

Appendix K. Archaeological Inventory Survey Report

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September 18, 2025

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IN REPLY REFER TO:
Project No.: 2023PR01321
Doc. No.: 2509AG08
Archaeology

Dear Kate Blystone:

**SUBJECT: Hawaii Revised Statutes (HRS) Chapter 6E-42 Historic Preservation Review
County of Maui Permit Application RFC2024-00075
AES Kuihelani Solar Phase 2 Project
Archaeological Inventory Survey
Waikapū Ahupua'a, Wailuku District (Pū'ali Komohana Moku), Island of Maui
TMK: (2) 3-8-005:002 por.**

This letter provides the State Historic Preservation Division's (SHPD's) review of the draft archaeological inventory survey (AIS) report titled *Draft Archaeological Inventory Survey Report for the AES Kuihelani Solar Phase 2 Project, Waikapū Ahupua'a, Wailuku District (Pū'ali Komohana Moku), Maui Island, TMK: [2] 3-8-005:002 por.* (Yucha et al., September 2025) in support of County of Maui permit application RFC2024-00075. Cultural Surveys Hawai'i, Inc (CSH) submitted an AIS testing strategy on January 11, 2024 (HICRIS Submission No. 2023PR01321.002) and SHPD agreed with the proposed AIS testing strategy on the same day, via HICRIS notification. SHPD received the initial draft AIS (Yucha et al., December 2024) on December 16, 2024 (HICRIS Submission No. 2023PR01321.009). In a letter dated August 21, 2025 (Project No. 2023PR01321, Doc. No. 2508AG02), SHPD requested revisions to the AIS. Our office received the revised AIS (Yucha et al., September 2025) for review and acceptance on September 4, 2025 (HICRIS Submission No. 2023PR01321.011).

AES Clean Energy Development, LLC (AES) proposes to develop a 40-megawatt (MW) active component (AC) photovoltaic (PV) and 160 megawatt-hour (MWh) battery energy storage system south of the existing AES Kuihelani Solar Plus Storage facility. The proposed project is anticipated to occupy less than half of the 729.6-acre project study area, which is privately owned by MP West LLC.

CSH conducted the AIS fieldwork between January 22 and April 29, 2024. CSH's AIS fieldwork included pedestrian survey of the project area, twelve ground penetrating radar (GPR) transects, observation of geotechnical boring and test excavations, and the excavation of 230 backhoe test trenches.

The AIS report identified four significant historic properties within the project study area, State Inventory of Historic Places (SIHP) Sites 50-50-04-08805 (subsurface cultural deposit complex), 50-50-04-09164 (ditch remnant), 50-50-04-09165 (artifact scatter), and 50-50-04-09166 (ditch or flume remnant). In accordance with HAR §13-13-284-6, the four historic properties were evaluated as significant under HAR §13-284-6 Criterion "d" for having yielded, or are likely to yield, information important for research on prehistory or history.

Kate Blystone
September 18, 2025
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CSH recommended mitigation for potential project impacts to SIHP Site 50-50-04-09165 (artifact scatter) and 50-50-04-08805 Feature C (subsurface deposit) in the form of archaeological monitoring (Table 1). SIHP Sites 50-50-04-08805 (Features A-B, and D), 50-50-04-09164, and 50-50-04-09166 are outside of the proposed project footprint and, thus CSH recommended no further work for the sites and features.

Based on the information provided, SHPD's project effect determination is "**Effect, with agreed upon mitigation commitments**" for the current project pursuant to HAR §13-284-7(a)(2). As stipulated in HAR §13-284-7, when SHPD comments that a project will result in "Effect, with agreed upon mitigation commitments", then detailed mitigation plans shall be developed for SHPD review and acceptance prior to project initiation. SHPD agrees with the recommended mitigation for SIHP Sites 50-50-04-09165 and 50-50-04-08805 pursuant to HAR §13-284-8(a)(1)(C). Additionally, SHPD requests on-site archaeological monitoring for excavations that extend more than 4.0 feet (1.2 meters) below the current ground surface and weekly on-site spot monitoring during all other ground disturbing activities associated with the project.

Please make the following minor revisions to the FINAL AIS:

1. Global. Revise site integrity and significance text and table sections to include assessment of each historic property for listing in the Hawaii Register of Historic Places as required by the recently revised HRS §6E definition of historic property.
2. Pg. 195, SIHP 50-50-04-08805 table, please update the function, which currently lists type (subsurface cultural deposit).
3. Appendix B, please include depths for all artifacts identified below the ground the surface.
4. Volumes II and III, where applicable, please update all temporary site numbers with SIHP numbers (e.g., Vol. III, pg. 175).

The AIS report (Yucha et al., September 2025) meets the minimum requirements of HAR §13-276-5. **It is accepted.** Please send one hard copy of the Final AIS, clearly marked FINAL, along with a text-searchable copy of the AIS report and a copy of this acceptance letter, to the Kapolei SHPD office, attention SHPD Library, and a second hard copy to the Maui SHPD office, attention April Greenberg. Additionally, submit a text-searchable PDF copy to HICRIS Project No. 2023PR01321 in response to the request, and a PDF copy to: SHPD.Archaeology.Library@hawaii.gov.

SHPD looks forward to receiving for review and acceptance an archaeological monitoring plan (AMP) meeting the requirements of HAR §13-279-4. When completed, please submit the AMP and associated filing review fees to HICRIS Project No. 2023PR01321 in response to our HICRIS request.

SHPD shall notify the County of Maui when the AMP has been reviewed and accepted, and the project initiation may continue.

Please contact April Greenberg, Maui Lead Archaeologist, at April.Greenberg@hawaii.gov or Susan A. Lebo, Archaeology Branch Chief, at Susan.A.Lebo@hawaii.gov, for any questions regarding archaeological resources or this letter.

Aloha,



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Table 1. SIHP Sites and Historic Preservation Recommendations.

SIHP No. 50-50-04	Feature(s)	Probable Age	Formal Type	Inferred Function	Significance Evaluation	Historic Preservation Recommendation
-08805	A to D (only C and D are in project area)	Historic	Complex (subsurface deposits)	Commercial Agriculture	d	Archaeological monitoring
-09164	--	Historic	Ditch remnant	Water control	d	No further work
-09165	--	Historic	Artifact scatter	Habitation	d	Archaeological monitoring
-09166	--	Historic	Ditch or flume foundation remnant	Water control	d	No further work

**Final
Archaeological Inventory Survey Report
for the AES Kuihelani Solar Phase 2 Project,
Waikapū Ahupua‘a, Wailuku District (Pū‘ali Komohana
Moku), Maui Island,
TMK: [2] 3-8-005:002 por.**

Volume I of III

**Prepared for
Kuihelani Solar Phase 2, LLC
and
County of Maui, Department of Planning**

**Prepared by
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September 2025

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Management Summary

Reference	Archaeological Inventory Survey Report for the AES Kuihelani Solar Phase 2 Project, Waikapū Ahupua‘a, Wailuku District (Pū‘ali Komohana Moku), Maui Island, TMK: [2] 3-8-005:002 por. (Yucha et al. 2024)
Date	September 2025
Project Number	Cultural Surveys Hawai‘i, Inc. (CSH) Job Code: WAIKAPU 54 Hawai‘i Cultural Resource Information System (HICRIS): 2023PR01321
Investigation Permit Number	CSH completed the fieldwork component of this study under archaeological fieldwork permit number 24-30, issued by the Hawai‘i State Historic Preservation Division (SHPD) per Hawai‘i Administrative Rules (HAR) §13-282.
Agencies	SHPD, County of Maui Department of Planning
Land Jurisdiction	Private; MP West LLC (Fee Owner)
Project Funding	Private; Kuihelani Solar Phase 2, LLC, a subsidiary of AES Clean Energy Development, LLC (AES)
Project Location	The study area for this archaeological inventory survey (AIS) is located on former sugarcane agricultural fields in the center of the isthmus of Maui, generally between Kuihelani Highway (Route 380) to the northwest, North Kīhei Road to the south and southwest, and Waikapū Stream and Maui Veterans Highway (Route 311) to the east. Access to the study area is provided by existing agricultural roads. The project, once constructed, is expected to occupy less than 50 percent of the AIS study area. The AIS study area is depicted on portions of the 2017 Puu o Kali, 2017 Maalaea, 2017 Paia, and 2017 Wailuku U.S. Geological Survey (USGS) topographic quadrangles.
Project Description	AES is proposing to develop a 40-megawatt (MW) AC PV and 160 MW-hour battery energy storage system within a portion of the AIS study area in TMK: [2] 3-8-005:002. The proposed study area extends south from the footprint of an existing solar plus storage energy project that was recently constructed (AES Kuihelani Solar Plus Storage). Access to the project site will be provided by existing agricultural roads.
Project Acreage	The AIS study area is 729.6 acres (295.3 hectares).
Historic Preservation Regulatory Context	The proposed development constitutes a project requiring compliance with and review under State of Hawai‘i historic preservation review legislation per Hawai‘i Revised Statutes (HRS) §6E-42 and HAR §13-284.

	<p>In April 2023, CSH completed an archaeological literature review and field inspection (LRFI) of a 1,380-acre (558-hecture) study area, inclusive of the AIS study area (Yucha et al. 2023). The LRFI included a reconnaissance-level pedestrian inspection that identified one previously documented historic property (SIHP # 50-50-04-01508; Spreckels/Waihe'e Ditch) and four potential historic properties related to historic agricultural land use. The LRFI was submitted to HICRIS on 3 November 2023 in order to assist the SHPD in their initial HRS 6E-42 project review.</p> <p>In November 2023, CSH submitted a proposed AIS fieldwork strategy to HICRIS for preliminary review by the SHPD. The SHPD agreed with the AIS fieldwork strategy on 11 January 2024 via HICRIS comment, allowing the AIS fieldwork to proceed. However, the SHPD clarified that the draft AIS report will only be accepted by the SHPD after submittal of appropriate permit applications for the project and an opportunity to review the construction designs. The accepted AIS fieldwork strategy included the completion of a 100 percent coverage pedestrian inspection, documentation of surface historic properties, archaeological observation of geotechnical testing, 12 ground penetrating radar transects, 230 test excavations placed within a systematic gridded pattern, and documentation of subsurface historic properties.</p> <p>This AIS investigation fulfills the requirements of HAR §13-276 and was conducted to identify, document, and assess the significance of any historic properties as outlined in the project's AIS fieldwork strategy agreed upon by the SHPD. This document is intended to support the proposed project's historic preservation review under HRS §6E-42 and HAR §13-284. It is also intended to support any project-related historic preservation consultation with stakeholders, such as state and county agencies and interested Native Hawaiian Organizations (NHOs) and community groups.</p>
<p>Fieldwork Effort</p>	<p>Fieldwork was accomplished between 22 January and 29 April 2024 by CSH archaeologists Jonas Madeus, B.A., Elwyn Leibold, B.A., Trevor Yucha, B.S., Allyson Ueki, M.A., and James C. Lansche, M.A., under the general supervision of principal investigators Josephine Yucha, M.S., and Hallett H. Hammatt, Ph.D. This work required approximately 203 person-days to complete.</p>
<p>Historic Properties Identified and Historic Property Significance</p>	<p>SIHP # 50-50-04-08805, a subsurface cultural deposit complex, was previously assessed by Yucha et al. (2021) as significant pursuant to HAR §13-284-6, Criterion "d" (have yielded, or is likely to yield, information important for research on prehistory or history). The additional findings of SIHP # -08805 Feature C and Feature D during the current AIS support this assessment. The historic property retains the integrity of location, setting, materials, and workmanship, and has</p>

	<p>provided information important to research on historic land use, soil treatment, and refuse disposal within the study area. The historic property is evaluated as eligible for listing in the Hawai'i Register of Historic Places (HRHP).</p> <p>SIHP # 50-50-04-09164 is a remnant water control structure that is assessed as significant pursuant to HAR §13-284-6, Criterion “d” (have yielded, or is likely to yield, information important for research on prehistory or history). The historic property retains the integrity of location, setting, design, materials, and workmanship, and has provided information important to research on historic land use and water control strategies of the study area. The historic property is evaluated as eligible for listing in the HRHP.</p> <p>SIHP # 50-50-04-09165 is an artifact scatter representing the remnants of Camp Seven that is assessed as significant pursuant to HAR §13-284-6, Criterion “d” (have yielded, or is likely to yield, information important for research on prehistory or history). The historic property retains the integrity of location, setting, materials, feeling, and association, and has provided information important to research on historic land use of the study area as well as domestic households among plantation camps. The historic property is evaluated as eligible for listing in the HRHP.</p> <p>SIHP # 50-50-04-09166 is a remnant water control structure that is assessed as significant pursuant to HAR §13-284-6, Criterion “d” (have yielded, or is likely to yield, information important for research on prehistory or history). The historic property retains the integrity of location, design, setting, materials, and workmanship, and has provided information important to research on historic land use and water control strategies of the study area. The historic property is evaluated as eligible for listing in the HRHP.</p>
<p>Effect Recommendation</p>	<p>A total of four significant historic properties have been identified within the AIS study area. The project has the potential to affect one or more significant historic properties within the study area. In accordance with HAR §13-284-7, the effect recommendation for this project is “effect, with agreed upon mitigation commitments.”</p> <p>It is anticipated that SIHP # -09165 and -08805, Feature C, will be impacted by grading and installation of project components, while SIHP # -08805, Feature D, is expected to be avoided. Additionally, SIHP # -09164 and -09166 are located outside of the footprint of project-related ground disturbance and will be avoided.</p>
<p>Mitigation Recommendations</p>	<p>As described in HAR §13-284-8, “If a project will have an “effect” (impact) on significant historic properties, then a mitigation commitment proposing the form of mitigation to be undertaken for</p>

each significant historic property shall be submitted by the agency to the SHPD for review and approval.” Mitigation recommendations are included in this AIS for the review and approval of the SHPD.

Archaeological Monitoring

As described in HAR §13-279-3, “archaeological monitoring may be an identification, mitigation, or post-mitigation contingency measure. Monitoring shall entail the archaeological observation of, and possible intervention with, on-going activities which may adversely affect historic properties.”

It is recommended that an archaeological monitoring program be developed to minimally include the following objectives:

- On-site archaeological monitoring for all project-related ground disturbance within the SIHP # 50-50-04-08805 historic property boundary (TE-73 and TE-171 locations). On-site archaeological monitoring will provide an opportunity to gather additional information important for research on the history of this subsurface cultural deposit.
- On-site archaeological monitoring for all project-related ground disturbance within the SIHP # 50-50-04-09165 historic property boundary. On-site archaeological monitoring will provide an opportunity to gather additional information important for research on the history of Camp Seven.
- On-site archaeological monitoring for open excavations that extend more than 4.0 ft (1.2 m) below the current ground surface. On-site archaeological monitoring of deep, open excavations that extend beneath the agricultural plow zone will be conducted for identification purposes to ensure that any additional subsurface features or potential historic properties are promptly identified and mitigated. Project-related open excavations that are anticipated to extend more than 4.0 ft (1.2 m) below the current ground surface are anticipated to include trenching for some of the subsurface conduit and excavation or grading for the installation of concrete battery pads or structures.
- On-call archaeological monitoring for shallow excavations that are less than 4.0 ft (1.2 m) below the current ground surface as well as the mechanical installation of the single-axis tracker posts that are driven into the ground without excavation or exposure of sediment. An archaeologist will remain on-call and available to conduct archaeological monitoring in the event of significant findings.

	<p>Archaeological monitoring shall be undertaken in accordance with an archaeological monitoring plan that shall be reviewed and accepted by the SHPD prior to the monitoring project in accordance with HAR §13-279-4.</p> <p><u>No Further Work</u></p> <p>No further mitigation is recommended for SIHP # 50-50-04-09164, and SIHP # 50-50-04-09166. These two historic properties have been assessed as significant for their information content pursuant to HAR §13-284-6, Criterion “d” and their potential to yield information important for research on history has been achieved with the documentation provided in this AIS report.</p>
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Section 1 Introduction

1.1 Project Background

At the request of Kuihelani Solar Phase 2, LLC, a subsidiary of AES Clean Energy Development, LLC (AES), and on behalf of the County of Maui Department of Planning, Cultural Surveys Hawai‘i, Inc. (CSH) has prepared this archaeological inventory survey (AIS) report for the AES Kuihelani Solar Phase 2 Project located within Waikapū Ahupua‘a, Wailuku District (Pū‘ali Komohana Moku), Maui, TMK: [2] 3-8-005:002 por. The study area for this archaeological inventory survey (AIS) is located on former sugarcane agricultural fields in the center of the isthmus of Maui, generally between Kuihelani Highway (Route 380) to the northwest, North Kīhei Road to the south and southwest, and Waikapū Stream and Maui Veterans Highway (Route 311) to the east. Access to the study area is provided by existing agricultural roads. The study area is depicted on portions of the 2017 Puu o Kali, 2017 Maalaea, 2017 Paia, and 2017 Wailuku U.S. Geological Survey (USGS) 7.5-minute topographic quadrangles (Figure 1), a tax map plat (Figure 2), and a 2020 aerial image (Figure 3).

The AIS study area, which is privately owned by MP West LLC, is 729.6 acres (295.3 hectares). The project, once constructed, is expected to occupy less than 50 percent of the AIS study area (Figure 4). AES is proposing to develop a 40-megawatt (MW) AC PV and 160 MW-hour battery energy storage system within a portion of the AIS study area in TMK: [2] 3-8-005:002. The proposed study area extends south from the footprint of an existing solar plus storage energy project that was recently constructed (AES Kuihelani Solar Plus Storage). Access to the project site will be provided by existing agricultural roads.

1.2 Historic Preservation Regulatory Context

The proposed development constitutes a project requiring compliance with and review under State of Hawai‘i historic preservation review legislation per Hawai‘i Revised Statutes (HRS) §6E-42 and Hawai‘i Administrative Rules (HAR) §13-284.

In April 2023, CSH completed an archaeological literature review and field inspection (LRFI) of a 1,380-acre (558-hectare) study area, inclusive of the AIS study area (Yucha et al. 2023). The LRFI included a reconnaissance-level pedestrian inspection that identified one previously documented historic property (State Inventory of Historic Places [SIHP] # 50-50-04-01508; Spreckels/Waihe‘e Ditch) and four potential historic properties related to historic agricultural land use. The LRFI was submitted to the Hawai‘i Cultural Resource Information System (HICRIS) on 3 November 2023 in order to assist the Hawai‘i State Historic Preservation Division (SHPD) in their initial HRS §6E-42 project review.

In November 2023, CSH submitted a proposed AIS fieldwork strategy to HICRIS for preliminary review by the SHPD. The SHPD agreed with the AIS fieldwork strategy on 11 January 2024 via HICRIS comment, allowing the AIS fieldwork to proceed. However, the SHPD clarified that the draft AIS report will only be accepted by the SHPD after submittal of appropriate permit applications for the project and an opportunity to review the construction designs. The accepted AIS fieldwork strategy included the completion of a 100 percent coverage pedestrian inspection, documentation of surface historic properties, archaeological observation of geotechnical testing,

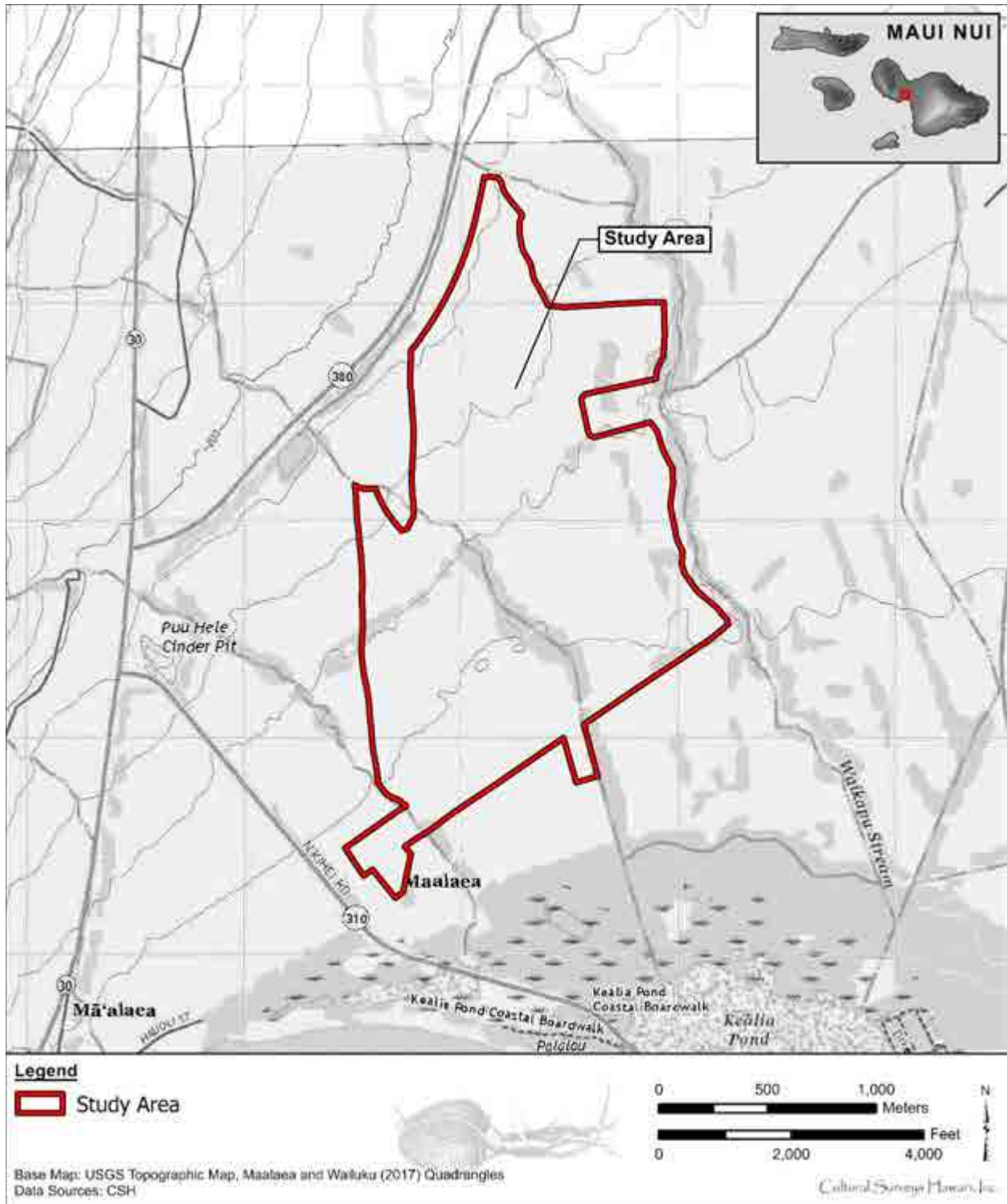


Figure 1. Portions of the 2017 Puu o Kali, 2017 Maalaea, 2017 Paia, and 2017 Wailuku USGS 7.5-minute topographic quadrangles showing the location of the AIS study area (U.S. Geological Survey 2017a, 2017b, 2017c, 2017d)

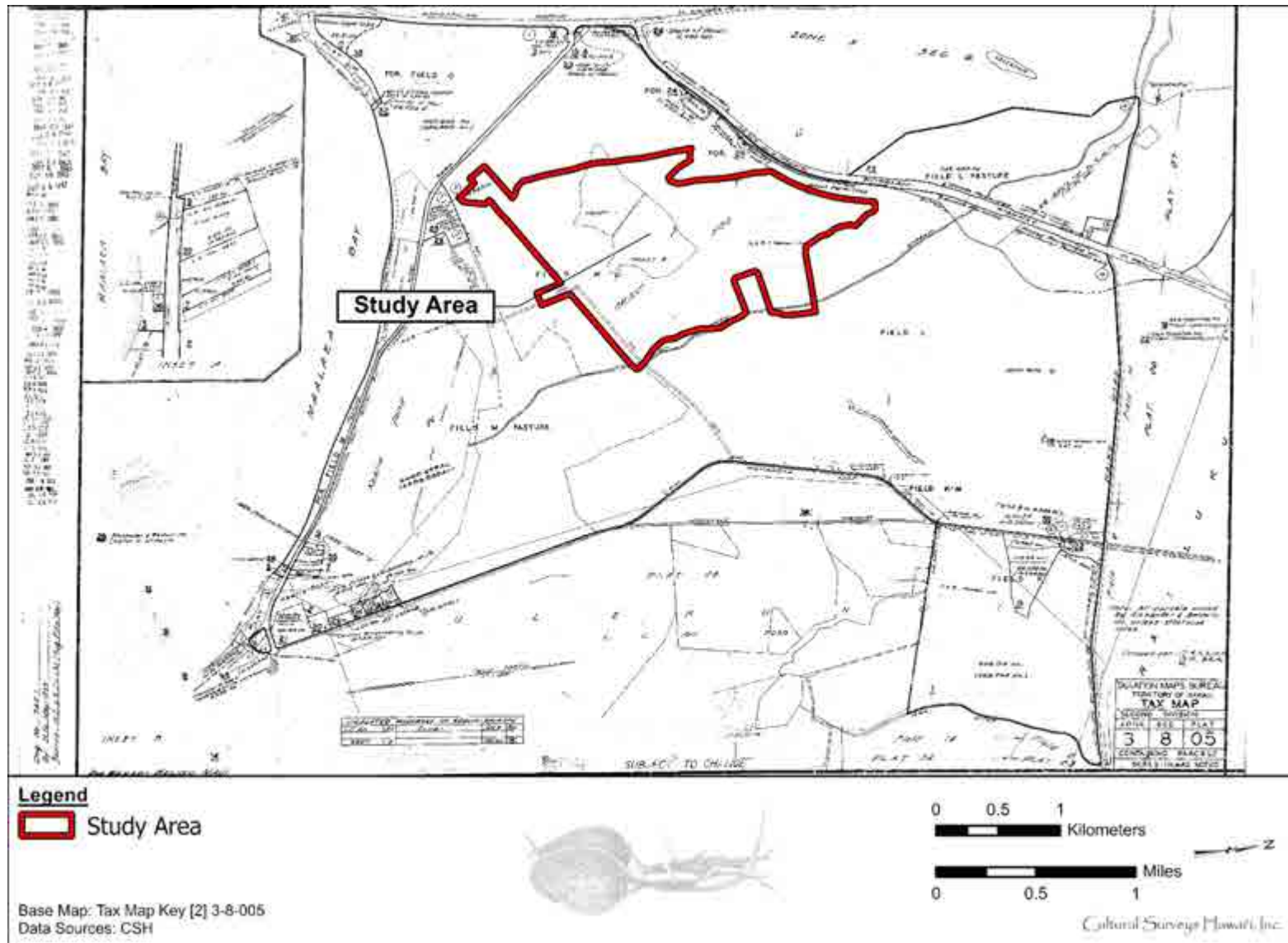


Figure 2. Tax Map Key (TMK) [2] 3-8-005 showing the AIS study area (Hawaii TMK Service 2014)

AIS for the AES Kauhelaui Solar Phase 2 Project, Waikapu, Wailuku, Maui

TMK: [2] 3-8-005:002 por.



Figure 3. Aerial image showing the location of the AIS study area (Esri 2023)

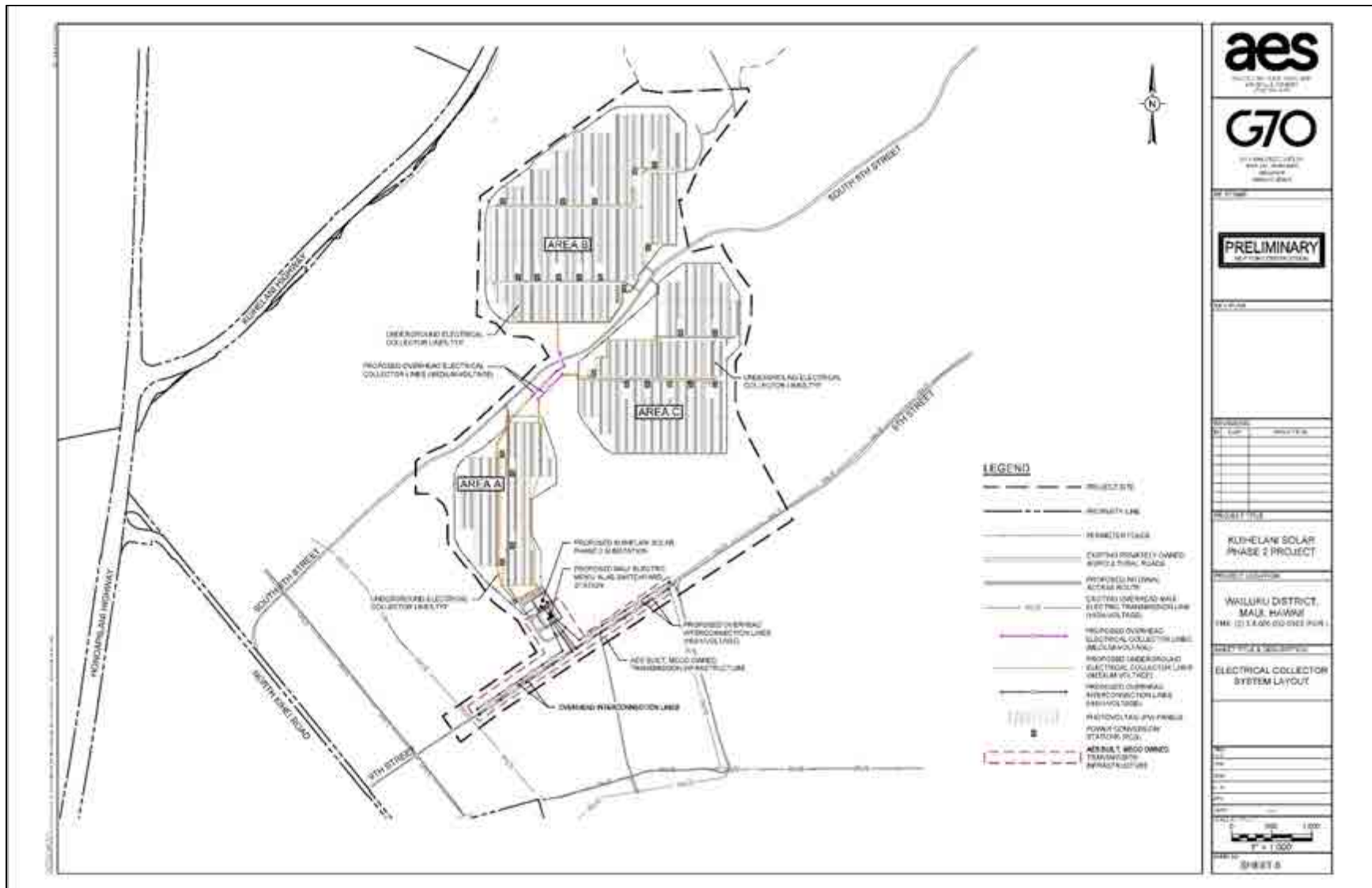


Figure 4. Client-provided site plan depicting the footprint of project-related ground disturbance within the study area

12 ground penetrating radar transects, 230 test excavations placed within a systematic gridded pattern, and documentation of subsurface historic properties (Appendix A).

This AIS investigation fulfills the requirements of HAR §13-276 and was conducted to identify, document, and assess the significance of any historic properties as outlined in the project's AIS fieldwork strategy agreed upon by the SHPD. This document is intended to support the proposed project's historic preservation review under HRS §6E-42 and HAR §13-284. It is also intended to support any project-related historic preservation consultation with stakeholders, such as state and county agencies and interested Native Hawaiian Organizations (NHOs) and community groups

1.3 Environmental Setting

1.3.1 Natural Environment

The study area is located at the center of the isthmus of Central Maui on relatively level ground located approximately 0.52 km (0.32 miles) from the Mā'alaea Harbor to the south and approximately 6.82 km (4.24 miles) from Kahului Harbor to the north. The study area is surrounded by portions of Pohakea Gulch northeast of North Kīhei Road, the Waihe'e Canal near Kuihelani Highway, and Waikapū Stream along its eastern boundary. It is directly north of Keālia Pond along the leeward shore of Maui. The elevation of land within the study area ranges from approximately 14.7 m (48.2 ft) above mean sea level (AMSL) at the southern end near Mā'alaea Harbor to 53.9 m (177 ft) AMSL at the northern end near Kuihelani Highway. The study area is presently within undeveloped former agricultural lands that were utilized for sugarcane cultivation until very recently and now heavily vegetated with grasses, shrubs, and some trees such as cane grass (*Pennisetum purpureum*) and other unidentified grasses, *kiawe* (*Prosopis pallida*), and *koa haole* (*Leucaena leucocephala*).

In 2014, the average annual air temperature for the study area was between 21.5°C (67.2°F) in February and 25.5°C (74.4°F) in August (Giambelluca et al. 2014). The land in the vicinity of the study area received a mean annual rainfall of 394.8 mm (15.5 inches) between 1978 and 2007, according to the University of Hawai'i 2011 *Rainfall Atlas of Hawaii* (Giambelluca et al. 2013).

According to the U.S. Department of Agriculture (USDA) (2001) Soil Survey Geographic (SSURGO) database and soil survey data gathered by Foote et al. (1972), the majority of soils within the study area consist of Jaucas sand, 0 to 15 percent slopes (JaC), Pulehu cobbly clay loam, 3 to 7 percent slopes (PtB), Pulehu cobbly silt loam, 0 to 3 percent slopes (PrA), Pulehu cobbly silt loam, 3 to 7 percent slopes (PrB), and Pulehu silt loam, 3 to 7 percent slopes (PpB) (Figure 5). Also represented are inclusions of Ewa silty clay, 0 to 3 percent slopes (EsA), Ewa silty clay loam, 0 to 3 percent slopes (EaA), Pulehu cobbly clay loam, 0 to 3 percent slopes (PtA), Pulehu clay loam, 0 to 3 percent slopes (PsA), Pulehu silt loam, 0 to 3 percent slopes (PpA), and Puuone sand, 7 to 30 percent slopes (PZUE).

Ewa series soils are described as follows:

This series consists of well-drained soils in basins and on alluvial fans on the island of Maui and Oahu. These soils developed in alluvium derived from basic igneous rock. They are nearly level to moderately sloping. Elevations range from near sea level to 150 feet...

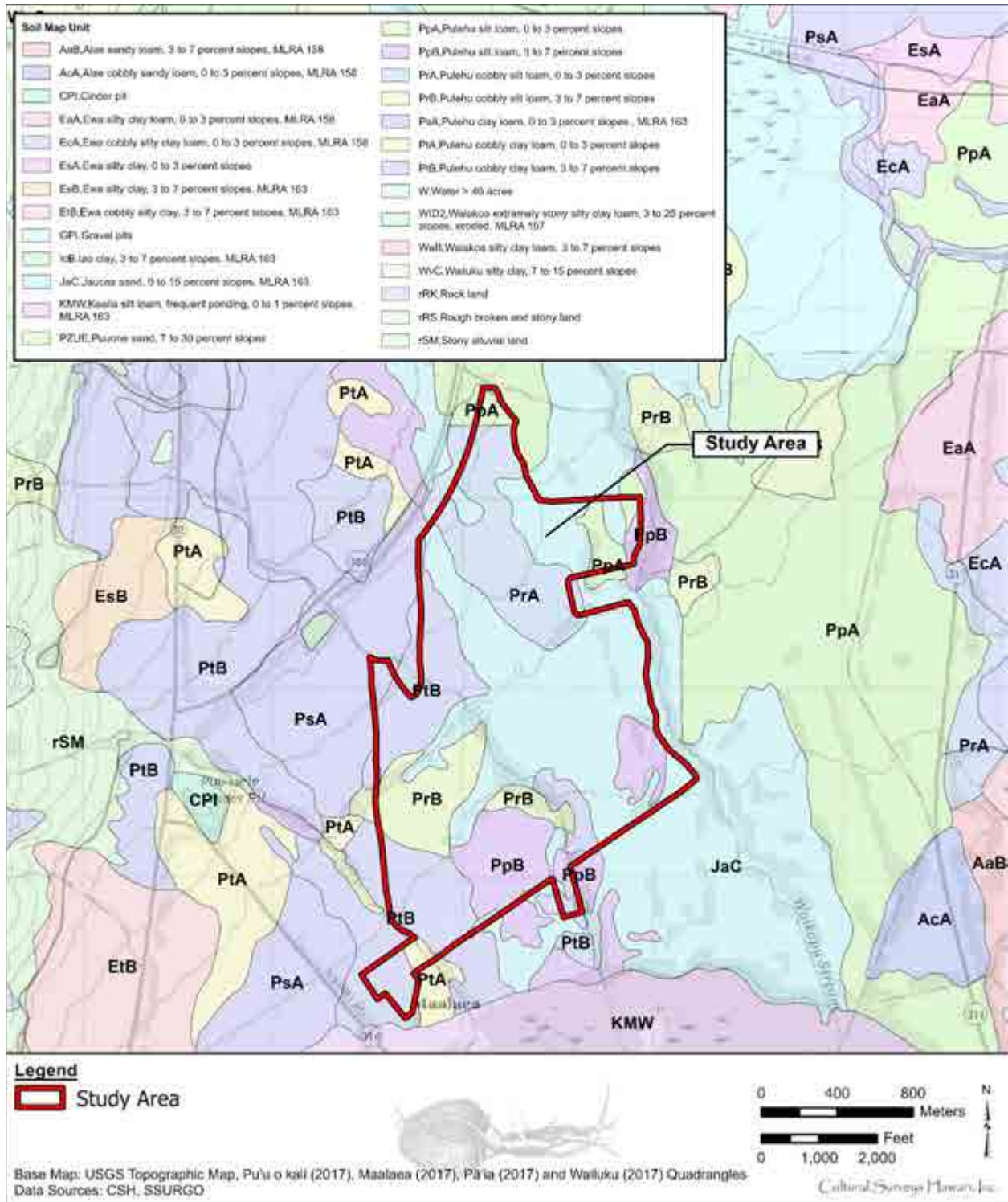


Figure 5. Overlay of Soil Survey of the State of Hawaii (Foote et al. 1972; U.S. Department of Agriculture 2001), indicating soil types within and surrounding the AIS study area

Ewa silty clay loam, 0 to 3 percent slopes (EaA).—On this soil, runoff is very slow and the erosion hazard is no more than slight. In a few small, gently sloping areas were included in mapping.

This soil is used for sugarcane and homesites.

Ewa silty clay, 0 to 3 percent slopes (EsA).—This soil has a profile like that of Ewa silty clay loam, 3 to 6 percent slopes, except for the texture of the surface layer. Runoff layer is very slow, and the erosion hazard is no more than slight.

This soil is used for sugarcane (Foote et al. 1972:29-30).

Jaucas sand, 0 to 15 percent slopes (JaC) is described as follows:

This series consists of excessively drained, calcareous soils that occur as narrow strips on coastal plains, adjacent to the ocean. These soils occur on all islands of this survey area. They developed in wind- and water-deposited sand from coral and seashells. ... Jaucas soils are geographically associated with Pulehu, Mokuleia, Kaloko, and Lualualei soils.

In many places the surface layer is dark brown as a result of accumulation of organic matter and alluvium. The soil is neutral to moderately alkaline throughout the profile.

Permeability is rapid, and runoff is very slow to slow. The hazard of water erosion is slight, but wind erosion is a severe hazard where vegetation has been removed. The available water capacity is 0.5 to 1.0 inch per foot of soil. In places roots penetrate to a depth of 5 feet or more. Workability is slightly difficult because the soil is loose and lacks stability for use of equipment. (Foote et al. 1972:48)

The Pulehu series soils are described as follows:

This series consists of well-drained soils on alluvial fans and stream terraces and in basins. ... They developed in alluvium washed from basic igneous rock. The soils are nearly level to moderately sloping. Elevations range from nearly sea level to 300 feet.

Pulehu clay loam, 0 to 3 percent slopes (PsA).—This soil is on alluvial fans and stream terraces and in basins. Included in mapping were small areas of Ewa, Mala, and Waialua soils. Also included were small areas of gravelly, stony, and gently sloping soils.

The surface layer is dark brown clay loam. This is underlain by dark-brown, dark grayish-brown, and brown, massive and single grain stratified loam, loamy sand, fine sandy loam, and silt loam. Below this is coarse, gravelly or sandy alluvium. The soil is neutral in the surface layer and neutral to mildly alkaline below the surface layer.

Permeability is moderate. Runoff is slow, and the erosion hazard is no more than slight. The available water capacity is about 1.4 inches per foot in the surface layer and subsoil. In places roots penetrate to a depth of 5 feet or more. Low areas are subject to flooding.

Puhelu cobbly clay loam, 0 to 3 percent slopes (PtA).—This soil is similar to Puhelu clay loam, 0 to 3 percent slopes, except that it is cobbly. This soil is used for sugarcane. Small acreages are used for pasture.

Pulehu cobbly clay loam, 3 to 7 percent slopes (PtB).—On this soil, runoff is slow and the erosion hazard is slight. Included in mapping were small areas that have thin, stratified layers of sand and gravel at a depth of 20 to 36 inches.

This soil is used for sugarcane. Small acreages are used for pasture.

Pulehu silt loam, 0 to 3 percent slopes (PpA).—This soil is similar to Pulehu clay loam, 0 to 3 percent slopes, except that the texture is silt loam. This soil is used for sugarcane. Small acreages are used for homesites.

Pulehu silt loam, 3 to 7 percent slopes (PpB).—This soil is similar to Pulehu clay loam, 0 to 3 percent slopes, except that the texture is silt loam. Runoff is slow, and the erosion hazard is slight. Included in mapping were small areas underlain by coral sand at a depth of 20 to 36 inches.

This soil is used for sugarcane.

Pulehu cobbly silt loam, 0 to 3 percent slopes (PrA).—This soil is similar to Pulehu clay loam, 0 to 3 percent slopes, except that the texture is silt loam and there are many cobblestones on the surface. In a few places cobblestones are common throughout the profile. Included in mapping were small areas underlain by coral sand at a depth of 20 to 36 inches.

This soil is used for sugarcane and pasture.

Pulehu cobbly silt loam, 3 to 7 percent slopes (PrB).—This soil is similar to Pulehu clay loam, 0 to 3 percent slopes, except that the texture is silt loam, and the surface layer is cobbly. Runoff is slow, and the erosion hazard is slight. Included in mapping were small areas underlain by coral sand at a depth of 20 to 36 inches.

This soil is used for sugarcane. Small areas are used for pasture. (Foote et al. 1972:115-116)

Puuone sand, 7 to 30 percent slopes (PZUE) is described as follows:

This series consists of somewhat excessively drained soils on low uplands on the island of Maui. These soils developed in material derived from coral and seashells. They are moderately sloping to moderately steep. ...Puuone soils are geographically associated with Iao and Jaucas soils.

... This soil is on sandhills near the ocean. Included in mapping were small areas of Iao and Jaucas soils. Also included were small areas where the cemented layer is less than 20 inches below the surface.

In a representative profile the surface layer is grayish-brown, calcareous sand about 20 inches thick. This is underlain by grayish-brown, cemented sand. The soil is moderately alkaline in the surface layer.

Permeability is rapid above the cemented layer. Runoff is slow, and the hazard of wind erosion is moderate to severe. The available water capacity is about 0.7 inches per foot in the surface layer and subsoil. In places roots penetrate to the cemented layer. (Foote et al. 1972:117)

1.3.2 Built Environment

The study area supported commercial sugarcane production until the end of 2016, when the last commercial sugarcane operations on Maui were closed. Presently, the entire area is comprised of fallow fields of sugarcane and overgrown field access roads. Kuihelani Highway (Route 380) generally defines the northwestern boundary of the study area. There is a commercial/light industrial development located on the opposite side of Kuihelani Highway. The western boundary is bordered by agricultural fields that approach North Kīhei Road, which curves along the coast near the southern boundary of the study area. The Maui Electric Company Maalaea Generating Station is off North Kīhei Road next to the southwestern corner of the study area, and the Keālia Pond Coastal Boardwalk is on the *makai* (seaward) side of the road. Mehamaha Loop and the Maui Veterans Highway, formerly the Mokulele Highway, (Route 311) are to the east.

Section 2 Methods

2.1 Field Methods

CSH completed the fieldwork component of this study under archaeological permit # 24-30, issued by the SHPD pursuant to HAR §13-282. Fieldwork was accomplished between 22 January and 29 April 2024 by CSH archaeologists Jonas Madeus, B.A., Elwyn Leibold, B.A., Trevor Yucha, B.S., Allyson Ueki, M.A., and James C. Lansche, M.A., under the general supervision of principal investigators Josephine Yucha, M.S., and Hallett H. Hammatt, Ph.D. This work required approximately 203 person-days to complete. In general, fieldwork included a 100 percent coverage pedestrian inspection, ground penetrating radar (GPR) survey, observation of geotechnical boring, and subsurface testing. The AIS fieldwork was conducted in accordance with the project's AIS fieldwork strategy (see Appendix A) that was reviewed and accepted by the SHPD prior to the start of work.

2.1.1 LRFI Pedestrian Survey

In March 2023, CSH conducted a reconnaissance-level field inspection of an approximate 1,380-acre (558-hectare) study area, including the current AIS study area, to develop preliminary information of the types and locations of historic properties that may be present on the surface of the study area. The pedestrian survey was accomplished through systematic sweeps with spacing varied depending upon surface conditions. The results of the field inspection were presented within the project's LRFI report (Yucha et al. 2023).

2.1.2 AIS Pedestrian Survey

In January 2024, CSH began AIS fieldwork with a 100 percent coverage pedestrian inspection of the 729.6-acre (295.3-hectare) AIS study area, a subset of the 1,380-acre (558-hectare) LRFI study area. The survey was completed using pedestrian transects that were spaced every 10-15 m depending upon ground visibility. In general, ground visibility was good throughout most of the study area since the area had been previously plowed and cleared during former agricultural operations.

2.1.3 Ground Penetrating Radar Survey

CSH utilized GPR survey during the AIS in an effort to increase survey coverage throughout the study area without further increasing the amount of invasive testing. In accordance with the project's AIS fieldwork strategy, CSH completed 12 GPR transects (GPR-1 through GPR-12) that were randomly distributed throughout the study area.

The GPR survey was performed using a Geophysical Survey Systems, Inc. (GSSI) SIR-3000 system equipped with a 400 MHz antenna. This is a bistatic system in which electromagnetic energy in the radar frequency range is transmitted into the ground via a sending antenna. Radar energy is reflected off the subsurface matrix, then received by another, paired antenna. Reflected energy is sampled, and the travel time (in nanoseconds) of the individual reflection waves is recorded. Wave propagation speed varies depending on the nature of the subsurface medium. Any changes in density or electromagnetic properties within the stratigraphic column may cause observable variations in reflection intensity. Reflection features may include discrete objects, stratigraphic layering, or other natural and/or man-made subsurface anomalies.

GPR data collection parameters were held constant throughout the survey under the assumption that soil characteristics are relatively consistent throughout the survey area. The maximum depth of interest generally was set at 3.0 m. The soil type for this area was determined to be “dry sand” and assigned GSSI Soil Type 1 with a dielectric constant of 4. The scans per unit option was set at 50 scans per meter. The settings used for this survey were based on the recommendations of GSSI (GPR manufacturer) for this soil type. The survey used the GSSI Quick3D collection mode for 3D scans of the survey areas. The survey was conducted from the X-axis traveling along the Y-axis with each GPR transect spaced every 25 cm.

Post-processing of the data was completed using GSSI RADAN 7 software to produce a 3D grid file or GPR profile slice for each location. Post-processing included an adjustment of the Time-Zero line to eliminate the GPR signal that is recorded between the base of the antenna and the ground surface. No other post-processing techniques were utilized.

The effectiveness of GPR is highly dependent on local soil conditions. The high signal attenuation rate of many soil types restricts the depth of radar penetration and therefore limits the effectiveness of GPR surveys. The Natural Resource Conservation Service (NRCS) produced maps indicating the relative suitability of GPR applications throughout the United States. The GPR suitability data was generated based on USDA soil survey data. In general, the study area is shown in an area described as “high” to “very high” for GPR suitability.

2.1.4 Observation of Geotechnical Boring and Test Pits

From 2 February through 23 February 2024, CSH observed geotechnical boring and test excavation operations conducted by Fewell Geotechnical Engineering, Ltd. (FGE) at 56 locations throughout the study area. Each bore hole was drilled to a targeted depth of 6 m (20 ft). The bore holes were approximately 7 cm in diameter. The bore holes were completed with a truck-mounted direct-push drilling probe. Each test pit was excavated to a target depth of approximately 3 m (10 ft) and approximately 2.5 m long by 0.8 m wide using a mini-excavator. The archaeologist observed each excavation and inspected the backdirt and sediment as FGE, Ltd. personnel removed column samples for collection.

Stratigraphic profiles were not recorded due to the methodology of the cores. Due to the small size of the bore hole, the underlying stratigraphy was not visible or accessible for the archaeologist to create a profile map. No sediment samples were collected by the archaeologist and no historic properties were identified with the sediment cores.

2.1.5 Subsurface Testing

The entirety of the study area was subject to continuous plowing and commercial agricultural land modifications for nearly a century. No human burials have been previously documented within the study area, however, human burials have been identified during archaeological studies on adjacent properties, west of Kuihelani Highway. Given the potential to encounter subsurface historic properties, the AIS fieldwork strategy included 230 test excavations (TE-1 through TE-230) placed within a systematic gridded pattern in accordance with the AIS fieldwork strategy (see Appendix A).

All test excavations were backhoe-assisted. Linear test excavations measured approximately 6.0 m (20 ft) long and 0.8 m (3 ft) wide. The backhoe was used to remove the plow zone, while archaeologists assessed the backdirt and the excavation area for a change in stratigraphy or the

presence of any cultural materials or deposits. The plow zone was approximately 0.9 to 1.2 m (3 to 4 ft) deep. Following removal of the plow zone, archaeologists entered the excavation to investigate the interface and determine the presence of natural sand. When undisturbed, *in situ* sand deposits were encountered, further excavation was conducted by hand. This hand excavation in sand deposits was specifically undertaken to identify intrusive pits, such as burial pits. The stratigraphy was documented, and any features were further investigated, mapped, and sampled. Following the documentation of stratigraphy and any features, the backhoe was used to further complete the excavation. The final depth of the excavation was determined by either sterile soil deposits or the maximum reach of the backhoe arm.

The stratigraphy in each test excavation was drawn and photographed. The sediments were described for each of the test excavations using standard USDA soil description observations/terminology. Sediment descriptions included Munsell color, texture, consistence, structure, plasticity, cementation, origin of sediments, descriptions of any inclusions such as cultural material and/or roots, lower boundary distinctiveness and topography, and other general observations. Where cultural features were exposed, they were carefully represented on the excavation profile. Feature documentation included profiles and/or plan view maps, collected samples, stratigraphic descriptions, and photographs.

2.1.6 Global Positioning System Data Collection

Test excavations, GPR survey areas, geotechnical test bore locations, surface and subsurface features, and points of interest were recorded with a Trimble Geo XH mapping grade GPS unit with a TSCI Datalogger and real-time differential correction. This unit provides sub-meter horizontal accuracy in the field. GPS field data was postprocessed, yielding horizontal accuracy between 0.5 and 0.3 m. GPS location information was converted into GIS shape files using GPS Pathfinder Office Software, Version 5.9, and graphically displayed using ArcGIS Desktop 10.6.1.9270.

2.1.7 Sample Collection

Materials collected during AIS fieldwork were identified and catalogued at CSH's laboratory facilities in Wailuku, Maui. Analysis of collected materials was undertaken using standard archaeological laboratory techniques. Artifacts were washed, sorted, measured, weighed, described, photographed, and catalogued. In general, artifact analysis focused on establishing, to the greatest extent possible, material type, function, cultural affiliation, and location and age of manufacture.

2.2 Laboratory Methods

2.2.1 Artifact Analysis

Artifact processing within the laboratory was class specific and included dry-brushing, washing, drying, and refitting. Artifacts were accessioned based upon provenience and class. Historic artifacts were identified using standard reference material. Artifact analysis produced a master catalogue that is presented in Appendix B. The analysis will be used to better refine the chronology of specific deposits and archaeological features as well as provide information on land use and potential cultural affiliation.

2.2.2 Faunal Analysis

Osseous remains identified as non-human in the field were collected for laboratory analysis. Vertebrate faunal material was identified to the lowest possible taxa by an osteologist trained in human and non-human skeletal identification, then weighed in grams and catalogued. The faunal analysis includes species identification and assessment of human modification for evidence of food consumption. Invertebrate material was assessed for marine shell as potential midden evidence, and the material was identified to the lowest possible taxa, weighed in grams, and catalogued.

2.3 Research Methods

Background research included a review of previous archaeological studies on file at the SHPD; review of documents at Hamilton Library of the University of Hawai'i, the Hawai'i State Archives, the Mission Houses Museum Library, the Hawai'i Public Library, and the Archives of the Bishop Museum; study of historic photographs at the Hawai'i State Archives and the Archives of the Bishop Museum; and study of historic maps at the Survey Office of the Department of Land and Natural Resources. Historic maps and photographs from the CSH library were also consulted. In addition, Māhele records were examined from the Waihona 'Aina (2000) database.

2.4 Report Preparation

An AIS report was prepared in conformance with HAR §13-276-5 and includes the following:

- a) A project description;
- b) A section of a USGS topographic map showing the project area boundaries and the location of all recorded historic properties;
- c) Historical and archaeological background sections summarizing prehistoric and historic land use of the project area and its vicinity;
- d) Descriptions of all historic properties, including selected photographs, scale drawings, and discussions of age, function, laboratory results, and significance, per the requirements of HAR §13-276. Each historic property will be assigned a Hawai'i State Inventory of Historic Properties number;
- e) If appropriate, a section concerning cultural consultations [per the requirements of HAR §13-276-5(g) and HAR §13-275/284-8(a)(2)].
- f) A summary of historic property categories, integrity, and significance based upon the Hawai'i Register of Historic Places criteria;
- g) A project effect recommendation;
- h) Treatment recommendations to mitigate the project's adverse effect on any historic properties identified in the project area that are recommended eligible to the Hawai'i Register of Historic Places.

2.5 Disposition of Materials

All collections, including samples and artifacts, resulting from the AIS process will be the property of the land owner, MP West LLC. Upon conclusion of the AIS investigation, all collected

materials will be temporarily curated at the offices of CSH in Wailuku, Maui, until a permanent curation facility can be decided upon, based on consultation with the landowner, SHPD, and any other potential stakeholders.

Section 3 Background Research

3.1 Traditional and Historical Background

The division of Maui's lands into political districts occurred during the rule of Kaka'alaneo, under the direction of his *kahuna* (chief), Kalaiha'ōhi'a (Beckwith 1970:383). This division resulted in 12 districts, or *moku*, during traditional times: Kula, Honua'ula, Kahikinui, Kaupō, Kīpahulu, Hāna, Ko'olau, Hāmākua Loa, Hāmākua Poko, Wailuku, Kā'anapali, and Lāhainā. The current study area is located between Wailuku and Waikapū Ahupua'a in the Wailuku Moku in the isthmus of Central Maui between the northwest slopes of Haleakalā and the southeast slopes of Mauna Kahalawai (West Maui Mountains). Overall, Wailuku and Waikapū Ahupua'a share an east-west boundary and collectively constitute the entirety of the central isthmus of Maui, which is bounded by 'Īao Valley to the west, Kahului Harbor to the north, Pā'ia and Hāli'imaile to the east, and Mā'alaea Harbor to the south. These combined lands encompass a total of approximately 43,779 acres.

Wailuku and Waikapū are two of four *ahupua'a* that traditionally comprise the *'okana* (sub-district) of Maui known as "Nā Wai 'Ehā," or "The Four Waters," so named for the four major deep-valley streams emanating from the West Maui Mountains (Handy et al. 1991:469; Moffat and Fitzpatrick 1995:23). Geographically and culturally, Nā Wai 'Ehā consisted of four deep valley streams (Waikapū, Wailuku, Waiehu, and Waihe'e) that watered four distinct areas of taro land that spread out fanwise to the shoreline (Handy et al. 1991:272) with the *ahupua'a* of both Wailuku and Waikapū extending across the isthmus of Maui to meet the traditional land boundaries of Hamakuapoko and Kula Moku. These two land divisions were of primary importance due to their location across "the whole of the central isthmus so as to cut off half of the lands in the district of Kula from access to the sea," and were sometimes referred to as Na Poko (W.D. Alexander in Sterling 1998:63).

3.1.1 Traditional Accounts

In ancient times, Waikapū and Wailuku were agriculturally abundant lands that were known for their extensive *lo'i*, or wetland taro cultivation (Handy et al. 1991:497). In an excerpt from C.T. Cheever (in Sterling 1998:75) the remnants of the pre-Contact cultivation of 'Īao Valley in Wailuku is described:

As you get into the valley and vega of Wailuku, you see numerous remains of old kihapais, or cultivated lots, and divisions of land now waste, showing how much more extensive formerly was the cultivation, and proportionately numerous the people, than now...

The whole valley of Wailuku, cultivated terrace after terrace, gleaming with running waters and standing pools, is a spectacle of uncommon beauty to one that has a position a little above it. (C.T. Cheevers in Sterling 1998:75)

Similar observations were made regarding the deep valley of Waikapū, lying immediately southwest of the paramount valley of the West Maui range in Wailuku. Writing his observations from long after the period of active *lo'i* cultivation, E.S.C. Handy (in Sterling 1998) observed:

Spreading north and south from the base of Waikapu to a considerable distance below the valley are the vestiges of extensive wet plantations, now almost obliterated by sugar cane cultivation; a few here and there are preserved in plantation camps and under house garden sites along the roads. ... Far on the north side, just above the main road and at least half a mile below the entrance to the canyon, an extensive truck garden on old terrace ground shows the large area and the distance below and away from the valley that was anciently developed in terraced taro culture. On the south side there are likewise several sizeable *kuleana* where terraces are now used for truck gardening. (E.S.C. Handy in Sterling 1998:94)

Handy et al. (1991) in *Native Planters in Old Hawaii Their Life, Lore, and Environment*, describes Waikapū Stream as land bound, as opposed to emptying into the ocean, with the water diverted into *lo'i* and the overflow dissipating on the dry plains of the central isthmus between West and East Maui (Handy et al. 1991:496) feeding the wetland of Keālia. Though there has been some speculation on the establishment of small fishing settlements with cultivation of sweet potatoes in the sandy soil or red *lepo* (dirt) near the shore, E.S.C. Handy stated that:

... From Waihee to Waikapu there is much good land below and bounding the ancient terrace area on the *kula* and in the lower valleys which would be ideal for sweet potato culture, but it is said that little was grown in this section because there was so much taro. (Sterling 1998:63)

3.1.1.1 Place Names of Wailuku

In the preface of *Place Names of Hawaii* (Pukui et al. 1974:x), Samuel Elbert states that:

Hawaiians named taro patches, rocks and trees that represented deities and ancestors, sites of houses and heiau, canoe landings, fishing stations in the sea, resting places in the forests, and the tiniest spots where miraculous or interesting events are believed to have taken place.

Place names are far from static ... names are constantly being given to new houses and buildings, land holdings, airstrips, streets, and towns and old names are replaced by new ones ... it is all the more essential, then to record the names and the lore associated with them [the ancient names] now. (Pukui et al. 1974:x)

Inherent in the statements of Elbert is the knowledge that the oldest place names held meaning and told the story of an area prior to European contact. Literal translations of place names for land areas and divisions near the study area are listed in Table 1, below, and may provide some insight to what this area was like prior to Western contact. Unless otherwise noted, translations are by Pukui et al. (1974).

3.1.1.2 The Naming of Wailuku and Waikapū

An early legend surrounding the naming of Wailuku comes from the legend of Hi'iaka, sister of the volcano goddess Pele, as she travelled through the Hawaiian Islands. When Hi'iaka's companion, Wahine'ōma'ō complains of hunger during their travels along a *kaha* (hot dry shore) portion of northern Maui, Hi'iaka offers a chant of supplication for nourishment from the local residents. Hi'iaka and Wahine'ōma'ō were met with little hospitality after their appeal for food

Table 1. Place name meanings of Wailuku and Waikapū Moku in the vicinity of the study area

Name	Translation
Ahuakolea ['Ili]	<i>Lit.</i> , “plover’s hill” (Thrum 1922:625); note <i>‘ili</i> is a land division within an <i>ahupua‘a</i>
Aikanaha ['Ili]	<i>Lit.</i> , “possession by forties” (Thrum 1922:626); Kanahā is also a fishpond in Wailuku Ahupua‘a, name of which has been translated by Pukui et al. (1974) as “the shattered [thing]”
Hanaula ['Ili]	<i>Lit.</i> , “red bay”
Haleki‘i [Heiau]	<i>Lit.</i> , “image house”; a <i>heiau</i> (Walker Site 44) located in Wailuku at the site of Pihana Heiau along the meander of ‘Īao Stream
‘Īao [Stream]	<i>Lit.</i> , “cloud supreme”; the ‘Īao Stream brings the water of the ‘Īao Valley to the ocean at Paukūkalo, a point just northwest of Kahului Harbor
Ka‘a [Point]	<i>Lit.</i> , “rolling”; a shoreline promontory just east of Kahului Bay
Kaalaea ['Ili]	<i>Lit.</i> , “the ocherous earth”
Kahului	<i>Lit.</i> , “the winning”; native name for the Kahului region is “Kaihuwa‘a” (Sterling 1998)
Kaiwaloa [Ridge]	<i>Lit.</i> , “the long fern”; <i>‘iwa</i> is a native fern (<i>Asplenium horridum</i>) with narrow, feather-shaped fronds (Pukui and Elbert 1986:104), may also refer to the flight of the <i>‘iwa</i> bird (<i>Fregata minor palmerstoni</i>)
Kalialinui [Gulch]	Possible literal translation: “large tree or plant used for medicine” (Pukui and Elbert 1986); Kalialinui Gulch is 11 miles long, beginning on the upper slopes of Haleakalā, and terminating on the flat plains of Kahului just south of Kanahā Pond
Kanahā [Pond]	Star name (Pukui and Elbert 1986); salt was gathered at Kanahā: “When the sea rose the hollows in the rocks were filled” (Sterling 1998)
Ka‘ōpala	<i>Lit.</i> , “the rubbish”; a dividing line between Pūlehu Nui Ahupua‘a and Waikapū Ahupua‘a
Kapalaalaea ['Ili]	<i>Lit.</i> , “daubed with reddish soil” (Thrum 1922:644)
Kapilau [Ridge]	<i>Lit.</i> , “the stench”
Kapili iki [gulch]	“Pili” is a type of grass (<i>Heteropogon contortus</i>) used in the thatching of traditional <i>hale</i> (house) construction; “ <i>iki</i> ” translates to short, or small; possibly meaning “short pili [grass]”
Kapūhau (var. Pukau, Pūhau) ['Ili]	Pūhau— <i>Lit.</i> , “the ice spring”; pū is short for puna (spring)
Kapukaulua	<i>Lit.</i> , “the fish hole”; located in the coastal region of Pā‘ia, at the most seaward portion of Spreckelsville; close to the reported location of Papanene Heiau (Walker Site 56); the reference to the fishing area concerns the <i>ulua</i> (crevalle, jack, pompano) fish
Keana ['Ili]	<i>Lit.</i> , “the cave” (Pukui et al. 1974:103)
Kuaiwa ['Ili]	<i>Lit.</i> , “nine times” (Thrum 1922:653) or nine generations
Loaloa (var. Kaloaloa) ['Ili]	“Elongated garden plot, as for sweet potatoes (so used in 1848 land claims)” (Pukui and Elbert 1986:209)

Name	Translation
Luapua'a (var. Kaluapuaa) ['Ili]	<i>Lit.</i> , "hog pit"
Mā'alaea	Perhaps a contraction of Maka'alaea (Ocherous earth beginning)
Mauna Kahalawai	<i>Lit.</i> , "the gathering of waters"; the West Maui Mountains (Pellegrino 2009)
Mau'oni [Pond]	One of the two fishponds located at the shore of Kanahā
Noho'ana ['Ili]	<i>Lit.</i> , "way of life" (Pukui and Elbert 1986:269)
'Ōhi'a ['Ili]	Two kinds of trees, 'ōhi'a'ai (<i>Eugenia malaccensis</i> /mountain apple) (Pukui and Elbert 1986:277) and 'ōhi'a lehua (<i>Metrosideros macropus</i> , <i>M. collina polymorpha</i>) (Pukui and Elbert 1986:199); found in the forested regions, the fruit of the 'ōhi'a'ai was prepared by splitting and drying it in the sun (Pukui and Elbert 1986:277); the wood of the 'ōhi'a lehua is hard and once used for images, spears, and mallets (Pukui and Elbert 1986:199)
Palama ['Ili]	<i>Lit.</i> , "lama wood enclosure"; Lama wood (<i>Diospyros sanwicensis</i>), whose name translates to "light" or "lamp" was a type of hardwood used in hale (house) construction (Abbott 1992:68); Lama wood was also an integral part of hula ceremony where a block from the tree would be wrapped in yellow kapa (Hawaiian cloth) and scented with 'ōlena (<i>Curcuma longa</i>) to represent Laka, the goddess of hula, sister and wife of Lono (Abbott 1992:117)
Palolo [Ditch]	<i>Lit.</i> , "clay"
Papa'ula	<i>Lit.</i> , "red flats"; the region just inland of this promontory is presently a portion of the modern Maui Country Club golf course
Paukūkalo	<i>Lit.</i> , "taro piece"; present-day shoreline community located at the northernmost region of Kahului Harbor; the 'Īao Stream reaches the ocean at Paukūkalo, a region formerly heavily planted in kalo (taro; <i>Colocasia esculenta</i>)
Pihana [Heiau]	<i>Lit.</i> , "fullness"; stories of this Wailuku Heiau include it being built in a single night by the legendary race of <i>menehune</i> (legendary small people) who brought the stones from Paukūkalo beach; also the construction of this heiau has been attributed to the Maui chief, Kahekili; listed as Walker Site 43
Pūlehu Nui [Ahupua'a]	Large pūlehu where pūlehu is literally translated as "broiled"; this ahupua'a abuts Wailuku and Waikapū and constitutes much of the central isthmus
Pu'u Lio [Hill]	<i>Pu'u</i> is the word for hill and <i>li'o</i> may be in reference to the bird named for the sound they make; place name possibly related to the <i>li'o</i> bird, which is the same as the 'a'o (<i>Puffinus auricularis newelli</i>) (Pukui and Elbert 1986:207)
Pu'unēnē	<i>Lit.</i> , "goose hill"; cinder cone once located inland of Papa'ula, mined for its gravel during WWII to construct the runways at NAS Kahului

Name	Translation
Wai'ale [Reservoir]	<i>Lit.</i> , “rippling water”; reservoir located in Wailuku, fed by waters of the Spreckels Ditch
Waikapū [Ahupua'a]	<i>Lit.</i> , “water of the conch”; reference to the conch shell formerly found in a cave at Waikapū, until it was stolen by a supernatural dog, named Puapualenalena; also, the scene of a great battle, fought between Kahekili, king of Maui, and Kalani'opu'u, king of Hawai'i Island, at Waikapū Commons
Wailuku [Ahupua'a]	<i>Lit.</i> , “water of destruction”; possibly a reference to the battle which took place at 'Īao between the forces of Kamehameha I and the Maui chiefs; Sterling (1998) states that Pukui et al. (1974) believes the name is older than the famous battle; Westervelt (1910) makes special reference to the waters of Wailuku in 'Īao emptying into the Kahului Harbor

was largely ignored by the area's residents (Emerson 1993:74). Hi'iaka then offered another chant making "known her wish, concluding her appeal with ominous threats against the life of the king, in case her demands were not met" (Emerson 1993:75). A portion of this chant reads:

<i>Haki kepahepa na moku;</i>	What wailing and beating of breast!
<i>Pa 'iauma ka aina;</i>	Wild anguish of child and of ghost
<i>Uwē kamali 'i, uwē ka hanehane —</i>	O'er the sandy plain of Kama'o.
<i>Ke uwē la i ka pili,</i>	The districts are frenzied with grief
<i>I ke kula o Ka-ma'o-ma'o;</i>	Tearing of hair and breaking of teeth
<i>Ka'a kumakena o Maui, e!</i>	One wail that lifts to heaven.
<i>la wai Maui?</i>	Who shall be heir to this Maui land?

(Emerson 1993:75-76)

The mention of Ka-ma'o-ma'o is in reference to the area known as Ke Kula o Kama'oma'o, or the Plains of Kama'oma'o (*lit.*, "greenness"), a region of sandy plains between Kahului and Wailuku, and the location of the current study area (Pukui et al. 1974:81).

The place name "Waikapū", according to (Pukui et al. 1974:223), literally translate to "Water of the Conch." This is due to a cave within Waikapū Valley that supposedly housed a supernatural conch shell (named Kīhapū, blessed with the breath of Lono) that resided there until it was stolen by a supernatural dog named Puapualenalena. This conch shell, when blown, was said to resound throughout all the Hawaiian Islands (Beckwith 1970:349; Pukui et al. 1974:223). According to W.K. Kauaililehua (in Sterling 1998:93):

On the left side of the stream is a cave and in the cave was the conch. It sounded all the time, unseen by the public...

On the northeast side of the stream on the opposite side of the conch that sounded, on the cliff, was a dog named Puapualenalena. Because he heard it he sought diligently to find it but did not succeed. Those who guarded the conch were very watchful. ...

The owners of the conch did not believe, perhaps, that a supernatural being would succeed in taking it away, so they tried to be a little careless. It was not taken, but on the day that Puapualenalena did get it away, they had been utterly careless. After he took it, it sounded no more to this day. (W.K. Kauaililehua in Sterling 1998:93)

Elsbeth Sterling (1998) provides several additional accounts of the naming of the waters of Nā Wai 'Ehā, specifically Wailuku and Waikapū, that have a grounding in the affairs of the Hawaiian people. According to H.T. Cheever (in Sterling 1998:63), the waters of Nā Wai 'Ehā were named after successive events during a famous, albeit unnamed, battle:

Waikapu—The water where the conch was blown, and the engagement began.
 Waiehu—The water where the combatants smoked with dust and perspiration.
 Wailuku—The water of destruction, where the battle began to be fierce and fatal.
 Waihee—The water of total rout and defeat, where the army melted away. (H.T. Cheever in Sterling 1998:63)

C.W. Stoddard expanded on this interpretation of the place names Waikapū and Wailuku in Nā Wai 'Ehā by relating them to the landing of Kamehameha I at Kalepolepo in the late 1700s (Sterling 1998:63) by relating that:

Kamehameha landed at Kalepolepo and a *kapu* [taboo] was put upon the nearest stream. It became sacred to royalty, as was the custom and is known as Waikapu to this hour—that is, forbidden water.

Presently the monarch began his march; and at the second stream a great battle raged, so those waters were called Luku—"to slaughter, to slay as in war, the destruction of many at once." (C.W. Stoddard in Sterling 1998:63)

The names and legends of the region may have their origins in one, or many, notable events that occurred in the time before Western contact. Though opinions vary, the central isthmus of Maui was nonetheless utilized by forces entering these battles.

3.1.1.3 The Plains of Kama'oma'o

Ke Kula o Kama'oma'o, or the Plains of Kama'oma'o, is the name given to a region of sandy plains spanning portions of Wailuku and Waikapū Ahupua'a (Emerson 1993). This area was known by Hawaiians in traditional times as a wandering place of the souls (Beckwith 1970), a place where dead spirits waited for a friendly escort, perhaps a family *'aumakua*, to show them the way to eternity:

The worst fate that can befall a soul is to be abandoned by its *aumakua* and left to stray, a wandering spirit (*kuewa*) in some barren and desolate place, feeding upon spiders and night moths. Such spirits are believed to be malicious and to take delight in leading travelers astray; hence the wild places which they haunt on each island are feared and avoided. Such are the plains of Kama'oma'o on the island of Maui. (Beckwith 1970:154)

According to Helen P. Hoyt (1976), Kama'oma'o is also a region where the "Marchers of the Night," or *Ka huaka'i o ka Po*, are sometimes heard and seen. When these spiritual "Night Marchers" appear, according to Beckwith (1932:199), "It is said that such a sight is fatal unless one has a relative among the dead to intercede for him."

The marchers carried candlenut torches which burned brightly even on a rainy night. They might even be seen in broad daylight and were followed by whirlwinds such as come one after another in columns. They cried "Kapu o moe!" as a warning to stragglers to get out of the way or to prostrate themselves with closed eyes until the marchers passed. (Beckwith 1932:199)

Ms. Holt-Padilla, Cultural Historian for the Maui Arts and Cultural Center, explains that the central isthmus was a dry, hot place with trails leading west toward Waikapū, and east along the Kīhei coastline. She stated that the guardian spirits of men, the *'aumakua* spirits, were known to wander on the lower, sandy plains of Waikapū. Ke Kula o Kama'oma'o is also described as a special place for the souls of the soldiers killed at Kakanilua, or the Battle of Wailuku Common (Hokulani Holt Padilla in Hill et al. 2006).

3.1.1.4 Warfare in the Sand Hills of Nā Wai 'Ehā

As a political center for the chiefly class (*ali'i*) of Hawaiian society, several large battles took place in the general vicinity of Wailuku, many of which entailed the marching of foreign armies through the *ahupua'a* of Waikapū after landing their canoes on the leeward shores of the central isthmus, near Kealia. One example was the Battle of Waikapū Common, or the Ahulau ka pi'ipi'i i Kakanilua. This battle entailed the clash of invading Hawai'i Island forces, headed by Kalaniopu'u, with the Maui forces under Kahekili in 1776. According to (Fornander 1969:153), following the plunder of the leeward east Maui coastline, Kalaniopu'u landed his invading troops at Mā'alaea. The following account describes the battle on the sand hills south of Wailuku:

The landing being effected early in the day, it was resolved to push forward at once, and 'on to Wailuku!' where Kahekili was residing, became the war cry of the day. The detachment or regiment known as the Alapa, mustering with several hundred men, was selected for this hazardous expedition, and with high courage they started across the isthmus of Kamaomao, known as the Waikapu common, determined, as the legend says, 'to drink the waters of the Wailuku that day.' This regiment was considered to be the bravest and best. ...They are said to have all been of equal stature and their spears of equal length; and the legend represents their appearance—with their feather cloaks reflecting the sunshine and the plumes of their helmets tossing in the wind—as a gorgeous and magnificent spectacle.

Little did this gallant troop apprehend the terrible fate that awaited them. Little did Kalaniopuu know the wily warrior with whom he was contending. Offering no resistance to the enemy while crossing the common, Kahekili distributed his forces in various directions of the Wailuku side of the common and fell upon the [Alapa] as it was entering among the sandhills southeast of Kalua, near Wailuku. The gallant and devoted Alapa were literally annihilated; only two out of the eight hundred escaped alive. (Fornander 1969:153)

According to Ms. Holt-Padilla, the outcome of the battle for Kakanilua was not decided on the first day. The day following the "Slaughter of the Pi'ipi'i at Kakanilua," the remaining forces of Kalani'ōpu'u were again sent to battle Kahekili's forces, which were expected to be in Wailuku (Hokulani Holt Padilla in Hill et al. 2006). Following the humiliating defeat, Kalaniopu'u consulted his remaining fighters and his war leaders, including his favorite, the young Kamehameha. After this Kalaniopu'u and his forces proclaimed "Tomorrow we will drink the waters of Wailuku and rest in the shade of Hekuawa" (Speakman 1978:13). In response to the invader's renewed vigor for battle:

Ka-hekili and his ally and nephew, the ruling chief of O'ahu, prepared another fish net [ambush], and the fish [Hawai'i Island warriors] swam into it. Ka-hekili's men rose before dawn and took their stand in the sand hills, some toward the Waikapu turn. The invading force from Hawai'i found a divided front from which the spears poured down on them "like a swift rainstorm." The terrified soldiers were surrounded and fled. (Speakman 1978:13-14)

The Big Island army was ambushed at an area close to Waikapū and was destroyed by the army of Kahekili on the plains of Kama'oma'o (Hokulani Holt Padilla in Hill et al. 2006). This second

day of fighting was known as the battle of Kamoku'ilima (Kamakau 1992:132). Kalaniopu'u never succeeded in taking Wailuku, and died shortly after the battle of Wailuku common. Upon the death of Kalaniopu'u, and the death of his sons, the young Kamehameha became the ruling chief of Hawai'i and the mortal enemy of the now aged Kahekili (Speakman 1978:12). Kamehameha would return to Wailuku and succeed where Kalaniopu'u had failed. By 1786, Kahekili controlled Maui, Moloka'i, Lāna'i, and O'ahu. This undisputed political control lasted for only a short period of time. In 1790, the last great conflict on Maui – the battle of Kepaniwai – was fought in 'Īao Valley in Wailuku. The battle of Kepaniwai marked the end of the reign of Kahekili and the beginning of the early Historic period and a politically unified Hawai'i (Pukui et al. 1974).

An 1841 account of Commodore Charles Wilkes of the American Navy published in the 7 January 1927 edition of the Honolulu Advertiser provides an early description of “a mound of human bones” thought to be the bodies of fallen warriors in the Sand Hills of Wailuku (Figure 6). The articles refers to the accounts of past battles fought in Central Maui.

3.1.2 Early Historic Period

The nineteenth century brought to Maui a multitude of commercial, demographic, social, and religious changes encouraged by the burgeoning foreign influx. In 1819, the first whaling ships arrived in Hawaiian waters and Lāhainā Harbor became a primary port of call for provisioning ships in the Islands. Closely following the arrival of the first whaling ships, the first Protestant missionaries and their families arrived in Lāhainā in 1823 (Bingham 1824). One of the first records regarding the number of residents living in the regions of Wailuku and Waikapū come from population statistics compiled by the early missionaries who settled there. In 1829, Protestant missionaries recorded school attendance figures for the out-stations of Wailuku as consisting of 612 students, with an additional 329 students in Waikepu (Waikapū Community Association) (Richards 1831). Just a few years later, the mission census data of 1831-1832 records the population of Waikapū at 733 inhabitants (Schmitt 1973:18).

The use of the northern coastline landing at Kahului by early Europeans proved difficult, for far more records exist of early explorers and merchant ships at anchor off the southern, more protected coastline of Maui than along the exposed, northern coast. An account by the American missionary Rufus Anderson (1865) portrays the obstacle of landing in Wailuku District:

We were bound to Wailuku, situated near the western side of the isthmus connecting West and east Maui. After crossing the channel the wind increased, and so rough was the sea that our landing seemed not quite safe. Mr. Alexander met us on the shore, but in such a stand-storm that we were obliged to veil our faces. We breasted the gale for a dozen miles, and near Wailuku were wet to the skin by a storm of rain. (Anderson 1865:176)

A landing on leeward coast of the central isthmus meant that the people and commerce that reached European ships came through the trails that transect the Plains of Kama'oma'o.

During the early and mid-1800s, the Hawaiian demography was affected by two dramatic factors: radical depopulation resulting from Western disease and nucleation around the developing port towns. Traditional Hawaiian populations lived in a largely dispersed settlement pattern.

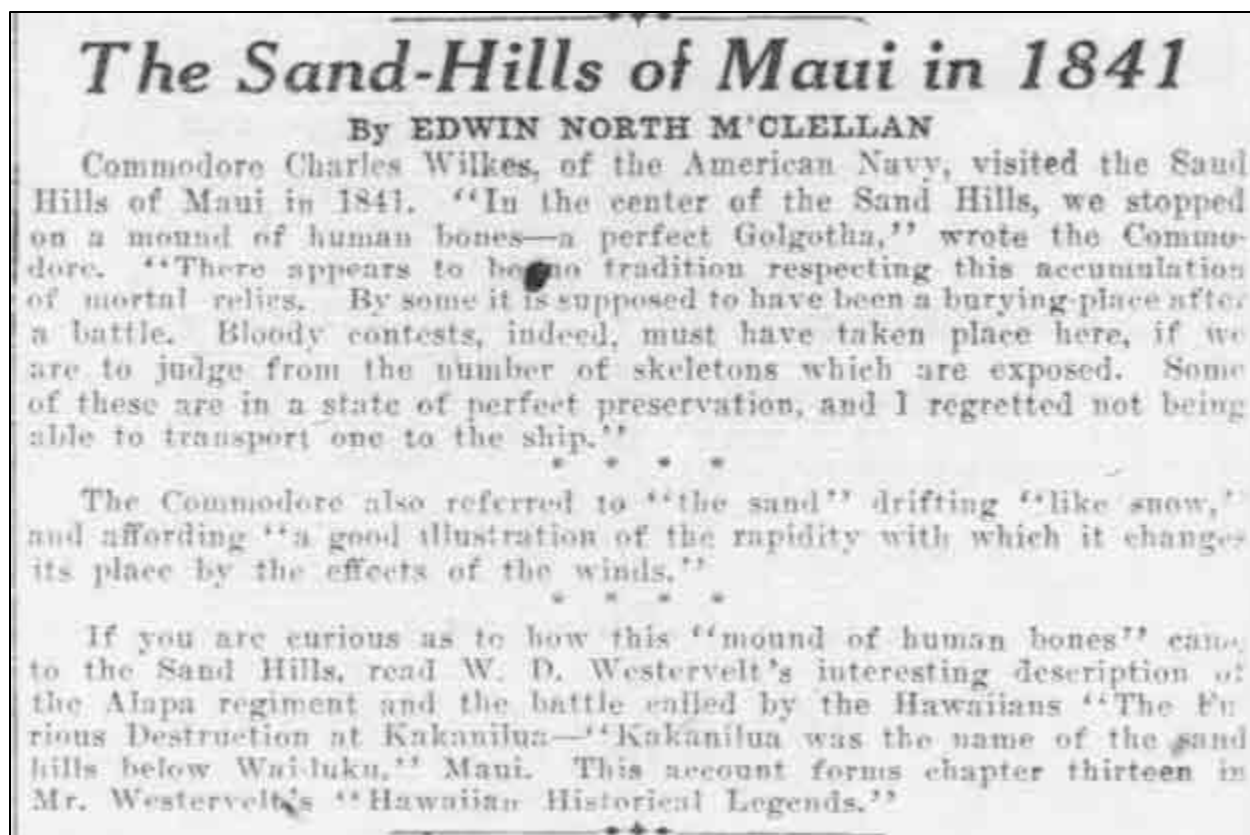


Figure 6. Newspaper clipping from the 7 January 1927 edition of the Honolulu Advertiser describing an 1841 discovery of human remains in the Sand Hills of Maui (The Honolulu Advertiser 1927)

Although there were royal centers and areas of more concentrated population, these areas never came close to rivaling the populations of the historic port towns that developed on Hawai'i's shorelines during the 1800s. Foreign commercialism initially came to Waikapū in the form of sugar processing and coffee production (Wyllie 1854). A man by the name of Antone (Anthony) Catalena was running a cane syrup factory at Waikapū ca. 1823 and is credited with being the founder of the industry in Hawai'i (Thrum 1874) while Antonio Silva set up a plantation and a mill in Waikapū ca. 1828 (Thurston 1906). At about the same time Antonio was also engaged in coffee agriculture with trees that reportedly produced above 20 pounds annually (Wyllie 1854). The Reverend Hiram Bingham (1824) wrote the following description about an excursion he took with the Reverend William Richards, in a letter sent to the American Board of Commissioners of Foreign Missions (ABCFM) in Boston, dated 30 August 1823.

The principal plantation in this district, called Waikapu (Wy-kah-poo) lies about midway between the two bays, watered by a small stream, descending in a south-eastern direction from the lofty mountains, that lie between Lahinah [sic] and that place. At this plantation which belongs to Cox [Kahekili Ke'eaumoku] and Kaahoomanoo [Ka'ahumanu], there are about 100 houses, six head of neat cattle, and eight horses. This is the most important, and almost the only inland settlement that I have seen in the islands. Its situation is very pleasant. You stand upon the bank of this little rivulet in the midst of the bananas, sugarcane, and taro; and the plains that lie upon the two bays spread upon your right and left, containing perhaps 100 or 150 square miles. Before you, at the distance of 15. (Bingham 1824:111)

These early commercial developments along with the establishment of the branch station of the ABCFM at Wailuku in November 1831 (Edwards 1832:403) would alter the traditional lifeways of Nā Wai 'Ehā and Waikapū in a manner best described by Kuykendall (1938), noting that from 1830 to 1854:

The commercial development during this period, by magnifying the importance of a few ports, gave momentum and direction to a townward drift of population; the population of the kingdom as a whole was steadily going down, but the population of Honolulu, Lahaina and Hilo was growing. (Kuykendall 1938:313)

Following this trend in the commercialization of agricultural pursuits across all islands, the remnants of indigenous agriculture either fell into disrepair or were absorbed by the developing plantations. Vestiges of extensive *lo'i* cultivation, which spread to the north and south from the base of Waikapū to a considerable distance below the valley, remained through the 1930s. Although most of the *lo'i* terraces in Waikapū had been plowed under by the expansion of commercial sugarcane cultivation, a few of the ancient terraces were preserved in plantation camps and under house sites as well as reused as garden sites, among which, and in addition to Hawaiian wet-taro, included Japanese dry-taro, truck gardens, and lotus for their seeds (Figure 7) (Handy et al. 1991:497).



Figure 7. Early photograph of Waikapū Valley, *lo'i*, *'auwai*, and dispersed homes (Waikapu Community Association 2018)

3.1.3 The Māhele and the Kuleana Act

The Organic Acts of 1845 and 1846 initiated the process of the Māhele—the division of Hawaiian lands—that introduced private property into Hawaiian society. On 27 January 1848, the Crown and the *ali ʻi* began to receive their land titles as *konohiki* (overseer of an *ahupua ʻa*) awards. For *konohiki* lands, a claim first had to be approved by the Land Commissioners. Upon confirmation of the claim, a certificate was awarded to the claimant. This certificate was called a Land Commission Award (LCA), which confirmed the claim of an individual for a parcel. The awardee could then obtain a Royal Patent (RP) from the Minister of the Interior, which indicated the government's interest in the land had been settled by the payment of a commutation fee. Commutation means “an exchange, or replacement.” The commutation fee was usually set at a maximum of one-third of the value of the unimproved land. The fee could be settled by the exchange of cash but was usually settled by the return of one-third of the lands (or cumulative value of the lands) originally awarded to the claimant (Chinen 1958:13).

On 19 October 1849, the Hawaiian Privy Council adopted resolutions to protect the rights of Native tenants, the *maka ʻāinana* (common people/tenants of the land). The Kuleana Act of 1850 confirmed these rights. Under this act, the claimant was required to produce two witnesses who knew the claimant and the boundaries of the land, knew that the claimant had lived on the land for a minimum of two years, and knew that no one had challenged the claim. The land also had to be surveyed. Native tenants or naturalized foreigners who could prove occupancy on the parcels before 1845 could be awarded lands they occupied or that they cultivated as *kuleana* (land holding of a tenant or *hoa ʻāina* residing in the *ahupua ʻa*) awards. No commutation fee was necessary to apply for a Royal Patent for a *kuleana* award, as the commutation fee had presumably already been paid by the *ali ʻi/konohiki* who had been awarded the entire *ahupua ʻa*, or an *ʻili* (a land division within an *ahupua ʻa*) in which the native tenant claimed his own small parcels (Chinen 1958:29-30).

During the Māhele, the lands surrounding Waikapū Commons were sold by the Department of Education in ten parcels, each amounting to more than 1,317 acres, and had Royal Patents issued for the sales in 1854. Later, all ten of these Royal Patents were surrendered and cancelled, and the land was quit-claimed back to the Board of Education in August 1860. In 1875 the Board of Education sold at auction the “Land known as the ahupuaa of Waikapu, saving grants hitherto made within said ahupuaa, or sales by the board of education” to Mr. Henry Cornwell, lands extending out from Waikapū Valley to the northwestern boundary of Pulehunui Ahupuaʻa. (The Pacific Commercial Advertiser 1879:5). Cornwell acquired the lands in fee-simple under Royal Patent No. 3152. The current study area is situated entirely within this land grant (Figure 8 and Figure 9). No *kuleana* awards were recorded near the current study area. The nearest one is LCA 5230 which is in the adjacent *ahupua ʻa* to the east, Pulehunui, and was claimed by Keaweamahi in 1902. The lands purchased by Cornwell were added to the holdings of the Waikapū Sugar Plantation, originally started by Henry Cornwell and James Louzada on Grant 2951 to the north, before the plantation was sold in 1876.

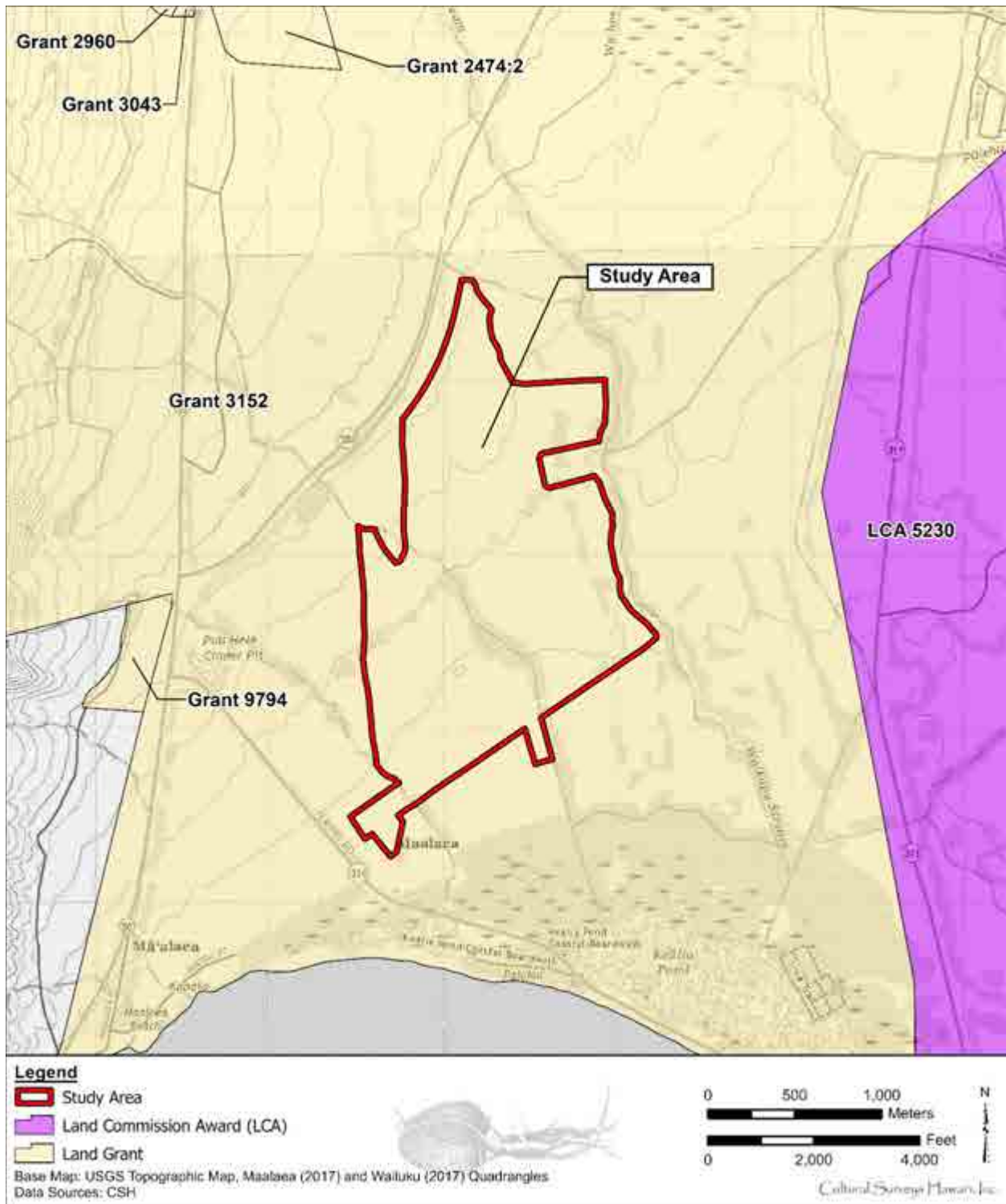


Figure 8. Portions of 2017 Maalaea and 2017 Wailuku USGS 7.5-minute topographic quadrangles showing the current study area in relation to Land Grant 3152 (U.S. Geological Survey 2017a, 2017d)

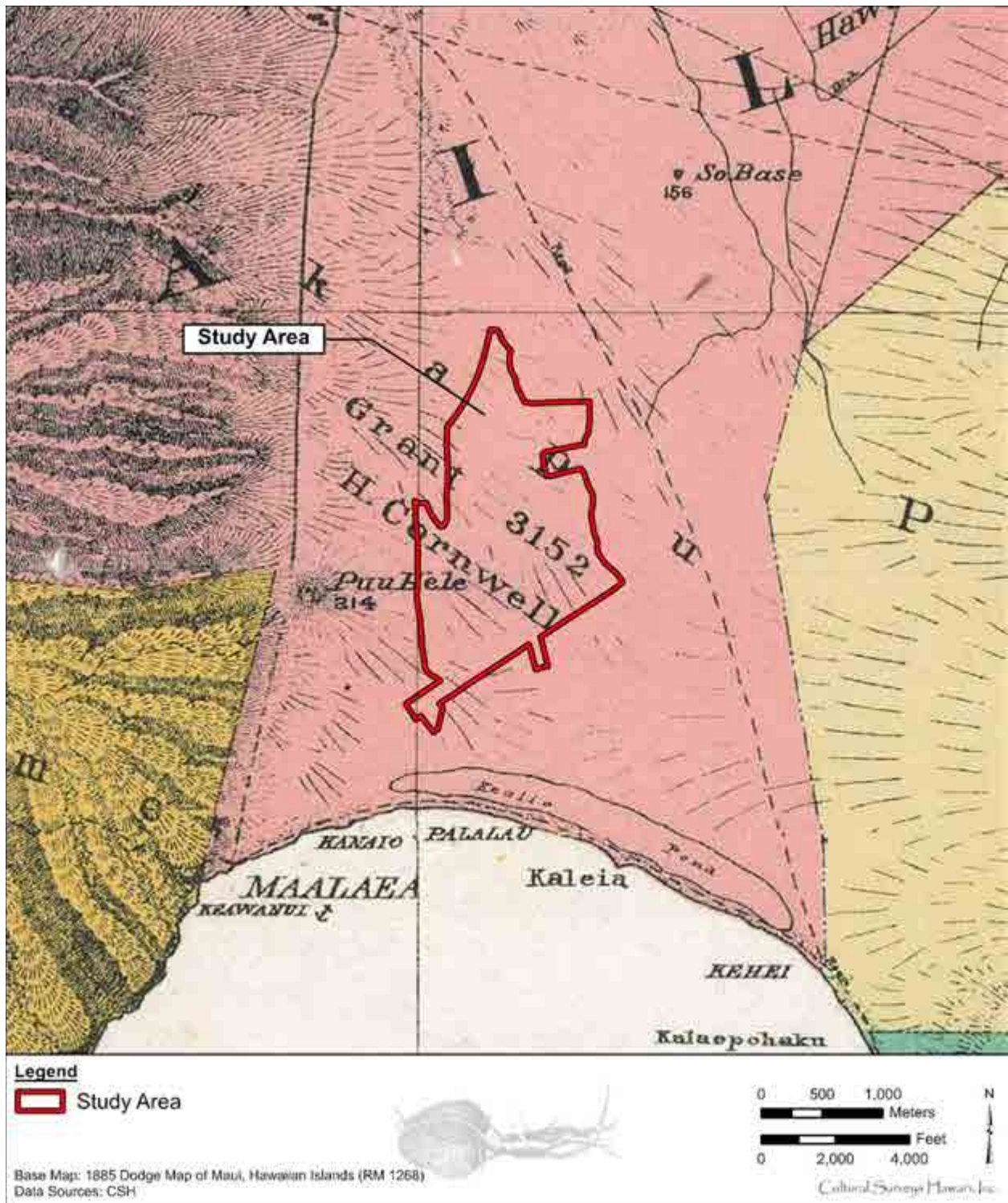


Figure 9. Portion of the Dodge (1885) map of Maui (RM 1268) showing the location of the study area within Land Grant 3152

3.1.4 Mid- to Late 1800s

A common crop on nearly all major Hawaiian Islands was sugarcane. With the passage of Hawaiian lands into the Western model of privatization, coupled with the decline of the indigenous population, the wet valleys on Nā Wai 'Ehā began to shift away from subsistence farming toward plantation style sugarcane cultivation. The fertility of the river valleys of Nā Wai 'Ehā were readily observed by visitors of the period. While traveling from Mā'alaea to Waikapū a late nineteenth century observer describes the following scenic views:

It took us about an hour to drive from Maalea [*sic*] to Waikapu and we began to see some indications of the beauty which the inhabitants of Maui ascribe to their beloved isle.

The mountain mass that seemed shapeless is rent by a series of deep gorges—each, we were told, a scene of bewildering beauty, both in rock-scenery and foliage. (Cummings 1881)

In general, it appears the most agriculturally fertile lands of Waikapū Ahupua'a did not extend beyond the alluvial sediments of the stream valley as the lower elevations leading into the central isthmus of Maui are dominated by windswept Pleistocene sand dune deposits (Figure 10) (Foote et al. 1972:48, 115).

3.1.4.1 Waikapū Congregational Church

Prior to the surge in commercial sugar cane cultivation, Waikapū was inhabited by dominantly Hawaiian homes with nearby taro patches feeding from the waters of Waikapū Valley. The small community residing here established the Waikapū Congregational Church in 1838 as a home-based Christian service, sometimes utilizing the facilities of the distant Ka'ahumanu Church in Wailuku. In 1868, the community was able to erect and dedicate a permanent structure (Figure 11). Residents moving to the region in 1908 recall that "we used to have 'hoikes', (rally days) there and folk from all Central Maui used to attend." According to residents, both the Wednesday night prayer services and Sunday all-day services would fill the church building to capacity (Head 1960).

During World War II, Waikapū Congregational Church was turned over to the military and used as a surgical hospital. The Church building was used as a ward with an additional 'nurses quarters' built off to the side of the main structure. It was during this period that the church had its steeple removed for being too clear a target for potential marauding enemy submarine gunners (Figure 12). Although the steeple was re-erected after the war, it continuously leaked and was again removed from the building. As sugarcane cultivation began to dominate the region in the early to mid-twentieth century, residential dwellings dwindled, as did the attendees of the Waikapū Congregational Church. As full-time pastors became unnecessary, the church members voted to merge with the Kahului Church, and the Waikapū Congregational Church was abandoned to the sugarcane fields that surround it (Head 1960).

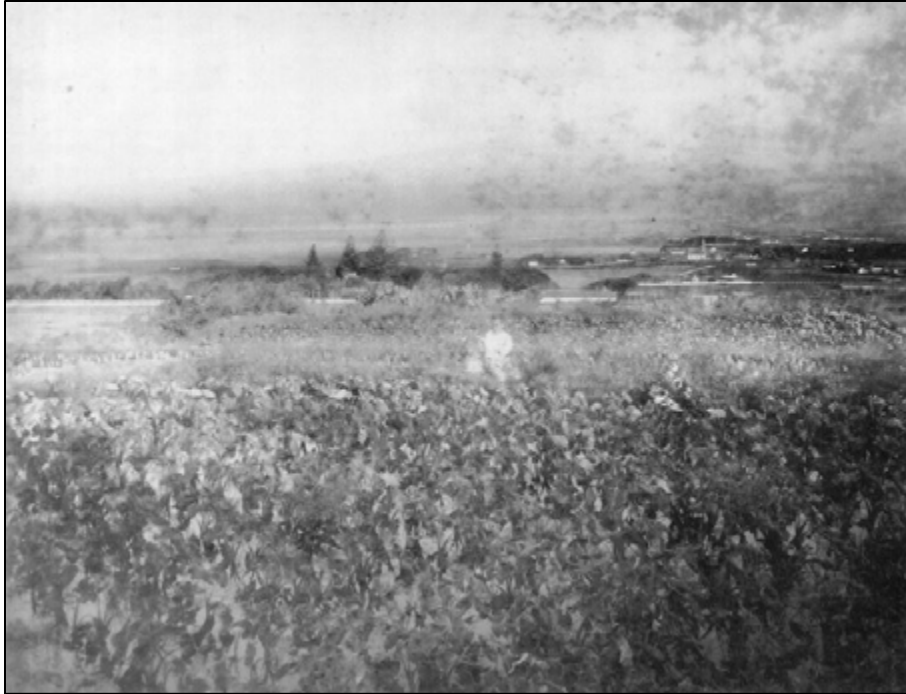


Figure 10. Historic photograph of the plains of Kama'oma'o (background) as viewed from the vegetated alluvial slopes of Waikapū Valley (Waikapu Community Association 2018)

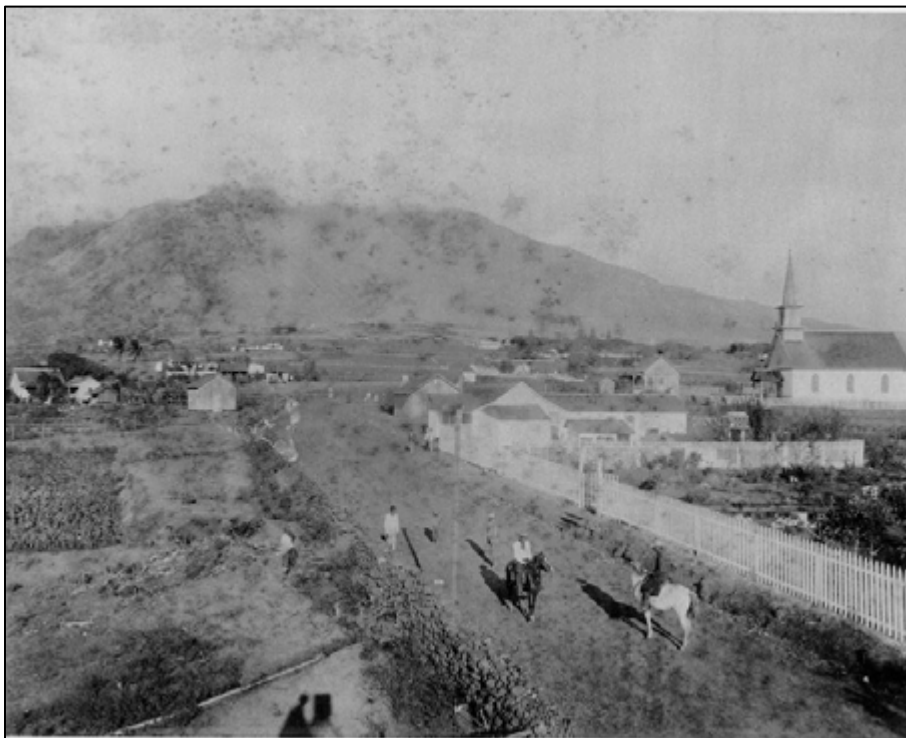


Figure 11. Historic photograph of Waikapū Congregational Church, Waiko Road, and the surrounding community (Waikapu Community Association 2018)



Figure 12. Waikapū Congregational Church after having its steeple removed during WWII (Waikapū Community Association 2018)

3.1.4.2 Development of Commercial Sugar in Waikapū

Henry Cornwell arrived on Maui from New York and started the Waikapu Sugar Company with James Louzada (his brother-in law) in 1864. The two partners constructed a steam-powered sugar mill situated on a 17-acre parcel that had been part of Land Grant 2951; land originally purchased by Henry Cornwell and J. Louzada in Waikapū (Wilcox 1996:61) (Figure 13).

In 1878, Claus Spreckels bought an undivided interest in 12,000 acres of the Waikapū Commons from W.H. Cornwell and leased an additional 24,000 acres of adjacent Wailuku Commons crown lands from the government (Wilcox 1996:61). These lands would form a large portion of Hawaiian Commercial and Sugar Company (HC&S) (Figure 14). The economic boom resulting from the passage of the Reciprocity Treaty in 1876 encouraged sugar baron Spreckels and other Hawaiian sugar planters to invest heavily in capital improvements such as irrigation systems, mills, and railroads. The reciprocity agreement with the U.S. brought down the heavy cost of high tariffs on sugar. In 1876, Henry Cornwell retired, and the remaining plantation lands were sold to the new partners Colonel W.H. Cornwell (Figure 15) and Colonel G.W. Macfarlane (The Honolulu Advertiser 1903:8). Henry Cornwell, originally born on Long Island in 1815, died in Waikapū in 1886 and was buried at Nu'uuanu Valley Cemetery on O'ahu (The Honolulu Advertiser 1886:3)

During his time at the head of the Waikapū plantation the Col. William H. Cornwell nourished a healthy relationship with Hawaiian Royalty. As a close friend of King Kalakaua (Kamehameha V) and Queen Regent Liliuokalani, Col. Cornwell would host events for the monarchs on his Maui properties, including celebrations for the Kalakaua's birthday that entailed festivities and horse races (Evening Bulletin 1888:3) (Figure 16). Kalakaua's annual celebrations on November 16 would be remembered well into the early twentieth century for the excitement of the horse races and the occasional after-race polo match (The Honolulu Advertiser 1916). Col. Cornwell also was appointed a member of the king's staff in the Revolution of 1887, elected to a four-year term as a member in the House of Nobles in 1890, and served a very short stint as the Minister of Finance in the cabinet of Queen Regent Liliuokalani (The Honolulu Advertiser 1903:8).

Most of the Waikapu Commons and across the isthmus was covered with sugarcane by the mid-nineteenth century. Waikapu Sugar Company operated from 1862 to 1894, when it was purchased and incorporated into the holdings of Wailuku Sugar Company (Kaukali and Subica 2010).

3.1.4.3 Organization of the Wailuku Sugar Company

A Chinese planter, Hungtai, is reputed to have operated the first sugar mill at Wailuku in 1823. As early as 1840, the first sugar venture organized by the Kingdom of Hawaii was begun by Kamehameha III (Kauikeaouli), at Wailuku (Moffat and Fitzpatrick 2004:54). The king's Wailuku plantation and mill were described by the Protestant missionary, Richard Armstrong:

The King has given out small lots of land, from one to two acres, to individuals for the cultivation of cane. When the cane is ripe, the king finds all the apparatus for manufacturing and when manufactured takes the half. Of his half, one fifth is regarded as the tax due to the aupuni (Hawaii Department of Survey) & the remaining four fifths is his compensation for the manufacture. These cane cultivators are released from all other demands of every description on the part of



Figure 13. Waikapu Sugar Company Mill, ca. 1890 (Waikapu Community Association 2018)

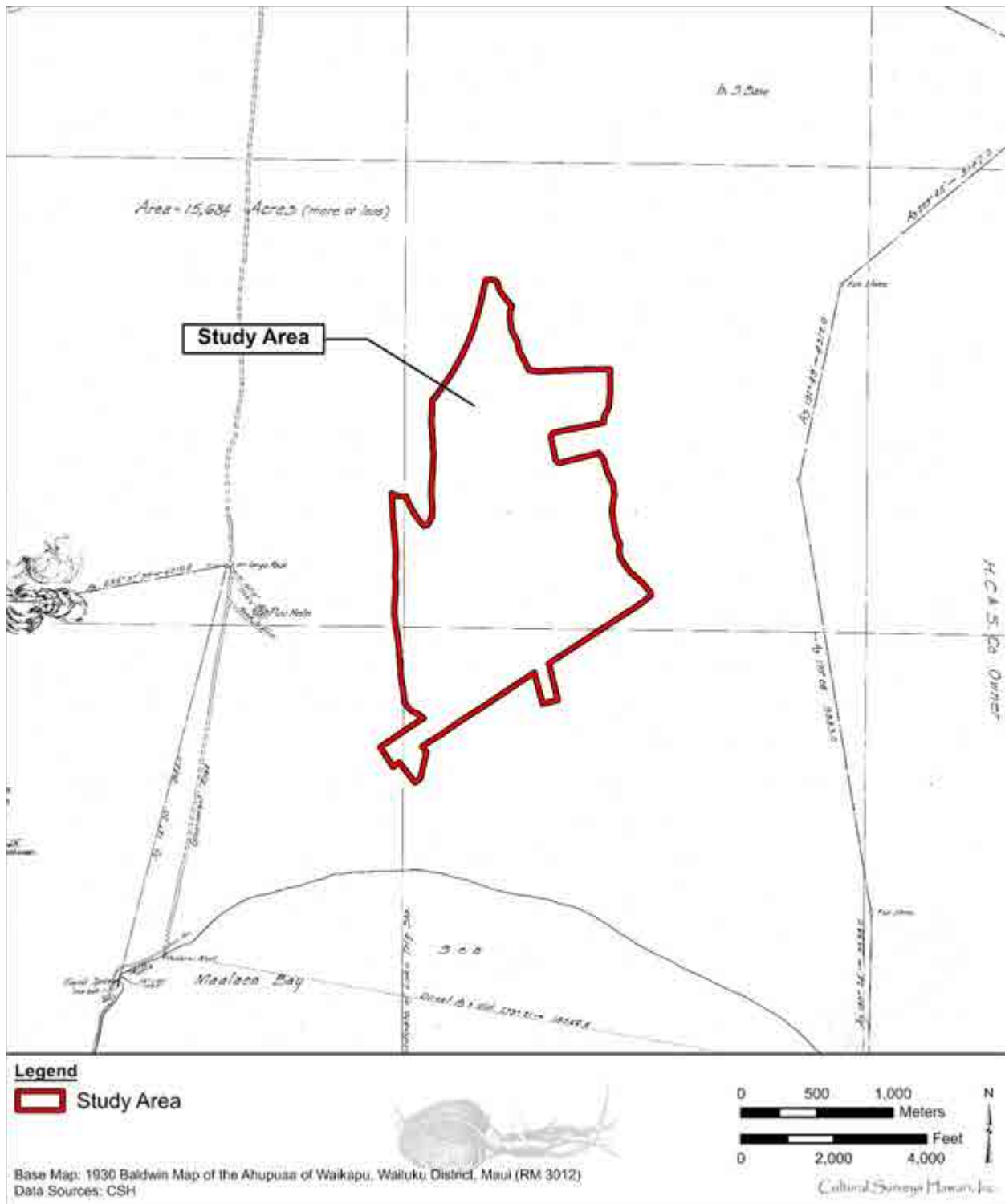


Figure 14. Baldwin (1930) map showing the current study area within the lands of Waikapu Sugar Co.



Figure 15. Colonel William H. Cornwell in the garb of the Hawaiian Royal Court (Unknown 1893)

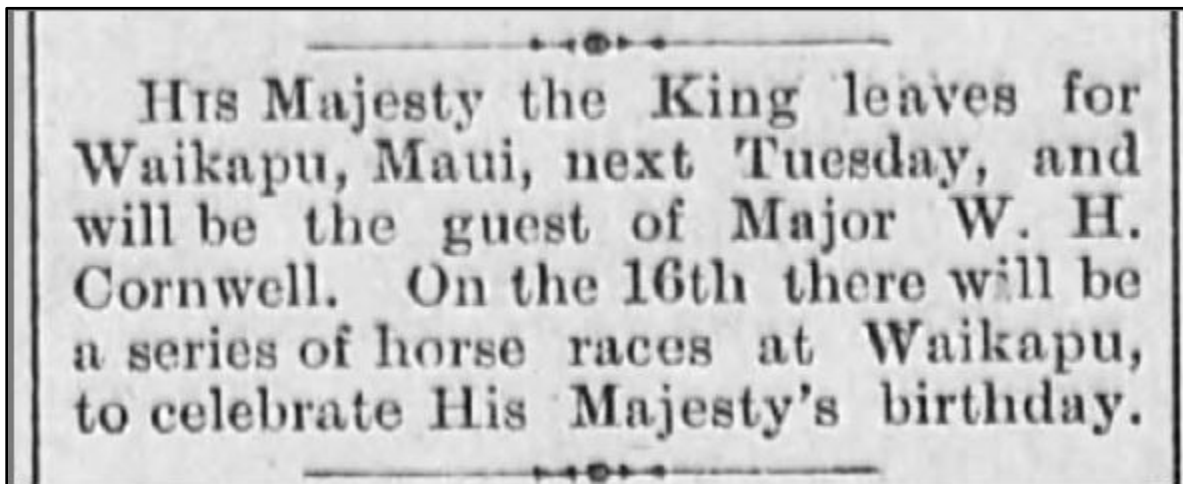


Figure 16. Newspaper announcement for the arrival of Kamehameha V to visit W. H. Cornwell on Maui for the King's birthday (Evening Bulletin 1888)

the chiefs [from Hawaiian Mission Children's Society Wailuku Station Report 1839]. (MacLennan 1997:33)

The modern plantation framework for the Wailuku Sugar Company began in the 1850s by the Protestant missionary Edward Bailey and one of his sons. Their early water-run mill eventually merged with sugar cultivation performed by Bal and Adams. These pioneer sugar partners later began the Wailuku Sugar Company. In 1862, the partners of the Wailuku Sugar Company grew to include James Robinson & Company, Thomas Cummins, and J. Fuller (Wilcox 1996:122). In 1863, Charles Brewer became a major partner in the operation of the Wailuku Sugar Company. By 1867, the Wailuku Sugar Company had 2,250 acres planted in cane. The Wailuku Sugar Company incorporated in 1875 and began to become profitable. In 1877, the Baileys were bought out (Nellist 1925:70).

3.1.4.4 The Waikapū Division of the Wailuku Sugar Company

The Waikapū sugar lands became a part of the Wailuku Sugar Company in 1894. Beginning in 1880, the Waikapū plantation lands began to be merged with those of the Wailuku and Waihee plantations. During the 1880s, F.L. Hoogs was named the head overseer of the Waikapu Division of the Wailuku Sugar Company. In 1887, American sugar growers revolted against the Hawaiian Monarchy and demanded a more liberal Constitution, which was granted, under duress, by Kalākaua. In 1905, a new sugar mill was constructed in Wailuku to accommodate the sugar brought in from the new outlying plantations, including Waikapū (Kaukali and Subica 2010:98).

The economic progress of the Wailuku Sugar Company required the importation of foreign labor. The increase in the labor population at the plantations required larger laborer camps. By the 1890s, a network of plantation housing camps had been established at the Waikapu Division of the Wailuku Sugar Company. These included Hopoi Camp, located at the Hopoi Reservoir, upland of the Waiale Reservoir; Waikapu Camp, located downslope of the Palolo Ditch and the south side Waikapū Ditch, on the Waikapū Stream; Hyashi Camp, located just west of Waikapu Camp, toward the Pu'u Hele cinder cone; Kimura Camp, located further west from Hyashi Camp; Pu'u Hele Camp, located at the base of a cinder cone downslope of the Pohakea Gulch, where today the North Kīhei Road meets the Hono a Pi'ilani Highway and the Pu'u Hele Cemetery. In the 1880s, immigrants from South America began to settle in Waikapū. They worked the sugar fields and brought their love of horseracing to the plantation culture of Maui (Kaukali and Subica 2010:98).

The traditional *konohiki* system of water division was evident at the Waikapu Division of the Wailuku Sugar Company. In an 1896 lawsuit (Cornwell v. Wailuku Sugar Company), testimony was entered regarding the destruction of traditional *kuāuna* (embankments of taro patches). This testimony established that, along with the growing of cane in the region, the traditional farming of taro had continued based on the customary rights of landowners under the old Hawaiian tenure. The Wailuku Sugar Company brought the action to stop traditional landowners from diverting irrigation water for raising taro (Hawaii Supreme Court 1896).

3.1.4.5 Hawaiian Commercial and Sugar in the Central Isthmus

The success of sugar grown in the region resulted in a second large plantation, in Waihe'e, producing over 757 tons of sugar and 45,000 gallons of molasses in 1865. The Waihe'e Mill manager was Samuel T. Alexander, and the mill's head foreman was Henry P. Baldwin, both of

whom would resign in the late 1860s to establish a small sugar enterprise of their own in upper Pā'ia (Gilmore 1936).

In 1869, on land located directly west of Pā'ia, a small *kuleana* of 11.94 acres was purchased by S.T. Alexander and his business partner, H.P. Baldwin, both descended from Lāhainā missionary families, who were eager to apply their agricultural experience to their own plantation. This initial land purchase was the beginning of the development of the entire central isthmus for sugar cultivation. In rapid succession, Alexander & Baldwin expanded its operations by purchasing other small *kuleana*, setting up a mill, and attracting more investment capital (Dean 1950).

In 1876, a treaty was signed between the Kingdom of Hawai'i and the United States, the Reciprocity Treaty, which opened larger and more lucrative markets for Hawaiian sugar. Plans were immediately drawn up by Alexander & Baldwin to finance a ditch to bring water from the Hāna region of East Maui to the arid plains of Pā'ia. The Kingdom of Hawai'i issued a lease for the construction right-of-way, and in 1879, the successful venture delivered millions of gallons of water to the central isthmus via the Hamakua Ditch (Wilcox 1996).

Competition was supplied by Claus Spreckels who engineered a similar irrigation ditch from Honomanū in East Maui to lands located just inland of Kahului, where the Spreckelsville Mill and plantation camp were built. Spreckels invested three million dollars in the HC&S and competed for sugar lands, wharf and warehouse space, railway lines, and shipping schedules with Alexander & Baldwin (Dorrance and Morgan 2000).

In 1882, Spreckels, following his success in building the Honomanu Ditch linking East Maui water sources with his sugar fields in the central isthmus, further capitalized on that success to engineer the Waihe'e Ditch [also named the Spreckels Ditch] in West Maui. The 15-mile-long ditch started at the 435-foot elevation of Waihe'e Stream, and carried 60 million gallons of water (per 24-hour day) to the Wai'ale Reservoir at the 214-foot elevation of Wailuku. Spreckels became the first plantation owner to irrigate his fields by water from both Haleakalā and the West Maui mountains (Wilcox 1996). By 1888, the Spreckels plantation covered 28,000 acres, making it the largest sugar plantation in the world. Financial pressures forced Spreckels to give up control of HC&S to Alexander & Baldwin in 1898 after a long and fierce battle.

In 1899, HC&S determined that cultivating the Pu'unēnē plains required far more water than the original Hamakua Ditch could provide. The Lowrie Ditch project, completed in 1900, was undertaken to provide an additional source of water to the central Maui plains. The ditch began at the Pāpa'a'ea Reservoir, at 1,000 ft elevation, and maintained a four-foot drop per mile following the ditch's initial plunge from the Kailua reservoir. Steep mountain gulches were traversed using the force of the constant weight of water flowing in a series of siphons. The Halehaku Gulch, at 250 ft deep, and the Māliko Gulch, at over 350 ft deep, were both crossed by giant siphons fabricated of three-eighths-inch iron and set in place by Japanese laborers (Thrum 1900).

3.1.5 1900s

In 1912, HC&S began to modernize the existing plantation camps. Between a huge influx of immigrant workers in 1909, and the burning of village areas of Pā'ia and Kahului to control smallpox in 1910, changes to the camp system were in full swing. The plantation workforce continued to expand until 1917, when the U.S. declared war on Germany, and the accompanying

draft depleted the labor pool. By 1919, postwar requirements for sugar had driven the price to an all-time high of \$471.40 per ton (Burns 1991). The post-WWI years saw the sugar industry, and companies like HC&S, add electricity to some villages. HC&S completed the Waikapū well [Well 7] in 1926; one of the largest deep wells in the world. The additional capacity of 40 million gallons per day (mgd) provided by this well was instrumental in planning more sugar and industry within Maui's central plains (Stearns and Macdonald 1942:216).

On 11 November 1929, Inter-Island Airways, Ltd. began flying regularly scheduled flights between the Hawaiian Islands. Amphibious eight-passenger Sikorsky S-38 aircraft landed at Mā'alaea Bay, taxied up a concrete ramp, and delivered passengers to waiting automobiles for the trip through Waikapū to Wailuku, and points beyond (Saito 2009). By 1936, the airline had purchased three new sixteen-passenger Sikorsky S-43 aircraft to supplement their four S-38s (Kennedy 1937). With air travel between islands increasing, plans were put underway to build a land based air strip at Pu'unēnē in neighboring Pūlehu Nui Ahupua'a to the southeast in lieu of the smaller airport located at Mā'alaea Harbor.

In addition to sugarcane cultivation, much of the lands of Waikapū in the mid-twentieth century were also tied-up in pastoral endeavors. In 1952, over 7,000 acres of land along the base of the West Maui Mountains, spanning from Waikapū to Ukumehame, were sold at auction in two leases (15- to 21-year lease terms) for \$16,582. These land tracts served as hog and cattle pasturage (Honolulu Star Bulletin 1952:5).

3.1.6 Contemporary Land Use

Throughout the twentieth century, the lands within and adjacent to the current study area remained under commercial sugarcane cultivation, and the current study area lands remained relatively unchanged until the construction of the Mā'alaea power plant facilities in the 1970s (Figure 17 through Figure 22). In the latter half of the 1900s, residential tracts were constructed along both the Kuihelani Highway and Honoapi'ilani Highway corridors that traverse Waikapū. Complementing the residential lots, to a lesser degree, are light industrial parcels, grocery stores, and business developments on the outskirts of the sugar fields of Waikapū.

The present alignment of North Kuihelani Highway (State Route 380) extends near the northwestern boundary of the study area. The study area resides in fallow sugarcane fields, with only sporadic buildings associated with the sugarcane operations scattered throughout the tall cane and invasive overgrowth, including dense thickets of *kiawe* and *koa haole*. The sandy sediments characteristic of the area known throughout Waikapū are still evident in the surface soil of the roads surrounding the inactive sugarcane fields.

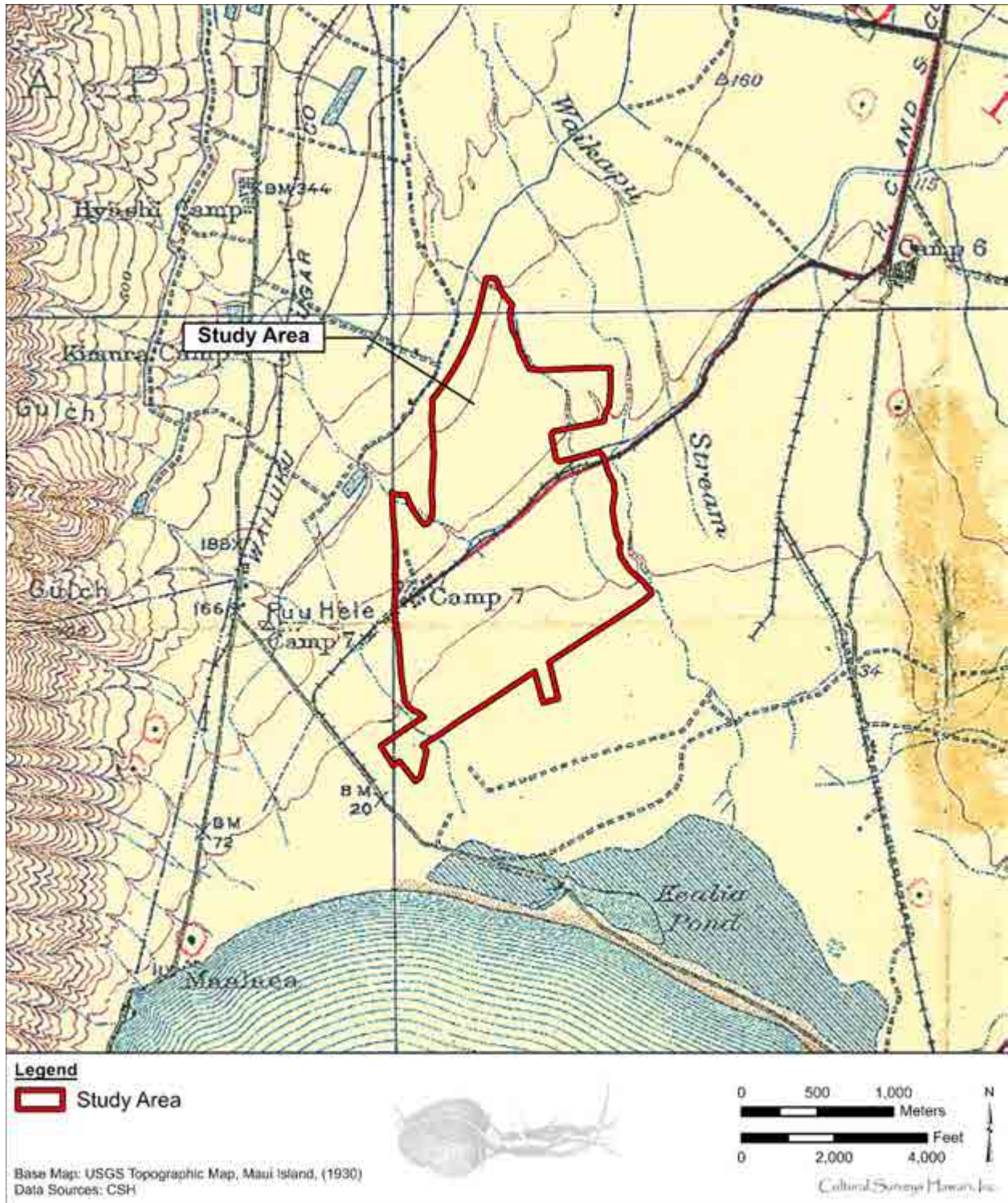


Figure 17. Portion of the 1930 Maui Island USGS topographic quadrangle showing plantation camps and plantation railroads around the study area vicinity (U.S. Geological Survey 1930)

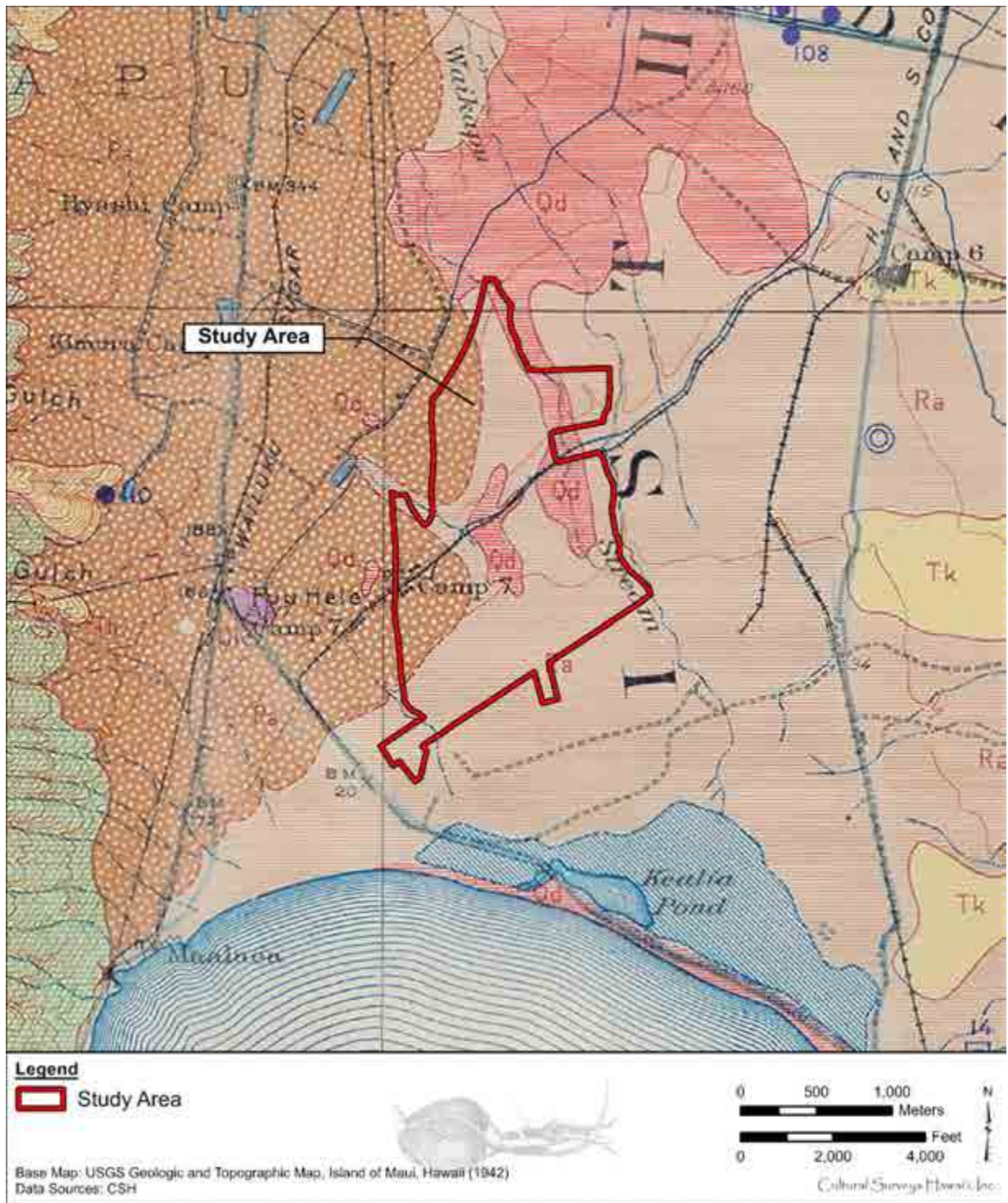


Figure 18. Portion of the 1942 USGS map of Maui Island showing testing locations (blue circles), calcareous sand dunes (red), unconsolidated deposits of younger alluvium (tan), consolidated earthy deposits of older alluvium (brown) and a Pleistocene great unconformity of Kula basaltic andesites (yellow with Tk) (U.S. Geological Survey 1942)

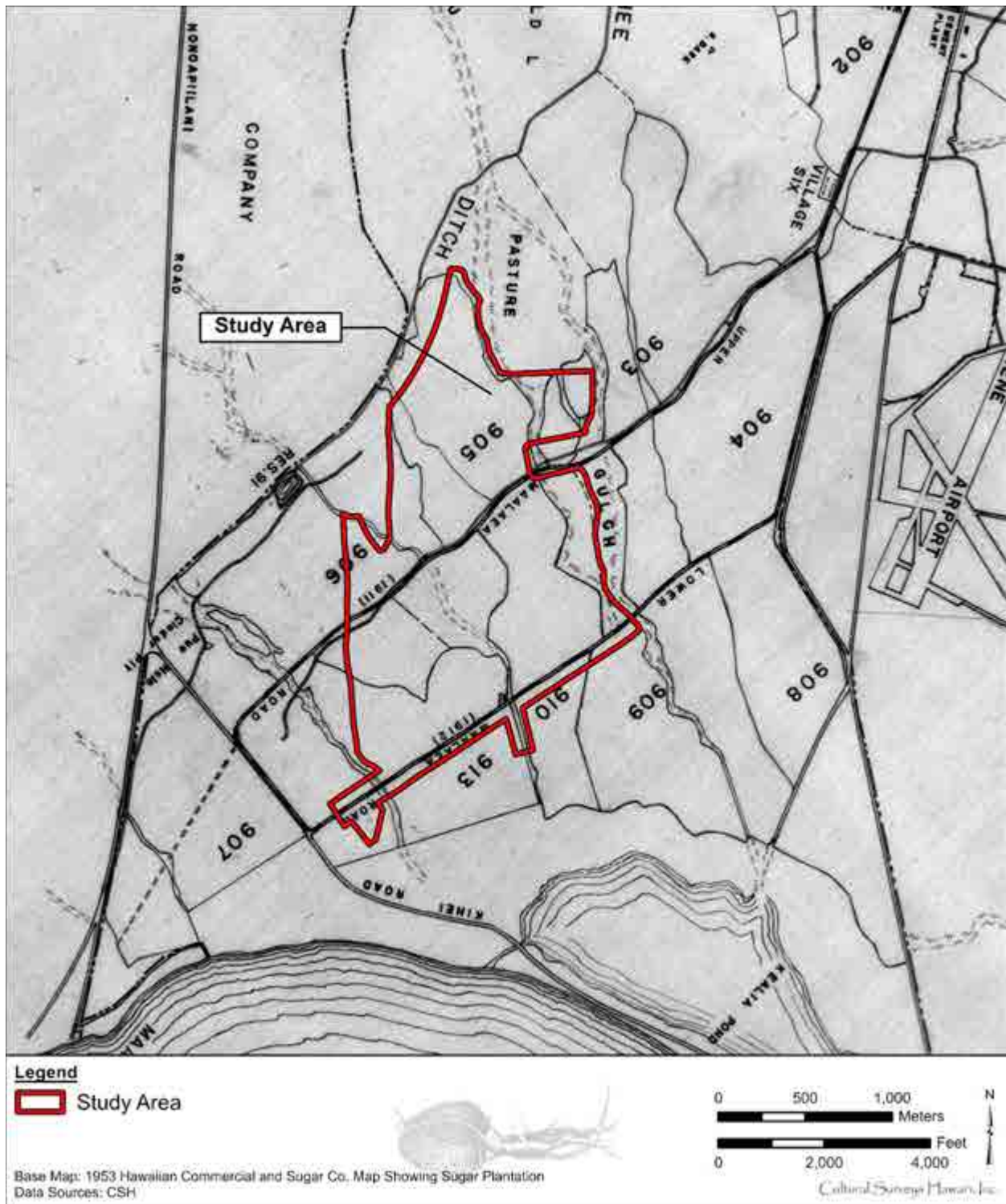


Figure 19. Hawaiian Commercial & Sugar Co. (1953) map showing the sugar plantation fields, Waikapu Pasture, Waikapu Road, and Waihe'e Ditch

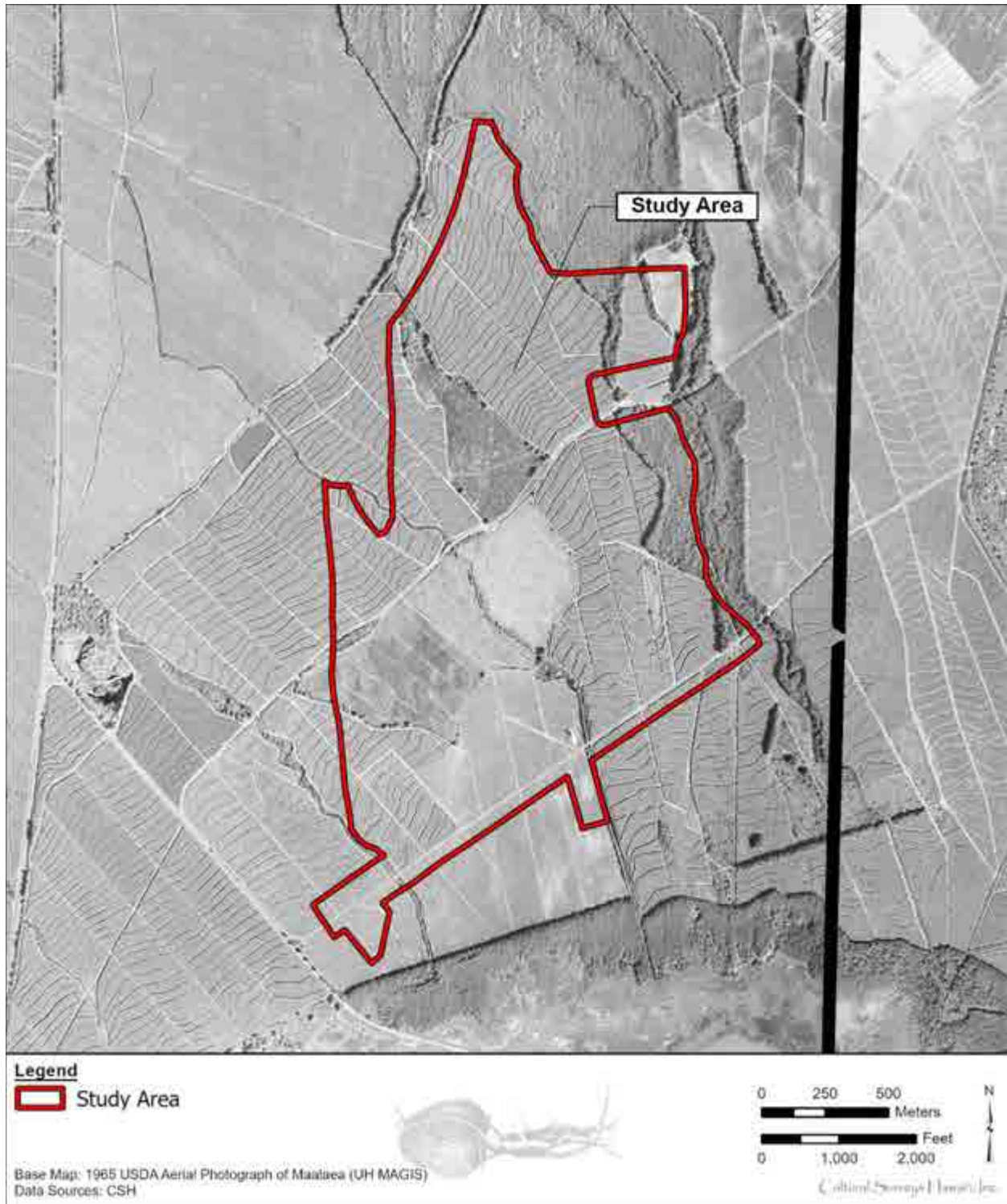


Figure 20. Portion of a USDA (1965) aerial image showing the study area and surrounding development

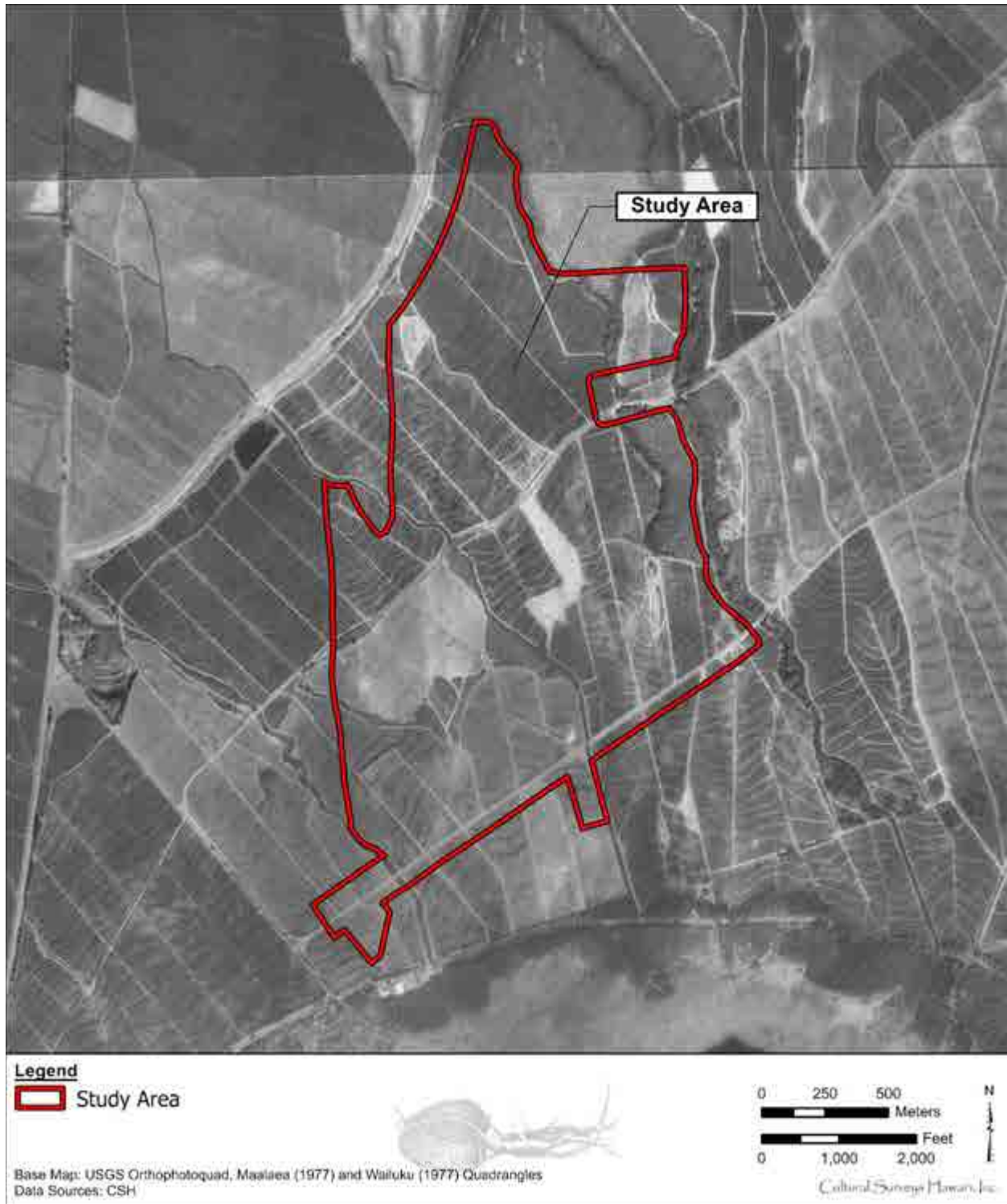


Figure 21. Portions of the 1977 Maalaea and 1977 Wailuku USGS orthophotoquads showing sugar cultivation around the current study area (U.S. Geological Survey 1977a, 1977b)



Figure 22. Portions of the 1992 Puu o Kali, 1996 Maalaea, 1997 Paia, and 1997 Wailuku USGS 7.5-minute topographic quadrangles showing the location of the study area (U.S. Geological Survey 1992, 1996, 1997a, 1997b)

3.2 Previous Archaeological Research

The earliest archaeological studies on the island of Maui were part of island-wide surveys conducted in the early 1900s (Stokes 1917; Walker 1931). These studies tended to focus on the generation of descriptive lists of large-scale architectural features or traditional ceremonial *heiau* sites. No *heiau* were documented in the immediate vicinity of the current study area.

Between 1931 and 1976, only sporadic archaeological studies were undertaken in the area. Following the passage of the National Historic Preservation Act in 1966 and HRS Chapter 6E, which established the historic preservation program in 1976, archaeological studies occurred as a condition of development on a more frequent basis. Previous archaeological studies conducted within approximately 3.8 km (2.4 mi) of the current project area have included AIS investigations (termed “archaeological surveys” pre-2002, before HAR §13-276-5), an archaeological data recovery, archaeological reconnaissance and LRFI surveys, and archaeological monitoring programs (Table 2 and Figure 23). Historic properties identified during previous studies in the vicinity of the study area include clusters of human burials near the Mā‘alaea Small Boat Harbor and in the region to the northwest, in addition to the Naval Air Station (NAS) Puunene (SIHP # 50-50-09-04164), habitation/agricultural complexes, and various historic plantation and ranching features (Figure 24). Note, the SIHP designation refers to the state of Hawai‘i (50), the island code for Maui (50), the topographic quadrangle for either Wailuku (04), Maalaea (09), or Puu o Kali (10), and a unique five-digit number.

3.2.1 Barrera (1976)

On 23 and 24 August 1976, Chiniago Enterprises conducted an archaeological walk-through survey of approximately 1,020 acres at Wai‘ale, formerly in agricultural orchard land (Barrera 1976). The survey was conducted along areas of known and observable ground disturbance, such as recent plantings and pipeline routes, in addition to overgrown areas of kiawe and lantana scrub. No historic properties were identified. The survey of the disturbed areas revealed no subsurface cultural remains except for two possible artifacts (a hammerstone and a possible basalt flake) on the surface of the parcel beneath dense vegetation. On-site monitoring was recommended due to known deposits of human skeletal remains in the nearby Sand Hills region of Wailuku.

3.2.2 Kennedy (1988)

In November 1988, Joseph Kennedy of Archaeological Consultants of Hawaii (ACH) performed an archaeological reconnaissance survey of properties located at TMK: [2] 3-5-004:025 por. in Waikapu, Maui. No surface features of cultural value remained on the subject property, likely due to historic agriculture. “While surface remains are not present, it is suspected that there is reasonable cause for subsurface indications to be present in the Iao clay and Wainee extremely stony silty clay soils” (Kennedy 1988:3).

Table 2. Previous archaeological studies in the vicinity of the study area

Reference	Type of Study	Location	Results (SIHP #s 50-50-)
Barrera (1976)	Archaeological walk-through survey	Upper Maui Lani area; multiple TMKs	No historic properties identified
Kennedy (1988)	Archaeological survey	Maui Central Park; TMK: [2] 3-7-1:2 por.	No historic properties identified, but potential for subsurface cultural material is suspected
Haun (1989)	Archaeological survey	Waikapu Mauka Partners Golf Resort	Identified nine features and complexes (no SIHP #s), including walls, ditches, terraces, mounds, depressions, modified outcrops, possible <i>heiau</i> or shrine, enclosures, and L-, C-, and U-shapes
Kennedy (1990)	Archaeological reconnaissance survey	Hawaiian Cement Puunene Quarry	No historic properties identified
Rotunno and Cleghorn (1990)	Archaeological reconnaissance survey	Horita Homes; TMKs: [2] 3-8-007:002 and 110	Identified two potential historic properties: a sandstone cobble-lined trail (Temp. Site No. 1) and a piled and compacted cobblestone mound (Temp. Site No. 3)
(Sinoto 1990a, 1990b)	Archaeological surface survey, subsurface assessment, and archaeological monitoring	Maui Lani Sand Borrow Site; TMK: [2] 3-8-007:103	No historic properties identified
Brisbin et al. (1991)	Archaeological data recovery	Waikapu Mauka Partners Golf Resort	Designated SIHP #s 04-02019 through -02027 to features/complexes identified by Haun (1989); returned radiocarbon dates suggest two separate, concurrent occupations from 1450 to 1675 and between 1650 and 1778
Donham (1991)	Archaeological field inspection	Waikapu Stream	Water channel and terrace wall affected by construction; no SIHP # designation

Reference	Type of Study	Location	Results (SIHP #s 50-50-)
Folk and Hammatt (1991)	Archaeological survey	600 acres in at Mā'alaea	Identified SIHP # 09-02708, plantation cemetery, and SIHP # 09-02709, HC&S Plantation Reservoir No. 13 Ditch
Kennedy (1991, 1994)	Archaeological survey	Waikapu Mauka Partners proposed residential development; TMKs: [2] 3-6-002:002 and 004	Documented seven single features and 11 complexes comprised of 74 (mostly agricultural) features (SIHP #s 04-02753 through -02770); identified intact child burial (Feature B) at SIHP # -02755, a human bone fragment at SIHP # -02756, and an adult burial (Feature E) at SIHP # -02757; returned radiocarbon dates suggest occupation from about 1500 to mid-1600s and again during early 1800s
Kennedy (1992)	Archaeological survey	Proposed residential project in Waikapū, TMKs: [2] 3-6-02:2 por. and [2] 3-6-04:09 por.	Identified 18 archaeological complexes (SIHP # -02753 through SIHP # -2770); dryland agricultural features occurred with the highest frequency across the project area; features comprise four broad categories that included boulder slope planting areas, clearing mounds, hillslope terraces, and gully bottom terraces; habitation features and two positively identified human burials, as well as nine possible burials, were also identified in and amongst the agricultural features
Kennedy and Trimble (1992)	Archaeological survey	Maalaea Field #175; TMK: [2] 3-8-001:018 por.	No historic properties identified
Sinoto and Pantaleo (1992)	AIS	Multiple locations; TMKs: [2] 2-5-003-005;	No historic properties identified

Reference	Type of Study	Location	Results (SIHP #s 50-50-)
		[2] 2-7-003, 007-011, 013, 016; [2] 3-8-001, 006, 007, 051, 059, 061, 070, 071	
Sinoto (1993)	Archaeological monitoring	Maui Lani Sand Borrow Site; TMK: [2] 3-8-007:103	No historic properties identified
Athens et al. (1994)	Archaeological survey and paleoenvironmental investigation	Maalaea Generating Station at 1000 North Kihei Rd TMK: [2] 3-8-005:025 por.	No historic properties identified
Robins et al. (1994)	Archaeological survey	14.7-mile transmission line from Maalaea Generating Station to Lāhainā	Identified 34 historic properties including canals, cattle walls, other walls, rock shelters, enclosures, a curbstone trail, a mound, a railroad berm, a terrace, an upright stone, and wall-platform; no features are in the vicinity of the current study area
Rotunno-Hazuka, Somer, Clark, et al. (1995)	Archaeological test excavations	Maui Lani Subdivision and Sand Borrow Site; TMKs: [2] 3-8-007:002 and 110	Determined insignificance for two temporary sites (T-1 and T-3) previously recorded by Rotunno and Cleghorn (1990); identified and determined an additional temporary site (T-4) insignificant; documented at least three additional human burials associated with SIHP # 04-02797
Rotunno-Hazuka, Somer, Flood, et al. (1995)	Archaeological research, test excavations, and burial investigations	Maui Lani Subdivision; TMKs: [2] 3-8-007:002 and 110	Newly identified 10 burial features with a minimum number of individuals (MNI) of 12 associated with SIHP # 04-02797
Athens et al. (1996)	Archaeological survey and	Keālia Pond, National Wildlife Refuge	No historic properties identified

Reference	Type of Study	Location	Results (SIHP #s 50-50-)
	paleoenvironmental investigation		
Pantaleo and Sinoto (1996)	Archaeological subsurface sampling	Maui Lani Subdivision Phase 1 and 1A parcels; TMKs: [2] 3-8-007:002, 110	Identified four additional burials of SIHP #s 04-04146 and -04147
Hammatt et al. (1996)	Archaeological survey addendum	Transmission line access roads from Maalaea Generating Station to Lāhainā	Identified eight historic properties consisting of historic ranching and pre-Contact habitation areas; no features are in the vicinity of the current study area
Burgett and Spear (1997b)	Archaeological inventory survey	Multiple locations; TMKs: [2] 3-8-006:003 and 999; [2] 3-8-004:999; [2] 3-8-005:999; [2] 3-8-008:999	No historic properties identified
Devereux et al. (1997)	Archaeological monitoring with limited subsurface testing	Ma'alaea to Lāhainā Transmission Line	No features identified in the vicinity of the current study area
Drolet and Sinoto (1998)	Archaeological survey	35 acre in Pu'unēnē; TMK: [2] 3-8-008:001 por.	Identified additional components of SIHP # 09-04164, NAS Puunene
Tomonari-Tuggle et al. (2000)	Archaeological inventory survey	Former NAS Puunene; TMKs: [2] 3-8-008:001, 005, 007, 008, 019, 020, 030, 031, 032, 034-038	Relocated SIHP # 09-04164, NAS Puunene, and identified additional components; identified four historic properties: SIHP # 09-04800, seven sugarcane plantation features; SIHP # 09-04801, two clusters of post-WWII ranching features; SIHP # 09-04802, former locomotive rail bed;

Reference	Type of Study	Location	Results (SIHP #s 50-50-)
			SIHP # 09-04803, portions of the Haiku Ditch and Reservoir No. 6
Sinoto and Titchenal (2003)	AIS	Phase VII Residential Project at Maui Lani; TMK: [2] 3-8-007:131 por.	No historic properties identified
Fredericksen and Fredericksen (2004)	AIS	Waikapu Affordable Housing Subdivision; TMKs: [2] 3-5-002:001 por. and 3-8-007:101	Documented a previously identified historic property, SIHP # 04-05474, Kama Ditch with associated Reservoir No. 6
Guerriero et al. (2004)	AIS	50-acre parcel; TMK: [2] 3-5-002:001 por.	Documented SIHP # 04-05474 Kama Ditch
Rotunno-Hazuka and Pantaleo (2004b)	Interim archaeological monitoring	New Sand Hills parcel; TMKs: [2] 3-8-007:121, 136 and 137 por.	No historic properties identified
Rotunno-Hazuka and Pantaleo (2004a)	Interim archaeological monitoring	59-acre Hawaiian Cement Sand Mining Operation in Waikapū Ahupua'a	Identified two burial features within completed Phase B (Fe. 1B and Fe. 2B and 30 additional burial features (Fe. 1A-30A) within the ongoing Phase A operations (features not assigned SIHP #s at time of report)
Sinoto et al. (2004)	AIS	Industrial Park on Waiko Rd; TMKs: [2] 3-8-007:089 and 102 por.	No historic properties identified
Rotunno-Hazuka and Pantaleo (2005)	AIS	Maui Lani Elementary School; TMK: [2] 3-8-007:137	No historic properties identified
Wilson and Dega (2005)	AIS	215.8-acre parcel in Wailuku and Waikapū; TMKs: [2] 3-5-002 and [2] 3-5-003	Documented components of SIHP # 04-05179, Waihe'e Ditch and SIHP # 04-05493, Waikapū Ditch, identified five new historic properties: SIHP #

Reference	Type of Study	Location	Results (SIHP #s 50-50-)
			-05726, an earthen ditch; SIHP # -05727, a large reservoir; SIHP # -05728, 14 erosion control berms; SIHP # -05729, a lesser stone and mortar ditch; and SIHP # -05730, Old Waikapu Rd
Dagan and Hammatt (2006)	LRFI	Former Maui Scrap Yard on Waiko Rd; TMK: [2] 3-8-007:105	No historic properties identified
Morawski et al. (2006)	Archaeological monitoring	Off-site construction near proposed Kehalani Mauka Subdivision in Wailuku and Waikapū; TMKs: [2] 3-5-002:001 por. and [2] 3-5-001:017 por.	Identified five historic properties: SIHP # 04-05680, human burial; SIHP #s 04-05965 and -05966, isolated and disturbed human remains; SIHP # 04-05963, historic roadbed; SIHP #04-05964, sugarcane flume portion
Fredericksen (2007)	Archaeological monitoring	0.5-acre parcel in Waikapu; TMK: [2] 3-8-007:101 por.	No historic properties identified
Hill et al. (2007)	LRFI	81.5-acre parcel in Pulehunui, near Mokulele Highway; TMK: [2] 3-8-008:007 por. and 008 por.	Relocated "Facility 100" of SIHP # 09-4164, NAS Puunene; no additional historic properties identified
Frey and Fredericksen (2008)	AIS	80-acre parcel in Pulehunui, near Maui Veterans Hwy; TMK: [2] 3-8-008:036 por.	Relocated "Facility 100" of SIHP # 09-04164, NAS Puunene; no additional historic properties identified
Pestana and Dega (2008)	Archaeological monitoring	Consolidated Baseyards on Waiko Rd; TMKs: [2] 3-8-007:089, 143, and 144	Documented SIHP # 04-06226, two human burials

Reference	Type of Study	Location	Results (SIHP #s 50-50-)
Hill et al. (2008)	Archaeological monitoring	10-acre parcel of Pu'uēnē School, Wailuku Ahupua'a, Wailuku District, Maui Island; TMK [2] 3-8-06:008	No historic properties identified
Hill et al. (2009)	LRFI	39.267-acre parcel in Pūlehunui; TMK: [2] 3-8-008:001 por	Documented previously identified features of SIHP # 09-04164, NAS Puunene, Facility 214 and Facility 343
Madeus et al. (2010)	Archaeological monitoring	0.45-acre parcel in Waikapu Industrial Park; TMK: [2] 3-8-094:030	No historic properties identified
Perzinski and Dega (2010)	AIS	Proposed Wai'ale Rd extension and Waiko Rd; TMKs: [2] 3-5-002:014, 018, 888; [2] 3-5-027:021; [2] 3-6-002:003; and [2] 3-8-005:999	Documented SIHP # 04-06668, a historic boulder terrace for either water diversion or a former footbridge footing on the southern bank of Waikapū Stream
Tome and Dega (2010)	AIS	607 acres of land spanning Wai'ale, Wailuku, and Waikapū; TMKs: [2] 3-8-005:023 por. and 037; [2] 3-8-007:071, 101, 102, and 104	Relocated SIHP # 04-01508, a portion of Spreckels/Waihe'e Ditch, and SIHP # 04-05504, an area where three human burials were discovered in 2003; identified SIHP # 04-06578, a buried fire pit/ <i>imu</i>
Titchenal and Sinoto (2010)	Archaeological assessment	8.552 acres at Waiko Road and Pakana Street, TMK: [2] 3-8-07:105	No historic properties identified
Lee-Greig et al. (2011)	AIS	Approximately 3165 acres	Identified 90 historic properties, SIHP #s 10-06693 through -06774, consisting of features associated with the sugar plantation, ranching and/or WWII period

Reference	Type of Study	Location	Results (SIHP #s 50-50-)
Guerriero et al. (2017)	AIS	Waikapū Country Town Project; TMKs: [2] 3-6-002:003; [2] 3-6-004:003; and [2] 3-6-005:007	Identified four historic properties: SIHP # 04-07881, 18 commercial sugarcane irrigation features; SIHP # 04-07882, remnant L-shaped retaining wall; SIHP #04 - 07883 WWII bunker; and SIHP # 04-07884, three historic artifact scatters; also documented a portion of a previously identified historic property, SIHP # 04-05197, the historic Waihe'e Ditch
Yucha and Hammatt (2018)	LRFI	Maalaea Generating Station at 1000 North Kihei Rd; TMK: [2] 3-8-005:025 por.	No historic properties identified
Yucha et al. (2021)	AIS	AES Kuihelani Solar Plus Storage Project on the eastern side of Kuihelani Hwy; TMK: [2] 3-8-005:002 por.	Identified components of six new historic properties, two historic water control complexes (SIHP #s 04-08800 and -08804), two water control structures (SIHP #s 04-08801 and -08803), a storage building (SIHP # 04-08802), and a subsurface cultural deposit (SIHP # 04-08805); also documented eight features of SIHP # 04-01508, Spreckels/Waihe'e Ditch

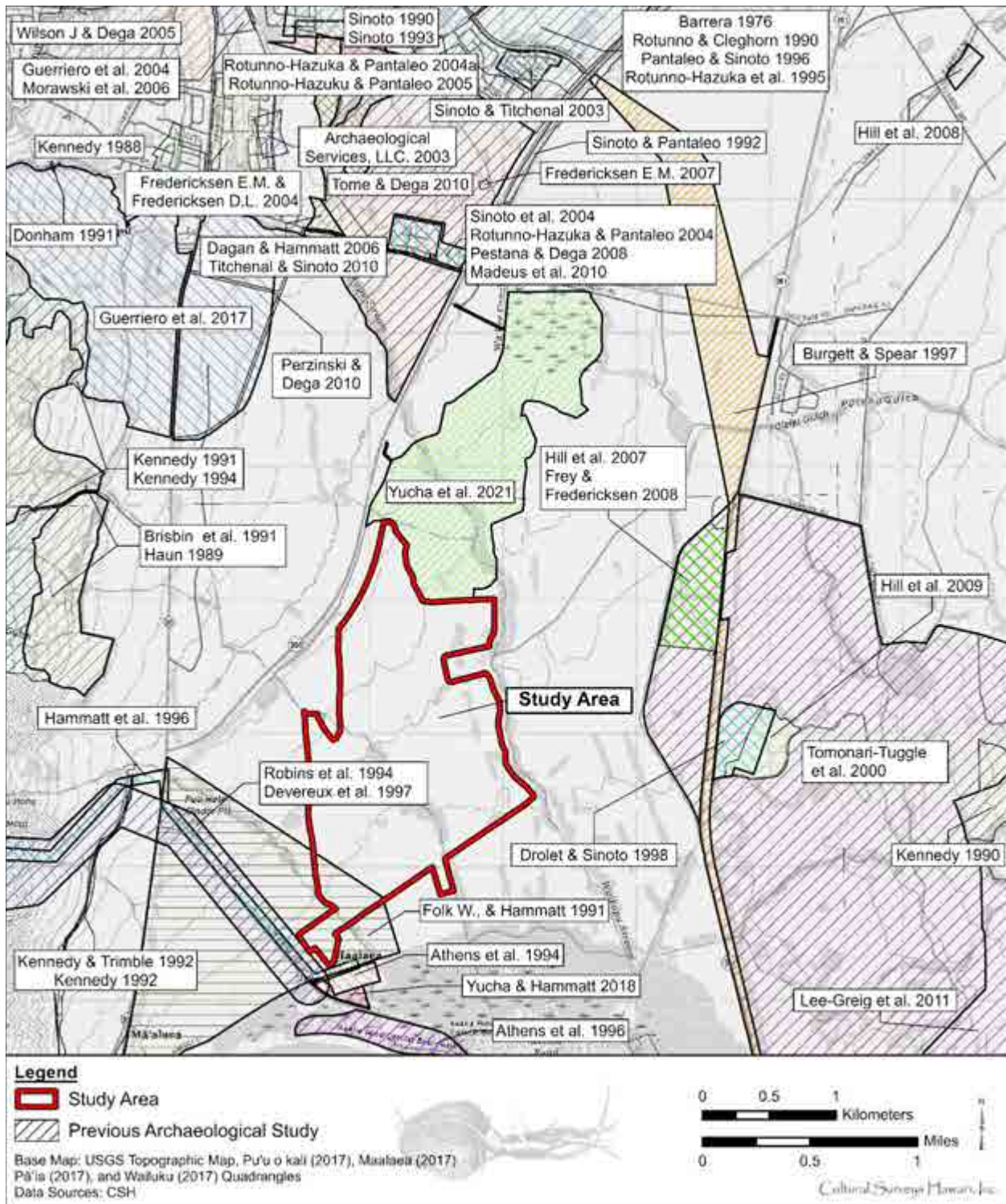


Figure 23. Portions of the 1992 Puu o Kali, 1996 Maalaea, 1997 Paia, and 1997 Wailuku USGS 7.5-minute topographic quadrangles showing the locations of previous archaeological studies in the vicinity of the current study area (U.S. Geological Survey 1992, 1996, 1997a, 1997b)

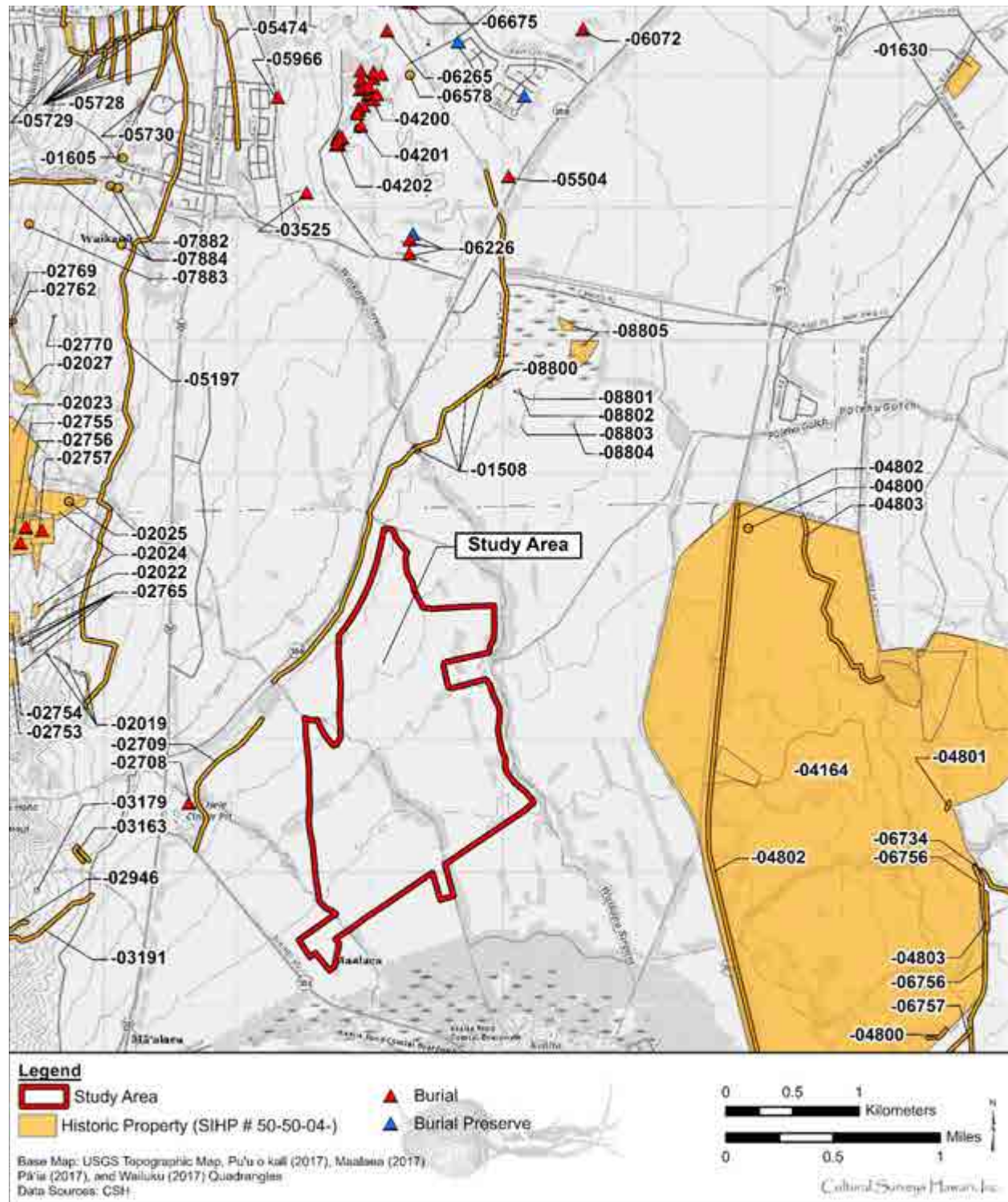


Figure 24. Portions of the 1992 Puu o Kali, 1996 Maalaea, 1997 Paia, and 1997 Wailuku USGS 7.5-minute topographic quadrangles showing the locations of historic properties identified in the vicinity of the current study area (U.S. Geological Survey 1992, 1996, 1997a, 1997b)

3.2.3 Haun (1989); Brisbin et al. (1991)

From 5 through 16 December 1988, Paul H. Rosendahl, Ph.D., Inc. (PHRI) conducted an AIS of approximately 600 acres for the Waikapu Mauka Partners Golf Resort project (Haun 1989). Nine archaeological features and complexes were documented during the pedestrian survey; however, no SIHP #s were assigned. The features include walls, ditches, terraces, mounds, depressions, modified outcrops, enclosures, and L, C, and U-shapes. In addition, a possible *heiau* or shrine was identified within one of the temporary habitation/agriculture complexes. Most features appeared associated with historic ranching or traditional dryland agriculture, while some features within the central portion of the study area above 500 ft AMSL appeared to represent pre-Contact temporary habitation. Further data collection by intensive survey and testing was recommended for all features/complexes.

PHRI conducted subsequent data recovery excavations at the nine features/complexes previously recorded by Haun (1989) (Brisbin et al. 1991). In the data recovery report, these features/complexes, formerly labeled with temporary site identifications, were designated as SIHP #s 50-50-04-02019 through -02027. SIHP # -02019 consists of a 457 m historic-era wall and an associated ditch. SIHP # -02020 is an approximately 1,596 square m agricultural area containing several stepped terraces and small garden plots. SIHP # -02021 consists of two agricultural terraces. SIHP # -02022 represents a historic linear water diversion wall extending approximately 400 m along a hillside. SIHP # -02023 is an agriculture and habitation complex that includes numerous enclosures (many C-shaped), terraces, a rectangular room with a paved terrace, and a hearth. SIHP # -02024 is also an agriculture and habitation (short-term) complex, which includes C-shaped structures, enclosures, a room, garden plots, terraces, and a possible shrine. SIHP # -02025 is a U-shaped structure once used a habitation area. SIHP # -02026 contains a small rectangular enclosure. SIHP # -02027 includes a large enclosure with a large terrace, small terrace, and small cupboard; several associated historic wine bottles indicate historic use, though not necessarily historic construction.

Data recovery excavations were conducted at features within SIHP #s -02020 and -02023 through -02027. Overall, the features mostly were agricultural, though many habitation features were documented along with architectural features. “West-end platforms” may represent *heiau* used as “agricultural temples” (Brisbin et al. 1991:90). Data recovery results denote that increases in density of agricultural features and elevation positively correlate. Radiocarbon dates and diagnostic artifacts suggest the area was utilized as early as 1450 until the modern era, with two periods of intense activity: one from about 1450 to 1675 and again between approximately 1650 and 1778. Results of the data recovery efforts also indicate two feature clusters, possibly signifying two separate but concurrent occupations.

3.2.4 Kennedy (1990)

In 1990, ACH completed an archaeological walk-through reconnaissance survey of the proposed Hawaiian Cement Puunene Quarry site. The study documented that the entire property was covered in sugarcane with the exception of Kolaloa Gulch. The survey included an inspection of Kolaloa Gulch and the surrounding agricultural fields. No historic properties were identified, and no further work was recommended.

3.2.5 Rotunno and Cleghorn (1990)

Between 16 and 31 January 1990, an archaeological reconnaissance survey was conducted by the Public Archaeology Section of the Applied Research Group of the Bernice Pauahi Bishop Museum on an approximately 1,000-acre parcel for the Horita Homes project area (TMKs: [2] 3-8-007:002 and 110) (Rotunno and Cleghorn 1990). Systematic sweeps, placed no less than 50 m apart, were taken across the five land sections (Zones 1 through 5) of the project area delineated by the survey team. Three temporary archaeological sites (labelled Temporary Site Numbers 1 through 3) between Zones 1 and 3. Temporary Site No. 1 consists of a pathway of compacted sand cobbles in a parallel alignment, seemingly delineating a pathway through the parcel with no discernable starting or ending point. Researchers noted the possibility of this path being a somewhat recent construction. Temporary Site No. 2 was initially identified as a disturbed rock wall but was later found to be the remnant of bulldozer tailings. Temporary Site No. 3 consists of a rock mound constructed of piled and compacted cobblestones that did not extend below the ground surface. Additional archaeological surveying and monitoring were recommended due to dense ground cover and the possibility of subsurface cultural remains and human skeletal remains.

3.2.6 Sinoto (1990a, 1990b, 1993)

From 2 through 8 May 1990, the B.P. Bishop Museum conducted a pedestrian survey of 70 acres for the Maui Lani Sand Borrowing Project at TMK: [2] 3-8-007:103. No historic properties were observed, however, the “dense vegetation cover hindered observation” (Sinoto 1990a:1). Archaeological monitoring was recommended for future excavations in sand deposits.

On 12 July 1990, the Bishop Museum conducted an archaeological subsurface assessment and continued archaeological monitoring of a portion of the Maui Lani Sand Borrow Project at TMK: [2] 3-8-007:103 (Sinoto 1990b). The field assessment part of the study included a survey of approximately one third of the existing ground surface, which had been previously grubbed and graded without an archaeologist present and prior to issuance of a grading and grubbing permit. Following the surface survey, archaeologists were assigned to monitor further ground disturbances at the project area. At the time of the interim field report (30 September 1990), no historic properties had been identified.

In a letter report dated 24 September 1993, Aki Sinoto of Aki Sinoto Consulting, summarized the archaeological monitoring of sand borrowing activities conducted during the previous four years at the Maui Lani Sand Borrow Site (Sinoto 1993). The report included the results of the surface survey and field assessment conducted by Public Archaeology Section, Applied Research Group of the B. P. Bishop Museum in May 1990 (Sinoto 1990a) and July 1990 (Sinoto 1990b), respectively. Results of subsequent archaeological monitoring were also reported.

Between July and November 1990, full-time archaeological monitoring was conducted by the Bishop Museum. Following a year long hiatus, archaeological monitoring resumed during March 1992, but was conducted by Aki Sinoto Consulting. Between May and November 1992, Aki Sinoto Consulting conducted periodic archaeological monitoring of the sand borrowing activities. No historic properties were identified during any archaeological monitoring. Cow bones were encountered, though were expected due to previous pasture uses associated with the project area. During the time of the report, sand borrowing had temporarily ceased; archaeological monitoring was expected to resume with future sand moving activities.

3.2.7 Donham (1991)

In November 1991, the Maui Section of the State Historic Preservation Division performed a field inspection of a proposed water pipeline easement across Waikapu Stream (Donham 1991). The inspection focused on the easement which was a 15-ft wide trench corridor to house the 12-inch waterline below the existing stream channel. Donham (1991) described that the area had been affected by extensive earth moving including the use of heavy equipment resulting in heavily disturbed ground and piles of dislodged and pushed boulders. "There is direct evidence that a water channel and terrace wall were once within the easement and were affected by construction on the south side of the stream...it does not seem likely that additional undisturbed features or deposits are present" (Donham 1991:3). It was recommended that the features affected by the work be recorded to the extent possible and minimal research be conducted regarding the L.C.A awards that are within and adjacent to the easement. No SIHP numbers were assigned in this report.

3.2.8 Folk and Hammatt (1991)

In October 1990, CSH completed an archaeological surface survey of approximately 600 acres of land at Mā'alaea in Waikapū Ahupua'a (Folk and Hammatt 1991). Fieldwork included a survey of the area excluding mature cane fields. Two historic properties were identified within the study area. SIHP # 50-50-09-02708 is a historic cemetery, and SIHP # -02709 is HC&S Plantation Reservoir No. 13 Ditch. SIHP # -02708 includes a minimum of seven burials with tombstones as well as other possible burial locations. The tombstones have Japanese *kanji* inscriptions, and the graves may be associated with the HC&S "Camp Seven," described as being demolished after World War II (Folk and Hammatt 1994:i). SIHP # -02709 is a large ditch that extends from Pōhākea Gulch to North Kīhei Road within the surveyed area. This portion of the ditch is constructed of mortar and exhibits a U-shaped cross-section with a maximum width of approximately 2.00 m and a maximum depth of approximately 1.25 m. The ditch was no longer active at the time of the survey, and no further work was recommended for the feature within the study area. The study recommended archaeological monitoring for the former area of Camp Seven and another uncultivated area in the southern portion of the study area. Options for preservation or disinterment of the graves at SIHP # -02708 were presented.

3.2.9 Kennedy (1991, 1994)

From 19 October to 28 November 1989, ACH conducted the pedestrian survey component of an archaeological survey with subsurface testing of the Waikapu Mauka Partners proposed residential project at portions of TMKs: [2] 3-6-002:002 and 3-6-002:004 (Kennedy 1991). ACH carried out the subsequent testing program from 11 February to 11 March 1990. In May 1994, a new version of the report with minimal revisions was finalized for the project (Kennedy 1994).

During the surface survey, seven single archaeological features and 11 complexes comprised of 74 features were identified and designated as SIHP #s 50-50-04-02753 through -02770. Most of these features likely functioned agriculturally; however, some features also indicated habitation, religious, and burial functions. SIHP #s -02753, through -02761, -02763 through -02765 all represent habitation/agricultural complexes. A human arm bone fragment was identified at the surface of SIHP # -02756 near a wall (Feature C). Possible burials were indicated at SIHP #s -02753, -02758 through -02761, -02763, and -02764. The remaining historic properties, which were not identified as complexes, include single agricultural walls (SIHP #s -02762, -02768, and

-02769), four wall segments (SIHP # -02765), a terrace cluster (SIHP # -02766), a U-shape (SIHP # -02767), and a remnant enclosure (SIHP # -02770). The function for SIHP # -02767 (U-shape) was interpreted as habitation/ agricultural and a possible burial. Overall, features/complexes represented a continuation of those previously documented by Haun (1989) on the adjoining property.

Subsurface testing was conducted within 10 of the 11 complexes at 24 total features, including five enclosures, four C-shapes, nine platforms, three mounds, one U-shape, one “[h]illslope [p]lanting [f]eature,” and one rock shelter (Kennedy 1991:20-21). Testing results identified an intact child burial (Feature B) at SIHP # -02755; an adult burial (Feature E) at SIHP # -02757; and cultural deposits at SIHP # -02756 (Features A and F). Five charcoal samples were extracted from soils near a platform (Feature G) at SIHP # -02753, a U-shape (Feature B) and platform (Feature E) at SIHP # -02755, an enclosure (Feature D) at SIHP # -02759, and a C-shape (Feature C) at SIHP # -02760. Calibrated dates returned for the five samples suggest the area was occupied from around 1500 through mid-1600s and then reoccupied during the early 1800s.

3.2.10 Kennedy (1992)

In 1992, ACH conducted an AIS of approximately 212 acres for the then proposed Waikapū Mauka subdivision (Kennedy 1992). A total of 11 archaeological site complexes comprised of 74 associated features and sub-features as well as seven additional singular archaeological sites were recorded, totaling 18 archaeological complexes, SIHP # 50-50-04-02753 through SIHP # -02770 (Kennedy 1992). Dryland agricultural features occurred with the highest frequency across the project area. Kennedy (1992) grouped these features into four broad categories that included: 1) boulder slope planting area; 2) clearing mounds; 3) hillslope terraces; and 4) gully bottom terraces. Habitation features as well as two positively identified human burials and nine possible burials were also identified in and amongst the agricultural features.

3.2.11 Kennedy and Trimble (1992)

On 14 April 1992, ACH conducted an archaeological survey of Maalaea Field #175 (TMK: [2] 3-6-001:018 por.), where C. Brewer Properties cultivated pineapple (Kennedy and Trimble 1992). During the 100% pedestrian survey, the study area was notably disturbed, likely by agricultural activities (i.e., commercial sugarcane and/or pineapple and farming) and/or the construction of roads. Miscellaneous modern refuse was observed on the ground surface, including concrete, plastic, paper, pieces of irrigation piping, and recently discharged bullet casings. Fragments of cow bones also scattered the surface. No historic properties were identified.

3.2.12 Sinoto and Pantaleo (1992)

Between October 1991 and September 1992, Aki Sinoto Consulting conducted an AIS of select portions of the northeast coast and central isthmus of Maui (Sinoto and Pantaleo 1992). This project included 20 miles of linear trenching for the installation of a 36” subsurface water line spanning Maliko Gulch in the east and terminating along Kuihelani Highway in Pu‘unene. The majority of the project area corridor coincided with existing cane-haul roads and paved roadways. Pedestrian inspection in the cut-banks of dirt roads and inspection of gulches that the transmission line crossed revealed no surface artifacts or features. Agricultural and ranching operations had altered most of the inspected gulches. Full-time monitoring was recommended for two of the six

phases, specifically within the coastal regions from Maliko Gulch to Haleakala Highway and within the Pu'unene corridor due to the possibility of subsurface cultural remains.

3.2.13 Athens et al. (1994)

Between 5 October 1993 and 23 January 1994, International Archaeological Research Institute, Inc. (IARII) conducted an archaeological survey and paleoenvironmental investigations at the Maui Electric Company (MECO) Mā'alaea Power Plant (Athens et al. 1994). The study area included two locations around the exterior of the power plant, a proposed warehouse site to the west of the plant and an eastern expansion area. The study included a surface survey and subsurface testing consisting of one backhoe test excavation within the proposed warehouse site and one backhoe test excavation and a core sample within the eastern expansion area. No historic properties were identified during the study. Radiocarbon and pollen analyses were conducted on sediment samples from the core extracted within the eastern expansion area and documented changes in deposition and vegetation in the late Pleistocene, early to mid-Holocene, and the late prehistoric period (Athens et al. 1994:iii). No further historic preservation work was recommended.

3.2.14 Devereux et al. (1997); Hammatt et al. (1996); Robins et al. (1994)

Between April and June 1994, CSH completed an archaeological survey of an approximately 14.7-mile proposed 69KV transmission line from the Maui Electric Company Station to Lāhainā (Robins et al. 1994). A total of 34 archaeological sites or site complexes were identified and limited subsurface testing was conducted within two site areas. Site types include canals, cattle walls, other walls, rock shelters, enclosures, a curbstone trail, a mound, a railroad berm, a terrace, an upright stone, and wall-platform. The primary functions of these historic properties were interpreted as relating to agriculture (primarily sugarcane), ranching, and/or temporary habitation. Two historic properties are identified as *heiau*, one as ritual/temporary habitation, and one as permanent habitation/possible burial. No historic properties were identified in the immediate vicinity of the current study area during this study.

From June through September 1996, as an addendum to the Robins et al. (1994) study, CSH conducted fieldwork for an archaeological survey of the access roads leading to pole locations for the Mā'alaea to Lāhainā Third 69KV Transmission Line Corridor Project (Hammatt et al. 1996). Seven archaeological sites were encountered and subsequently documented in October and November 1996, concurrently with the archaeological monitoring program (Devereux et al. 1997). The access road survey identified a total of seven historic properties, although none are in the vicinity of the current study area. The sites range from historic cattle walls and irrigation features to pre-Contact temporary shelters and a probable fishing shrine (SIHP # 50-50-09-4230). All sites were evaluated as being significant under Criterion "d", except for the probable fishing (SIHP # 09-4230), which was deemed culturally significant under Criterion "e". All the sites were to be protected by fencing during the project and preserved in their original condition following completion of the project.

Between August 1996 and January 1997, CSH conducted archaeological monitoring with limited subsurface testing for the MECO Mā'alaea to Lāhainā Third 69KV Transmission Line Project (Devereux et al. 1997). The project area encompassed a corridor 15.2 miles long and 300 ft wide. The monitoring program included an archaeological survey and subsurface testing, fencing, restoration, and data recovery efforts within various segments of the corridor. The seven historic

properties identified by Hammatt et al. (1996) were recorded concurrently with the archaeological monitoring program. Those sites were assessed as historic ranching and pre-Contact habitation areas. One additional historic property was identified as SIHP 50-50-08-04381, consisting of petroglyphs and lithic scatter near Ukumehame Gulch. SIHP #s 50-50-09-04229 (historic water diversion structure), -04230 (pre-Contact religious shrine), and -04231 (pre-Contact temporary habitation enclosure) were within Maalaea quadrangle, however no historic properties were identified in the immediate vicinity of the current study area. Subsurface testing via two hand excavated test units was limited to SIHP # 50-50-08-04381. SHPD consultation and future archaeological mitigation for construction associated ground disturbance was recommended.

3.2.15 Rotunno-Hazuka, Somer, Clark, et al. (1995)

Between 23 May and 14 June 1990, Applied Research Group of the Bernice Pauahi Bishop Museum conducted test excavations at two possible historic properties previously documented by Rotunno and Cleghorn (1990) as temporary site numbers T-1 and T-4. An additional potential historic property was recorded as temporary site T-4 and tested. Test excavations also occurred at the established SIHP # 50-50-04-02797 burial complex located approximately 75 m southwest of the Maui Waena Intermediate School (Rotunno-Hazuka, Somer, Clark, et al. 1995).

Significant cultural resources were not identified on the surface or within test excavations at the three temporary sites. Therefore, these features were determined archaeologically insignificant. T-1 represents parallel cobble alignments that were interpreted as features recently constructed, possibly by people using off-road vehicles in the sand dunes. T-3, consisting of two rock mounds, was explained as most likely natural features created by sand dune erosion. The mound features were not consistent with known traditional Hawaiian burial markers or trail markers (*ahu*). T-4 appeared to be a recent campfire remnant based on the observed piled of rocks covering a modern trash pit proximal to dirt bike trails.

No human burial features were identified during the subsurface testing at SIHP # -02797. However, varying concentrations of fragmented human skeletal remains were observed both on the surface and within test excavations at the western periphery of the sand borrow pit near the approximate location of where Neller (1984) first documented burials at SIHP # -02797. The recovered remains represented an MNI of at least three individuals. Rotunno-Hazuka, Somer, Clark, et al. (1995) recommended SIHP # -02797 be considered significant. Additional recommendations included that all construction related to the project area cease until formulation of a burial treatment plan, future ground disturbance in the project area be monitored by an archaeologist, and that a burial preserve plan be created and implemented for future development of the project area.

3.2.16 Rotunno-Hazuka, Somer, Flood, et al. (1995)

In 1992, the Anthropology Department for the Bernice Pauahi Bishop Museum researched historical documents and maps for the Maui Lani Development area and conducted archaeological test excavations for burial investigations near SIHP # 50-50-04-02797, a burial complex previously identified at the western periphery of a sand borrow site on the development parcel's eastern boundary (Rotunno-Hazuka, Somer, Flood, et al. 1995). The test excavations resulted in the identification of ten burial features representing at least 12 additional human burials associated with SIHP # -02797. Six of the burial features were preserved *in situ*, while one individual was

disinterred because it had already been exposed in the sandpit. Recovered skeletal remains were handled by the SHPD on Maui. The documentation of additional skeletal remains at SIHP # -02797 prompted the SHPD to request a more intensive AIS of the proposed development area. The results of this AIS are presented by Pantaleo and Sinoto (1996).

3.2.17 Athens et al. (1996)

Between 31 May and 2 June 1995, IARII conducted an archaeological survey and paleoenvironmental coring for kiosks, board walk, and parking areas within the Keālia Pond National Wildlife Refuge (Athens et al. 1996). Subsurface testing included the excavation of five backhoe trenches and one core within the study area. No historic properties were identified. Analysis of the sediment core failed to identify any evidence of Hawaiian agricultural activities, but provided information on the paleoenvironment surrounding Keālia Pond (Athens et al. 1996:53-54).

3.2.18 Pantaleo and Sinoto (1996)

Between 8 and 28 March 1995, Aki Sinoto Consulting conducted a supplemental surface survey and archaeological subsurface testing for Maui Lani Partners, Ltd. for development in the Maui Lani area of Wailuku (TMKs: [2] 3-8-007:002 and 110) (Pantaleo and Sinoto 1996). Intensive subsurface testing occurred at Maui Lani Development Phase 1 parcel, Phase 1A parcel, and SIHP # 50-50-04-02797, a human burial complex. A total of 90 machine excavated trenches, two shovel scrapes, and 1 manually excavated trench were tested in a total of 58 localities. During the archaeological investigation, six human burials were identified and designated as SIHP #s - 04146 and -04147 and four additional burials were designated as components of SIHP # -02797.

Eighty acres proposed for residential development comprised the Phase 1 parcel, located near the Maui Waena Intermediate School. Ten trenches were manually excavated in the Phase 1 parcel. No historic properties were identified in the Phase 1 parcel.

The Phase 1A parcel was 172 acres proposed for an 18-hole golf course south of the Phase 1 parcel border. Sixty-eight backhoe excavated trenches, two shovel scrapes, and one manually excavated trench were tested in the Phase 1A parcel. Two distinct, previously undocumented human burials were identified during testing in this parcel. One burial, SIHP # -04146 was identified at Locality 12. The other burial, SIHP # -04147, was exposed in a road cut along the slope of a dune at Locality 21.

Twelve trenches were placed in and around a sand borrowing pit and known burial complex SIHP # -02797. Four additional human burials were identified in association with SIHP # -02797. Additionally, scattered surface human remains were identified in association with SIHP # -02797. Six machine excavated trenches were tested to investigate the origin of the scattered surface human remains; neither human burials nor non-burial cultural deposits were identified within any of these six test excavations.

The lack of apparent predictability in locating subsurface cultural remains, specifically human burials, based upon surface features (man-made or natural), led researchers to conclude no effective predictive method for avoiding burials, and thus the parcel was cleared for continued development with an archaeological monitor present to help mitigate potential impacts.

Archaeological monitoring was recommended for future ground disturbance associated with development within the project area due to the high potential for encountering burials.

3.2.19 Burgett and Spear (1997)

In March 1997, Scientific Consultant Services, Inc. (SCS) conducted an AIS of a proposed 67-acre power plant location and associated 10 miles of transmission line corridor across the western-central isthmus of Maui for CH2M Hill (Burgett and Spear 1997a). All proposed development was taking place within former sugarcane fields. Field methods included vehicular surveys along existing cane roads, and pedestrian surveys where the corridor strayed from the roadway and lighter vegetation permitted access. No observable artifacts, surface features, or historic properties were identified, and no further archaeological work was recommended for the project.

3.2.20 Drolet and Sinoto (1998)

On 18 September and 13 October 1998 Aki Sinoto Consulting conducted an archaeological survey for a proposed Army Air National Guard planning area, TMK: [2] 3-8-008:001 por. (Drolet and Sinoto 1998). The study area comprised a 35-acre parcel directly west of the former Mokulele Highway, renamed Maui Veterans Highway. The study identified additional components of SIHP # 50-50-09-04164, NAS Puunene, in the form of historic building foundations and portions of the asphalt airfield complex. The field survey included pedestrian transects which noted over 15 concrete structure foundations including five intact splinter shelters, shops, barracks and C.P.O. quarters, recreational buildings, and a boiler house. Additionally, portions of the former runways and taxiways covered approximately half of the survey area. Historic maps of the airfield base were used to conclusively identify the material remnants as they were highly disturbed. No further archaeological work was recommended except for a detailed plan map of the intact shelter features and a field check of the entire airfield complex.

3.2.21 Tomonari-Tuggle et al. (2000)

In November 1999, IARII conducted an AIS of the site of the former Naval Air Station (NAS) Puunene, located in the southern portion of the central isthmus of Maui (Tomonari-Tuggle et al. 2000). A 100% pedestrian survey was conducted on the project parcel with the exceptions of the existing NAS Puunene structures, the Maui Hog pig farm and recycling facility, areas of active and mature sugarcane growth, and a fenced area under development for motorsport racing. The rocky land permitted only a single subsurface excavation near an observed historic trash deposit, which yielded no cultural findings. In addition to relocation and supplementing the list of the former military buildings, constituting SIHP # 50-50-09-04161 Features A through GGG (NAS Puunene), archaeologists also identified four additional historic properties, SIHP #s 50-50-09-04800 through -04803.

SIHP # -04800 consists of seven sugarcane plantation features including canal sections, a possible roadbed, and artifact assemblages near former site of Camp 6. SIHP # -04801 consists of two clusters of post-WWII ranching features, namely fence lines, corrals, and watering troughs. SIHP # -04802 consists of one former locomotive rail bed for the Kihei Railroad. SIHP # -04803 consists of portions of the Haiku Ditch and associated Reservoir No. 6. Preservation in place was recommended for all sites. Should there be a need to remove sites SIHP #s -04800 through -04803,

it was recommended that complete testing and documentation of these site be conducted prior to removal.

3.2.22 Sinoto and Titchenal (2003)

In December 2002, Aki Sinoto Consulting conducted an AIS for the Phase VII Maui Lani Subdivision project (Sinoto and Titchenal 2003). Fieldwork for this project consisted of a 100% pedestrian survey and subsurface testing of 15 backhoe trenches. No artifacts or historic properties were identified within the project area. Field researchers noted that the ground surface and stratigraphy of the parcel indicated substantial previous disturbance to the surface of the parcel. Archaeological monitoring was recommended for all ground disturbing activities on or near the project area due to the known presence of human burials in the area.

3.2.23 Fredericksen E. M. and Fredericksen D. L. (2004)

In August, September, and December 2003, Xamanek Researches conducted an AIS of approximately 100 acres for the Waikapu Affordable Housing Subdivision project (TMKs: [2] 3-5-002:001 por. and 3-8-007:101) (Fredericksen and Fredericksen 2004). Nearly half of the study area had been disturbed by former sand mining activities. A previously identified historic property, SIHP # 50-50-04-05474, Kama Ditch with associated Reservoir No. 6, was documented within the project area. The SHPD collected architectural data for SIHP # -05474, which was to be mostly demolished during the project. Archaeological monitoring was recommended for the project.

3.2.24 Guerriero et al. (2004)

Archaeological Services Hawaii (ASH) conducted an AIS of a 50-acre parcel for proposed development at the Emmanuel Lutheran Church (TMK: [2] 3-5-002:001 por.) (Guerriero et al. 2004). At this time, CSH has not been able to locate a copy of the report. The following was described by O'Claray-Nu et al. (2018:22):

The AIS included a pedestrian survey with subsurface backhoe testing of a total of 25 backhoe trenches (TR1-25). Results of the pedestrian survey identified one historic property, a disturbed segment of State Site 50-50-04-5474, the Kama Ditch, situated within the southwestern portion of the project area. Also noted was a metal sluice gate, designated Feature 1 of Site 5474. The ditch, also known as *kamaauwai* was constructed around 1905 to 1907 and provided water to irrigate the sugar cane fields surrounding the project area. Site 5474 was assessed as significant under Criterion "a" because of its association with the plantation era and Criterion "d" for its information content under the Federal and State historic preservation guidelines (O'Claray-Nu et al. 2018:22)

3.2.25 Rotunno-Hazuka and Pantaleo (2004)

In April 2004, the SHPD accepted an interim archaeological monitoring report submitted by ASH for the development of Consolidated Baseyards within the Puuone sand dunes located east of Waiko Road in Waikapū (Rotunno-Hazuka and Pantaleo 2004b). This monitoring program entailed following a D-9 bulldozer as it rendered the natural vegetated surface into a usable flattened lot for the proposed future construction of multiple baseyard plots. Detailed observations

of the path of the bulldozers revealed no historic properties or cultural materials. During the study, only 12 of the proposed 30 acres of development were assessed.

3.2.26 Rotunno-Hazuka and Pantaleo (2004a)

In April 2004, ASH submitted to SHPD an interim archaeological monitoring program for the continued development of the 59-acre Hawaiian Cement Sand Mining Operation in Waikapū Ahupua‘a (Rotunno-Hazuka and Pantaleo 2004a). Fieldwork during this study involved the continuous monitoring of ground disturbing activities associated with the removal of sand for construction aggregate uses. This archaeological monitoring began at least as early as January 2000 and was divided into Phases A and B. At the time of the report, Phase B was complete, while Phase A was ongoing. Phase B documented the identification of two human burials, Fe. 1B and Fe. 2B, which were left *in situ* pending preservation plans in accordance with the SHPD guidelines. Phase A had documented 40 additional human burials within 30 discrete features, labeled Fe. 1A through Fe. 30A. Since this work was ongoing, additional discoveries were anticipated. All observed burials were to be proposed for preservation in place by the property owner and reviewed by the MLIBC.

3.2.27 Sinoto et al. (2004)

In August 2000, Aki Sinoto Consulting conducted an AIS of an approximate 30-acre parcel to for light industrial development in Waikapū (Sinoto et al. 2004). Fieldwork involved a 100% pedestrian survey and subsurface testing of eight backhoe trenches. No cultural materials or historic properties were encountered. As much as 75% of the project surface area was noted as having been previously disturbed by ground altering activities including grubbing and grading. Archaeological monitoring was recommended for all ground disturbing phases of construction due to the known presence of human remains in the dunes surrounding the project area.

3.2.28 Rotunno-Hazuka and Pantaleo (2005)

In February 2005, ASH conducted additional AIS subsurface testing prior to development at the proposed site for Maui Lani Elementary School (TMK: [2] 3-8-007:137) (Rotunno-Hazuka and Pantaleo 2005). The study included a pedestrian survey of the 29-acre project area and 15 machine-excavated test trenches, which were concentrated mostly in the northern half of the project area where development was proposed. No historic properties were identified during the surface survey or subsurface testing, so the study was termed an archaeological assessment. No further archaeological testing was recommended, but archaeological monitoring was recommended for future ground disturbance associated with the project area due to the high probability of human burials near the project area.

3.2.29 Wilson and Dega (2005)

In August 2005, SCS conducted an AIS on two parcels of land totaling 215.8 acres for the ‘Alaneo Development Project on the boundary between Waikapū and Wailuku Ahupua‘a (TMKs: [2] 3-5-002 and [2] 3-5-003) (Wilson and Dega 2005). The AIS included a systematic pedestrian survey and 21 backhoe test trenches. Seven historic properties were documented during the surface survey and all relate to historic sugarcane cultivation. Two historic properties, SIHP #s 50-50-04-05179 and -05493, were previously identified. SIHP # -05179 consists of a surface portion of the

Waihe'e Ditch and SIHP # -05493 is a surface portion of the Waikapū Ditch. Five historic properties were newly identified. SIHP # -05726 consists of a historic earthen berm ditch. SIHP # -05727 consists of an active and maintained rectangular reservoir. SIHP # -05728 consists of 14 earthen erosion control berms, all running parallel to one another in a cross-slope orientation. SIHP # -05729 consists of a stone and mortar irrigation ditch, possibly representing a recently widened former irrigation ditch. SIHP # -05730 consists of a 945-m portion of the alignment of Old Waikapū Road, observed to be running roughly between the two parcels making up the project area.

Only one trench (ST-6) encountered a historic property, largely because it was excavated across one of the earthen berms comprising SIHP # -05728 to gain insight into its construction. No subsurface historic properties were identified during trenching portions of this study. No further archaeological work for the project.

3.2.30 Dagan and Hammatt (2006)

On 22 November 2006, CSH conducted a Due Diligence Letter Report and Field Inspection on the proposed site for the Maui Scrap Yard Project (Dagan and Hammatt 2006). During the field inspection, most of the study area was covered with industrial scrap. No historic properties were identified during this study, however, two sand piles of unknown origin at the northern end of the parcel were noted as a likely source for subsurface findings. A complete AIS and archaeological monitoring provisions were recommended prior to and during all future ground disturbances.

3.2.31 Morawski et al. (2006)

Between December 2003 and July 2005, SCS and ASH conducted archaeological monitoring of off-site construction near the proposed Kehalani Mauka Subdivision Project in Wailuku and Waikapū (TMKs: [2] 3-5-002:001 por. and [2] 3-5-001:017 por.) (Morawski et al. 2006). Five historic properties were identified during the 20 months of monitoring. SIHP # 50-50-04-05680 is a complete, *in situ* human burial located along Wai'ale Road. The burial was preserved in place and capped with a buried concrete slab. SIHP # -05965 consists of disturbed human remains (an adult humerus portion). SIHP # -05966 consists of an incomplete and previously disturbed subadult burial. The human remains of SIHP #s -05965 and -05966 were assessed at the Maui SHPD Office and temporarily curated there pending long-term mitigation. SIHP # -05963 is a historic roadbed associated with early use of Wai'ale Road. SIHP # -05964 is a portion of a historic sugarcane irrigation flume consisting of concrete and corrugated metal.

3.2.32 Fredericksen E. M. (2007)

In February 2006, Xamanek Researches conducted archaeological monitoring of the proposed Waiale Well No. 1 site located *mauka* of Kuihelani Highway in Waikapū (Fredericksen 2007). Monitoring included the screening of select portions of sandy matrix to inspect for cultural remains. All project-related excavation occurred within compacted and relatively undisturbed aeolian sand sediments. No cultural remains or historic properties were observed.

3.2.33 Hill et al. (2007)

On 2 May 2007, CSH conducted an LRFI of an 81.5-acre parcel located in Pulehunui Ahupua'a, near NAS Puunene on the *makai* side of Mokulele Highway (Hill et al. 2007). A pedestrian survey of the project area was undertaken in the areas not actively planted in mature sugarcane, including

fallow fields and the roadway access and egress surrounding the active sugarcane fields and highway. One previously identified historic property was relocated during the study; “Facility 100” of SIHP # 50-50-09-4164 (NAS Puunene). Consultation with the SHPD was recommended for all future ground disturbing work regarding additional documentation or mitigation of SIHP # -4164 “Facility 100.”

3.2.34 Frey and Fredericksen (2008)

Between 28 and 29 January 2008, Xamanek Researches conducted an AIS of an 80-acre portion of land in Pulehunui Ahupua‘a previously assessed by Hill et al. (2007) and containing SIHP # 50-50-09-04164 “Facility 100” of NAS Puunene (Frey and Fredericksen 2008). Development plans for the parcel included the possible demolition of “Facility 100,” which, in turn, necessitated the reevaluation and reassessment of the “Facility 100” structure. The mitigation measures for the “Facility 100” structure were not detailed. Part of the parcel evaluation also consisted of the mechanical excavation of 32 backhoe trenches across the surface of the parcel, which was at this time devoid of the sugarcane growth that hampered the efforts of previous studies. While historic debris was observed on the surface of the plow zone, excavations did not reveal any cultural materials or historic properties.

3.2.35 Hill et al (2008)

In 2007, CSH oversaw the removal of outdated cesspools and the installation of modern sewer lines and septic tanks at the Pu‘unēnē School (Hill et al 2008). No historic properties were identified.

3.2.36 Hill et al. (2009)

In August 2008, CSH conducted an LRFI of 39.267-acre parcel for the County of Maui’s proposed Maui Community Correctional Center in Pūlehunui Ahupua‘a, Wailuku, TMK: [2] 3-8-008:001 por. The study documented two previously identified components of SIHP # 50-50-09-04164, NAS Puunene, consisting of Facility 214, a partially intact set of two WWII-era concrete air-raid shelters, covered in soil to form a protective revetment for the storage and maintenance of aircraft, and Facility 343, an intact WWII-era basalt cobble and concrete retaining wall and foundation for an intact above-ground gasoline storage tank. The field inspection conducted by CSH documented extensive modification and damage to SIHP# -04164, Facility 214. Passive preservation for Facility 343 was recommended following removal of the gasoline storage tank feature.

3.2.37 Pestana and Dega (2008)

Between 29 August 2006 and 15 November 2007, SCS conducted archaeological monitoring for the Consolidated Baseyards site located on Waiko Road (Pestana and Dega 2008). Two human burials, SIHP # 50-50-04-06226 Features 1 and 2, were encountered during monitoring of a drainage line. SIHP # 50-50-04-06226 Feature 1 (Burial 1) was identified at the northern end of Manea Place and was displaced entirely during the excavation activities. The individual was assessed as an adult Native Hawaiian male. The recovered remains were relocated to a nearby burial preserve area, which is approximately 750 m (0.47 mile) east of the current study area. SIHP # 50-50-04-06226 Feature 2 (Burial 2) was discovered on East Uahi Way and identified as an *in situ* flexed burial that was partially disturbed by the excavation activities. A gastropod shell was

observed among the displaced remains and believed to be associated with the burial. Burial 2 was preserved in an above ground hollow tile burial structure placed at the original find location. Archaeological data recovery was recommended for SIHP # 50-50-04-06226 Feature 1, and full-time monitoring was recommended for all future ground disturbing activities due to the likelihood of encountering additional human burials in the sandy sediment characteristic of this area.

3.2.38 Madeus et al. (2010)

On 9 December 2009 and 7 January 2010, CSH conducted archaeological monitoring for the development of a 0.45-acre parcel at Waikapu Industrial Park (Madeus et al. 2010). Ground disturbance during this project included general grading and the excavation of footings, foundations, and utility trenches to service the new structures. No cultural materials or historic properties were observed during monitoring. The study area had undergone extensive previous ground disturbances. Archaeological monitoring was recommended for all future ground disturbing activities due to the known presence of human burials within sand deposits characteristic of this area.

3.2.39 Perzinski and Dega (2010)

In August 2009, SCS conducted an AIS of an approximate 2.5 km long corridor for the proposed Wai'ale Road extension and a 1.3 km long by 0.2 km wide corridor for the proposed Waiko Road improvement in Waikapū (TMKs: [2] 3-5-002:014, 018, 888; [2] 3-5-027:021; [2] 3-6-002:003; and [2] 3-8-005:999) (Perzinski and Dega 2010). The investigation included a pedestrian survey and 64 backhoe trenches. No cultural materials were encountered within the backhoe trenches. One historic property was documented during the pedestrian survey. SIHP # 50-50-04-06668 is a historic boulder terrace on the southern bank of Waikapū Stream. The terrace was interpreted as functioning for either water diversion or as a former footbridge footing. No sediments were present within the boulder terrace. SIHP # -06668 was assessed as significant per Criterion "d" (have yielded, or have the potential to yield significant information to the history of the area) of the Hawai'i State Register, and no additional testing was recommended.

3.2.40 Tome and Dega (2010)

Between 13 June 2008 and 16 September 2009, SCS conducted an AIS of approximately 607 acres of undeveloped land spanning the aeolian sand dunes crossing Wai'ale, Wailuku, and Waikapū (Tome and Dega 2010). The investigation included a 100% pedestrian survey and the excavation of 282 backhoe trenches and five manually excavated test units. Area A of the project area contained two previously identified historic properties, SIHP # 50-50-04-01508, a portion of the Spreckels Ditch, and SIHP # 50-50-04-05504, a locale consisting of at least three human burials. These sites had been designated by the SHPD outside of any previous archaeological study (Tome and Dega 2010:38). The human remains were identified by an archaeologist from ASH in 2003 during a casual observation while monitoring at a nearby Maui Lani project area. The pedestrian survey relocated the two previously identified site locales.

Additional testing around SIHP # -05504 did not encounter any additional human remains, which helped to define the site boundaries. One newly identified historic property was documented in one excavation during subsurface testing. SIHP # 50-50-04-06578 designates a buried fire pit/*imu* (underground oven) observed within Trench ST-90 located in Area A. Archaeological

monitoring was recommended for all ground disturbing activities associated with the development of the project area.

3.2.41 Tichenal and Sinoto (2010)

In March 2010, Aki Sinoto Consulting conducted an AIS for the proposed light industrial subdivision (Tichenal and Sinoto 2010) associated with the current Lot 1-A Improvements Project (TMK: [2] 3-8-007:105). The AIS included a surface survey of the entire project area, the excavation of nine backhoe-assisted test excavations, and the excavation of eleven subsurface inspection units. No historic properties were identified during the study. Due to the negative findings of the AIS, the study was termed an archaeological assessment.

3.2.42 Lee-Greig et al. (2011)

From 18 October through 12 December 2009 and from 1 through 17 February 2010, CSH conducted an AIS of approximately 3165 acres in Pūlehunui for a proposed agricultural subdivision (Lee-Greig et al. 2011). Ninety historic properties (SIHP #s 50-50-10-06693 through -06774) were documented, consisting of features associated with the sugar plantation, ranching and/or WWII period.

3.2.43 Guerriero et al. (2017)

From February through June 2013, ASH conducted an AIS for the Waikapū Country Town Project (TMKs: [2] 3-6-002:003; [2] 3-6-004:003; and [2] 3-6-005:007) (Guerriero et al. 2017). The project area was divided into five parcels: Parcel 3 Mauka, Parcel 3 Waena, Parcel 3 Makai, Parcel 7, and Parcel 6. Fieldwork included a 100 percent coverage pedestrian survey followed by a subsurface testing program consisting of 150 mechanically excavated test excavations. The testing method employed by the survey consisted of systematic random sampling to obtain information about the subsurface conditions across the project area and to determine future or additional excavation strategies as needed. No historic properties were identified during subsurface test excavation.

During the AIS, four historic properties were identified during the surface survey: SIHP #s 50-50-04-07881 through -07884. SIHP # -07881 consists of 18 component features associated with historic commercial sugarcane irrigation (e.g., concrete-lined ditches and headwalls, dirt culverts, and sluice gates). SIHP # -07882 is a remnant L-shaped retaining wall. SIHP # -07883 was interpreted as a World War II bunker. SIHP # -07884 consists of three discrete scatters of historic materials including ceramic sherds and glass bottle fragments. Additionally, previously identified SIHP # -05197, the historic Waihe'e Ditch, runs north/south through the northwest portion of the project area.

All 18 feature components of SIHP # -07881 were identified along the northwestern boundary of the project area, south of Waikapū Stream, in Parcel 3 Mauka. Irrigation features comprising SIHP # -07881, including the reservoir (Feature 3) at the project area's western extent, were recorded historically on a 1955 USGS map. SIHP # -07882 is located near SIHP # -07881 Feature 2 (ditch) and the Parcel 3 Mauka and Parcel 6 boundary.

SIHP # -07883 was identified on the southern side of an access road transecting east/west Parcel 3 Mauka. The three distinct historic artifact scatters (Features 1–3) of SIHP # -07884 were

documented near SIHP # -07881 Feature 2 (ditch) in the northeastern corner of Parcel 3 Mauka (Feature 1), in the northern-central portion of Parcel 6 (Feature 2), and at the southeastern corner of Parcel 7 (Feature 3).

In addition to the SIHP #s identified, six other features were recorded and designated temporary site numbers. These temporary sites include a concrete slab of early to mid-1900s construction (TS4), and five rock piles (TS21, TS22, and TS23 through TS25). TS4 (slab) was identified with Parcel 3 Mauka approximately 81 m (265.75 ft) east of the reservoir at the western extent of the project area. TS21 and TS22 (rock piles) were recorded within Parcel 3 Mauka, while the other TS23 through TS25 (rock piles) were documented within Parcel 3 Waena. None of these features were determined to meet significance criteria. Other than archaeological monitoring during the project, additional archaeological work was not recommended for these temporary sites.

SIHP #s -07881 through -07884 were assessed as significant under Criterion D, since “they have yielded, or have the potential to yield significant information to the history of the area;” SIHP # -07883 (bunker) was additionally assessed with significance Criterion C for having “a distinct method or style of construction during a certain era (Guerriero et al. 2017:2). Guerriero et al. (2017) recommended preservation in place for SIHP # -07883 (bunker); alternatively, recommendation was presented for replacement of SIHP # -07883 with an interpretative commemorative plaque if preservation is not viable. Archaeological monitoring was recommended for the project.

3.2.44 Yucha and Hammatt (2018)

On 7 June 2016, CSH conducted an LRFI for the construction of a storm water retention basin at the Maalaea Generating Station (MGS) at 1000 North Kīhei Road in Waikapū Ahupua‘a (Yucha and Hammatt 2018). An unimproved road was depicted on a 1923 topographic map of the project area, yet no evidence of the road was detected during the field inspection. Ground visibility was excellent, and no surface historic properties were identified in the project area.

3.2.45 Yucha et al. (2021)

Between April 2019 and September 2020, CSH conducted an AIS for the AES Kuihelani Solar Plus Storage Project entailing approximately 451.48 acres (182.71 hectares) of former (fallow) commercial agricultural fields on the eastern side of Kuihelani Highway (TMK: [2] 3-8-005:002 por.) (Yucha et al. 2021). The AIS included a 100 percent coverage pedestrian inspection, a GPR survey of 17 transects, the observation of 25 geotechnical test bores, and a representative subsurface test excavation of 258 backhoe-assisted trenches throughout the project area. Overall, the observed stratigraphy included a mix of aeolian sand, lithified sand, and alluvial loams. Components of seven historic properties were identified, and all the features were associated with commercial sugarcane cultivation. These include six newly identified historic properties, SIHP # 50-50-04-08800 through -08805, as well as documentation of eight features of Spreckels/Waihe‘e Ditch (SIHP # 50-50-04-01508) within the project area. The six newly identified historic properties consist of two historic water control complexes (SIHP #s -08800 and -08804), two water control structures (SIHP #s -08801 and -08803), a storage building (SIHP # -08802), and a subsurface cultural deposit (SIHP # -08805).

Section 4 Results of Fieldwork

4.1 LRFI Pedestrian Survey

In March 2023, CSH conducted a reconnaissance-level field inspection of an approximate 1,380-acre (558-hectare) study area, including the current AIS study area, to develop preliminary information of the types and locations of historic properties that may be present on the surface. The pedestrian survey was accomplished through systematic sweeps with spacing varied depending upon surface conditions. The results of the field inspection were presented within the project's LRFI report (Yucha et al. 2023). CSH identified historic properties primarily related to the former use of the area for commercial agriculture. The LRFI recommended the completion of an AIS as the next step in the historic preservation review process in order to formally document and assess each historic property.

4.2 AIS Pedestrian Survey

In January 2024, CSH began AIS fieldwork with a 100 percent coverage pedestrian inspection of the 729.6-acre (295.3-hectare) AIS study area, a subset of the 1,380-acre (558-hectare) LRFI study area. The survey was completed using pedestrian transects that were spaced every 10-15 m depending upon ground visibility. In general, ground visibility was good throughout most of the study area since the area had been previously plowed and cleared during former agricultural operations (Figure 25 and Figure 26). The AIS pedestrian inspection identified two historic properties on the surface of the study area. These historic properties included a linear cement and concrete remnant ditch related to historic through modern commercial agricultural operations (SIHP # 50-50-04-09164) and an artifact scatter representing the remnants of HC&S Camp Seven (SIHP # 50-50-04-09165). Full documentation of each historic property, including an assessment of significance, is provided in Section 6.

4.3 Ground Penetrating Radar

CSH utilized GPR survey during the AIS in an effort to increase survey coverage throughout the study area without further increasing the amount of invasive testing. In accordance with the project's AIS fieldwork strategy, CSH completed 12 GPR transects (GPR-1 through GPR-12) that were randomly distributed throughout the study area (Figure 29 and Figure 30). Each GPR transect was 100.0 m (328.0 ft) long and consisted of a single transect to produce a reflection profile of subsurface conditions.

In general, the reflections that were collected during the GPR survey for this AIS are consistent with the findings of subsurface test excavation within the study area. The GPR reflection profiles show the interface of the plow zone occurring at approximately 1.0 to 1.2 m (3.2 to 3.9 ft) below surface. The GPR signal was not able to effectively penetrate beneath the plow zone into the underlying natural soil deposits. No historic properties or potential archaeological anomalies were identified during the GPR survey for this AIS.



Figure 25. General view showing vegetation and surface conditions within a portion of the study area, view to south



Figure 26. General view showing vegetation and surface conditions within a portion of the study area, view to northeast

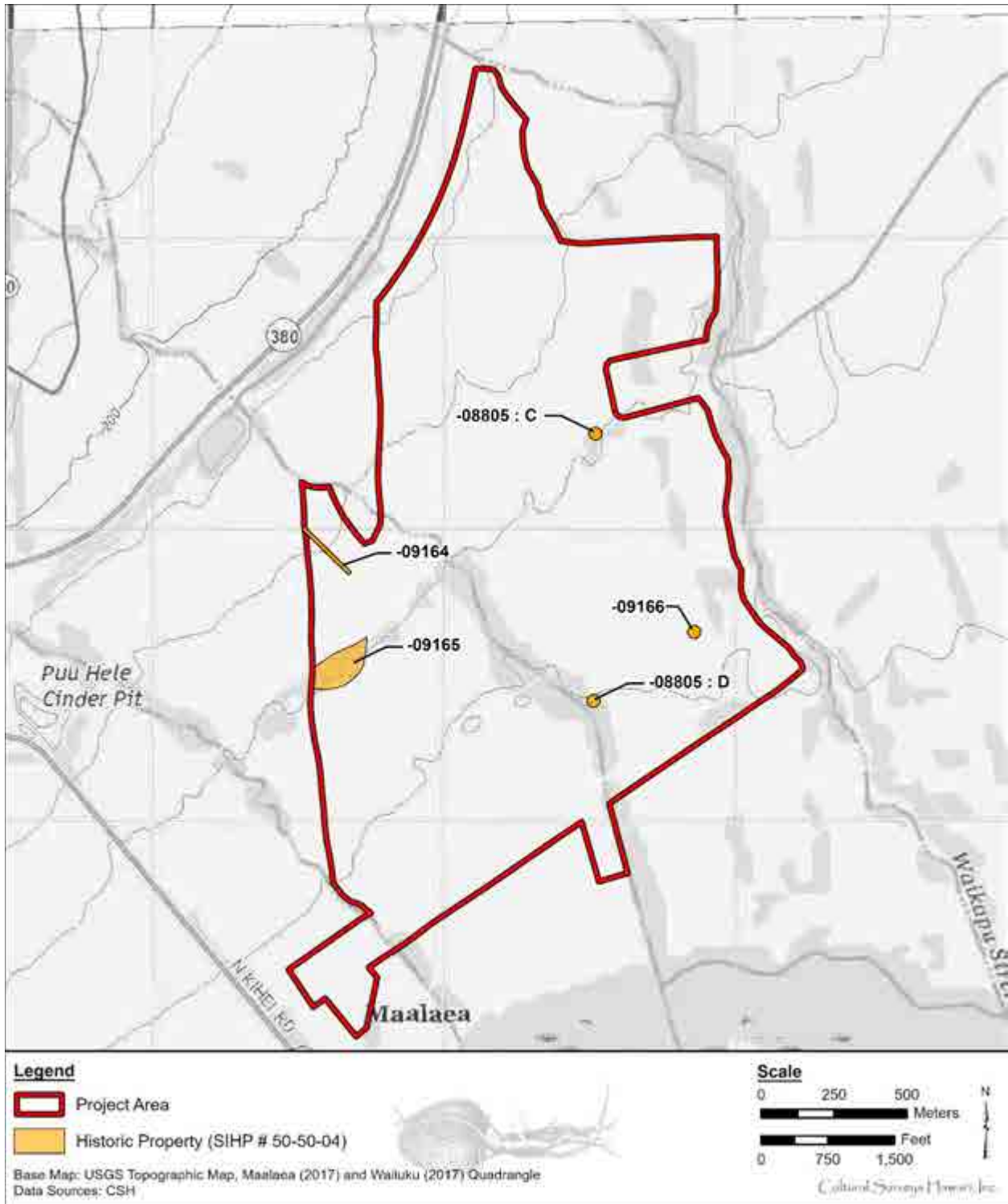


Figure 27. Portions of the 2017 Maalaea and 2017 Wailuku USGS 7.5-minute topographic quadrangles showing the location of historic properties identified within the study area (U.S. Geological Survey 2017a, 2017d)



Figure 28. Aerial image showing the location of historic properties identified within the study area (EagleView Technologies Inc. 2023)

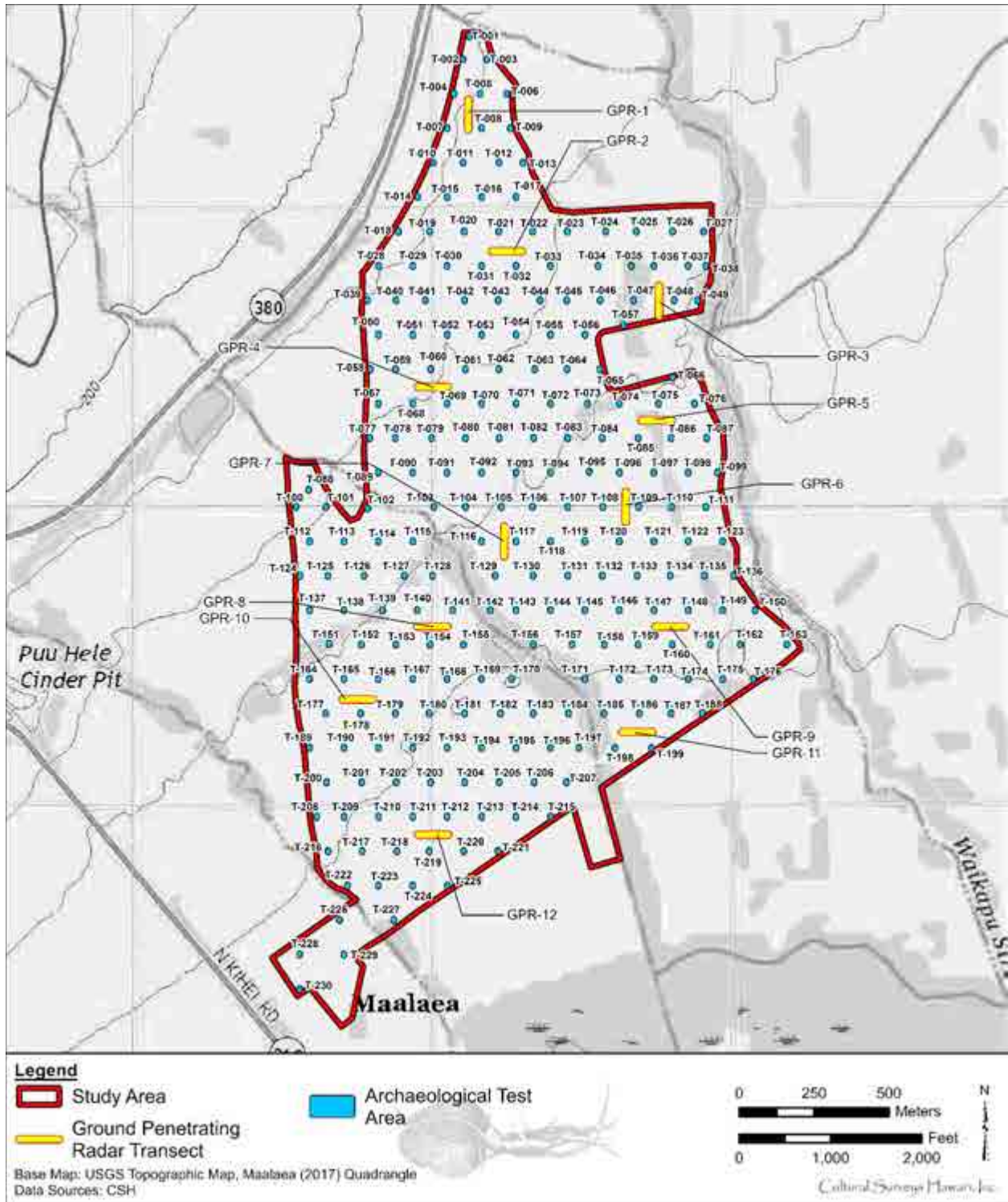


Figure 29. Portion of the 2017 Maalaea USGS 7.5-minute topographic quadrangle showing the location of the AIS test excavations and GPR survey transects within the study area (U.S. Geological Survey 2017a)



Figure 30. Aerial image showing the location of the AIS test excavations and GPR survey transects within the study area (EagleView Technologies Inc. 2023)

4.3.1 GPR-1

GPR-1 was completed on 22 April 2024 within the northernmost portion of the study area, near TE-4 through TE-9 (see Figure 29 and Figure 30). Prior to the survey, the transect area was cleared of surface vegetation that included fallow sugarcane (*Saccharum* spp.), crown flower (*Calotropis gigantea*), and various grasses. The surface of the transect area was level. No anomalies were detected in the reflection profiles of GPR-1 (Figure 31 through Figure 33). The reflections are consistent with the results of adjacent AIS test excavations that identified the plow zone and the interface of the underlying substrate.

4.3.2 GPR-2

GPR-2 was completed on 22 April 2024 within the northern portion of the study area, near TE-21, 22, 31, and 32 (see Figure 29 and Figure 30). Prior to the survey, the transect area was cleared of surface vegetation that included fallow sugarcane (*Saccharum* spp.), crown flower (*Calotropis gigantea*), and *koa haole* (*Leucaena leucocephala*). The surface of the transect area was undulated as a result of previous mechanical plowing. No anomalies were detected in the reflection profiles of GPR-2 (Figure 34 through Figure 36). The reflections are consistent with the results of adjacent AIS test excavations that identified the plow zone and the interface of the underlying substrate.

4.3.3 GPR-3

GPR-3 was completed on 22 April 2024 within the northwestern portion of the study area, near TE-36, 47, 48, and 56 (see Figure 29 and Figure 30). Prior to the survey, the transect area was cleared of surface vegetation that included fallow sugarcane (*Saccharum* spp.), *koa haole* (*Leucaena leucocephala*), and various grasses. The surface of the transect area was undulated as a result of previous mechanical plowing. No anomalies were detected in the reflection profiles of GPR-3 (Figure 37 through Figure 39). The reflections are consistent with the results of adjacent AIS test excavations that identified the plow zone and the interface of the underlying substrate.

4.3.4 GPR-4

GPR-4 was completed on 22 April 2024 within the northeastern portion of the study area, near TE-59, 60, 68, and 69 (see Figure 29 and Figure 30). Prior to the survey, the transect area was cleared of surface vegetation that included fallow sugarcane (*Saccharum* spp.) and various grasses. No anomalies were detected in the reflection profiles of GPR-4 (Figure 40 through Figure 42). The reflections are consistent with the results of adjacent AIS test excavations that identified the plow zone and the interface of the underlying substrate.

4.3.5 GPR-5

GPR-5 was completed on 22 April 2024 within the eastern-central portion of the study area, near TE-72, 74, 95, and 96 (see Figure 29 and Figure 30). Prior to the survey, the transect area was cleared of surface vegetation that predominantly included fallow sugarcane, castor bean (*Ricinus communis*) and various grasses. The surface of the transect area was undulated as a result of previous mechanical plowing. No anomalies were detected in the reflection profiles of GPR-5 (Figure 43 through Figure 45). The reflections are consistent with the results of adjacent AIS test excavations that identified the plow zone and the interface of the underlying substrate.



Figure 31. GPR-1, general view of GPR transect location, view to north

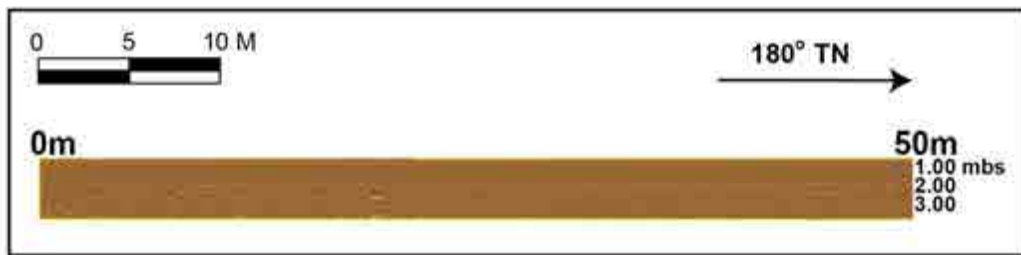


Figure 32. GPR-1 reflection profile (0-50 m)

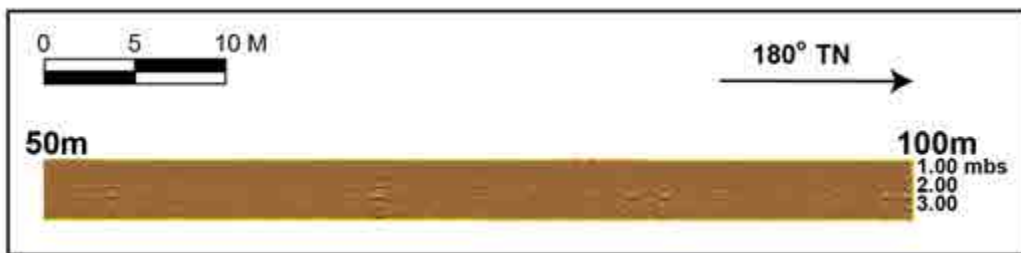


Figure 33. GPR-1 reflection profile (50-100 m)



Figure 34. GPR-2, general view of GPR transect location, view to east



Figure 35. GPR-2 reflection profile (0-50 m)



Figure 36. GPR-2 reflection profile (50-100 m)



Figure 37. GPR-3, general view of GPR transect location, view to south



Figure 38. GPR-3 reflection profile (0-50 m)



Figure 39. GPR-3 reflection profile (50-100 m)



Figure 40. GPR-4, general view of GPR transect location, view to west



Figure 41. GPR-4 reflection profile (0-50 m)



Figure 42. GPR-4 reflection profile (50-100 m)



Figure 43. GPR-5, general view of GPR transect location, view to east



Figure 44. GPR-5 reflection profile (0-50 m)

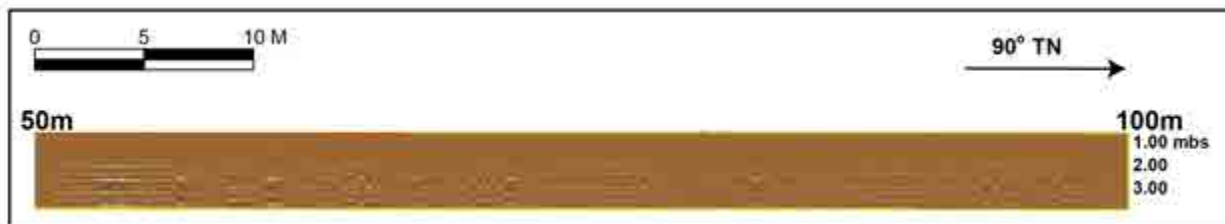


Figure 45. GPR-5 reflection profile (50-100 m)

4.3.6 GPR-6

GPR-6 was completed on 23 April 2024 within the northeastern portion of the study area, near TE-36, 47, 48, and 56 (see Figure 29 and Figure 30). Prior to the survey, the transect area was cleared of surface vegetation that included fallow sugarcane (*Saccharum* spp.), crown flower (*Calotropis gigantea*), and various grasses. The surface of the transect area was level. No anomalies were detected in the reflection profiles of GPR-6 (Figure 46 through Figure 48). The reflections are consistent with the results of adjacent AIS test excavations that identified the plow zone and the interface of the underlying substrate.

4.3.7 GPR-7

GPR-7 was completed on 23 April 2024 within the center of the study area, near TE-92, 116, 117, and 130 (see Figure 29 and Figure 30). Prior to the survey, the transect area was cleared of surface vegetation that included fallow sugarcane, *koa haole* (*Leucaena leucocephala*), and various grasses. The surface of the transect area was level. No anomalies were detected in the reflection profiles of GPR-7 (Figure 49 through Figure 51). The reflections are consistent with the results of adjacent AIS test excavations that identified the plow zone and the interface of the underlying substrate.

4.3.8 GPR-8

GPR-8 was completed on 23 April 2024 within the southwestern portion of the study area, near TE-139, 140, 141, and 154 (see Figure 29 and Figure 30). Prior to the survey, the transect area was cleared of surface vegetation that included fallow sugarcane, *koa haole* (*Leucaena leucocephala*), and various grasses. The surface of the transect area was level. No anomalies were detected in the reflection profiles of GPR-8 (Figure 52 through Figure 54). The reflections are consistent with the results of adjacent AIS test excavations that identified the plow zone and the interface of the underlying substrate.

4.3.9 GPR-9

GPR-9 was completed on 23 April 2024 within the southeastern portion of the study area, near TE-146, 147, 159, and 160 (see Figure 29 and Figure 30). Prior to the survey, the transect area was cleared of surface vegetation that included *koa haole* (*Leucaena leucocephala*) and various grasses. The surface of the transect area was level. No anomalies were detected in the reflection profiles of GPR-9 (Figure 55 through Figure 57). The reflections are consistent with the results of adjacent AIS test excavations that identified the plow zone and the interface of the underlying substrate.

4.3.10 GPR-10

GPR-10 was completed on 23 April 2024 within the southwestern portion of the study area, near TE-166, 177, 178, and 179 (see Figure 29 and Figure 30). Prior to the survey, the transect area was cleared of surface vegetation that included fallow sugarcane, *koa haole* (*Leucaena leucocephala*), and various grasses. The surface of the transect area was level. No anomalies were detected in the reflection profiles of GPR-10 (Figure 58 through Figure 60). The reflections are consistent with the results of adjacent AIS test excavations that identified the plow zone and the interface of the underlying substrate.



Figure 46. GPR-6, general view of GPR transect location, view to north



Figure 47. GPR-6 reflection profile (0-50 m)



Figure 48. GPR-6 reflection profile (50-100 m)



Figure 49. GPR-7, general view of GPR transect location, view to south

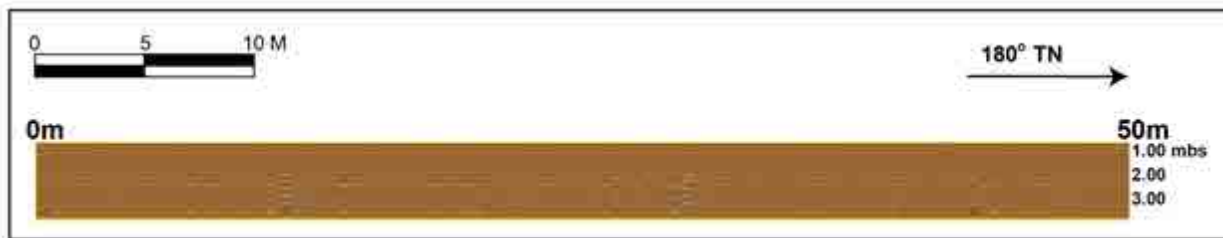


Figure 50. GPR-7 reflection profile (0-50 m)

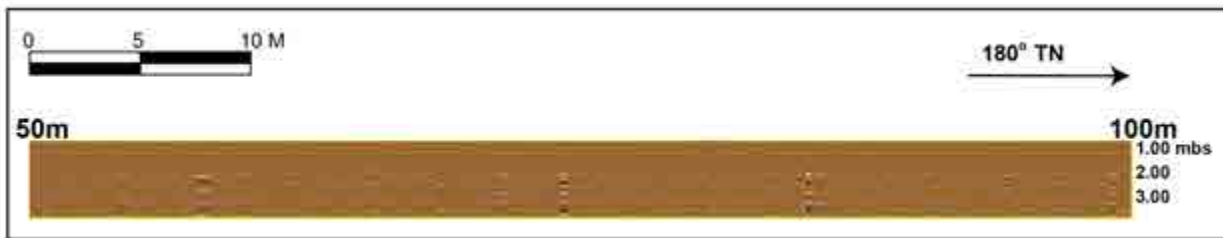


Figure 51. GPR-7 reflection profile (50-100 m)



Figure 52. GPR-8, general view of GPR transect location, view to east



Figure 53. GPR-8 reflection profile (0-50 m)



Figure 54. GPR-8 reflection profile (50-100 m)



Figure 55. GPR-9, general view of GPR transect location, view to east



Figure 56. GPR-9 reflection profile (0-50 m)



Figure 57. GPR-9 reflection profile (50-100 m)



Figure 58. GPR-10, general view of GPR transect location, view to east



Figure 59. GPR-10 reflection profile (0-50 m)



Figure 60. GPR-10 reflection profile (50-100 m)

4.3.11 GPR-11

GPR-11 was completed on 23 April 2024 along the southern boundary of the study area, near TE-185, 186, 187, and 198 (see Figure 29 and Figure 30). Prior to the survey, the transect area was cleared of surface vegetation that included *koa haole* (*Leucaena leucocephala*) and various grasses. The surface of the transect area was level. No anomalies were detected in the reflection profiles of GPR-11 (Figure 61 through Figure 63). The reflections are consistent with the results of adjacent AIS test excavations that identified the plow zone and the interface of the underlying substrate.

4.3.12 GPR-12

GPR-12 was completed on 23 April 2024 within the southwestern corner of the study area, near TE-204, 211, 218, and 219 (see Figure 29 and Figure 30). Prior to the survey, the transect area was cleared of surface vegetation that included *koa haole* (*Leucaena leucocephala*) and various grasses. The surface of the transect area was level. No anomalies were detected in the reflection profiles of GPR-12 (Figure 64 through Figure 66). The reflections are consistent with the results of adjacent AIS test excavations that identified the plow zone and the interface of the underlying substrate.

4.4 Geotechnical Boring

From 2 February through 23 February 2024, CSH observed geotechnical boring and test excavation operations conducted by Fewell Geotechnical Engineering, Ltd. (FGE) at 56 locations throughout the study area. This work required approximately 15 person-days to complete.

The geotechnical test bores (bores) and test pits were distributed throughout the current study area (Figure 67). Each bore hole was drilled to a targeted depth of 6 m (20 ft). The bore holes were approximately 7 cm in diameter. The bore holes were completed with a truck-mounted direct-push drilling probe. The archaeologist watched as the machine drilled each bore hole and inspected the back dirt and sediment as FGE, Ltd. personnel removed column samples for collection.

Each test pit was excavated to a target depth of approximately 3.0 m (10 ft) and approximately 2.5 m long by 0.8 m wide using a mini-excavator. The archaeologist watched as the machine excavated east test pit and inspected the back dirt as FGE Ltd. personnel removed bulk samples from excavator spoils at targeted depths. Samples were collected at the discretion of FGE Ltd. Personnel based on observed stratigraphic changes criteria and thus differed in each test pit.

Stratigraphic profiles were not recorded due to the methodology of the cores. Due to the small size of the bore hole, the underlying stratigraphy was not visible or accessible for the archaeologist to create a profile map. No sediment samples were collected by the archaeologist and no historic properties were identified with the sediment cores. Several surface historic artifacts were collected in the immediate vicinity of Test Bore 22 (B-22) during geotechnical observation as this bore location is within the historic property boundary of SIHP # 50-50-04-09165. Observation of the geotechnical boring and excavation testing provided additional documentation of the general types and variation of stratigraphy within the study area, which includes a mix of aeolian sand, alluvially deposited basalt cobbles/gravels, and alluvial loams.



Figure 61. GPR-11, general view of GPR transect location, view to east



Figure 62. GPR-11 reflection profile (0-50 m)



Figure 63. GPR-11 reflection profile (50-100 m)



Figure 64. GPR-12, general view of GPR transect location, view to east

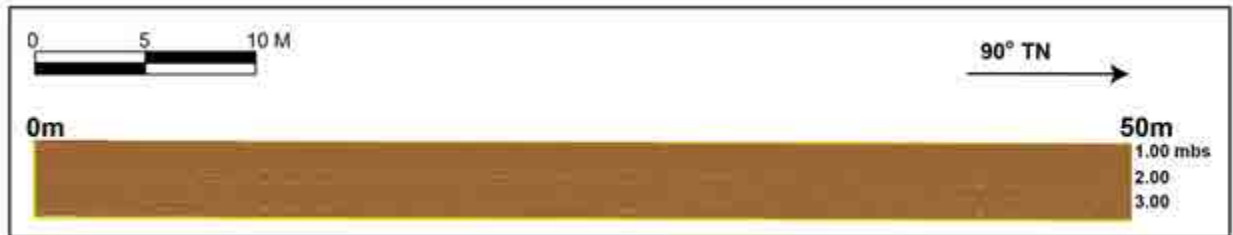


Figure 65. GPR-12 reflection profile (0-50 m)



Figure 66. GPR-12 reflection profile (50-100 m)

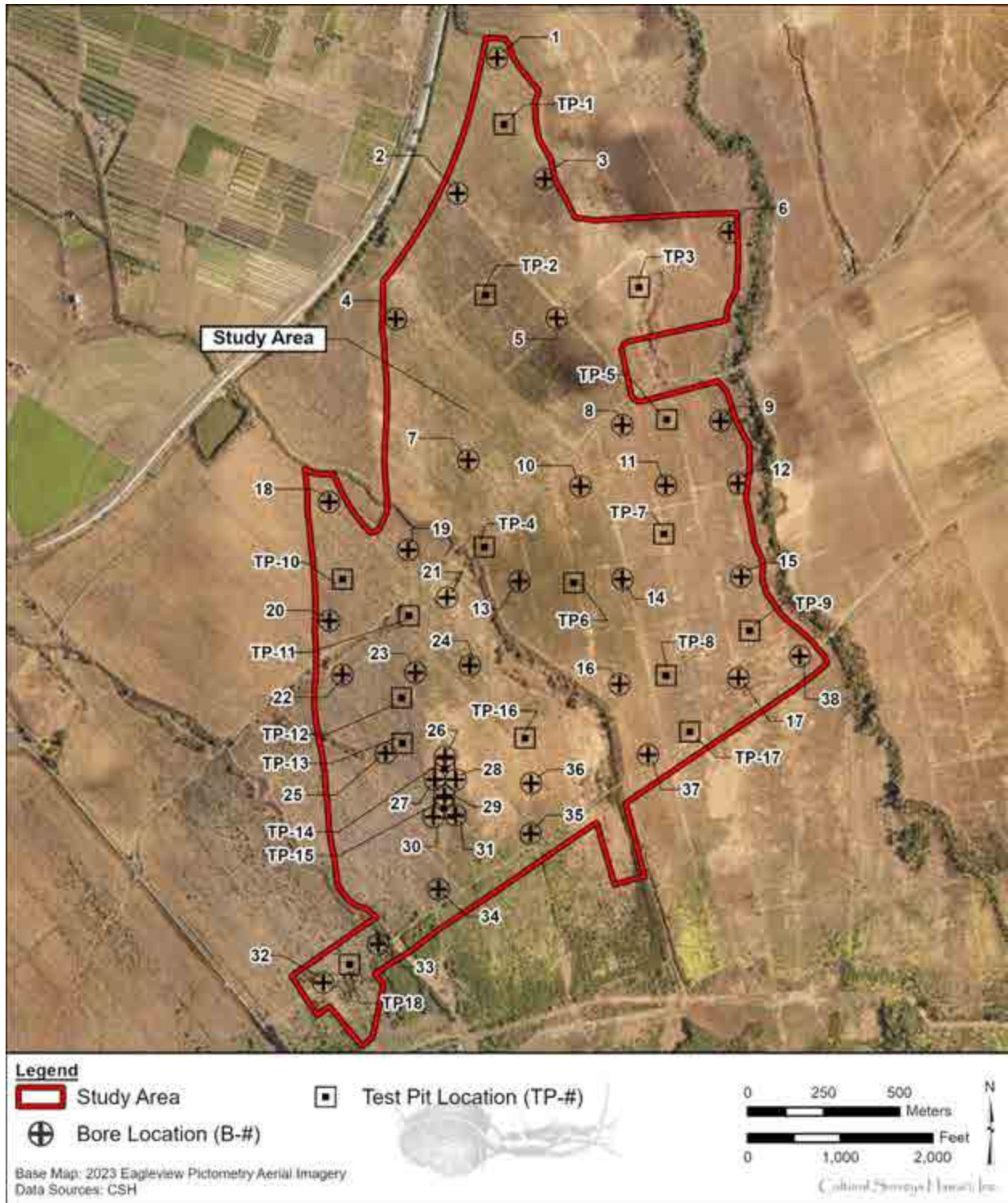


Figure 67. Aerial photograph depicting the location of geotechnical test bores and excavations within the study area (EagleView Technologies Inc. 2023)

4.4.1 Test Bore 1 (B-1)

B-1 was located within the northern portion of the study area in TMK: [2] 3-8-005:002. A CSH archaeologist observed boring and collection of samples by FGE, Ltd. Sample 1 was collected at 0.4-0.9 m and consisted of sandy clay loam (Figure 68). Sample 2 was collected at depths of 0.9-1.5 m and consisted of sandy clay loam. Sample 3 was collected at depths of 1.5-1.9 m and consisted of sandy loam. Sample 4 was collected at depths of 2.5-3.0 m and consisted of silt loam. Sample 5 was collected at depths of 4.1-4.5 m and consisted of silt loam. Sample 6 was collected at depths of 5.5-6.0 m and consisted of sandy loam and gravels (Figure 69). Samples 1 and 2 were interpreted by CSH as being representative of the agricultural plow zone, while Samples 3 through 6 were interpreted by CSH as being representative of natural soil deposition.

4.4.2 Test Bore 2 (B-2)

B-2 was located within the northern portion of the study area in TMK: [2] 3-8-005:002. A CSH archaeologist observed boring and collection of samples by FGE, Ltd. Sample 1 was collected at 0.4-0.9 m and consisted of sandy clay loam. Sample 2 was collected at depths of 0.9-1.5 m and consisted of silty clay loam. Sample 3 was collected at depths of 1.5-1.9 m and consisted of sandy clay loam, loamy sand, and silt loam (Figure 70). Sample 4 was collected at 2.5-3.0 m and consisted of silt loam (Figure 71). Sample 5 was collected at depths of 4.1-4.5 m and consisted of silt loam. Sample 6 was collected at depths of 5.5-6.0 m and consisted of sandy loam and gravel. Samples 1 and 2 were interpreted by CSH as being representative of the agricultural plow zone, while Samples 3 through 6 were interpreted by CSH as being representative of natural soil deposition.

4.4.3 Test Bore 3 (B-3)

B-3 was located within the northern portion of the study area in TMK: [2] 3-8-005:002. A CSH archaeologist observed boring and collection of samples by FGE, Ltd. Sample 1 was collected at 0.4-0.9 m and consisted of sandy loam. Sample 2 was collected at depths of 0.9-1.5 m and consisted of sandy clay loam and silty clay loam. Sample 3 was collected at depths of 1.5-1.9 m and consisted of silt loam and silty clay loam (Figure 72). Sample 4 was collected at depths of 2.5-3.0 m and consisted of silt loam and gravels. Sample 5 was collected at depths of 4.1-4.5 m and consisted of silt loam. Sample 6 was collected at depths of 5.5-6.0 m and consisted of silty clay loam (Figure 73). Samples 1 and 2 were interpreted by CSH as being representative of the agricultural plow zone, while Samples 3 through 6 were interpreted by CSH as being representative of natural soil deposition.

4.4.4 Test Bore 4 (B-4)

B-4 was located within the northern portion of the study area in TMK: [2] 3-8-005:002. A CSH archaeologist observed boring and collection of samples by FGE, Ltd. Sample 1 was collected at 0.4-0.9 m and consisted of sandy clay loam. Sample 2 was collected at depths of 0.9-1.5 m and consisted of sandy loam. Sample 3 was collected at depths of 1.5-1.9 m and consisted of silt loam and silty clay loam (Figure 74). Sample 4 was collected at depths of 2.5-3.0 m and consisted of silt loam. Sample 5 was collected at depths of 4.1-4.5 m and consisted of silt loam (Figure 75). Sample 6 was collected at 5.5-6.0 m and consisted of silt loam. Samples 1 and 2 were interpreted by CSH as being representative of the agricultural plow zone, while Samples 3 through 6 were interpreted by CSH as being representative of natural soil deposition.



Figure 68. B-1, Sample 1 (0.4-0.9 m), sandy clay loam



Figure 69. B-1, Sample 6 (5.5-6.0 m), sandy loam and gravels



Figure 70. B-2, Sample 3 (1.5-1.9 m), sandy clay loam, loamy sand, and silt loam



Figure 71. B-2, Sample 4 (2.5-3.0 m), silt loam



Figure 72. B-3, Sample 3 (1.5-1.9 m), silt loam and silty clay loam



Figure 73. B-3, Sample 6 (5.5-6.0 m), silt loam and silty clay loam



Figure 74. B-4, Sample 3 (1.5-1.9), silt loam



Figure 75. B-4, Sample 5 (4.1-4.5 m), silt loam

4.4.5 Test Bore 5 (B-5)

B-5 was located within the northern portion of the study area in TMK: [2] 3-8-005:002. A CSH archaeologist observed boring and collection of samples by FGE, Ltd. Sample 1 was collected at 0.4-0.9 m and consisted of sandy loam and sandy clay loam (Figure 76). Sample 2 was collected at depths of 0.9-1.5 m and consisted of loamy sand and gravels. Sample 3 was collected at depths of 1.5-1.9 m and consisted of silt loam (Figure 77). Sample 4 was collected at depths of 2.5-3.0 m and consisted of silt loam. Sample 5 was collected at depths of 4.1-4.5 m and consisted of silty loam and silty clay loam. Sample 6 was collected at depths of 5.5-6.0 m and consisted of silty clay loam. Samples 1 and 2 were interpreted by CSH as being representative of the agricultural plow zone, while Samples 3 through 6 were interpreted by CSH as being representative of natural soil deposition.

4.4.6 Test Bore 6 (B-6)

B-6 was located within the northeastern portion of the study area in TMK: [2] 3-8-005:002. A CSH archaeologist observed boring and collection of samples by FGE, Ltd. Sample 1 was collected at 0.4-0.9 m and consisted of sandy clay loam. Sample 2 was collected at depths of 0.4-0.9 m and consisted of silt loam (Figure 78). Sample 3 was collected at depths of 1.5-1.9 m and consisted of silt loam (Figure 79). Sample 4 was collected at 2.5-3.0 m and consisted of silt loam. Sample 5 was collected at depths of 4.1-4.5 m and consisted of alluvial deposited loamy sand and cobbles. Sample 6 was collected at 5.5-6.0 m and consisted of silt loam. Samples 1 and 2 were interpreted by CSH as being representative of the agricultural plow zone, while Samples 3 through 6 were interpreted by CSH as being representative of natural soil deposition.

4.4.7 Test Bore 7 (B-7)

B-7 was located within the central portion of the study area in TMK: [2] 3-8-005:002. A CSH archaeologist observed boring and collection of samples by FGE, Ltd. Sample 1 was collected at 0.4-0.9 m and consisted of sandy loam. Sample 2 was collected at depths of 0.9-1.5 m and consisted of silt loam (Figure 80). Sample 3 was collected at depths of 1.5-1.9 m and consisted of silt loam. Sample 4 was collected at 2.5-3.0 m and consisted of silt loam. Sample 5 was collected at a depth of 4.1-4.5 m and consisted of alluvial deposited loamy sand and cobbles. Sample 6 was collected at 5.5-6.0 m and consisted of alluvial deposited loamy sand with gravels and silty clay loam (Figure 81). Samples 1 and 2 were interpreted by CSH as being representative of the agricultural plow zone, while Samples 3 through 6 were interpreted by CSH as being representative of natural soil deposition.

4.4.8 Test Bore 8 (B-8)

B-8 was located within the eastern portion of the study area in TMK: [2] 3-8-005:002. A CSH archaeologist observed boring and collection of samples by FGE, Ltd. Sample 1 was collected at 0.4-0.9 m and consisted of sandy clay loam. Sample 2 was collected at depths of 0.9-1.5 m and consisted of loamy sand with gravels and silt loam. Sample 3 was collected at depths of 1.5-1.9 m and consisted of silt loam (Figure 82). Sample 4 was collected at 2.5-3.0 m and consisted of silty clay loam. Sample 5 was collected at a depth of 4.1-4.5 m and consisted of silt loam. Sample 6 was collected at 5.5-6.0 m and consisted of silt loam, silty clay loam, and alluvial deposited gravels (Figure 83).



Figure 76. B-5, Sample 1 (0.4-0.9 m), sandy loam and sandy clay loam



Figure 77. B-5, Sample 3 (1.5-1.9 m), silt loam



Figure 78. B-6, Sample 2 (0.9-1.5 m), collection methods



Figure 79. B-6, Sample 3 (1.5-1.9 m), silt loam



Figure 80. B-7, Sample 2 (0.9-1.5 m), silt loam



Figure 81. B-7, Sample 5 (4.1-4.5 m), alluvial loamy sand and gravel



Figure 82. B-8, Sample 3 (1.5-1.9 m), silt loam



Figure 83. B-8, Sample 6 (5.5-6.0 m), silt loam, silty clay loam, and alluvial deposited gravels

Samples 1 and 2 were interpreted by CSH as being representative of the agricultural plow zone, while Samples 3 through 6 were interpreted by CSH as being representative of natural soil deposition.

4.4.9 Test Bore 9 (B-9)

B-9 was located within the northern portion of the study area in TMK: [2] 3-8-005:002. A CSH archaeologist observed boring and collection of samples by FGE, Ltd. Sample 1 was collected at 0.4-0.9 m and consisted of loamy sand. Sample 2 was collected at depths of 0.9-1.5 m and consisted of sand. Sample 3 was collected at depths of 1.5-1.9 m and consisted of silt loam (Figure 84). Sample 4 was collected at depths of 2.5-3.0 m and consisted of sand. Sample 5 was collected at depths of 4.1-4.5 m and consisted of loamy sand and sandy clay loam (Figure 85). Sample 6 was collected at depths of 5.5-6.0 m and consisted of sandy loam and silty clay loam. Samples 1 and 2 were interpreted by CSH as being representative of the agricultural plow zone, while Samples 3 through 6 were interpreted by CSH as being representative of natural soil deposition.

4.4.10 Test Bore 10 (B-10)

B-10 was located within the central portion of the study area in TMK: [2] 3-8-005:002. A CSH archaeologist observed boring and collection of samples by FGE, Ltd. Sample 1 was collected at 0.4-0.9 m and consisted of sandy loam. Sample 2 was collected at depths of 0.9-1.5 m and consisted of sandy clay loam. Sample 3 was collected at depths of 1.5-1.9 m and consisted of silt loam. Sample 4 was collected at depths of 2.5-3.0 m and consisted of silt loam (Figure 86). Sample 5 was collected at depths of 4.1-4.5 and consisted of silty clay loam. Sample 6 was collected at depths of 5.5-6.0 m and consisted of silt loam and alluvial deposited gravels (Figure 87). Samples 1 and 2 were interpreted by CSH as being representative of the agricultural plow zone, while Samples 3 through 6 were interpreted by CSH as being representative of natural soil deposition.

4.4.11 Test Bore 11 (B-11)

B-11 was located within the eastern portion of the study area in TMK: [2] 3-8-005:002. A CSH archaeologist observed boring and collection of samples by FGE, Ltd. Sample 1 was collected at 0.4-0.9 m and consisted of loamy sand. Sample 2 was collected at depths of 0.9-1.5 m and consisted of sand. Sample 3 was collected at depths of 1.5-1.9 m and consisted of sand and silt loam (Figure 88). Sample 4 was collected at depths of 2.5-3.0 m and consisted of sand and loamy sand (Figure 89). Sample 5 was collected at depths of 4.1-4.5 m and consisted of sandy clay loam. Sample 6 was collected at depths of 5.5-6.0 m and consisted of silty clay loam. Samples 1 and 2 were interpreted by CSH as being representative of the agricultural plow zone, while Samples 3 through 6 were interpreted by CSH as being representative of natural soil deposition.

4.4.12 Test Bore 12 (B-12)

B-12 was located within the eastern portion of the study area in TMK: [2] 3-8-005:002. A CSH archaeologist observed boring and collection of samples by FGE, Ltd. Sample 1 was collected at 0.4-0.9 m and consisted of sandy loam and gravels (Figure 90). Sample 2 was collected at depths of 0.9-1.5 m and consisted of silt loam. Sample 3 was collected at depths of 1.5-1.9 m and consisted of silt loam (Figure 91). Sample 4 was collected at depths of 2.5-3.0 m and consisted of silty clay loam. Sample 5 was collected at depths of 4.1-4.5 m and consisted of silty clay loam.



Figure 84. B-9, Sample 3 (1.5-1.9 m), silt loam



Figure 85. B-9, Sample 5 (4.1-4.5 m), loamy sand and sandy clay loam



Figure 86. B-10, Sample 4 (2.5-3.0 m), silt loam



Figure 87. B-10, Sample 6 (5.5-6.0 m), gravel and fine silt



Figure 88. B-11, Sample 3 (1.5-1.9 m), sand and silt loam



Figure 89. B-11, Sample 4 (2.5-3.0 m), sand and loamy sand



Figure 90. B-12, Sample 1 (0.4-0.9 m), sandy loam and gravel



Figure 91. B-12, Sample 3 (1.5-1.9 m), silt loam

Sample 6 was collected at depths of 5.5-6.0 m and consisted of silty clay loam. Samples 1 and 2 were interpreted by CSH as being representative of the agricultural plow zone, while Samples 3 through 6 were interpreted by CSH as being representative of natural soil deposition.

4.4.13 Test Bore 13 (B-13)

B-13 was located within the central portion of the study area in TMK: [2] 3-8-005:002. A CSH archaeologist observed boring and collection of samples by FGE, Ltd. Sample 1 was collected at 0.4-0.9 m and consisted of sandy loam and sandy clay loam with gravels. Sample 2 was collected at depths of 0.9-1.5 m and consisted of loamy sand and gravels (Figure 92). Sample 3 was collected at depths of 1.5-1.9 m and consisted of loamy sand and silt loam. Sample 4 was collected at depths of 2.5-3.0 m and consisted of silt loam (Figure 93). Sample 5 was collected at depths of 4.1-4.5 m and consisted of silty clay loam. Sample 6 was collected at depths of 5.5-6.0 m and consisted of silty clay loam and alluvial deposited cobbles and loamy sand. Samples 1 and 2 were interpreted by CSH as being representative of the agricultural plow zone, while Samples 3 through 6 were interpreted by CSH as being representative of natural soil deposition.

4.4.14 Test Bore 14 (B-14)

B-14 was located within the central portion of the study area in TMK: [2] 3-8-005:002. A CSH archaeologist observed boring and collection of samples by FGE, Ltd. Sample 1 was collected at 0.4-0.9 m and consisted of sandy clay loam. Sample 2 was collected at depths of 0.9-1.5 m and consisted of sandy loam and aeolian sand (Figure 94). Sample 3 was collected at depths of 1.5-1.9 m and consisted of silt loam. Sample 4 was collected at 2.5-3.0 m and consisted of silt loam (Figure 95). Sample 5 was collected at depths of 4.1-4.5 m and consisted of silty clay loam. Sample 6 was collected at depths of 5.5-6.0 m and consisted of silty clay loam with gravels and silt loam. Samples 1 and 2 were interpreted by CSH as being representative of the agricultural plow zone, while Samples 3 through 6 were interpreted by CSH as being representative of natural soil deposition.

4.4.15 Test Bore 15 (B-15)

B-15 was located within the eastern portion of the study area in TMK: [2] 3-8-005:002. A CSH archaeologist observed boring and collection of samples by FGE, Ltd. Sample 1 was collected at 0.4-0.9 m and consisted of sandy loam (Figure 96). Sample 2 was collected at depths of 0.9-1.5 m and consisted of loamy sand. Sample 3 was collected at depths of 1.5-1.9 m and consisted of silt loam. Sample 4 was collected at depths of 2.5-3.0 m and consisted of sand. Sample 5 was collected at depths of 4.1-4.5 m and consisted of sand. Sample 6 was collected at depths of 5.5-6.0 m and consisted of sandy loam (Figure 97). Samples 1 and 2 were interpreted by CSH as being representative of the agricultural plow zone, while Samples 3 through 6 were interpreted by CSH as being representative of natural soil deposition.



Figure 92. B-13, Sample 2 (0.9-1.5 m), loamy sand and gravels



Figure 93. B-13, Sample 4 (0.9-1.5 m), silt loam



Figure 94. B-14, Sample 2 (0.9-1.5 m), sandy loam and aeolian sand



Figure 95. B-14, Sample 4 (2.5-3.0 m), silt loam



Figure 96. B-15, Sample 1 (0.4-0.9 m), sandy loam



Figure 97. B-15, Sample 6 (5.5-6.0 m), sandy loam

4.4.16 Test Bore 16 (B-16)

B-16 was located within the central portion of the study area in TMK: [2] 3-8-005:002. A CSH archaeologist observed boring and collection of samples by FGE, Ltd. Sample 1 was collected at depths of 0.4-0.9 m and consisted of sandy clay loam (Figure 98). Sample 2 was collected at depths of 0.9-1.5 m and consisted of sandy clay loam and aeolian sand. Sample 3 was collected at depths of 1.5-1.9 m and consisted of silt loam. Sample 4 was collected at 2.5-3.0 m and consisted of silt loam and aeolian sand. Sample 5 was collected at depths of 4.1-4.5 m and consisted of sand and compacted clay loam (Figure 99). Sample 6 was collected at depths of 5.5-6.0 m and consisted of silty clay loam. Samples 1 and 2 were interpreted by CSH as being representative of the agricultural plow zone, while Samples 3 through 6 were interpreted by CSH as being representative of natural soil deposition.

4.4.17 Test Bore 17 (B-17)

B-17 was located within the eastern portion of the study area in TMK: [2] 3-8-005:002. A CSH archaeologist observed boring and collection of samples by FGE, Ltd. Sample 1 was collected at 0.4-0.9 m and consisted of sandy loam (Figure 100). Sample 2 was collected at depths of 0.9-1.5 m and consisted of silt loam. Sample 3 was collected at depths of 1.5-1.9 m and consisted of silt loam (Figure 101). Sample 4 was collected at depths of 2.5-3.0 m and consisted of dune sand. Sample 5 was collected at depths of 4.1-4.5 and consisted of loamy sand. Sample 6 was collected at depths of 5.5-6.0 m and consisted of silty clay loam. Samples 1 and 2 were interpreted by CSH as being representative of the agricultural plow zone, while Samples 3 through 6 were interpreted by CSH as being representative of natural soil deposition.

4.4.18 Test Bore 18 (B-18)

B-18 was located within the western portion of the study area in TMK: [2] 3-8-005:002. A CSH archaeologist observed boring and collection of samples by FGE, Ltd. Sample 1 was collected at 0.4-0.9 m and consisted of sandy loam. Sample 2 was collected at depths of 0.9-1.5 m and consisted of silty clay loam (Figure 102). Sample 3 was collected at depths of 1.5-1.9 m and consisted of silt loam. Sample 4 was collected at depths of 2.5-3.0 m and consisted of silt loam. Sample 5 was collected at depths of 4.1-4.5 m and consisted of silt loam and gravels (Figure 103). Sample 6 was collected at depths of 5.5-6.0 m and consisted of compacted silt loam. Samples 1 and 2 were interpreted by CSH as being representative of the agricultural plow zone, while Samples 3 through 6 were interpreted by CSH as being representative of natural soil deposition.

4.4.19 Test Bore 19 (B-19)

B-19 was located within the western portion of the study area in TMK: [2] 3-8-005:002. A CSH archaeologist observed boring and collection of samples by FGE, Ltd. Sample 1 was collected at 0.4-0.9 m and consisted of sandy loam. Sample 2 was collected at depths of 0.9-1.5 m and consisted of gravels and silt loam (Figure 104). Sample 3 was collected at depths of 1.5-1.9 m and consisted of compacted silt loam. Sample 4 was collected at 2.5-3.0 m and consisted of silty clay loam. Sample 5 was collected at depths of 4.1-4.5 m and consisted of silt loam and gravels. Sample 6 was collected at depths of 5.5-6.0 m and consisted of silt loam and gravels (Figure 105). Samples 1 and 2 were interpreted by CSH as being representative of the agricultural plow zone, while Samples 3 through 6 were interpreted by CSH as being representative of natural soil deposition.



Figure 98. B-16, Sample 1 (0.4-0.9 m), sandy loam



Figure 99. B-16, Sample 5 (4.1-4.5 m) sand and compacted clay loam



Figure 100. B-17, Sample 1 (0.4-0.9 m), sandy loam



Figure 101. B-17, Sample 3 (1.5-1.9 m), silt loam



Figure 102. B-18, Sample 2 (0.9-1.5 m), silty clay loam



Figure 103. B-18, Sample 5 (4.1-4.5 m), silt loam and gravels



Figure 104. B-19, Sample 2 (0.9-1.5 m), silt loam and gravels



Figure 105. B-19, Sample 6 (5.5-6.0 m), silt loam and gravels

4.4.20 Test Bore 20 (B-20)

B-20 was located within the western portion of the study area in TMK: [2] 3-8-005:002. A CSH archaeologist observed boring and collection of samples by FGE, Ltd. Sample 1 was collected at 0.4-0.9 m and consisted of sandy loam. Sample 2 was collected at depths of 0.9-1.5 m and consisted of sandy clay loam. Sample 3 was collected at depths of 1.5-1.9 m and consisted of sandy loam and silt loam (Figure 106). Sample 4 was collected at 2.5-3.0 m and consisted of silt loam. Sample 5 was collected at depths of 4.1-4.5 m and consisted of silt loam and loamy sand with gravels (Figure 107). Sample 6 was collected at depths of 5.5-6.0 m and consisted of silt loam. Samples 1 and 2 were interpreted by CSH as being representative of the agricultural plow zone, while Samples 3 through 6 were interpreted by CSH as being representative of natural soil deposition.

4.4.21 Test Bore 21 (B-21)

B-21 was located within the western portion of the study area in TMK: [2] 3-8-005:002. A CSH archaeologist observed boring and collection of samples by FGE, Ltd. Sample 1 was collected at 0.4-0.9 m and consisted of sandy clay loam (Figure 108). Sample 2 was collected at depths of 0.9-1.5 m and consisted of silty clay loam. Sample 3 was collected at depths of 1.5-1.9 m and consisted of silt loam. Sample 4 was collected at depths of 2.5-3.0 m and consisted of silt loam. Sample 5 was collected at depths of 4.1-4.5 m and consisted of silty clay loam (Figure 109). Sample 6 was collected at depths of 5.5-6.0 m and consisted of silt loam. Samples 1 and 2 were interpreted by CSH as being representative of the agricultural plow zone, while Samples 3 through 6 were interpreted by CSH as being representative of natural soil deposition.

4.4.22 Test Bore 22 (B-22)

B-22 was located within the western portion of the study area in TMK: [2] 3-8-005:002. A CSH archaeologist observed boring and collection of samples by FGE, Ltd. Sample 1 was collected at 0.4-0.9 m and consisted of sandy loam. Sample 2 was collected at depths of 0.9-1.5 m. Sample 3 was collected at depths of 1.5-1.9 m and consisted of silt loam (Figure 110). Sample 4 was collected at depths of 2.5-3.0 m and consisted of silt loam. Sample 5 was collected at depths of 4.1-4.5 m and consisted of silt loam. Sample 6 was collected at depths of 5.5-6.0 m and consisted of silt loam. Samples 1 and 2 were interpreted by CSH as being representative of the agricultural plow zone, while Samples 3 through 6 were interpreted by CSH as being representative of natural soil deposition. Surface artifacts associated with SIHP # 50-50-04-09165 were observed in the immediate vicinity of bore hole location, which were collected for laboratory analysis. No cultural materials were observed in any subsurface sample.

4.4.23 Test Bore 23 (B-23)

B-23 was located within the western portion of the study area in TMK: [2] 3-8-005:002. A CSH archaeologist observed boring and collection of samples by FGE, Ltd. Sample 1 was collected at 0.4-0.9 m and consisted of sandy loam. Sample 2 was collected at depths of 0.9-1.5 m and consisted of silt loam. Sample 3 was collected at depths of 1.5-1.9 m and consisted of silty clay loam (Figure 111). Sample 4 was collected at depths of 2.5-3.0 m and consisted of silt loam. Sample 5 was collected at depths of 4.1-4.5 m and consisted of silt loam, clay loam, and loamy sand. Sample 6 was collected at depths of 5.5-6.0 m and consisted of silt loam and loamy sand with gravels (Figure 112). Samples 1 and 2 were interpreted by CSH as being representative



Figure 106. B-20, Sample 3 (1.5-1.9 m), sandy loam and silt loam



Figure 107. B-20, Sample 5 (4.1-4.5 m), silt loam and loamy sand with gravels



Figure 108. B-21, Sample 1 (0.4-0.9 m), sandy clay loam



Figure 109. B-21, Sample 5 (4.1-4.5 m), silty clay loam



Figure 110. B-22, Sample 3 (1.5-1.9 m), silt loam



Figure 111. B-23, Sample 3 (1.5-1.9 m), silt loam



Figure 112. B-23, Sample 6 (5.5-6 m), silt loam and loamy sand with gravels

of the agricultural plow zone, while Samples 3 through 6 were interpreted by CSH as being representative of natural soil deposition.

4.4.24 Test Bore 24 (B-24)

B-24 was located within the western portion of the study area in TMK: [2] 3-8-005:002. A CSH archaeologist observed boring and collection of samples by FGE, Ltd. Sample 1 was collected at 0.4-0.9 m and consisted of sandy clay loam. Sample 2 was collected at depths of 0.9-1.5 m and consisted of sandy loam. Sample 3 was collected at depths of 1.5-1.9 m and consisted of silt loam (Figure 113). Sample 4 was collected at depths of 2.5-3.0 m and consisted of silt loam. Sample 5 was collected at depths of 4.1-4.5 m and consisted of silt loam and gravels (Figure 114). Sample 6 was collected at depths of 5.5-6.0 m and consisted of silt loam and silty clay loam. Samples 1 and 2 were interpreted by CSH as being representative of the agricultural plow zone, while Samples 3 through 6 were interpreted by CSH as being representative of natural soil deposition.

4.4.25 Test Bore 25 (B-25)

B-25 was located within the southwestern portion of the study area in TMK: [2] 3-8-005:002. A CSH archaeologist observed boring and collection of samples by FGE, Ltd. Sample 1 was collected at 0.4-0.9 m and consisted of sandy loam. Sample 2 was collected at depths of 0.9-1.5 m and consisted of silty clay loam and gravels. Sample 3 was collected at depths of 2.5-3.0 m and consisted of silt loam and gravels (Figure 115). Sample 4 was collected at depths of 3.0-3.7 m and consisted of silt loam and loamy sand. Sample 5 was collected at depths of 4.1-4.5 m and consisted of silt loam (Figure 116). Sample 6 was collected at depths of 5.5-6.0 m and consisted of silty clay loam. Samples 1 and 2 were interpreted by CSH as being representative of the agricultural plow zone, while Samples 3 through 6 were interpreted by CSH as being representative of natural soil deposition.

4.4.26 Test Bore 26 (B-26)

B-26 was located within the southwestern portion of the study area in TMK: [2] 3-8-005:002. A CSH archaeologist observed boring and collection of samples by FGE, Ltd. Sample 1 was collected at 0.4-0.9 m and consisted of sandy loam. Sample 2 was collected at 0.9-1.5 m and consisted of loamy sand and aeolian sand (Figure 117). Sample 3 was collected at depths of 1.5-1.9 m and consisted of sand and silt loam (Figure 118). Sample 4 was collected at depths of 2.5-3.0 m and consisted of silt loam. Sample 5 was collected at a depth of 4.1-4.5 m and consisted of silt loam and silty clay loam. Sample 6 was collected at 5.5-6.0 m and consisted of silty clay loam. Samples 1 and 2 were interpreted by CSH as being representative of the agricultural plow zone, while Samples 3 through 6 were interpreted by CSH as being representative of natural soil deposition.



Figure 113. B-24, Sample 3 (1.5-1.9 m), silt loam



Figure 114. B-24, Sample 5 (4.1-4.5 m), silt loam and gravels



Figure 115. B-25, Sample 3 (2.5-3 m), silt loam and gravels



Figure 116. B-25, Sample 5 (4.1-4.5 m), silt loam



Figure 117. B-26, Sample 2 (0.9-1.5 m), loamy sand



Figure 118. B-26, Sample 3 (1.5-1.9 m), sand and silt loam

4.4.27 Test Bore 27 (B-27)

B-27 was located within the southwestern portion of the study area in TMK: [2] 3-8-005:002. A CSH archaeologist observed boring and collection of samples by FGE, Ltd. Sample 1 was collected at 0.4-0.9 m and consisted of sandy loam. Sample 2 was collected at depths of 0.9-1.5 m and consisted of sandy clay loam. Sample 3 was collected at depths of 1.5-1.9 m and consisted of sandy clay loam and silt loam (Figure 119). Sample 4 was collected at depths of 2.5-3.0 m and consisted of silt loam and silty clay loam. Sample 5 was collected at depths of 4.1-4.5 m and consisted of silty clay loam (Figure 120). Sample 6 was collected at depths of 5.5-6.0 m and consisted of silty clay loam. Samples 1 and 2 were interpreted by CSH as being representative of the agricultural plow zone, while Samples 3 through 6 were interpreted by CSH as being representative of natural soil deposition.

4.4.28 Test Bore 28 (B-28)

B-28 was located within the southwestern portion of the study area in TMK: [2] 3-8-005:002. A CSH archaeologist observed boring and collection of samples by FGE, Ltd. Sample 1 was collected at 0.4-0.9 m and consisted of sandy loam. Sample 2 was collected at depths of 0.9-1.5 m and consisted of sandy loam. Sample 3 was collected at depths of 1.5-1.9 m and consisted of sandy loam and loamy sand (Figure 121). Sample 4 was collected at depths of 2.5-3.0 m and consisted of sandy loam and silty clay loam with gravels (Figure 122). Sample 5 was collected at depths of 4.1-4.5 m and consisted of silt loam. Sample 6 was collected at depths of 5.5-6.0 m and consisted of silt loam. Samples 1 and 2 were interpreted by CSH as being representative of the agricultural plow zone, while Samples 3 through 6 were interpreted by CSH as being representative of natural soil deposition.

4.4.29 Test Bore 29 (B-29)

B-29 was located within the southwestern portion of the study area in TMK: [2] 3-8-005:002. A CSH archaeologist observed boring and collection of samples by FGE, Ltd. Sample 1 was collected at 0.4-0.9 m and consisted of sandy loam. Sample 2 was collected at depths of 0.9-1.5 m and consisted of sandy loam and silt loam with gravels (Figure 123). Sample 3 was collected at depths of 1.5-1.9 m and consisted of silt loam. Sample 4 was collected at 2.5-3.0 m and consisted of alluvial gravels and silt loam (Figure 124). Sample 5 was collected at depths of 4.1-4.5 m and consisted of silt loam. Sample 6 was collected at depths of 5.5-6.0 m and consisted of silt loam. Samples 1 and 2 were interpreted by CSH as being representative of the agricultural plow zone, while Samples 3 through 6 were interpreted by CSH as being representative of natural soil deposition.

4.4.30 Test Bore 30 (B-30)

B-30 was located within the southwestern portion of the study area in TMK: [2] 3-8-005:002. A CSH archaeologist observed boring and collection of samples by FGE, Ltd. Sample 1 was collected at 0.4-0.9 m and consisted sandy loam. Sample 2 was collected at depths of 0.9-1.5 m and consisted of loamy sand. Sample 3 was collected at depths of 1.5-1.9 m and consisted of silt loam (Figure 125). Sample 4 was collected at depths of 2.5-3.0 m and consisted of silt loam and loamy sand. Sample 5 was collected at depths of 4.1-4.5 m and consisted of loamy sand and silty clay loam (Figure 126). Sample 6 was collected at depths of 5.5-6.0 m and consisted of silty clay



Figure 119. B-27, Sample 3 (1.5-1.9 m), sandy clay loam and silt loam



Figure 120. B-27, Sample 5 (4.1-4.5 m), silty clay loam



Figure 121. B-28, Sample 3 (1.5-1.9 m), sandy loam and loamy sand



Figure 122. B-28, Sample 4 (2.5-3.0 m), sandy loam and silty clay loam with gravels



Figure 123. B-29, Sample 2 (0.9-1.5 m), sandy loam and silt loam with gravels



Figure 124. B-29, Sample 4 (2.5-3.0 m), alluvial deposited gravels and silt loam



Figure 125. B-30, Sample 3 (1.5-1.9 m), silt loam



Figure 126. B-30, Sample 5 (4.1-4.5 m), loamy sand and silty clay loam

loam. Samples 1 and 2 were interpreted by CSH as being representative of the agricultural plow zone, while Samples 3 through 6 were interpreted by CSH as being representative of natural soil deposition.

4.4.31 Test Bore 31 (B-31)

B-31 was located within the southwestern portion of the study area in TMK: [2] 3-8-005:002. A CSH archaeologist observed boring and collection of sample samples by FGE, Ltd. Sample 1 was collected at 0.4-0.9 m and consisted of sandy loam. Sample 2 was collected at depths of 0.9-1.5 m and consisted of loamy sand and silt loam with gravels. Sample 3 was collected at depths of 1.5-1.9 m and consisted of silt loam. Sample 4 was collected at depths of 2.5-3.0 m and consisted of silt loam and silty clay loam (Figure 127). Sample 5 was collected at depths of 4.1-4.5 m and consisted of silty clay loam. Sample 6 was collected at 5.5-6.0 m and consisted of silty clay loam (Figure 128). Samples 1 and 2 were interpreted by CSH as being representative of the agricultural plow zone, while Samples 3 through 6 were interpreted by CSH as being representative of natural soil deposition.

4.4.32 Test Bore 32 (B-32)

B-32 was located within the southwestern portion of the study area in TMK: [2] 3-8-005:002. A CSH archaeologist observed boring and collection of samples by FGE, Ltd. Sample 1 was collected at 0.4-0.9 m and consisted of sandy loam. Sample 2 was collected at depths of 0.9-1.5 m and consisted of loamy sand. Sample 3 was collected at depths of 1.5-1.9 m and consisted of sandy loam and gravels (Figure 129). Sample 4 was collected at 2.5-3.0 m and consisted of sandy clay loam and gravels. Sample 5 was collected at depths of 4.1-4.5 m and consisted of silt loam (Figure 130). Sample 6 was collected at depths of 5.5-6.0 m and consisted of silt loam. Samples 1 and 2 were interpreted by CSH as being representative of the agricultural plow zone, while Samples 3 through 6 were interpreted by CSH as being representative of natural soil deposition.

4.4.33 Test Bore 33 (B-33)

B-33 was located within the southwestern portion of the study area in TMK: [2] 3-8-005:002. A CSH archaeologist observed boring and collection of samples by FGE, Ltd. Sample 1 was collected at 0.4-0.9 m and consisted of sandy loam. Sample 2 was collected at depths of 0.9-1.5 m and consisted of sandy clay loam and silt loam with gravels. Sample 3 was collected at depths of 1.5-1.9 m and consisted of silt loam. Sample 4 was collected at depths of 2.5-3.0 m and consisted of silt loam (Figure 131). Sample 5 was collected at depths of 4.1-4.5 m and consisted of loamy sand and silty clay loam. Sample 6 was collected at depths of 5.5-6.0 m and consisted of silty clay loam (Figure 132) Samples 1 and 2 were interpreted by CSH as being representative of the agricultural plow zone, while Samples 3 through 6 were interpreted by CSH as being representative of natural soil deposition.

4.4.34 Test Bore 34 (B-34)

B-34 was located within the southwestern portion of the study area in TMK: [2] 3-8-005:002. A CSH archaeologist observed boring and collection of samples by FGE, Ltd. Sample 1 was collected at 0.4-0.9 m and consisted of sandy loam. Sample 2 was collected at depths of 0.9-1.5 m and consisted of sandy loam and silt loam (Figure 133). Sample 3 was collected at depths of 1.5-1.9 m and consisted of silt loam. Sample 4 was collected at depths of 2.5-3.0 m and consisted of silt loam (Figure 134). Sample 5 was collected at depths of 4.1-4.5 m and consisted of silt loam



Figure 127. B-31, Sample 4 (4.1-4.5 m), silt loam and silty clay loam



Figure 128. B-31, Sample 6 (5.5-6.0 m), silty clay loam



Figure 129. B-32, Sample 3 (1.5-1.9 m), sandy loam and alluvial deposited gravels



Figure 130. B-32, Sample 5 (4.1-4.5 m), silt loam



Figure 131. B-33, Sample 4 (4.1-4.5 m), silt loam



Figure 132. B-33, Sample 6 (5.5-6.0 m), silty clay loam



Figure 133. B-34, Sample 2 (0.9-1.5 m), sandy loam and silt loam



Figure 134. B-34, Sample 4 (2.5-3.0 m), silt loam

and silty clay loam. Sample 6 was collected at depths of 5.5-6.0 m and consisted of silty clay loam. Samples 1 and 2 were interpreted by CSH as being representative of the agricultural plow zone, while Samples 3 through 6 were interpreted by CSH as being representative of natural soil deposition.

4.4.35 Test Bore 35 (B-35)

B-35 was located within the southern portion of the study area in TMK: [2] 3-8-005:002. A CSH archaeologist observed boring and collection of samples by FGE, Ltd. Sample 1 was collected at 0.4-0.9 m and consisted of sandy loam. Sample 2 was collected at depths of 0.9-1.5 m and consisted of sandy loam and loamy sand (Figure 135). Sample 3 was collected at depths of 1.5-1.9 m and consisted of loamy sand and gravels. Sample 4 was collected at depths of 2.5-3.0 m and consisted of sand and silt loam (Figure 136). Sample 5 was collected at depths of 4.1-4.5 m and consisted of silt loam and silty clay loam. Sample 6 was collected at depths of 5.5-6.0 m and consisted of silty clay loam. Samples 1 and 2 were interpreted by CSH as being representative of the agricultural plow zone, while Samples 3 through 6 were interpreted by CSH as being representative of natural soil deposition.

4.4.36 Test Bore 36 (B-36)

B-36 was located within the southern portion of the study area in TMK: [2] 3-8-005:002. A CSH archaeologist observed boring and collection of samples by FGE, Ltd. Sample 1 was collected at 0.4-0.9 m and consisted of sandy loam. Sample 2 was collected at depths of 0.9-1.5 m and consisted of sandy clay loam. Sample 3 was collected at depths of 1.5-1.9 m and consisted of sandy loam and silt loam (Figure 137). Sample 4 was collected at depths of 2.5-3.0 m and consisted of silt loam and sand. Sample 5 was collected at depths of 4.1-4.5 m and consisted of sand. Sample 6 was collected at depths of 5.5-6.0 m and consisted of sand and silty clay loam (Figure 138). Samples 1 and 2 were interpreted by CSH as being representative of the agricultural plow zone, while Samples 3 through 6 were interpreted by CSH as being representative of natural soil deposition.

4.4.37 Test Bore 37 (B-37)

B-37 was located within the southern portion of the study area in TMK: [2] 3-8-005:002. A CSH archaeologist observed boring and collection of samples by FGE, Ltd. Sample 1 was collected at 0.4-0.9 m and consisted of sandy loam. Sample 2 was collected at depths of 0.9-1.5 m and consisted of loamy sand. Sample 3 was collected at depths of 1.5-1.9 m and consisted of sand (Figure 139). Sample 4 was collected at depths of 2.5-3.0 m and consisted of sand. Sample 5 was collected at depths of 4.1-4.5 m and consisted of sand (Figure 140). Sample 6 was collected at depths of 5.5-6.0 m and consisted of sand. Samples 1 and 2 were interpreted by CSH as being representative of the agricultural plow zone, while Samples 3 through 6 were interpreted by CSH as being representative of natural soil deposition.



Figure 135. B-35, Sample 2 (0.9-1.5 m), sandy loam and loamy sand



Figure 136. B-35, Sample 4 (2.5-3.0 m), sand and silt loam



Figure 137. B-36, Sample 3 (1.5-1.9 m), sandy loam and silt loam



Figure 138. B-36, Sample 6 (5.5-6.0 m), sand and silty clay loam



Figure 139. B-37, Sample 3 (1.5-1.9 m), sand



Figure 140. B-37, Sample 5 (4.1-4.5 m), sand

4.4.38 Test Bore 38 (B-38)

B-38 was located within the southeastern portion of the study area in TMK: [2] 3-8-005:002. A CSH archaeologist observed boring and collection of samples by FGE, Ltd. Sample 1 was collected at 0.4-0.9 m and consisted of loamy sand. Sample 2 was collected at depths of 0.9-1.5 m and consisted of sand. Sample 3 was collected at depths of 1.5-1.9 m and consisted of loamy sand (Figure 142). Sample 4 was collected at depths of 2.5-3.0 m and consisted of sand (Figure 141). Sample 5 was collected at depths of 4.1-4.5 m and consisted of silt loam. Sample 6 was collected at depths of 5.5-6.0 m and consisted of silty clay loam. Samples 1 and 2 were interpreted by CSH as being representative of the agricultural plow zone, while Samples 3 through 6 were interpreted by CSH as being representative of natural soil deposition.

4.4.39 Test Pit 1 (TP-1)

TP-1 was located within the northern portion of the study area in TMK: [2] 3-8-005:002. A CSH archaeologist observed excavation and collection of samples by FGE, Ltd. Sample collection depths varied by stratigraphic changes determined at geotechnical engineer's discretion. Stratigraphy observed consisted of disturbed sandy loam and alluvial deposited loamy sand and gravels (0.0-0.80 m) interpreted by CSH as being representative of the agricultural plow zone, with alternating layers of silt loam and alluvial deposited loamy sand with cobbles to the base of excavation (BOE) (0.8-2.4 m), interpreted by CSH as being representative of natural soil deposition (Figure 144).

4.4.40 Test Pit 2 (TP-2)

TP-2 was located within the northern portion of the study area in TMK: [2] 3-8-005:002. A CSH archaeologist observed excavation and collection of samples by FGE, Ltd. Sample collection depths varied by stratigraphic changes determined at geotechnical engineer's discretion. Stratigraphy observed consisted of disturbed sandy clay loam and silty clay loam (0.0-0.85 m) interpreted by CSH as being representative of the agricultural plow zone, with alternating layers of silt loam and alluvial deposited loamy sand with gravels to the BOE (0.85-2.7 m), interpreted by CSH as being representative of natural soil deposition (Figure 145).

4.4.41 Test Pit 3 (TP-3)

TP-3 was located within the northeastern portion of the study area in TMK: [2] 3-8-005:002. A CSH archaeologist observed excavation and collection of samples by FGE, Ltd. Sample collection depths varied by stratigraphic changes determined at geotechnical engineer's discretion. Stratigraphy observed consisted of disturbed sandy clay loam and disturbed silty clay loam (0.0-1.06 m) interpreted by CSH as being representative of the agricultural plow zone, with various silt loam layers to the BOE (1.06-3.2 m), interpreted by CSH as being representative of natural soil deposition (Figure 146).

4.4.42 Test Pit 4 (TP-4)

TP-4 was removed from the sample by FGE, Ltd. Personnel.



Figure 141. B-38, Sample 3 (1.5-1.9 m), loamy sand



Figure 142. B-38, Sample 4 (2.5-3.0 m), sand



Figure 143. TP-1, overview of excavation, view to northeast



Figure 144. TP-1, observed stratigraphy (0.0-2.4 m), view to east



Figure 145. TP-2, observed stratigraphy (0.0-2.7 m), view to east



Figure 146. TP-3 observed stratigraphy (0.0-3.2 m), view to east

4.4.43 Test Pit 5 (TP-5)

Test Pit 5 (TP-5) is located within the eastern portion of the study area in TMK: [2] 3-8-005:002. A CSH archaeologist observed excavation and collection of samples by FGE, Ltd. Sample collection depths varied by stratigraphic changes determined at geotechnical engineer's discretion. Stratigraphy observed consisted of disturbed sandy clay loam and gravelly silty clay loam (0.0-1.10 m) interpreted by CSH as being representative of the agricultural plow zone, and varying layers of silt loam with small concentrations of alluvial deposited gravels to the BOE (1.1-2.9 m), interpreted by CSH as being representative of natural soil deposition (Figure 147).

4.4.44 Test Pit 6 (TP-6)

Test Pit 6 (TP-6) is located within the central portion of the study area in TMK: [2] 3-8-005:002. A CSH archaeologist observed excavation and collection of samples by FGE, Ltd. Sample collection depths varied by stratigraphic changes determined at geotechnical engineer's discretion. Stratigraphy observed consisted of disturbed sandy clay loam and gravelly silty clay loam (0.0-0.9 m) interpreted by CSH as being representative of the agricultural plow zone, and varying layers of silt loam with small concentrations of alluvial deposited gravels to the BOE (0.9-2.47 m), interpreted by CSH as being representative of natural soil deposition (Figure 148).

4.4.45 Test Pit 7 (TP-7)

Test Pit 7 (TP-7) is located within the eastern portion of the study area in TMK: [2] 3-8-005:002. A CSH archaeologist observed excavation and collection of samples by FGE, Ltd. Sample collection depths varied by stratigraphic changes determined at geotechnical engineer's discretion. Stratigraphy observed consisted of disturbed sandy clay loam and silty clay loam (0.0-1.10 m) interpreted by CSH as being representative of the agricultural plow zone, and intrusions of alluvial deposited cobbles and loamy sand with varying layers of silt loam to the BOE (1.4-2.9 m), interpreted by CSH as being representative of natural soil deposition (Figure 149).

4.4.46 Test Pit 8 (TP-8)

Test Pit 8 (TP-8) is located within the southeast portion of the study area in TMK: [2] 3-8-005:002. A CSH archaeologist observed excavation and collection of samples by FGE, Ltd. Sample collection depths varied by stratigraphic changes determined at geotechnical engineer's discretion. Stratigraphy observed consisted of disturbed sandy loam (0.0-0.4 m) interpreted by CSH as being representative of the agricultural plow zone, and silty clay loam to the BOE (0.4-2.4 m), interpreted by CSH as being representative of natural soil deposition (Figure 150).



Figure 147. TP-5 observed stratigraphy (0.0-2.9 m), view to south



Figure 148. TP-6 observed stratigraphy (0.0-2.47 m), view to southeast



Figure 149. TP-7 observed stratigraphy (0.0-2.9 m), view to southeast



Figure 150. TP-8 observed stratigraphy (0.0-2.4 m), view to east

4.4.47 Test Pit 9 (TP-9)

Test Pit 9 (TP-9) is located within the eastern portion of the study area in TMK: [2] 3-8-005:002. A CSH archaeologist observed excavation and collection of samples by FGE, Ltd. Sample collection depths varied by stratigraphic changes determined at geotechnical engineer's discretion. Stratigraphy observed consisted of disturbed sandy clay loam, alluvial deposited cobbles, and silt loam (0.0-0.8 m) interpreted by CSH as being representative of the agricultural plow zone, and alternating layers of silt loam and dune sand to the BOE (0.8-2.4 m), interpreted by CSH as being representative of natural soil deposition (Figure 151).

4.4.48 Test Pit 10 (TP-10)

Test Pit 10 (TP-10) is located within the western portion of the study area in TMK: [2] 3-8-005:002. A CSH archaeologist observed excavation and collection of samples by FGE, Ltd. Sample collection depths varied by stratigraphic changes determined at geotechnical engineer's discretion. Stratigraphy observed consisted of disturbed sandy clay loam (0.0-1.15 m) interpreted by CSH as being representative of the agricultural plow zone, and silty clay loam to the BOE (1.4-2.18 m), interpreted by CSH as being representative of natural soil deposition (Figure 152).

4.4.49 Test Pit 11 (TP-11)

Test Pit 11 (TP-11) is located within the western portion of the study area in TMK: [2] 3-8-005:002. A CSH archaeologist observed excavation and collection of samples by FGE, Ltd. Sample collection depths varied by stratigraphic changes determined at geotechnical engineer's discretion. Stratigraphy observed consisted of disturbed sandy clay loam (0.0-0.6 m) interpreted by CSH as being representative of the agricultural plow zone, and silty clay loam to the BOE (0.6-1.95 m), interpreted by CSH as being representative of natural soil deposition (Figure 153).

4.4.50 Test Pit 12 (TP-12)

Test Pit 12 (TP-12) is located within the southwest portion of the study area in TMK: [2] 3-8-005:002. A CSH archaeologist observed excavation and collection of samples by FGE, Ltd. Sample collection depths varied by stratigraphic changes determined at geotechnical engineer's discretion. Stratigraphy observed consisted of disturbed sandy clay loam (0.0-0.55 m) interpreted by CSH as being representative of the agricultural plow zone, and alternating layers of silt loam and silty clay loam to the BOE (0.55-1.96 m), interpreted by CSH as being representative of natural soil deposition (Figure 154).



Figure 151. TP-9 observed stratigraphy (0.0-2.4 m), view to southwest



Figure 152. TP-10 observed stratigraphy (0.0-2.18 m), view to north



Figure 153. TP-11 observed stratigraphy (0.0-1.95 m), view to northwest



Figure 154. TP-12 observed stratigraphy (0.0-1.96 m), view to southwest

4.4.51 Test Pit 13 (TP-13)

Test Pit 13 (TP-13) is located within the southwest portion of the study area in TMK: [2] 3-8-005:002. A CSH archaeologist observed excavation and collection of samples by FGE, Ltd. Sample collection depths varied by stratigraphic changes determined at geotechnical engineer's discretion. Stratigraphy observed consisted of disturbed sandy clay loam and silty clay loam (0.0-0.87 m) interpreted by CSH as being representative of the agricultural plow zone, and silt loam with small concentrations of alluvial deposited gravels to the BOE (0.87-1.97 m), interpreted by CSH as being representative of natural soil deposition (Figure 155).

4.4.52 Test Pit 14 (TP-14)

Test Pit 14 (TP-14) is located within the southwest portion of the study area in TMK: [2] 3-8-005:002. A CSH archaeologist observed excavation and collection of samples by FGE, Ltd. Sample collection depths varied by stratigraphic changes determined at geotechnical engineer's discretion. Stratigraphy observed consisted of disturbed sandy clay loam and silty clay loam (0.0-1.10 m) interpreted by CSH as being representative of the agricultural plow zone, and silt loam deposits to the BOE (1.10-2.6 m), interpreted by CSH as being representative of natural soil deposition (Figure 156).

4.4.53 Test Pit 15 (TP-15)

Test Pit 15 (TP-15) is located within the southwest portion of the study area in TMK: [2] 3-8-005:002. A CSH archaeologist observed excavation and collection of samples by FGE, Ltd. Sample collection depths varied by stratigraphic changes determined at geotechnical engineer's discretion. Stratigraphy observed consisted of disturbed sandy loam and sand (0.0-1.15 m) interpreted by CSH as being representative of the agricultural plow zone, and sand deposits with small concentrations of alluvial deposited gravels to the BOE (1.15-2.9 m), interpreted by CSH as being representative of natural soil deposition (Figure 157). Between depths of 1.15-1.30 m, a potential charcoal stain was observed within a sand layer indicating possible prior disturbance or previously occurring natural burn event. Examination of bucket spoils from the darkened layer identified no charcoal pieces or other organics within stained sand layer.

4.4.54 Test Pit 16 (TP-16)

Test Pit 16 (TP-16) is located within the southern portion of the study area in TMK: [2] 3-8-005:002. A CSH archaeologist observed excavation and collection of samples by FGE, Ltd. Sample collection depths varied by stratigraphic changes determined at geotechnical engineer's discretion. Stratigraphy observed consisted of disturbed clay loam and sandy clay loam with sand concentrations (0.0-1.05 m) interpreted by CSH as being representative of the agricultural plow zone, and silt loam deposits to the BOE (1.05-2.35 m), interpreted by CSH as being representative of natural soil deposition (Figure 158).



Figure 155. TP-13 observed stratigraphy (0.0-1.97 m), view to northwest



Figure 156. TP-14 observed stratigraphy (0.0-2.6 m), view to northeast



Figure 157. TP-15 observed stratigraphy (0.0-2.9 m), view to north



Figure 158. TP-16 observed stratigraphy (0.0-2.35 m), view to northwest

4.4.55 Test Pit 17 (TP-17)

Test Pit 17 (TP-17) is located within the southern portion of the study area in TMK: [2] 3-8-005:002. A CSH archaeologist observed excavation and collection of samples by FGE, Ltd. Sample collection depths varied by stratigraphic changes determined at geotechnical engineer's discretion. Stratigraphy observed consisted of disturbed sandy clay loam (0.0-0.75 m) interpreted by CSH as being representative of the agricultural plow zone, and silty clay loam deposits to the BOE (0.75-2.20 m), interpreted by CSH as being representative of natural soil deposition (Figure 159).

4.4.56 Test Pit 18 (TP-18)

Test Pit 18 (TP-18) is located within the southern portion of the study area in TMK: [2] 3-8-005:002. A CSH archaeologist observed excavation and collection of samples by FGE, Ltd. Sample collection depths varied by stratigraphic changes determined at geotechnical engineer's discretion. Stratigraphy observed consisted of disturbed sandy clay loam (0.0-0.60 m) interpreted by CSH as being representative of the agricultural plow zone, and silty clay loam deposits to the BOE (0.75-2.25 m), interpreted by CSH as being representative of natural soil deposition (Figure 160).



Figure 159. TP-17 observed stratigraphy (0.0-2.2 m), view to south



Figure 160. TP-18 observed stratigraphy (0.0-2.25 m), view to northeast

4.5 Subsurface Testing

Subsurface testing for this AIS included the excavation of 230 test excavations (TE-1 through TE-230) that were distributed throughout the study area in a systematic gridded pattern (see Figure 29 and Figure 30). The testing coverage was consistent with the project's AIS fieldwork strategy that was reviewed and accepted by the SHPD on 11 January 2024 via HICRIS comment (see Appendix A). The documentation of each test excavation is presented in Volumes II and III of this report. During the subsurface testing portion of the AIS fieldwork, CSH identified two additional features of a previously documented historic property (SIHP # 50-50-04-08805 Features C and D) and one newly identified historic property (SIHP # -09166).

SIHP # -08805 was previously documented during CSH's AIS for the AES Kuihelani Solar Plus Storage Project (Yucha et al. 2021) and initially consisted of two locations of a buried cultural deposit (Feature A and B) that consisted of historic refuse with manufacture dates spanning the 1920s to 1980s related to commercial agriculture. The newly identified features of SIHP # -08805 include a buried cultural deposit consisting of vertebrate and invertebrate faunal material, concrete, and metal fragments that were identified within TE-73 (Feature C), and buried cow (*Bos taurus*) osseous remains within TE-171 (Feature D). SIHP # -09166 consisted of a buried concrete remnant that appears to have been a foundation for a ditch or flume and is associated with historic commercial agriculture. Full documentation of each historic property, including an assessment of significance, is provided in Section 6.

Section 5 Results of Laboratory Analysis

Artifacts and other cultural material collected in the field were brought to the CSH office in Wailuku for further analysis, accessioned, and prepared for temporary curation. Material collected during AIS fieldwork for additional laboratory analysis included 101 historic to modern artifacts, terrestrial vertebrate osseous remains, and various types of marine and terrestrial invertebrate remains. No traditional or pre-Contact artifacts were identified within the study area. As part of the analysis, historic artifacts were separated by type into glass (Section 5.1.1), ceramic (Section 5.1.2), metal (Section 5.1.3), and miscellaneous (Section 5.1.4). Faunal remains were separated by type into vertebrate (Section 5.2.1) and invertebrate (Section 5.2.2). A master catalogue of all collected material is also provided in Appendix B.

Nearly all the material collected during the AIS was either associated with SIHP #s 50-50-04-08805 or -09165. SIHP # -08805 included various artifacts as well as terrestrial and invertebrate faunal remains related to historic commercial agriculture. SIHP # -09165, the remnants of HC&S Camp Seven, included a surface scatter of glass, ceramic, and metal fragments that, along with historic maps showing the camp structures, was used to define the boundaries of the historic property. The analysis of the material collected from these historic properties also assisted in the assessment of historic property significance, association, function, and age. Full documentation of each historic property, including an assessment of significance, is provided in Section 6.

5.1 Historic Artifact Analysis

5.1.1 Glass Artifacts

A total of 41 glass artifacts (67.7 g) representing bottles or bottle fragments (n=34), structural window glass (n=6), and indeterminate items (n=1) were collected during AIS fieldwork (Table 3). The attributes used to analyze each glass artifact included the following: portion (complete or fragment portion); color; functional class (containers, unidentifiable objects, domestic items); category (bottle, window component, household fixture, flatware, hollowware, other); content (soda, medicine, food, cosmetic, wine/beer/ale, other); manufacturing technique (bottle machine, pressed glass, cup-bottom mold, two-piece mold); bottle closure (crown top, cork, screw top-exterior thread); base marks (bare iron pontil, sand pontil); type of labels (embossing, ACL-applied color label, paper label, stamped), glass manufacturer's marks, and brand marks/labels. The majority of collected glass artifacts consisted of small fragments with few diagnostic attributes apart from color.

As previously noted, nearly all of the artifacts collected during the AIS were identified within historic properties. Five glass artifacts (Acc. #s 2-5 and 18) were collected from TE-73 within SIHP # -08805 Feature C. One glass artifact was collected from TE-171 within SIHP # -08805 Feature D. The remainder of the glass artifacts were either collected from the surface of SIHP # -09165 or identified during the excavation of TE-151 within the footprint of SIHP # -09165.

Glass artifacts included one intact glass jar (Acc. # 58) and several glass fragments (Acc. #s 20, 44, 45, 56, and 62) that included embossing or other diagnostic attributes. Acc. # 58 is a colorless, one pint, wide-mouth glass jar (Figure 161). The remainder of the fragments consisted of body, shoulder, or heel fragments that were diagnostic based solely on color.

Table 3. Analysis of glass artifacts

Acc. #	TE-#	Depth (cmbs)	SIHP # 50-50-04	Description
2	73	0-130	-08805 Feature C	Colorless glass bottle glass fragment, slightly concave
3				Colorless glass, bottle glass fragment
4				Colorless glass fragments, interior striation pattern identical in both fragments
5				Fragments of colorless glass
18				Colorless glass tubular fragment
20	171	25	-08805 Feature D	Aqua, glass bottle fragment, base and partial heel fragment, embossed; "W" on base
26	151	0-20	-09165	Olive glass bottle glass, shoulder fragment, beverage use
27				Colorless glass fragment, faint aqua hue, slightly concave, unknown use
28				Colorless glass fragment, slightly concave
29				Colorless glass fragment, slightly concave
30				Colorless flat glass fragments (2)
31				Colorless flat glass fragments
43				Lavender bottle glass, lip to neck, partial shoulder fragment, vertical mold lines, bead finish
44				Aqua glass bottle fragments, round base fragment and body fragment, Embossing "C O / 2 3" on base
45				Greenish aqua glass bottle base to heel fragment, embossed "W" or "M" on base, likely soda bottle
46				Amber (brown) glass bottle, base fragments, (2) embossed with a dot on base
47				Aqua glass bottle, body fragment
48				Greenish aqua glass bottle, body fragment
49				Surface
50	Lavender glass, possible bottle fragment, curved at one end			
55	Olive green glass bottle base and partial body fragment, round base, arched base, no identifying marks			

Acc. #	TE-#	Depth (cmbs)	SIHP # 50-50-04	Description
56				Amber glass bottle base, heel and body fragment, round base, embossed "J A P A / 4" on base, probable Sake bottle
57				Olive/amber glass bottle, neck fragment, partial collar/lip
58				Colorless glass bottle, complete, round base, square body, wide mouth twist-off, embossed "16 FL. OZ. (ONE PINT)" on shoulder, "443-16A / (Ball-Icon logo) / H4" on base (logo is an "i" inside a "B")
59				Lavender glass fragment, decorative item, round shaped
60				Lavender glass fragment, decorative item, round shaped, scalloped design
61				Lavender glass fragment, decorative item
62				Colorless glass bottle base and partial body fragment, embossed "W" or "M" on base
63				Clear aqua blue glass bottle base fragment, round base
64				Light aqua glass bottle neck and lip fragment, grooved ring finish
65				Colorless glass fragment, internal cracks
66				Slight lavender, decorative glass item, possible decanter lid, scalloped edges, round
67				Milk glass jar fragment, lip to body fragment, threaded finish, octagonal body shape
68				Milk glass jar fragment, body to base fragment, embossed with Japanese writing on base, octagonal body shape
94				Colorless bottle glass, body fragment, Embossing: "TZ / UBULAR / ORK U.S.A." Possible glass lantern cover from R.E. Dietz Company from New York City, USA, est. 1840
95				Amber glass bottle fragment, body fragments (2)
96				Light blue glass fragment
97				Aqua glass fragment
98				Aqua glass fragment

Acc. #	TE-#	Depth (cmbs)	SIHP # 50-50-04	Description
99				Light aqua glass fragment
100				Colorless glass fragment



Figure 161. Accession # 58, glass jar, collected from the surface of SIHP # -09165

In 1904, Michael Owens invented the Automatic Bottle Machine (ABM). This machine blew the bottles from base to lip in a machine. Bottles made by this technique are characterized by two side seams that extend from the base and up and over the lip of the bottle, as well as few to no bubbles present in the glass and a more uniform glass thickness throughout the bottle as compared to mouth-blown glass bottles. The majority of the bottle glass fragments collected within the current study area were manufactured after the advent of the automatic bottle machine and decolorization of bottle glass in 1904.

Green glass is described as “non-olive” and “olive” green colors. Shades of green are the most popular or common bottle colors. The greens were formed by using coloring agents such as iron, chromium, or copper that each make different variations of the color. Two olive green bottle glass fragments (Acc. #s 26 and 55) were collected from SIHP # -09165 (Figure 162).

Aqua glass is a result of the iron impurities that are found in most sands and a common color in all types of American made bottles that were manufactured prior to the 1920s. With the exception of soda bottle manufacture, which continued with aqua colored glass well after the 1920s, aqua glass became less common after the 1920s when colorless, or clear glass replaced it as the color of choice (Lindsey 2010). A total of ten aqua tinted bottle glass fragments were collected during AIS fieldwork, including one fragment within TE-171 above SIHP # -08805 Feature D and nine fragments associated with SIHP # -09165. As part of the analysis, these fragments were divided based on variations in color and other attributes (Figure 163 through Figure 166).

Manganese dioxide was added to some glass made between 1905 and 1920 in order to decolorize the glass and achieve a clear bottle or window pane (Lindsey 2010). While the glass product began as clear glass when manufactured, the manganese gave some of the glass an “amethyst” tint after exposure to the sun or to ultraviolet light. Several fragments of “amethyst” or “sun colored” bottle glass were recovered in association with SIHP # -09165 (Acc. #s 43, 59-61, and 66) (Figure 167 through Figure 170). Acc. # 66 is interpreted as a portion of a decorative decanter stopper based on shape and design.

Amber glass was very common during the span of the late eighteenth through mid-twentieth centuries. Amber colors were produced from the natural impurities in glass and color additives such as nickel, sulfur, black lead, and carbon. One amber bottle base fragment embossed with “JAPA” on the bottom was interpreted as a probable sake bottle (Figure 171). The remainder of the amber glass fragments were unmarked (Figure 172). All the amber glass collected during AIS fieldwork was associated with SIHP # -09165.

One colorless glass fragment (Acc. # 94), collected from the surface of SIHP # -09165, is a possible glass lantern cover fragment based on surface embossing (Figure 173). The colorless glass fragment included the embossing “TZ / UBULAR / ORK U.S.A.”, which was attributed to the R.E. Dietz Company of New York (est. 1840). From the visible embossing, this was presumably one of the tubular lantern models which the R.E. Dietz & Smith started manufacturing in 1868 (Dietz 1914). Observing the spacing of the text on the glass fragment, it appears that the “& Smith” would not be present on this lantern which means that this was manufactured after Dietz bought out Smith in 1869. With foreigners coming to Maui long before this, the earliest date for this glass fragment would be 1869.



Figure 162. Accession #s 26 (1) and 55 (2), olive green glass bottle fragments



Figure 163. Accession #s 47 (1), 97 (2), and 98 (3), aqua colored glass fragments



Figure 164. Accession #s 63 (1) and 96 (2), aqua green glass bottle fragments



Figure 165. Accession #s 44 (1) and 64 (20) aqua bottle fragments



Figure 166. Accession #s 20 (1) and 45 (2), aqua and light green bottle bases with “W” or “M” embossed on base



Figure 167. Accession # 43, amethyst, or lavender, colored bottle glass fragment

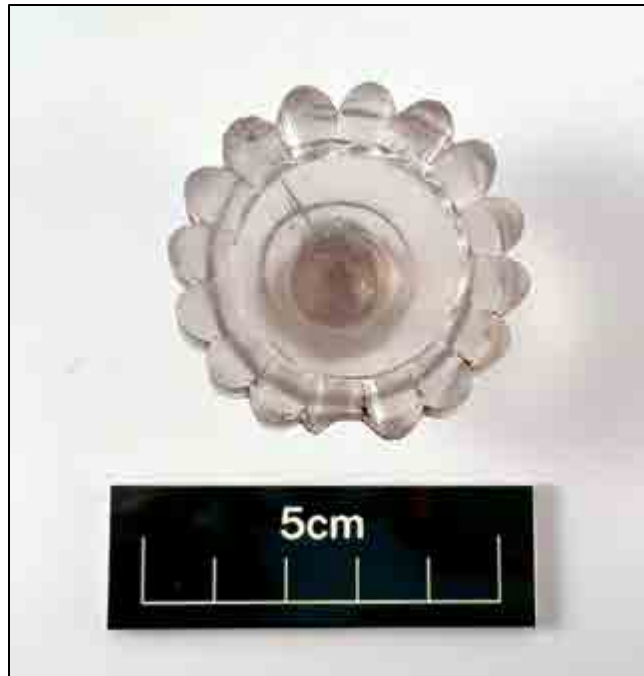


Figure 168. Accession # 66, top view of an amethyst decorative glass decanter stopper



Figure 169. Accession # 66, profile view of the amethyst decorative glass decanter stopper



Figure 170. Accession #s 59 (1), 60 (2), and 61 (3), amethyst glass fragments



Figure 171. Accession # 56, amber glass bottle base with “JAPA / 4” embossed on bottom suggesting this is a sake bottle



Figure 172. Accession #s 57 (1), 56 (2), 95 (3), and 46 (4), amber glass bottle fragments



Figure 173. Accession # 94, embossed glass, a glass lantern cover from R.E. Dietz Company, New York City, USA est. 1840

Two milk glass fragments (Acc. #s 67 and 68), collected from the surface of SIHP # -09165, are interpreted as cosmetic or toiletry jar-type containers (Figure 174 and Figure 175). Milk glass is an opaque white glass that is produced by the addition of tin or zinc oxide, fluoride, and phosphates. Acc. # 68 is embossed with a partial Japanese kanji character or similar marking.

Two fragments of pressed flat glass fragments (Acc. #s 30 and 31) were collected during the excavation of TE-151 within SIHP # -09165 (Figure 176). They appear to be too thin to be window glass and the use is indeterminate.

5.1.2 Ceramic Artifacts

A total of 49 ceramic artifacts (581 g) were collected during AIS fieldwork (Table 4). Of the total, 48 were collected from subsurface excavation or surface inspection within SIHP # -09165, and one artifact was collected within SIHP # -08805 Feature C. Each artifact was analyzed for functional class, ware type, surface treatment, and decoration type. Maker's marks or trademarks were also recorded whenever present.

Ceramic ware types can sometimes be reflective of former land use and, potentially, social status of the individuals associated with a particular site. Earthenware vessels were primarily utilitarian in nature and common to most households. Stoneware items were considered to be of a higher quality ware. Vitreous china and porcelains were considered to be luxury items and used by those of a significantly higher status (Cunningham 2002; Pogue 1994). Earthenware and stoneware vessels were imported to Hawai'i as early as the late eighteenth century from Great Britain and from the mid-twentieth century from the United States.

Identifiable domestic ceramic items fall into one of three types; vessel; toiletry; or tableware. Tableware is further divided into either hollowware or flatware. The ceramic assemblage that was collected from SIHP # -09165 consisted primarily of hollowware with blue and white transfer print designs with some examples of horizontal banding-type decoration (Figure 177 through Figure 189). Transfer printed decoration was developed by John Sadler and Guy Green of Liverpool in 1756 then adopted by Josiah Wedgwood who used this decorating technique on his ivory based "cream ware" (Winn 2007). There was also one stoneware sherd identified with a brown glaze on its interior and exterior which indicates that it was likely used to hold liquids.

In addition to domestic ceramics, a portion of a ceramic porcelain insulator spacer (Acc. # 12) was collected within TE-73 from SIHP # -08805 Feature C (Figure 190).

5.1.3 Metal Artifacts

A total of ten metal artifacts (1,029 g) were collected during AIS fieldwork (Table 5). Seven of these items were collected within TE-73 from SIHP # -08805 Feature C, while three items were collected from the surface of SIHP # -09165. While metal items, like nails, can be dated based on various characteristics, the metal artifacts collected during the AIS are overall in poor, corroded condition and could not be dated.

The two nails collected from SIHP # -08805 Feature C (Acc. # 8 and 9) appear to be round with flat heads, indicating possible wire nails (Figure 191). The transition of cut nails to wire nails was gradual and wire nails were not the dominant nail type until the 1890s, as many builders preferred cut nails well into the twentieth century (Nelson 1968).



Figure 174. Accession #s 67 (1) and 68 (2), milk glass jar fragments



Figure 175. Accession # 68, milk glass jar base showing embossing



Figure 176. Accession #s 30 (1) and 31 (2), flat pressed colorless glass fragments

Table 4. Analysis of ceramic artifacts

Acc. #	TE-#	Depth (cmbs)	SIHP # 50-50-04	Description
12	73		-08805 Feature C	Porcelain insulator spacer
32	151	0-20	-09165	Whiteware, holloware, rim to body fragment, transparent glaze, underglaze blue botanical print design on exterior
33				Whiteware, holloware, rim to body fragment, transparent glaze, no decoration on fragment
34				Whiteware, holloware, rim to body fragment, transparent glaze, underglaze brown unknown pattern
35				Whiteware, unknown body fragment, transparent glaze, underglaze blue bird pattern
36				Whiteware, unknown rim to body fragment, transparent glaze, underglaze blue botanical pattern
37				Whiteware, unknown body fragment, transparent glaze, underglaze blue unknown pattern
38				Whiteware, unknown body fragment, transparent glaze, underglaze (grayish-blue) rim lined pattern
39	151	0		Whiteware holloware, foot ring and waist fragment, transparent glaze, underglaze faded blue unknown pattern
40				Whiteware holloware, foot ring and waist fragment, transparent glaze, underglaze faded blue stripe around foot and unknown pattern
41				Whiteware holloware, rim to waist fragment, transparent glaze, underglaze faded blue geometric maze pattern around rim
42				Whiteware holloware, rim to waist fragment (2), transparent glaze, underglaze blue geometric pattern
51				Whiteware tableware, body fragment, transparent glaze (brown) circular pattern underglaze on exterior
52				Whiteware tableware body fragment, transparent overglaze, light blue linear pattern underglaze
53				164
69	Surface	0	Whiteware holloware, foot to rim fragment, transparent glaze, underglaze polychrome (blue and brown), alternating horizontal bands on exterior	
70			Whiteware holloware, foot, well, to cheek fragment, transparent glaze, underglaze monoglaze (light green), on exterior	

Acc. #	TE-#	Depth (cmbs)	SIHP # 50-50-04	Description
71				Whiteware tableware, unknown vessel, body fragment, transparent glaze, underglaze (brown) petal design on exterior
72				Whiteware unknown vessel, body fragment, transparent glaze, underglaze (gray), landscape design on exterior
73				Whiteware tableware, unknown vessel, body fragment, transparent glaze, underglaze (green), partial structure in design, exterior
74				Whiteware, unknown function, base fragment, round base, exterior of base is unglazed, interior is transparent glazed
76				Whiteware, holloware, cup, cheek, to body to rim fragment, transparent glaze, underglaze monochrome (blue), botanical design (water lilies), exterior
77				Whiteware, holloware, body fragment, transparent glaze, underglaze monochrome (blue), transfer print, botanical design, exterior
78				Whiteware, holloware, body to rim fragment, transparent glaze, underglaze monochrome (blue), transfer print, geometric design, exterior and interior
79				Whiteware, flatware, rim to marley fragment, transparent glaze, underglaze monochrome (blue), transfer print, botanical design, exterior and interior
80				Whiteware, holloware, cheek to body fragment, transparent glaze, underglaze monochrome (blue), transfer print, botanical design, exterior
81				Whiteware, tableware, rim fragment, transparent glaze, underglaze monochrome (blue), transfer print, botanical and geometric design, exterior and interior
82				Whiteware, flatware, well foot, to marley fragment, transparent glaze, underglaze monochrome (blue), transfer print, botanical and geometric design, exterior and interior
83				Whiteware, holloware, foot to body fragment, transparent glaze, underglaze monochrome (blue), transfer print, band around foot, exterior
84				Whiteware, holloware, foot to body fragment, transparent glaze, underglaze monochrome (blue), transfer print, partial unknown design, double band around foot, exterior

Acc. #	TE-#	Depth (cmbs)	SIHP # 50-50-04	Description
85				Whiteware, holloware, foot to body fragment, transparent glaze, underglaze monochrome (blue), transfer print, botanical design, exterior
86				Whiteware, holloware, foot to body fragment, transparent glaze, underglaze monochrome (blue), transfer print, botanical design, exterior
87				Whiteware, holloware, foot to body fragment, transparent glaze, underglaze monochrome (blue), transfer print, geometric design, lines around foot and on base, exterior
88				Whiteware, holloware, cheek to body fragment, transparent glaze, underglaze monochrome (blue), transfer print, flow blue technique, geometric and floral design, exterior
89				Whiteware, holloware, foot to body fragment, transparent glaze, underglaze monochrome (blue), printed, Makers Mark, used on pieces after the Trademark Act in 1862; reads "Trade Mark" / sunrise design
90				Whiteware, holloware, foot to cheek fragment, transparent glaze, underglaze monochrome (blue), printed, Makers Mark, used on pieces after the Trademark Act in 1862; reads "Trade" / sunrise design/ "M"
91				Whiteware, holloware, foot to body fragment, transparent glaze, blue blob design on fragment
101				Whiteware, holloware, foot to body fragment, transparent glaze, underglaze (blue) transfer print, geometric design exterior
102				Whiteware, body fragment, transparent glaze, no pattern on fragment
103				Whiteware flatware, foot to marley fragment, transparent glaze, no pattern on fragment
104				Whiteware holloware, body to rim fragment, transparent glaze, no pattern on fragment
105				Whiteware holloware, body fragment, transparent glaze, underglaze (blue) transfer print, design not recognizable, exterior
106				Whiteware holloware, body fragment, transparent glaze, underglaze (blue) transfer print, design not recognizable

Acc. #	TE-#	Depth (cmbs)	SIHP # 50-50-04	Description
107				Whiteware holloware, body fragment, transparent glaze, underglaze (blue) transfer print, design not recognizable, interior and exterior
108				Whiteware unknown, body fragment, transparent glaze, underglaze (light blue) no design on fragment
110				Whiteware, rim fragment, transparent glaze, underglaze (light gray) no design on fragment



Figure 177. Accession # 76, blue and white transfer print ceramic cup



Figure 178. Accession #s 89 (1) and 90 (2), ceramic whiteware hollowware, trademark stamp on base



Figure 179. Accession #s 78 (1), 79 (2), 81 (3), and 107 (4) exterior patterns of blue and white transfer print



Figure 180. Accession #s 78 (1), 79 (2), 81 (3), and 107 (4) interior patterns of blue and white transfer print, rim portions



Figure 181. Accession #s 85 (1), 86 (2), and 91 (3) ceramic whiteware holloware, blue and white transfer print, foot and base portions



Figure 182. Accession #s 83 (1), 84 (2), and 40 (3) ceramic whiteware holloware, foot and base portions, blue and white transfer print design



Figure 183. Accession #s 32 (1), 35 (2), 36 (3), 37 (4), 42 (5), 77 (6), 80 (7), 88 (8), 105 (9), and 106 (10), ceramic whiteware, blue and white transfer print designs

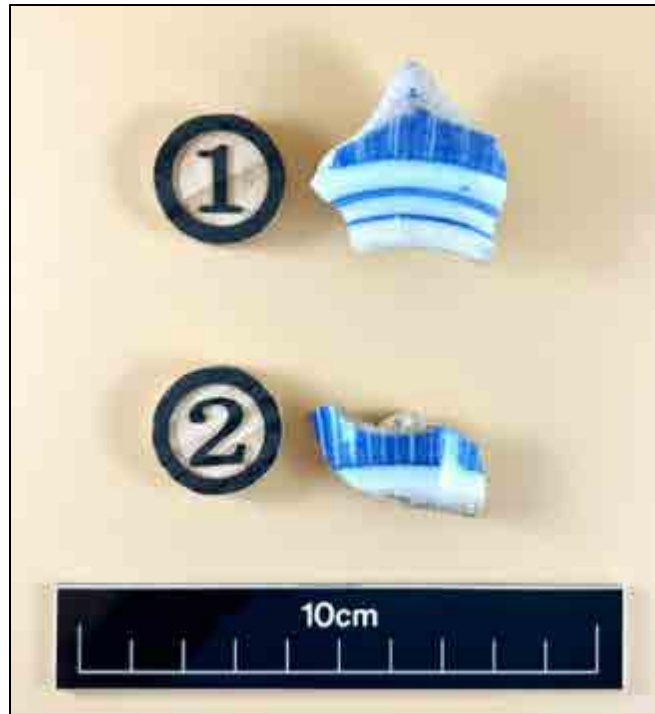


Figure 184. Accession #s 87 (1) and 101 (2), ceramic whiteware hollowware portions

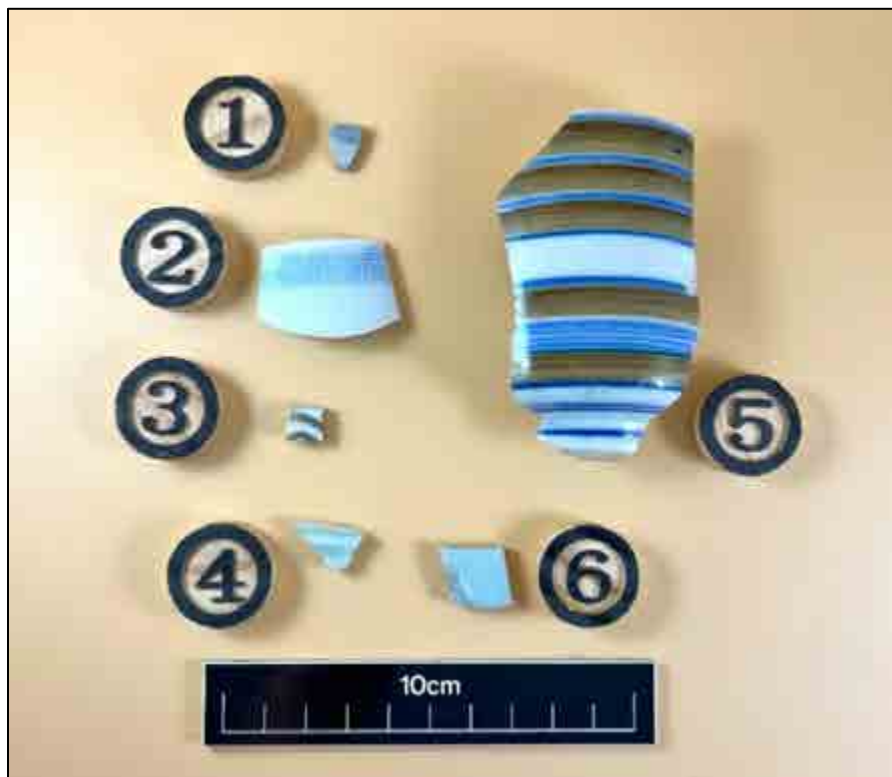


Figure 185. Accession #s 38 (1), 41 (2), 51 (3), 52 (4), 69 (5), and 108 (6) ceramic whiteware fragments, Acc. # 69 (4) is a rim to foot rim cup portion with banded glaze print



Figure 186. Accession #s 39 (1), 70 (2), and 103 (3) ceramic whiteware hollowware fragments



Figure 187. Accession #s 33 (1), 102 (2), 104 (3), 75 (4), 109 (5), and 110 (6) ceramic fragments, Acc. # 75 is stoneware and Acc. # 109 is yellowware



Figure 188. Accession #s 34 (1), 71 (2), 72 (3), and 73 (4) ceramic whiteware fragments



Figure 189. Accession # 74 ceramic jar or vase base fragment, interior glazed



Figure 190. Accession #12, ceramic porcelain insulator spacer

Table 5. Analysis of metal artifacts

Acc. #	TE-#	Depth (cmbs)	SIHP # 50-50-04-	Description
6	73	0-130	-08805 Feature C	Heavily corroded, 13.6 g, unidentifiable
7				Heavily corroded thin fragments, 10.1 g, unidentifiable
8				Round nail, round flat head, heavily corroded, 10.0 g, 8.36 cm long, 0.74 cm wide, 0.72 cm thick
9				Round nail, round flat head, heavily corroded, 2.4 g, 4.37 cm long, 0.79 cm wide, 0.75 cm thick
10				Sheared-off head of a construction bolt or fastener, 4.2 g, 0.7 cm long, 2.4 cm wide
11				Heavily corroded flat and folded fragments, 44.6 g, unidentifiable
17				Heavily corroded flat and folded fragments, 364.0 g, unidentifiable
23	Surface	0	-09165	Railroad spike, square shaft, flat head, bi-faced point, 47.60 g, 11.43 cm long, 0.95 cm wide, 0.81 cm thick
54				Railroad spike, square shaft, flat head. 151.8 g, 12.63 cm long, 2.93 cm wide, 1.28 cm thick
92				Flat, square sheet, perforation along one side, 380.4 g, 12.90 cm long, 11.43 cm wide, 0.58 cm thick, unidentifiable



Figure 191. Accession #s 8 (1) and 9 (2), hardware nails