or minor alteration of existing structures, facilities, land, and equipment*. While an identified land use with “B” is a site plan approval, a letter to the Office of Mauna Kea Management (now CMS) dated February 19, 2016, stated that the decommissioning of the Hōkū Ke‘a telescope would require a CDUA to be reviewed and approved, subject to conditions, by the BLNR and an EA.

UH Hilo, CMS, and their agents are now proposing to decommission the Hōkū Ke‘a Observatory and associated facilities, per the terms of its Site Decommissioning Plan (SDP). A component of its SDP is for the Board of Land and Natural Resources review and issuance of a Conservation District Use Permit (CDUP).

- 3) *The proposed land use complies with the provisions and guidelines contained in Chapter 205A, HRS entitled "Coastal Zone Management", where applicable.*

The objectives, policies, and guidelines of the Coastal Zone Management (CZM) program contained in Chapter 205A, Hawai‘i Revised Statutes (HRS), are focused on the preservation, protection, and where possible, the restoration of the natural resources of the coastal zone in Hawai‘i. The proposed land use is outside the Special Management Area (SMA) and is thus not subject to County SMA rules.

All work will be conducted entirely within the MKSR at an elevation of roughly 13,350 feet above sea level. UH Hilo and their agents will implement a series of mitigation measures, such as erosion and water quality measures, to ensure that the project’s potential adverse environmental impacts are minimized. Consistent with the CZM program, the public has had an opportunity to review the DEA prepared in support of this application and provide comments.

- 4) *The proposed land use will not cause substantial adverse impact to existing natural resources within the surrounding area, community or region.*

The proposed decommissioning is limited to the removal of existing structures and restoration of the site to its pre-construction condition, as closely as possible. The proposed project will not cause any substantial or significant adverse impacts to the site’s existing natural resources or within the surrounding area. The proposed project is expected to benefit the natural environment through returning the area to a basic topography consistent with the surrounding area and improving the visual environment.

- 5) *The proposed land use, including buildings, structures and facilities, shall be compatible with the locality and surrounding areas, appropriate to the physical conditions and capabilities of the specific parcel or parcels.*

The proposed land use does not include the development of any buildings, structures, or facilities. This project will, to the maximum extent practicable, remove Observatory Building, Generator Building, and associated telecommunications and electrical infrastructure, and restore the Hōkū Ke'a site, as closely as possible, to a basic topography consistent with the area. In doing so, the site will be restored to a natural appearance, consistent with the locality and surrounding areas, and appropriate to the physical conditions of the Mauna Kea summit region.

- 6) *The existing physical and environmental aspects of the land, such as natural beauty and open space characteristics, will be preserved or improved upon, whichever is applicable.*

The proposed project includes removing existing buildings that are located in a sensitive environment and restoring the site to a basic topography consistent with the area. The removal of existing unused buildings and restoration of the site would improve the visual character and natural beauty of the area.

- 7) *Subdivision of land will not be utilized to increase the intensity of land uses in the Conservation District.*

No subdivision of land is proposed for this project.

- 8) *The proposed land use will not be materially detrimental to the public health, safety and welfare.*

The project includes removing existing buildings and infrastructure as well as restoring the site to a basic topography consistent with the area. In addition, a boulder barrier will be installed along the top of the slope on the west side of the project area to prevent visitors from inadvertently driving down the steep slope. The project will not be materially detrimental to the public health, safety, and welfare.

#### CULTURAL IMPACT ANALYSIS:

Pacific Consulting Services, Inc. (PCSI) prepared a Cultural Impact Assessment (CIA) for the Hōkū Ke'a Observatory Decommissioning project. The Hōkū Ke'a site is located within the boundary of the Mauna Kea Summit Region Historic District (SIHP Site 26869). The Hōkū Ke'a project area is located within the Traditional Cultural Property (TCP) known as Kūkahau'ula (SIHP Site 21438).

Through archival research and a compilation of native traditions, historical accounts, and oral-historical interviews, a detailed cultural history of Mauna Kea documents a wide

range of cultural knowledge and practice associated with the mountain. A variety of cultural and religious beliefs and practices pertain to and are occurring on the mountain today. This includes traditional and customary cultural practices and beliefs as well as contemporary cultural practices and beliefs.

Modern-day oral history consultants have described their knowledge concerning cultural practices in the summit region of Mauna Kea. These include Ahu and Kūahu (burials and scattering of cremated remains), piko (umbilical cord) deposition in Lake Wai'au, and navigation and orienteering. Cultural activities are documented by the rangers in their daily observation reports, but there appears to be no estimate of the level of use of the summit by cultural practitioners. The applicant and their agent note that the three (3) most visited areas are Lake Wai'au, the Adze Quarry, and Pu'u Wēkiu.

The project site does not involve one of these three areas. The applicant and their agents note that consultation with cultural practitioners did not identify any previously unknown historic properties, traditional properties, or traditional and customary cultural practices within the Hōkū Ke'a project area.

The Hōkū Ke'a Observatory Decommissioning project involves the removal of man-made elements from the summit of Mauna Kea. This will enhance the area for cultural practitioners and open views to the summit region. During deconstruction and removal activities and site restoration, the project site and access to and near the area will be limited to construction and monitoring personnel. Access will be maintained to the remaining parts of the summit. Additionally, there will be noise associated with decommissioning and restoration activities which will occur during daylight hours.

These impacts will short-term and temporary as decommissioning and restoration activities are anticipated to be completed in five (5) months. No long-term negative impacts to cultural practices are anticipated and it is expected that the project will have a beneficial effect on Native Hawaiian practices.

## **DISCUSSION**

The project's purpose is to decommission and remove the Hōkū Ke'a Observatory Building, Generator Building, and associated telecommunications and electrical infrastructure as part of the University's commitment to reduce its footprint at the summit of Mauna Kea. The project includes full removal and partial restoration to a basic topography that is consistent with the area.

Prior to any site deconstruction activities, BMPs that will be installed, but not limited to, include a truck washdown area outside of the project site, construction fencing around the project site, silt fences or similar erosion control measures to limit or prevent runoff from the site to surrounding areas, and a construction entrance. Attachment F of the application contains a more expansive list of BMPs and measures to limit or mitigate the project's potential impacts.

Demolition of both the Observatory Building and Generator Building will include hazardous material remediation for lead-containing paint (LCP), interior electrical demolition, removal of telescope steel base, and building demolition. Debris removal will include building debris, concrete pad debris, and electrical debris.

Exterior electrical demolition will include toning, trenching, conduit removal, and capping. Conduits will be demolished from the Observatory Building to the roadway. Existing electrical equipment that powers the UH88 telescope and all other electrical infrastructure not associated with Hōkū Ke'a will remain in place will remain in place.

Site restoration will restore the site to a basic topography consistent with the area. Full restoration of the site was considered; however, not pursued due to may create wēkiu bug habitat in area of high use and in an area where they are not currently found, displace visitors into areas that may not accommodate such uses or could negatively impact existing or potential wēkiu bug habitat, complications with potentially removing utilities that serve existing observatories not slated for decommissioning, and difficulties with restoring the area back to historic/pre-development conditions.

Only minor grading consisting of cuts and fills of less than approximately one foot may be required to achieve design finish grades. Excavation and backfilling of existing foundations and utility lines of up to approximately two to three feet may be required. Fill materials will be carefully selected from stockpiles of fill materials from other areas of Mauna Kea and screened to ensure compatibility with the area.

Upon completion of site deconstruction, removal, and restoration; a boulder barrier will be placed along the top of the slope on the west side of the project site. Boulders will be sourced from the opposite side of Mauna Kea Access Road near the project site. Boulders will be approximately 3.5 feet in diameter and spaced no more than six feet apart. The boulder barrier is intended to prevent visitors from inadvertently driving down the steep slope near the project site once the structures have been removed and the area restored to a more basic and consistent topography.

Based on the information provided, staff believes that the project will have negligible adverse environmental or ecological effects provided that best management practices and mitigation measures as described in the application and environmental assessment and as required by rule or laws are fully implemented.

## **RECOMMENDATION**

Based on the preceding analysis, staff recommends that the Board of Land and Natural Resources APPROVE Conservation District Use Application HA-3906 for the Hōkū Ke'a Observatory Decommissioning Project located at Ka'ohe, Hāmākua, Hawai'i, TMK (3) 4-4-015:009 (por) subject to the following conditions:

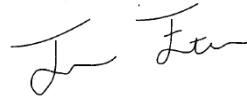
1. The permittee shall comply with all applicable statutes, ordinances, rules, and regulations of the federal, state, and county governments, and applicable parts of this chapter;
2. The permittee, its successors and assigns, shall indemnify and hold the State of Hawai'i harmless from and against any loss, liability, claim, or demand for property damage, personal injury, and death arising out of any act or omission of the applicant, its successors, assigns, officers, employees, contractors, and agents under this permit or relating to or connected with the granting of this permit;

3. The permittee shall comply with all applicable Department of Health administrative rules;
4. Unless otherwise authorized, any work or construction to be done on the land shall be initiated within one (1) year of the approval of such use, in accordance with construction plans that have been signed by the chairperson and shall be completed within three (3) years of the approval of such use. The permittee shall notify the department in writing when construction activity is initiated and when it is completed;
5. Prior to the start of construction activities, the applicant shall forward to the SHPD, for review and acceptance, the archaeological monitoring plan (AMP);
6. All representations relative to mitigation and Best Management Practices set forth in the accepted application and environmental assessment or impact statement for the proposed use are incorporated as conditions of the permit;
7. The permittee shall plan to minimize the amount of dust generating materials and activities. Material transfer points and on-site vehicular traffic routes shall be centralized. Dusty equipment shall be located in areas of least impact. Dust control measures shall be provided during weekends, after hours and prior to daily start-up of project activities. Dust from debris being hauled away from the project site shall be controlled;
8. The permittee shall notify the Office of Conservation and Coastal Lands (OCCL) in writing prior to the initiation and upon completion of the project;
9. Should historic remains such as artifacts, burials or concentration of charcoal be encountered during construction activities, work shall cease immediately in the vicinity of the find, and the find shall be protected from further damage. The contractor shall immediately contact SHPD (808-692-8015), which will assess the significance of the find and recommend an appropriate mitigation measure, if necessary;
10. The permittee shall utilize Best Management Practices for the proposed project;
11. The permittee understands and agrees that the permit does not convey any vested right(s) or exclusive privilege;
12. In issuing the permit, the department and board have relied on the information and data that the permittee has provided in connection with the permit application. If, subsequent to the issuance of the permit such information and data prove to be false, incomplete, or inaccurate, this permit may be modified, suspended, or revoked, in whole or in part, and the department may, in addition, institute appropriate legal proceedings;

13. Where any interference, nuisance, or harm may be caused, or hazard established by the use, the permittee shall be required to take measures to minimize or eliminate the interference, nuisance, harm, or hazard;
14. Obstruction of public roads, trails, and pathways shall be avoided or minimized. If obstruction is unavoidable, the permittee shall provide alternative roads, trails, or pathways acceptable to the department;
15. During construction, appropriate mitigation measures shall be implemented to minimize impacts to off-site roadways, utilities, and public facilities;
16. The permittee shall obtain a county building or grading permit or both for the use prior to final construction plan approval by the department;
17. Artificial light from exterior lighting fixtures, including but not limited to floodlights, uplights, or spotlights used for decorative or aesthetic purposes, shall be prohibited if the light directly illuminates or is directed to project across property boundaries toward the shoreline and ocean waters, except as may be permitted pursuant to section 205A-71, HRS. All exterior lighting shall be shielded to protect the night sky;
18. The permittee shall avoid nighttime construction during the seabird fledging period of September 15 through December 15;
19. The permittee shall not use barbed wire for fencing;
20. The permittee shall ensure that all project vehicles, machinery, and equipment shall be cleaned, inspected by its user, and found free of mud, dirt, debris, and invasive species;
21. The permittee acknowledges that the approved work shall not hamper, impede, or otherwise limit the exercise of traditional, customary, or religious practices of native Hawaiians in the immediate area, to the extent the practices are provided for by the Constitution of the State of Hawai'i, and by Hawai'i statutory and case law;
22. Other terms and conditions as may be prescribed by the Chairperson; and
23. Failure to comply with any of these conditions shall render this Conservation District Use Permit void under Chapter 13-5, as determined by the chairperson or board.



Respectfully submitted,



Trevor Fitzpatrick, Staff Planner  
Office of Conservation and Coastal Lands



Approved for submittal:



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DAWN N. S. CHANG, Chairperson  
Board of Land and Natural Resources

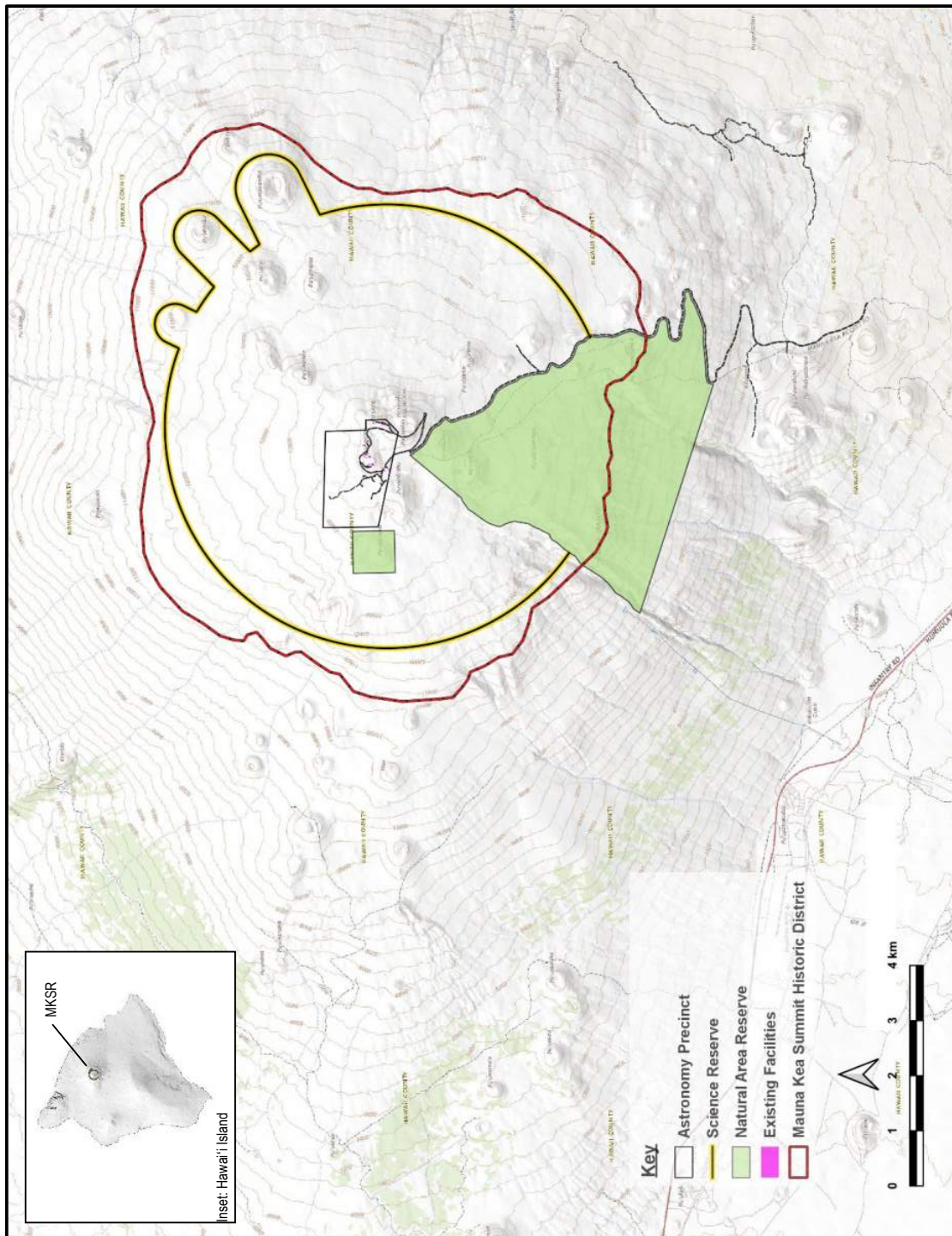


Figure 1. Mauna Kea Science Reserve Shown on the USGS 1:250,000 Topographic Sheet (1975).

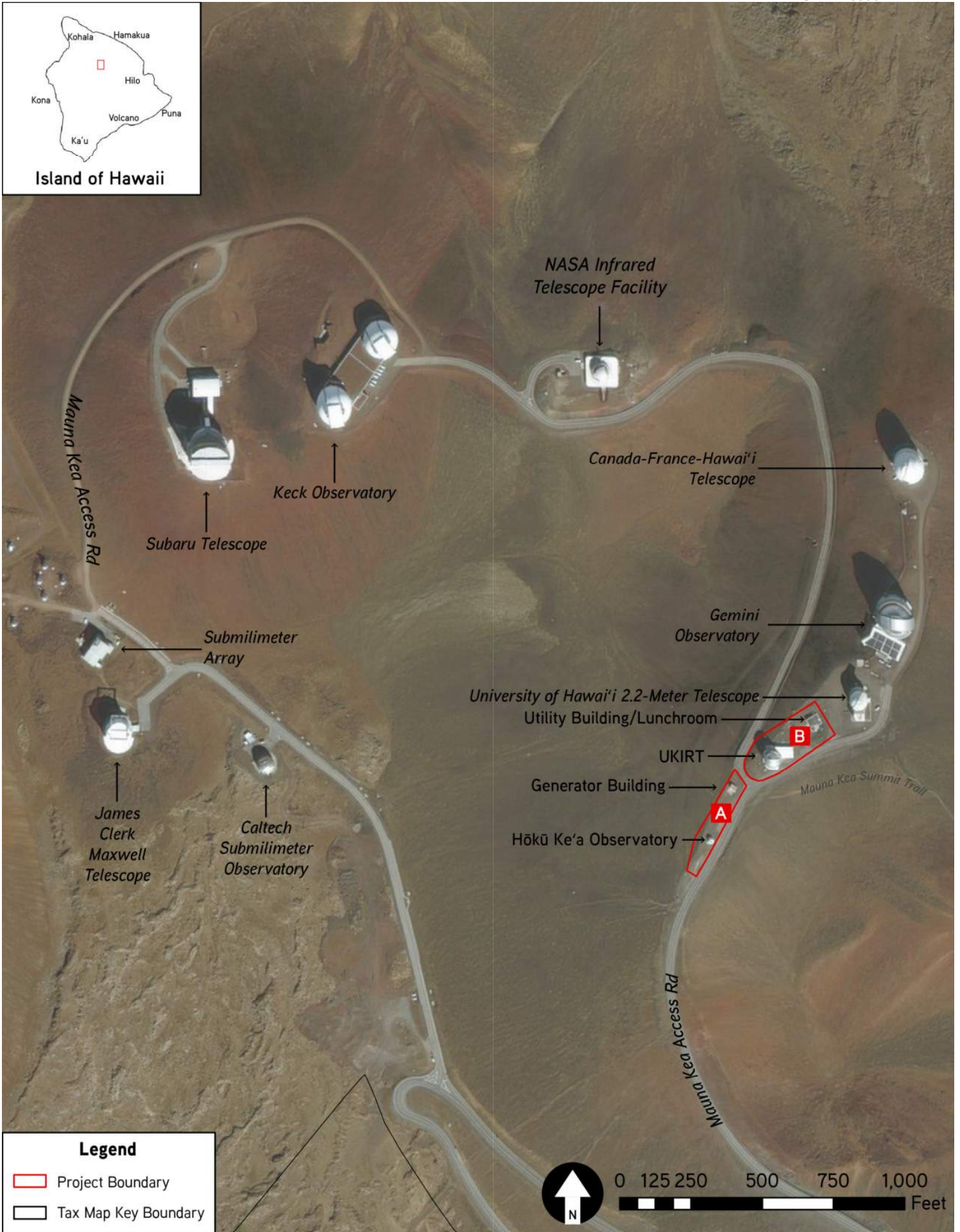
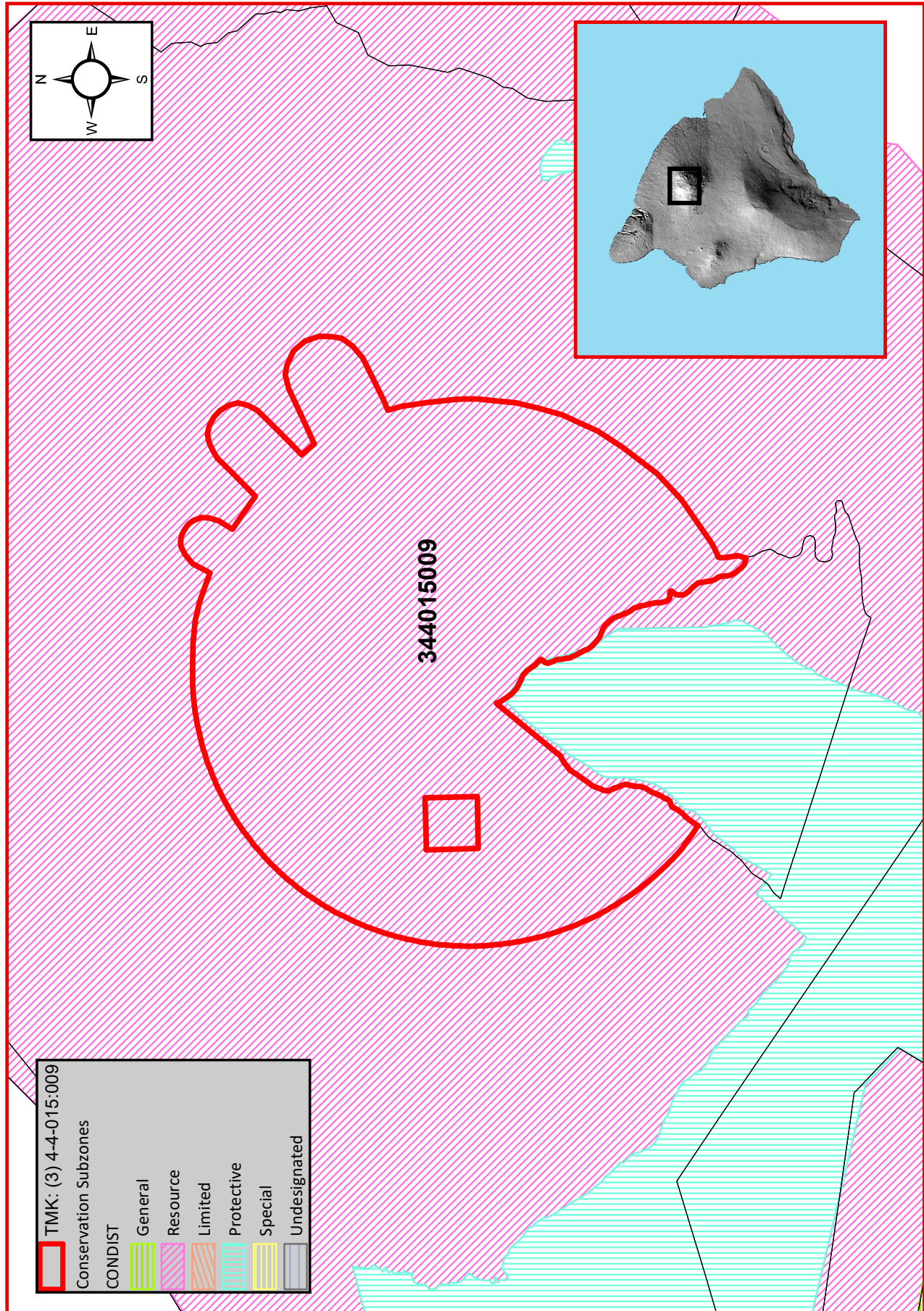
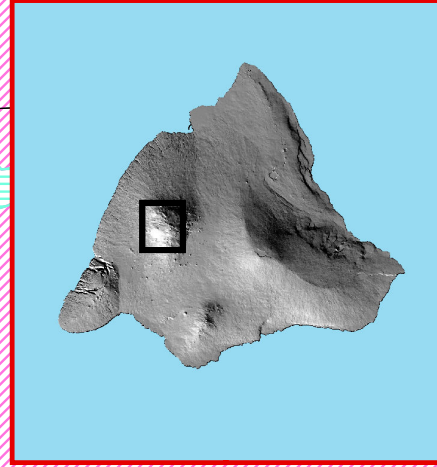
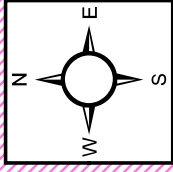


Exhibit 1



0 2,500 5,000 10,000 Feet



Date: 3/21/2023

All boundaries are approximate

Produced by Trevor Fitzpatrick @ OCCL

**Exhibit 2**

K-1

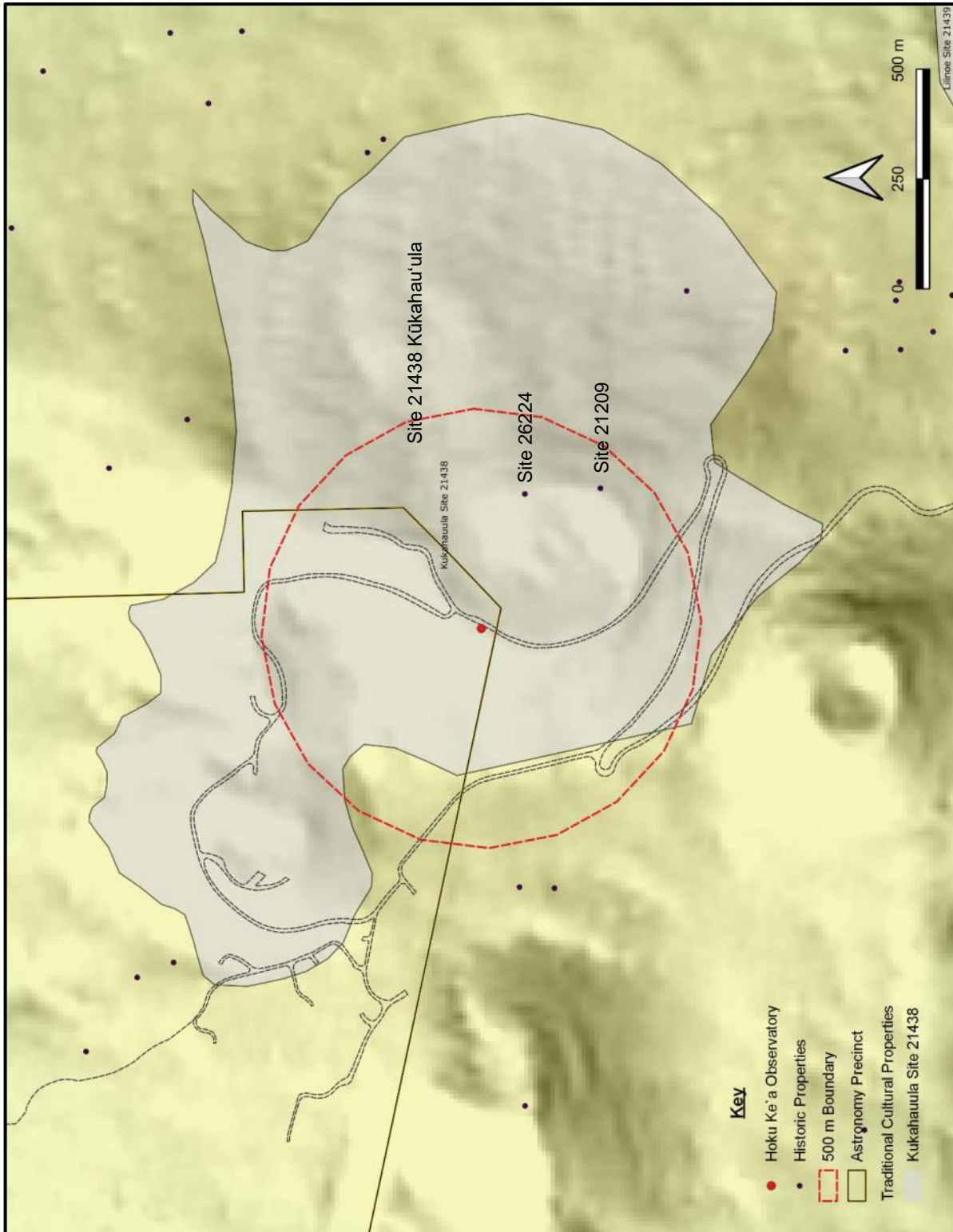


Figure 10. Mauna Kea Summit Region Showing Traditional Cultural Properties and Historic Properties in Relation to the Hōkū Ke'a Observatory, the Astronomy Precinct, and a 500 meter Buffer around Hōkū Ke'a.

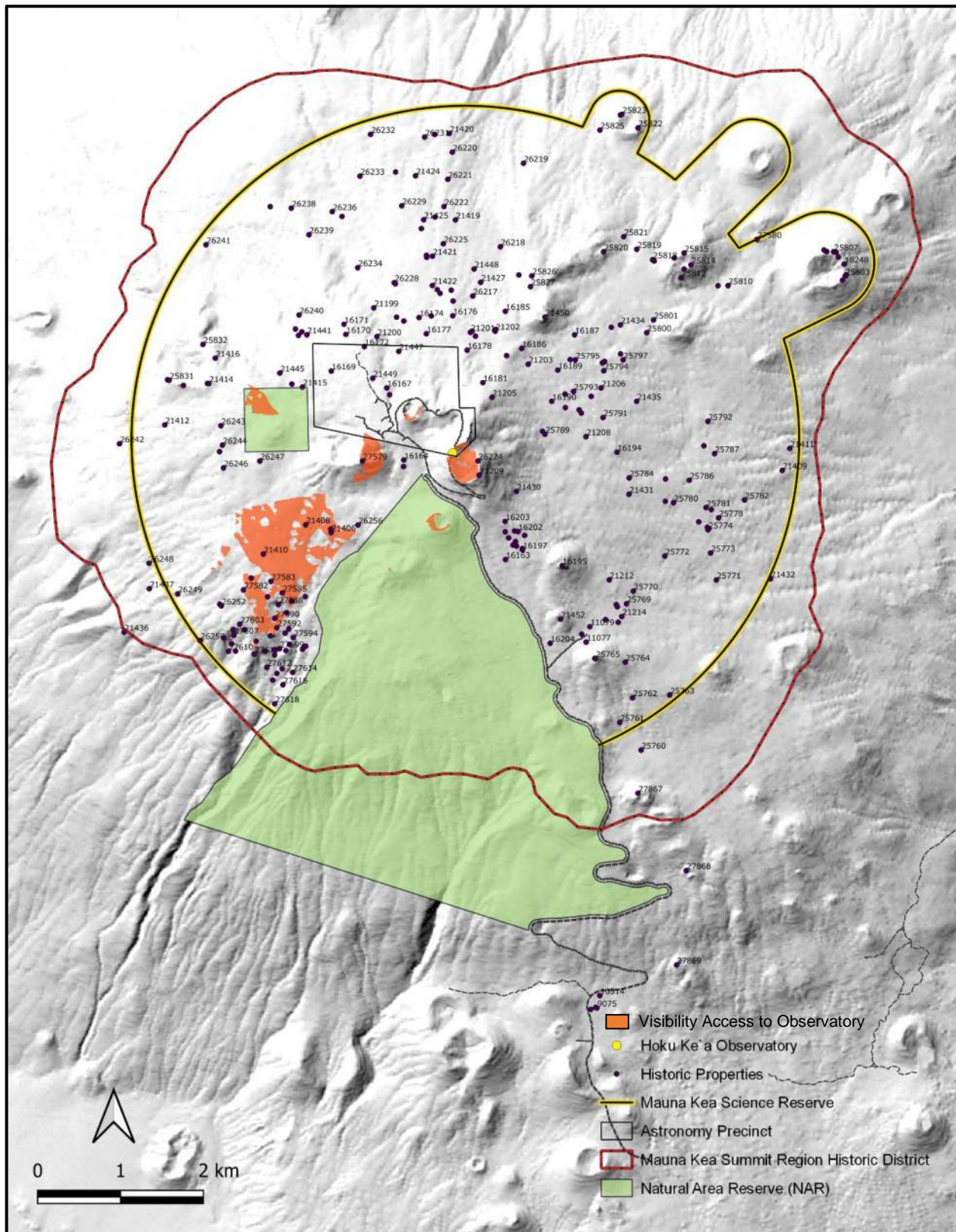


Figure 11. Visibility Analysis of Hōkū Ke'a Observatory from Historic Properties in the MKSR.



JOSH GREEN, M.D.  
GOVERNOR | KE KIA'AINA  
  
SYLVIA LUKE  
LIEUTENANT GOVERNOR | KA HOPE KIA'AINA



STATE OF HAWAII | KA MOKU'ĀINA 'O HAWAII  
DEPARTMENT OF LAND AND NATURAL RESOURCES

STATE HISTORIC PRESERVATION DIVISION  
KAKUHIHEWA BUILDING  
601 KAMOKILA BLVD, STE 555  
KAPOLEI, HAWAII 96707

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AND COASTAL LANDS  
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DAWN N. S. CHANG  
CHAIRPERSON  
BOARD OF LAND AND NATURAL RESOURCES  
COMMISSION ON WATER RESOURCE  
MANAGEMENT

FIRST DEPUTY  
M. KALEO MANUEL  
DEPUTY DIRECTOR - WATER  
  
AQUATIC RESOURCES  
BOATING AND OCEAN RECREATION  
BUREAU OF CONVEYANCES  
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HISTORIC PRESERVATION  
KAHOOLAWE ISLAND RESERVE COMMISSION  
LAND  
STATE PARKS

January 25, 2023

Greg Chun, Executive Director  
Center for Maunakea Stewardship  
University of Hawai'i  
640 A'ohōkū Place  
Hilo, Hawaii 96720  
Email: [gchun711@hawaii.edu](mailto:gchun711@hawaii.edu)

IN REPLY REFER TO:  
Project No. 2021PR00168  
Doc. No. 2301SN09  
Archaeology, Architecture

Dear Mr. Chun:

SUBJECT: **Chapter 6E-8 State Historic Preservation Review  
Hoku Kea Observatory Decommissioning Project  
Archaeological Monitoring Plan  
Ka'ohe Ahupua'a, Hāmākua District, Island of Hawai'i  
TMK: (3) 4-4-015:009 por.**

This letter provides the State Historic Preservation Division's (SHPD's) review of a draft plan titled, *Archaeological Monitoring Plan in Support of the Hōkū Ke'a Decommissioning Project, Ka'ohe Mauka Ahupua'a, Hāmākua District, Island of Hawai'i, TMKs: (3) 4-4-015:009 (por.)* (Gosser 2022). The draft plan is submitted by the Center for Maunakea Stewardship (CMS), University of Hawai'i in support of the proposed decommissioning and removal of the Hōkū Ke'a Observatory, generator buildings and foundations.

In a letter dated July 28, 2022 (Project No.2022PR00168, Doc. No. 2207SN02), SHPD requested archaeological monitoring for identification purposes during the initial ground disturbance and subsequent deconstruction, removal and restoration of the project area to decommission the Hōkū Kea Observatory. SHPD did not concur with the CMS' HRS §6E project effect determination of "no historic properties affected" and requested an archaeological monitoring plan (AMP) based on the presence of historic properties located in the vicinity of the proposed project areas. The SHPD received the draft AMP on December 19, 2022. The Hōkū Ke'a Observatory decommissioning project includes the full removal of the Observatory Building, the Generator Building, and the associated telecommunication and electrical infrastructure in Area A. It also includes the additional infrastructure associated with two buildings in Area B. However, the United Kingdom Infrared Telescope (UKIRT) observatory and a utility building/lunchroom in Area B are not a part of the current project. Additionally, UH Hilo indicates the scope includes partial (not full) restoration of the area. The submittal indicates that the deconstruction, removal, and restoration activities will be conducted pursuant to a Site Decommissioning Plan (SDP) which includes a Site Deconstruction and Removal Plan (SDRP) and a Site Restoration Plan (SRP).

#### Project Description

The scope of work for the proposed project consists of the following:

#### Site Deconstruction:

- Installation of best management practices (BMPs)
- Observatory and Generator Building demolition and debris removal
- Electric conduit and conductor removal
- Utility room electrical demolition and debris removal

Greg Chun  
January 25, 2023  
Page 2

Site Restoration:

- Minor grading to restore the site to a basic topography consistent with the area
- Cuts and fills of less than one foot in some areas and up to two to three feet where existing foundations and utility lines are located

The previous submittal included a supporting archaeological document prepared as part of the due diligence identification of historic properties and assessment of the potential for the project to adversely affected significant historic properties either directly or indirectly. The literature review and field inspection and architectural evaluation was prepared by Pacific Consulting Services, Inc. (PCSI 2021). The PCSI (2021) report indicated that 264 historic properties have been identified within the MKSR. No historic properties are located within the current project area. Four sites have been identified within 500 meters of the proposed project area and include the following:

- Site 50-10-23-26224 – USGS marker located on the summit of Kukahau‘ula
- Site 50-10-23-21209 – Possible burial
- Site 50-10-23-21438 – Kukahau‘ula (the summit) designated as a Traditional Cultural Property (TCP) and is comprised of three pu‘u.
- Site 50-10-23-26869 – Mauna Kea Summit Region Historic District

The Observatory and Generator buildings were constructed in 1968 and are historic properties as defined in §6E-2, HRS. The submittal indicates that these buildings are not being evaluated for eligibility for the Hawaii State Register of Historic Places based on the lack of integrity and sufficient significance due to modifications to these buildings over the years.

**Findings**

A review of our records indicates that this project area has been included in several archaeological investigations. The Hōkū Kea Observatory site is within the Maunakea Summit Region Historic District (SIHP 50-10-23-26869) and near several previously identified historic properties including Kūkahau‘ula Summit (SIHP 50-10-23-21438). The submittal indicates that the following mitigation measures will be implemented as required by the Comprehensive Management Plan (CMP) and the Cultural Resources Management Plan (CRMP) to minimize any potential impacts to historic properties:

- All persons involved with construction activities will be required to attend a mandatory training about the cultural and historical resources on Mauna Kea.
- A qualified archaeologist will monitor all ground disturbance activities
- The archaeological monitor will have the authority to cease construction activity in the event that any historic properties are encountered.
- Pursuant to Chapter 6E, if historic properties are encountered, all work shall cease and CMS will be notified and SHPD and Kahu Kū Mauna will be consulted.
- Appropriate mitigation will be developed in consultation with SHPD if the find is considered significant.

The previous submittal indicated that the procedures detailed in the SHPD-approved Long-Term Historic Property Monitoring Plan (Gosser et al., 2014) would be followed, however, SHPD determined that the Gosser et al. (2014) plan does not meet the needs for the current project.

In accordance with HAR §13-279-4, the current AMP provides a scope of work, a summary of the archaeological investigations in the area, a summary of historic land use, and stipulates the following:

- A coordination meeting will be conducted between the construction team and monitoring archaeologist prior to construction activities so the construction team is aware of the monitoring provisions in the plan;
- On-site monitoring will be conducted for all ground disturbing activities. One monitor is required for each piece of ground altering machinery during this project;
- Demolition conducted above ground that does not require excavation below the depth of the existing feature (i.e., pavement) will be subject to spot check monitoring;
- The archaeological monitor has the authority to temporarily halt all activity in the area in the event of a potential historic property being identified, or to record archaeological information for cultural deposits or features;
- If non-burial historic properties are identified, documentation shall include, as appropriate, recording



Greg Chun  
January 25, 2023  
Page 3

stratigraphy using USDA soil descriptions, GPS point collection, recordation of feature contents through excavation or sampling of features, screening of features, representative scaled profile drawings, photo documentation using a scale and north arrow, and appropriate laboratory analysis of collected samples and artifacts. Additionally, photographs and profiles of excavations will be collected from across the project area even if no significant historic properties are encountered.

- If human remains are identified, work will cease in the vicinity and the find shall be secured, and provisions outlined within the Hawaii Revised Statutes (HRS) §6E-43 and HAR §13-300-40, and any SHPD directives, shall be followed;
- Collected materials not associated with burials will be temporarily stored at the archaeological firm's office/laboratory until an appropriate curation facility is selected, in consultation with the landowner and the SHPD; and
- Any changes in these provisions shall occur only with written approval from the SHPD.

The plan meets the minimum requirements of HAR §13-279-4. **The plan is accepted.** Please send one hard copy of the document, clearly marked FINAL, and a copy of this letter to the Kapolei SHPD office, attention SHPD Library. Send a second hard copy and a copy of this letter to the Hilo SHPD office, attention Sean Nāleimaile. Lastly, please send a text-searchable PDF copy of the final AMP to HICRIS Project No. 2022PR00168 using the Project Supplement option and a PDF copy to [Lehua.K.Souares@hawaii.gov](mailto:Lehua.K.Souares@hawaii.gov).

**SHPD hereby notifies the CMS** that the project initiation process may continue.

**SHPD requests** written notification via email and HICRIS at the start of archaeological monitoring. Following completion of archaeological monitoring, SHPD looks forward to receiving for review and acceptance an archaeological monitoring report meeting the requirements of HAR §13-279-5 within 60 days following the completion of the fieldwork. **Please submit** the draft archaeological monitoring report (AMR) and accompanying submittal review fee to our office via HICRIS to Project 2022PR00168 using the Project Supplement option.

Please contact Sean Nāleimaile at (808) 933-7651 or at [sean.p.naleimaile@hawaii.gov](mailto:sean.p.naleimaile@hawaii.gov) for any questions or concerns regarding this letter.

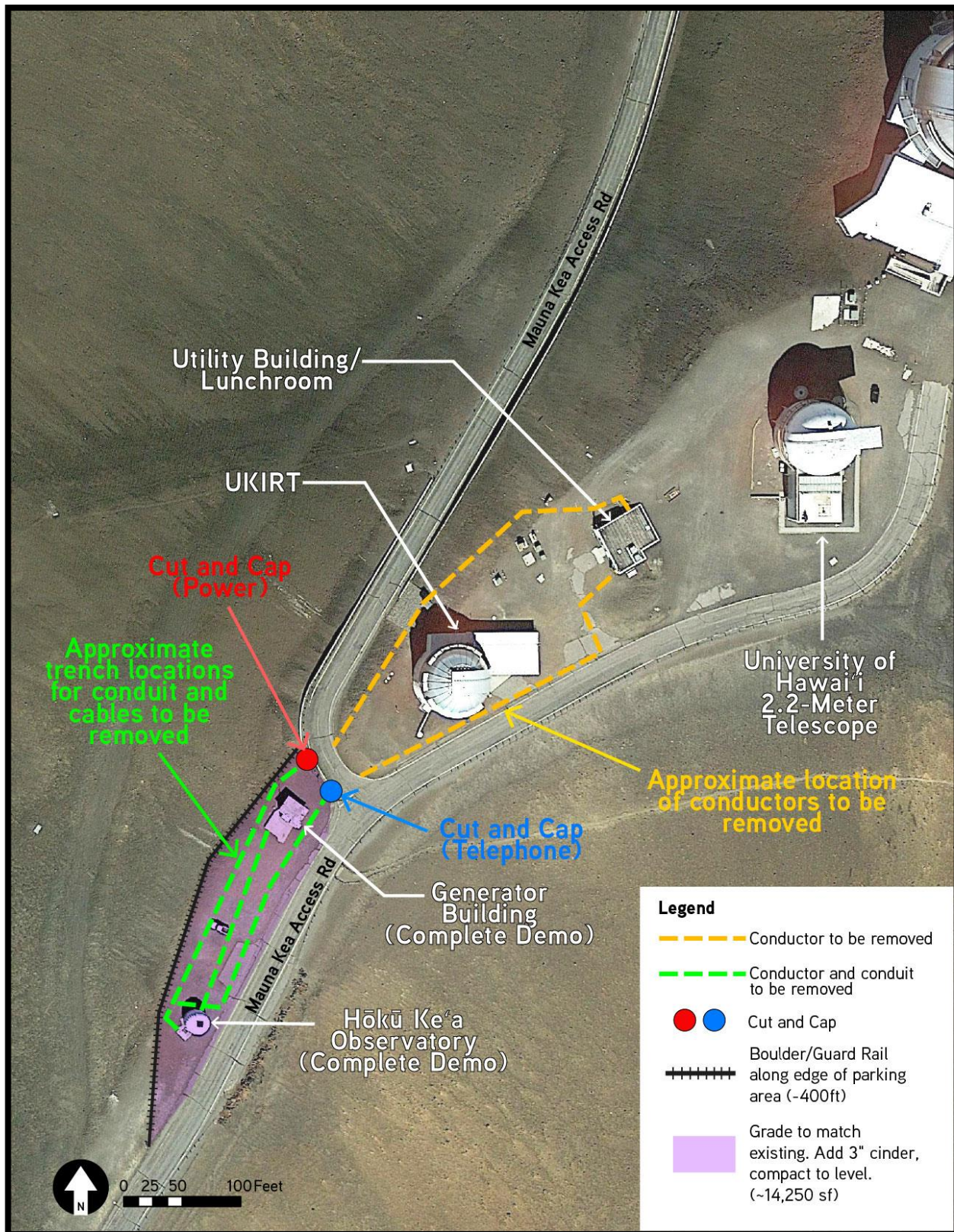
Aloha,  
*Alan Downer*

Alan S. Downer, PhD  
Administrator, State Historic Preservation Division  
Deputy State Historic Preservation Officer

cc. Jennifer Scheffel, [jmsheffel@gmail.com](mailto:jmsheffel@gmail.com)



Figure 4. Proposed Action





## Site Photos



*Hōkū Keʻa Observatory Building*

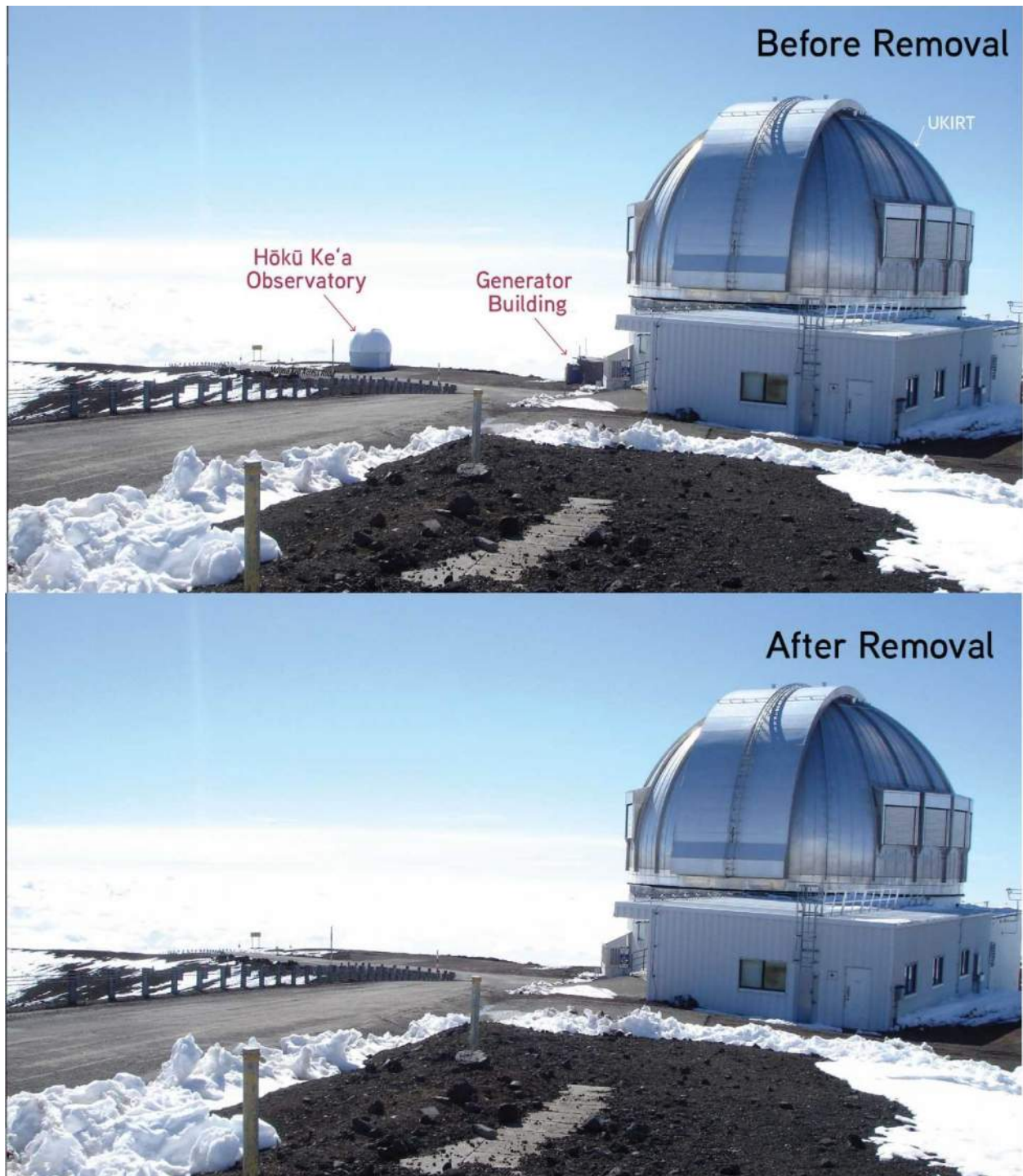


*Generator Building*



*Utility Room/Lunchroom*





*Before and After Simulation*



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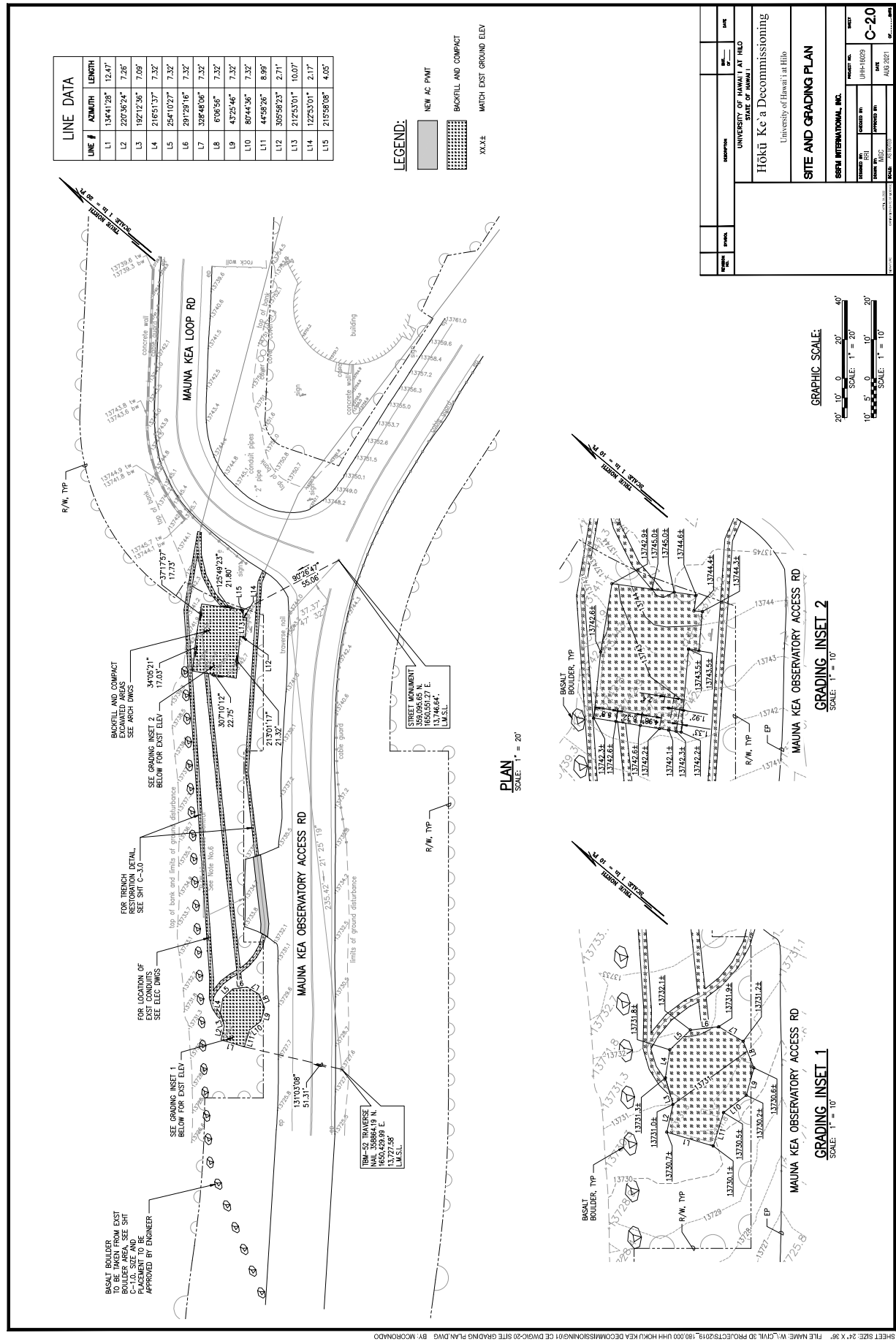
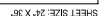


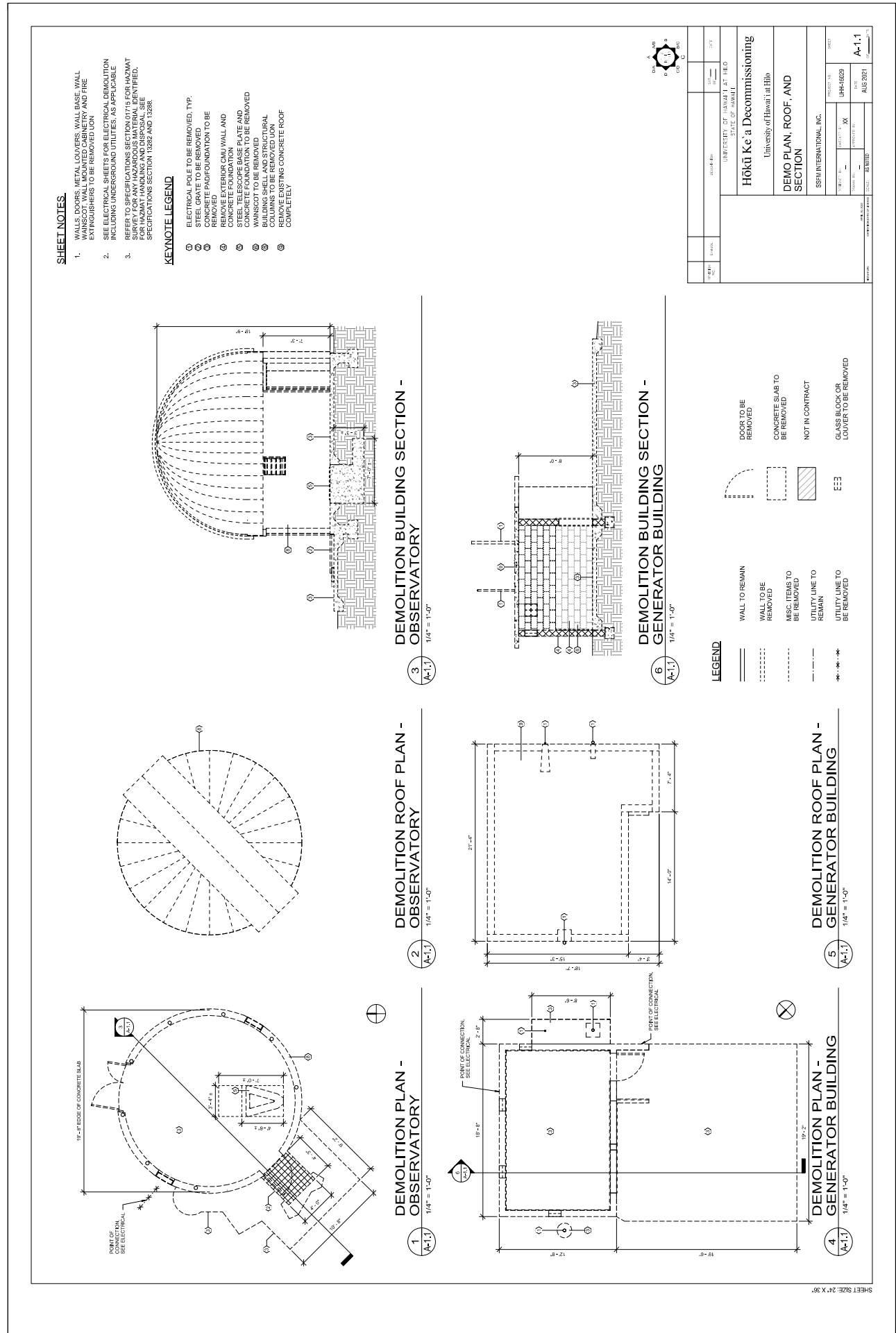
Exhibit 6





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## Best Management Practices and Other Measures to Minimize Impacts

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### GENERAL

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The following general BMPs would be implemented to minimize impacts during project activities:

- All construction shall conform to the 2018 International Building Code and the latest State of Hawai'i amendments and ordinances.
- All work shall be confined to the designated area of work. Any damage caused by the contractor shall be repaired by the contractor.
- All items that are to remain in place shall be protected during the construction period.
- All work shall be in compliance with the requirements of the latest *Mauna Kea Comprehensive Management Plan* and other construction-related plans.
- All employees will receive training on site conditions (including potential contamination sources), permit requirements, and required BMPs.
- Premises shall be kept free from accumulation of waste materials, construction debris, and rubbish.
- Waste materials, construction debris and rubbish shall be disposed of lawfully and in accordance with the Construction Waste Management Plan.
- If the contractor shall perform work causing unique noise, odors, or other disturbances outside of regular business hours, such work shall be scheduled with Maunakea Observatories Support Services (MKSS).
- A monitor would be on-site during site restoration to monitor fill placement and compaction.

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### DUST CONTROL

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All construction activities would comply with the provisions of HAR Chapter 11-60.1, Air Pollution Control, and HAR Chapter 11.60.1-33, Fugitive Dust. A dust control plan would be developed and implemented to minimize fugitive dust during construction, to be approved by the DOH. Measures to control fugitive dust during construction may include, but not be limited to, the following:

- Planning the different phases of construction, focusing on minimizing the amount of airborne, visible fugitive dust-generating materials and activities, centralizing on-site vehicular traffic routes, and locating potential dust-generating equipment in areas of the least impact.
- Providing an adequate water source at the site prior to start-up of construction activities.
- Minimizing airborne, visible fugitive dust from shoulders and access roads.
- Providing reasonable dust control measures during weekends, after hours, and prior to daily start-up of construction activities.
- Controlling airborne, visible fugitive dust from debris being hauled away from the project site.

Additionally, contractors would be required to maintain equipment with emissions controls.

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### INVASIVE SPECIES

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The following BMPs detailed in the *Maunakea Invasive Species Management Plan* (Vanderwoude, et.al, 2015) will be implemented to minimize the spread of invasive species:

- All vehicles shall be externally cleaned at least monthly and the interior maintained in a clean condition at all times prior to arrival at the Saddle Road and Maunakea Access Road junction. (SOP #1)
- All vehicles with three or more axles and heavy equipment shall be thoroughly cleaned prior to arrival at the Saddle Road and Maunakea Access Road junction and inspected by a DLNR-approved biologist. (SOP #1)
- Aggregate and fill materials shall be inspected by a DLNR-approved biologist for plant, animal, and earthen materials. Both the load and the site where aggregate and fill materials were extracted or stored shall be inspected. (SOP #2)

The following applicable measures detailed in the USFWS's Biosecurity Protocol – Hawaii Island (July 2018) would be implemented to minimize the introduction of invasive species:

- All work vehicles, machinery, and equipment would be cleaned, inspected by its user, and found free of mud, dirt, debris, and invasive species prior to entry to the Mauna Kea Forest Reserve.
  - Vehicles, machinery, and equipment must be thoroughly pressure washed in a designated cleaning area and visibly free of mud, dirt, plant debris, insects, frogs (including frog eggs), and other vertebrate species such as rats, mice, and non-vegetative 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 (truck beds with accumulated material (intentionally placed or fallen from trees) are prime sites for hitchhikers).
  - 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 shall be sanitized with a solution of >70% isopropyl alcohol or a freshly mixed 10% bleach solution.
  - Any machinery, vehicles, equipment, or other supplies found to be infested with ants (or other invasive species) must not enter natural areas or native habitat. Treatment is the responsibility of the equipment or vehicle owner and operator.
- Base yards and staging areas inside and outside areas must be kept free of invasive species.
  - Base yards and staging areas should be inspected at least weekly for invasive species and any found invasive removed immediately. Pay particular attention to where vehicles are parked overnight, keeping areas within 10-meters of vehicles free of debris.
  - 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.
- Contractors shall visually inspect and clean clothes, boots, pack, radio harness, tools and other personal gear and equipment, for seeds, soil, plant parts, insects, and other debris prior to going to the project site and prior to leaving the project site. A small brush is handy for cleaning boots, equipment, and gear. Soles of shoes should be sanitized using a solution of >70% isopropyl alcohol or a freshly mixed 10% bleach solution.

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## CULTURAL, ARCHAEOLOGICAL, AND HISTORIC RESOURCES

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The following measures will be implemented, as required by the CMP and the CRMP, to minimize potential impacts to archaeological and historic resources:

- Access would be maintained to the summit region during decommissioning and restoration activities.
- All persons involved with the deconstruction and restoration activities would be educated about the historical and cultural significance of the Maunakea summit area and shall be given training as to what constitutes respectful and sensitive behavior while on the summit area.
- A Cultural Monitoring Plan would be developed and reviewed by KKM and approved by the CMS Director prior to implementation of the Proposed Action. A cultural monitor will be present during all deconstruction and restoration activities.
- An independent qualified archaeologist would be retained by the contractor to monitor all ground disturbing activities for historic features such as artifact concentrations of shell or charcoal.
  - The archaeological monitor would have the authority to order that any or all construction activity cease in the event any historic properties or human remains are encountered.
  - Per HRS Chapter 6E, if the contractor encounters possible or suspected historical features, all work would immediately be suspended and CMS would be notified, who in turn would notify SHPD.
  - In addition, Kahu Kū Mauna Council would be consulted.
  - If the feature is deemed significant, an appropriate mitigation plan (which may include recovery) would be developed jointly by SHPD and UH Hilo.
- A Rock Movement Plan, developed by the contractor and approved by CMS, would be included in the construction BMPs.
- The procedures detailed in the SHPD-approved Long-term Historic Property Monitoring Plan for the University of Hawai'i Management Areas on Mauna Kea would be followed (Gosser et al., 2014).
- In the unlikely event that any human remains or any burial goods over fifty years old are uncovered at any time after construction commences, the procedures set out in HRS Chapter 6E-43.6 and HAR 13-300-40 would be followed.
  - This includes immediately suspending all work in the area and notifying CMS, who in turn would notify SHPD.
  - Work shall not commence until a treatment and disposition plan has been developed by SHPD in consultation with the Hawai'i Island Burial Council, Office of Hawaiian Affairs, OMKM, and any recognized descendants.

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## SITE RESTORATION

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The following BMPs will be implemented to minimize impacts during site restoration activities:

- A geologist will be on site to monitor earthwork operations and observe whether undesirable materials are encountered during the excavation and scarification process and confirm whether the exposed subsurface conditions are similar to those described above.
- A geologist will observe and/or test imported fill materials prior to being transported to the site for the intended use.
- Any grading would be in conformance with the Hawai'i County Grading Ordinance.
- All construction would conform to the 2018 International Building Code and the latest State of Hawai'i amendments and ordinances.

- All work would be confined to the designated area of work. Any damage caused by the contractor would be repaired by the contractor.
- All work would comply with the requirements of the latest Mauna Kea Comprehensive Management Plan and other construction-related plans.

---

## **TRAFFIC AND TRANSPORTATION**

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The following measures will be implemented to minimize traffic and transportation related impacts:

- Equipment and materials would be transported to and from the project site during non-peak hours.
- All construction vehicles would be maintained in proper operating condition and loads would be properly secured to prevent dust, debris, leakage, or other adverse conditions from affecting public roadways.
- The majority of project personnel (e.g., equipment operators, laborers, and electricians) would be transported to the project site via van from either Halepōhaku or other central location.

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## **WATER RESOURCES**

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The following measures would be implemented to minimize potential impacts to water resources:

- Construction plans and specifications would include BMPs to minimize erosion on the project site during and after construction, as well as measures to contain runoff on-site during construction.
- Temporary erosion control measures would be used during construction to prevent soil loss and to minimize surface runoff into downslope intermittent streams and Lake Waiau.