Sovereign Councils of the Hawaiian Homelands Assembly

Pa`upena Community Development Inc.
P.O. Box 403, Kula, Maui, Hawai`i 96790
Telephone/Text: (808) 276-2713
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April 21, 2020

Aloha mai e na Hawaiian Homes Commissioners,

I ho`omahalo ia `oukou for three actions: repatriation of more than 5,500 Maui homeland acres in October 2018; approval of a Right Of Entry (ROE) last August, and consideration of the Kuhio Awards program in this centennial year of the 1920 Hawaiian Homes Commission Act federal trust.

To wit, at its Oct. 15, 2018, meeting on Maui, the commission elicited from DHHL Land Management Division (LMD) acting Administrator Kahana Albinio an announcement that the department would vacate five permits to non-Hawaiian entities, as of year-end 2018 — permits involving 5,664 acres of Valley Isle trust lands. Pa`upena CDC was grateful for this repatriation of `aina after advocating for two years that DHHL should restrain from permitting trust lands to non-Hawaiian, nonbeneficiary entities.

Pa`upena is thankful because the repatriation led to commission approval Aug. 19, 2019, for the CDC to receive a two-year due-diligence ROE to a 127-acre tract. The latter parcel is part of 5,057 Waiohuli/Keokea homeland acres originally requested by Pa`upena 3.4 years ago, on Dec. 24, 2016.

And, Commissioners, I appreciate your contemplation here of the so-called Kuhio Awards program during our centennial of the Hawaiian Homes Commission Act. Under this previously proposed program, 45,000 waitlist beneficiaries immediately, or as soon as feasible, would receive Kuhio-Award leases throughout the archipelago. Kuhio Awards would average 2.3 acres per homestead out of at least 103,000 homeland acres not currently being leased or permitted.

Regarding homestead size, I live on a 1-acre Waiohuli residential lot. My homestead is replete with dragonfruit, pineapples, kabocha pumpkin, five liliko`i varieties, chili peppers, and lehua mamo for lei making. Fruit trees include apple, mountain apple, avocado, banana, guava, five mango varieties, papaya, peach, pear, plum, rollinia (like atemoya), Serinam cherry, soursop, `ulu, and citruses of calamansi, kumquat, lemon and Satsuma tangerine. We also have two honey beehives and a laying chicken. As a sustainable homesteader, I maintain that all residential lease awards should be 1 acre or larger in size. I believe Prince Jonah Kuhio Kalaniana`ole would agree.

ADDITIONALLY, I would like to advocate on matters of due diligence; a revocable permit for 4,750 acres, and a land-use request for a Makena ROE.

First, Pa`upena would like to make a six-month report, as requested by Commissioner David Ka`apu, on the CDC's ROE to the 127-acre Waiohuli/Keokea homelands parcel along Kula Highway.

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With invaluable kokua from USDA conservation specialist Jason Hew, Pa`upena is able to present the due-diligence assessments, archaeological reports, environmental evaluation, and a request for a waiver of Environmental Assessment (EA), as allowed under department rules. USDA officials signed off on all assessments, which Jason has compiled and which are attached for DHHL and commission review. Pa`upena also presents for approval its due-diligence Master and Business plans and budget for the 127 acres.

Pa`upena seeks a 30-year long-term license to the latter Waiohuli/Keokea acreage. DHHL and commission approval of the due-diligence documents and of an EA waiver would facilitate the CDC's plans for a beneficiary-training ag park, and community pasturing on the `aina, as provided under HHCA Section 211.

Second, Pa`upena submitted April 1, 2020, to DHHL LMD a land-use request for a month-to-month Revocable Permit (RP) to manage and maintain 4,750 Waiohuli/Keokea makai acres below Keanuhea Drive. The CDC seeks such a steward arrangement, or contract, in order to prevent brush fires, and to mitigate trespassing, illegal hunting, and the dumping of refuse and derelict vehicles. Just Wednesday, Pa`upena President Norman Abihai made police report No. 20-013694 to Maui officer Nephi Laga, with a photo showing a truck with license plate trespassing April 6 on the subject land. Norman hopes DHHL will seek prosecution of the violator.

Finally, Pa`upena CDC submitted last November to DHHL LMD, a land-use request for a two-year due-diligence ROE to five Makena parcels totaling 228.088 homeland acres. The CDC's plans for the `aina include farming and community pasturing, especially by beneficiaries with genealogical ties to these South Maui lands, and possibly an `opio water-sports program at the nearby Makena shoreline.

In conclusion, mahalo to the department and to the commission for repatriation 18 months ago of more than 5,500 acres of Maui trust lands; for approval six months ago of a Pa`upena ROE to 127 homeland acres, and for re-consideration of the Kuhio Awards program.

And I hope the commission will consider positively Pa`upena's (1) Master and Business plans and budget; due-diligence documents; archaeological reports, and request for an EA waiver involving 127 Waiohuli/Keokea homeland acres, (2) land-use request three weeks ago for an RP to manage and maintain 4,750 Waiohuli/Keokea makai acres, and (3) land-use request five months ago for a two-year due-diligence ROE to 228 acres of Makena trust lands.

Mahalo nui,
-Kekoa Enomoto
Chairwoman of the board

Pa`upena Community Development Inc. (CDC)

Master Plan

Subject: Right of Entry No.690

TMK: (2) 2-2-034: 026 (por.) & 028 (por.)

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Pa`upena Community Development Inc. (CDC)

Mission

Pa`upena CDC is a beneficiary-owned group, whose vision is to fulfill Prince Kuhio's century-old dream for native Hawaiians to reconnect with Waiohuli ahupua`a in thriving farming and ranching communities, and to share this paradigm throughout the pae`aina (archipelago). The mission of Pau`pena CDC is to provide resources and training for fellow Hawaiian Homes trust beneficiaries to build homes and self-sufficient communities.

<u>Project Goals for ROE #690</u>

- #1: To complete and repair perimeter/boundary fencing
- #2: To complete and repair inside existing paddocks
- #3: Constructing Water Catchment sytems
- #4: To complete one acre agriculture project
- #5: Restoring existing roads

Description of Goals

All of our goals embedded in the above vision and mission are in line with our mission to reconnect with the Waiohuli ahupua`a in thriving farming and ranching communities. We want to show that by improving the area that had been leased by a non-Hawaiian beneficiary we are able to demonstrate that we are self-sufficient and are fulfilling our Prince's vision and dream.

The non-homesteading land use envisioned under this request is for Pa`upena CDC to run cattle in the project area. In addition, Pa`upena CDC principals will dedicate one acre for an agricultural demonstration site to educate and train beneficiaries in farming concepts and techniques. We seek to undertake agricultural and pastoral activities—including infrastructural enhancements to roads, fencing and paddocks, on Hawaiian homeland, as prescribed by the 1920 Hawaiian Homes Commission Act of federal trust.

We will provide ag-and pastoral training and resources to beneficiaries, especially to some of more than 9,000 waitlisters.

We will demonstrate the capability of Pa`upena's board, staff, and volunteers to manage 127 Waiohuli/Keokea homelands acres, in order to qualify for a two-year-due diligence Right of Entry and eventually long-term license to approximately 4,750 adjacent acres of trust lands.

The proposed land use will benefit the federal 1921 Hawaiian Homes Commission Act trust in five direct and indirect ways: by fulfilling the act, Prince Kuhio's vision and the commission's kuleana; by preparing trust applicants for their awards, and by producing license rental fees.

First, the proposed land use of a beneficiary organization running cattle in the paniolo tradition and providing agricultural training fulfills purposes of the Hawaiian Homes Commission Act. The latter document proclaims: "The policy of this Act is to enable native Hawaiians to return to their lands in order to fully support self-sufficiency for native Hawaiians and the self-determination of native Hawaiians in the administration of this Act, and the preservation of the values, traditions, and culture of native Hawaiians."

Second, the land-use proposal realizes Prince Jonah Kuhio Kalaniana`ole's desire to give his people land to farm, ranch and be enriched. As the federal document declares: "The principal purposes of this Act include but are not limited to:

(1) Establishing a permanent land base for the benefit and use of native Hawaiians, upon which they may live, farm, ranch, and otherwise engage in commercial or industrial or any other activities as authorized in this Act;

(2) Placing native Hawaiians on the lands set aside under this Act in a prompt and efficient manner and assuring long-term tenancy to beneficiaries of this Act and their successors; . . .

(4) Providing adequate amounts of water and supporting infrastructure, so that homestead lands will always be usable and accessible; and

(5) Providing financial support and technical assistance to native Hawaiian beneficiaries of this Act so that by pursuing strategies to enhance economic self-sufficiency and promote community-based development, the traditions, culture and quality of life of native Hawaiians shall be forever self-sustaining."

Third, the HHCA trust benefits because the land-use proposal enables the Hawaiian Homes Commission director and members to exercise their fiduciary duty "to act exclusively in the interest of beneficiaries under the act (and to) adhere to the terms of the trust as set forth in the act," per Title 10 Administrative Rules Section 10-2-19.

Fourth, beneficiaries running cattle and cultivating crops will prepare applicants to accept agriculture and pastoral awards, and the associated kuleana.

Lastly, income generation via Right Of Entry rental fees directly will benefit the trust.

Description of Project Area

According to the Maui Island Plan from DHHL the topography of the area, Keokea and Waiohuli, is characterized by rolling hills that grow increasingly steep toward the mauka areas. According to the USGS topographic map, elevations range from approximately 640 feet above sea level in the western (makai) portion of the tract to approximately 3,000 feet above sea level in the eastern portion (mauka).

In regards to natural disaster events in the area, per FEMA the area is in a flood zone that is ouside of the 500-year flood plain, which designates areas determined to be outside of the 500-year flood plain. Also, the rainfall is an average 15 inches in the lower elevations and 30 inches in the higher elevations. (2004 DHHL Maui Island Plan, Page 91)

Concerning the infrastructure of the project area, there is only one-way in and out from Kula Highway, as noted on the maps provided. There are dirt roads within the project area that go around the perimeter. Vehicles and pedestrians are able to access the project area safely.

Improvements will be made to the project area by completing our goals above. Please refer to the maps provided with due-diligence documentation to locate existing paddocks, roads, and boundary fencing.

There are no known unique natural and cultural elements in the project area, ie. Hei`au, so it is safe to implement our mission in line with ranching and farming the area.

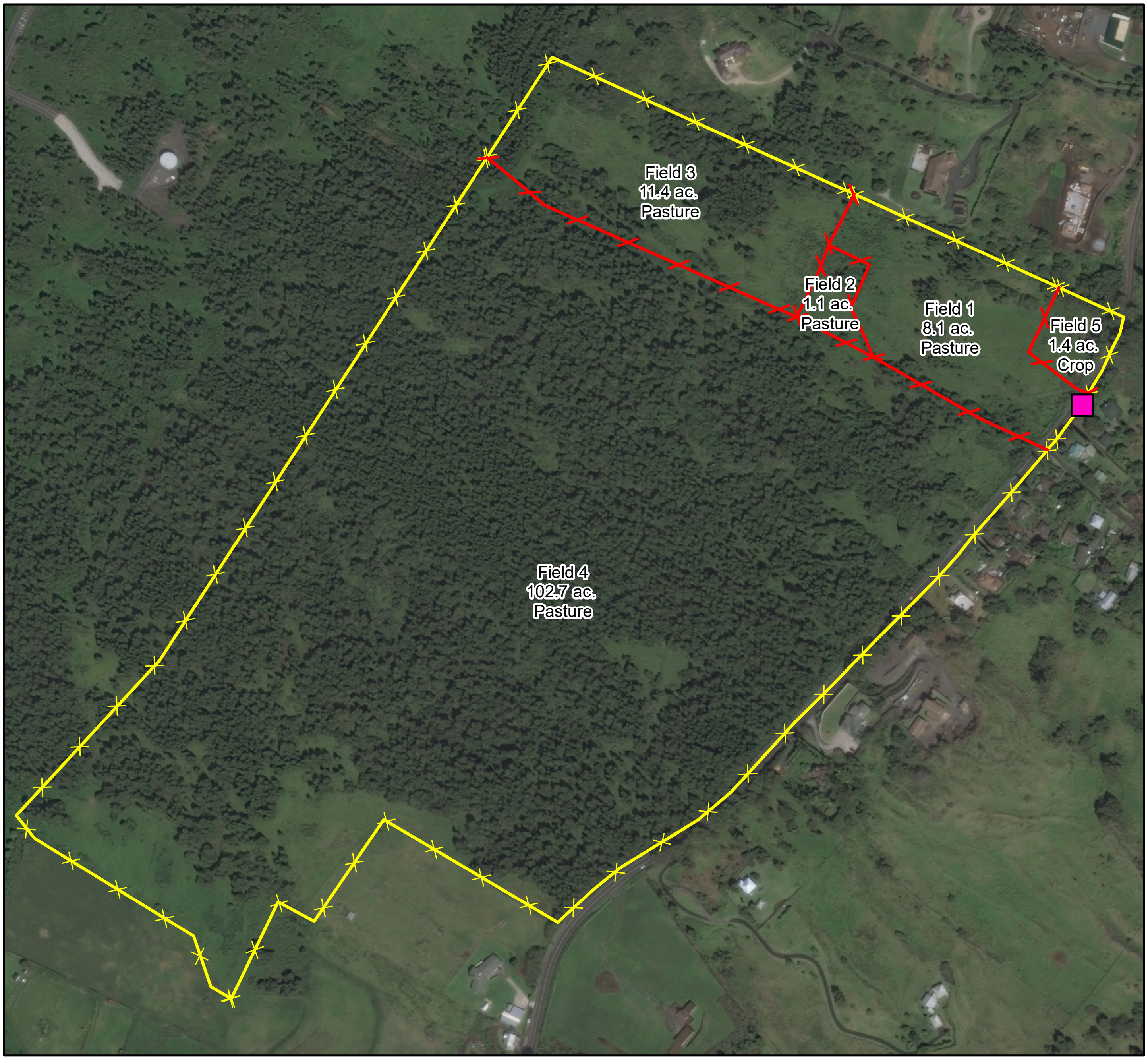
Paʻupena Community Development has worked with Jason Hew, Maui Soil & Water Conservation Districts Conservation Specialist, to develop a Conservation plan. The conservation plan was reviewed and accepted by the USDA Natural Resource Conservation Service and the Central Maui Soil & Water Conservation District board. The conservation plan developed for Paʻupena Community Development is included as a part of the master plan that addresses due diligence required in the right of entry. The signed conservation plan assesses many different environmental aspects as well as evaluates the capability of ranching activities. Included in the conservation plan are various maps, a schedule of practice implementation (Conservation Plan), implementation requirements for each scheduled conservation practice, a comprehensive Environmental Evaluation, cultural resource documentation, threatened and endangered species evaluation, field inventory documentation, and correspondence between the cooperator and the planner. Information included in the conservation plan addresses items required in the master plan such as a narrative description of the project goals, narratives and graphical descriptions of the project area including topography, areas susceptible to natural disaster events, locations of known sensitive or unique cultural resources, the identification of level of infrastructure improvements and location of improvements, and a site plan drawing to scale of the project area depicting programmatic use of the area. Jason Hew can be contacted at (808) 214-1746 or by email at jason.hew@usda.gov for any questions or concerns.

Master Plan Map

Date: 3/11/2020

Customer(s): PA'UPENA COMMUNITY DEVELOPMENT
District: CENTRAL MAUI SOIL & WATER CONSERVATION DISTRICT
Approximate Acres: 124.6
Legal Description: TMK (2) 2-2-034:026, 028

Field Office: KAHULUI SERVICE CENTER
Agency: Maui Soil & Water Conservation Districts
Assisted By: Jason Hew
State and County: HI, Maui County, Hawaii
Land Units: Farm# 1956 Tract # 1818



Prepared with assistance from USDA-Natural Resources Conservation Service

Legend

Proposed Cross Fences
Perimeter Fence (Improvements Required)
Gate

N

0 250 500 750 1,000 Feet

Pa`upena Community Development Inc. (CDC)

Business Plan

Subject: Right of Entry (ROE) #690

TMK: (2) 2-2-034:026 (por.) & 028 (por.)

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Pa`upena Community Development Inc. (CDC)

Executive Summary

Pa`upena CDC is a Maui-based IRS 501(c)(3) nonprofit beneficiary organization under the auspices of the 1921 Hawaiian Homes Commission Act federal trust since November 29, 2016.

Our structure for leadership is as follows:

Officers: President, Vice President, Secretary, and Treasurer
Board of Directors no more than eight, with a Chairperson

Overall goals for Pa`upena CDC are to repatriate trust lands to native Hawaiian homelands beneficiaries; to educate, motivate and mobilize beneficiaries about how to access Maui trust lands, and to create quality housing and self-sufficient communities through farming and ranching.

In the context of 127 Waiohuli/Keokea mauka homeland acres along Kula Highway, Pa`upena proposes a Business Plan featuring five projects over the next 30 years with an estimated $176,500 budget. These projects seek to manifest the vision of Prince Jonah Kuhio Kalaniana`ole, and to help native Hawaiian beneficiaries with education, financial programs and networking to provide the resources and tools to live a sustainable life through farming and ranching.

As a 501(c)(3) nonprofit, Pa`upena's financial strategy is to procure funding mainly via grants, donations and loans, since the CDC is contrained from for-profit strategies.

Pa`upena's marketing strategy is to network with its communities, businesses and other Hawaiian entities to obtain the needed resources to empower native Hawaiian beneficiaries to be self-sufficient. We will use digital platforms and social media to connect with beneficiaries, and will hold educational sessions both in person and via a digital platform.

Mission and Vision

Pa`upena CDC is a beneficiary-owned group, whose vision is to fulfill Prince Kuhio's century-old dream for native Hawaiians to reconnect with Waiohuli ahupua`a in thriving farming and ranching communities, and to share this paradigm throughout the pae`aina (archipelago). The mission of Pau`pena CDC is to provide resources and training for fellow Hawaiian Homes trust beneficiaries to build homes and self-sufficient communities.

Values:
-Ea: sovereignty, the life breath that undergirds all efforts.
-`Eleu: Energetic and proactive.
-E Huli`au Kakou: Change the system, transform the community.
-Education: Train others to be financially sustainable.

ROE #690 Projects

TMK: (2) 2-2-034: 026 (por.) & 028 (por.)

Project 1: Perimeter and Boundary Fencing

Project 2: Paddocks

Project 3: Water-catchment Systems

Project 4: Agriculture

Project 5: Roads

Project Descriptions

Project 1:

Repair and complete the existing perimeter and boundary fencing. Boundary fence line is 9,823 feet. In order to repair and complete fencing, we will be expanding use of all existing fencing materials such as, but not limited to, wire fencing, fence nails, fence posts and fence staples/pins.

Maintenance for the perimeter and boundary will be included in the budget.

Budget for Projects 1 and 2 is explained at the end of Project 2.

Project 2:

Repair and fix the four existing paddocks on subject property. Fencing for these four paddocks is in addition to the boundary fence line.

- Paddock A estimated fence line is 1,260 feet.

- Paddock B estimated fence line is 583 feet.
- Paddock C estimated fence line is 1,024 feet.
- Paddock D estimated fence line is 6,956 feet.

Current status of the paddocks is overgrown with greenery and weeds, and rundown due to weather conditions and neglect by the past lessee to maintain the enclosures.

Budget for Project 1 and 2 is estimated to be $150,000. The materials that are on subject property will be recycled and reused.

Materials that need to be replaced are listed and detailed, based on 12,690 feet of fence line (including a 15% cushion for inflation):

8'x6" post	$20.00	405 pieces	$8,100
10' brace (H)	$26.00	180 pieces	$4,680
7' T-post galvanized	$12.00	2,000 pieces	$24,000
330' field fence 12.5x6	$300.00	45 pieces	$13,500
Smooth wire 10#, 12.5 gal	$23.00	35 pieces	$805
Fencing nails	$100.00	2 buckets	$200
Clips	$50.00	14 cases	$700
12' corral panels	$200.00	22 panels	$4,400
Subtotal	$56,385	+15%, $8457.75	Total: $64,842.75

A Pau`pena goal is to rent-to-own a 305 excavator quick coupler with thumb and accessories; this equipment will assist the CDC to manage and maintain the fencing, and help with all current and future projects. This coupler can range in price; see notes in Project 5 for rental cost. We also would consider purchasing excavator accessories, including a rock auger at $7,500, buster and driver at $6,000, and an all-in-one fence-wire-roller attachment and strainer at $7,000.

To keep the fence line clear of weeds, Pa`upena will purchase a Steamwand SW900 model at $18,500 plus trailer at $7,000, equals $25,500. This equipment will enable Pa`upena to kill weeds in a natural and economical way. The Steamwand SW900 runs on 10 liters of water per minute with the ability to run two applicator heads simultaneously. This machine is very popular among farmers. Thus, $7,500 + $6,000 + $7,000 + $25,500 + $3,825 (15 percent cushion) + $64,842.75 = $114,667.75; so approximate cost involving "305 excavator quick coupler with thumb" is $35,332.25.

Project 3:

Pa`upena will install water-catchment systems throughout the subject property for self-sustainability. There are on-premise now two water-catchment systems that will be restored. Pa`upena will run a pilot program with Tsunami Water Products' Atmospheric

Water Generators (AWG). This AWG system is able to produce some 200 gallons of water daily for both ranching and farming aspects of the subject property. Tsunami has donated a $26,000 machine plus trailer to Pa`upena, which must build a small structure with donated solar panels for electricity to run the machine.

Contruction/operating costs are about $5,000.

Project 4:

We will designate 1 acre of the subject property to have native agriculture, i.e., to grow dryland kalo. We will fence off the area to prevent access by cattle. Pa`upena aims to install in the ag area, the Tsunami Atmospheric Water Generator along with a water-delivery system that will utilize available resources yet not harm the `aina.

Quote from Pacific Pipe, 82 Pu`u Ehu Place, Suite 101, Kahului, HI 96732, as of 3/31/20, for materials needed to set up a water-delivery system:

Quote #31884-00

Techline .9GPH@18" 500' Netafim Inline tubing	1	Roll	$157.20 /roll	$157.20
401-12.50x360' Fabri Non-woven 401 series	1	Each	$461.50/each	$461.50
Stake-50 6"x1"x6" stake 50/bag 20 bags per case	20	Each	$8.68/each	$173.60
XBS500 .50"x500' solid hose w/green stripe ID =.615	1	Roll	$48.58/roll	$48.58
Subtotal	23	$840.88	Taxes: $35.03	$875.91

Labor/operating costs are $5,000.

Project 5:

Pa`upena will improve the existing dirt road within the subject property. We will use a 305 excavator with thumb (please refer to Project 2 for accessories list). We will rent-to-own the machinery from a company, such as CAT, Service Rentals, Sunbelt or Bacon Universal.

Estimated timeline to complete is two weeks, or 10 working days.

Rental price is $4,000.

Hauling price is $800.

Diesel gas at $4 per gallon, 20 gallons daily, totals $800.

Labor/operating costs are $10,000. Thus, $4,000 + $800 + $800 + $10,000 equals $15,600.

In conclusion budgetwise, the estimated expenses and perceived total are, as follows:

Projects 1 and 2	— $150,000
Project 3	— $5,000
Project 4	— $5,875.91
Project 5	— $15,600
TOTAL	— $176,475.91

Financial History

- 2017-18: Implemented $100,000 USDA Socially Disadvantaged and Veteran Farmers and Ranchers grant project.
- 2018: $1,325 Council for Native Hawaiian Advancement grant project to register voters.
- 2018: $400,000 donation from Paul C. Phillips Revocable Trust.
- 2019-20: $47,000 Department of Hawaiian Home Lands priority-projects grant to build water-catchment systems on six Upcountry Maui homestead farms for the purpose of collecting water-intake data.
- 2020-21: $179,000 Enterprise Community Partners/HUD community-needs-assessment grant project.

Marketing Strategy

Pa`upena's target population to be served is 9,047 beneficiaries with 50 percent native Hawaiian blood quantum who are on the waitlists for Hawaiian homestead awards on Maui. They include 3,785 residential, 4,654 agricultural, and 608 pastoral beneficiaries. The purpose and need are to mitigate the state's food-sovereignty crisis by empowering native Hawaiian beneficiaries with farming-and-ranching knowledge and techniques and, thereby, make them sustainable and self-sufficient foodwise.

Pa`upena creates partnerships to benefit Hawaiian beneficiaries, by networking within the native Hawaiian community and throughout America. Partnerships include, but are not limited to:
-Big Water Consulting of Seattle, Managing Director Kevin Klingbeil.
-Council for Native Hawaiian Advancement, or CNHA.

-Credit Edge Solutions LLC, co-owner Kainoa Lei MacDonald.
-EA Ecoversity, founder Dr. Ku Kahakalau.
-Hawaiian Community Assets.
-Local farmers and ranchers.
-Maui Hawaiian homestead associations, such as at Keokea homestead, Paukukalo homestead, Waiehu Kou 3.
-Sovereign Council of Hawaiian Homestead Associations, or SCHHA.
-World Indigenous Nations University Hawaii Pasifika, founder Dr. Peter Hanohano.

KAHULUI SERVICE CENTER
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8088715500 ext. 3

JILL FICKE-BEATON
DISTRICT CONSERVATIONIST

Conservation Plan

PA'UPENA COMMUNITY DEVELOPMENT
PO BOX 403
KULA, HI 96790

OBJECTIVE(S)

Due diligence to receive a long term right of entry to a Department of Hawaiian Home Lands parcel. This conservation plan will be included as part of a master plan to DHHL. To implement a prescribed grazing management plan. To manage the harvest of vegetation with grazing and/or browsing animals. To improve or maintain desired species composition, structure, and vigor of plant communities. To improve or maintain quantity and quality of forage for grazing and/or browsing animals' health and productivity.

Prescribed Grazing(528)

Prescribed Grazing (Lifespan 1 year) is the proper management and harvest of forages with grazing and/or browsing animals. The technical specifications for this prescribed grazing system will be followed as described on the customized Implementation Requirements (IR) designed for these fields.

Tract	Field	Planned Amount	Month	Year	Applied Amount	Date
1818	1	8.1 Ac	3	2021		
1818	2	1.1 Ac	3	2021		
1818	3	11.4 Ac	3	2021		
1818	4	102.7 Ac	3	2021		
	Total:	123.3 Ac				

1. The cooperator is responsible to ensure all planned and installed practices are within legal property boundaries and appropriate setbacks.
2. The NRCS makes no representation on the existence or non-existence of any utilities and will not be liable for damage to utilities and damage resulting from disruption of service caused by construction activities.
3. The cooperator is responsible for obtaining all necessary permits (special management area, special use, conservation district use, in-stream activities, building, easements, right-of-ways, water rights, etc.) as applicable before starting work.
4. Cultural resources are protected by law. It is illegal to intentionally destroy or disturb historic and cultural sites (NHPA, 1966). Any inadvertent findings of cultural resources or artifacts of significance during land development activities should be reported to the State Historic Preservation Office (SHPO) before additional work is undertaken.
5. For agricultural operations, the Maui County Development Services Administration may waive the permit requirements of the county Grubbing & Grading Ordinance when implementing the conservation practices contained in this plan, provided this plan is approved by the appropriate Soil & Water Conservation District (SWCD) Board and the practices are installed according to NRCS standards and specifications. Modifications to this plan that effect grading and grubbing activities must be approved by the appropriate SWCD Board, and is the responsibility of the cooperator.
6. Plan approval does not authorize or qualify practices for cost-sharing.

CERTIFICATION OF PARTICIPANTS

Norman Alidra 4-3-20
PA'UPENA COMMUNITY DEVELO DATE

MAUI SOIL & WATER CONSERVATION DISTRICTS
JASON HEW (Affiliate) Digitally signed by JASON HEW (Affiliate) Date: 2020.04.03 15:12:17 -10'00'

CERTIFICATION OF:

DISTRICT CONSERVATIONIST
STEPHANIE FICKE-BEATON Digitally signed by STEPHANIE FICKE-BEATON Date: 2020.04.06 11:01:56 -10'00'
JILL FICKE-BEATON DATE

CONSERVATION DISTRICT
M Silva April 6, 2020
CENTRAL MAUI SOIL & WATER DATE

PUBLIC BURDEN STATEMENT

According to the Paperwork Reduction Act of 1995, an agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a valid OMB control number. The valid OMB control number for this information collections is 0578-0013. The time required to complete this information collection is estimated to average 45/0.75 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection information.

PRIVACY ACT

The above statements are made in accordance with the Privacy Act of 1974 (5 U.S.C 522a). Furnishing this information is voluntary; however failure to furnish correct, complete information will result in the withholding or withdrawal of such technical or financial assistance. The information may be furnished to other USDA agencies, the Internal Revenue Service, the Department of Justice, or other state or federal law enforcement agencies, or in response to orders of a court, magistrate, or administrative tribunal.

USDA NON-DISCRIMINATION STATEMENT

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USDA Office of the Assistant Secretary for Civil Rights
1400 Independence Avenue, SW.
Washington, DC 20250-9410
Or call toll free at (866) 632-9992 (voice) to obtain additional information, the appropriate office or to request documents. Individuals who are deaf, hard of hearing, or have speech disabilities may contact USDA through the Federal Relay service at (800) 877-8339 or (800) 845-6136 (in Spanish). USDA is an equal opportunity provider, employer, and lender. Persons with disabilities who require alternative means for communication of program information (e.g., Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD).

Conservation Plan Map

Date: 3/11/2020

Customer(s): PA'UPENA COMMUNITY DEVELOPMENT
District: CENTRAL MAUI SOIL & WATER CONSERVATION DISTRICT
Approximate Acres: 124.6
Legal Description: TMK (2) 2-2-034:026, 028

Field Office: KAHULUI SERVICE CENTER
Agency: Maui Soil & Water Conservation Districts
Assisted By: Jason Hew
State and County: HI, Maui County, Hawaii
Land Units: Farm# 1956 Tract # 1818

Prepared with assistance from USDA-Natural Resources Conservation Service

Legend

KA_PaupenaCommunityDevelopment

Practice name

Prescribed Grazing

USDA

N

0 250 500 750 1,000 Feet

Livestock Inventory and Demand Summary for:
Paupena Community Development
127
3/17/2020

Notes:

Grazable acres were estimated by aerial imagery and ground truthing. 2 breeds of cattle will be used, Herd 1 is angud hereford mix, Herd 2 is a miniature dexter miniature angus mix.

Livestock Class	Planned Number	Avg. Weight	Intake Rate (%)	Lbs/Day	Lbs/Year	Management Details	Time Frame for Alt Pasture or Dry Lot
Cow/Calf Pairs Herd 1	4	1,200	2.6	124.8	45,552	Grazing System Year Round	
Cow/Calf Pairs Herd 2	5	700	2.6	91.0	33,567	Grazing System Year Round	
Totals	**9**			**216**	**79,119**		

Livestock Class	Forage Demand by Month (Lbs/month)											
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Cow/Calf Pairs Herd 1	3,390	3,800	4,434	4,491	4,415	4,331	4,096	3,823	3,595	3,003	3,060	3,117
Cow/Calf Pairs Herd 2	3,233	3,625	3,115	3,263	2,987	2,787	2,621	2,189	2,231	2,272	2,472	2,771
Total Forage Demand	**6,623**	**7,425**	**7,549**	**7,754**	**7,401**	**7,119**	**6,717**	**6,012**	**5,826**	**5,275**	**5,531**	**5,887**
Grazing System Total Demand	**6,623**	**7,425**	**7,549**	**7,754**	**7,401**	**7,119**	**6,717**	**6,012**	**5,826**	**5,275**	**5,531**	**5,887**
Alternative Pasture Total Demand	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Dry Lot Total Demand	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Annual Totals	Lbs/Year
Grazing System	**79,119**
Alternative Pasture	**0**
Dry Lot	**0**
Total Forage Demand	**79,119**

Pasture Forage Production Summary for:
Paupena Community Developn
127
3/17/2020

Grazing System Pasture Forage Production								
Field/ Paddock Number	**Kind of Forage**	**Acres (Usable)**	**TFP * lbs/ac**	**Total Production Pounds**	**Pasture Grazing Eff. (%)**	**Usable Pounds**	**Hay Then Graze?**	**If Yes, Month Hay Cut**
1	Kikuyugrass (upper)	8.1	7,200	58,320	38	22,162	No	
2	Kikuyugrass (upper)	1.1	7,200	7,920	69	5,465	No	
3	Kikuyugrass (upper)	11.4	7,200	82,080	32	26,266	No	
4	Kikuyugrass (upper)	16.1	7,200	115,920	28	32,458	No	
Totals		**37**		**264,240**		**86,350**		
Averages		**9**	**7,200**	**66,060**	**42**	**21,587**		

* TFP = Total Forage Production - Total forage production is the total amount of forage produced (factors in both the amount of forage that is available to grazing or haying plus the remaining growth that is left behind after grazing or haying)

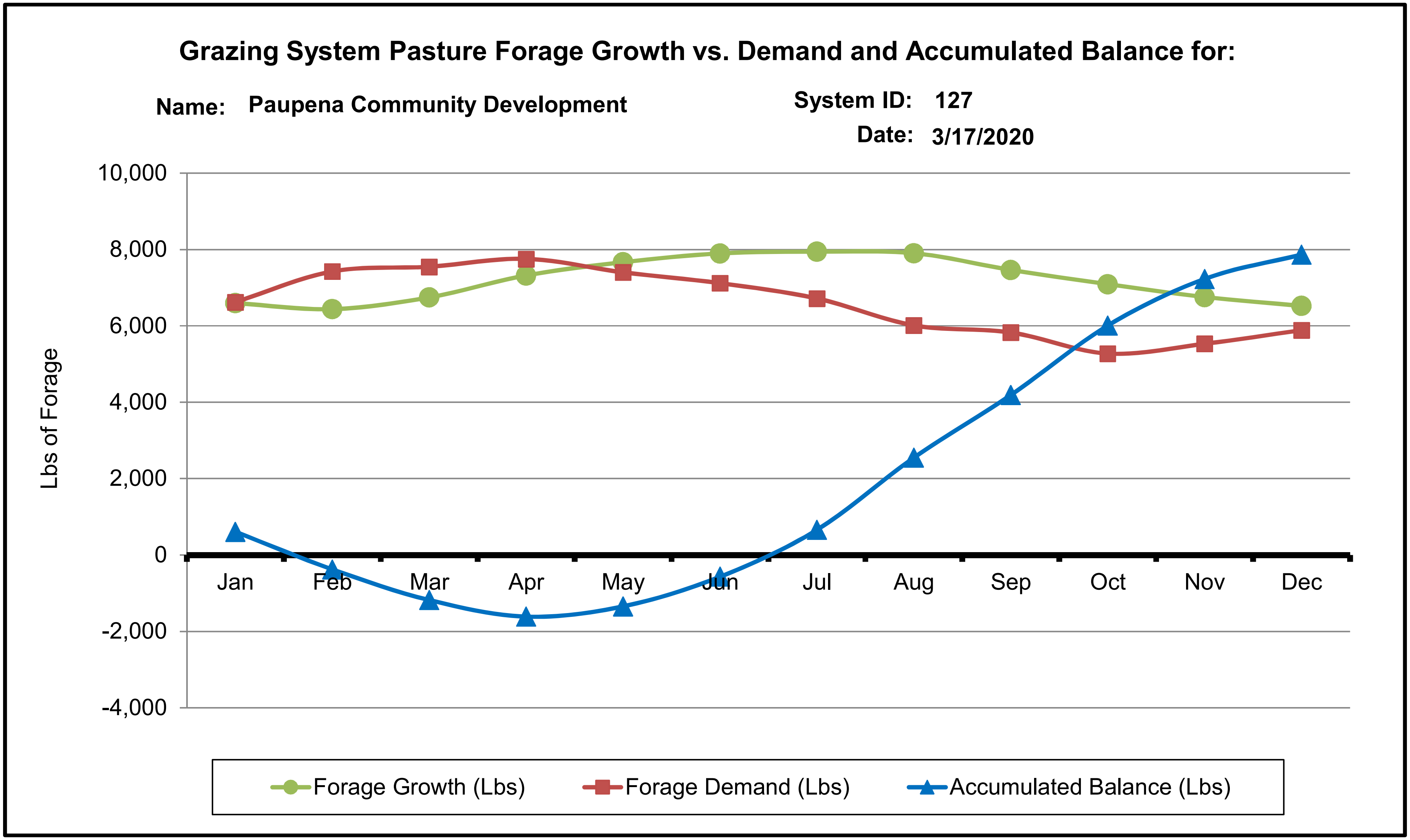
Field/ Paddock Number	Grazing System Pasture Forage Available by Month (Lbs/month)											
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
1	1,693	1,652	1,731	1,879	1,968	2,027	2,039	2,028	1,916	1,820	1,734	1,674
2	417	407	427	463	485	500	503	500	472	449	428	413
3	2,006	1,958	2,052	2,227	2,333	2,402	2,416	2,404	2,271	2,157	2,055	1,984
4	2,479	2,420	2,536	2,752	2,882	2,969	2,986	2,970	2,806	2,666	2,539	2,452
Totals	**6,596**	**6,439**	**6,746**	**7,320**	**7,668**	**7,898**	**7,943**	**7,902**	**7,465**	**7,092**	**6,755**	**6,523**

Summary of Livestock Needs and Pasture Forage Production
Paupena Community Development
127
3/17/2020

	Totals	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
Grazing System													
Total Forage Available (Lbs)	86,350	6,596	6,439	6,746	7,320	7,668	7,898	7,943	7,902	7,465	7,092	6,755	6,523
Total Forage Needs (Lbs)	79,119	6,623	7,425	7,549	7,754	7,401	7,119	6,717	6,012	5,826	5,275	5,531	5,887
Total Difference (Lbs)	7,230	-26	-987	-803	-434	267	779	1,226	1,890	1,640	1,817	1,224	636
Accumulated Balance (Lbs) by Month		610	-377	-1,180	-1,613	-1,346	-567	659	2,550	4,189	6,006	7,230	7,867
Alternative Pasture													
Total Forage Available (Lbs)	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Forage Needs (Lbs)	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Difference (Lbs)	0	0	0	0	0	0	0	0	0	0	0	0	0
Accumulated Balance (Lbs) by Month		0	0	0	0	0	0	0	0	0	0	0	0
Dry Lot													
Total Forage Available (Lbs)	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Forage Needs (Lbs)	0	0	0	0	0	0	0	0	0	0	0	0	0

Feed and Forage Balance Summary

The estimated annual total livestock forage needs are:	**79,119 Lbs**
The estimated total pounds of forage provided through grazing are:	**86,350 Lbs**
(This includes the grazing system and any alternative pasture)	
For a difference of:	**7,230 Lbs**
The balance between ALL sources of feed and the needs of the livestock is (+/-):	**7,230 Lbs**


Grazing System Pasture Forage Growth vs. Demand and Accumulated Balance for:
Name: Paupena Community Development
System ID: 127
Date: 3/17/2020
Lbs of Forage
10,000
8,000
6,000
4,000
2,000
0
-2,000
-4,000
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Forage Growth (Lbs)
Forage Demand (Lbs)
Accumulated Balance (Lbs)

TIME CONTROL GRAZING WORKSHEET

Only enter the additional information needed as indicated by the yellow cells. The remaining cells and information will populate automatically based on the information entered into the Livestock Forage Balance Worksheet.

Name: **Paupena Community Development** County: **Kahului**
System ID: **127** Date: **3/17/2020**

Minimum Rest Period =	25	days	Avg Animal Weight =	922	pounds
Maximum Rest Period =	40	days	Animal Numbers =	9	head
Grazing Efficiency =	33	percent	Number of Herds =	1	
			Intake Rate =	2.60	percent

Field Name or Number	Kind of Forages	Field Acres	Usable Forage Production (Lbs/Acre)	Usable Forage Production (Lbs/Field or Paddock)	Paddock Factor	Minimum Grazing Period (no. of days)	Maximum Grazing Period (no. of days)	Animal Density (Lbs of animal per acre)	Minimum Stubble Height (inches)
1	Kikuyugrass (upper)	8.1	2736	22161.6	1.0	**8.6**	**13.7**	**1,025**	**4**
2	Kikuyugrass (upper)	1.1	4968	5464.8	0.3	**2.1**	**3.4**	**7,545**	**4**
3	Kikuyugrass (upper)	11.4	2304	26265.6	1.2	**10.1**	**16.2**	**728**	**4**
4	Kikuyugrass (upper)	16.1	2016	32457.6	1.5	**12.5**	**20.0**	**516**	**4**
AVERAGES:		9	3006.00	21587.4	1	8.3	13.3	4.1	
TOTALS:	4 (fields)	37	12,024	86,350				Avg. Acres/Animal	

TOTAL AVAILABLE PASTURE FORAGE (Lbs.): 86,350

DEFINITIONS

Paddock Factor= A factor related to the relative size and production of each field
Animal Density= The pounds of animals per acre concentrated on a field at one time
Minimum Grazing Period= The approximate grazing time in each field during fast forage growth. Based on minimum rest periods
Maximum Grazing Periods= The approximate grazing time in each field during slow forage growth. Based on maximum rest periods
Minimum and Maximum Rest Periods= The number of days forage should be given rest be grazing again
Minimum Stubble Height= Forage should not be grazed below these heights

Intake rate= The daily consumption as a percentage of the animals body weight; Guide- 2.0% for maintenance, 3.0% for average production, 4.0% for high production, for beef cows (year round) use 2.6%.

Grazing Efficiency= The percent of total forage utilized by the animal; Guide- 1-3 fields-≤ 30; 4-8 fields- 30-40%; 8-12 fields- 40-50%; 12-16 fields- 50-60%; 16-24 fields- 60-65%; >24 fields- 65-70%; haying operation- 70% (harvest efficiency).

By signing the below, I acknowledge that I :
- have reviewed this Job Sheet and have an understanding of its contents and requirements;
-will not make changes to this Job Sheet, without prior concurrence of NRCS;
- will install, operate, and maintain this practice in accordance with this Job Sheet; and
- will obtain all necessary permits and/or rights, comply with all ordinances and laws, and notify all utilities pertaining to this job Sheet.

Client Signature/Date

Approving NRCS Signature/Date

DETAILED SUMMARY

USDA NRCS
United States Department of Agriculture
Natural Resources Conservation Service

Name: Paupena Community Deve
System ID: 127
County: Kahului
Date: 3/17/2020
By: Jason Hew

LIVESTOCK

The class(es) of livestock used to make these calculations is:

Cows

The total number of livestock used for these calculations is:	9	Head
The average weight of all livestock used for these calculations is:	922	Pounds
The estimated average daily intake rate used is:	2.60	% of animal weight
The estimated annual total livestock forage needs are:	79,119	Lbs/Year

FORAGE

The total usable grazing acres are:	36.7	Acres
The estimated total pounds of forage available through grazing are:	86,350	Lbs
The estimated average grazing efficiency used is:	33	percent
The estimated total pounds of forage are:	86,350	Lbs/Year

*(* Incorporates storage/feeding loss)*

DIFFERENCES

The estimated difference between the total forage and animal needs is:	7,230	Lbs dry matter
(A minus sign equals estimated additional amount needs per year for the number of animals shown above.	OR	intake/Year
The figures consider all hay sources and may be excessive. No minus sign means a surplus is estimated)	3.6	Tons/Year

CARRYING CAPACITY ESTIMATES

Pasture only

For this operation, using the type and size of your livestock, it is estimated that the
Forage produced from the pasture (grazing only during growing season) during a period of ………… 365 days*
There is enough to supply the forage needs of ………………………………………………………… **9.9** head**

*Normally 250-270 days; **For stocker operations with less than a 240 day duration on the system, the above calculations may be incorrect.

For the next 3 calculations, forages from the grazed pasture **only** was considered. Hay is not included.

If the grazing efficiency on grazed acres was **40%**, enough pasture forage is estimated to feed:	**13**	head*
If the grazing efficiency on grazed acres was **50%**, enough pasture forage is estimated to feed:	**17**	head*
If the grazing efficiency on grazed acres was **60%**, enough pasture forage is estimated to feed:	**21**	head*

When grazing efficiency is increased, total production will likely increase as well. Some increases in the production was assumed (5%,10%,15%) to come up with the carrying capacity estimates if the grazing efficiency for this operation was increased.

DEFINITIONS

Total Forage Production= The total above ground biomass in pounds of dry matter per acre (this is not the harvested yield).
Paddock Factor= A factor related to the relative size and production of each field
Animal Density= The pounds of animals per acre concentrated on a field at one time
Minimum Grazing Period= The approximate grazing time in each field during fast forage growth. Based on minimum rest periods
Maximum Grazing Periods= The approximate grazing time in each field during slow forage growth. Based on maximum rest periods
Minimum and Maximum Rest Periods= The number of days forage should be given rest be grazing again
Minimum Grazing Height= Forage should not be grazed below these heights
Intake rate= The daily consumption as a percentage of the animals body weight; Guide- 2.0% for maintenance, 3.0% for average production, 4.0% for high production, for beef cows (year round) use 2.6%.
Grazing Efficiency= The percent of total forage utilized by the animal; Guide- 1-3 fields-≤ 30; 4-8 fields- 30-40%; 8-12 fields- 40-50%; 12-16 fields- 50-60%; 16-24 fields- 60-65%; >24 fields- 65-70%; haying operation- 70% (harvest efficiency).
Carrying Capacity= The number of animals, based on weight of animals, a given farm may be able to provide forage for a given period.

Drought Contingency Plan

This prescribed grazing plan is based on average forage production for your ranch. However, averages are based on a mixture of good grazing years and poor grazing years. Therefore, on some years you will have a surplus of forage and others you will have a forage deficit. When forage production is poor for a extend period of time due to drought or other cause, you should have a contingency plan for how manage through a drought. Below is a contingency plan for you to adapt for you ranch.

1)	At the onset of drought conditions the forage grazing demand should be reduced by culling all unproductive breeding stock (i.e. cows which did not breed back)
2)	At the onset of drought conditions the forage grazing demand should be reduced by weaning and selling nursing animals earlier. This will reduce the forage demand by as much as 30% for lactating animals.
3)	Supplemental feeding will reduce the extend the available forages.
4)	Relocate livestock to areas where drought conditions are less severe.
5)	Consider confining and feeding livestock on one "sacrifice" paddock to prevent all paddocks from becoming degraded.
6)	
7)	
8)	
9)	
10)	

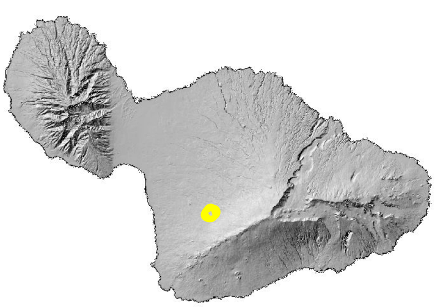
Location Map

Date: 12/17/2019

Customer(s): PA'UPENA COMMUNITY DEVELOPMENT
District: CENTRAL MAUI SOIL & WATER CONSERVATION DISTRICT
Approximate Acres: 124.6
Legal Description: TMK (2) 2-2-034:026, 028

Field Office: KAHULUI SERVICE CENTER
Agency: Maui Soil & Water Conservation Districts
Assisted By: Jason Hew
State and County: HI, Maui County, Hawaii
Land Units: Farm# 1956 Tract # 1818

Prepared with assistance from USDA-Natural Resources Conservation Service



N

Legend

Maui Roads
KA_PaupenaCommunityDevelopment

0 1,250 2,500 3,750 5,000 Feet

Soils Map

Date: 12/17/2019

Customer(s): PA'UPENA COMMUNITY DEVELOPMENT
District: CENTRAL MAUI SOIL & WATER CONSERVATION DISTRICT
Approximate Acres: 124.6
Legal Description: TMK (2) 2-2-034:026, 028

Field Office: KAHULUI SERVICE CENTER
Agency: Maui Soil & Water Conservation Districts
Assisted By: Jason Hew
State and County: HI, Maui County, Hawaii
Land Units: Farm# 1956 Tract # 1818

Legend

Prepared with assistance from USDA-Natural Resources Conservation Service

KA_PaupenaCommunityDevelopment

Soils Map

- KGKC- Kamaole very stony silt loam, 3-15% slopes
- KGLC- Kamaole extremely stony silt loam, 3-15% slopes
- KxC- Kula loam, 4-12% slopes
- KxD- Kula loam, 12-20% slopes
- KxaD- Kula cobbly medial loam, 12-20% slopes
- KxbE- Kula-Rock outcrop complex, 12-40% slopes

USDA

N

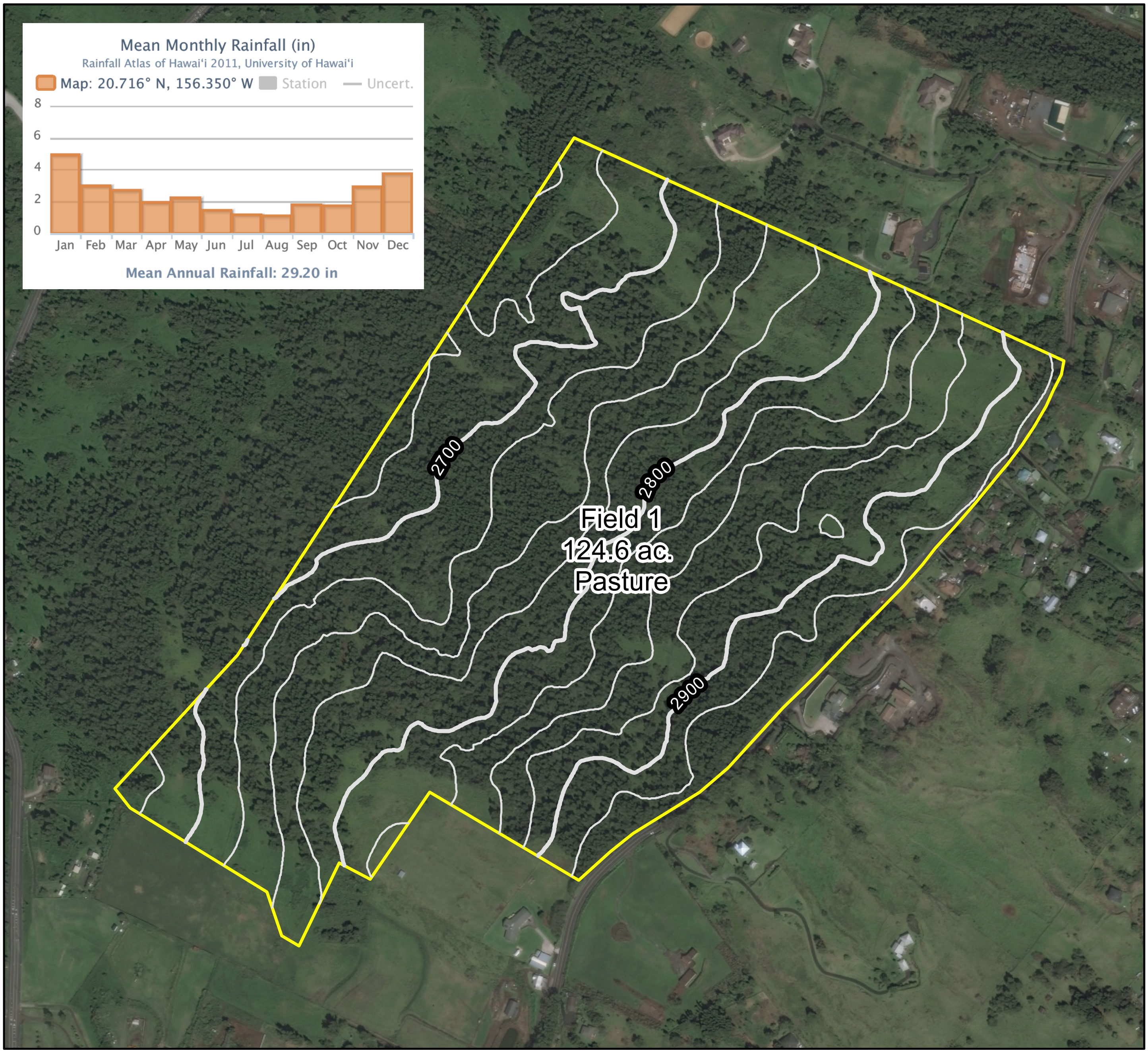
0 375 750 1,125 1,500 Feet

Elevation and Rainfall Map

Date: 12/17/2019

Customer(s): PA'UPENA COMMUNITY DEVELOPMENT
District: CENTRAL MAUI SOIL & WATER CONSERVATION DISTRICT
Approximate Acres: 124.6
Legal Description: TMK (2) 2-2-034:026, 028

Field Office: KAHULUI SERVICE CENTER
Agency: Maui Soil & Water Conservation Districts
Assisted By: Jason Hew
State and County: HI, Maui County, Hawaii
Land Units: Farm# 1956 Tract # 1818



Prepared with assistance from USDA-Natural Resources Conservation Service

USDA

N

Legend

25 Ft. Contour
KA_PaupenaCommunityDevelopment

0 375 750 1,125 1,500 Feet

T & E Species Data Table

Client Name: Paupena Community Development
Project Location (TMK): (2) 2-2-034:026,028
Date: 3/11/2020

Sightings within project location

FWS (Point)
There are no federally-listed threatened or endangered species within project location.

HBMP (Point)
There are no federally-listed threatened or endangered species within project location.

FWS (Area)
There are no federally-listed threatened or endangered species within project location.

HBMP (Area)
There are no federally-listed threatened or endangered species within project location.

Critical Habitat
There are no critical habitat units within project location.

Critical Habitat (Proposed)
There are no critical habitat units within project location.

Sightings within 0.33 miles of the project location

FWS (Point)
There are no federally-listed threatened or endangered species within 0.33-mile buffer of project location.

HBMP (Point)
There are no federally-listed threatened or endangered species within 0.33-mile buffer of project location.

FWS (Area)
There are no federally-listed threatened or endangered species within 0.33-mile buffer of project location.

HBMP (Area)
There are no federally-listed threatened or endangered species within 0.33-mile buffer of project location.

Critical Habitat
There are no critical habitat units within 0.33-mile buffer of project location.

Critical Habitat (Proposed)
There are no critical habitat units within 0.33-mile buffer of project location.

Other sightings in the vicinity of the project location (1:24,000 map scale)

FWS (Point)
There are no federally-listed threatened or endangered species in the vicinity of project location.

HBMP (Point)

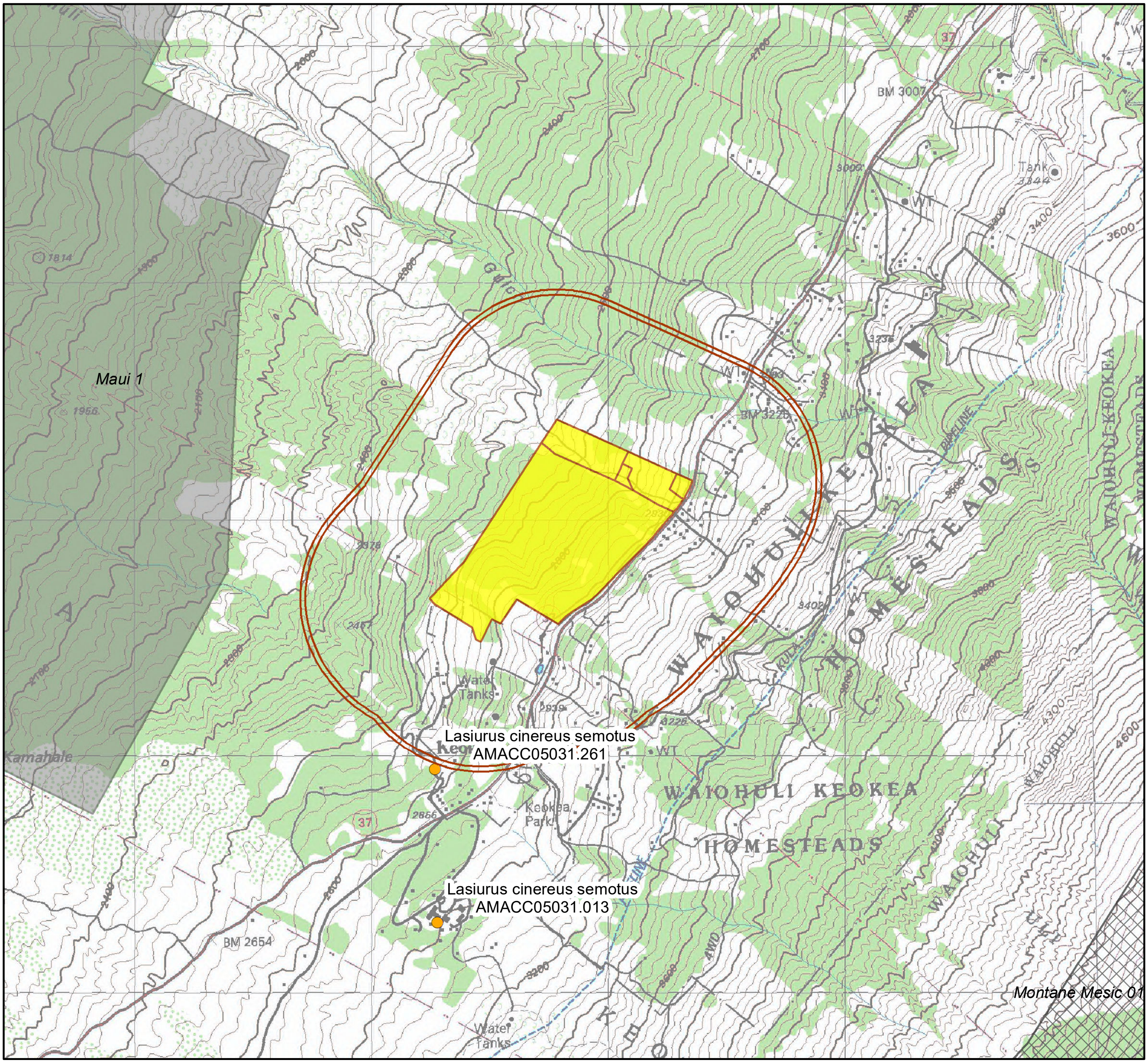
EOCODE	SNAME	SCOMNAME	ACCURACY	LASTOBS	USESA	OBS_TYPE
AMACC05031.013	Lasiurus cinereus semotus	Hawaiian Hoary Bat, Ope`ape`a	S	1983	LE	H
AMACC05031.261	Lasiurus cinereus semotus	Hawaiian Hoary Bat, Ope`ape`a	S	1990	LE	H

FWS (Area)
There are no federally-listed threatened or endangered species in the vicinity of project location.

HBMP (Area)
There are no federally-listed threatened or endangered species in the vicinity of project location.

Critical Habitat
UNIT
Maui 1

Critical Habitat (Proposed)
Unit
Montane Mesic 01



C, T & E Species Map for: Paupena Community Development TMKs: (2) 2-2-034:026,028 Date: 3/11/2020

FWS occurrences (accurate to 0.3 mile)

- Current point occurrence
- Historic point occurrence
- Current polygon occurrence
- Historic polygon occurrence

HBMP occurrences (accurate to 0.3 mile)

- Current point occurrence
- Historic point occurrence
- Current polygon occurrence
- Historic polygon occurrence

Current occurrences observed from 1994 to present

Critical Habitat

- Final Critical Habitat
- Proposed Critical Habitat

Project Location

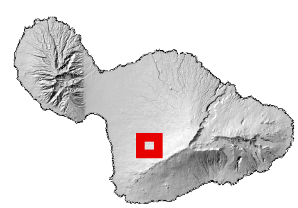
- APE
- 0.33-mile APE buffer

1:24,000

N

0 0.3 0.6 Mi

0 0.4 0.8 Km



Island of Maui

U.S. Department of Agriculture Natural Resources Conservation Service **ENVIRONMENTAL EVALUATION WORKSHEET**	NRCS-CPA-52 11/2019	**A. Client Name:** **Paupena Community Development Inc.**
		B. Conservation Plan ID # (as applicable): N/A **Program Authority** (optional): CTA
D. Client's Objective(s) (purpose): Due diligence to receive a long term right of entry to a Department of Hawaiian Home Lands parcel. To implement a prescribed grazing managaement plan. Manage the proper amount of livestock based on forage availability.		**C. Identification #** (farm, tract, field #, etc. as required): Farm# 1956 Tract# 1818 TMKs (2) 2-2-034:026,028

E. Need for Action:	**H. Alternatives**		
	No Action √ if RMS ☐	***Alternative 1*** √ if RMS ☐	***Alternative 2*** √ if RMS ☐
Need to maintain or improve desired species composition, structure, and vigor of plant communities. Need to maintain or improve quality and quantity of forage available for grazing animal's health and productivity.	Client will continue existing operation without change.	Progressive Conservation System Alternative with the implementation of the following Practices: Prescribed Grazing (528)	

Resource Concerns

In Section "F" below, analyze, record, and address concerns identified through the Resources Inventory process. (See FOTG Section III - Resource Planning Criteria for guidance).

F. Resource Concerns and Existing/ Benchmark Conditions (Analyze and record the existing/benchmark conditions for each identified concern)	**I. Effects of Alternatives**					
	No Action		***Alternative 1***		***Alternative 2***	
	Amount, Status, Description *(Document both short and long term impacts)*	**√ if does NOT meet PC**	**Amount, Status, Description** *(Document both short and long term impacts)*	**√ if does NOT meet PC**	**Amount, Status, Description** *(Document both short and long term impacts)*	**√ if does NOT meet PC**
SOIL						
No resource concern identified	No effect	☐ NOT meet PC	No effect	☐ NOT meet PC		☐ NOT meet PC
WATER						
No resource concern identified	No effect	☐ NOT meet PC	No effect	☐ NOT meet PC		☐ NOT meet PC

F. Resource Concerns and Existing/ Benchmark Conditions (Analyze and record the existing/benchmark conditions for each identified concern)	**I. (continued)**					
	No Action		***Alternative 1***		***Alternative 2***	
	Amount, Status, Description *(Document both short and long term impacts)*	**√ if does NOT meet PC**	**Amount, Status, Description** *(Document both short and long term impacts)*	**√ if does NOT meet PC**	**Amount, Status, Description** *(Document both short and long term impacts)*	**√ if does NOT meet PC**
AIR						
No resource concern identified	No effect	☐ NOT meet PC	No effect	☐ NOT meet PC		☐ NOT meet PC
PLANTS						
Plant productivity and health GLCS - Plant Residue element score is 2 AND GLCS - Site Adaptation element score is 2 AND GLCS – Uniformity of Use element score is 2.	Continued concerns with Plant-production and health without NRCS assistance.	☑ NOT meet PC	Plant-related production and health concerns will improve due to proper livestock management	☐ NOT meet PC		☐ NOT meet PC
Plant structure and composition GLCS - Desirable Forage Plants element score is 3 AND GLCS - Live Plant Cover element score is 2.	Continued concerns with plant communities' diversity, composition and structure concerns without NRCS assistance.	☑ NOT meet PC	Plant communities' diversity, composition and structure will improve due to proper lavestock management.	☐ NOT meet PC		☐ NOT meet PC
ANIMALS						
No resource concern identified	No effect	☐ NOT meet PC	No effect	☐ NOT meet PC		☐ NOT meet PC
ENERGY						
No resource concern identified	No action, no effect	☐ NOT meet PC	No Effect	☐ NOT meet PC		☐ NOT meet PC
Human Economic and Social Considerations						
Management Level Currently no management occuring on land unit.	No change		Management level will increase due to rotation of livestock and monitoring of forage quantities.			
Profitability Currently no profitibility of operation	No change		In the sort term profitibility will decrease to due infrastructer requirements. Long term profitibility will increase with livestock production.			

Special Environmental Concerns: Environmental Laws, Executive Orders, policies, etc.						
In Section "G" complete and attach Environmental Procedures Guide Sheets for documentation as applicable. Items with a "●" may require a federal permit or consultation/coordination between the lead agency and another government agency. In these cases, effects may need to be determined in consultation with another agency. Planning and practice implementation may proceed for practices not involved in consultation						
G. Special Environmental Concerns (Document existing/ benchmark conditions)	**J. Impacts to Special Environmental Concerns**					
	No Action		***Alternative 1***		***Alternative 2***	
	Document all impacts (Attach Guide Sheets as applicable)	√ if needs further action	Document all impacts (Attach Guide Sheets as applicable)	√ if needs further action	Document all impacts (Attach Guide Sheets as applicable)	√ if needs further action
●Clean Air Act *Guide Sheet* No non-attainment areas located within the PLU (source: FOTG) Class I area (Haleakala National Park) located over 5.8 miles away from PLU	No Effect	☐	No Effect	☐		☐
●Clean Water Act / Waters of the U.S. *Guide Sheet* No wetlands, lakes, streams, channels, or other water conveyances (potential Waters of the US) are present in the planning area. Source:strmaqresmau_l_hi009.shp ArcGIS layer, Planner observation No "impaired" waters listed under Section 303(d) of the CWA are located in proximity to the planning area. Source: Final 2004 List of Impaired Waters in Hawaii No point-source discharges occur in planning area based on planner observation of field conditions	No Effect	☐	No Effect	☐		☐
●Coastal Zone Management *Guide Sheet* No Coastal Zone Management Areas are in or near the planning area. Source: Hawaii CZM maps	No Effect	☐	No Effect	☐		☐
Coral Reefs *Guide Sheet* No coral reefs or associated water bodies (e.g. embayment areas) are present in or near the planning area. Source: benthichabmau_a_hi009 layer ArcGIS	No Effect	☐	No Effect	☐		☐
●Cultural Resources / Historic Properties *Guide Sheet* Cultural resources	No Effect No action, no effect	☐	No Effect	☐		☐

•Endangered and Threatened Species *Guide Sheet* There are 2 occurrences of the Hawaiian hoary bat within the vicinity (greater than 0.33 miles away) of the project location. (see CTE maps and data tables).	No Effect	☐	No Effect No Effect to at-risk species or their habitats will occur. It is recommended to follow the NRCS USFWS Programmatic Informal Consultation: "No woody plants over 15 feet (ft) (4.6 meters (m)) tall will be removed, cut, or trimmed during the sensitive bat pup birthing and rearing season (June 1 to September 15). If a project has woody plants over 15 ft tall that must be removed, cut, or trimmed from June 1 to September 15, this programmatic consultation will not be applicable and our office should be contacted for further guidance. If a bat is present at the project site, the area will be avoided. If a bat arrives in the construction area after work begins, work will cease until the animal leaves on its own accord."	☐		☐
Environmental Justice *Guide Sheet* No low-income or minority populations or Indian Tribes live in proximity to the planning area. Source: Census Data, Planner observation	No Effect	☐	No Effect	☐		☐
•Essential Fish Habitat *Guide Sheet* No EFH is present in or downstream of the planning area. Source : USGS maps	No Effect	☐	No Effect	☐		☐
Floodplain Management *Guide Sheet* No 100-year floodplain present in or near the planning area. Source: fldpln100yr_a_hi009 layer	No Effect	☐	No Effect	☐		☐
Invasive Species *Guide Sheet* Invasive species ARE present in or near the planning area. Predominant species include spinney amaranth, balloon plant, apple of Sodom, fireweed, Christmas berry, Mysore raspberry, hairy horseweed and minimal other herbaceous weeds. Source: Planner observation	No Effect Without NRCS assistance, invasive species will persist, and/or spread due to lack of management	☐	No Effect Practices will provide for the control and/or prevent the introduction and/or spread of invasive species.	☐		☐
•Migratory Birds/Bald and Golden Eagle Protection Act *Guide Sheet* Habitat for migratory birds including egret, mynah, cardinal, Japanese white eye and doves present. No habitat for bald or golden eagles is present in or near the planning area. No proposed action to result in a "take" to any migratory bird, nest or egg. (Planner observation)	No Effect No action, no effect	☐	No Effect No take of any migratory bird, nest, or egg is expected to occur [and/or] planned practices will not take or disturb eagles.	☐		☐
Natural Areas *Guide Sheet* Site is surrounded by fallow pasture land (DHHL), actively grazed pastures, and residential parcels. Planner observation	No Effect No action, no effect	☐	No Effect No effect on the natural areas is expected from practice implementation.	☐		☐

Prime and Unique Farmlands *Guide Sheet* No prime or unique farmlands or farmlands of statewide or local importance are present in the planning area. Source: NRCS Web Soil Survey	No Effect	☐	No Effect	☐		☐
Riparian Area *Guide Sheet* No riparian areas are present in or near the planning area. Source: Planner observation	No Effect	☐	No Effect	☐		☐
Scenic Beauty *Guide Sheet* Site is surrounded by fallow land, pastures and residential lots but does have a view of Haleakala. Planner observation	No Effect No action, no effect	☐	No Effect Scenic beauty will not be effected by implementation of the conservation practice. Mountain view will not be diminished.	☐		☐
●Wetlands *Guide Sheet* No wetlands are present in or near the planning area. Source: nwimau_a_hi009 layer ArcGIS	No Effect	☐	No Effect	☐		☐
●Wild and Scenic Rivers *Guide Sheet* No Federal or State designated Wild, Scenic, or Recreational river segments or rivers listed in the Nationwide Rivers Inventory (NRI) are present in or near the planning area. Source: http://www.rivers.gov/hawaii.php	No Effect	☐	No Effect	☐		☐

K. Other Agencies and Broad Public Concerns	***No Action***	***Alternative 1***	***Alternative 2***
Easements, Permissions, Public Review, or Permits Required and Agencies Consulted.	No easements, permissions, public review, or permits required if no action will be completed	Maui Soil & Water Conservation Districts, Natural Resources Conservation Service. Any required permits are the responsibility of the client to obtain.	
Cumulative Effects Narrative (Describe the cumulative impacts considered, including past, present and known future actions regardless of who performed the actions)	Invasive/undesireable species will continue to spread throughout the site	Proper management of livestock will increae forage productivity and help manage weed growth.	
L. Mitigation (Record actions to avoid, minimize, and compensate)	No action, no mitigation required	Actions to avoid, minimize, and compensate are included in the Implementation Requirements for each conservation practice.	
M. Preferred Alternative — √ preferred alternative	☐	☑	☐
Supporting reason		This alternative will help address the operator's resource concerns and accomplish their objectives.	

N. Context (Record context of alternatives analysis) | local | regional |

The significance of an action must be analyzed in several contexts such as society as a whole (human, national), the affected region, the affected interests, and the locality.

O. To the best of my knowledge, the data shown on this form is accurate and complete:
In the case where a non-NRCS person (e.g. a TSP) assists with planning they are to sign the first signature block and then NRCS is to sign the second block to verify the information's accuracy.

Jason Hew	**Conservation Specialist**	**4/3/2020**
Signature (TSP if applicable)	**Title**	**Date**
	District Conservationist	
Signature (NRCS)	**Title**	**Date**

If preferred alternative is not a federal action where NRCS has control or responsibility and this NRCS-CPA-52 is shared with someone other than the client then indicate to whom this is being provided.

The following sections are to be completed by the Responsible Federal Official (RFO)

NRCS is the RFO if the action is subject to NRCS control and responsibility (e.g., actions financed, funded, assisted, conducted, regulated, or approved by NRCS). These actions do not include situations in which NRCS is only providing technical assistance because NRCS cannot control what the client ultimately does with that assistance and situations where NRCS is making a technical determination (such as Farm Bill HEL or wetland determinations) not associated with the planning process.

P. Determination of Significance or Extraordinary Circumstances

To answer the questions below, consider the severity (intensity) of impacts in the contexts identified above. Impacts may be both beneficial and adverse. A significant effect may exist even if the Federal agency believes that on balance the effect will be beneficial. Significance cannot be avoided by terming an action temporary or by breaking it down into small component parts.

If you answer ANY of the below questions "yes" then contact the State Environmental Liaison as there may be extraordinary circumstances and significance issues to consider and a site specific NEPA analysis may be required.

Yes	No	
☐	☑	• Is the preferred alternative expected to cause significant effects on public health or safety?
☐	☑	• Is the preferred alternative expected to significantly affect unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas?
☐	☑	• Are the effects of the preferred alternative on the quality of the human environment likely to be highly controversial?
☐	☑	• Does the preferred alternative have highly uncertain effects or involve unique or unknown risks on the human environment?
☐	☑	• Does the preferred alternative establish a precedent for future actions with significant impacts or represent a decision in principle about a future consideration?
☐	☑	• Is the preferred alternative known or reasonably expected to have potentially significant environment impacts to the quality of the human environment either individually or cumulatively over time?
☐	☑	• Will the preferred alternative likely have a significant adverse effect on ANY of the special environmental concerns? Use the Evaluation Procedure Guide Sheets to assist in this determination. This includes, but is not limited to, concerns such as cultural or historical resources, endangered and threatened species, environmental justice, wetlands, floodplains, coastal zones, coral reefs, essential fish habitat, wild and scenic rivers, clean air, riparian areas, natural areas, and invasive species.
☐	☑	• Will the preferred alternative threaten a violation of Federal, State, or local law or requirements for the protection of the environment?

Q. NEPA Compliance Finding (check one) The preferred alternative:		Action required
☑	1) is **not a federal action** where the agency has control or responsibility.	Document in "R.1" below. No additional analysis is required
☐	2) is a federal action **ALL** of which is **categorically excluded** from further environmental analysis **AND** there are **no extraordinary circumstances as identified in Section "O".**	Document in "R.2" below. No additional analysis is required
☐	3) is a federal action that has been **sufficiently analyzed** in an existing Agency state, regional, or national NEPA document **and** there are no predicted significant adverse environmental effects or extraordinary circumstances.	Document in "R.1" below. No additional analysis is required.
☐	4) is a federal action that has been sufficiently analyzed in another Federal agency's NEPA document (EA or EIS) that addresses the proposed NRCS action and its' effects **and has been formally adopted by NRCS**. NRCS is required to prepare and publish its own Finding of No Significant Impact for an EA or Record of Decision for an EIS when adopting another agency's EA or EIS document. (**Note: This box is not applicable to FSA)**	Contact the State Environmental Liaison for list of NEPA documents formally adopted and available for tiering. Document in "R.1" below. No additional analysis is required
☐	5) is a federal action that has **NOT** been sufficiently analyzed or may involve predicted significant adverse environmental effects or extraordinary circumstances and may require an EA or EIS.	Contact the State Environmental Liaison. Further NEPA analysis required.

R. Rationale Supporting the Finding	
R.1 Findings Documentation	Not a federal action, Technical assistance only
R.2 Applicable Categorical Exclusion(s) **(more than one may apply)** 7 CFR Part 650 *Compliance With NEPA*, subpart 650.6 *Categorical Exclusions* states prior to determining that a proposed action is categorically excluded under paragraph (d) of this section, the proposed action must meet six sideboard criteria. See NECH 610.116.	

I have considered the effects of the alternatives on the Resource Concerns, Economic and Social Considerations, Special Environmental Concerns, and Extraordinary Circumstances as defined by Agency regulation and policy and based on that made the finding indicated above.

S. Signature of Responsible Federal Official:

Signature	**Title**	**Date**

Additional notes

TECHNICAL NOTE

USDA NATURAL RESOURCES CONSERVATION SERVICE PACIFIC ISLANDS AREA

Cultural Resources Technical Note 1

CULTURAL RESOURCES INVESTIGATION WORKSHEET for Phase I of Conservation Planning

Worksheet Completed for:

Client and Business Name: Paupena Community Development Inc.

Planning Unit Name or Identifier: TMK (2) 2-2-034:026,028

Worksheet Completed by:

Planner Name: Jason Hew

Date Completed: 3/17/2020

	Documentation of Investigation Conducted	Yes	No
1	Are there any historic properties listed on the **National/State Register of Historic Places** within the project area?		X
	If yes, describe below:		
2	Are there any cultural resources shown on the **USGS topo map** in the project area?		X
	If yes, describe below:		
3	Does the **client** know of any cultural resources in the project area?	X	
	If yes, describe below:		
	Refer to the 8/21/2019 SHPD letter and August 2015 Preservation Plan prepared by Michael Dega of Scientific Consultant Services Inc. in the case file		
4	Were any cultural resources identified via a field inspection of the project area?	X	
	If yes, describe below:		
	Sites described in the documents above		
	Field inspection conducted by:		
	Jason Hew		
	Date field inspection conducted:		
	3/3/2020		
5	For all cultural resources identified in steps 1, 2, 3, and 4 above:		
	Describe condition of cultural resources:		
	Describe vegetation in area where cultural resources located:		
	Describe land use activities in area where cultural resources located: (e.g. cropping, grazing, forest, natural area, etc.)		
	Insert GPS location of the cultural resources identified onto the Conservation Plan Map. Print out map and attach to this worksheet.		

Take photos and attach to this worksheet. May use Photo Documentation Technical Note.

Purpose of Worksheet:

This worksheet shall be used in the Pacific Islands Area for conservation planning purposes to conduct and document an investigation to identify cultural resources that are, or may be, in the conservation planning project area.

The investigation includes a review of existing information (steps 1 and 2) which is completed in the office before step 3 the client interview and step 4, the field inspection, is conducted.

No specialized training is required to complete steps 1 and 2. Step 3, the client interview should be conducted in conjunction with step 4, the field inspection, so the client is available to point out any previously known cultural resources.

A field inspection is conducted to examine previously known cultural resources identified in steps 1, 2, and 3 and to also survey the project area to locate new cultural resources. The field inspection should be conducted by a staff person(s) with NRCS PIA cultural resources training (Cultural Resources Modules 1-8).

When should this Worksheet be Completed:

This worksheet shall be completed by the NRCS planner during Phase I of the NRCS conservation planning process (Collection and Analysis - Understanding the Problems and

What this Information is Used for:

The worksheet shall be used by the NRCS planner to complete the cultural resources evaluation for the Resource Problem Worksheet (Conservation Planning Technical Note No. 1).

The information collected shall also be used to inform the client of the presence/absence of cultural resources within the conservation plan project area.

Pursuant to NRCS' General Manual 450, Part 405.1.D(2)(i), it is NRCS' responsibility to advise the client that should they choose to implement any conservation practices recommended in the NRCS Conservation Plan, the client must adhere to all state and local historic preservation law. This Cultural Resources Technical Note #1 serves as NRCS' notification to the client of the necessity of adhering to state and local historic preservation law relative to the presence/absence of cultural resources within the conservation plan area. The NRCS advises the client to consult with the SHPO (State Historic Preservation Office) prior to the implementation of conservation practices contained within the conservation plan. In securing permits, should they be required by state and local law, the client may wish to furnish the data collected on this form to the state or local permitting office as part of a permit application.

Client Signature & Date ***(required for CTA-only plans)*** **:**

I certify that NRCS has advised me of my responsibility to adhere to state and local historic preservation law and conduct any consultations with the SHPO, as applicable.

Filing:

This worksheet should be printed out and filed in the client's conservation plan file folder.

Definitions:

Cultural Resources, in NRCS, are considered equivalent to "historic properties". They include any prehistoric or historic district, site, building, structure or object listed in or eligible for listing in the National Register of Historic Places (maintained by the Secretary of the Interior). They also include all records, artifacts and physical remains associated with the historic properties. They may consist of the traces of all of the past activities and accomplishments of people.

This same term may also refer to: (1) resources that have little or no historic values but do have contemporary cultural value; (2) resources included in or determined eligible for inclusion in the National Register of Historic Places or an equivalent register maintained at the state or local level; (3) unevaluated resources that may be eligible for inclusion in the National Register or an equivalent; (4) properties that may qualify for the protections afforded by the Archeological Resources Protection Act or the Native American Graves Protection and Repatriation Act.

CS Project Number 461-PP-Final

A PRESERVATION PLAN FOR THE DEPARTMENT OF HAWAIIAN HOME LANDS (DHHL), KULA RESIDENTIAL LOTS IN THE WAIOHULI SUBDIVISION, WAIOHULI AND KĒŌKEA AHUPUA`A, MAKAWAO DISTRICT, MAUI ISLAND, HAWAI`I [TMK: (2) 2-2-002:014 por.]

Prepared by:
Michael Dega, Ph.D.

August 2015
FINAL

Prepared for:
Department of Hawaiian Home Lands
Waiohuli Homesteaders Association
1099 Alakea St., Suite 2000
Honolulu, HI 96813

SCIENTIFIC CONSULTANT SERVICES Inc.

HAWAII

1347 Kapiolani Blvd., Suite 408 Honolulu, Hawai`i 96814

EXECUTIVE SUMMARY

In keeping with the goals of the Department if Hawaiian Home Lands (DHHL), large sections of the Waiohuli landscape, as well as isolated but significant historic sites on the parcel, are being subject to permanent Preservation. These sites represent a legacy being passed to the current owners of this uniquely Hawaiian landscape. In keeping with the theme of continuity, Preservation of a large, predominantly uninterrupted section of the Waiohuli landscape is proposed, this section containing a diversity of traditional Hawaiian site types from pre-Contact times. This section is referred to as the Historic Preserve Area (HPA). Several other sites are being subject to Preservation outside the HPA in that they encompass significance in form, type, or time period and represent unique features to the landscape.

To date, multiple phases of archaeological work have been performed on the Waiohuli parcel in Waiohuli and Kēōkea Ahupua`a, Makawao District, Maui Island, Hawai`i [TMK: (2) 2-2-002:014 por.]. These include the following: Archaeological Inventory Survey (Kolb *et al.* 1997); Archaeological Data Recovery (Dega *et al*. 2007), Archaeological Inventory Survey of Road Corridors (Dega and Havel 2005), Archaeological Reconnaissance (Dega *et al.* 2005), Archaeological Monitoring (through November, 2007), Burial Treatment (Dega 2006), and Preservation Planning (Dega 2006). Per the latter, this Preservation Plan was accepted by the State Historic Preservation Division (SHPD) in September, 2006.

The current document represents a revision to the originally accepted Preservation Plan. Both the number of sites/features being subject to Preservation have changed from the original plan, the boundaries of the HPA are more clearly demarcated herein (metes and bounds), and a slight alteration to the western portion of the HPA is also offered herein, per infrastructural concerns. This plan requires a determination from the SHPD. Once acceptable to the SHPD, the Plan will be enforced.

Per the present Preservation Plan, a total of twenty-five (25) sites composed of 262 features will be preserved in perpetuity. Twenty-three of the sites occur in the HPA while two sites occur in the southwestern portion of the development on individual lots.

Multiple groups and/or organizations were consulted during preparation of this Preservation Plan. These include the SHPD, Maui/Lana`i Islands Burial Council (MLIBC), the DHHL, Office of Hawaiian Affairs (OHA), and the Waiohuli Homesteader's Association.

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INTRODUCTION

This Preservation Plan has been prepared by Scientific Consultant Services (SCS), Inc. for the Department of Hawaiian Home Lands (DHHL) in anticipation of the development of residential housing lots and community parks in the Waiohuli Subdivision, Waiohuli and Kēōkea Ahupua`a, Makawao District, Maui Island, Hawai`i [TMK: (2) 2-2-002:014 por.] (Figures 1 and 2). This Preservation Plan specifically focuses on interim and long-term, permanent preservation of twenty-five (25) multi-component sites primarily reflecting habitation, agricultural, and ceremonial loci previously identified and documented on the property. This plan also demarcates the location of the *c*. 65-acre Historic Preserve Area (HPA) that will preserve all but two of these sites (see below). The HPA represents preservation of a large, mostly continuous swath of landscape containing all representations of site types and time periods in Waiohuli. Two breaches occur in the HPA so that it is not completely continuous: Road A, which connects all the DHHL parcels in this area; and second, a small portion of the diversion ditch (surface, earthen berms), which allows water to flow through a natural drainage on the southern side of the HPA. Both Road A and the diversion ditch were engineered to avoid known archaeological sites. Both breaches do not disturb any sites. This HPA, in concert with one established on the neighboring Kēōkea parcel, preserves 50 multi-component sites over a c. 110-acre area. Other significant sites, occurring in other sections of both parcels, will also be preserved.

Per the present Preservation Plan, a total of twenty-five (25) sites composed of 262 features will be preserved in perpetuity. Twenty-three of the sites occur in the HPA while two sites occur in the southwestern portion of the development on individual lots. (Note: The current document represents a revision to the originally accepted Preservation Plan. Both the number of sites/features being subject to Preservation have changed from the original plan, the boundaries of the HPA are more clearly demarcated herein (metes and bounds), and a slight alteration to the western portion of the HPA is also offered herein, per infrastructural concerns. This plan requires a determination from the SHPD. Once acceptable to the SHPD, the Plan will be enforced).

The present Preservation Plan follows procedures outlined in the Hawai`i Administrative Rules, Title 13 Department of Land and Natural Resources, Subtitle 13 State Historic Preservation Division Rules, Chapter 277 Rules Governing Minimal Requirements for Archaeological Site Preservation and Development (DLNR/SHPD 2003). This Preservation Plan provides standards to ensure proper preservation and a “no adverse effect” in the public’s interest (DLNR/SHPD 2003).

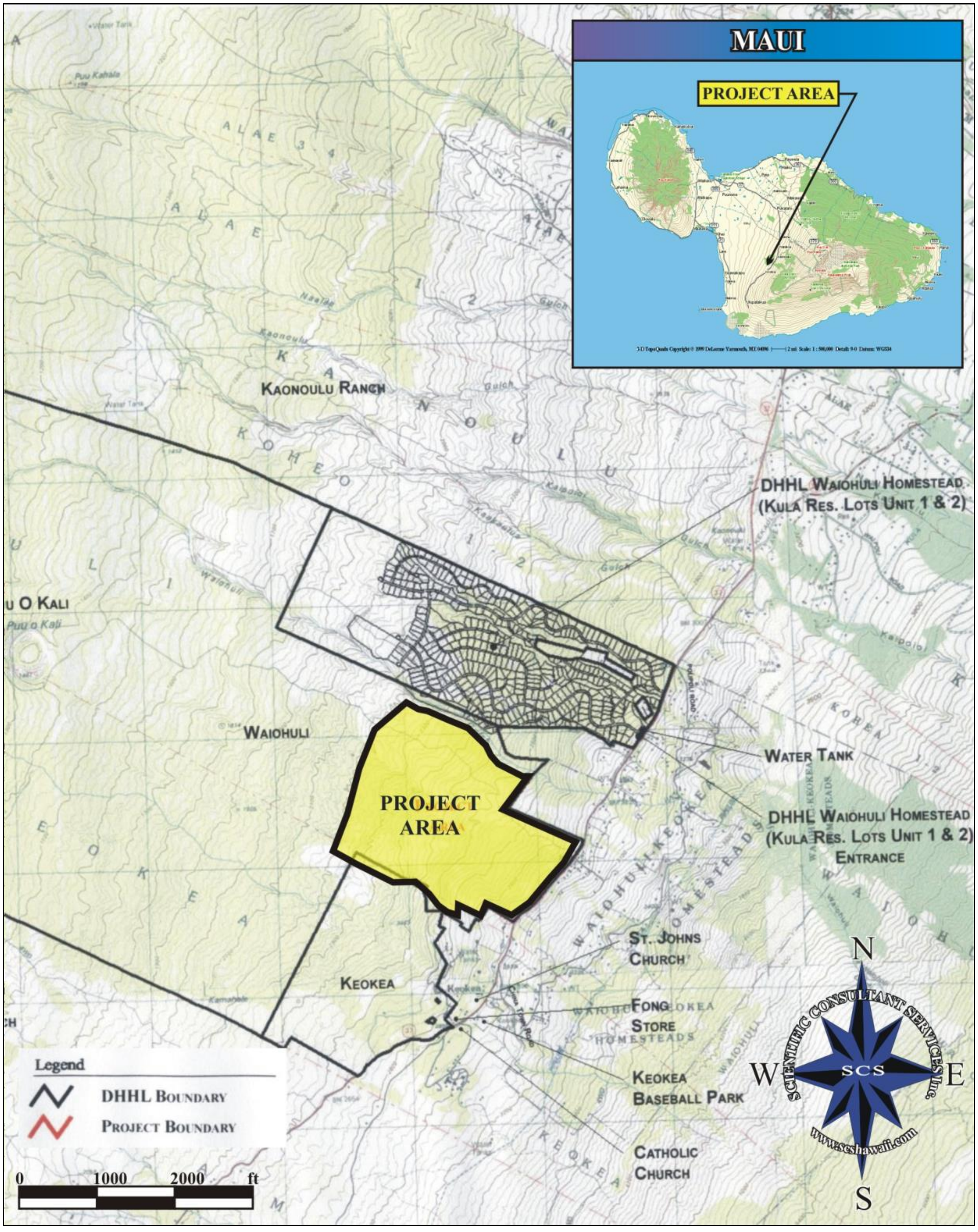

Figure 1: USGS Quadrangle Map Showing Project Area Location.

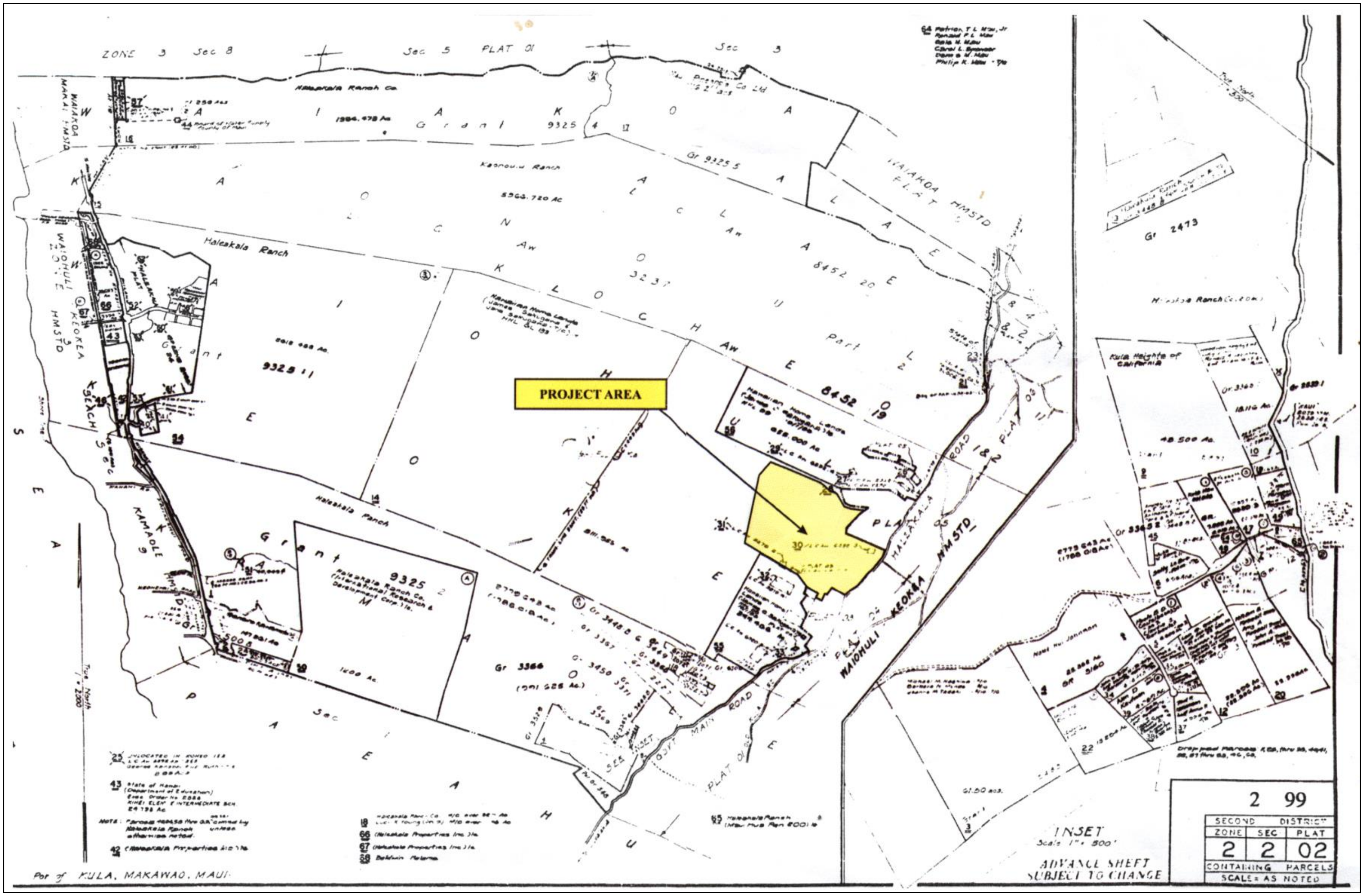

Figure 2: Tax Map Key Showing Project Area Location.

Preservation means the mitigation form in which a historic property is preserved, whether through avoidance and protection (conservation) or exhibition (interpretation). There are four steps to preserving a site, the first of which is executed here: preparation of a Preservation Plan. The following three steps include review and approval of the Preservation Plan by SHPD prior to preservation work, execution of the Preservation Plan, and verification by SHPD that the plan has been successfully executed.

This Preservation Plan provides a brief background to the archaeology of the Waiohuli and Kēōkea parcels, discusses preservation procedures pertaining to the respective sites, and enumerates the methods to be utilized during preservation. A separate Burial Treatment Plan (BTP) has been prepared to discuss preservation of the six (6) identified burial sites on the Waiohuli property (Dega 2005). Both plans are based on information gleaned through Inventory Survey (Kolb *et al*. 1997), Data Recovery (Dega *et al*. 2007), focused Road Survey work (Dega and Havel 2005), and reconnaissance/site evaluation of the entire project area also in 2005. Archaeological Monitoring has recently been completed on both the Kēōkea and Waiohuli parcels.

HISTORIC LAND USE

In 1848, commissioners of the Māhele instigated an extreme modification to traditional land tenure on all islands that resulted in a division of lands and a system of private ownership. The Mahele was based upon the principles of Western law. While a complex issue, many scholars believe that in order to protect Hawaiian sovereignty from foreign powers, Kauikeaouli (Kamehameha III) was forced to establish laws changing the traditional Hawaiian society into that of a market economy (Kuykendall Vol. I 1938:145, footnote 47, *et passim*; Daws 1968:111; Kame`eleihiwa 1992:169–170, 176). The dramatic shift from a redistributive economy to a market economy resulted in drastic changes to land tenure, among other things. As a result, foreigners demanded private ownership of land to ensure their investments (Kuykendall Vol. I, 1938:145, *et passim*; Kame`eleihiwa 1992:178; Kelly 1998:4).

Once lands were made available and private ownership was instituted, native Hawaiians, including the *maka`ainana* (commoners), were able to claim land plots upon which they had been cultivating and living. Oftentimes, foreigners were simply just given lands by the *ali`i*. However, commoners would often only make claims if they had first been made aware of the foreign procedures (*kuleana* lands, or land commission awards). These claims could not include any previously cultivated or currently fallow land, *okipu*, stream fisheries, or many other natural resources necessary for traditional survival (Kame`eleihiwa 1992:295; Kirch and Sahlins 1992). Awarded parcels were labeled as Land Commission Awards (LCAs). If occupation could be established through the testimony of witnesses, the petitioners were issued a Royal Patent number and could then take possession of the property. Commoners claiming house lots in Honolulu, Hilo, and Lahaina~ were required to pay commutation to the government before obtaining a Royal Patent for their awards (Chinen 1961:16).

According to TMK: (2) 2-2-002 (see Figure 2), LCA 6592:3 is located within the current project area. According to the Waihona `Aina Database (2015), LCA 6592 was claimed by, and awarded to Puana, Royal Patent7808. Puana' claim states that he had *lo`i* (wetland taro), *kula* (farm) lands, a house lot, sweet potatoes, Irish potatoes, and bananas on his land.

PREVIOUS ARCHAEOLOGY

Kolb *et al*. (1997) conducted Inventory Survey of the current Waiohuli project area and beyond (on DHHL tracts to the west) that led to the identification and documentation of 213 archaeological sites composed of 1,093 features (Figure 3). During Road Survey work by SCS in 2005 (Dega and Havel 2005), an additional nine previously unidentified archaeological sites composed of 35 features were documented. Eight sites, composed of 78 features, were further investigated through attentive Data Recovery (Dega *et al*. 2007), following a specific research design formed by SCS (Dega 2004). The vast majority of sites to be preserved under this plan were originally recorded during Inventory Survey by Kolb *et al*. (1997) and were recommended for Preservation in the same report.

All the non-burial sites proposed for Preservation herein primarily occur over a c. 65-acre fairly continuous landscape and consist of twenty-three (23) sites composed of 235 features. In addition, two (2) sites composed of 27 features, occurring in a different portion of the project area, will also be preserved (see below). The total number of sites being preserved is twenty-five (25) with a combined 262 features.

Based on previous archaeological work in Waiohuli, the functional and temporal interpretations of the various sites, and input from SHPD, the MLIBC, the DHHL, OHA, and the Waiohuli Homesteader's Association, a total twenty-five (25) archaeological sites composed of 262 features will be preserved on the Waiohuli parcel (Note: Six burial sites will also be

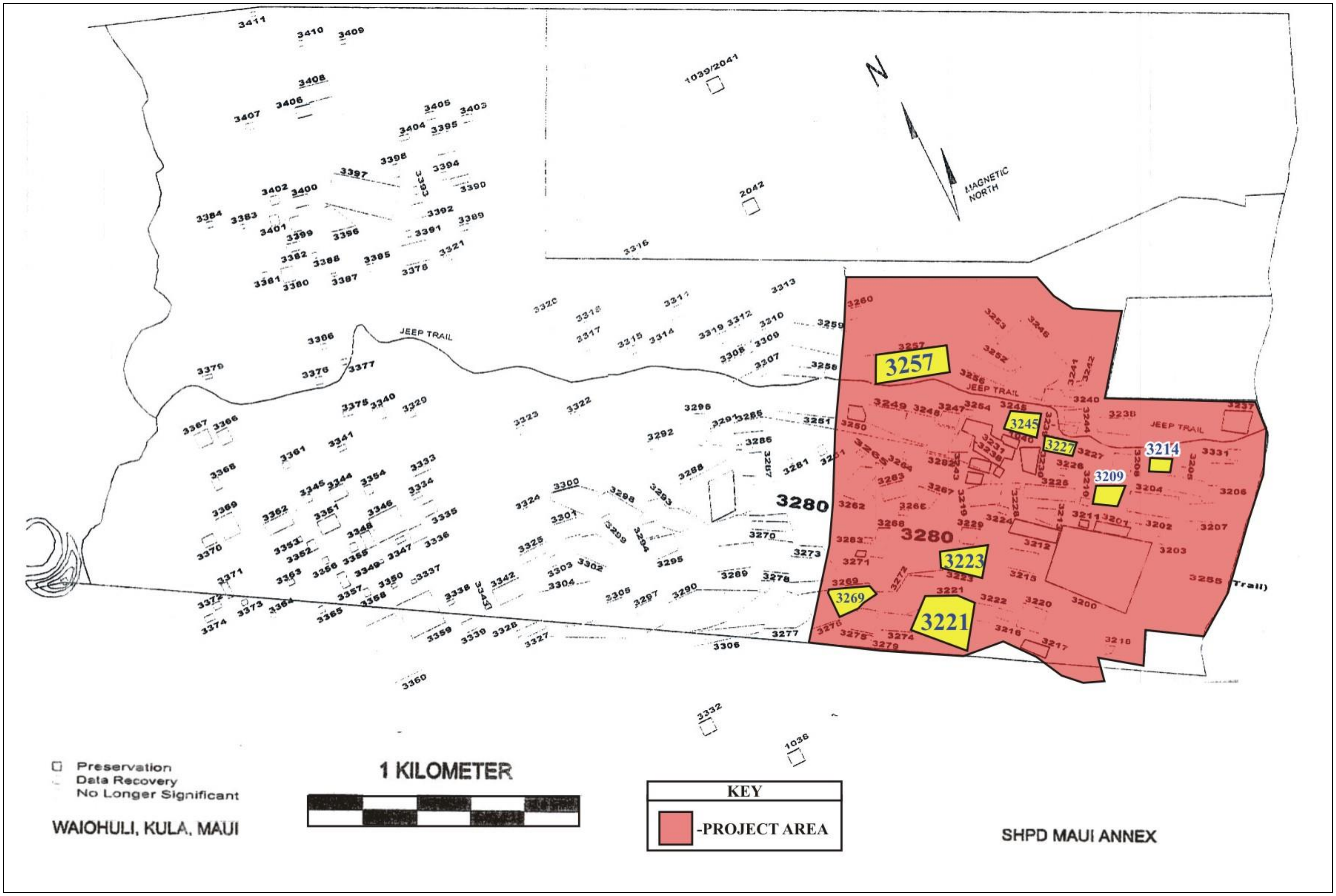

Figure 3: Plan View Map Illustrating Sites Documented in Waiohuli Project Area (from Kolb *et al*. 1997). Note: Highlighted Sites Depict Data Recovery Sites.

Table 1: Waiohuli Preservation Sites, Site Type and Site Area, Site Treatment, and Feature Class-Feature Chronology (from Kolb *et al*. 1997: D-7 through D-16 and Dega *et al*. 2007.

State Site Number (50-50-10-XXXX) and Location	**Feature Type, Dimensions (total area)**	**Treatment, Buffer Zone/Location**	**Feature Class and Chronology (Note: Adjusted Age dates have been recalibrated through OxCal '05 (2 Sigma)**
50-50-10-1040 HPA	Heiau; (2,003 m²)	Preservation; 0 m buffer zone in HPA; Preserved Area 2,003 m²	Kaimupe`elua Heiau; A.D. 1540-1830, 1660-1940
50-50-10-3200 HPA	Enclosure, Mound, Platform, Terrace, U-Shape, Wall; (50,545 m²)	Preservation; 0 m buffer zone in HPA; Preserved Area 50.545 m²	93 Agricultural, 4 Permanent Habitation, 3 Post-Contact Habitation A.D. 1440-1770
50-50-10-3201 HPA	C-shape, Enclosure, Terrace; (2,782 m²)	Preservation; 0 m buffer zone in HPA; Preserved Area 2,782 m²	4 Permanent Habitation, 3 Agricultural, 1 Temporary Habitation, 1 Boundary; Traditional-period
50-50-10-3211 HPA	Terrace; (218.0 m²)	Preservation; 0 m buffer zone in HPA; Preserved Area 218 m²	2 Agricultural; Traditional-Period
50-50-10-3212 HPA	Enclosure, Platform, Terrace, Garden Encl.; (6,710 m²)	Preservation; 0 m buffer zone in HPA; Preserved Area 6,710 m²	5 Permanent Habitation, 2 Temporary Habitation, 2 Agricultural; Traditional-Period
50-50-10-3217 HPA	Wall, Terrace; (1,161 m²)	Preservation; 0 m buffer zone in HPA; Preserved Area 1,161 m²	1 Permanent Habitation, 1 unknown; A.D. 1420-1750
50-50-10-3230 HPA	Platform, Wall, Terrace; (3,874 m²)	Preservation; 0 m buffer zone in HPA; Preserved Area 3,874 m²	2 Temporary Habitation, 1 Agricultural, 1 Boundary; Traditional-Period
50-50-10-3231 HPA	Enclosure, C-shape, Platform, Terrace, U-shape, Wall; (1,154 m²)	Preservation; 0 m buffer zone in HPA; Preserved Area 1,154 m²	6 Permanent Habitation, 3 Boundary, 2 Agricultural; Traditional-Period
50-50-10-3232 HPA	Enclosure, C-shape, Platform, Alignment, Mound, Wall, Terrace; (2,189 m²)	Preservation; 0 m buffer zone in HPA; Preserved Area 2,189 m²	4 Agricultural, 3 Permanent Habitation, 2 Boundary; A.D. 1250-1620, 1530-1820, 1590-1880, modern sample
50-50-10-3233 HPA	Enclosure, C-shape, Mound Terrace; (4,913 m²)	Preservation; 0 m buffer zone in HPA; Preserved Area 4,913 m²	4 Agricultural, 3 Permanent Habitation, 1 Temporary Habitation; Traditional-Period
50-50-10-3235 HPA	Terrace; (2,459 m²)	Preservation; 0 m buffer zone in HPA; Preserved Area 2,459 m²	3 Agricultural, 1 Permanent Habitation; Traditional-Period
50-50-10-3234 HPA	Wall, Enclosure, Alignment, Mound (2,058 m²)	Preservation; 0 m buffer zone in HPA; Preserved Area 2,058 m²	5 Agricultural, 2 Permanent Habitation, 1 Boundary, 1 Unknown; Traditional-Period
50-50-10-3236 HPA	Enclosure, Alignment, C-shape, Garden encl., Terrace, Wall; (8,838 m²)	Preservation; 0 m buffer zone in HPA; Preserved Area 8,838 m²	7 Agricultural, 3 Permanent Habitation, 1 Boundary; Traditional-Period
50-50-10-3227 HPA	Enclosure, Platform, Terrace; (4,419 m²)	Preservation; 0 m buffer zone in HPA; Preserved Area 4,419 m²	6 Permanent Habitation; A.D. 1500-1880
50-50-10-3250 HPA	Enclosure, Terrace, Rock shelter; (3,361 m²)	Preservation; 0 m buffer zone in HPA; Preserved Area 3,261 m²	1 Ritual, 1 Temporary Habitation, 1 Agricultural; A.D. 1570-1860
50-50-10-3243 HPA	Lava Tube, Wall; (160 m²)	Preservation; 0 m buffer zone in HPA; Preserved Area 160 m²	1 Ritual, 1 Boundary; Traditional-Period
50-50-10-3225 HPA	Platform, Walled Terrace, Terrace (3,361 m²)	Preservation; 0 m buffer zone in HPA; Preserved Area 3,361 m²	4 Permanent Habitation; Traditional-Period

State Site Number (50-50-10-XXXX) and Location	**Feature Type, Dimensions (total area)**	**Treatment, Buffer Zone/Location**	**Feature Class and Chronology (Note: Adjusted Age dates have been recalibrated through OxCal '05 (2 Sigma)**
50-50-10-3238 HPA	Walled Terrace, Terrace, L-shape Terrace (5,642 m²)	Preservation; 0 m buffer zone in HPA; Preserved Area 5,642 m²	3 Permanent Habitation, 3 Agricultural, 1 Temporary Habitation; Traditional-Period
50-50-10-3247 Hpa	Terrace, wall, l-shape terrace, walled terrace (3,919 m²)	Preservation; 0 m buffer zone in hpa; preserved area 3,919 m²	3 agricultural, 1 permanent habitation; Traditional-period
50-50-10-3248 Hpa	Alignment, modified outcrop, terrace, wall (10,046 m²)	Preservation; 0 m buffer zone in hpa; preserved area 10,046 m²	2 boundary, 2 agricultural, 1 permanent habitation; Traditional-period
50-50-10-3249 Hpa	Enclosure, wall (11,025 m²)	Preservation; 0 m buffer zone in hpa; preserved area 11,025 m²	3 boundary, 1 agricultural; Traditional-historic period
50-50-10-3251 Hpa	Enclosure, terrace, alignment, rock shelter, garden enclosure, modified outcrop, paving (30,494 m²)	Preservation; 0 m buffer zone in hpa; preserved area 30,494 m²	7 permanent habitation, 6 agricultural, 3 temporary habitation, 2 boundary; Traditional-period
50-50-10-3269 Lot 270/271	C-shape, enclosure, modified outcrop, mound, l-shape, terrace (c. 11,000 m²)	Preservation; 3 m buffer zone around enclosures and mounds; preserved area 5,200 m²	10 agricultural, 4 permanent habitation, 1 temporary habitation, 1 boundary; Traditional-period
50-50-10-3282 Hpa	Rock shelter, enclosure, mound (7,828 m²)	Preservation; 0 m buffer zone in hpa; preserved area 11,025 m²	2 temporary habitation, 1 agricultural; Traditional-period
50-50-10-3283 Lot 251	Platform, enclosure, terrace (2,743 m²)	Preservation; 3 m buffer zone around habitation sites; preserved area 2,743 m²	6 permanent habitation, 5 agricultural; Traditional period

preserved). A majority of these sites occur in the 65-acre HPA, with an additional cluster of traditional Hawaiian sites to be preserved outside the HPA along the project area's southwestern flank (see Figure 2). A total of two (2) preservation sites with a combined twenty-seven (27) features occur outside the HPA.

The following tables provide information on all 25 preservation sites (none of these sites has a confirmed burial component) to be preserved in Waiohuli. Table 1 lists the 23 Waiohuli sites that were originally slated for Preservation by Kolb *et al*. (1997) with the creation of the HPA as well as two sites identified during additional survey by SCS in 2004 (see Havel and Dega 2005) which are also recommended for Preservation. Please note that a majority (23/25) sites listed in Table 1 do not require immediate buffer zones as they all occur within the HPA, which itself will be formed by a buffer zone. Figures 4, 5 and 6, illustrate the HPA area, sites within the HPA, and the two sites occurring outside the HAP which are to be preserved (Note: State Sites 50-50-10-3221, 50-50-10-3227, 50-50-10-3250. State Sites 50-50-10-3257, 50-50-10-3271, and 50-50-10-3272 are being preserved under a Burial Treatment Plan; Dega 2005).

Again, in total, twenty-five (25) sites with 262 features will be preserved in Waiohuli under this Preservation Plan. The total, when divided by feature class, is as follows: 158 agricultural features (terraces, mounds, garden enclosures), 67 permanent habitation features

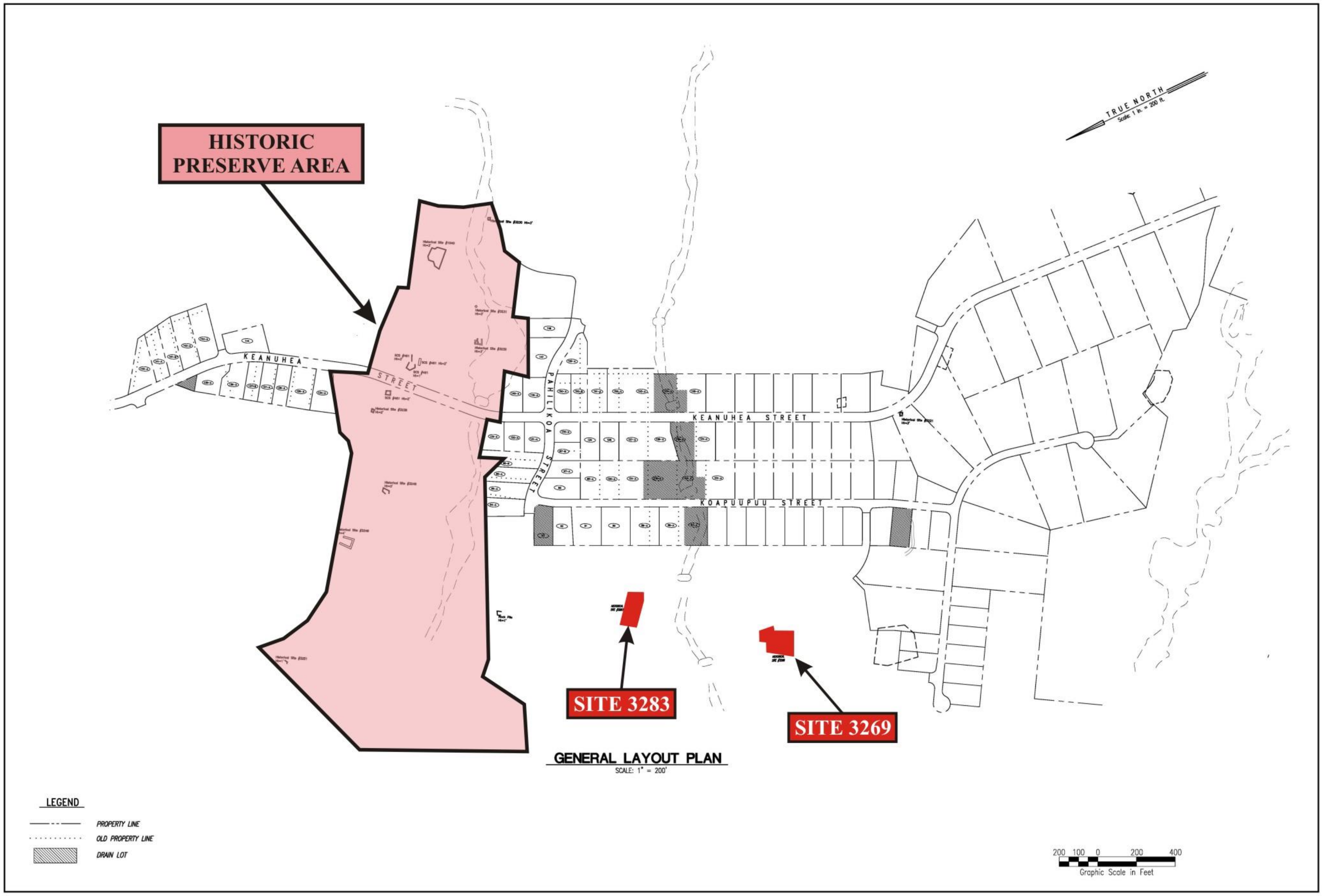

Figure 4: Plan View Map of Current Subdivision Showing the Historic Preserve Area the Locations of and Site-3283 and Site-3269 in Relation to the Residential Lots.

Figure 5: Plan View Map of Current Project Area Showing Historic Preserve Area, Sites within Historic Preserve Area, and Sites Outside Preserve Area Protected Under this Preservation Plan.

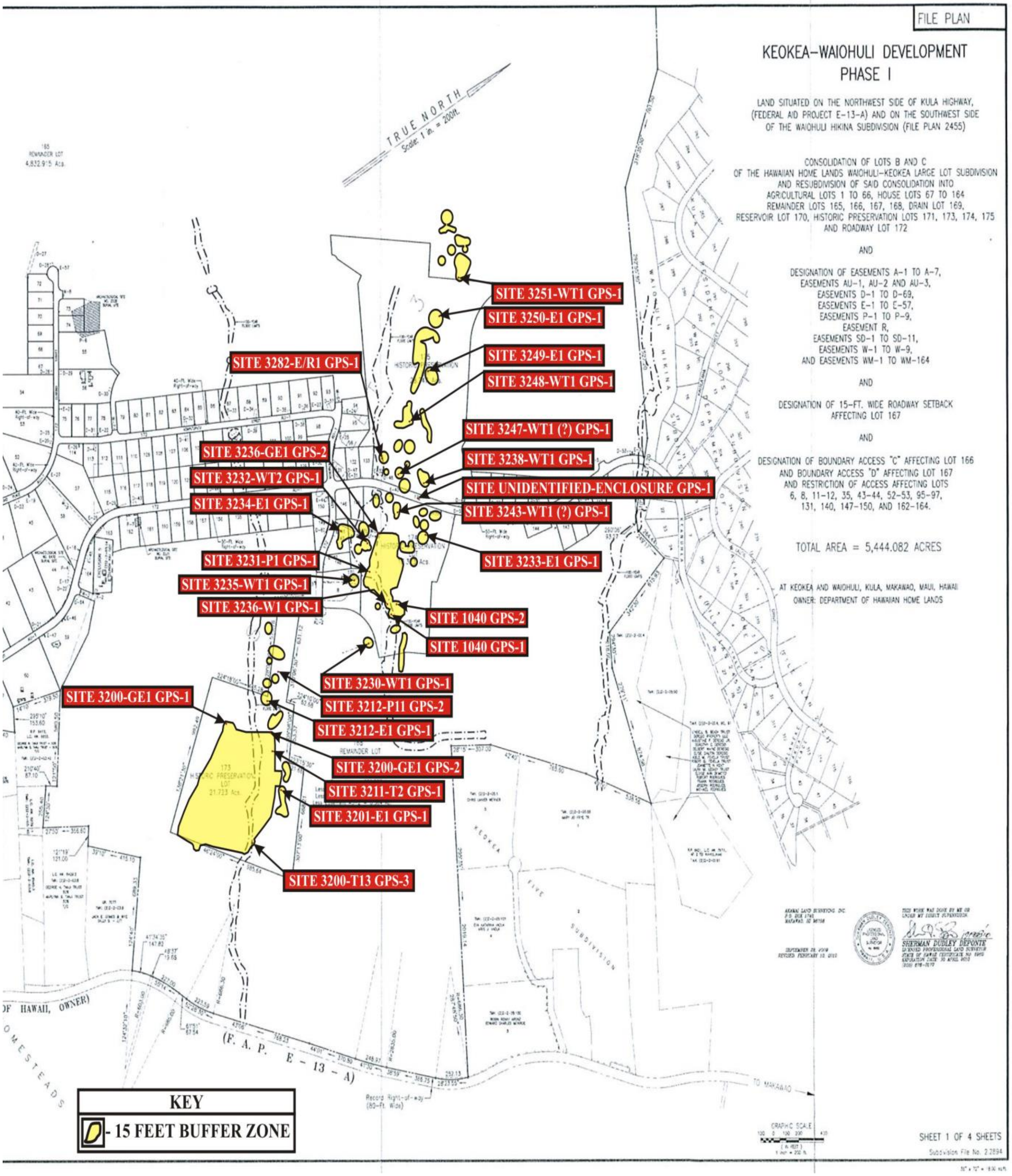

Figure 6: Plan View Map of Project Area Showing Sites Mapped by GPS within Historic Preserve Area.

(platforms, enclosures, terraces), 14 temporary habitation loci (rock shelters, terraces), 3 ceremonial sites (*heiau*, enclosure), 18 boundary features (walls), and 2 features with unknown functional ascription.

A majority of these features are present within the Historic Preserve Area which itself extends from c. 2700 feet above mean sea level (amsl.) to c. 2200 feet amsl and occupies an entire ridgeline bordered by gently sloping land to the north and a swale to the south (see Figures 4 through 6). This swale constitutes a portion of the aforementioned diversion ditch; no construction will occur for the ditch in this area as water diverted from upland will simply flow through the natural swale/drainage (Figure 5, see Figure 7). The basic idea of creating the HPA in this fashion was to preserve numerous classes of sites across a stretch of continuous landscape. The HPA locale also contained the greatest density of sites in Waiohuli.

The Waiohuli development was intentionally planned around formation of the HPA area, which provided much leniency in buffer zones on all sides of the HPA. Both roads and residences formerly proposed for the southeastern portion of the HPA were terminated by planners, which has opened up much area for the HPA. The northern and southern flanks of the HPA represent the long axes, measuring approximately 3,600-4,000 linear feet (1,097-1,219 meters). The east and west flanks measure c. 1000 feet (250-300 meters) in linear distance. The HPA is bounded on the shorter east and west flanks by presently undeveloped lands. The eastern flank will remain primarily undeveloped all the way to Kula Highway. The western flank will eventually be bounded by Phase II residential development, with property line markers already having been established between Phase I and Phase II areas. The northern, long axis is defined by open spaces which give way to residential lots (located no closer than c. 50 meters away and up to 300+ meters away) and Road G. The southern, long axis is also flanked by open spaces, proceeded by residential lots and an east-west coursing road (not designated to date). Again, the residential lots and infrastructure (roads) were designed around the HPA to allow for ample open spaces between the residential lots/infrastructure and the HPA landscape. Figure 7 shows a plan view map of Waiohuli Residential Lots showing location of road “a” and the diversion ditch.

SITE DESCRIPTIONS

The twenty-five (25) sites subject to Preservation have been subject to Inventory Survey (Kolb *et al*. 1997) and evaluation through several reconnaissance phases of work by SCS (Havel and Dega 2005; DHHL memo 2005). None of the sites have been subject to Archaeological Data Recovery or other forms of archaeological mitigation.

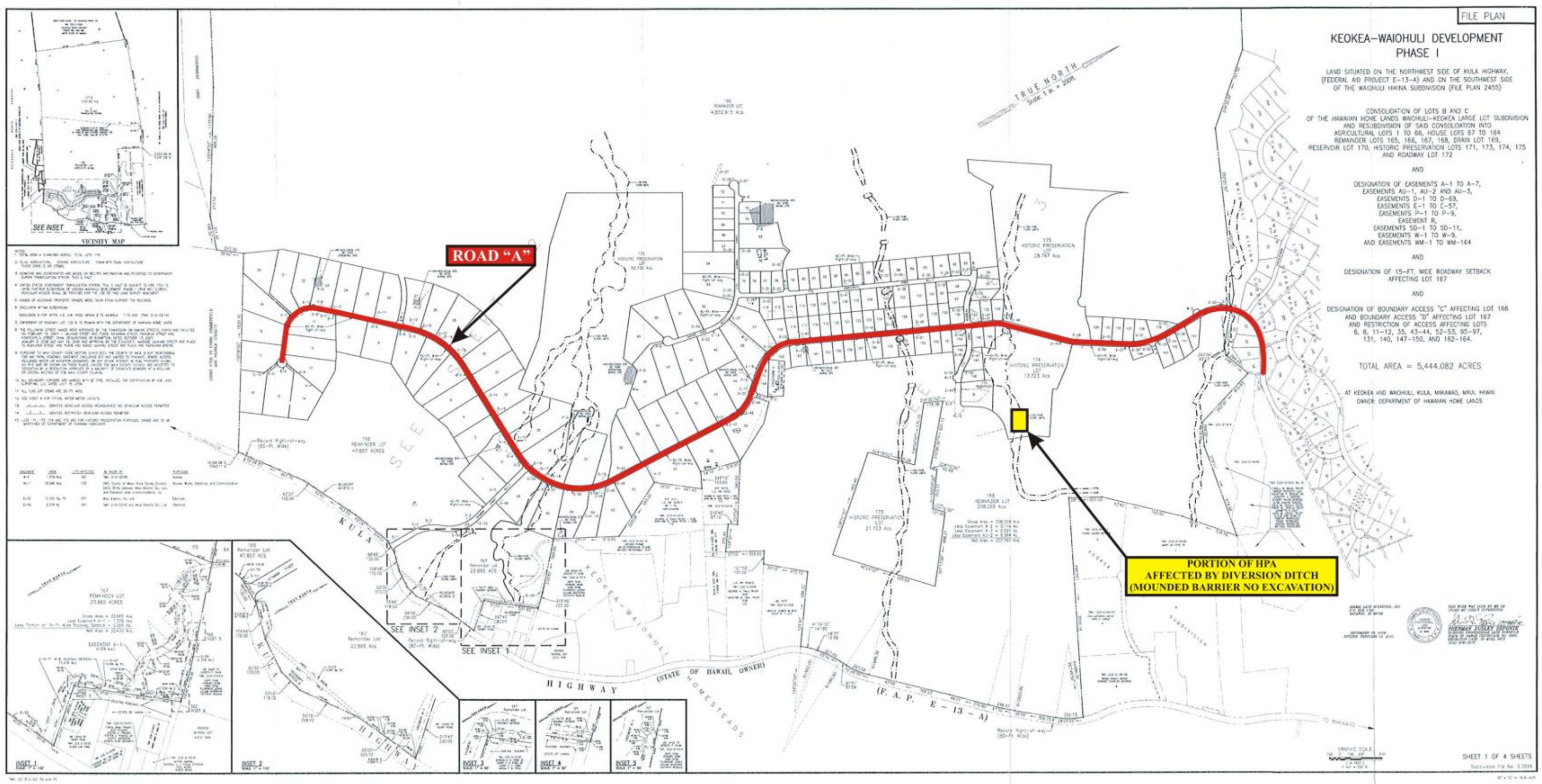

Figure 7: Plan View Map of Waiohuli Residential Lots Showing Location of Road "A" and the Diversion Ditch.

Basic data on the sites are presented in Table 1 above. Due to the high number of sites and features being preserved, each site will not be afforded an individual description or plan view map. The reader is referred to Table 1 and Figures 5 and 6 (above) and Kolb *et al*. (1997) for more in-depth site descriptive information.

CONSULTATION

In accordance with HRS § 13-277-3 (4), SCS has consulted with ten individuals and organizations of the Makawao area for whom the preserved historic properties have significance. This Preservation Plan was submitted to the Department of Hawaiian Home Lands, the Waiohuli Homesteaders Association, the Office of Hawaiian Affairs, representatives of the Maui/Lana`i Islands Burial Council, and the State Historic Preservation Division for review. Comments from these consulting groups have been incorporated into this final Preservation Plan. The establishment of the Historic Preserve Area involved multiple meetings and discussions with many groups and individuals, including the Maui/Lana`i Islands Burial Council, members of the Waiohuli Homesteaders Association, representatives from various departments of the DHHL, and SHPD-Maui. Several of the above members also met with SCS and DHHL Land Division representatives on numerous occasions in Honolulu and on Maui. Evidence of the consultation process are presented in Appendix A.

SITE PRESERVATION

The following text provides proposed preservation measures for the twenty-five (25) sites being preserved under this plan. The two sites that do not occur within the HPA (State Site 50-50-10-3269 and State Site 50-50-10-3283) are discussed separately (see Figures 5 and 6). The remainder of the sites (n=23) all occur within the HPA; these will be preserved en masse and also be discussed separately (see Figures 5 and 6).

STATE SITES 50-50-10-3269 AND 50-50-10-3283

Preservation of both sites will take the form of avoidance and protection, also referred to as *conservation*. There are no plans for installing signs at the sites. There will be special provisions accorded confirmed cultural and lineal descendants, members of the Waiohuli Homesteaders Association and/or DHHL, school groups, other Native Hawaiian organizations, and any other groups so permitted by the Waiohuli Homesteaders Association for allowing access to the sites for cultural practices or education. In addition, a provision for access by permitted archaeological researchers and the general public is offered here. However, no excavation will be conducted unless approved by SHPD and/or the DHHL. Public access to the sites may be made available by contacting the Waiohuli Homesteaders Association. Parking affording such visits will occur on neighborhood streets. Access for upkeep of the sites, as needed, will be afforded confirmed descendants, members of the Waiohuli Homesteaders Association, and any involved lessees (Note: Right-of-Entry and Access to these and other sites may need to be stated in any affected lessees' lease). In absence of confirmed descendants, any lessees and the Waiohuli Homesteaders Association are responsible for upkeep of the sites. In the event that these land parcels are not awarded, the Waiohuli Homesteaders Association, along with DHHL, will be responsible for maintenance and protection of the two sites.

The following measures will be carried out to provide the maximum preservation and conservation of the two sites within the context of the proposed development:

- The preservation zone for these two sites is 3 meters (10 feet), with the interim and permanent buffer points being established from all points along the respective exterior wall directions of the sites (Figure 8; see Figure 5). As the to-be preserved features at both sites are somewhat geographically dislocated, the buffer zones will extend in a large circular fashion from the furthest removed features at each site to also preserve the in-between feature areas. Please note that for State Site 50-50-10-3269, only the agricultural and permanent habitation features will be preserved (this excludes features on Figure 8 marked "T2, C1, M/O1). For State Site 50-50-10-3283, only the permanent habitation features will be preserved (see Figures 5 and 8 buffer outlines). The buffer zones offered herein have been minimized as this is Hawaiian-owned land and Waiohuli residents are, appropriately, ultimately responsible for guardianship of their ancestral sites.

- No construction will be allowed to be conducted within established preservation zones. During construction activity on the Waiohuli parcel, interim buffer zones around these sites will be demarcated by orange construction fencing placed around the entire perimeter of the buffer zone. Once construction has been completed, permanent buffer zones will be established around the sites (3 m) and may be demarcated by landscaping and/or boulders placed at the corners of the buffer zones. The permanent buffer zones shall be kept free of all structures.

- Only landscaping with native plants may occur within the permanent buffer zones. However, no landscaping shall be allowed within the sites themselves.

- Demarcation of the buffer zones at the respective sites will be duly recorded by the client's surveyors (DHHL) and must be reviewed and accepted as appropriate by the Department of Land and Natural Resources-State Historic Preservation Division (DLNR-SHPD) prior to construction on the parcel. The buffer zones shall be surveyed and plotted on all construction plans.

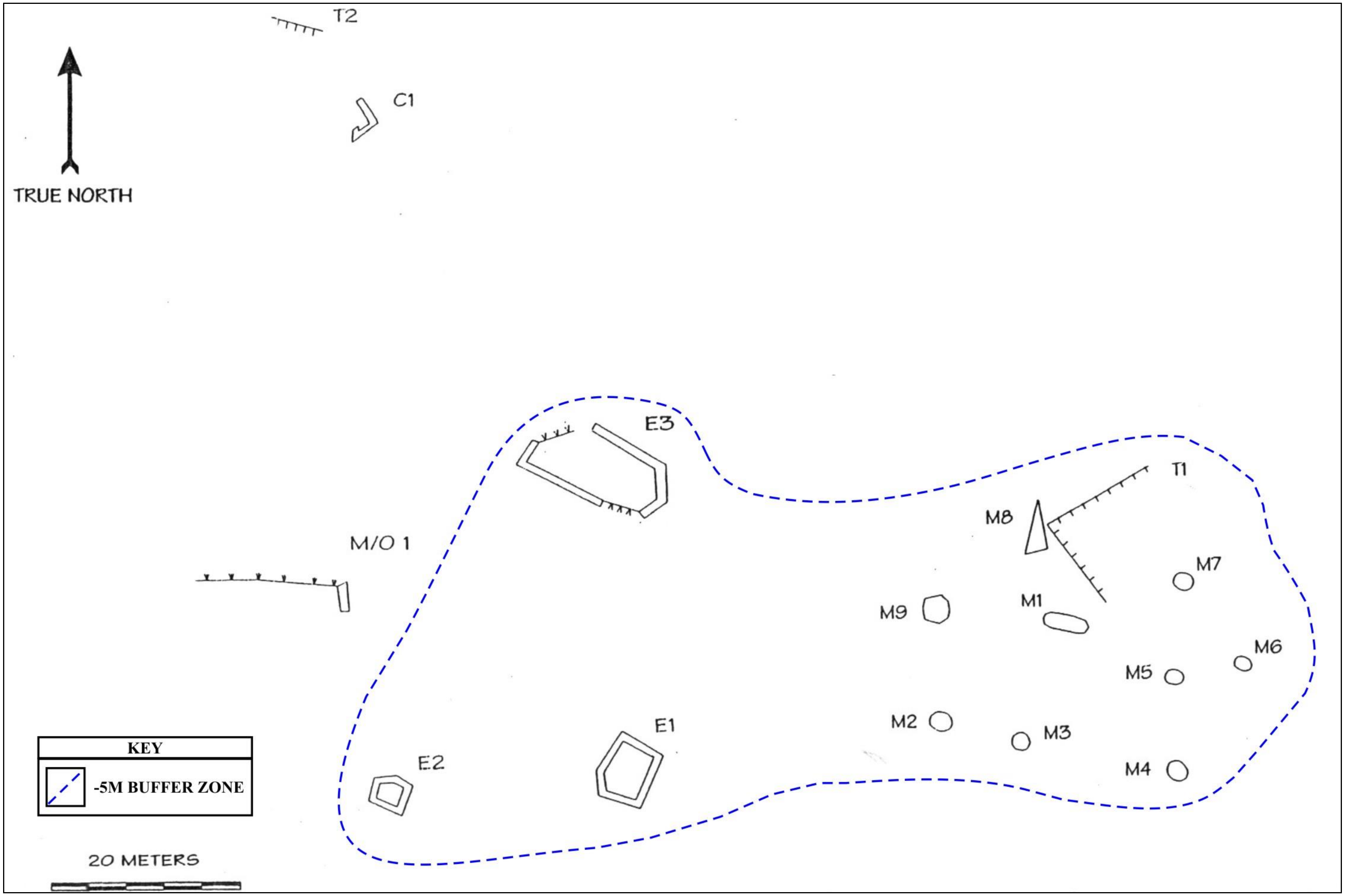

Figure 8: Plan View Map of State Site 50-50-10-3269 and Proposed Buffer Zone (plan view from Kolb *et al*. 1997).

- No heavy equipment or other construction-related machines or materials will be allowed to be moved or stored in the set preservation zones. The preservation buffer zones surrounding the sites shall not be used as staging and/or storage areas.

- All trees and understory brush may be removed using hand-clearing techniques.

- All existing stones, whether stacked or not, will be left in place.

- Should storm, earthquake, or other natural or cultural damage occur to the sites and their environs, and should this necessitate repairs to ensure the safety of descendants wishing to visit the sites, the Waiohuli Homesteaders Association will notify the SHPD of the situation and reach an agreement with the SHPD on how to proceed prior to implementing any alterations to the ground surface, sites, or vegetation within the preservation zones.

- Modern debris generated by users of the sites or that have been blown into the sites may be removed by hand from within the preservation zones whenever is deemed necessary by the descendants, the lessees, or by the Waiohuli Homesteaders Association.

- This Preservation Plan shall be made part of the binding lease agreement for the lots on which State Site 50-50-10-3269 (Lot 270/271) and State Site 50-50-10-3283 (Lot 251) occur.

- These provisions are made for on-going preservation of the site's locations. These portions of the property will be preserved, with preservation provisions being binding on any successive owners and/or lessees of the respective lots.

HISTORIC PRESERVE AREA

A Historic Preserve Area (HPA), encompassing some 65-acres of land, will ultimately preserve twenty-three (23) multi-component archaeological sites. The HPA has been set aside to preserve the sites for the Waiohuli Homesteaders Association and to promote the archaeology of the Waiohuli-Kēōkea region. There is a provision in this plan to include future scientific endeavors in the HPA. These may occur if approved by the SHPD, DHHL, and the Waiohuli Homesteaders Association. The HPA itself encompasses a large swath of land through the mid-section of the Waiohuli parcel (see Figures 4 and 5).

Preservation of the HPA sites will take the form of preservation and conservation. There may be plans for signage at certain sites (*e.g.*, Kaimupe`elua Heiau, some residential clusters and garden enclosures) but this will only occur in the future and is subject to SHPD review. There will be special provisions accorded confirmed cultural and lineal descendants, members of the Waiohuli Homesteaders Association, school groups, other Native Hawaiian organizations, and any other groups so permitted by the Waiohuli Homesteaders Association for allowing access to the HPA for cultural practices or educational purposes. The DHHL is proposing an education program for Waiohuli which will likely involve some hands-on fieldwork in the future. As such, a provision for access by researchers and/or educators is offered herein. However, no excavation will be conducted unless approved by SHPD and/or the DHHL. Public access to the HPA may be made available by contacting the Waiohuli Homesteaders Association. Parking affording such visits will occur on neighborhood streets. Access will be allowed to the HPA by confirmed descendants and members of the Waiohuli Homesteaders Association for care and upkeep of the HPA, as needed. In absence of available descendants, the Waiohuli Homesteaders Association is responsible for upkeep of the HPA.

The following measures will be carried out to provide the maximum preservation and conservation of the HPA within the context of the proposed residential development:

- There are no individual site preservation zones for the HPA sites as a boundary has been formed around the entire *c*. 65-acre parcel (see Figure 5).

- At this time, no construction will be allowed to be conducted within the HPA excepting for construction of Road A, a major artery connecting all the DHHL parcels from Waiohuli I to the north and Kēōkea to the south, and berms related to the diversion ditch to the south of the HPA. Road A has been surveyed, is clear of sites, and will be monitored on a full-time basis by archaeologists during construction work. The diversion ditch corridor has also been specifically surveyed and is clear of any sites to be preserved. Also, if a visitor's center or another edifice is proposed for construction in the HPA by the Homesteader's association or another group, permission from DHHL and SHPD must be granted. During construction activity on the Waiohuli parcel, an interim buffer zone of the HPA or those areas accessible by machine will be demarcated by orange construction fencing. Once construction has been completed, a permanent buffer zone will be established around the HPA and may be demarcated by landscaping and/or boulders placed at various key places of the HPA boundary, where possible. This HPA is for the landowners of Waiohuli and under their jurisdiction; no large permanent buffer zones need to be placed around the entire 65-acre parcel. The parcel should be easily demarcated by the lack of structures and access points on the HPA landscape. No landscaping shall be allowed within the HPA site's themselves.

- On-ground confirmation of the HPA buffer zone will be duly recorded by the client's surveyors (DHHL) prior to any construction on the parcel. If the illustrations in this plan become outdated and subdivision plans are altered, new illustrations will be forwarded to the SHPD depicting preservation site locations in relation to the new subdivision zones. The c. 65-acre HPA will remain intact regardless of plan alterations through time.

- No heavy equipment or other construction-related machines or materials will be allowed to be moved or stored in the HPA preservation area unless approved by SHPD and subject to full-time archaeological monitoring. The preservation sites and buffer zones surrounding the site shall not be used as staging and/or storage areas.

- All trees and understory brush may be removed using hand-clearing techniques.

- All existing stones, whether stacked or not, will be left in place.

- Should storm, earthquake, or other natural or cultural damage occur to the HPA and its environs, and should this necessitate repairs to ensure the safety of descendants or educational groups wishing to visit these portions of the HPA, the Waiohuli Homesteaders Association will notify the SHPD of the situation and reach an agreement with the SHPD on how to proceed prior to implementing any alterations to the ground surface, site, or vegetation within the HPA.

- Modern debris generated by users of the sites or that have been blown into the sites may be removed by hand from within the preservation area whenever is deemed necessary by the descendants or by the Waiohuli Homesteaders Association.

- If the Waiohuli Homesteaders Association finds that any of the sites have been disturbed in any way, they will immediately notify the SHPD. Repairs or stabilization of the damages cannot proceed until directed to do so by the SHPD.

- Signs for several sites may be created for the DHHL. The signs will be recognizable as official County signs to the public. The following provides an <u>example</u> of one possible sign. The upper portion of the sign would include the following text:

Historic Site 1040
Kaimupe`elua Heiau
Waiohuli Ahupua`a, Kula Moku
This area is preserved as part of Hawaiian heritage.
Damage to this Historic Site is punishable under Chapter 6E-11
Hawai`i Revised Statutes.
Please help protect this important historic site.

- The lower portion of the site could be interpretive:

Archaeological research has shown that most people in the old Kula *Moku* lived in the uplands at this elevation. By the A.D. 1400–1600s, sweet potato and dryland *kalo* fields covered much of the landscape, with scattered house sites and ceremonial sites also present on the landscape. Medium-sized religious structures (175–675 m² in area) were present in this area and seem to have been used by different families in the *ahupua`a*. The names of some of these *heiau* were still recalled in the early 1900s.

This site is one of those medium-sized *heiau*. Archaeologists have mapped and dated the site. This site was possibly constructed and utilized from the A.D. 1400s. This *heiau* was probably used by families living at houses in the immediate vicinity.

- This Preservation Plan shall be made part of the binding lease agreement for the Waiohuli parcel.

- These provisions are made for on-going preservation of the HPA. This portion of the property will be preserved, with preservation provisions being binding on any successive owners and/or lessees of the parcels impacted by the HPA.

VERIFICATION

As is illustrated in Figure 5, buffer zones will be founded around the two aforementioned sites (50-50-10-3269, 50-50-10-3283) and the HPA (where practical). Orange construction fencing will be required around the two non-HPA sites on an interim basis should areas within or nearby the respective lots be developed and along the proposed Road A corridor flanks. The same is true for the diversion ditch and adjacent lots. For the two sites subject to interim and long-term preservation, verification that orange construction fencing has been set in place around the sites pursuant to this plan must be made to SHPD before construction begins on the subject lot or adjacent road (Road G, south run). Verification will take the form of both a telephone and written notification. Verification will be accomplished by SCS for the DHHL. Permanent buffer zones will remain around these sites regardless whether development occurs on the respective lots.

- Upon final subdivision approval, a list of all Tax Map Key (TMK) designations for all the affected lots will be submitted by DHHL to SHPD, the Waiohuli Homesteaders Association, and any other interested parties. The list will contain the awarded/unawarded TMK parcel number and the State Site number designation for the archaeological site being preserved. This Preservation Plan shall be updated with a map and pertinent details related to final subdivision approval.

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APPENDIX A: CONSULTATION

PBR
HAWAII

LAND PLANNING
LANDSCAPE ARCHITECTURE
ENVIRONMENTAL STUDIES

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MEETING MINUTES

MEETING DATE: Ocotber 13, 2004

PRESENT:
Charlie Maxwell/Waiohuli Cultural Consultant
Dana Naone Hall/ MLIBC
Melissa Kirkendall/SHPD
Perry Artates/Waiohuli Homesteaders Association
Mike Dega/SCS
Tom Schnell/PBR Hawaii

DISTRIBUTION:
Uncle Charlie Maxwell/ Waiohuli Cultural Consultant
Dana Naone Hall/MLIBC
Melissa Kirkendall/SHPD
Perry Artates/ Waiohuli Homesteaders Association
Mike Dega/SCS
Tom Schnell/PBR Hawaii
Bernard Kea/Community Planning
Larry Sumdia/DHHL

SUBJECT: WAIOHULI DATA RECOVERY MEETING

A meeting was held at the State Historic Preservation Division's Maui office on October 13, 2004. The purpose of the meeting was to discuss issues related to archaeological data recovery for archaeological sites located on DHHL's Waiohuli property identified primarily by TMK 2-2-2: parcel 14, but also on a small portion of TMK 2-2-2: parcel 55.

The following is a brief record of the meeting:

- There was general discussion that some lots will have archaeological sites, however, there may still be useable areas on some of these lots and DHHL will award useable lots with sites to beneficiaries who would agree to take care of the sites on their lots. PA stated that people in the Waiohuli Homestead have requested lots with sites. CM agreed that awarding lots with sites is acceptable.

- It was acknowledged that the previous archaeology report prepared by Kolb did not provide complete information on all sites and may contain errors. MK stated that a re-assessment of all sites is needed.

- Regarding data recovery sites, a map showing locations of eight sites considered for data recovery was spread on the table for discussion.

- DH stated that there should not be an automatic conclusion that data recovery sites can be destroyed.

- MD stated that the proposed roadways are being staked by a survey crew and the primary focus of the archaeological work at this time is to determine if the proposed alignment of the roads will impact any significant sites or features. Sites proposed for data recovery in proposed road alignments are sites 3221, 3223, 3218 and 3257. MD is concentrating on these sites and any data recovery should focus on these sites first.

- It was understood that based on the significance of any sites or features along proposed roadways, roadways may have to be realigned to avoid sites, however, changing the alignment may then impact other sites. This may not allow many options and the engineer needs to be aware of the impact on other sites of moving roads.

- DH stated that both temporary and permanent habitatation sites may be important

- Sites 3214 and 3209 are proposed for data recovery as they are in the proposed alignment for the road down from Kula Highway. The alignment most likely was chosen based on the slope and topography, so it may be difficult to realign. Site 3209 is a portion of an awai system. MK stated she would like to see the site saved if possible.

- DH thought the awai could be significant and that it should be avoided. She would like to know more about the site and what else is there. Also the terrace system related to the awai should be preserved.

- CM would like to meet again regarding the awai site after its significance has been assessed.

- MD reported that site 3257 is approximately six acres as outlined on the map. This site is proposed for data recovery, however individual features, if significant, may be preserved. The site is currently cleared and mapped, but needs to be tested.

- PA asked about what happened when digging for installation of utilities happens. I was agreed that monitoring should be provided in association installation of utilities.

- DH stated where roads cross over data recovery sites she would like to know which sites are most important. DH thought data recovery may have to be done to know what to preserve on a site. DH acknowledged that any construction project has constraints. She stated it is important to understand the relationship of features within a site. If a road bisects a site how is the integrity of the site impacted? In addition, it must be understood how the whole site operated to know the impact of bisecting the site or the impact of realigning the road to miss one feature, but possibly impacting another feature by the realignment. Once data recovery is done the significance of the site will have to be determined.

- MD stated that data recovery of the selected sites should be done by December.

- It was agreed to meet again as more information becomes available.

This is our understanding of the topics discussed and the conclusions reached. Please give PBR HAWAII written notification of any errors or omissions within seven calendar days. Otherwise, this report will be deemed an accurate record and directive.

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HRD05/1503B

June 23, 2005

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1001 Bishop Street
Honolulu, HI 96813

RE: Draft Environmental Assessment for the Proposed Waiohuli Homestead Community Project, Kula, Maui, Hawaii, TMK: 2-2-002:014 (portion) and 055 (portion).

Dear Lacey Kazama,

The Office of Hawaiian Affairs (OHA) is in receipt of your June 2, 2005 request for comment on the above listed proposed project, TMK: 2-2-002:014 (portion) and 055 (portion). OHA offers the following comments:

As was suggested in the Environmental Impact Statement, several efforts should be made to protect the archaeological resources in the area of proposed construction. An Archaeological Monitoring Plan, a Burial Treatment Plan and a Data Recovery effort should be completed prior to moving forward with the proposed project. OHA also recommends that all encountered human burials be preserved in-situ and that all ground altering activities be monitored by a professional archaeologist. It is also requested that the pre-contact historic properties, even after data recovery, not be destroyed unless absolutely necessary to accommodate housing for Native Hawaiians.

OHA also request that native flora be incorporated into the future landscaping plan. Four native plants in particular: ʻĀwikiwiki (*Canavalia pubescens*), Koʻoloaʻula (*Abutilon menziesii*), Iliana (*Bonamia menziesii*) and Maʻo Hau Hele (*Hibiscus brackenridgei*) are present on the project area. These should be replanted and cultivated where possible to promote a native ecosystem in the Kula region.

OHA further requests your assurances that if the project goes forward, should iwi or Native Hawaiian cultural or traditional deposits be found during ground disturbance, work will cease, and the appropriate agencies will be contacted pursuant to applicable law.

Thank you for the opportunity to comment. If you have further questions or concerns, please contact Jesse Yorck at (808) 594-0239 or jessey@oha.org.

'O wau iho nō,

Clyde W. Nāmu'o
Administrator

CC: Thelma Shimaoka
OHA Community Affairs Coordinator (Maui)
140 Hoohana St., Ste. 206
Kahului, HI 96732

Darrell Ing
Department of Hawaiian Homelands
P.O. Box 1879
Honolulu, HI 96805

Ms. Genevieve Salmonson, Director
Office of Environmental Quality Control
235 South Beretania Street, Suite 702
Honolulu, HI 96813

October 27, 2006

The Honorable Micah A. Kane
Chairman
Hawaiian Homes Commission
P.O. Box 1879
Honolulu, Hawaii 96805

Dear Chairman Kane:

Subject: Approval to remove and relocate human remains inadvertently discovered at Waiohuli, Maui [TMK:2-2-02: por. 056], pursuant to the requirements of the Native American Graves Protection and Repatriation Act and the Archeological Resources Protection Act

This letter represents a request on behalf of Scientific Consultant Services, Inc. (SCS) that the Department of Hawaiian Home Lands (DHHL) approve disinterment of an inadvertently discovered burial situated within TMK: 2-2-02: portion of 056, Kula Residential Lots, Waiohuli Subdivision, Waiohuli Ahupua`a, Makawao District, Maui Island, Hawai`i

On Tuesday, February 15, 2005 human remains were discovered on the above referenced parcel during Inventory Survey-level documentation of archaeological sites in Road F of the Undivided Interest development at Waiohuli, Maui. The remains were identified at State Site No. 50-50-10-3272 (Site 3272). All appropriate interim protective measures were immediately put in place, protocol was followed through contacting DHHL, State Historic Preservation Division (SHPD), and Dana Naone Hall, Vice-Chair of the Maui/Lana`i Islands Burial Council (MLIBC), and the site was secured from further disturbance. As the human remains were discovered on DHHL lands, compliance work with the Native American Graves Protection and Repatriation Act (NAGPRA) was initiated. The remains found at Site 3272 in Road F are treated as an inadvertent discovery because the remains were discovered during preparation for construction and not intentionally excavated for the purposes of study.

Accordingly, SCS completed the following activities as required under NAGPRA for proper disposition of the human remains found within the above referenced lot:

1. Consultation letters to the MLIBC, DHHL, and SHPD-Burial Sites Program notifying them of the inadvertent discovery and interim protective measures that were enacted to preserve the burial site.

2. Informational briefings of the discovery were made to the MLIBC on three occasions in 2005 (SHPD is currently reviewing the documents and will ascribe the correct dates of the meetings). Descendents and/or representatives thereof attended the council meetings with M. Dega, SCS on two occasions.

3. A written plan of action was drafted in August, 2005 and documents the planned treatment, care, and handling of the human remains through a Burial Treatment Plan. This plan was also present to the MLIBC on three occasions in 2005.

4. An Archaeological Monitoring Plan was prepared prior to any construction work on the Waiohuli and Keokea parcels that details field methods and protocol should significant historic prperties, inclusive of burials, be identified during infrastructure construction work. The plan was accepted by SHPD on May 31, 2006.

6. An Archaeological Preservation Plan was also prepared prior to any construction work on the Waiohuli and Keokea parcels that details the preservation of 49+ sites across the parcels. This plan was accepted by SHPD on June 22, 2005.

Since the human remains discovered in the proposed Road F corridor require relocation, we are requesting your permission and approval to remove and relocate the human remains pursuant to the requirements of the Archeological Resources Protection Act (ARPA). The final disposition of the remains shall be determined at a future date. Please note that a chain of custody letter would be written following disinterment of the remains.

Should you have any questions, please call me at 597-1182 or contact me by email (mike@scshawaii.com).

Best Regards,

Michael Dega, Ph.D.
Scientific Consultant Services, Inc.

CONCUR:

____
Micah A. Kane, Chairman
Hawaiian Homes Commission

DATE: ______________________________

PBR
HAWAII

LAND PLANNING
LANDSCAPE ARCHITECTURE
ENVIRONMENTAL STUDIES

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MEETING MINUTES

MEETING DATE: September 7, 2004

PRESENT:
Mike Dega/SCS
Bob Spear/SCS
Jenny/SCS
Bill/SCS
Melissa Kirkendall/SHPD
Larry Sumida/DHHL
Stewart Matsunaga/DHHL
Darrell Ing/DHHL
Bernard Kea/Community Planning
Tom Schnell/PBR Hawaii

DISTRIBUTION:
Mike Dega/SCS
Bob Spear/SCS
Larry Sumdia/DHHL
Tom Schnell/PBR Hawaii
Bernard Kea/Community Planning
Melissa Kirkendall /SHPD

SUBJECT: WAIOHULI FIELD MEETING SEPTEMBER 7, 2004

A meeting was held at DHHL's Waiohuli lands on Maui on September 7, 2004. The purpose of the meeting was for representatives of DHHL, project archeaologists, engineers, and planners to meet with Melissa Kirkendall of the State Historic Preservation and discuss concerns noted in Melissa's letter dated August 18, 2004.

The following is a brief record of the meeting:

- At SIHP # 3227 visual inspection of the site compared with Kolb's Inventory Survey diagram of the same site revealed that many features were not documented by Kolb. This led to the conclusion that many (or all) other sites surveyed by Kolb may not have been adequately documented.

- Question of Kolb's recommendation for 'No Further Work' for 12 sites. Based on current situation, Melissa would like to see the remaining 56 sites reviewed again. Mike has proposed data recovery for 8 sites, so the remaining 48 sites will have to be re-addressed.

- SCS/DHHL in agreement for re-evaluation and further explanation of the need for re-evaluating the sites including recommendations for each site: whether it is Data Recovery or 'No Further Work'... etc.

- Melissa suggested that the additional work would not involve formal inventory survey but more like an investigation/reconnaissance survey. Test at an inventory level in order to determine significance. The additional work could be documented as an addendum to Kolb's report.
- Larry stated that DHHL wants to do what is right.
- DHHL and PBR concerned about the schedule and change in scope for SCS.
- Bernard stated that the first priority is for the layout of the roads. If we need to move the roads we need to find out ASAP.
- Melissa stated that SHPD is very willing to work with DHHL/Community Planning and suggested that the additional work could be done in phases, with the sites in the potential road alignment surveyed first; an interim phase plan to focus on the roadways.
- It was suggested that SCS work with surveyors side by side. The surveyors could stakeout the centerline of the proposed roads at approximate 200 foot intervals and SCS crew will perform investigative swaths, along that centerline. The primary concern would be to locate and confirm burial sites in primary roadways.
- There was general consensus that the roads are a priority and the lots are secondary. If there are sites in lots, the lessee will be tasked with preservation or some lots may be reconfigured or omitted from the lease inventory. Preservation tasks will need to be defined and provisions will be written into leases.
- None of the lots have been selected or awarded. Beneficiaries will be told at lot selection what sites are on each lot and the associated restrictions. If there are too many sites on a particular lot, DHHL could decide not to award it.
- Melissa said that the current data recovery plan proposed by Mike could proceed while the additional work is being done.
- SCS could possibly bring on a second crew (4 people) to conduct survey and another crew to focus on the data recovery.
- Regarding Kolb's work Melissa said that ag features were ignored; habitation sites have high probability of human burials. Part of the reconnaissance survey will include testing.
- DHHL prefers not to disturb burials during construction of roadways.

- Melissa asked how flexible were the roadway alignments. The preference is to leave burials in place. Burial Council and Hawaiian homestead association/council will be involved if there are burials. The treatment of burials on Hawaiian Home Lands must comply with the Federal NAGPRA (American Graves Protection and Repatriation Act). Under NAGPRA the Island Burial Council, OHA, and community groups must be consulted but DHHL decides on the final disposition.

- DHHL and Community Planning thought that the Keokea and Waiohului communities could be consulted.

- It was agreed to do the work in the road corridors ASAP.

- The group walked to Ka Imu Pe`e Lua Heiau. SCS provided a map explanation and identified the location.

- Melissa stressed that there is a need to explore and re-explore current preservation plans and re-evaluate Kolb's recommendations.

- The group moved to an unidentified enclosure near roadway alignment A.

- Melissa acknowledged that a road may need to go through the area and near the site.

- Regarding the site, Melissa noted: the high walls, no entry, impressive construction, view plane and stated that this feature was possibly ceremonial.

- Discussion regarding that even if a specific site is outside of the road alignment there may be a need to establish buffer zones that may affect the alignment. Also a 2:1 slope is needed at the edge of a road. This may affect sites (or alter the alignment of the road) below the grade of the road.

- It was noted that there is no preservation plan for the area. Melissa noted that we need to come up with a creative way to deal with things and could create an interim preservation plan for any sites near the road. She also noted that rest of the preservation area would be a wonderful place for students to document (with permission to study/map/record).

- Mike would like the surveyors to survey and stake Road 'A' first. The archaeologists can then inventory and test and then produce a preservation plan.

- Regarding the preservation plan, DHHL asked to what extent the community needs to be involved.

- Melissa said that we need to get the community involved now. The community should be able to voice their concerns and opinions, but DHHL has the final say.

- It should be noted that the current community residents will probably not be occupants of the subdivision—the new occupants will be from other parts of Maui and some may be from off-island.

In conclusion, it was agreed:

- To get a survey crew to state out the roadway alignments ASAP.

- To do additional work to update Kolb's survey in the areas of the roadway alignments (interim plan).

- Proceed with the current date recovery plan of eight sites proposed by Mike.

- Lessees would be responsible for preservation of sites within their individual lots.**[DID MELISSA WANT ALL THOSE SITES TO BE RE-EVALUATED ANYWAYS OR JUST PRESERVE BY LOT OWNERS????]**

- To get community involved ASAP.

This is our understanding of the topics discussed and the conclusions reached. Please give PBR HAWAII written notification of any errors or omissions within seven calendar days. Otherwise, this report will be deemed an accurate record and directive.

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SCS Project 315-1

THE ARCHAEOLOGY OF UPLAND KĒŌKEA, AN ARCHAEOLOGICAL DATA RECOVERY REPORT FOR THE DEPARTMENT OF HAWAIIAN HOMELANDS (DHHL) KULA RESIDENTIAL LOTS, UNIT 1 OF THE KĒŌKEA SUBDIVISION, KĒŌKEA AHUPUA`A, MAKAWAO DISTRICT, MAUI ISLAND, HAWAI`I [TMK: 2-2-02:por. of 55]

Prepared By:
Michael F. Dega, Ph.D.,
Lauren Morawski, B.A.,
and
Chris Monahan, Ph.D.

With contributions by
Gail Murakami, B.A.,
Alan Ziegler, Ph.D.,
and
Guerin Tome, B.A.
July 2004

Prepared for:
Department of Hawaiian Home Lands
Keokea Homesteaders Association
1099 Alakea St., Suite 2000
Honolulu, HI 96813

ABSTRACT

Data Recovery-level archaeological investigations were conducted at 21 habitation and agricultural sites on a 351-acre Department of Hawaiian Homelands (DHHL) parcel in Kēōkea Ahupua`a, Makawao District, Maui Island, Hawai`i [TMK: 2-2-02:55]. The aim of the project was to address questions concerning chronology, settlement patterns, and social stratification in this upland locale. The investigations led to several conclusions, or more conservatively, working hypotheses.

Only a sparse population exploited the Kēōkea landscape prior to the A.D. 1400s (with one outstanding exception). A population surplus drew more people to Kēōkea during the A.D. 1400 to 1600 range. Then, the population of Kēōkea appears to have stabilized through the late 1700s. The early portion of the 19th century apparently saw a decline in population, as archaeological evidence for continued permanent occupation of Kēōkea is virtually non-existent. There appears to be gradual and continuous settlement for the area from the A.D. 1400s followed some 400 years later by a fairly abrupt decrease in population.

Who lived in the Kēōkea is even harder to determine than how many lived there. Only scant evidence was available to suggest the differences between households of chiefs and those of commoners. The chiefs, if any occupied the area, were certainly lesser chiefs, with a majority of the population being *maka`ainana* living in two to three structure clusters. Several sites contained up to five and six structures, implying some form of social differentiation. Site architecture itself was fairly homogeneous throughout the project area, with no one form dominating another. Agricultural pursuits appear to have flourished in association with habitation. Prior to the A.D. 1400s, only small terraces were identified in terms of formalized architectural structures. The terraces grew and expanded with the initial surge in population in the A.D. 1400s to 1600s and rapidly expanded in size and number from the A.D. 1600s. Agricultural site construction decreased concomitant with population decline in the late 1700s to early 1800s.

Marine species are present in site midden as food resources and as artifacts, although in small quanitity. The small amount of marine food remains suggests a heavy reliance on terrestrial species and crops and very low dependence on coastal resources. The percentage of dog and pig remains was low, almost too low to make assessments of social stratification. Rat remains dominated assemblages, a trait common to more sedentary populations.

Twelve known or possible burials were identified on the Kēōkea landscape. Based on stratigraphic positioning with dated layers, the burials were interred during pre-Contact and protohistoric times. The burials were identified within structures and were all re-buried on site. All the burial sites are being preserved in perpetuity.

An impoverished total of 197 traditional-period artifacts and two modern artifacts (two sherds) were recovered during limited testing. The traditional artifacts were derived from basalt, volcanic glass, coral, marine shell, and ocre. The assemblage was dominated by basalt debitage, which indicates tool manufacturing or re-working activities. The dataset exhibited an overwhelming dependence on this terrestrial tool.

Macrobotanical analysis revealed that the lack of historic introductions in the samples suggests that a majority of the charcoal dates came from a time when native species were prevalent and historic introductions were rare. Based on the presence of several species (*i.e., `akoko, `ilima, aheahea*), the Kēōkea landscape was one of a lowland dry shrub community during traditional occupation. Agriculture flourished in the area, however, and primarily capitalized on the major concentrations of fog drip prevalent in the area.

These pithy statements neatly summarize a complex social landscape that has evolved for more than 700 years. The possibility for additional research is possible because the Kēōkea community association has set aside a Historic Preserve Area of approximately 46 acres for preservation and possible future reseach. The association has shown a tremendous commitment to the history of their land and the land of their ancestors.

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INTRODUCTION

Scientific Consultant Services (SCS), Inc. conducted Archaeological Data Recovery at 21 historical sites on a 351-acre parcel known as TMK:2-2-02:56 within K□∩kea Ahupua`a, Kula District, Maui Island, Hawai`i (Figures 1 and 2). Archaeological work was conducted in advance of a proposed agricultural lot subdivision being developed in Kēōkea by the Department of Hawaiian Homelands (DHHL). Data Recovery operations were conducted in accordance with HAR 13-13-278 governing Data Recovery standards (DLNR/SHPD 2001).

Data Recovery, primarily an excavation-based form of mitigation, followed a Scope of Work (SOW) prepared by Dr. Ross Cordy (then Branch Chief of Archaeology at the State Historic Preservation Division [SHPD]) in January 2002. The work plan focused on testing a sample of habitation and agricultural loci in the Kēōkea project area that was previously identified during Inventory Survey (Brown *et al*. 1989). The research design had three main objectives (Cordy 2002): 1) to clarify the nature and the age of agricultural sites in upland Kēōkea; 2) to evaluate population growth patterns in Kēōkea; and 3) to evaluate pig and dog consumption patterns in permanent house sites in Kēōkea. Multiple datasets were required to address these and other questions.

Overall, twenty permanent habitation sites and one agricultural site were selected for Data Recovery from a total of thirty-nine habitation sites and two agricultural sites (Figure 3). These sites were primarily selected for three reasons: their high structural integrity, their represention of permanent habitation loci in various geographical and topographical locales across the greater Kēōkea area, and finally, their ability to be relocated.

DATA RECOVERY RESEARCH QUESTIONS AND SCOPE OF WORK DIRECTIVES

This document provides both descriptive and analytic information of Kēōkea upland settlement patterns. Couched in terms of the three work plan questions related to chronology and the nature of upland settlement patterns are additional questions related to prehistoric social hierarchy, household cluster variability (in terms of architecture, site location, site components), and demography. As should be noted early in this analysis, questions related to intra-site (and intra-feature) variability cannot be sufficiently addressed through the methodology followed for this project. Another caveat is that while the questions were primarily based on analyzing more widespread phenomena such as population growth and consumption patterns (see Cordy 2002), the methodology and time required to assess such queries were not compatible with the research

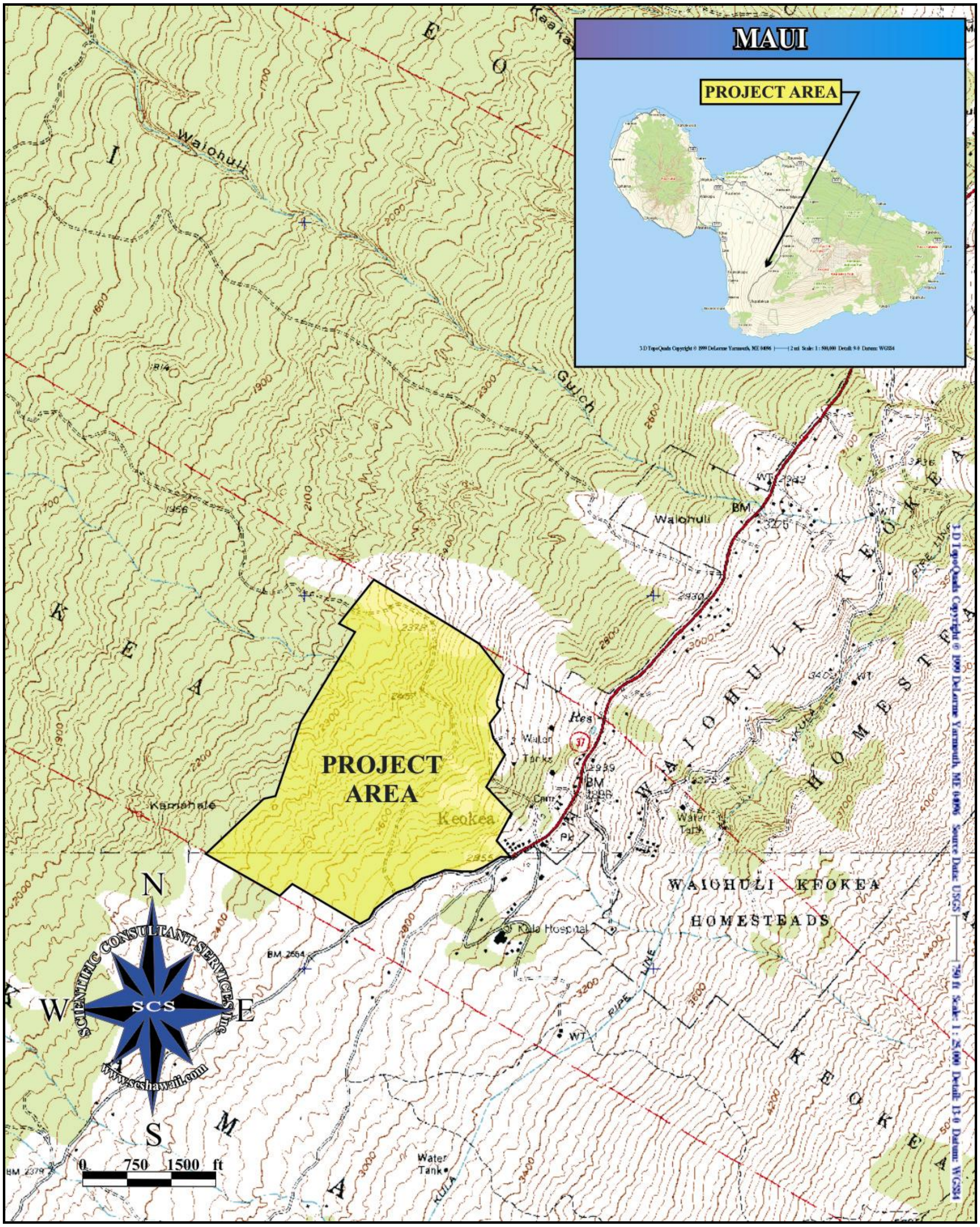


Figure 1: USGS Quadrangle Map Showing Project Area Location.

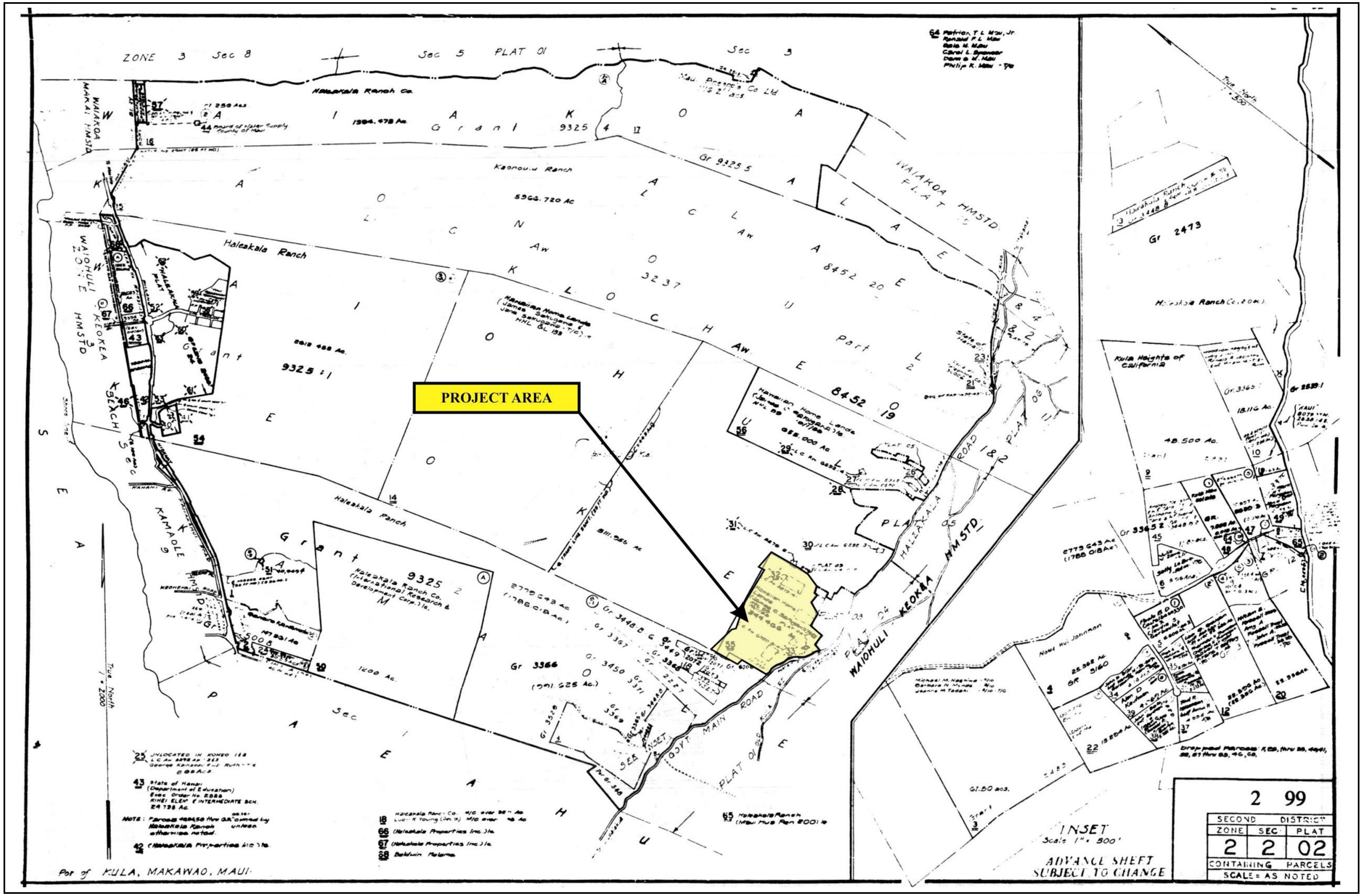


Figure 2: Tax Map Key [TMK: 2-2-02:55] Showing Project Area Location.

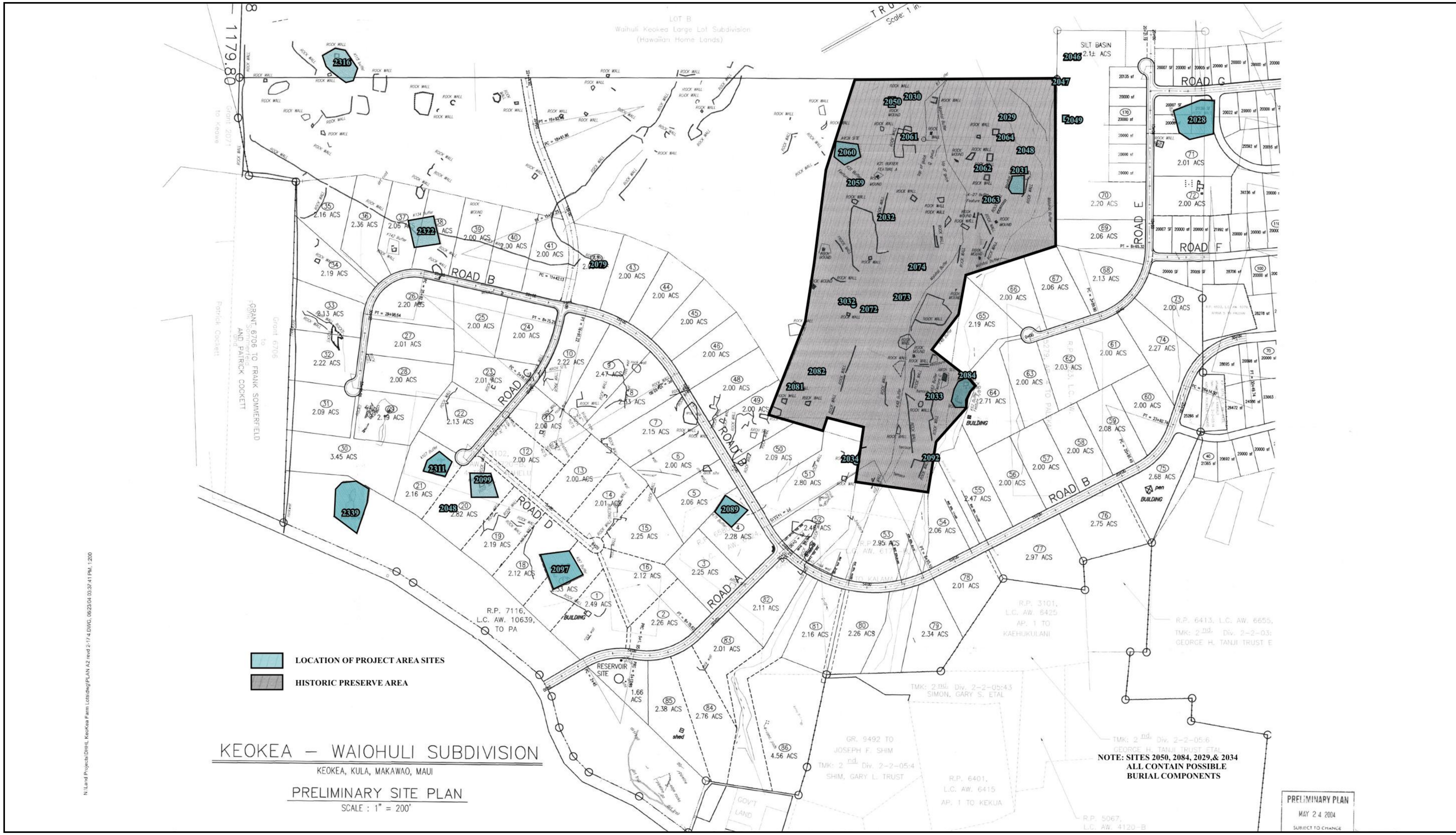


Figure 3: Map of Project Area Showing Site Locations.

goals. As is shown below, the datasets to address these questions, particularly related to pig and dog consumption patterns, suffer from sample-size inadequacies. Additional testing at select sites could, perhaps, rectify this problem.

WORK PLAN QUESTIONS

The three questions driving this Data Recovery investigation were formed by Cordy (2002). The questions appear to be an extension of research goals initially posed in the work of Kolb *et al*. (1997) and in Dunn *et al*. (1999). As SHPD recommended that the SOW be followed directly, the following research questions, background, and required datasets are entirely derived from the SOW. Further background information pertaining to the physical setting of the project area, the historical framework of Kēōkea, and previous archaeological research conducted within and near the K□∩kea project area may also be found within Cordy's (2002) SOW, the Kēōkea Inventory Survey report produced by Brown *et al*. (1989), and the earlier influential study of Kolb *et al*. (1997).

(1) Clarify the Nature and Chronology of Agricultural Sites in the Project Area.

This research directive addresses the function and age of agricultural sites in terms of the overall settlement pattern of the upland K□∩kea and Waiohuli area. Previous work in the area found that the uplands began to be utilized for agriculture from the *c*. A.D. 1200s, with some possibility of earlier farming. The Kolb *et al*. (1997) model further proposes that as the population expanded in the uplands from the *c*. A.D. 1400s through historic times, the size and number of agricultural field areas also increased. The construction of large garden enclosures is argued to show late prehistoric (*c*. A.D. 1600s) agricultural intensification. The present research was thus geared toward obtaining samples for radiocarbon dating that could document use of the agricultural sites through time. The association between agricultural sites and certain topographical reaches was also to be assessed.

(2) Evaluate Population Growth Patterns in the Project Area.

Recent archaeological work in the Waiohuli and K□∩kea uplands led to the interpretation that few house sites were occupied in the area during the A.D. 1200s to 1300s. Instead, there was a marked increase in the number of occupied house sites from the A.D. 1400s through early historic times. Kolb *et al*. (1997) postulated that this pattern is reflective of population growth in the uplands. This second research directive was primarily geared toward obtaining datable samples from habitation sites in order to contribute to the list of previously dated sites in upland K□∩kea and Waiohuli. Patterns reflecting the history of population growth in this general area would be better established through the analysis of modal date ranges. The most desirable samples were taken from proveniences directly associated with feature architecture in order to date both the initial construction of a site and abandonment of the site. The dates would bracket site occupation and be utilized in larger-scale chronological comparisons.

(3) Evaluate Pig and Dog Consumption Patterns in Permanent House Sites Within the Project Area.

This question addresses social ranking per individual households or household clusters. Kolb *et al*. (1997) explored the pattern that higher ranked individuals consumed more pigs and dogs than commoners. While acknowledging sample size and provenience issues (one problem of addressing this question in the present study), the prior work found that a majority of the habitation sites had no dog or pig remains, while some house sites yielded small amounts of dog remains and several sites also contained only small amounts of pig remains. In other terms, few salient patterns along this line of inquiry were established. The data was interpreted by Kolb *et al*. (1997) to mean that most of the house sites belonged to commoners' lesser chiefs. However, they found no difference in household consumptive practices versus social ranking. There is also the question as to whether the presence of pig/dog remains at a site may reflect social variant use of a site between the sexes.

Sample excavations of permanent house sites in upland K□∩kea were excavated with the hope of recovering sufficient pig and dog remains to evaluate consumption patterns across space and time. As was the case with the studies by Kolb *et al*. (1997) and Dunn *et al*. (1999), the present study details serious problems with sample sizes and provenience that rendered the data nearly irrelevant. As will be discussed more below, the preferred method of assessing this question would be to excavate more extensively at habitation sites in lieu of less concentrated testing over a larger area of many sites. While the amount of places to excavate would decrease, clearer intra-site patterns would be more readily discernable.

UPLAND KULA ARCHAEOLOGICAL REVIEW

Recent archaeological investigations in the vicinity of the Kēōkea project area have addressed similar research concerns as those outlined above. The main comparative studies are the Waiohuli study by Dunn *et al*. (1999) and the SHPD-DHHL research conducted by Kolb *et al*. (1997). These two studies are supplemented by the mostly descriptive Inventory Survey research by Brown *et al*. (1989).

When comparing the results of the two former projects, there are both similarities and discrepancies (which often occurs in archaeology). First, Kolb *et al*. (1997) proposed that upland agriculture primarily commenced from the A.D. 1200s, with agricultural plots increasing in quantity from the A.D. 1400s. The A.D. 1600s marked a time of intensification, as seen through the construction of large garden enclosures. Conversely, the data derived from the Dunn *et al*. (1999:100) study show a slightly different picture: two, not three phases of agricultural use were dated. The first phase involved small-scale agricultural practices from the *c*. 1200s to 1400s. The second phase by-passed an intermediate phase and instead went directly into intensified agricultural practices in the form of garden enclosure construction dating from the 1600s to the 1700s.

Secondly, there is a discrepancy in the modal chronology for upland permanent habitation sites. Whereas Kolb *et al*. (1997) indicate that permanent habitation occurred in Waiohuli and K□∩kea from A.D. 1200 through the A.D.1400s to 1600s and beyond, Dunn *et al*. (1999) demonstrate that permanent habitation in Waiohuli occurred primarily from the A.D. 1600s, with only a small sample of sites inferred to have been constructed and occupied as early as the 1400s. The Dunn *et al*. (1999) chronology of habitation sites reveals that none were constructed or occupied prior to the 1400s. As is shown below, the present dataset of radiocarbon dates from K□∩kea should sway this argument.

Finally, when comparing pig/dog consumption pattern analyses, Kolb *et al*. (1997) and Dunn *et al*. (1999) both concur, based on their samples, that only limited quantities of pig and dog were consumed at permanent habitation sites in these upland areas. As such, any patterns in determining social ranking were weak. For instance, Dunn *et al*. (1999:100) note that their sample only consisted of 0.7 g of dog remains and 4.4 g of pig bone. This is the same pattern discussed by Kolb *et al*. (1997): pig and dog remains were indeed recovered from habitation structures but very infrequently and in no great quantities. Perhaps the only real pattern of interest along this line of inquiry was proposed the Waiohuli report (Dunn *et al*. 1999:100): all pig and dog remains, except 1.8 g, were associated with stratigraphic layers dating to the 1600s and later. This pattern will be further explored in the present study.

KĒŌKEA DATA RECOVERY METHODOLOGY

Kēōkea Data Recovery field investigations were conducted from early May 2002 through early August 2002. The field crew consisted of Amy Buffum, Adam Johnson, Kirk Johnson, Guerin Tome, and Jenny Pickett. John Zachman directed the field crew and Michael Dega, Ph.D. supervised the project. Twenty-one archaeological sites were subject to various degrees of archaeological testing. Additional site mapping and recordation occurred only at sites requiring refined site plan view maps or at those that were not mapped during the Inventory Survey phase of research.

FIELD METHODOLOGY: OVERVIEW

As part of this study, fieldwork tasks included the re-identification of sites and component features (a harrowing endeavor due to massive vegetation encompassing the parcel and burying the sites under foliage, among other factors), extensive hand-clearing of the sites, site mapping and recording, and test excavations. Sites selected for Data Recovery were first re-located, then hand cleared.

Mapping and Recording

Selected sites and their component features previously mapped during Inventory Survey by Brown *et al*. (1989) were evaluated for the completeness of previous mapping. In some instances, additional wall alignments or site features not identified during Inventory Survey were plotted on an overall site plan view map. Nuances in architectural characteristics not previously recorded were also documented during this phase of work. The ground surface of each site and associated features were also systematically surveyed to assess the presence/absence of surface artifacts or midden scatters. Selected sites not mapped during Inventory Survey were subsequently mapped and recorded by SCS crewmembers. Photographs of each investigated site and any component features were taken by SCS during fieldwork. In most instances, Inventory Survey plan view maps of the sites (when available) were fairly accurate and only photography and excavation were required at those sites.

Excavation

Test units (TUs) were manually excavated at all habitation sites. Mechanically excavated stratigraphic trenches (STs) were excavated at one agricultural site, primarily to obtain charcoal samples and date construction and use of the component features. Test units and stratigraphic trenches differ. Test units are highly controlled units utilized to obtain a maximum amount of information from both *in situ* and screened sample proveniences. All sediment from the test units is sifted through 1/4-inch and 1/8-inch wire screen to obtain finer fractions. Stratigraphic trenches are also excavated in a controlled manner but are not subject to screening. When applicable, additional features were mapped and succinctly recorded on field forms. Photographs were taken of each test unit and focused on recording unit profiles. Excavations were recorded on descriptive field forms. All recovered materials were sorted, bagged, labeled by provenience, and recorded on standard field forms.

Reporting

The reporting of the Data Recovery sites follows a specific structure. It begins with a summary of the site, which includes a short description of its features and excavations. The Feature Description section only reports on the features from a site that were subject to Data Recovery. Finally, the Excavation section details the excavation of each test unit or stratigraphic trench in sequential order of test unit, not feature. Each excavation description provides a description of the stratigraphy and cultural material found in each unit. Details about cultural materials are found in tabular form in the appendices. Appendix A is traditional artifacts, Appendix B is vertebrate remains, Appendix C is invertebrate remains, and Appendix D is the radiocarbon table.

LABORATORY METHODS: OVERVIEW

All collected cultural remains were directed to Bertell Davis, Ph.D. of the SCS laboratory in Honolulu for processing and curation. Ecofactual and artifactual remains were sorted, analyzed, and catalogued. Forty-four samples were submitted to Beta Analytic Laboratories for radiocarbon dating analysis. Soil hue notation was identified with Munsell color charts (2000). All cultural materials recovered during Data Recovery are currently being curated at SCS' temperature controlled facility on O`ahu until a more suitable location for permanent curation has been determined. All field notes, illustrations, and photographs have been catalogued at the SCS laboratory in Honolulu. All lithic materials were analyzed by Robert L. Spear, Ph.D., a lithic specialist. Faunal remains were identified, analyzed, and classified by Alan Zeigler, Ph.D.

Concentration indices (CI) were calculated for all test excavation units. CI values are standard comparative measures expressed as the density of cultural material—*i.e*., subsistence remains—per cubic meter of cultural matrix. These values are derived by dividing the weight of each category of cultural material recovered from a given excavation unit by the volume of cultural matrix within that unit. The formula reads:

$$\text{Weight of Cultural Material} \div \text{Volume of Cultural Matrix} = \text{CI}$$

For example, the CI value of an excavation unit measuring 1.0 m by 1.0 m and 0.1 m thick, and yielding 500.0 g of faunal remains, would be equal to 500/0.1, or 5,000. This is normally written in numerical form only, since *per cubic meter* is understood as given. It should be noted, in the case of this example, that the unit volume cannot exceed 0.1 m^3; however, the presence of non-cultural matrix or other debris—bedrock, boulder concentrations, etc.—can reduce the volume of actual cultural material in the sample matrix.

For the purposes of this project, the volume of screened cultural matrix was calculated in the field in order to determine the concentration of pig/dog remains per site. This was accomplished by calculating the number of 10-liter buckets needed to remove the matrix. Using buckets to measure volume helped to account for the ubiquity of basalt cobbles and undulating bedrock substratum. Liters were then converted to cubic meters by multiplying the obtained volume (in liters) by .001, as 1 liter is equal to 1,000 cubic centimeters (cc^s).

TESTING OVERVIEW

A total of thirty-six 1.0 m by 1.0 m test units, two 1.0 m by 2.0 m test units, and three stratigraphic trenches of varying size were excavated at twenty-one sites in order to address the aforementioned research questions. A total of forty-one excavation units were excavated during this Data Recovery program. Please note that in the Results section of this report, typically only the features that were tested are architecturally described. Other feature descriptions may be viewed in Brown *et al*. (1989).

Testing was implemented to obtain the most data available related to feature construction methods, feature chronology (specifically when it was constructed, occupied, and abandoned) and feature activities, as seen through associated material culture. All excavated test units were placed directly adjacent to or through feature walls in order to address these queries.

DATA RECOVERY RESULTS

Twenty-one archaeological sites were subject to Data Recovery. Twenty of the sites were assessed as permanent habitation loci and one (Site -2098) was assessed as agricultural. No sites previously designated as temporary habitation loci were re-mapped or tested. Emphasis in the research design was placed on inter-site temporal patterning and the relationship between certain faunal remains and socioeconomic status. The following text provides basic summary information about the sites and their associated testing. Following the summary are more in-depth site descriptions and testing results. Subsequent to these summaries, questions driving this investigation are addressed.

STATE SITE 50-50-10-2030

SITE -2030 SUMMARY

Site -2030 (PHRI Site No. K-7) was initially recorded as a complex consisting of two features (Figure 4), a rectangular enclosure (Feature A) and a circular enclosure (Feature B [Brown *et al*. 1989:E-3 to E-5]). Additionally, it was noted that there were various agricultural features directly adjacent to and scattered in the nearby vicinity of the main structures. (These agricultural features remain unrecorded.) The site was recorded as measuring 60.0 m (northwest-southeast) by 30.0 m (1,800.0 m²). The site complex is located at 692.0 m amsl and occurs approximately 80.0 m east of the western project boundary, 40.0 m northeast of Site -2050, and approximately 480.0 m south of the northern project boundary. The site lies on a local landscape characterized as dissected alluvial slope. Present vegetation within and near the site includes various grasses, *lantana*, *ilima*, and wattle trees.

Both Feature A and Feature B were interpreted as permanent habitation features based on construction typology and the large amount of occupied space. In terms of architectural characteristics, the site complex was previously interpreted as a pre-Contact habitation and agricultural site. The rectangular enclosure, designated Feature A, measures 13.0 m by 10.0 m (130.0 m²) and is located approximately 9.3 m southeast of the circular enclosure, designated as Feature B. During the present project, two test units, TU-1 and TU-2, were excavated within Feature A and one test unit, TU-3, was excavated within Feature B.

TU-1 yielded 18 traditional artifacts, including a *Cellana sanwichensis* scraper and a possible stone mirror. A variety of marine shell and sparse amounts of faunal material were recovered from TU-1. Two charcoal samples from TU-1 were submitted for radiocarbon dating. Both samples yielded dates that fell in the A.D. 1470 to 1660 range, a time period firmly associated with pre-Contact times. Construction of the feature appears to be contemporaneous with occupation as the charcoal dated from the lower stratigraphic level is directly associated with a basal architectural provenience. Additionally, wood samples submitted for taxonomic identification yielded a variety of native trees, shrubs, and one species of fern. These plants have common traditional uses (firewood, etc.). The different species at different stratigraphic levels may indicate minor to moderate landscape change through time. TU-2 yielded three traditional artifacts, a volcanic glass flake and two basalt flakes. A sparse amount of faunal material, marine shell, charcoal, and *kukui* nut were also recovered. TU-3 was the only unit excavated within Feature B and yielded one fragment *of Canis familiaris* (dog) and charcoal. One radiocarbon sample was submitted from TU-3. The sample yielded a conventional date of

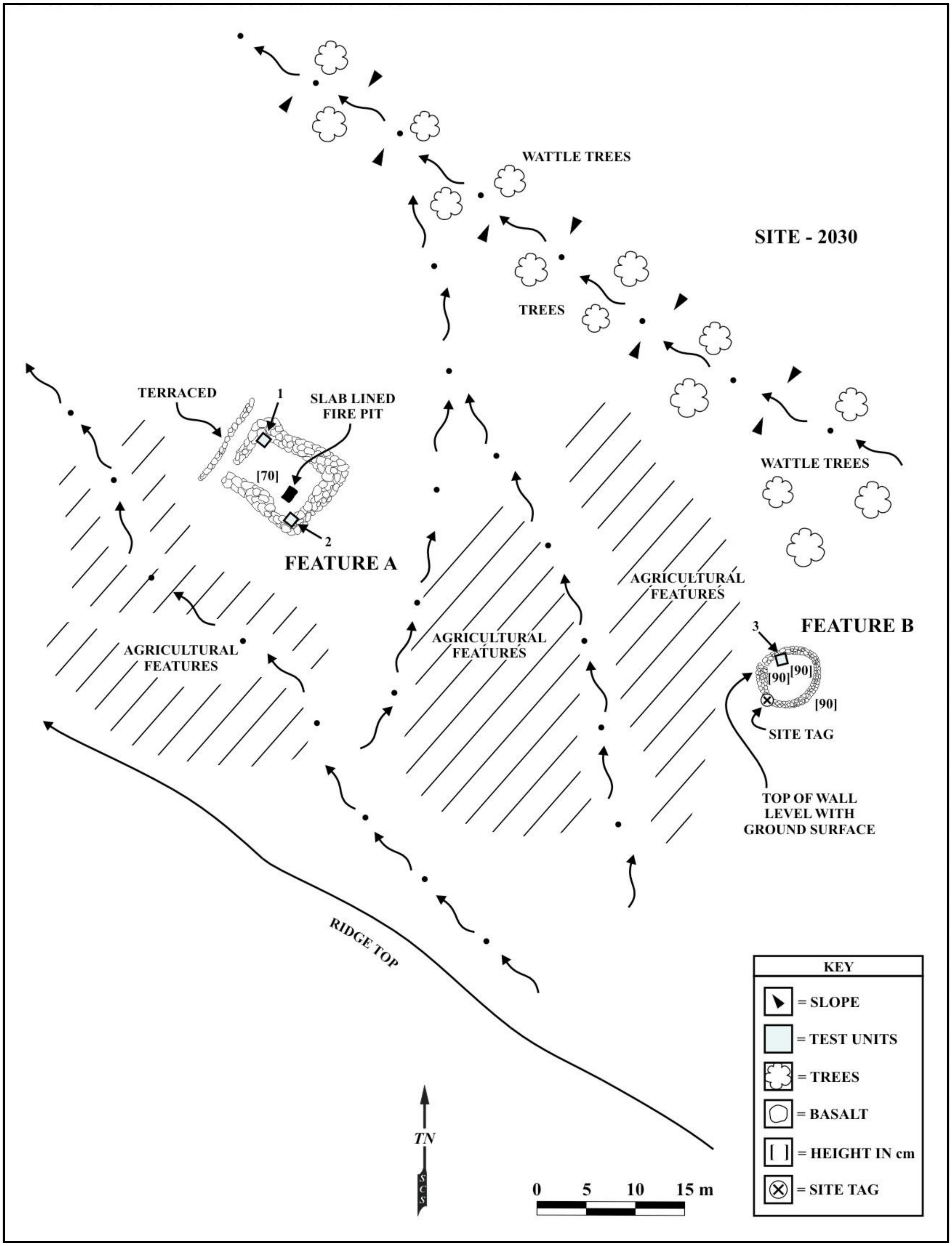


Figure 4: Site -2030 Plan View Map.

103.09±0.81 pMC, which means that the dated material was likely living within the last 50 years. This particular charcoal sample from TU-3 may have been the result of bioturbation.

SITE -2030 FEATURE DESCRIPTION

Feature A

Feature A is a rectangular enclosure measuring 13.0 m in length (northwest-southeast) by 10.0 m in width (130.0 m^2). The feature is constructed of stacked basalt on an exposed natural outcrop (Figure 5). A rock-lined hearth is located in the southeast corner of the structure. TU-1 and TU-2 were excavated in Feature A.

Feature B

Feature B is a circular enclosure constructed of stacked rock on a natural outcrop, overlooking a drainage ditch to the north. The feature has an additional paved, level area attached to its southwest flank. The walls of feature B are substantially higher than other features in the area, measuring approximately 1.0 m in height. TU-3 was excavated within Feature B.

Figure 5: Site -2030, Feature A. View to East.

SITE -2030 EXCAVATION

Test Unit 1 (TU-1)

TU-1 measured 1.0 m by 1.0 m and was placed in the north corner of Feature A to abut the northwest and northeast walls of the enclosure. The north and east sides of the unit form part of the architecture of the feature, with wall facing stones occurring north-south 20 cm to 30 cm from the east wall and east-west 5 cm from the north wall. The stones in the unit measure a maximum of 54 cm above ground surface on the interior of the enclosure. The architectural layer was excavated through the ground surface into the substrate. No cultural material was observed within the architectural layer.

TU-1 contained three stratigraphic layers (Figure 6). Layer I extended from the ground surface to a maximum 34 cmbs and consisted of very dark brown (10YR 2/2) silt. The matrix contained 50 to 60 percent rock, ranging in size from pebbles to boulders, and a fair amount of medium to large roots. Cultural materials were randomly distributed throughout the layer, with no discernable concentrations evident. Cultural materials recovered from this provenience included charcoal, marine shell, faunal remains (fish), *kukui* nut, volcanic glass, basalt flakes/debitage, and a ground stone fragment. Layer II (a variable 8–36 cmbs) was composed of black (10YR 2/1) silt that was singularly confined to the southern corner of unit. Cultural materials recovered from Layer II were almost identical to those in Layer I and included charcoal, marine shell, faunal remains (bird), *kukui* nut, volcanic glass, and basalt flakes/debitage. Layer III (30–64 cmbs) consisted of dark, yellowish-brown (10YR 3/4) silt with a smaller percentage of rock (15–20% pebbles and cobbles). There were a moderate amount of roots extant at this level. The level was culturally sterile, with the exception of a few charcoal flakes that percolated through the soil. The unit terminated on bedrock.

<u>Midden</u>

Sparse counts of faunal remains were found in TU-1. Fish and small to medium mammal were identified in upper strata. Sparse amounts of chicken, medium bird, rat, pig, and small to medium mammal were identified in the lower cultural strata. Marine shell was more abundant in the unit's primary cultural deposit (Layer I and Layer II) and identified species included Opihi, *Cellana sanwichensis, Cypraea, Drupa, and Tellina palatam*. Additionally, small amounts of crustacean and echinoidea were identified throughout the primary cultural deposit.

<u>Artifacts</u>

A total of 18 artifacts were recovered from TU-1, Layers I and II. These include a marine shell (*Cellana sanwichensis*) scraper that was utilized around a quarter of its edge, a

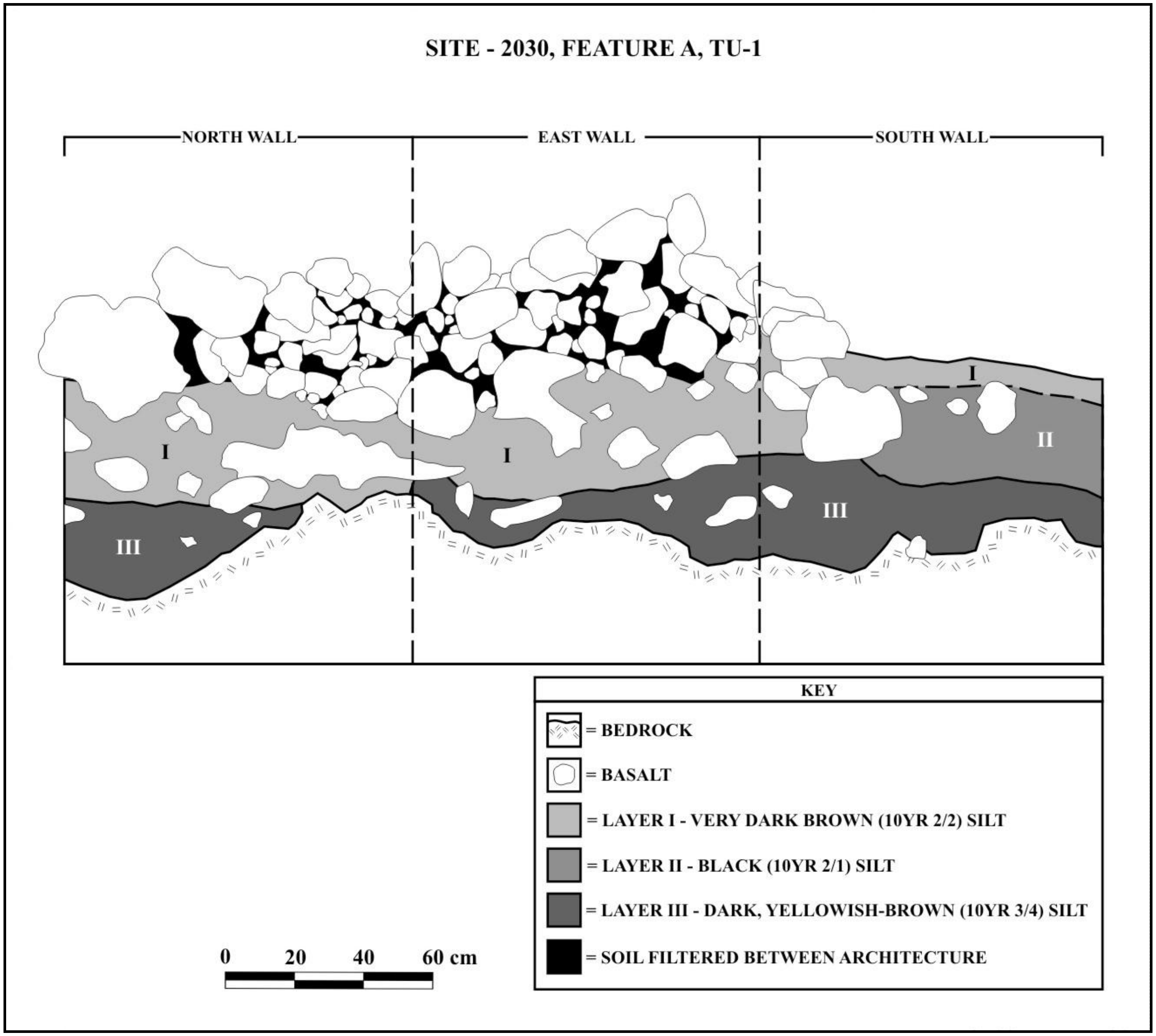


Figure 6: Site -2030, Feature A, TU-1 Profile.

possible stone mirror, 2 primary flakes, 5 intermediate flakes, and 12 non-diagnostic basalt flakes.

Charcoal

A total of 89.4 g of charcoal was acquired from TU-1. The randomly distributed charcoal was collected from Layers I and II.

Dating

Two charcoal samples were submitted from TU-1. One sample was submitted from the upper statigraphic level at 0 to 10 cmbs and dates the base of the architecture, and the other was from the lower stratigraphic level at 30 cm to 40 cm. Both samples yielded dates that are contemporaneous and both date initial site construction. The upper sample 0 to 10 cmbs yielded an age range of 300±40B.P. or within the two Sigma date range of A.D. 1480 to 1660 and within the one Sigma range at A.D. 1510 to 1600. The lower sample, acquired from 30 to 40 cmbs, yielded an age range of 320±40 BP, or, within the two Sigma date range of A.D. 1470 to 1650 and A.D. 1510 to 1640 in the one Sigma range. The dates intimate construction and use of the feature commencing at or around the late 1400s and terminating in the early 1600s. The feature appeared to have been used for domestic activities through the early 1600s, when it was abandoned.

Taxanomic Identification of Botanical Remains

Samples from TU-1 submitted for identification yielded a variety of native shrubs, trees, and one species of fern. No historically introduced plants were identified within the sample. The upper stratigraphic levels yielded *`aheahea, naio, olopua, kulu`i, olomea,* and *`ilima*. Lower stratigraphic levels yielded *`aheahea*, as in Layer I, and *lama, `aiea, `ulei, hao*, and *hapu`u*, the one fern species identified in the sample. All of these plants have a variety of domestic uses and some species; such as *olomea, `aiea*, and *olopua*, were commonly used as kindling and firewood.

Test Unit 2 (TU-2)

TU-2 measured 1.0 by 1.0 m and was placed in the south corner of the Feature A enclosure, the unit abutting the southwest wall of the feature and extending into the southeast wall. The surface of the unit was comprised of feature tumble and *in situ* architectural elements. The architectural elements measure a maximum 69 cm above the ground surface on the interior of the feature. The base of the architectural layer continued into contexts. No cultural material was observed within the architectural layer. Two stratigraphic layers were encountered in this unit (Figure 7). Layer I (0–44 cmbs) consisted of very dark brown (10YR 2.5/2) silt. The matrix

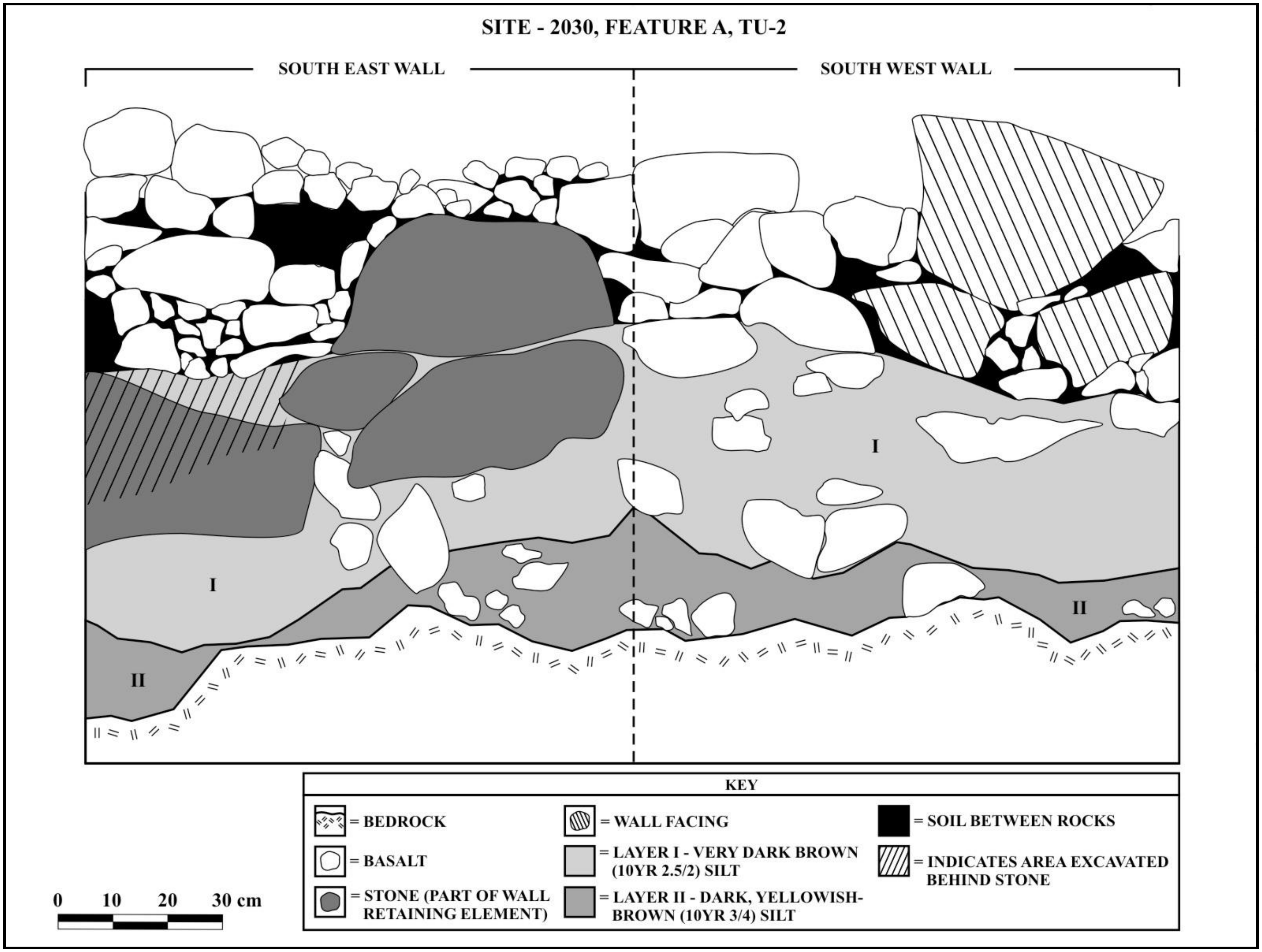


Figure 7: Site -2030, Feature A, TU-2 Profile.

contained a large proportion of rocks of varying sizes; roots were common throughout the layer. Cultural materials recovered from Layer I included charcoal, *kukui* nut, faunal remains (pig and rat), marine shell, volcanic glass, and basalt debitage. The cultural material was fairly well dispersed throughout the layer. However, a noticeable aggregation of cultural materials occurred from approximately 20 to 30 cmbs. Layer II (44–56 cmbs) consisted of dark, yellowish-brown (10YR 3/4) silt. The matrix contained a large proportion of rock, decomposing saprolite, and a few small roots. The matrix was culturally sterile and the unit was terminated at 56 cmbs.

<u>Midden</u>

A sparse amount of bone was found in Layer I. Rat and pig were identified in the lower portion of the cultural strata. Marine shell was identified in the lower portion of the cultural strata, with the greatest concentration and species diversity occurring from 20 to 30 cmbs. Species identified include *Turbo sanwichensis* and *Cypraea* sp. Land snail was identified within the lower portion of the deposit as well.

<u>Artifacts</u>

A total of three artifacts were identified in TU-2. They were recovered from Layer I, the cultural strata, and include 1 volcanic glass intermediate flake, 1 basalt intermediate flake, and 1 basalt non-diagnostic flake.

<u>Charcoal</u>

A total of 99.6 g of charcoal and 2.7 g of *kukui* nut were recovered from TU-2. The charcoal was evenly distributed through all levels within Layer I.

<u>Dating</u>

No radiocarbon samples were submitted for dating the TU-2 cultural layer.

Test Unit 3 (TU-3)

TU-3 measured 1.0 by 1.0 m and was placed in the northern portion of the Feature B enclosure near its northwestern corner. The unit was placed here to excavate a cross section of architecture in order to determine feature construction and to determine on what type of surface the feature was constructed. Through excavation it was determined that the feature was constructed on Layer II, saprolite, and was constructed of large cobbles and a few small boulders, with smaller cobbles used as fill. Construction materials extended 10 cm to 20 cm into Layer I soil. The surface of the unit was comprised of *in situ* wall architecture and wall tumble. The architectural elements in the unit measured a maximum 75 cm above the ground surface on the interior of enclosure. No cultural materials were observed within the architectural layer as it met the ground surface.

TU-3 contained two stratigraphic layers (Figure 8). Layer I (0–44 cmbs) was composed of dark grayish-brown (10YR 3/2) silt. Rock content was high as architectural elements of the feature extended 10 cm to 20 cm into Layer I soil. Roots were abundant throughout the layer. Cultural material recovered from Layer I included charcoal, which was concentrated between 10 to 30 cmbs and gradually decreasing with depth, and one fragment of dog, which was located under an architectural stone at approximately 10 to 20 cmbs. Layer II (36–108 cmbs) consisted of dark, yellowish-brown (10YR 4/6) silt. Rocks were abundant, with large cobbles of decomposing saprolite and small cobbles and pebbles being distributed randomly throughout the layer. These rocks were not interpreted to compose part of the architectural layer. Layer II was culturally sterile and the unit was terminated at bedrock.

Faunal Analysis

One piece of dog bone (*Canis familiaris*) was recovered from Layer I at approximately 10 to 20 cmbs.

Artifacts

No artifacts were collected from TU-3.

Charcoal

A total of 10.4 g of charcoal was recovered from Layer I. The charcoal was collected from 0 to 44 cmbs. An observable aggregation was noted from 10 to 30 cmbs, then charcoal gradually decreased with depth. The aggregation did not represent a sub-surface feature such as hearth.

Dating

One wood charcoal sample was submitted from TU-3 (10–20 cmbs) and yielded a conventional radiocarbon age of 103.09±0.81 pMC. This means that the dated material was living within the last 50 years and the dated sample was modern. Again, it is possible that a modern charcoal fragment worked its way into the matrix through time, either through human or natural actions.

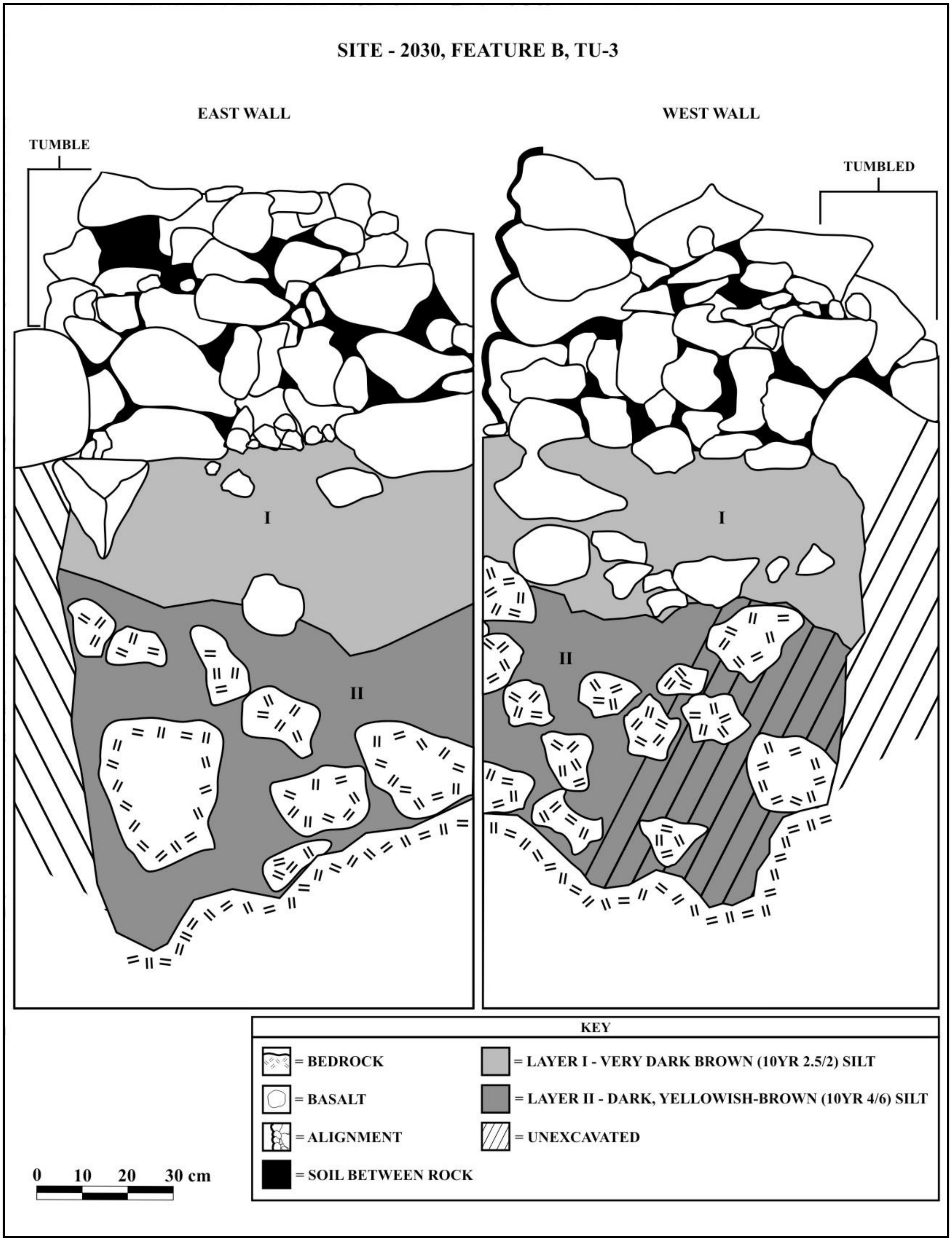


Figure 8: Site -2030, Feature B, TU-3 Profile.

STATE SITE 50-50-10-2032

SITE -2032 SUMMARY

Site -2032 (PHRI Site No. K-36) is a site complex consisting of five stone enclosures (Features A–E) within an area of approximately 120.0 m by 90.0 m (10,800.0 m²). According to Brown *et al.* (1989:E-16), the site complex consists of two rectangular enclosures, one trapezoidal enclosure, two attached circular enclosures, one very large rectangular enclosure, and numerous associated agricultural features, presumably terraces (Figure 9). This site also appears to be a proto-type Hawaiian residential cluster. A network of low stonewalls connects many of the features. Site -2032 is located at an elevation of 710.0 m amsl and is geographically provenienced immediately upslope of an ephemeral drainage, approximately 240.0 m east of the western boundary of the project area and 50.0 m upslope (east) of Site -2061. The local landscape is dominated by dissected alluvial slopes and vegetation in the area is again dominated by the presence of *lantana*, morning glory, grasses, wattle, Christmas berry, and *`ilima*.

Site -2032 was interpreted as a traditional, pre-Contact habitation and agricultural complex (Brown *et al.* 1989:E-16) with five stone enclosures. Three of these (Features A, B, and C) were tested during the present Data Recovery project (Figure 10). Feature A is a rectangular enclosure measuring 4.8 m by 3.3 m (exterior dimensions) and is located in the northern portion of the site. Feature B is a rectangular enclosure measuring 5.9 m by 5.4 m and is located in the eastern portion of the site. This feature has been re-interpreted to be a small *heiau*. Feature C is a sub-trapezoidal stone enclosure measuring 9.0 m by 7.5 m. A total of four test units (TU-1 through TU-4) were excavated in Features A, B, and C.

The four excavation units yielded traditional stone tools (including utilized basalt flakes), faunal remains (including rat, fish, and pig), marine mollusks and *kukui* nut shell, coral, and charcoal. In addition, TU-4 (in Feature B) yielded several human remains, including a phalange and cranium. These remains were reburied on site in a ceremony conducted on July 4, 2002, by Dana Naone Hall of the Maui/Lana`i Islands Burial Council (additional details below). Unfortunately, the only wood charcoal sample from Site -2032was submitted for radiocarbon dating (from TU-3 in Feature A) yielded a modern date.

Overall, Site -2032 consists of five well-constructed enclosures that represent a proto-type Hawaiian residential cluster. The multiple features are suggested to perform different functions, including those related to sleeping, food preparation, or ceremony. Feature B has been reinterpreted to be a *heiau* with a burial component. This assessment is based on the presence of

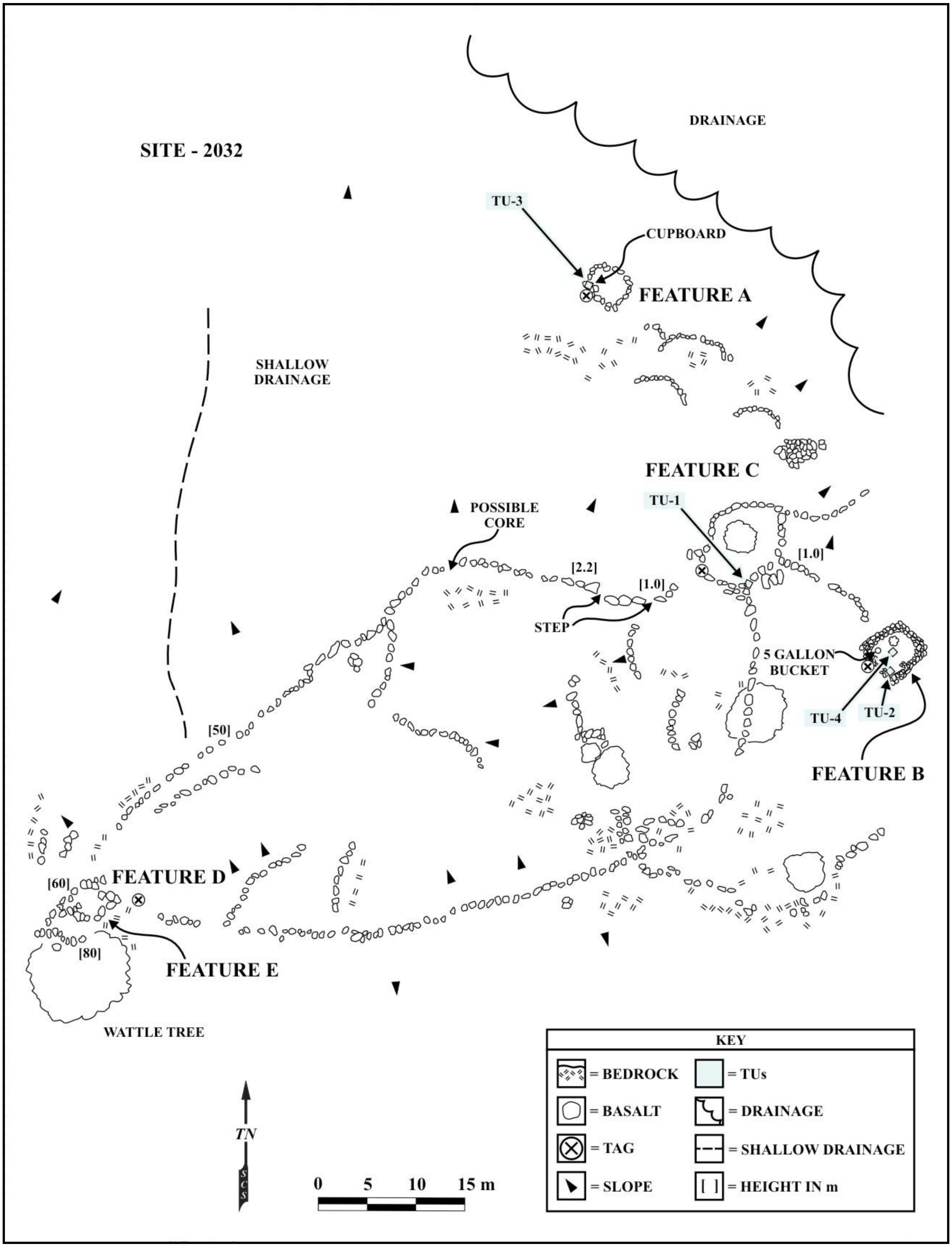


Figure 9: Site -2032 Plan View Map.

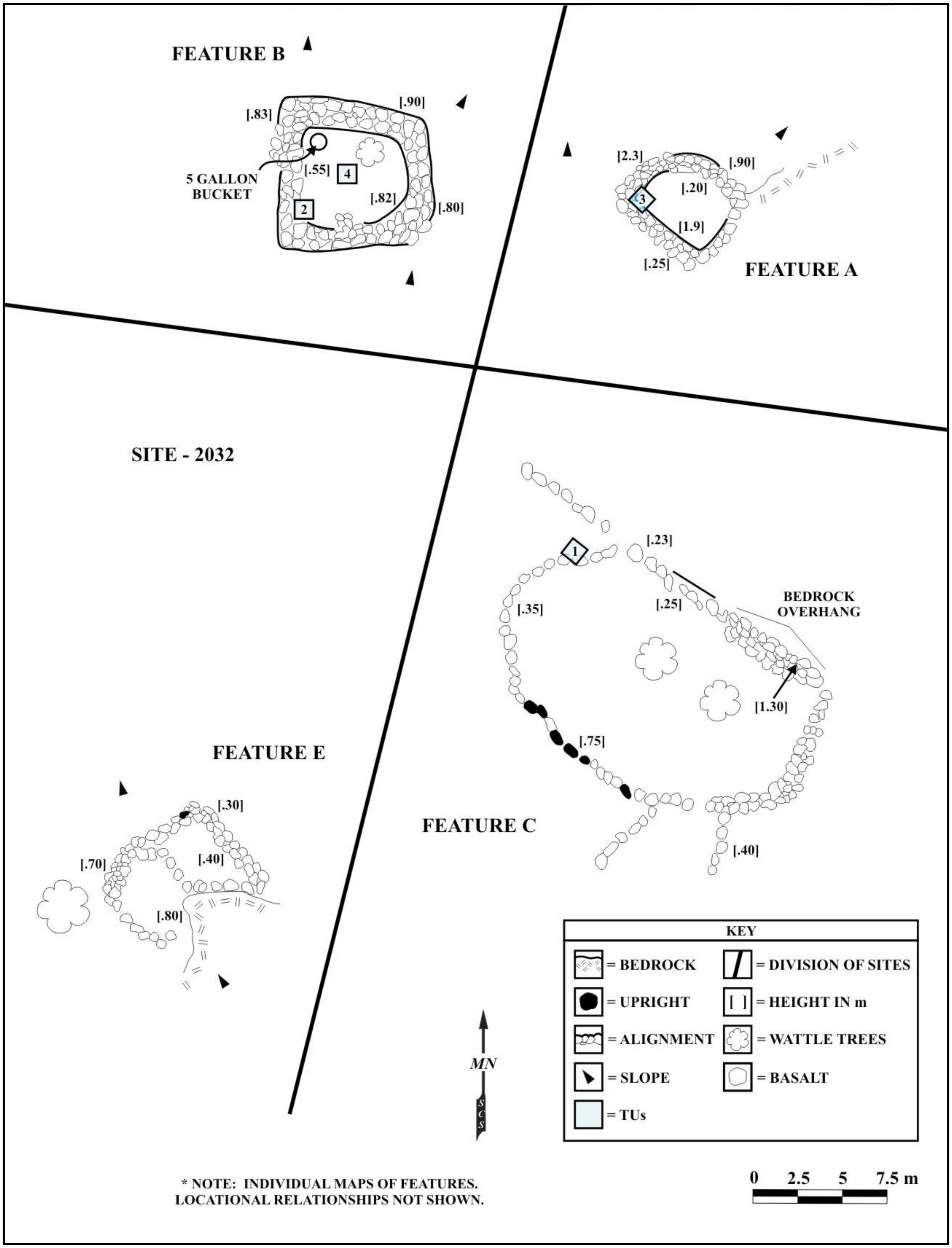


Figure 10: Site -2032 Enlarged Plan View Map with Excavation Locations.

human remains in the center of the feature (as was estimated by Dr. Kirkendall and Dana Naone Hall) and a field visit to be site by Dr. P. Kirch. Kirch suggested Feature B to be a small *heiau*. As such, the multi-component site appears to show at least one definitive example of a site complex with multiple functions.

SITE -2032 FEATURE DESCRIPTION

Feature A

Feature A consists of a rectangular enclosure with a 'cupboard' and intact facing on the interior of the southwest wall. This feature is located in the northern portion of Site -2032. The enclosure, which measures approximately 4.8 m by 3.3 m (15.8 m²), exhibits excellent structural integrity. As with Feature B, it is noteworthy that the enclosure did not include any openings or truncations that may have served as passages into or out of the enclosure. Feature walls are relatively high (*c.* 2.0 m, measured from the exterior) and constructed of stacked basalt cobbles and boulders. The exterior walls average 1.0 m in thickness. TU-3 was excavated within Feature A.

Feature B

Feature B is a rectangular stone enclosure (Figure 11) located in the eastern portion of Site –2032, adjacent to an ephemeral drainage. Compared with other features at this site and

Figure 11: Site -2032, Feature B. View to South.

within the project area, in general, Feature B exhibits excellent structural integrity and form. All feature walls are faced on both sides, with relatively few areas of collapse. The walls are constructed of core-filled basalt cobbles and boulders averaging 1.20 m in height and the wall is 1.0 m wide. The exterior dimensions of Feature B measure 5.9 m by 5.4 m (31.9 m^2). Christmas berry shrubs are located within the enclosure. TU-2 and TU-4 were excavated at this feature.

Initially, the field supervisor and crew were mystified by the lack of any openings or truncations that might have served as entryway to the interior portion of the feature. Several alternative hypotheses were offerred, one being that the feature functioned as a burial shrine.

Feature C

Feature C is a sub-trapezoidal stone enclosure containing a small terrace-retaining wall composed of stacked cobbles and boulders. All the feature walls are partially collapsed, but some facing is present on the interior of the west wall. Maximum wall heights measure approximately 1.0 m. A small bedrock overhang (3.3 m long, 0.6 m deep, 0.6 m high) is located on the exterior of the north wall. The exterior dimensions of Feature C measure 9.0 m by 7.5 m (67.5 m^2). Feature walls are constructed of stacked basalt cobbles and boulders and average 70 cm wide. In addition to the main enclosure, there are several stone alignments built off the exterior walls. Some of these connect to other features at Site -2032. TU-1 was excavated at this feature.

SITE -2032 EXCAVATION

Test Unit 1 (TU-1)

TU-1, a 1.0 m by 1.0 m unit, was placed in the southwestern corner of Feature C in order to examine the base construction of the architecture and to test for the presence/absence of cultural deposits. The unit abutted the feature's west wall and breached the small terrace retaining wall. The excavation of TU-1 demonstrated that the west wall was constructed directly on bedrock. The remaining architecture extended approximately 15 cm to 20 cm below the ground surface and was based in lower Layer I.

TU-1 excavations revealed the presence of three sedimentary layers (Figure 12). Layer I (20–30 cm thick) was a dark brown (7.5YR 3/3) (dry) silt. In some locales (*e.g.*, the west wall of TU-1), this layer rested directly on bedrock. Fine- to medium-sized roots were abundant throughout the layer and pebbles, cobbles, and boulders comprised 30 percent of the matrix. This layer included the base of stacked stone architecture. With the exception of some possible fire-cracked rock, no cultural materials were recovered from Layer I. Only trace evidence of

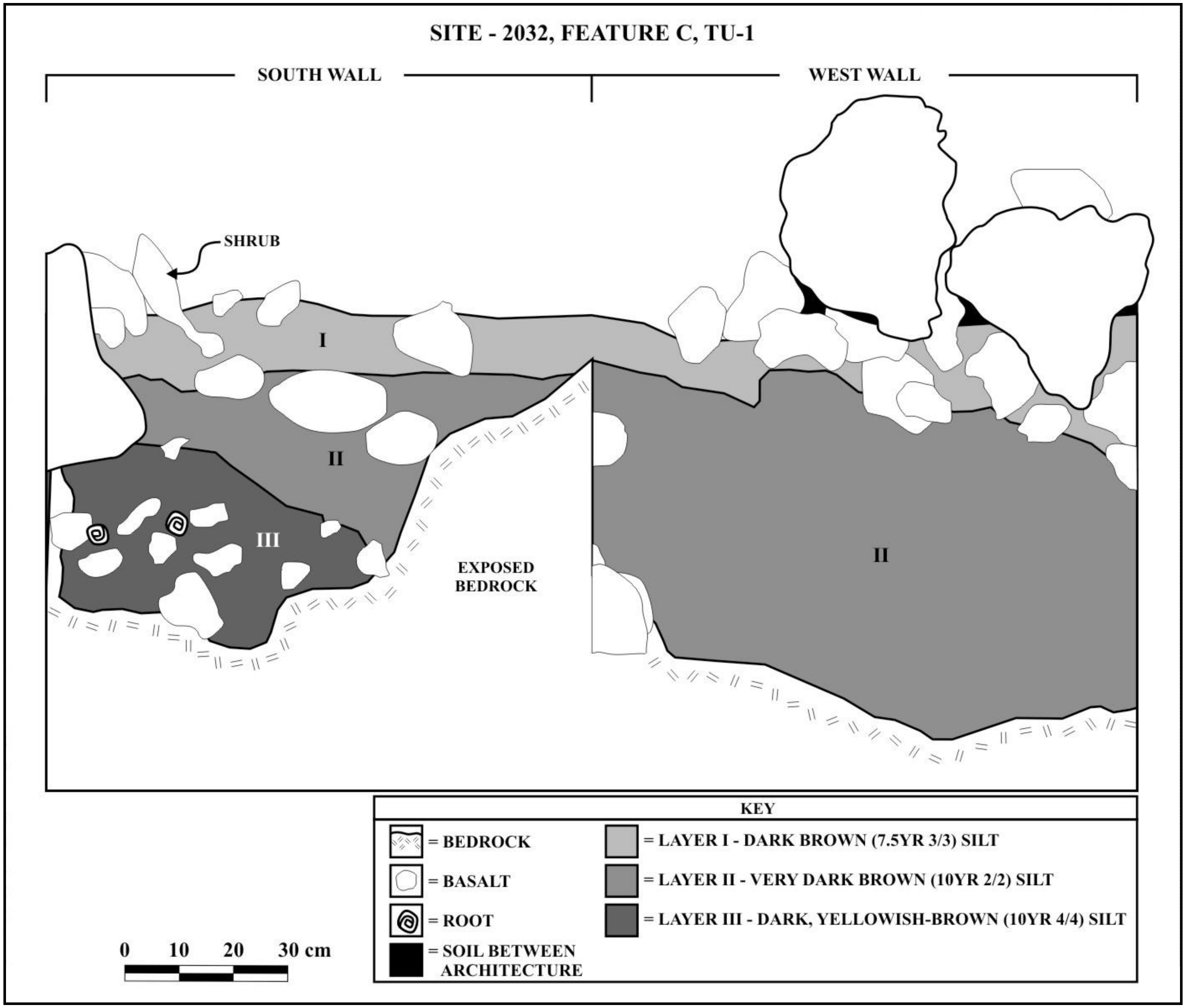


Figure 12: Site -2032, Feature C, TU-1 Profile.

charcoal was recovered. Layer II (25–50 cm thick) was composed of very dark brown (10YR 2/2) (dry) silt. In some places (*e.g.,* the south wall of TU-1), this layer was laterally truncated against the exposed bedrock. Roots are fewer in this layer. Pebbles, cobbles, and boulders comprised 50 percent of the matrix. Layer II was sterile. Layer III (20–30 cm thick) was composed of dark, yellowish-brown (10YR 4/4) silt. Roots were relatively few in this layer. Pebbles and cobbles comprised 50 percent of the matrix. Again, no cultural materials were recovered from Layer III.

<u>Midden</u>

Only a very small amount of charcoal (0.1 g) was recovered from TU-1, this being from Level 2 (10–20 cmbs).

<u>Artifacts</u>

With the exception of some possible fire-cracked rock, no cultural materials were recovered from TU-1.

<u>Dating</u>

No radiocarbon samples dates were obtained for TU-1.

<u>Taxonomic Identification of Botanical Remains</u>

No wood charcoal samples were analyzed for taxonomic affiliation from TU-1.

<u>Faunal Analysis</u>

No faunal remains were recovered from TU-1.

Test Unit 2 (TU-2)

TU-2, a 1.0 m by 1.0 m unit, was placed in the interior, southeast corner of Feature B to examine feature base construction and to test for the presence/absence cultural deposits. The test unit abutted the feature's east wall and breached the south wall. Feature architecture extended approximately 5 cm to 30 cm below the ground surface and was based in the lower levels of Layer I. Excavation yielded a traditional stone tool, faunal remains, charcoal, and a feature (SSF-1), described below.

TU-2 excavations revealed three sedimentary layers (Figure 13). Layer I (15–35 cm thick) was composed of very dark brown (10YR 2/2) silt. Roots were abundant throughout the layer. Pebbles, cobbles, and boulders comprised 30 percent of the matrix. This layer

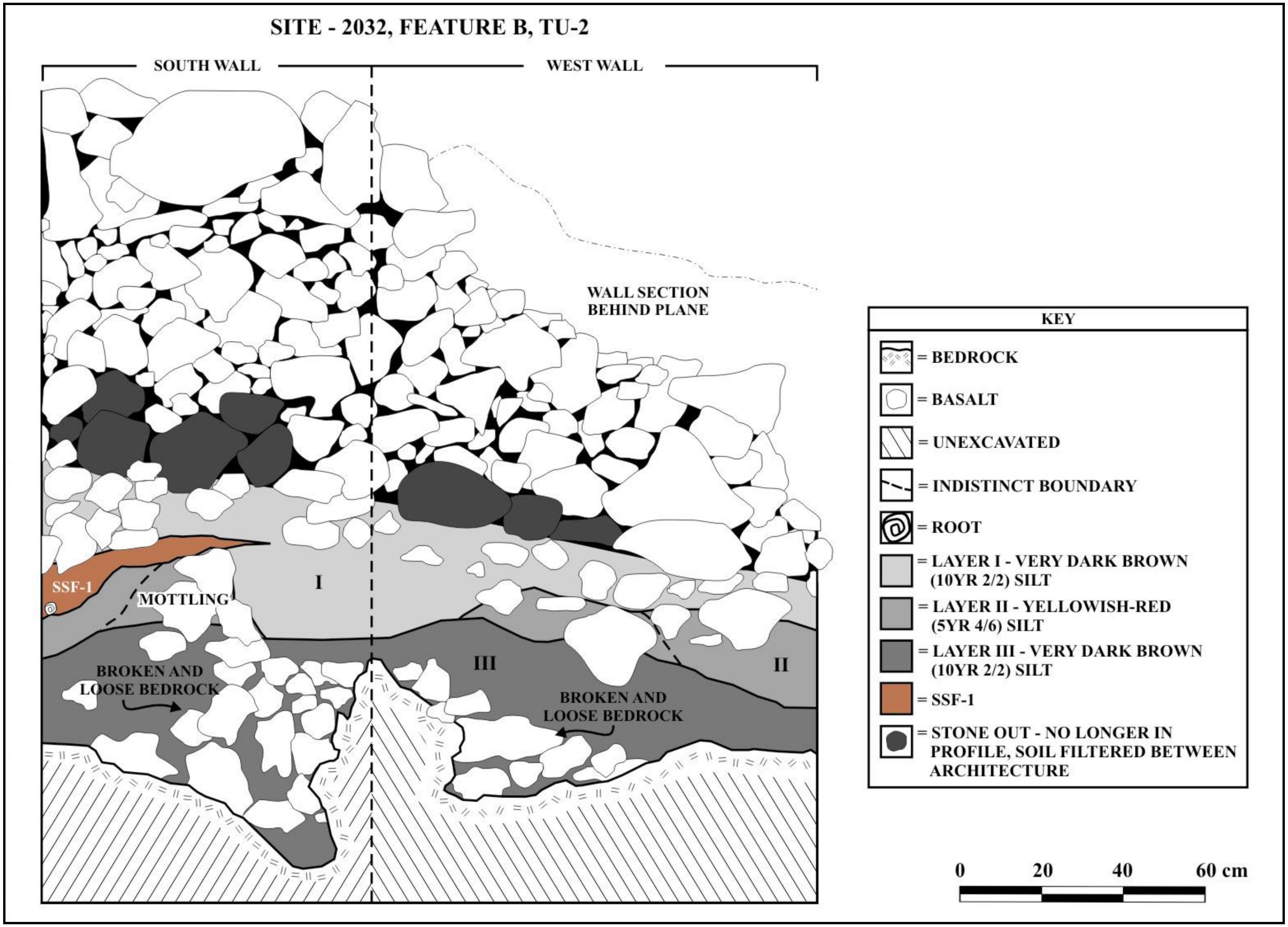


Figure 13: Site -2032, Feature B, TU-2 Profile.

encompasses the base of stacked stone feature architecture. Faunal remains and charcoal were recovered in this layer. One feature was located at the boundary of Layer I and Layer II (see below). Layer II (15–25 cm thick) was a yellowish-red (5YR 4/6) silt. In some locations (*e.g.,* the southern end of the TU-2 west wall), this layer was laterally truncated and disappeared so that Layer I rests directly on top of Layer III. Roots were less abundant in Layer II compared with the overlying layer, but still common. Pebbles, cobbles, and boulders comprised 5 to 30 percent of the matrix. One stone tool was recovered from the uppermost portion of this layer. Charcoal was recovered throughout the layer. Layer III (15–40 cm thick) a very dark brown (10YR 2/2) silt. Roots were less abundant compared with overlying layers. Pebbles, cobbles, and boulders comprised approximately 50 percent of the soil matrix. Most, if not all, of these rocks appeared to be degrading bedrock. No cultural materials were recovered from Layer III. Trace amounts of charcoal appeared in the stratum.

A feature, designated SSF-1, was exposed at 15 to 20 cmbs in the southeastern corner of TU-2. SSF-1 contained a black-colored lens, up to 15 cm thick, which decreased in width laterally to the west. In plan view, SSF-1 exhibited an irregular shape, roughly following the boundary of the stone architecture along the southeast corner of Feature B. SSF-1 does not exhibit an oval shape in plan view, one of the classic characteristics of a hearth feature. A modest amount of charcoal (7.2 g) was recovered from SSF-1. No other materials were contained within SSF-1.

Midden

Other than charcoal and faunal remains, which are described separately below, no midden was recovered from TU-2.

Artifacts

One traditional artifact was recovered from Level 2 (10–20 cmbs) in TU-2. The artifact consisted of a basalt flake, which had been polished on two facets, this reflecting use wear as a cutting and/or scraping tool.

Charcoal

A modest amount of charcoal (less than 10.0 g per level) was recovered from Levels 1 through 5 (0–50 cmbs) in TU-2.

Dating

One sample from SSF-1 was submitted for radiocarbon dating. The sample returned a modern date.

Taxonomic Identifications of Botanical Remains

No wood charcoal samples were analyzed for taxonomic affiliation from TU-2.

Faunal Analysis

A total of three faunal specimens were recovered from TU-2. One pig bone was excavated from Level 2 (10–20 cmbs). One taxonomically-indeterminate fish bone and one Polynesian Rat bone were excavated from Level 3 (20–30 cmbs). According to Ziegler, based on morphological characteristics, the pig bone was not distinguishable to either pre-Contact or post-Contact times. The Polynesian Rat, a known human commensal species, was likely either brought to the site by the activities of dogs or alternatively, followed a stable food source to the area, this feature having been surrounded by agricultural features. Finally, the fish bone—even though it cannot be assigned to taxon represents a marine species. There are no permanent streams or water bodies in the project area, nor have there likely ever been any, given the local topography and climate. Thus, this bone represents a food item transported by humans from the coast.

Test Unit 3 (TU-3)

TU-3, measuring 1.0 m by 1.0 m, was placed in the interior, northeastern corner of Feature A in order to examine the depth of architecture base construction, to test for the presence/absence of cultural deposits, and to evaluate the purported 'cupboard.' The unit abutted the interior facing of the east wall and breached the interior facing of the enclosure's north wall. Excavation along the enclosure's north wall revealed a typical facing of informally stacked cobbles and boulders with pebble core fill. Several of the stacked boulders penetrated 10 to 20 cmbs to the base of Layer I. The 'cupboard' was mainly composed of pebbles, which were loosely constrained by informally arranged cobbles and boulders. The 'cupboard' was not the actual function of the small overhang. The excavation of TU-3 yielded traditional stone tools, *kukui* nut shells, and trace amounts of charcoal.

The excavation of TU-3 revealed three main sedimentary layers (Figure 14). Layer I (15–25 cm thick) was composed of very dark grayish-brown (10YR 3/2) silt. Fine, small roots were abundant throughout the layer. Pebbles, cobbles, and boulders comprised 40 percent of the matrix. This layer included the base of stacked stone feature architecture. Traditional stone

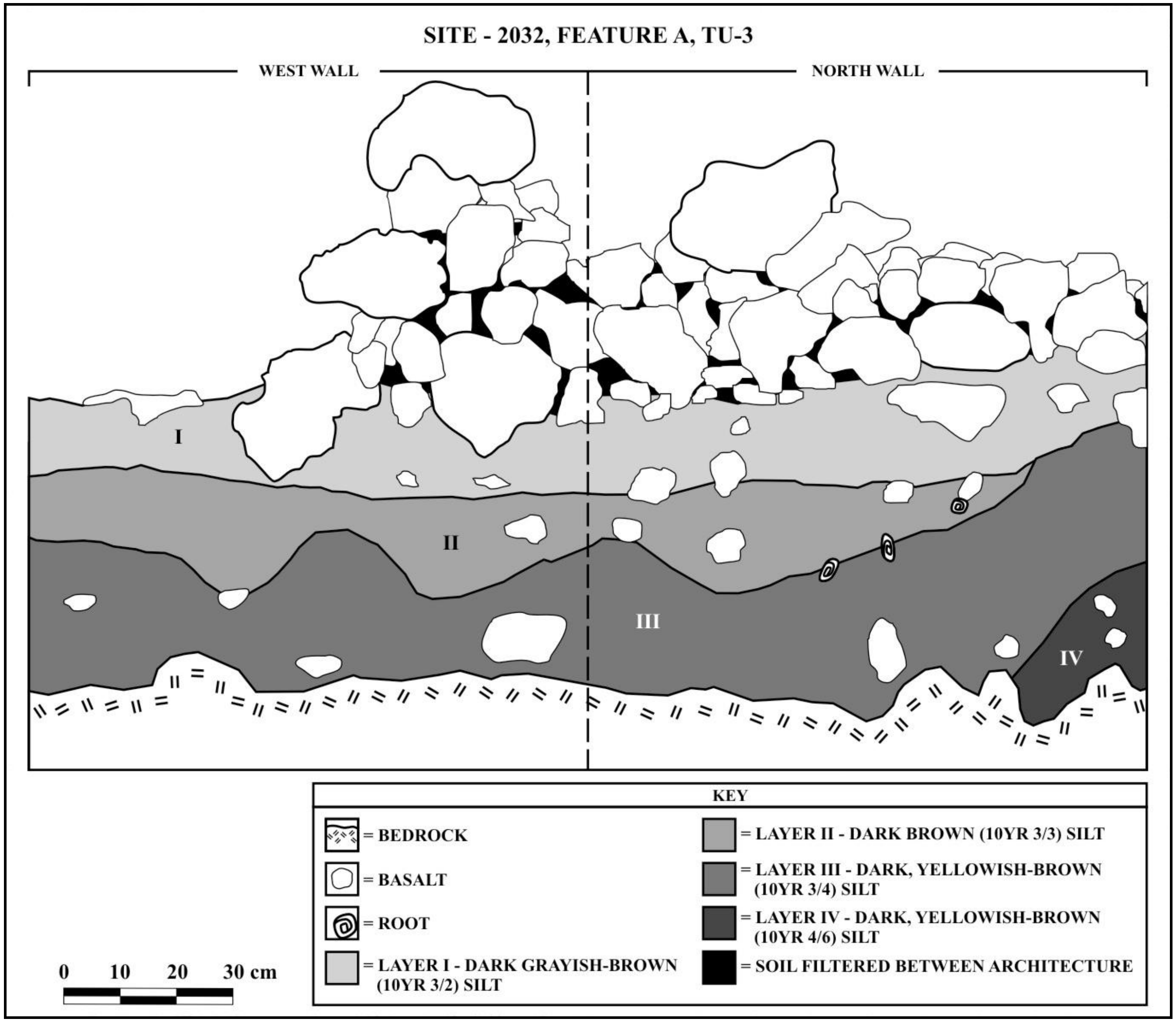


Figure 14: Site -2032, Feature A, TU-3 Profile.

tools, *kukui* nut shells, and charcoal were recovered from this layer. Layer II (10–25 cm thick) was a dark brown (10YR 3/3) silt. In some locations (*e.g.,* the eastern end, north wall of TU-3), this layer was laterally truncated and disappeared so that Layer I rests directly on top of Layer III. Small to medium roots were common in Layer II and pebbles, cobbles, and boulders comprised 45 percent of the matrix. This layer was culturally sterile—only a trace amount of charcoal was present. Layer III (15–30 cm thick) was a dark yellowish-brown (10YR 3/4) silt with some clay content and rested directly on bedrock. Medium-sized roots were common, with pebbles, cobbles, and boulders comprising approximately 50 percent of the matrix. Most, if not all, of these rocks appear to be degrading bedrock. This layer was culturally sterile. A lateral facies, identified as Layer IV by the excavator, was located in the eastern end of the TU-3 north wall. This sub-unit differed slightly in hue (10YR 4/6) from Layer III, but otherwise had the same characteristics and was culturally sterile.

Midden

Other than a small amount of charcoal, the only midden recovered from TU-3 consisted of two *kukui* nut shell fragments from Level 2 (10–20 cmbs).

Artifacts

One traditional artifact was recovered from Level 2 (10–20 cmbs) in TU-3. This basalt flake had been polished, reflecting use wear as a cutting and/or scraping tool.

Charcoal

A small amount of charcoal (1.0 to 2.0 g in each level) was recovered from Level 2 (10–20 cmbs) and Level 3 (20–30 cmbs) in TU-3.

Dating

One wood charcoal sample from Level 2 (10–20 cmbs) in TU-3 was submitted for radiocarbon dating. The sample returned a date of 30±80 B.P. When calibrated, the possible dates were A.D. 1795 and A.D. 1670 to 1770 at two Sigma and A.D. 1690 to 1730 and A.D. 1810 to 1930 at one Sigma. This date implies, at best, an early historic date. The sample dated near terminal occupation of the site, post-construction.

Taxonomic Identification of Botanical Remains

No wood charcoal samples were analyzed for taxonomic affiliation from TU-3.

Faunal Analysis

No faunal remains were recovered from TU-3.

Test Unit 4 (TU-4)

As described above, Feature B is a rectangular stone enclosure located in the eastern portion of Site -2032. During TU-2 excavations, it was suggested that Feature B was a burial shrine, and that an additional test unit (TU-4) should be excavated in the center of the enclosure to evaluate this hypothesis. The excavation of TU-4, a 1.0 by 1.0 m unit, proceeded to 32 cmbs, at which point human remains were exposed, leading to the immediate suspension of excavation. Following consultation with appropriate parties, excavation in this unit was terminated. In addition to the human remains, TU-4 also yielded traditional stone tools, historical artifacts, marine shell, coral, and charcoal. All of these items were eventually reburied in TU-4 with the human remains. Based on stratigraphic positioning, the base of the architecture and the human remains are roughly contemporaneous.

The human remains encountered in TU-4 consisted of a human phalange and a human cranium occurring *in situ* between Level 3 and Level 4 (20–40 cmbs), respectively. Once the remains were identified as human, all work in the area ceased and protocol concerning the inadvertent discovery of burials was followed. The remains were interpreted as representing a secondary and a primary adult burial, with a minimum number of two individuals occurring in the same burial pit. The remains were associated with an intact cultural deposit. The first remain, a phalange, was found at a severe angle and distance (5–10 cm) above the second fragment, an *in situ* cranium. The latter (cranium) was associated with burial pit fill and likely indicated the presence of a fully articulated burial. The cranial fragment of the first individual was facing west/northwest. Thus, the phalange is argued to represent one individual (secondary context) and the cranium represents another individual (primary, *in situ* context). An on-site ceremony was conducted on July 4, 2002 by Dana Naone Hall of the MLIBC.

Both skeletal materials were interpreted to be contemporaneous with, or slightly post-date, occupation of the feature. Predicated on the size of Feature B and feature construction (well-constructed, faced walls on all four sides), the feature has been re-classified as a small ceremonial site. Contemporaneity between the burials and construction of the feature seems most possible as the cultural remains and the architecture appear to have occurred at the same depth below surface.

Midden

Several fragments of marine shell were recovered from Levels 2 and 3 (10–30 cmbs) in TU-4. These specimens were not formally analyzed because they were subsequently reburied with the human remains and other finds from TU-4. Field notes identify these shells as 'bivalves', which suggests they are marine species transported some distance from the coast to Site -2032 as food items.

Artifacts

Volcanic glass debitage and two possible formal stone tools were recovered from the upper 30 cmbs (*i.e.,* Levels 1–3) of TU-4. All this material, including a possible hammerstone and a smooth pebble (a possible abrader), was reburied with the human remains and other finds from TU-4. No formal analysis was conducted.

Charcoal

The presence of charcoal was noted through the various excavated levels of TU-4. No samples were collected.

Dating

No wood charcoal samples from TU-4 were submitted for radiocarbon dating.

Taxonomic Identification of Botanical Remains

No wood charcoal samples from TU-4 were analyzed for taxonomic affiliation.

Faunal Analysis

Field notes from TU-4 document the recovery of several mammal bones (including rodent) and fish bones from the upper 30 cmbs (*i.e.,* Levels 1–3). No formal analysis of these remains was conducted. All these faunal remains were reburied with the human remains and other excavated material from TU-4.

STATE SITE 50-50-10-2034

SITE -2034 SUMMARY

Site -2034 (PHRI Site No. K-64) is located in the central portion of the parcel and is located *c*. 61.0 m to the south of the Historic Preserve Area's easternmost flank. The site occurs within designated Lot 52. Site -2034 consists of one feature, an enclosure measuring 143.0 m^2. The feature measures 13.0 m long by 11.0 m wide and is attached to a downslope terrace. A test unit was excavated outside the enclosure near an opening in the feature's northwest wall by Brown *et al*. (1989:E-28) during Inventory Survey. The unit yielded a cultural deposit consisting of a basalt flake, sea urchin remains, and charcoal. One sample of charcoal was submitted for radiocarbon analysis and returned a date of A.D. 1420 to 1660, a time period clearly dating the cultural stratum to traditional times.

During the present Data Recovery program, a single test unit was placed against an interior wall of the enclosure to further evaluate the function and chronology of the feature. Human skeletal remains consisting of a phalange and a tooth were identified at 10 to 15 cmbs during screening and *in situ* during excavation, respectively. The skeletal remains were directly associated with the upper portion of the site's traditional cultural deposit (dated to prehistoric times). Due to this association, the remains, not representing a burial per se, were presumed to be those of a traditional Native Hawaiian individual.

Once the remains were identified as human, all work in the area ceased and protocol concerning the inadvertent discovery of burials was performed. The remains were guardedly assessed as representing a primary adult burial. No information on the articulation or orientation is available work in the area ceased after the remains were initially encountered. An on-site, re-burial ceremony has not yet been conducted by a representative of the MLIBC. The site, however, has been secured and is slated fro preservation.

STATE SITE 50-50-10-2035

SITE -2035 SUMMARY

Site -2035 (PHRI Site No. K-105) consists of one main feature (Feature A)—a rectangular enclosure (Figure15). Unnamed associated terraces presumably related to agriculture were found in the surrounding areas. The central feature and surrounding terraces occupy an area of approximately 26.0 m by 26.0 m (676.0 m²). The site is located at an elevation of 829.0 m amsl on a small bluff overlooking an alluvial slope. The site complex is located some 100.0 m northwest of Kula Highway and approximately 30.0 m northeast of the southern project boundary, which is demarked by a rock ranch wall. Vegetation in the area includes *lantana*, grasses, and wattle.

Based on limited site recordation and the results of one test excavation at the site during Inventory Survey (Brown *et al*. 1989:E-38), this site was assessed as a traditional, pre-Contact habitation and agricultural loci. Feature A is a rectangular enclosure measuring approximately

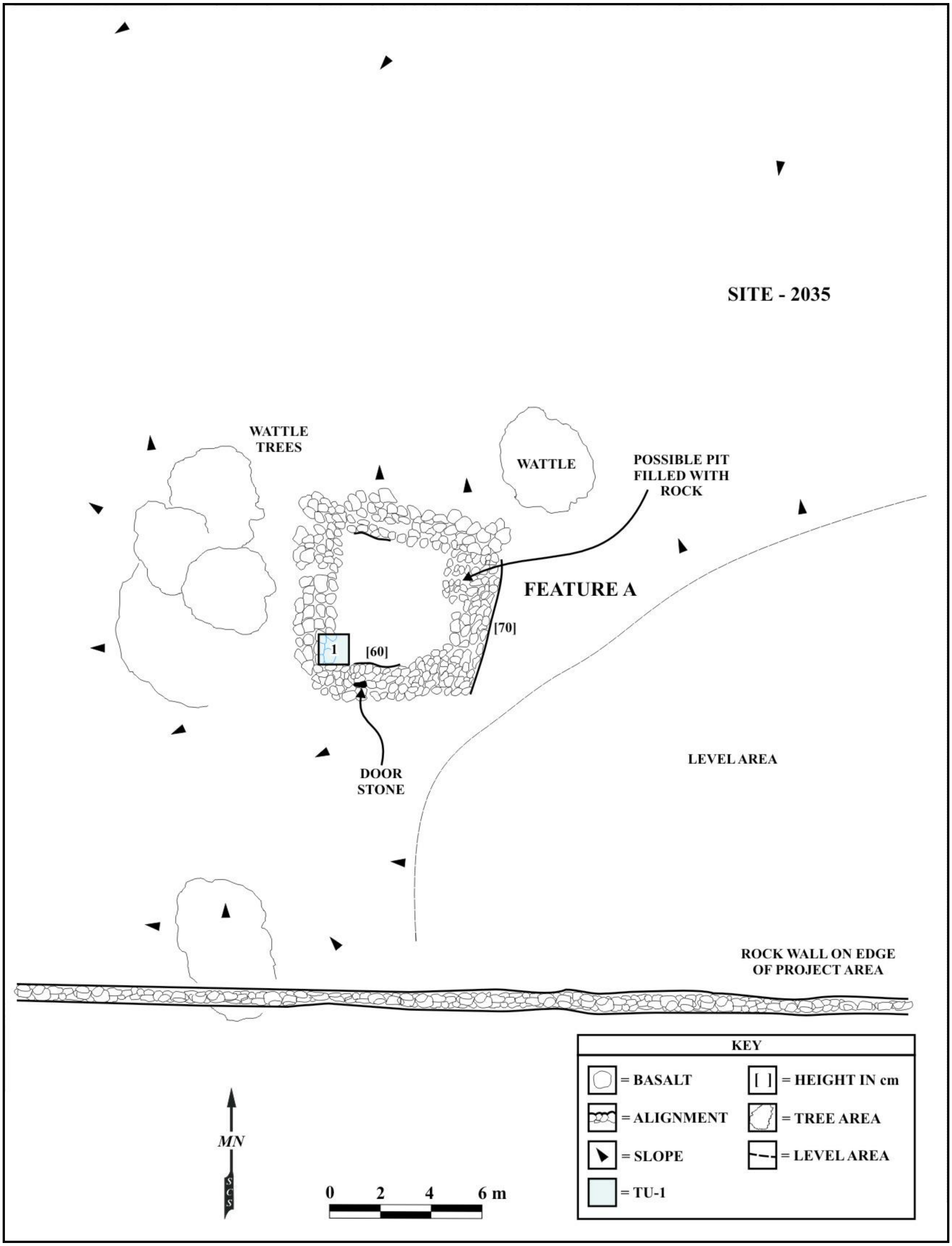


Figure 15: Site -2035 Plan View Map.

8.0 m by 8.0 m (64.0 m²). The single test unit (TU-1) excavated during Inventory Survey yielded fish and mammal bone, *kukui* nut shell, and charcoal (Brown *et al.* 1989:E-38). The same authors (*ibid:*E-38) reported a single radiocarbon date from this test pit as representing "three possible calendric age ranges of A.D. 1470 to 1670, A.D. 1775 to 1793, and A.D. 1947 to 1953, a wide range indeed.

During the present Data Recovery investigations, TU-1 was excavated by SCS within Feature A. The unit yielded traditional stone tools (debitage) and *kukui* nut shell. Two radiocarbon samples from the unit yielded dates from the A.D. 1400 to 1600s, during protohistoric times. These date ranges, gleaned from samples dating initial feature construction and near terminal occupation, show site activity from at least the late 15th century through early historic times.

SITE -2035 FEATURE DESCRIPTION

Feature A

Feature A is a rectangular enclosure constructed from a combination of basalt pebbles (as filler), cobbles, and boulders. The enclosure measures approximately 8.0 m by 8.0 m (64.0 m²) and facing is present on portions of the exterior eastern wall and portions of the interior north and south walls. The north and west walls collapsed. According to Brown *et al.* (1989:E-38), there is a possible rock-filled pit—unexplored during either Inventory Survey or Data Recovery—in the northeast (interior) corner of the enclosure. Terraces, possibly related to traditional agriculture, are located north of Feature A. These features were not recorded during Inventory Survey. One test unit, excavated during Inventory Survey and located near the center of the enclosure, yielded fish and mammal bone, *kukui* nut shell, and charcoal (Brown *et al.* 1989:E-38). A single radiocarbon date from this test pit represented "three possible calendric age ranges of AD 1470-1670, AD 1775-1793, and AD 1947-1953" (*ibid:*E-38). TU-1 was excavated in Feature A.

SITE -2035 EXCAVATION

Test Unit 1 (TU-1)

One test unit (TU-1) measuring 1.0 m by 1.0 m was excavated in the southwest (interior) corner of Feature A during Data Recovery. This unit was placed to directly abut the alignment of the interior facing along the feature's west and south walls. Traditional artifacts were recovered from Level 2 through and including Level 5 (10–50 cmbs) in TU-1. A possible hearth was exposed between 20 and 30 cmbs in the northern corner of the enclosure's west wall.

The excavation of TU-1 revealed three major sedimentary layers occurring beneath stacked architectural stones and above bedrock (Figure 16). Layer I (40–60 cm thick) was a black (10YR 2/1) silt. Roots and organic material were abundant, particularly in the upper portion of the layer. Pebbles and small cobbles dominated the upper portion of the layer, which becomes less rocky with increasing depth. Feature architecture was based in the upper portion of this layer. Stone tool debitage and charcoal was scattered throughout Layer I, including levels well below the base of the stacked stones. The possible hearth was located in this layer. Layer II (10–15cm thick) was composed of very dark brown (10YR 2/2) silt, with 10 to 15 percent pebble and cobble content. This layer contained scattered flecks of charcoal—which may or may not be cultural—but no cultural material. Roots and charcoal were much less abundant in this layer compared with Layer I. Layer III (10–40 cm thick) was a dark brown (7.5YR 3/3) silt. This layer rested directly atop bedrock and was culturally sterile.

Midden

Other than charcoal, the midden record consisted of several pieces of unburned *kukui* nut shell recovered from the upper 10 cm (Level 1) and between 20 and 30 cmbs (Level 3). These shells may represent food remains.

Artifacts

Eight pieces of debitage were recovered between 10 and 50 cmbs. All but one of the lithic flakes were manufactured from basalt (the other was composed of volcanic glass). The vertical distribution of these traditional artifacts is noteworthy. With artifacts recovered from Level 2 (10–20 cmbs) through and including Level 5 (40–50 cmbs), there was at least 20 cm, and perhaps as much as 40 cm, separating the lowest and highest finds. This raises the possibility of multiple occupation episodes at this site, or, at the least, a relatively lengthy period of intermittent site occupation. Additionally, much of the cultural material was derived from levels well below the probable base of architecture, thus suggesting site activity/occupation occurred prior to formalizing the site through construction of the stone enclosure.

Charcoal

Charcoal was recovered from Level 1 through, and including, Level 7 (0–70 cmbs) but was most abundant (by weight) in Levels 2 through 4 (10–40 cmbs). Charcoal was present, only in very sparse quantities, between 40 and 70 cmbs, with no charcoal occurring below 70 cmbs. The possible hearth, located between 20 and 30 cmbs, also yielded charcoal. With the exception of this feature, the charcoal was distributed more or less randomly throughout the sedimentary matrix.

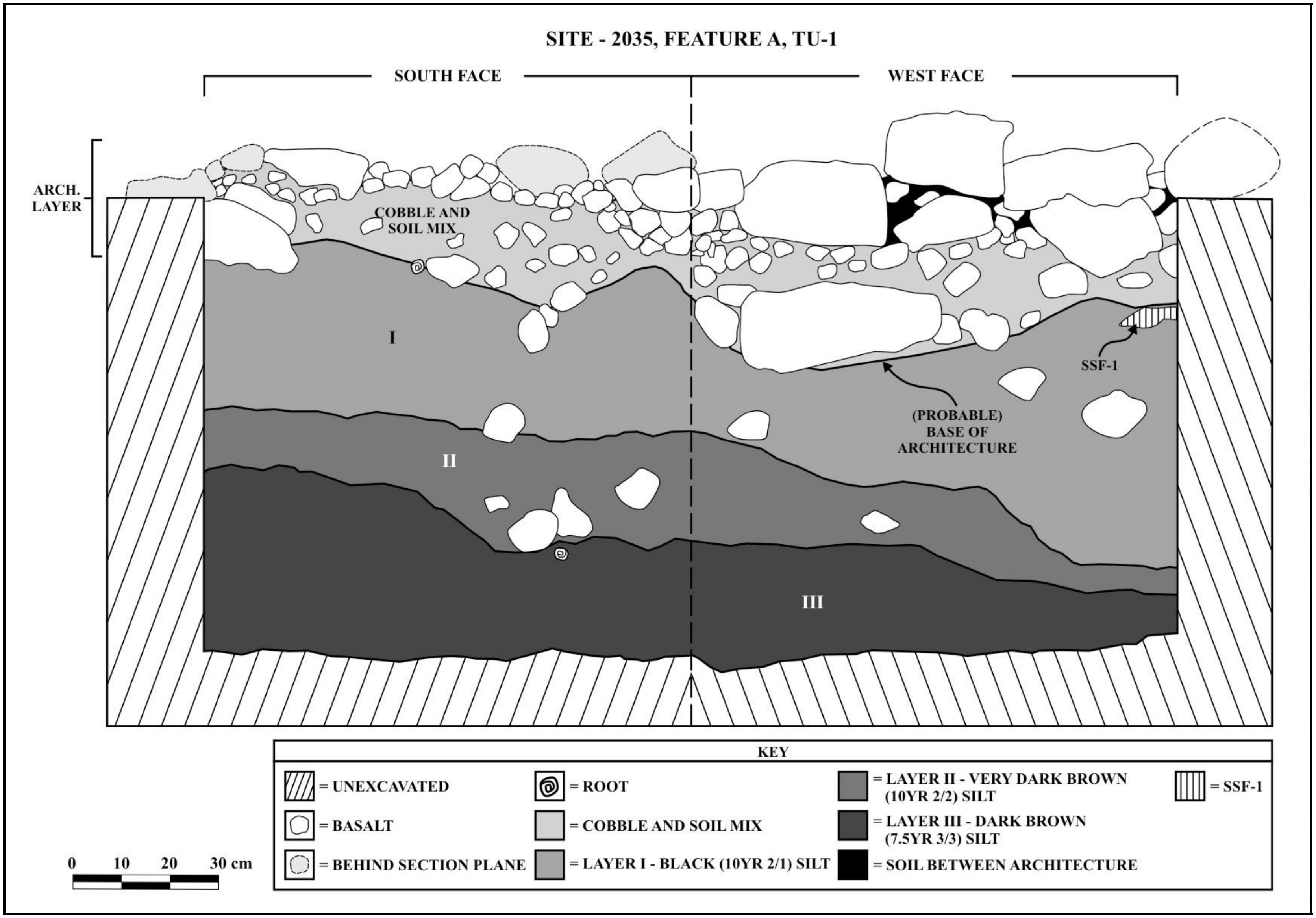


Figure 16: Site -2035, Feature A, TU-1 Profile.

Dating

Two samples of wood charcoal from TU-1 (Feature A) were submitted for radiocarbon dating analysis. The first sample, from Level 2 (10–20 cmbs) yielded a conventional date of 220±70 B.P. When calibrated, the calendric age range of this sample was A.D. 1500 to 1890 (2 Sigma) and A.D. 1630 to 1820 (1 Sigma). The second sample, from Level 4 (30–40 cmbs), produced a conventional age of 290±70 B.P. When calibrated, the age range was A.D. 1440 to 1690 (2 Sigma) and A.D. 1490 to 1660 (1 Sigma). These dates are stratigraphically consistent with site occupation from pre-Contact times (15^{th}–16^{th} century) through early historic times. As noted above by the hiatus in cultural materials between two cultural deposits, this site was likely occupied in the A.D. 15^{th} and 16^{th} century, abandoned for a short time, and re-occupied during early historic times.

Taxonomic Identification of Botanical Remains

No wood charcoal samples from TU-1 were analyzed for taxonomic affiliation from Site -2035.

Faunal Analysis

Interestingly, no faunal remains were recovered from Site -2035. This is most likely a product of sampling as during Inventory Survey testing, fish and mammal remains were recovered.

STATE SITE 50-50-10-2046

SITE -2046 SUMMARY

Site -2046 (PHRI Site No. K-1, BPBM Site No. T-15) consists of two main features (Figure 17), a platform (Feature A) and a sub-rectangular enclosure (Feature B). A number of additional landscape features such as agricultural features may be associated, but they remain unrecorded. The two main features, along with additional mounds, paved areas, walls, possible trails, terraces, and modified outcrops cover a total area of at least 80.0 m by 40.0 m (3,200.0 m^2). The two main features together occupy an area of approximately 40.0 m by 20.0 m (800.0 m^2) within this larger area. The site complex is located at 692.0 m above mean sea level (amsl), approximately 40.0 m east of the western boundary of the project area, 230.0 m south of the northern boundary of the project area, and within the proposed Historic Preserve Area. The immediate Site -2046 landscape includes a small, dissected alluvial slope and forms a small plateau above the small drainage. Vegetation in the site area includes *lantana*, *`ilima*, grasses, wattle, and *panini*.

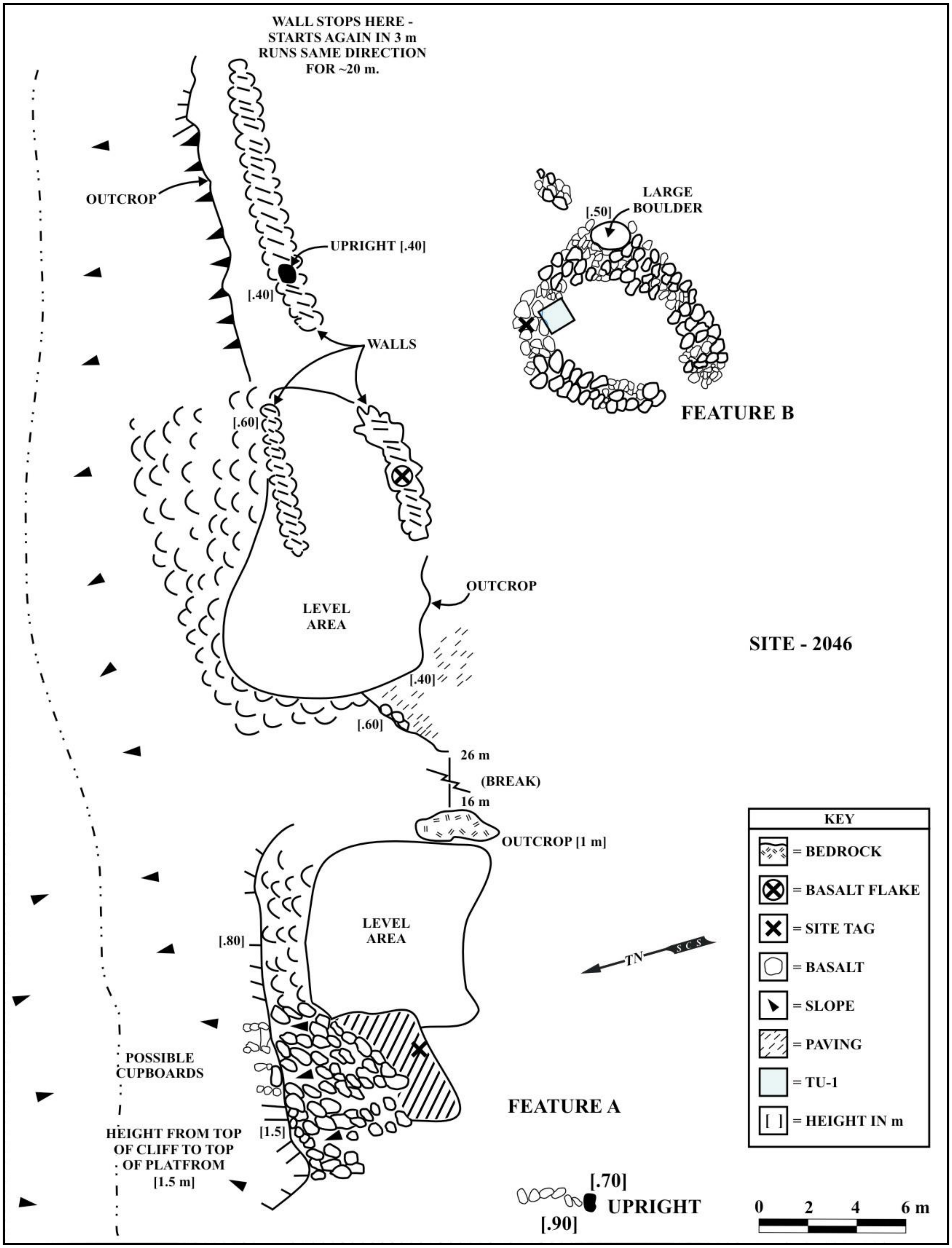


Figure 17: Site -2046 Plan View Map.

Based on artifact evidence recovered from the site's ground surface, including a basalt flake identified near the enclosure, this site complex was interpreted as a traditional, pre-Contact habitation and agricultural site (Brown *et al.* 1989:E-1). Feature A, the platform, measures approximately 7.0 m by 7.0 m and is located approximately 25.0 m northwest of the enclosure designated Feature B. Feature A was not selected for testing. One test unit (TU-1) was excavated within the sub-rectangular enclosure labeled Feature B. Feature B measures approximately 5.8 m by 6.4 m. The test unit in Feature B yielded one traditional artifact, a basalt adze blank, from the ground surface. No artifacts or other significant finds were recovered from the subsurface contexts. One charcoal sample from 10 to 20 centimeters below surface (cmbs) was subject to radiocarbon dating and yielded a protohistoric-historic date of A.D. 1690 to 1730 and A.D. 1810 to 1920. This sample dated the initial construction of the feature.

SITE -2046 FEATURE DESCRIPTION

Feature B

Feature B is a sub-rectangular enclosure with stacked walls constructed of basalt cobbles and boulders up to 50 cm in height. The exterior dimensions of the feature are 5.8 m by 6.4 m (37.1 m^2). The top of the south and west walls are level with the interior ground surface. The east wall consists of modified bedrock. The interior of the west end of the enclosure is curved, rather than angled, suggesting either partial collapse of the corners or an intentional rounded internal design. TU-1 was excavated in Feature B.

SITE -2046 EXCAVATION

Test Unit 1 (TU-1)

TU-1 measured 1.0 by 1.0 m and was excavated in the northwest corner of Feature B. The test unit abutted the east wall of the feature and extended into the north wall of the feature in order to examine the base construction of the architecture. The excavation of TU-1 demonstrated that the architecture extended approximately 10 to 20 cm into the upper stratigraphic layer, Layer I.

The excavation revealed two major sedimentary layers beneath the stacked stones and above the bedrock. Layer I (30–50 cm thick) consisted of very dark, grayish-brown (10YR 3/2) silt. Roots and cobbles were abundant throughout the layer. The stone architecture was based in Layer I. This layer contained charcoal. Layer II (20–35 cm thick) was composed of dark, yellowish-brown (10YR 4/4) silt. Roots decreased in quantity from the overlying layer and rocks were more abundant. This layer rested directly atop bedrock and was culturally sterile.

Midden

Only charcoal was recovered from TU-1. This sample of charcoal was not taxonomically identified.

Artifacts

One basalt adze blank (SCS Artifact No. 2) was recovered from within the north wall architecture at the ground surface level in TU-1. This small adze blank (maximum dimension = 6.5 cm) is based on a reworked adze as shown by two polished surfaces.

Charcoal

Charcoal was recovered from Level 1 through Level 3 (0–30 cmbs) in TU-1 (Feature B), and was most abundant (by weight) between 10 and 20 cmbs. Otherwise, the charcoal was distributed more or less randomly throughout the sedimentary matrix, rather than occurring in a concentrated form. The charcoal was associated with the base of Feature B architecture and may represent landscape clearing just prior to feature construction.

Dating

One sample of wood charcoal from Level 2 (10–20 cmbs) in TU-1 was dated to 60+/-50 BP. OxCal produced a variable distribution for this date at both 1 Sigma and 2 Sigma probabilities. At 1 Sigma, the date was calculated at A.D. 1810 to 1920. At 2 Sigma, the date measured A.D. 1800 to 1940. These readings indicate that the charcoal and the base of architecture date to historic times. Based on this evidence alone, it is probable that the feature was constructed during the historic transition period. The presence of the adze, a traditional-period artifact, implies that traditional-period tools were being utilized during and after the historic transition period (post A.D. 1778).

Taxonomic Identification of Botanical Remains

No charcoal samples were analyzed from TU-1 (Feature B).

Faunal Analysis

No faunal remains were recovered from TU-1 (Feature B).

STATE SITE 50-50-10-2047

SITE -2047 SUMMARY

State Site -2047 (PHRI Site No. K-2) consists of two primary features designated Feature A and B (Figure 18) with an unknown number of associated agricultural features such as terraces, mounds, and modified outcrops (Brown *et al*. 1989:E-1). These agricultural features were not recorded during the present or prior investigations. Site -2047 consists of two attached enclosures (Features A and B) built onto a basalt outcrop with the aforementioned agricultural features scattered in the general area. Site -2047 is located at 692.0 m amsl approximately 260.0 m southwest of the northern project boundary and 23.8 m east of the western project boundary and existing fence corner. The site occurs in the proposed Historic Preserve Area. Approximate site dimensions can be estimated at 32.0 m by 20.0 m (640.0 m^2) and may not include all of the associated agricultural features. The landscape consists of dissected alluvial slopes and vegetation in the area includes various grasses, *lantana*, and *ilima.*

Based on evidence available at the ground surface, the site is consistent with a traditional, pre-Contact habitation and agricultural site (Brown *et al*. 1989:E-1). Feature A is a roughly square enclosure measuring 12.0 m by 10.5 m (126.0 m^2) with a pavement in the southwest corner. One test unit (TU-1) was excavated within Feature A. Feature B is an irregularly shaped enclosure constructed adjacent to the northern corner of Feature A. The feature is constructed at a lower elevation and measures approximately 10.0 m by 7.0 m (70.0 m^2). One test unit (TU-2) was excavated within Feature B. Two features interpreted as hearths were identified in TU-2. Both features were encountered at depths below the base of the architectural component of the feature, either indicating site activity prior to feature construction or the features were made at specific depths after construction was completed.

Excavations of TU-1 yielded two traditional artifacts, a modified non-diagnostic marine shell worked into a roughly oval shape, and a volcanic glass core with a single unprepared platform. Additionally, a sparse amount of faunal materials were recovered and include medium bird and Cypraea. One radiocarbon sample was submitted for analysis and returned a date of A.D. 1390 to 1530 (A.D. 1400–1495 at 1 Sigma). This sample clearly dates the feature to pre-Contact times, perhaps as early as the late A.D. 14th century. TU-2 similarly yielded eight traditional artifacts, including one basalt flake with polish and a variety of unpolished, utilized basalt flakes. A variety of faunal materials were recovered from TU-2, albeit in modest quantity, and include fish, bird, dog, pig, marine shell, and land snail. Site -2047 was one of only two sites excavated that yielded both pig and dog remains. Three charcoal samples were submitted

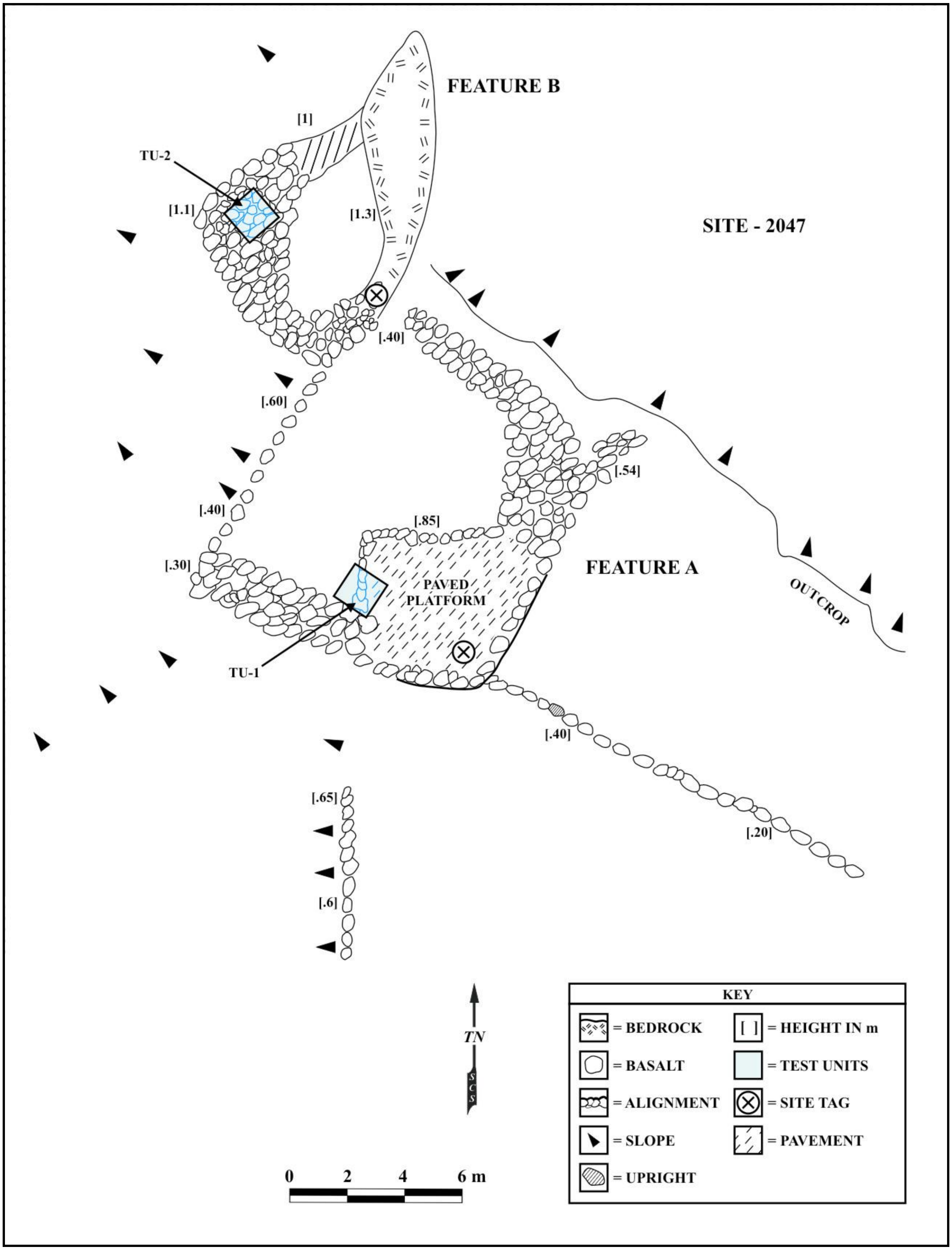


Figure 18: Site -2047 Plan View Map.

for radiocarbon dating from various proveniences throughout the unit. All three dates indicate pre-Contact usage of the site commencing at or around the mid to late A.D. 1400's. The stratigraphic integrity of the lower dated sample is somewhat problematic, but still within the approximate depth-age of the sample. The presence of the two hearths in TU-2, the latter located within a fairly discrete area along the southwest corner of Feature B, may reflect a secular activity area related to food processing.

SITE -2047 FEATURE DESCRIPTIONS

Feature A

Feature A is a large, roughly square enclosure with a pavement (Figure 19) located in its southern corner. The feature measures 12.0 (northeast-southwest) by 10.5 m (126.0 m²). The unpaved surface of the feature is relatively level. The pavement presumably functioned as an internal specialized activity area. Feature A consists of two semi-linear walls on the northeast and southwest sides, one amorphously shaped wall on the southeast side, and an alignment on the northwest side. The walls range in width from 1.0 m to 2.0 m and average approximately 0.5 m in height. TU-1 was excavated in Feature A.

Figure 19: Site -2047, Feature A. View to Northwest.

Feature B

Feature B is an irregularly shaped enclosure constructed adjacent to the north corner of Feature A. This feature is constructed at a lower elevation on the bedrock outcrop. Feature B measures 10.0 (northeast-southwest) by 7.0 m long (70.0 m^2). Feature B consists of two irregularly shaped walls that form its northern, southern, and western boundaries that connect to the bedrock outcrop that serves as the eastern boundary. The walls that form the northern and eastern perimeter of the feature exhibit facing on both the interior and exterior sides. Both Features A and B are constructed of stacked basalt cobble and boulder walls that utilize the slope of the natural outcrop. TU-2 was excavated in Feature B.

SITE -2047 EXCAVATIONS

Test Unit 1 (TU-1)

Test Unit-1 (TU-1) measured 1.0 by 1.0 m and was placed in the southeastern corner of the Feature A enclosure. The surface of the unit comprised architecture in the eastern half and piled cobbles and small boulders in the southwestern corner, with a level soil area occurring in the northwest corner. *Lantana*, Christmas berry, and large clumps of grass were present on the surface of the unit. The architectural layer was excavated to reveal a faced wall that extended northward from the southern wall. No cultural materials were observed within the architectural layer.

TU-1 contained four stratigraphic layers (Figure 20). Layer I (0 to 22–30 cmbs) consisted of very dark brown (7.5YR 2.5/3) fine silt with a large percentage of decomposing organic material. Rock content was high and roots were prolific. No cultural materials were observed within Layer I. Feature architecture was located near the base of Layer I. Layer II (22 to 30–34 cmbs) consisted of a black (10YR 2/1) very fine silt. Rock content was high and the presence of roots diminished with depth. Layer III (34–53 cmbs) consisted of very dark brown (10YR 2/2) silt. Rock content was high and consisted mainly of subangular basalt cobbles. Cultural materials recovered from Layer III consisted of one worked marine shell, one volcanic glass core, charcoal, faunal (bird) material, and a sparse amount of marine shell. Layer IV (53–67 cmbs) consisted of a dark, yellowish-brown (10YR 3/4) very fine silt. This soil was saprolitic and culturally sterile.

Midden

A sparse amount of faunal material, identified as medium bird bone, was recovered in the cultural strata. Additionally, only a very modest amount of marine shell (*Cypraea* sp. and non-diagnostic marine shell) was recovered from the Layer III cultural strata.

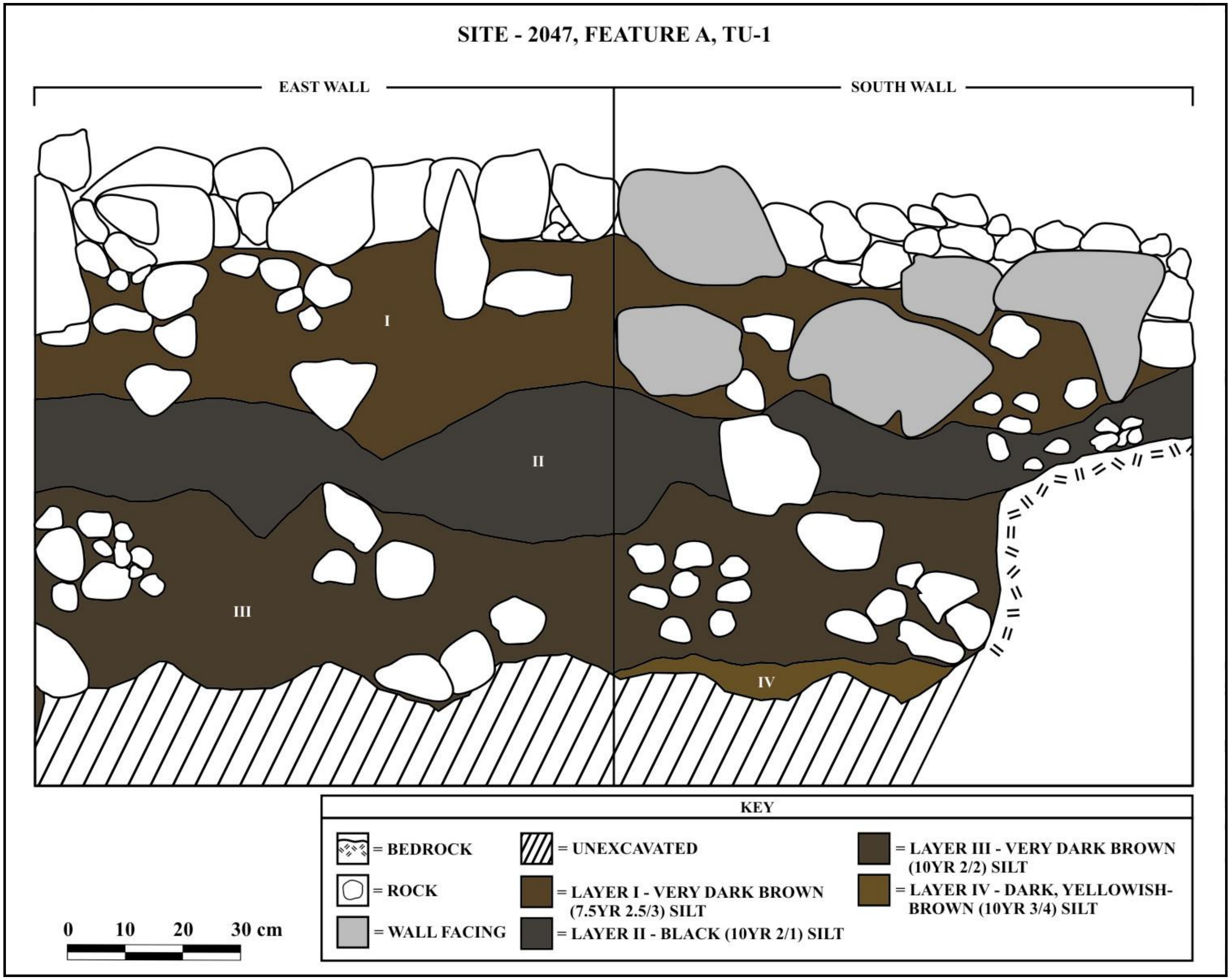


Figure 20: Site -2047, Feature A, TU-1 Profile.

Artifacts

Two artifacts were recovered from TU-1. The artifacts were also recovered from Layer III, the feature's primary cultural strata. One artifact was a modified, non-diagnostic marine shell that was worked to a rough oval shape. The second artifact consisted of a volcanic glass core with a single unprepared platform.

Charcoal

A total of 23.9 g of charcoal was found in TU-1. The charcoal was observed and collected from Layer III with no observable/apparent concentrations. This charcoal was not taxonomically identified.

Dating

One radiocarbon sample from TU-1 was submitted for radiocarbon dating. The sample was acquired from Layer I at 20 to 30 cmbs. The sample yielded an age range of 450$\pm$60 B.P. or within the two Sigma date range of A.D. 1390 to 1530. With one standard deviation, the sample yielded a date range of A.D. 1400 to 1495. The Layer I sample returned a firm 14th to 15th century date for construction of Feature A.

Test Unit 2 (TU-2)

TU-2 measured 1.0 m by 1.0 m and was located in the southwest corner of Feature B. The unit was positioned to abut the western wall and extend into the southern wall. A notched area of recessed cobbles was located in the southeast corner of the unit. The surface of the unit is composed primarily of architecture and tumble from the wall. The northeastern portion of the unit exhibits a roughly level soil surface. No cultural materials were observed on the surface of the test unit. The architectural component of the feature was excavated and created a roughly level surface. No cultural materials were observed within the architectural component of TU-2.

TU-2 contained two stratigraphic layers (Figure 21). Layer I (0–75 cmbs) consisted of very dark, grayish-brown (10YR 3/2) silt. It contained an extensive cultural deposit and two subsurface features (SSF-1 and SSF-2). Feature architecture was based at the terminus of Layer I (60–70 cmbs). Cultural materials were observed and collected from 20 to 80 cmbs, some of the cultural deposits having moved downward into Layer II through time. SSF-1 was encountered within Layer I at 24 cmbs and extended to 54 cmbs (Figure 22). The feature was located along the north wall of TU-2 and was classified as a rock-lined hearth. The feature measured 75 cm by 50 cm and extended into the north wall of the unit. The terminal spatial extent of the feature remained undetermined. The feature was characterized by a thin layer of light brown ash

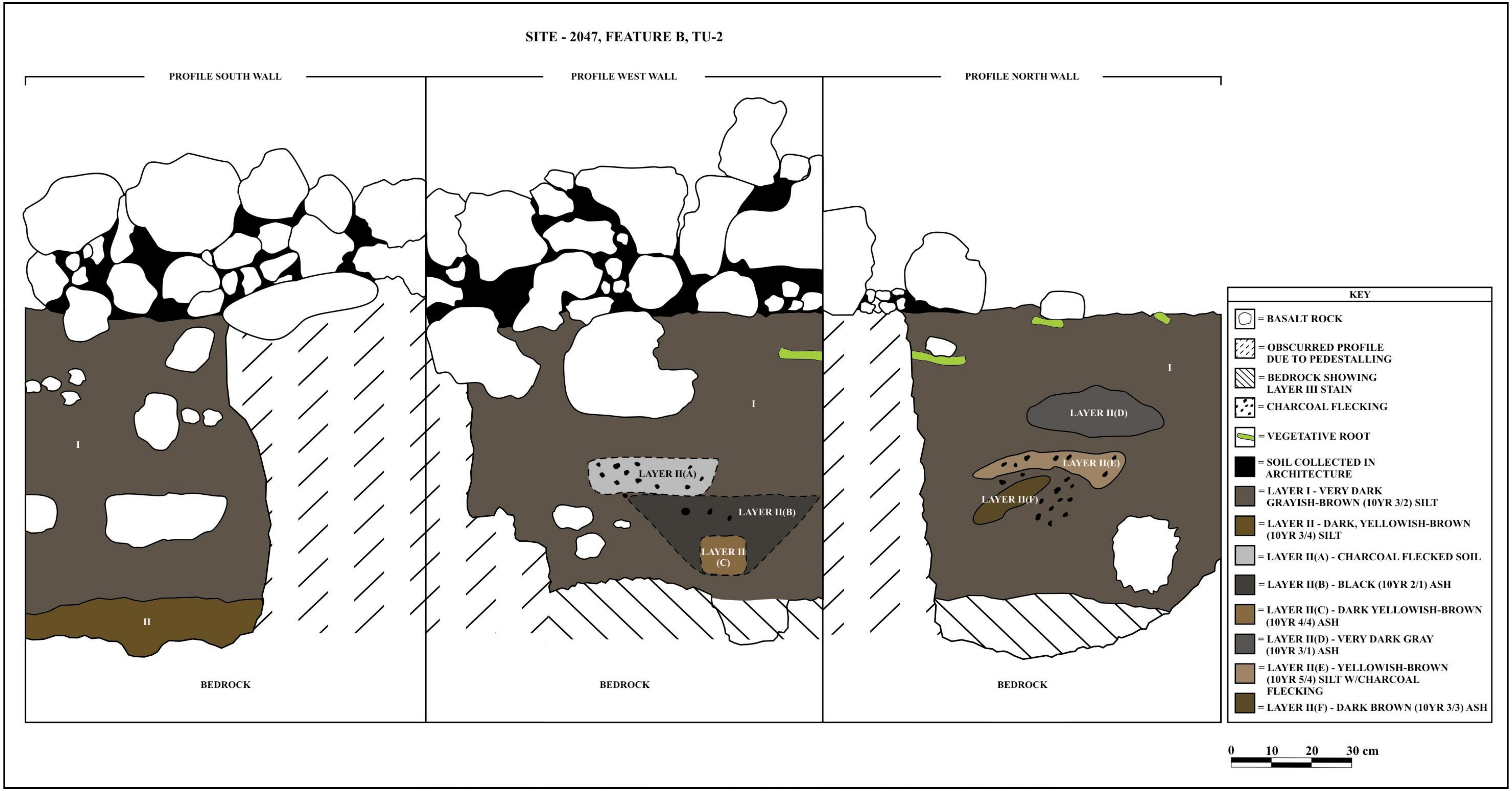


Figure 21: Site -2047, Feature B, TU-2 Profile.

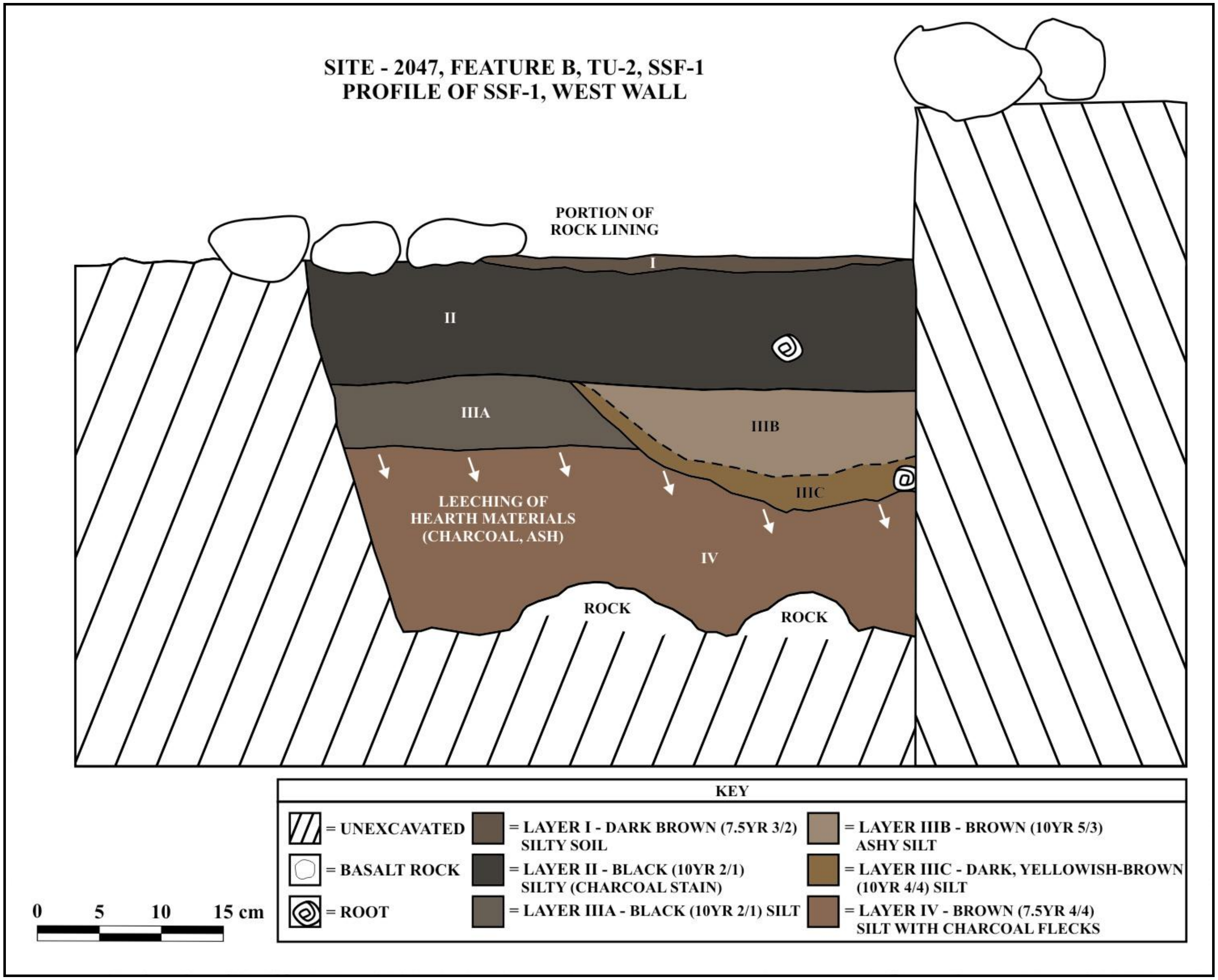


Figure 22: Site -2047, Feature B, TU-2, Profile of SSF-1.

interspersed with gray and black ash overlying dark, charcoal-stained silt that contained an abundance of cultural materials. The concentration of cultural materials increased with depth. Cultural materials recovered from the hearth included one basalt flake with polish, basalt and volcanic glass debitage, charcoal, faunal materials including the remains of fish, bird, pig, and dog, marine shell, crustacean, and echinoid. Cultural materials were concentrated between 24 and 44 cmbs. The last 10 cm of SSF-1 consisted of charcoal stained silt, this likely due to leeching from above. Constructed hearthstones were found in the west wall underneath the architecture of the feature indicating that the hearth (SSF-1) predated or was fairly contemporaneous with Feature B construction. The matrix surrounding SSF-1 contained cultural materials as well; they were concentrated between 20 to 62 cmbs and included basalt and volcanic glass debitage, charcoal, faunal materials, marine shell, and echinoid. These materials may have been cleaned from the hearth at one time.

The second subsurface feature, SSF-2, was encountered at the base of SSF-1. These subsurface features show two distinct events in one location of the site. It appears likely that this portion of Feature B was utilized as a primary food preparation area. In general, SSF-2 was non-discrete and was interpreted as a diffuse hearth. The feature measured roughly 24 cm by 24 cm and extended into the north and west walls for an undetermined distance. The feature was encountered at 54 cmbs and extended to roughly 72 cmbs; however, all boundaries were indistinct and diffuse. The matrix of SSF-2 consisted of light brown, highly mottled ashy silt overlying brown feature fill with charcoal. A possible post mold was located in the northwest portion of the feature. The post mold measured 8 cm in diameter and extended from 65 to 74 cmbs. The post mold matrix consisted of light brown silt similar to the matrix of SSF-2. This secondary feature may have been a truncated post mold or simply a burrow pit. Cultural materials recovered from SSF-2 included charcoal, echinoid, crustacean, and fish bone. The feature terminated within Layer I.

Layer II (69–84 cmbs) consisted of a dark, yellowish-brown (10YR 3/4) silt with a moderate amount of small to medium cobbles (<50%) and few, small roots. As the surface of Layer II was undulating, the depths of Layer II varied throughout the test unit. Layer II was mainly concentrated in the southern half of the unit. Cultural materials diminished with depth and charcoal flecking appeared to be concentrated in the area beneath SSF-2, this likely a function of leeching. The unit was terminated upon encountering bedrock.

Midden

A variety of faunal material was recovered from TU-2. Identified species included fish, chicken, medium and medium to large bird, dog, pig, small to medium mammal, and medium vertebrate. A minimal amount of marine shell was recovered, with the identified species including *Nerita picea, Theodoxus neglectus, Mitrella bella, Isognomon californicum, Isognomon sp., Tellina palatam*. Introduced land snail was also found. These faunal classes include the presence of dog and pig remains as well as shell midden, the latter acquired from a marine environment far removed from Kēōkea.

Artifacts

A total of eight artifacts were recovered from TU-2. All of these artifacts were recovered from Layer I, the primary cultural strata of Feature B. The artifacts included a basalt flake with one polished surface, one secondary flake, three intermediate flakes, and three non-diagnostic flakes.

Charcoal

A fairly large amount of charcoal was collected from various proveniences in TU-2. Minimally, 249.4 g of charcoal was collected, with additional amounts collected from soil matrix samples. The charcoal was collected from Layer I and from within the two subsurface features. SSF-1 and SSF-2 contributed a majority of the sample size of charcoal, as would be expected of hearths.

Dating

Three charcoal samples from TU-2 were submitted for radiocarbon dating. The first sample was acquired from Layer I at 20 to 30 cmbs. The sample yielded an age range of 280±60 B.P. The calendric date for this sample is within the two Sigma date range of A.D. 1450 to 1680 and A.D. 1510 to 1670 at one Sigma. The second sample was acquired from Layer I, SSF-1 (44–54 cmbs). The sample yielded an age range of 330±40 B.P. The sample yielded a two Sigma calendric date of A.D. 1460 to 1650 and a one Sigma date of A.D. 1550 to 1640. The third sample was acquired from near the base of the Layer I cultural deposit at 60 to 70 cmbs. The sample yielded an age range of 220±70 B.P. The calendric measurement of this date is A.D. 1500 to 1890 at two Sigma and A.D. 1630 at 1820 at one Sigma. This third date, a protohistoric date from a sample retrieved at a greater depth than the frist two dates, shows some stratigraphic incongruity. This may be a function of dating a partially disturbed layer versus the more intact subsurface feature. Regardless, the dates show definite prehistoric activity at the site suggest that the site was constructed and utilized in the A.D. 1400 to 1600 range. The presence of the two subsurface features may be argued to show intensive use (food preparation) of one structural area at Feature B almost certainly done in concert with finished site construction.

STATE SITE 50-50-10-2049

SITE -2049 SUMMARY

State Site No. -2049 (PHRI Site No. K-4) consists of two partially attached enclosures designated Feature A and Feature B (Figure 23). The site is located on a gently sloping alluvial plain to the south of a small, unnamed drainage ditch. Site -2049 is located at 695.0 m amsl, approximately 220.0 m southwest of the northern boundary of the project area and 250.0 m east of the western boundary of the project area. Site -2049 also occurs within the proposed Historic Preserve Area. Vegetation in and near the site consists of *lantana*, grasses, and *`ilima*.

Based on architectural evidence, the site is consistent with a traditional, pre-Contact habitation location (see Brown *et al.* 1989). However, based on present research, the site is more specifically argued to be a men's *hale*. The two features, which are connected by several low walls, occupy an area of approximately 22.0 m by 15.0 m (330.0 m^2). Feature A, a C-shaped enclosure on the northeast of the site, measuring approximately 7.2 m by 6.0 m, was not tested. One test unit (TU-1) was excavated within the enclosure designated Feature B, a rectangular enclosure measuring approximately 8.5 m by 7.5 m. Human remains were found in Feature B and thus no more excavations took place at the site.

The single test unit excavated in Feature B yielded traditional artifacts, including several possible adze fragments, basalt debitage, and volcanic glass. Faunal remains (*i.e.*, pig, fish, and sea urchin) and charcoal were also recovered. Six native Hawaiian plant species were identified from the charcoal samples. Human remains, represented by a single, *in situ* vertebra, were also identified. The vertebra was thought to represent a portion of a fully articulated, *in situ* individual. Following protocol and consultation with the appropriate parties, the test unit was terminated and back-filled. All finds, including the single human vertebra, were reburied. As was suggested by the provenience of the cultural materials in relationship to the burial, the burial post-dated the protohistoric period cultural deposit. The two events were not associated in time, only in space. At the request of the Maui/Lana`i Islands Burial Council (MLIBC), charcoal samples were retained for radiocarbon dating. Two radiocarbon samples were processed and reveal the upper contexts of the site's cultural deposit dating from A.D. 1630 to 1670, into early historic times. These two samples post-dated site construction and likely intimate the near

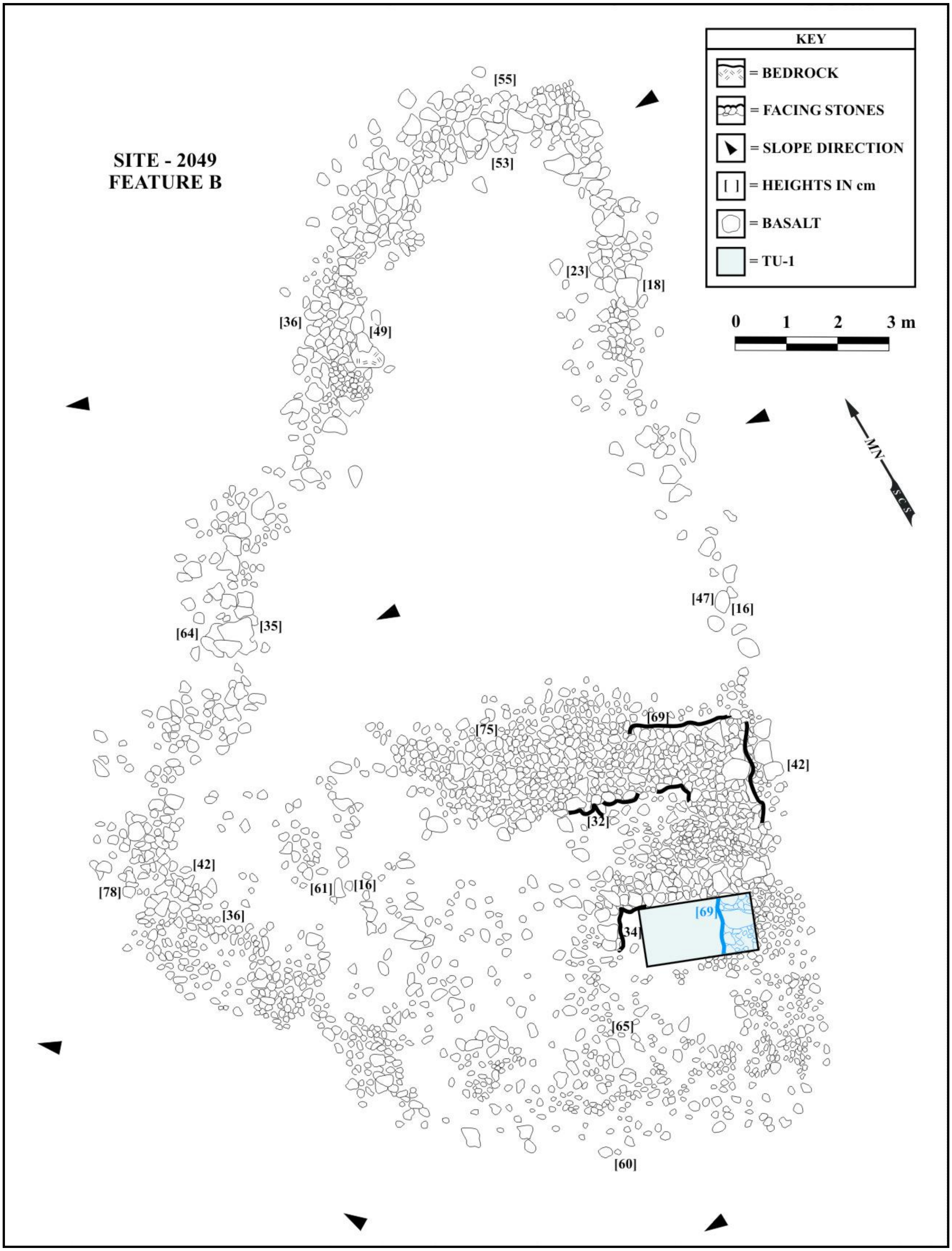


Figure 23: Site -2049 Plan View Map.

terminal dates for site occupation. Site construction is estimated to have occurred well within traditional times.

SITE -2049 FEATURE DESCRIPTION

Feature B

Feature B is a partially disturbed, rectangular enclosure with one possible partition in its interior. The feature measures approximately 8.5 m by 7.5 m (exterior dimensions; 63.8 m^2) and is best preserved and intact along the northeast and southeast walls. Facing is present on portions of both the interior and exterior of the northeast and southwest walls, both which attain a maximum height of approximately 30 cm above the surface. These intact sections demonstrate that the original wall width was approximately 1.0 m. Informally aligned stones emanate from the east corner of Feature B north to Feature A. More loosely aligned stones connect the western portion of Feature B to the other side of Feature A. TU-1 was excavated in Feature B.

SITE -2049 EXCAVATION

Test Unit 1 (TU-1)

One test unit (TU-1), measuring 1.0 m by 2.0 m, was excavated in Feature B. The test unit was positioned within the feature to examine wall architecture and to test for the presence/absence of cultural material. Based on small sections of intact wall facing, Feature B was originally subdivided into two units, possibly room partitions. The test unit was placed in the interior, northeast corner of the southern partition in Feature B. The unit abutted the feature's north wall and breached the interior facing of the east wall. Excavation of TU-1 proceeded in five arbitrary 10-cm levels before the unit was terminated and back-filled at approximately 46 cmbs. Excavation of TU-1 demonstrated that the east and north walls extend approximately 30 cm to 40 cm below the ground surface, well into the second stratigraphic layer.

Two major stratigraphic units were exposed in TU-1 before it was terminated and back-filled (Figure 24). Layer I, composed of dark brown (10YR 3/3) silt, including the present ground surface—where not covered by stones-was a variable 10 cm to 15 cm thick. Roots and rootlets were abundant throughout the layer. Subangular pebbles, cobbles, and boulders comprised 50 percent or more of the matrix. A traditional stone tool and flecks of charcoal were identified in this layer. Layer II consisted of two lateral facies that were separately named. Layer IIa was a dark brown (10YR 3/3) silt (western half) and Layer IIb was a reddish-brown (5YR 3/4) silt (eastern half). This layer was approximately 25 cm to 30 cm thick when terminated, and its base depth was not determined. The stacked boulders comprising the base of the enclosure walls were located in this layer. Roots and rocks were less abundant than the overlying layer. Traditional stone tools (adze, basalt debitage, volcanic glass), faunal remains

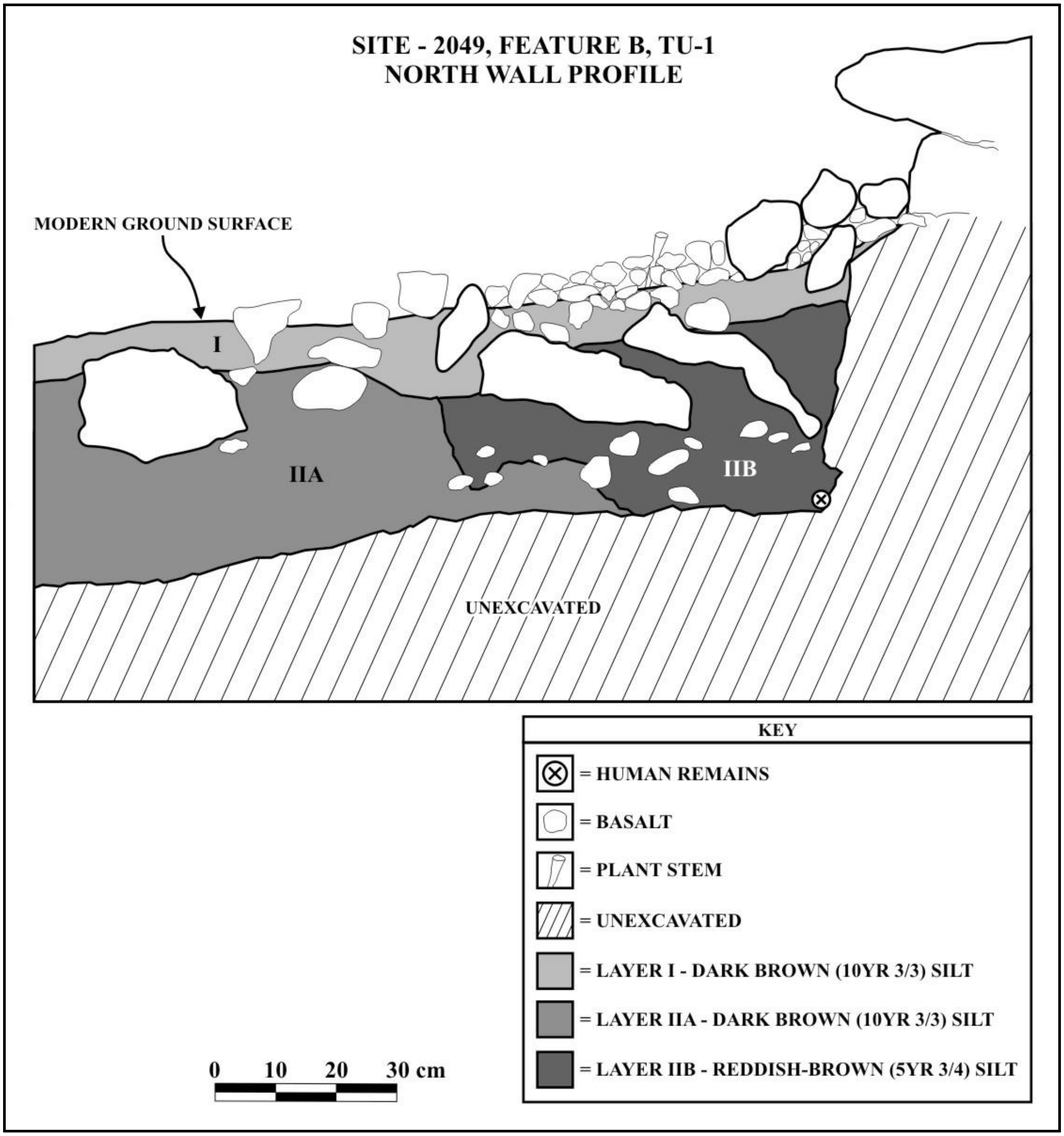


Figure 24: Site -2049, Feature B, TU-1 Profile.

(pig tooth, among others), sparse amounts of marine shell, and charcoal were recovered from Layer II, in addition to the single human vertebra.

Inadvertent Discovery of Human Remains

A single vertebra, thought to represent a segment of an articulated human burial, intruded through the cultural deposit into Layer II at 46 cmbs. Based on stratigraphic association, the burial seems to post-date, and is therefore independent of, the cultural deposit. The primary burial was an adult oriented north-south within the eastern flank of the unit. Once the remains were identified as human, all work in the area ceased and protocol concerning the inadvertent discovery of burials was performed. An on-site, re-burial ceremony was conducted on May 23, 2002 by Charles Maxwell Sr. of the MLIBC. As only based on the presence of a single vertebra, the burial at Site -2049 is thought to represent a single, *in situ*, articulated find. Premised on its primary association directly through the documented cultural stratum, the burial was interpreted to post-date occupation of the site. It is possible that the burial was historic, perhaps from the early 19th century, and was interred through an existing cultural deposit. The deposit itself dated to protohistoric times.

Midden

Other than a small amount of charcoal and several faunal vertebrate remains, midden recovered from Level 2 (10–20 cmbs) in TU-1 consisted of several fragments of sea urchin (Echinoidea). The presence of this marine species several miles from the coast indicates its introduction into the site by humans, presumably as food items. This material was reburied in TU-1.

Artifacts

Several traditional artifacts were recovered from Layers I and II in TU-1. These include several adze fragments, core tools, and various basalt and volcanic glass debitage. No formal analysis of the tools was conducted. These artifacts were all re-interred in TU-1 with the human vertebrae.

Charcoal

Charcoal was recovered from Levels 1 through 4 (0–40 cmbs) in TU-1. Level 2 yielded only a trace amount of charcoal (1.0 g). Levels 3 and 4 produced more significant quantities (29.5 g and 63.8 g, respectively). This was the only material collected from TU-1, per request of the MLIBC.

Taxonomic Identification of Botanical Remains

Sixty-six wood charcoal samples were analyzed for taxonomic affiliation from Level 3 (62 specimens) and Level 4 (4 specimens) in TU-1. All six identified taxa are native to Hawai`i. The majority of specimens (50 of 66 pieces, 86% by weight) represent one taxa, *Chamaesyce* sp. In decreasing order by weight (g), the taxa present in TU-1 included the following:

- *Chamaesyce* sp. (*`akoko*)—a shrub traditionally used for firewood (50 pieces)
  Dodonaea viscose (`a`ali`i)—a shrub traditionally used for *lei* (flowers and fruit pods) and house posts (5 pieces)
- *Psychotria* sp. (*kopiko*)—a tree traditionally used for firewood and to make *kapa* logs (7 pieces)
- *Nototrichium sandwicensus* (*kulu`i*)—a shrub with unknown uses (2 pieces)
- *Sida fallax* (*`ilima*)—a shrub used for floor and wall habitation coverings, as well as medicine (1 piece)
- *Nestegis sandwicensis* (*olopua*)—a tree traditionally used for adze handles, spear shafts, digging sticks, and kindling (1 piece)

These wood samples reflect a wide variety of traditional uses including house building, medicinal use, various kinds of tools (including fishing gear), and firewood. The botanical data alone are suggestive of a habitation site where multiple and varied activities took place. The wood sample record also reveals only native species present in the sample, a pattern showing that non-native species, if existent at the time of site use, were not utilized. The lack of historic materials at the site also supports the notion for pre-Contact occupation of the site.

Faunal Analysis

Several vertebrate specimens, including pig and fish bones, were recovered from TU-1. Per burial protocol, these faunal remains were reburied and no formal analysis of the faunal remains was conducted. Simply the presence of pig remains at the site is significant due to their possible social implications.

Dating

Two radiocarbon dates were obtained from Levels 3 and 4 of TU-1. The samples were based on carbonized *Chamaesyce* sp. (*`akoko)*. A date of 250±40 B.P. was obtained from between 20 and 30 cmbs. The calendric age of this date is A.D. 1510 to 1680 at two Sigma and A.D. 1630 to 1670 at one Sigma, both firmly associated with traditional times. A second date of 170±40 B.P. was obtained from 32 cmbs in Level 4. The calendric date of this sample measured

A.D. 1650 to 1890 at two Sigma and A.D. 1730 to 1820 at one Sigma. Thus, as is apparent, the two samples are not entirely consistent with their stratigraphic position in the test unit (*i.e.,* the slightly younger date is lower in the sequence). However, the standard deviations of the two samples overlap. The two samples both post-date site construction. The single identified human remain was located 15 cm lower than these dated sediments. The latter charcoal sample may have been a victim of stratigraphic disturbance during burial interment sometime during historic times. The dates together, however, suggest continued but varied use of the feature from traditional times (1600s; habitation function) through protohistoric times (habitation/burial function).

STATE SITE 50-50-10-2050

SITE -2050 SUMMARY

Site -2050 (PHRI Site No. K-8) is a three feature complex (Feature A, B and C), although Data Recovery investigations modified earlier descriptions of Feature A by adding an ancillary feature (Figure 25). The site is located at 692.0 m amsl and approximately 80.0 m east of the western project area boundary. The site is situated on ridge that slightly slopes to the west. Site -2030 is located approximately 35.0 m to the north on the same ridgeline. The local landscape consists of dissected alluvial slopes and present vegetation in the area is dominated by various grasses, *lantana*, and `*ilima*.

During Inventory Survey, this site was designated as a traditional, pre-Contact habitation and agricultural site, a common functional interpretation for site complexes in the area (Brown *et al*. 1989:E-5). The site measures 70.0 northwest-southeast by 35.0 m (total area of 2,450.0 m²). Feature A, an enclosure, is located in the northwest portion of the site and measures approximately 20.0 m by 15.0 m. Three test units (TU-1 through TU-3) were excavated within this feature. Feature B is a rectangular enclosure located in the eastern portion of the site and measures 13.0 m by 7.0 m. One test unit (TU-6) was excavated in this feature. Feature C is a rectangular enclosure located to the south of Feature A and west of Feature B. The feature measures 12.0 m by 8.0 m and two test units (TU-4 and TU-5) were excavated within this feature.

SITE -2050 FEATURE DESCRIPTIONS

Feature A

Feature A is an enclosure measuring 20.0 m long by 15.0 m wide (Figure 26). The feature is rectangular in shape with intact facing on both the exterior and interior walls of some

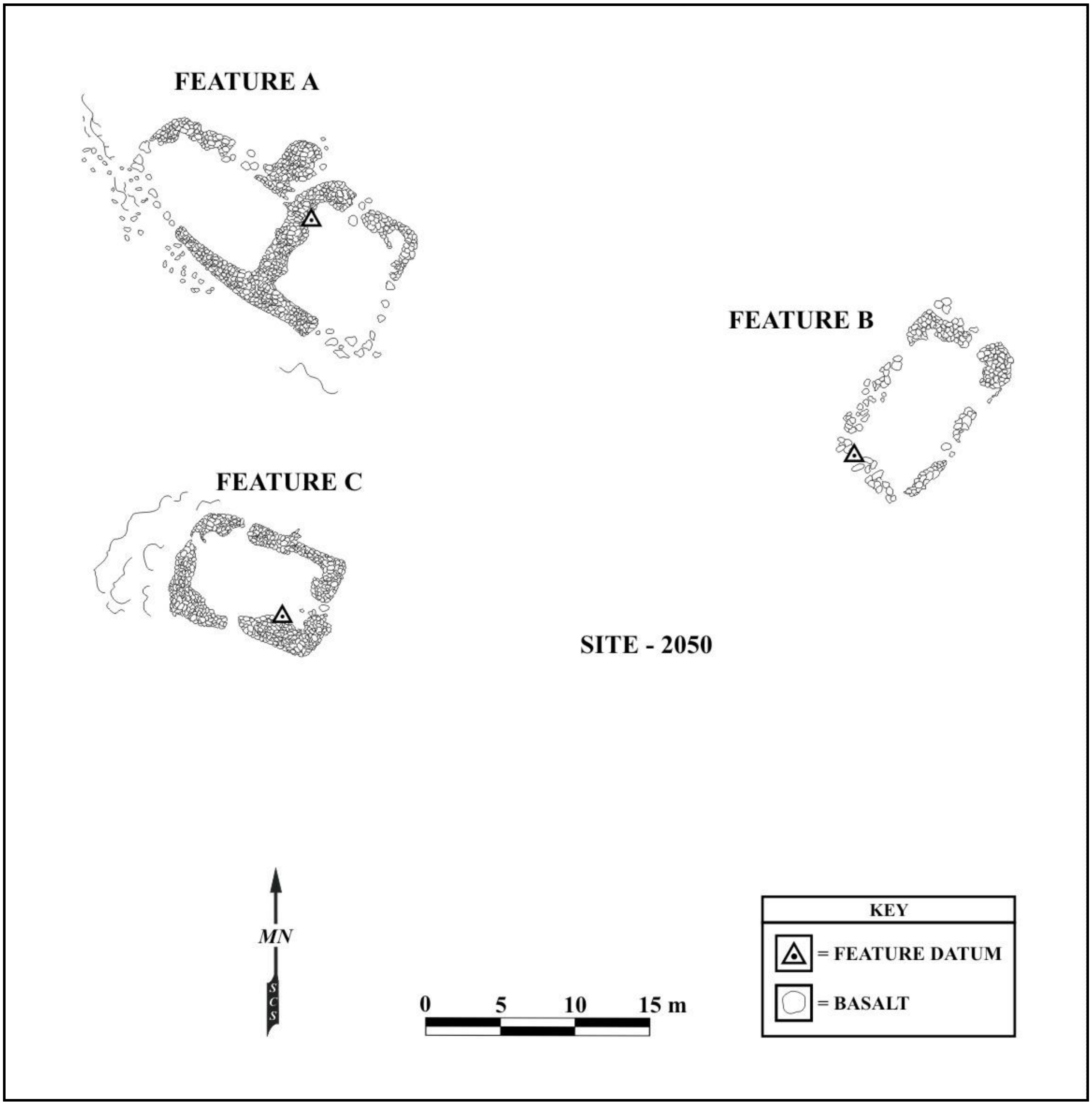


Figure 25: Site -2050 Plan View Map.

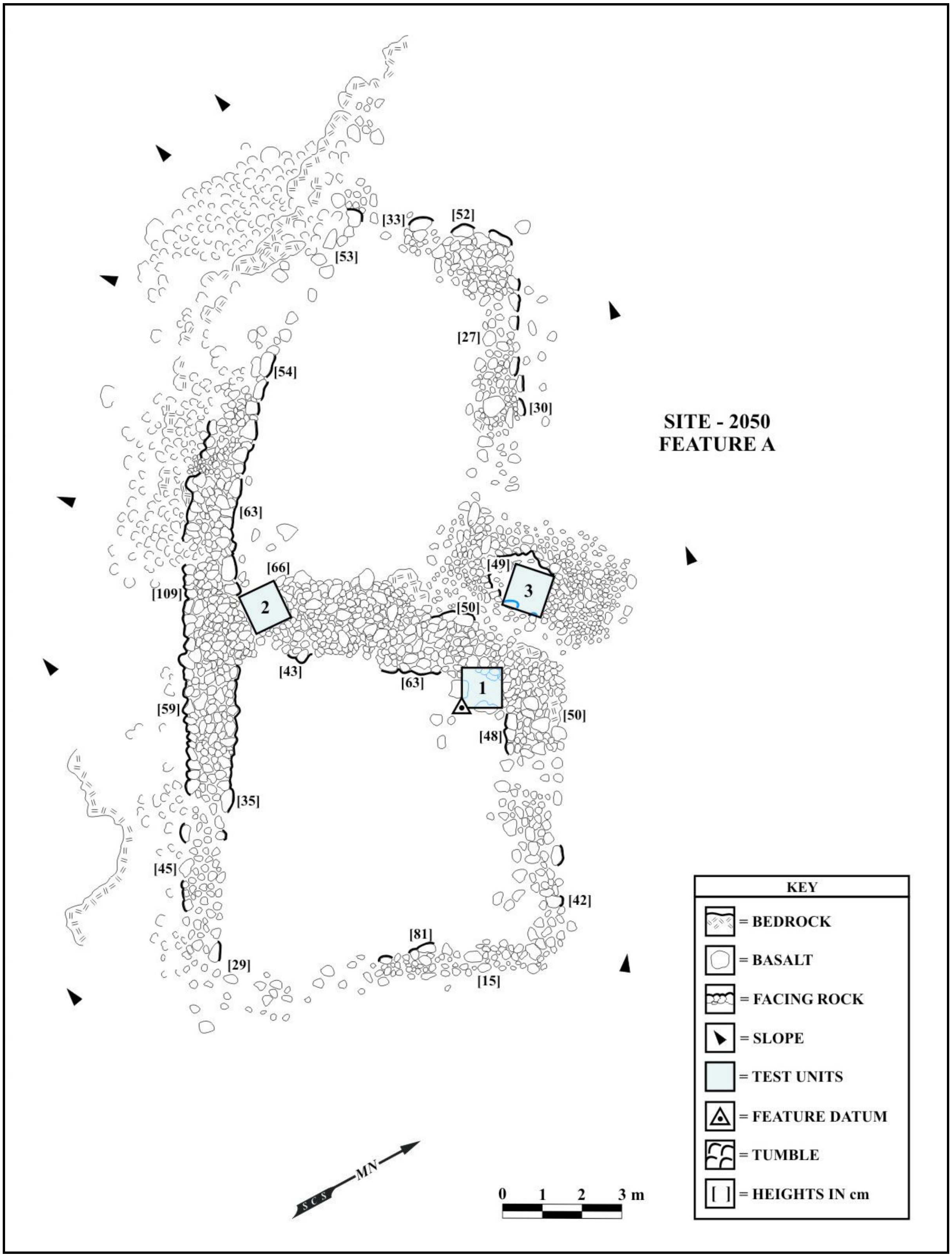


Figure 26: Site -2050, Feature A Plan View.

portions of the feature (Figure 27). Wall widths range from 1.0 m to 1.5 m and wall heights range from 29 cm to 109 cm above the ground surface. The feature was constructed on bedrock with stacked sub-angular cobbles and boulders. A rock-lined hearth was located off the northwest corner of the structure. An ancillary structure is located on the western side of the enclosure. The structure consists of an oval-shaped enclosure with faced interior walls. The ancillary feature measures 4.0 m by 2.0 m and was thought to be a food cooking or storage area. The interior, enclosed space of the feature measures 1.2 m by 1.2 m. Three test units were excavated within Feature A. One test unit was excavated within the ancillary enclosure. TU-1, TU-2, and TU-3 were excavated in Feature A.

Feature B

Feature B is a rectangular enclosure measuring 13.0 m long by 7.0 m in wide (Figure 28). Wall widths average 1.0 m and heights range from 26 cm to 65 cm, this variation due to wall disturbance. Intact facing is present on the interior of the northeast corner. One test unit was excavated within Feature B. TU-6 was excavated in Feature B.

Figure 27: Site -2050, Feature A with TU-1 Location. View to West.

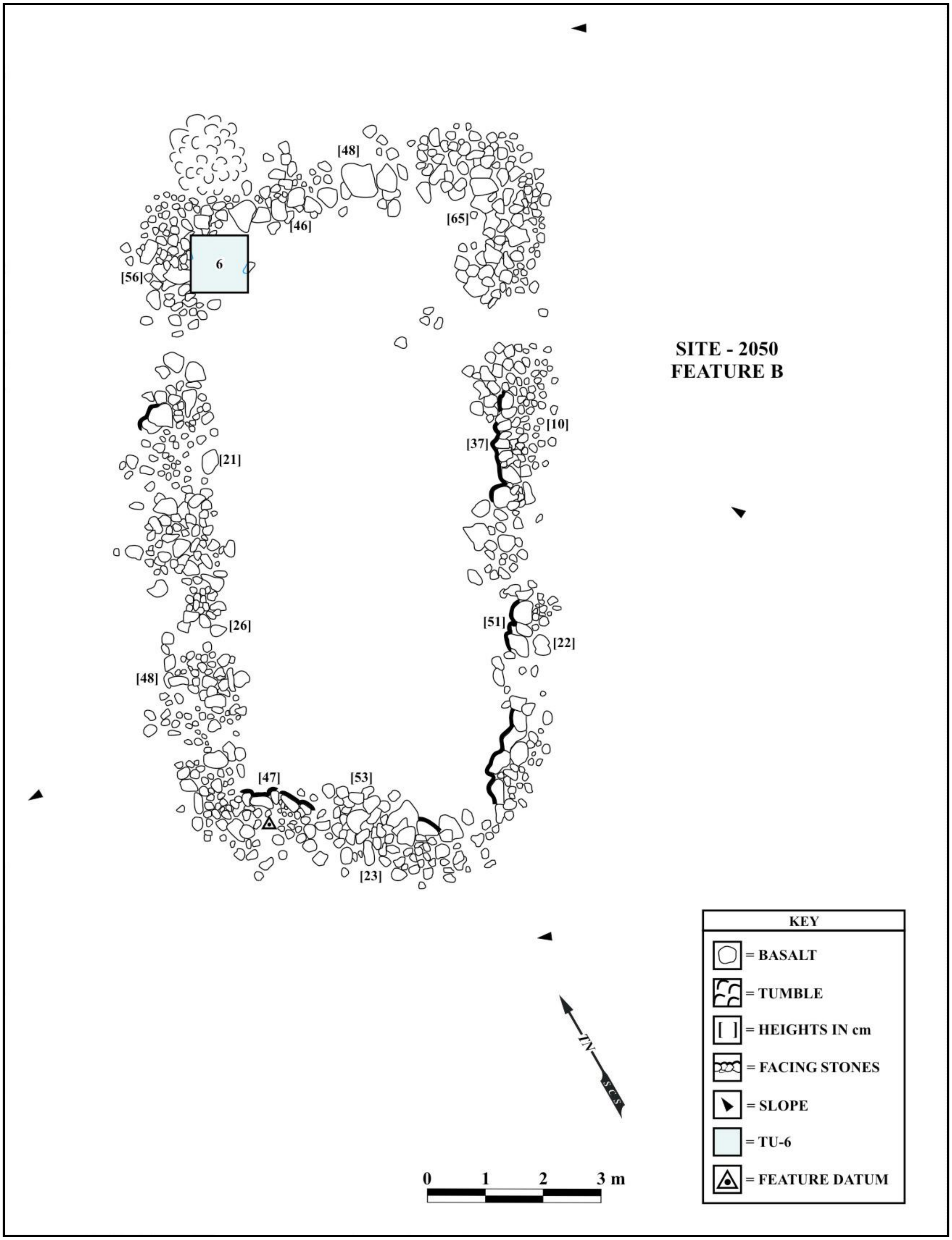


Figure 28: Site -2050, Feature B Plan View.

Feature C

Feature C is a rectangular enclosure measuring 12.0 m long by 8.0 m wide (Figure 29). Wall widths average 1.5 m and heights range from 23 cm to 70 cm. The feature exhibits intact facing on some interior and exterior portions. Historic-era ranching activities have led to extensive damage of the feature walls. TU-4 and TU-5 were excavated in Feature C. During excavation, human remains were encountered in one unit. The human remains were left *in situ* and excavated materials were returned to their original provenience.

SITE -2050 EXCAVATIONS

Test Unit 1 (TU-1)

TU-1 measured 1.0 m by 1.0 m and was placed in the northwest corner of a wall partition partially dividing Feature A. TU-1 abutted the north and west corner of the structure. The surface of the excavation unit comprised small to large *a`a* cobbles and small boulders with decomposing organic matter filtering through the rock spaces. The stones in the unit measure a maximum 55 cm above the ground surface on the interior of the feature. The architectural layer was excavated to ground surface and continued into the soil layers. No cultural material was observed or collected from the architectural layer.

Only one stratigraphic layer was encountered in TU-1 (Figure 30). Layer I (0–49 cmbs) consisted of a dark brown (7.5YR 3/2) loose silt. The matrix contained an average of 30 to 40 percent small cobbles and many small to medium roots. Cultural material recovered from Layer I included charcoal, *kukui*, a basalt core fragment, marine shell, faunal material, volcanic glass, and basalt debitage. Cultural materials decreased in quantity and variety with depth. Rock content increased to 75 to 90 percent within the last 20 cm of Layer I. The unit was terminated on decomposing bedrock.

Midden

Sparse amounts of rat bone were located in all levels of the unit while fish was identified in lower levels. Only a limited amount of marine shell species were identified in the cultural strata. These included *Theodoxus neglectus*, *Cypraea* sp., and echinoid.

Artifacts

A total of four artifacts were recovered from TU-1 from the cultural strata between the surface and 30 cmbs. The small assemblage included one intermediate basalt flake, one secondary volcanic glass flake, and four non-diagnostic basalt flakes.

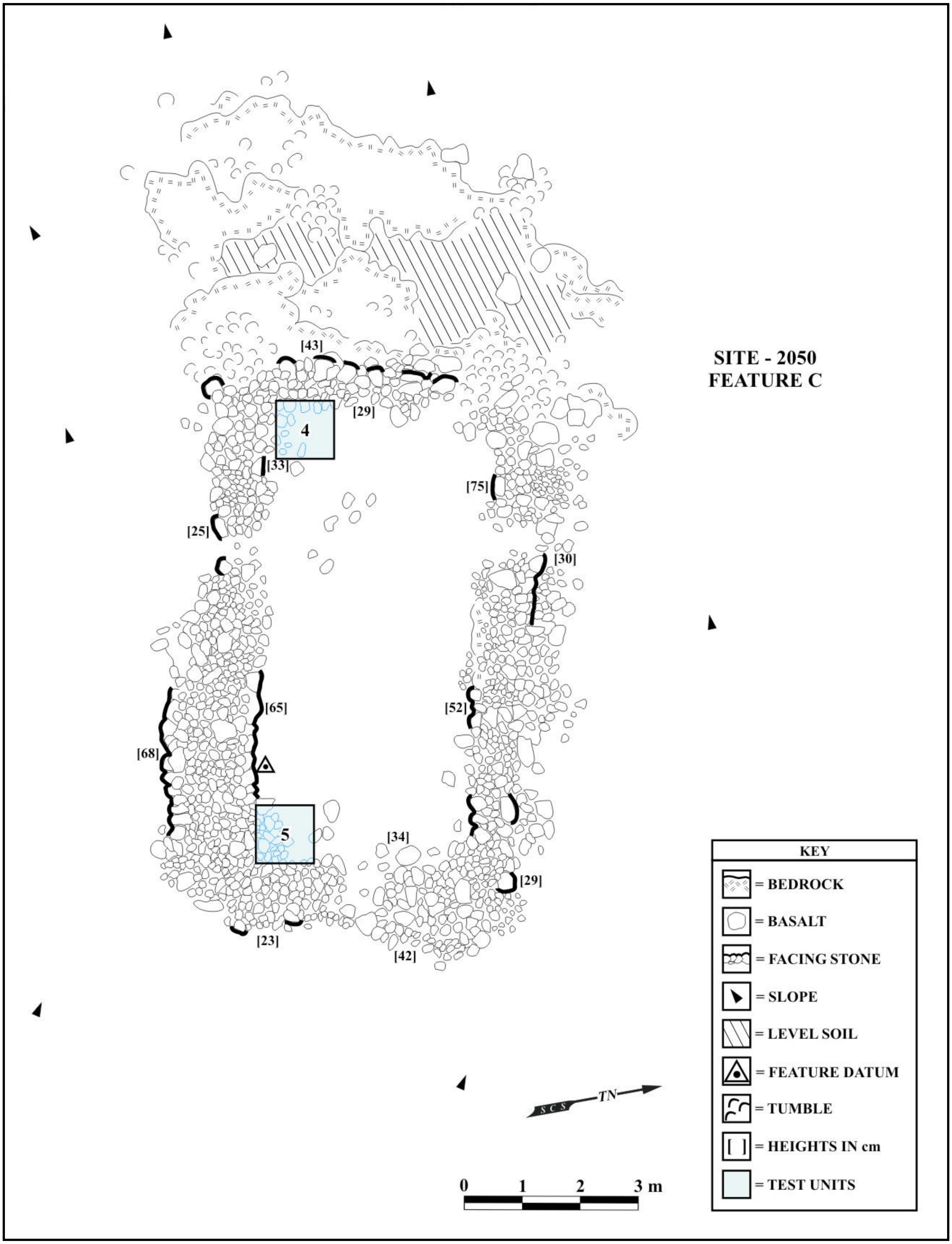


Figure 29: Site -2050, Feature C Plan View.

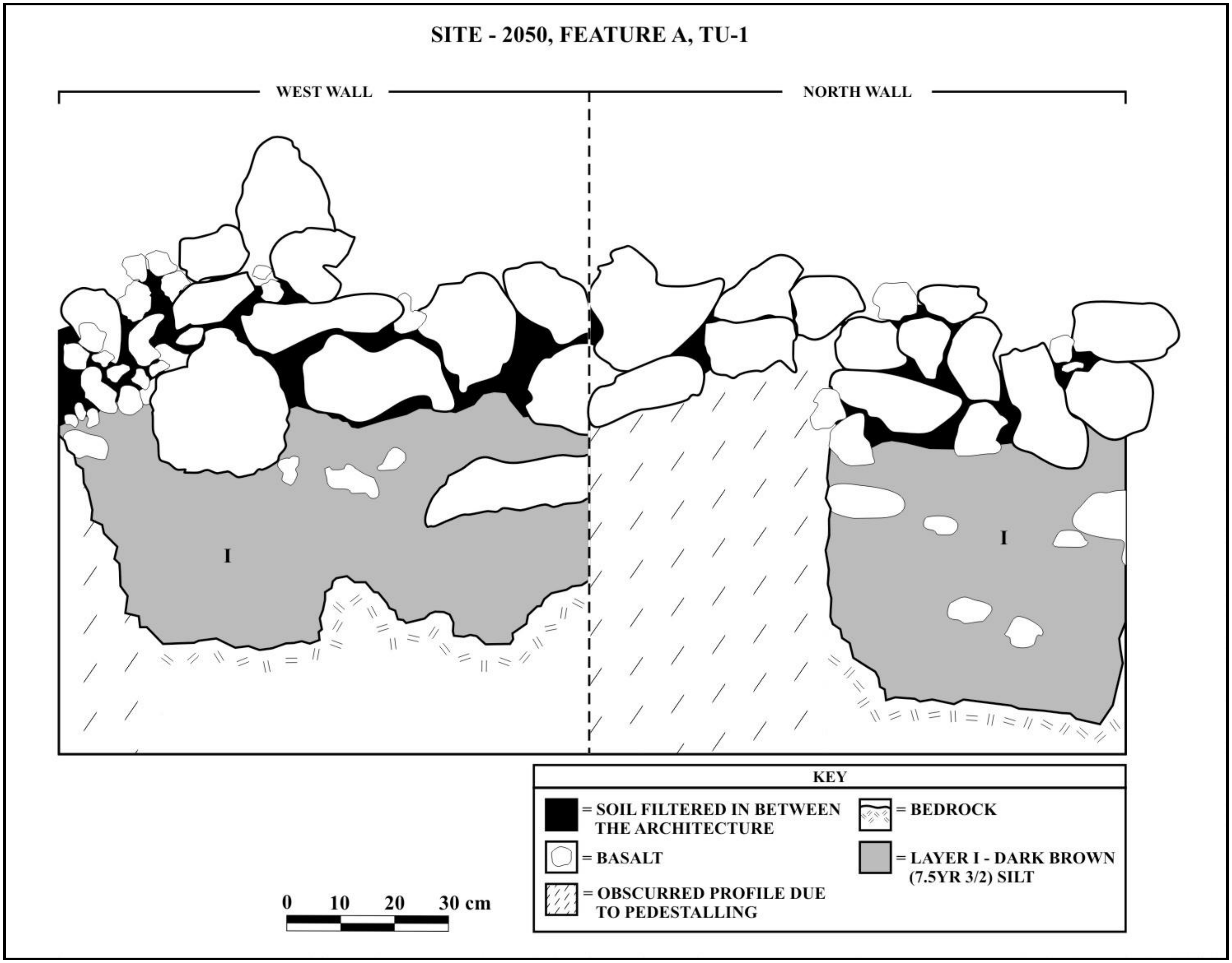


Figure 30: Site -2050, Feature A, TU-1 Profile.

Charcoal

A total 12.0 g of charcoal and 1.7 g of *kukui* was acquired from TU-1. The charcoal and *kukui* nut fragments were collected exclusively from the upper levels of Layer I (0–30 cmbs). The fragments were randomly dispersed throughout this provenience. None of the samples were submitted for radiocarbon dating.

Test Unit 2 (TU-2)

TU-2 measured 1.0 m by 1.0 m and was placed in the southwest corner of the interior wall in Feature A. As was the goal of most excavations during the project, this test unit was oriented abutting feature architecture to make arguments assessing what type of construction methods were used in building the feature and when the structure was built. The surface of TU-2 was composed of architecture and the maximum height reached 30 cm above the ground surface. The architectural layer was excavated to ground surface, with no architecture intruding into subsurface contexts. Feature construction consisted of large cobbles and small boulders that were loosely stacked, with smaller cobbles and pebbles used as fill between the larger rocks (a process commonly known as "chinking"). No cultural material was observed or collected from within the architectural layer.

Two stratigraphic layers were found within this unit (Figure 31). Layer I (0–36 cmbs) consisted of black (10YR 2/1) silt. The matrix contained a 40 percent proportion of rocks, these being mostly small subangular cobbles. A wide variety of cultural materials were recovered from the soil surface to approximately 30 cmbs, with a sparse amount of charcoal extending to the base of excavation. Thus, there is a definite correlation between feature architecture and site activity at Feature A in that all site activity was contemporaneous with feature construction. Cultural materials recovered from the cultural stratum included basalt debitage, charcoal, *kukui* nut fragments, faunal remains, and marine shell. A small amount of Layer II was found at the bottom of the north wall. Layer II (5 cm) was dark, yellowish-brown (10YR 3/4) silt. It was culturally sterile.

Midden

A fair assemblage of midden was recovered from TU-2, the volume and diversity exceeding that of TU-1. The TU-2 deposit may predate the deposit in TU-1. In this portion of the feature, the partition wall may have been constructed at a later date. Recovered marine shell species included *Cellana* sp, *Cypraea* sp, *Conus* sp, *Tellina palatam*, and *Echinoid*. Faunal remains included non-diagnostic fish bones and other fish such as medium *procellarid*, chicken, medium bird, dog, pig, small-medium mammal, and medium mammal. The presence of the dog

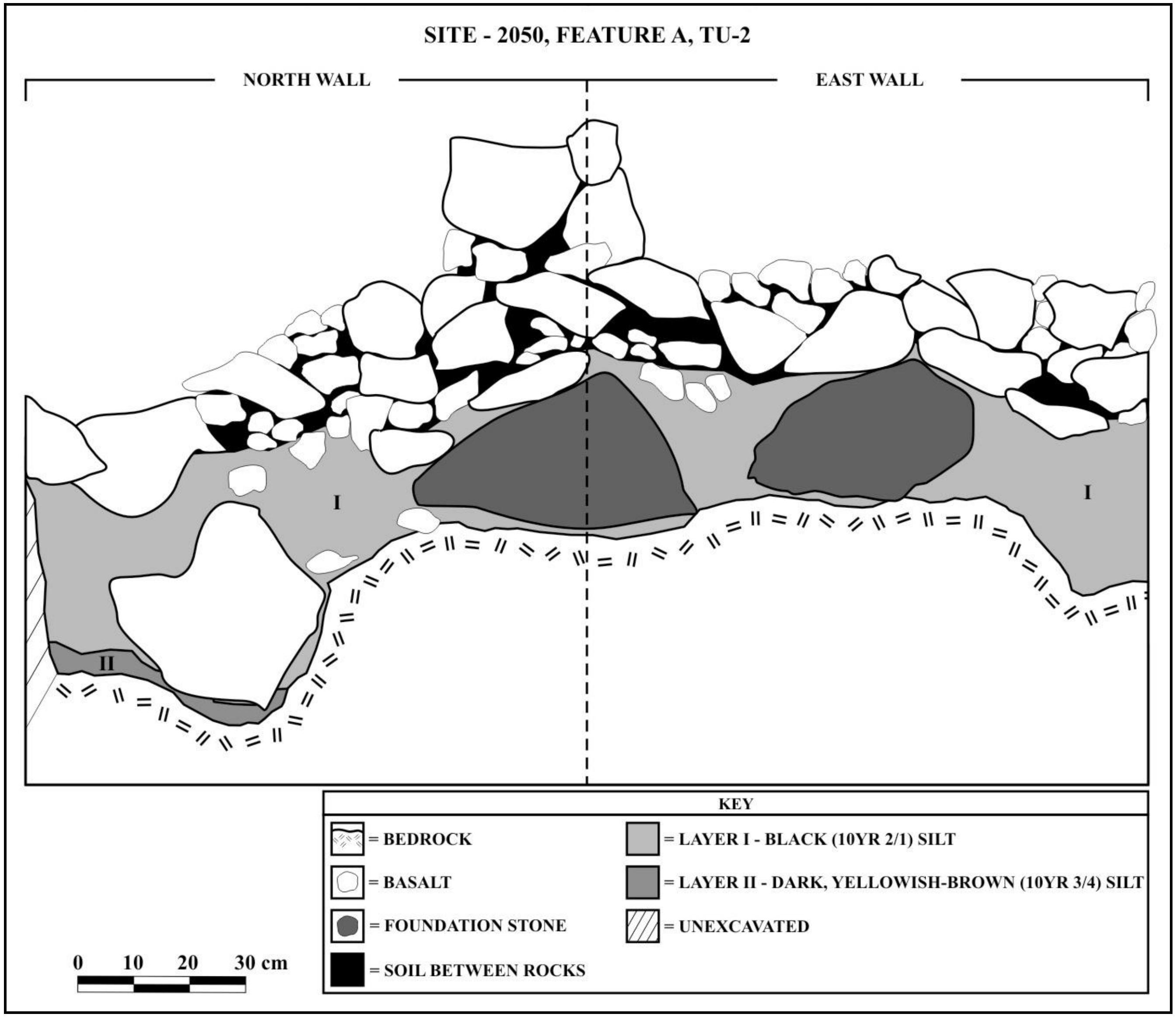


Figure 31: Site -2050, Feature A, TU-2 Profile.

and pig remains suggests that the site may have been used by higher-ranked individuals or was a men's *hale* (see Discussion section).

Artifacts

Only one artifact was recovered from TU-2. The artifact was a non-diagnostic basalt flake recovered from the approximate center of the cultural stratum.

Charcoal

A total 76.0 g of charcoal and 3.9 g of *kukui* nut were recovered from TU-2. The charcoal was randomly distributed through all the levels.

Dating

Two wood charcoal samples were submitted from TU-2. One *in situ* charcoal sample was submitted from Level 2 at 26 cmbs. This sample yielded an age range of 170±50 B.P. At two Sigma, the date range was A.D. 1650 to 1890 and at the one Sigma range it was primarily A.D. 1720 to 1820. Both of these dates are within protohistoric times. A second sample from Level 5 at 42 to 72 cmbs was also submitted. This sample yielded a range of 310±70 B.P. When calibrated, the date range at two Sigma was A.D. 1440 to 1680 and A.D. 1490 to 1650 at one Sigma, both ranges firmly within traditional times. The provenience of the older, second date correlates with the architectural base of the feature. The two events, feature construction and the burning episode that provided the charcoal, are thus presumed to be contemporaneous. The two samples date the earliest phase of occupation and construction of Feature A, no earlier than the mid-A.D. 1400s, with continuous use of the feature through protohistoric times.

Taxanomic Identification of Botanical Remains

Flora samples submitted for analysis portrayed use of a variety of native trees and shrubs. The upper stratigraphic sample yielded only one species of wood, *akoko*, which was commonly used as firewood. The lower stratigraphic sample yielded 13 native and Polynesian introduced varieties of trees and shrubs. Species identified within this sample included *akoko*, *aheahea*, *k`i, lama, a`ali`i, olopua, `aiea, kulu`i, `ulei, ho`awa, kopiko, hao*, and *i`lima*. Uses for these plants included consumption, medicine, firewood, tool handles, house construction, floor coverings, and possibly ornamentation such as floral garlands or *lei*.

Test Unit 3 (TU-3)

TU-3 also measured 1.0 by 1.0 m and was placed in the associated ancillary feature on the western side of Feature A. The test unit was placed abutting the southeast wall of the ancillary feature and bisected the edge of the raised platform area of Feature A and the depression on the southern end of the feature. The surface of the test unit was comprised of small pebbles and cobbles with decomposing organic matter filling the voids between rocks. The architectural layer was excavated to the soil surface and continued into contexts. An alignment of *a`a* boulders delineated the raised cobble platform from the depression. No cultural materials were observed within the architectural layer.

Three stratigraphic layers were encountered in this unit (Figure 32). Layer I (0–12 cmbs) consisted of very dark, grayish-brown (10YR 3/2) loose, silt commingled with organic debris. The matrix contained 50 percent basalt cobbles and boulders. Cultural materials recovered from Layer I included volcanic glass, a basalt flake, and charcoal. The architecture of the platform appeared to terminate near the base of Layer I. Layer II (12–62 cmbs) consisted of very dark brown (10YR 2/2) moist, loose silt. The matrix consisted of 30 to 40 percent small to large basalt cobbles. Cultural materials recovered from Layer II included a basalt flake with polish, basalt debitage, volcanic glass debitage, charcoal, marine shell, and faunal remains. Overall, it appeared as though the quantity of cultural material increased with depth. At the base of Level 3, approximately 20 to 25 cmbs, *in situ* chicken remains were encountered. A feature was also encountered at 25 cmbs, directly below the chicken remains, and extended to a maximum depth of 52 cmbs (see below). Interestingly, the *in situ* chicken remains encountered directly above the feature were unbutchered and unburnt. Layer III (62–65 cmbs) consisted of dark, reddish-brown (7.5YR 2.5/3) saprolitic-infused silt. Layer III was culturally sterile. The excavation of TU-3 terminated on bedrock.

One feature (SSF-1) was identified within the Feature A ancillary structure on the western side of TU-3. The feature was interpreted as a hearth or *`imu* pit. SSF-1 was encountered between 23 to 30 cmbs and extended throughout TU-3, with the exception of the northwest and northeast corner. The feature is pit-shaped and ranged in depth from 16 to 37 cmbs. The feature originated within Layer II and terminated at the top of Layer III (sterile saprolite). Feature fill sediment consisted of black (10YR 2/1) silt, this hue due to the abundance of charcoal flecking. Cultural material collected from within the feature fill included charcoal, a basalt core, volcanic glass, marine shell, echinoid, and faunal remains. Certainly food preparation through cooking was one function of the feature. It is possible that the remaining artifacts represent secondary deposition as they may have been cleared into the hearth upon its useful termination.

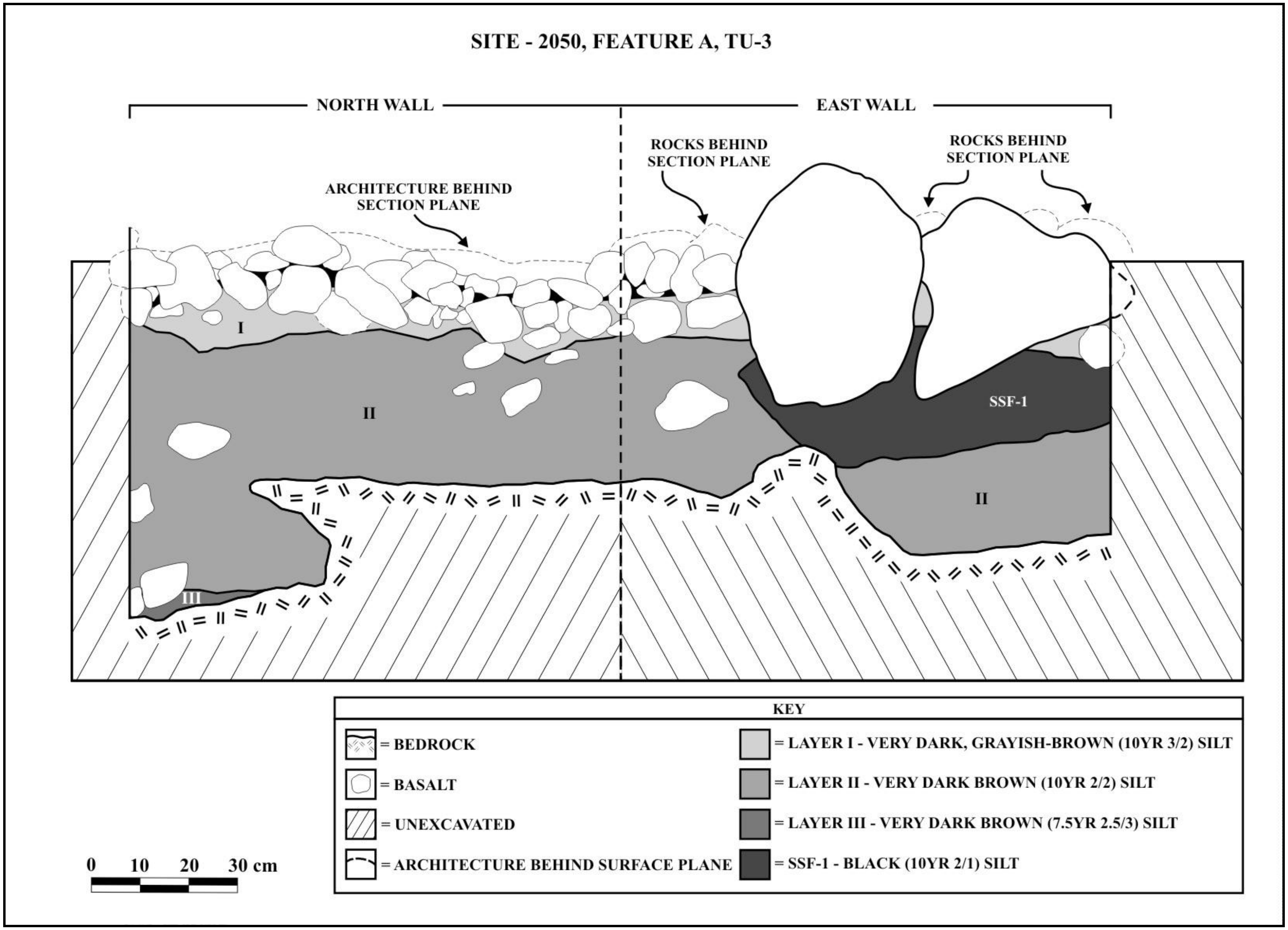


Figure 32: Site -2050, Feature A, TU-3 Profile.

Midden

A variety of midden was recovered from TU-3. Marine shell species included *Cellana* sp, *Cellana sanwichensis*, *Conus* sp, and non-diagnostic shell fragments. Additionally, *Echinoidea* and *echinometra mathaei* were identified within the deposit. Recovered faunal remains included fish, medium shearwater bird, chicken, Medium bird, rat, pig, and small-medium mammal. A greater volume and variety of midden was deposited above the feature. Land snail was also identified in the unit.

Artifacts

A total of 17 artifacts were identified in TU-3. All artifacts were collected from the Layer II feature. The artifact assemblage included a basalt flake with polish, six intermediate flakes, three secondary flakes, and nice non-diagnostic basalt flakes.

Charcoal

A total 114.1 g of charcoal was collected from TU-3. The charcoal was collected from all levels with the greatest concentration occurring in the combustion feature.

Dating

Two wood charcoal samples from TU-3 were submitted for analysis. One sample was submitted from the interface of the cultural strata and the feature. The second sample was acquired from the feature itself. Both samples were submitted from depths underlying the cobble paved platform inside the feature. It is proposed that this element of the features construction was added at a later time and its function remains unknown at this time. The first sample was acquired from a depth of 20 to 30 cmbs and yielded an age range of 400+50 B.P. When calibrated, the returned date range at two Sigma was A.D. 1420 to 1640 and A.D. 1430 to 1520 at one Sigma, both clearly within the 15th and 16th century. The second sample, acquired from the feature at 24 to 34 cmbs, yielded an age range of 330+60 B.P. After calibration, the date returned a range of A.D. 1440 to 1660 at two Sigma and A.D. 1480 to 1640 at one Sigma, both ranges also within the 15th and 16th century.

Test Unit 4 (TU-4)

TU-4 measured 1.0 m by 1.0 m and was excavated in the northwest corner of the Feature C enclosure. The north and west flanks of the unit contained small *a`a* boulders composing wall architecture while the surface of the southern and eastern half of the unit were comprised of soil and decomposing organic material. After removal of a small segment of wall architecture, it was determined that the architecture extended into subsurface contexts. An alignment consisting of two boulders was present below the surface and formed the interior face or extent of construction in the northwest corner of the enclosure (into Layer I). Boulder construction extended to bedrock. A coral abrader and a basalt core were collected from within the architectural layer.

Two stratigraphic layers were encountered in TU-4 (Figure 33). Layer I (0–48 cmbs) consisted of dark brown (7.5YR 3/2) to black (7.5YR 2.5/1) loose silt. Rock content in the stratum was high and consisted of angular basalt cobbles existing throughout the entire unit, with a concentration in the northern half of the unit where wall construction continued into a context. The subangular cobbles extended to the base of excavation over bedrock. Roots, particularly small rootlets, were prolific throughout the layer. Cultural materials recovered from Layer I included an ocre mineral, volcanic glass and basalt debitage, faunal remains (fish, bird, rat, and small to medium mammal), marine shell, charcoal, and *kukui* nut fragments. Layer II (48–54 cmbs) was composed of dark, reddish-brown (5YR 2.5/2) compact silt associated with decomposed saprolitic bedrock. This layer varied in depth across the unit due to the undulating nature of the bedrock. The layer was not a primary cultural stratum and only yielded a moderate amount of charcoal flecking evenly dispersed throughout the layer. No other cultural materials were observed within this layer.

<u>Midden</u>

A variety of midden was recovered from TU-4. However, only one species of marine shell was identified, that being *Cypraea* sp., and only one echinoid was identified. Recovered faunal remains included a variety of species: fish, medium shearwater bird, chicken, Hawaiian Flightless Rail, medium bird, rat, small to medium mammal, and small to medium vertebrate. The presence of the shearwater, a prehistorically extinct bird species, further indicates a pre-Contact deposition time at the site.

<u>Artifacts</u>

A total of nice artifacts were recovered in TU-4, all being traditional period tools. The nine artifacts were collected from Layer I, the primary cultural stratum, and included one coral abrader, one basalt core, one ocre mineral, two secondary flakes, and four non-diagnostic basalt flakes.

<u>Charcoal</u>

A total 197.2 g of charcoal was collected from TU-4. The charcoal was collected from all levels within Layer I and II. Several *in situ* samples were collected for dating purposes.

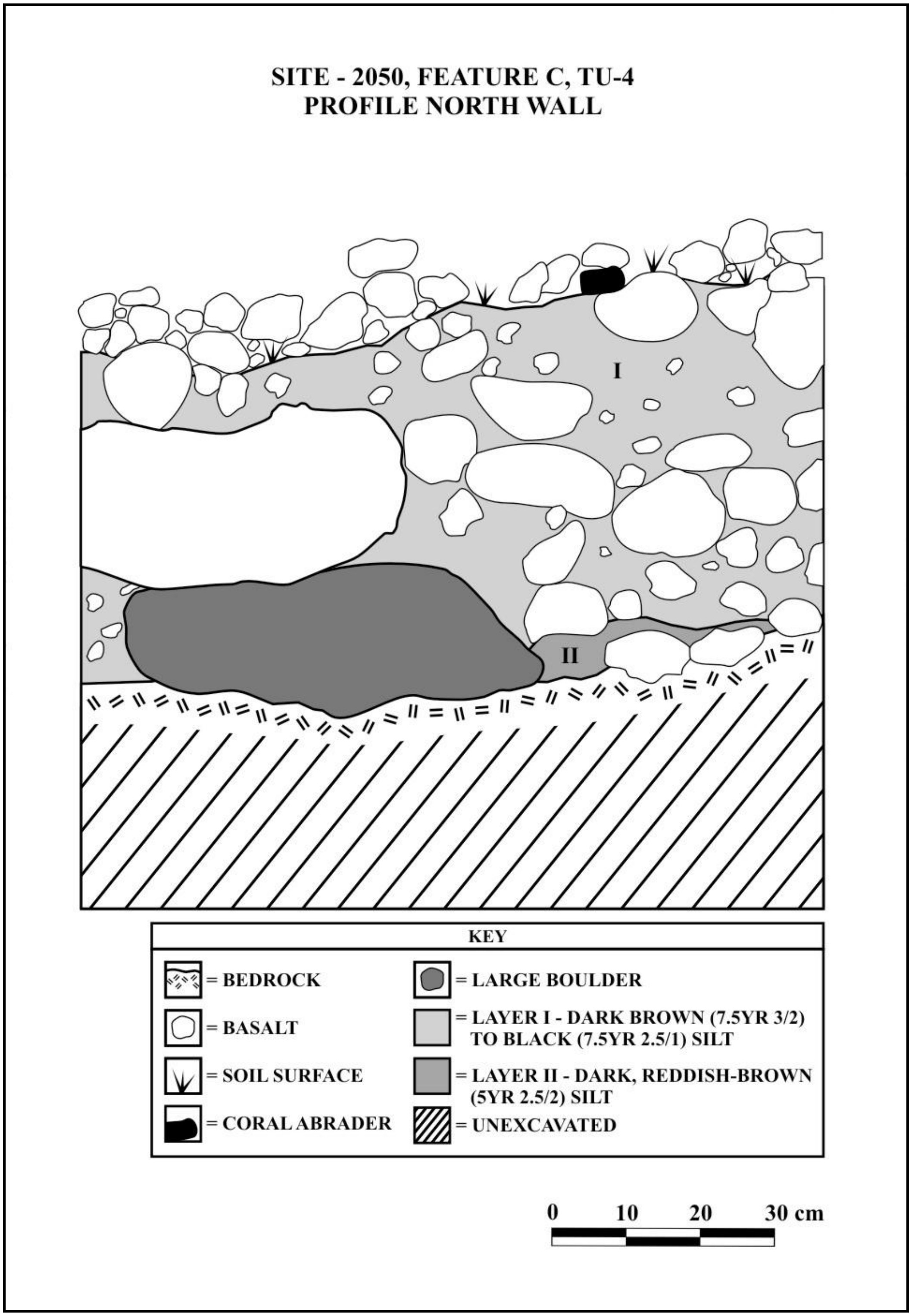


Figure 33: Site -2050, Feature C, TU-4 Profile.

Dating

One wood charcoal sample from the base of the Layer I cultural stratum was submitted for dating. The sample was acquired *in situ* from Level 5, near the base of the cultural layer, at 42 cmbs. The sample yielded an age range of 230$\pm$40 B.P. When calibrated, the date returned a primary age range of A.D. 1620 to 1690 at two Sigma and A.D. 1740 to 1800 at one Sigma. This solitary date from one specific location within the feature implies that activities at this particular site commenced in the mid 1600s and occupation was likely continuous until shortly around or slightly after Contact. The dates appear to be contemporaneous with construction of the feature, as the sample and basal architecture have the same provenience. This later-period date for the construction and use of Feature C contrasts with the dates for Feature A. It is possible that while Feature A was occupied from the mid A.D. 1400s through protohistoric times, Feature C represents an addition to the site at a later date, toward the terminus of site occupation in the 19th century.

Taxanomic Identification of Botanical Remains

Floral samples submitted for analysis from the test unit yielded a variety of native and Polynesian introduced shrubs, vines, and trees. Of all the samples submitted for botanical identification, TU-4 provided the greatest diversity of species with over 20 varieties of native shrubs and trees being identified. These species included *hame, ahakea, alahe`e, akoko, aheahea, lama, a`ali`i, ipu, ohi`a lehua, naio, olopua, `aiea, kuli`i, kopiko, hao, `iliahi, `I`lima, pukiawe, kolea, `ulei, olomea,* and *ho`awa*. These plants commonly served many functions, including those related to food, medicine, water storage, ornamentation, *kapa* production, tools and tool handles, weapons, firewood, firestarter, house building and furnishing materials, and perhaps religious and funerary use.

Test Unit 5 (TU-5)

TU-5 was placed in the southwest corner of the Feature C enclosure. The unit measured 1.0 m by 1.0 m and extended into the south wall of the feature abutting the west wall. The surface of the unit consisted of a layer of stacked cobbles, assorted cobbles and small boulders representing feature tumble, and pockets of soil with organic debris. The architectural component of the feature above the ground surface was excavated and consisted of a thin layer of stacked and piled cobbles. No cultural material was recovered from the architecture. Layer I (0–48 cmbs) consisted of a dark brown (10YR 3/3) fine silt with charcoal staining. The matrix was fairly rocky, with 35 to 40 percent gravel, and roots were common. Cultural materials recovered from within Level 1 included charcoal, marine shell, basalt debitage, and one coral fragment. The soil matrix changed in color slightly from Level 1 to Level 2 in that the soil became a darker brown (10YR 2/2) to black (2.5Y 2.5/1) in the latter and represented more compacted silt. Cultural materials recovered from Level 2 included a basalt core, basalt debitage, worked marine shell, faunal remains, and charcoal. These classes of artifacts and remains were not analyzed more thoroughly in the field or laboratory as during excavation, an *in situ* human cranium was exposed.

A single human cranium was identified within the traditional-period cultural deposit. The articulation of the burial was only assumed as all work in the area ceased. The conjectured primary burial was an adult roughly oriented north-south within the western flank of the unit. As was protocol, once the remains were identified as human, all work in the area stopped and notifications were made. An on-site, reburial ceremony was conducted on June 5, 2002 by Dana Naone Hall of the MLIBC. The reconstruction of TU-4 and TU-5 in Feature C was completed on June 12, 2002 by the SCS fieldcrew.

Based on positioning, the single burial at Site -2050, Feature C is thought to represent a complete, *in situ*, articulated find. This has not been proven. As based on its primary association with the upper portion of the documented cultural stratum, the burial was interpreted to be contemporaneous with, or to slightly post-date, occupation of the site. Predicated on the size of Feature C (96.0 m^2), feature construction (facing on the southeastern side of the structure), material remains (concentrated cultural deposit), and the association with Features A and B of Site -2050, Feature C may be classified as a large permanent house site or an ancillary activity area (men's/women's *hale*). However, the functional definition of the feature remains to be more securely established. The date of this cultural deposit appears similar to the sample from TU-4, which yielded an age range of 230$\pm$40 B.P. This date implied that activities at this particular site commenced in the mid-1600s, with occupation being continuous until shortly around or slightly after contact when the site was abandoned. The burial appeared to be contemporaneous with the cultural deposit (mid-1600s) as there was no evidence to suggest that it had been interred through the cultural deposit.

Test Unit 6 (TU-6)

TU-6, a 1.0 m by 1.0 m unit, was excavated in the northwest corner of the Feature B enclosure. The unit abutted the interior of the west and north walls of the enclosure. The surface of the test unit was comprised of stacked cobble and boulder construction in the northwest corner and soil with mixed organic debris in the remainder of the unit. Boulder construction was excavated to reveal a level soil surface. No cultural material was observed within the architectural layer. The architectural layer only slightly intruded in Layer I sediment.

TU-6 contained two stratigraphic layers (Figure 34). Layer I (0–42 mbs) was composed of dark, reddish-brown (5YR 2.5/2) fine silt. The matrix comprised tightly compacted subangular cobbles with approximately 15 percent soil. Roots were common throughout the matrix. One coral abrader, with one worked facet, was recovered from the southern end of the unit at 5 cmbs. Sparse amounts of charcoal flecking and one fragment of rat bone were collected during screening Layer I sediment. Layer II (38–50 cmbs) consisted of dark, yellowish-brown (10YR 3/4) compacted silt. The layer contained a smaller percentage of cobbles than Layer I as well as minimal roots. The layer was culturally sterile and terminated on bedrock.

Midden

Midden was minimal in this unit. Only one fragment of *Rattus exulans* was recovered from TU-6. The sample does not represent pre-Contact dietary remains but rather, a byproduct of sedentary living (see Discussion section).

Artifacts

One artifact, a coral abrader, was recovered from TU-6 at about 5 cmbs. The coral abrader exhibited one worked facet.

Charcoal

A total of only 0.3 g of charcoal was recovered from the screen at TU-6. No charcoal was recovered from an *in situ* context.

Dating

No radiocarbon samples were submitted from TU-6, this due to the sparse amount of charcoal collected from the unit and the modest presence of a thin cultural layer.

STATE SITE 50-50-10-2059

SITE -2059 SUMMARY

Site -2059 (PHRI Site No. K-20) consists of three architectural structures (Features A–C) located on a small level area (Figures 35 and 36) measuring approximately 65.0 m by 35.0 m (2,275.0m²). The site is situated at 725.0 m amsl on a dissected alluvial slope. The local landscape is dominated by basalt outcrops. This site complex is located approximately 200.0 m east of the western project area boundary and approximately 20.0 m southwest of Site -3032. Vegetation within and around the site includes *lantana*, grasses, *`ilima*, wattle, and Christmas berry.

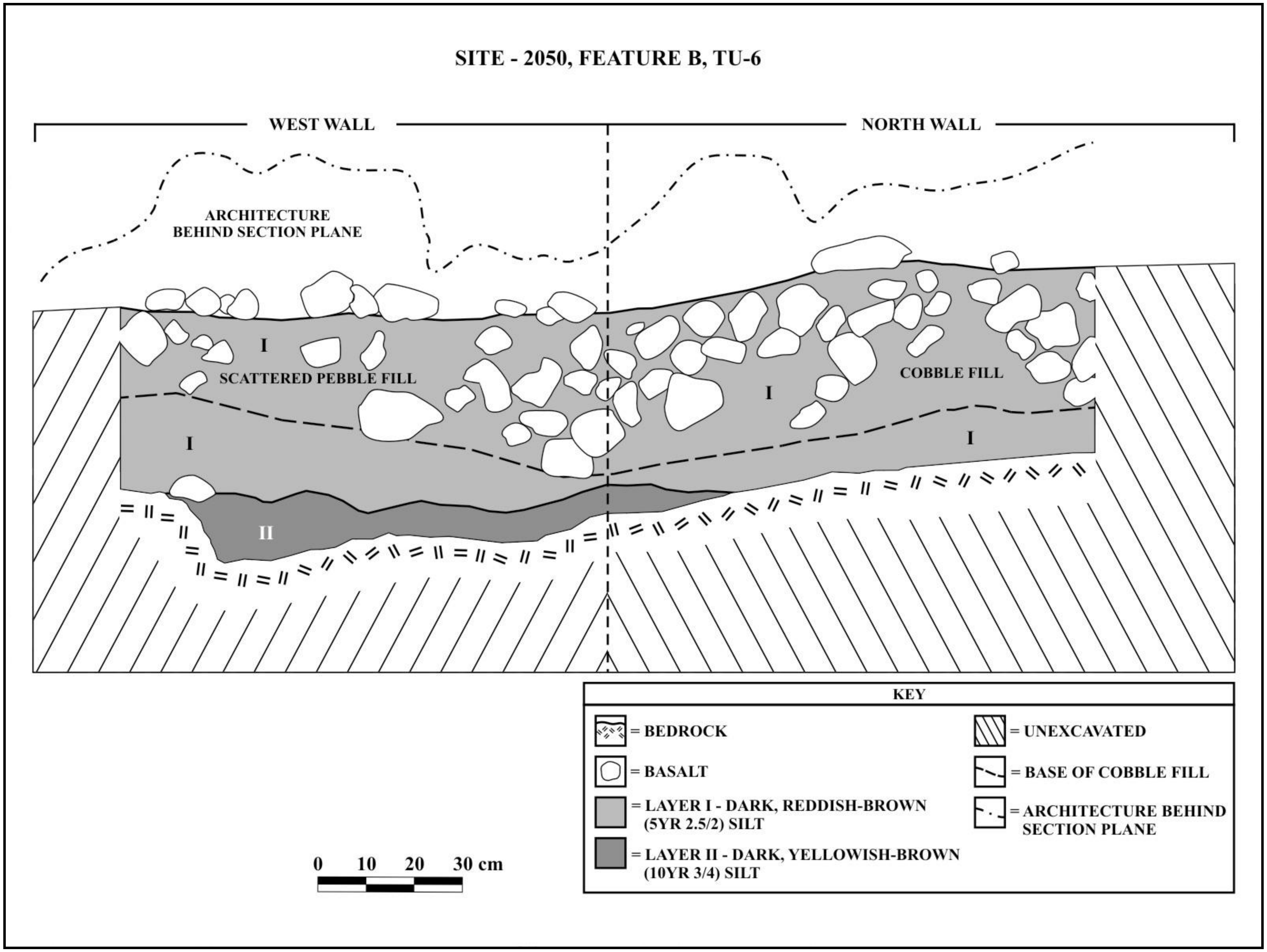


Figure 34: Site -2050, Feature B, TU-6 Profile.

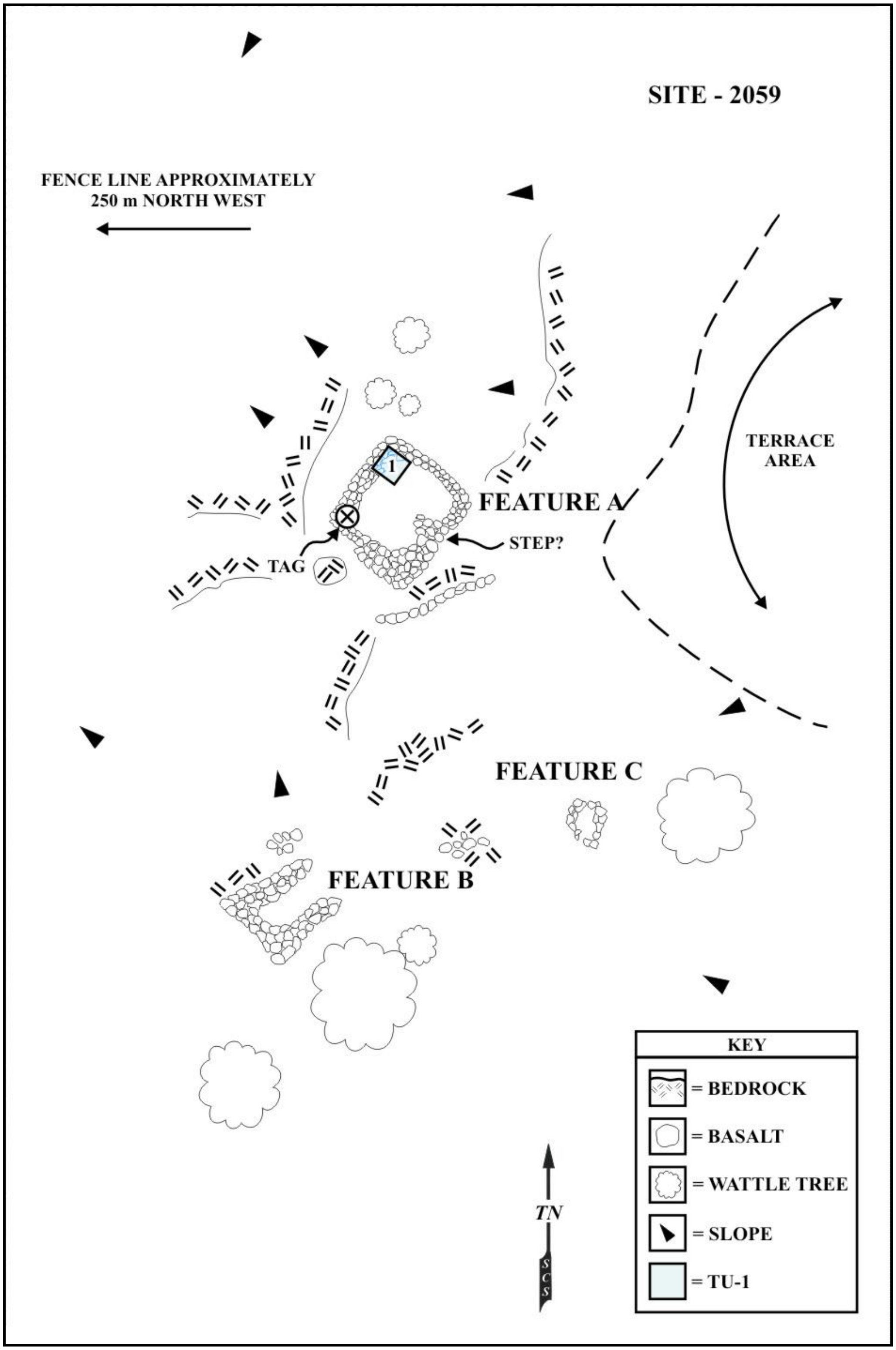


Figure 35: Site -2059 Plan View Map.

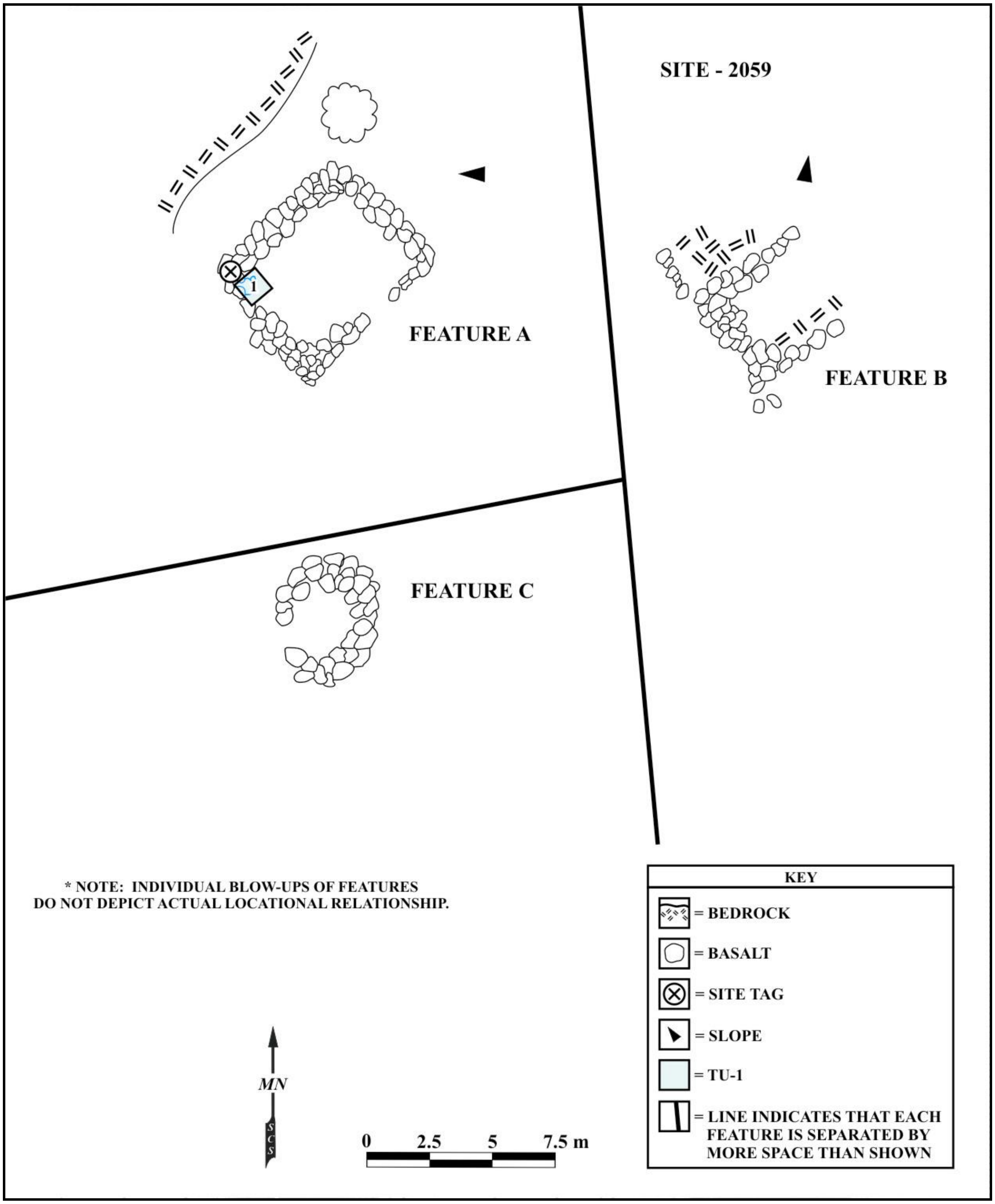


Figure 36: Site -2059 Close-up Plan View.

This site was classified during Inventory Survey as a habitation and agricultural complex dating to pre-Contact times (Brown *et al.* 1989:E-10). The features composing this site include two enclosures (Features A and C), one residential terrace (Feature B), and numerous agricultural terraces. Features B and C are described in Brown *et al. (*1989:E-10) and were not tested during the present research. The agricultural terraces were not recorded during Inventory Survey but simply noted. One test unit (TU-1) was excavated in Feature A, a square enclosure measuring 6.3 m by 6.3 m. The excavation unit yielded several basalt flakes—indicative of traditional stone tool manufacture and/or maintenance, several historic-era ceramic shards, wood charcoal, and *opihi* shells. No radiocarbon dates were obtained from this feature but the presence of the ceramics clearly indicates a historical component to the site.

SITE -2059 FEATURE DESCRIPTION

Feature A

Feature A is a square-shaped stone enclosure (Figure 37) with a possible entryway along the east wall of the structure and a possible step on the interior of the east wall (Brown *et al.* 1989:E-10). The non-formalized walls (non-faced) are composed of basalt pebbles, cobbles, and boulders together having a maximum height of approximately 50 cm above the ground surface. The sides of the enclosure are each approximately 6.3 m in length (~40.0 m^2). The walls measure approximately 50 cm wide. TU-1 was excavated in Feature A.

Figure 37: Site -2059, Feature A. View to West.

SITE -2059 EXCAVATION

Test Unit 1 (TU-1)

One test unit (TU-1) measuring 1.0 m by 2.0 m was excavated in Feature A at Site -2059. The test unit was located in the northwest corner of the enclosure abutting the north wall and proceeding through the west wall. Excavation revealed four main sedimentary layers beneath the stacked stones and above the bedrock (Figure 38). Layer I (10–25 cm thick) consisted of a dark reddish-brown (5YR 2.5/2) silt. Cultural materials were sparse in Layer I and the rest of the unit. Only a single *opihi* shell and charcoal flecking were observed in Layer I. Layer II (10–15 cm thick) was a dark reddish-brown (5YR 3/2) silt. This layer only contained sparse, randomly distributed charcoal flecking. Layer III (10–15 cm thick) a reddish-brown (5YR 4/4) silt. This stratum was sterile. Layer IV (30 cm thick) was composed of dark brown (7.5YR 3/3) silty clay, which rested directly over bedrock. This layer was also sterile.

Midden

A single *opihi* shell (*Cellana* sp.) was recovered from Level 2 (10–20 cmbs) in TU-1. This marine mollusk was transported to the site, which is, at its closest, several miles from the coastline. There are several different species of this genus in Hawai`i, all of which are marine mollusks found at or around the tidal zone. This shell presumably represents food remains introduced by the occupants of Site -2059.

Artifacts

Three pieces of basalt debitage were recovered from Level 1 (0–10 cmbs) in TU-1. These finds, while limited in quantity, are evidence for traditional Native Hawaiian stone tool manufacture and/or maintenance at this location. In addition to the lithics, several ceramic shards representing historical occupation of the site were recovered from the upper 20 cm of TU-1. The ceramic assemblage consisted of two stoneware body sherds with dark brown interior and exterior glaze. The sherds were non-diagnostic and did not contain evidence to provide reliable sourcing as to manufacture date, vessel type, or vessel function. Combined with the absence of a large (for one test unit) traditional cultural deposit in Feature A, this site may have been occupied for only a short time period during historic times.

Charcoal

Wood charcoal was recovered from just below the ground surface to approximately 50 cmbs in TU-1. The charcoal was randomly distributed throughout the unit and did not form a concentration indicative of a hearth or other combustion feature.

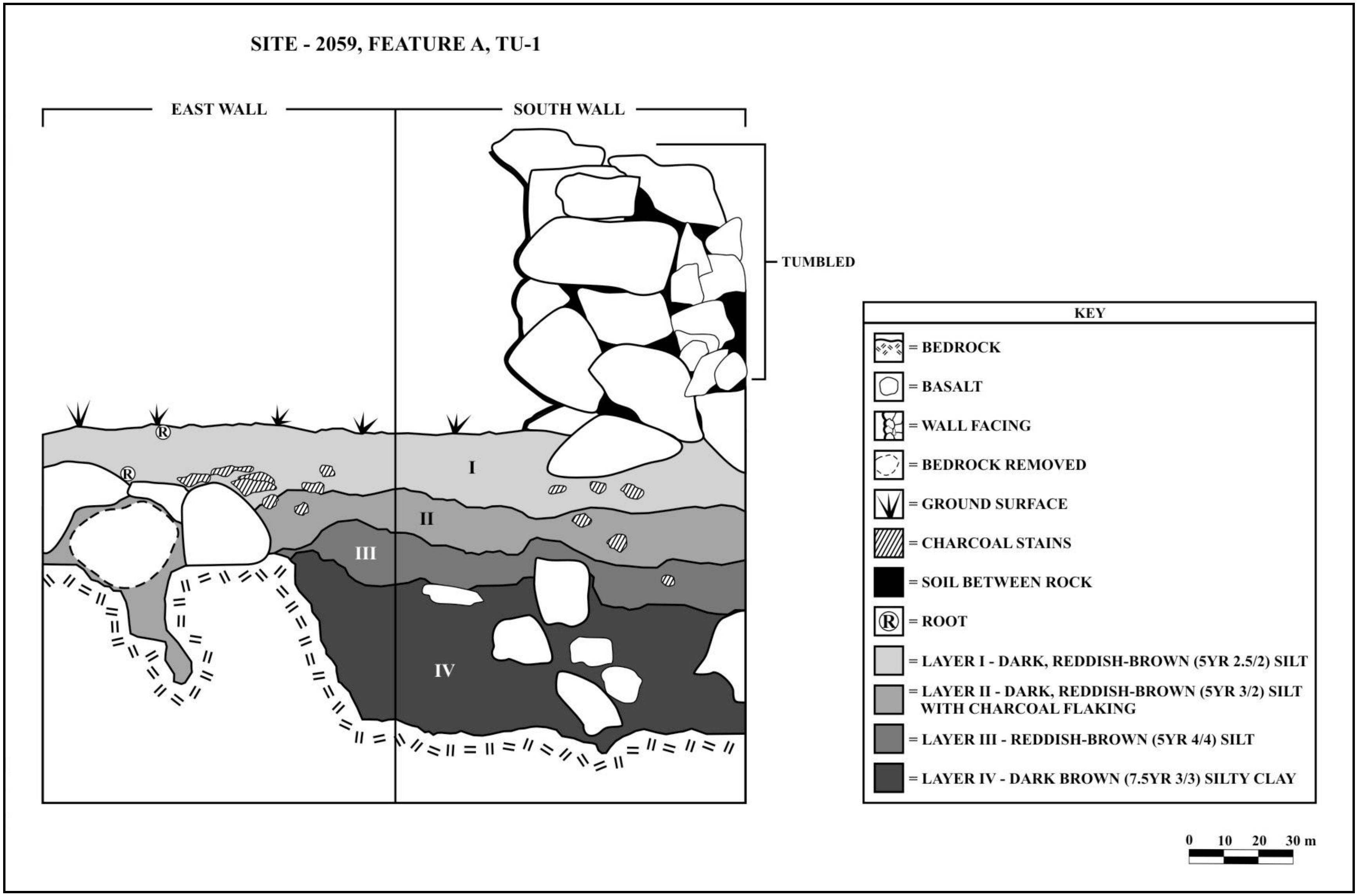


Figure 38: Site -2059, Feature A, TU-1 Profile.

Dating

One charcoal from Layer I, 10 to 20 cmbs, was submitted for radiocarbon dating analysis. The samples returned a modern date.

Taxonomic Identification of Botanical Remains

No botanical samples from TU-1 were analyzed for taxonomic identification.

STATE SITE 50-50-10-2061

SITE -2061 SUMMARY

Site -2061 (PHRI Site No. K-25) consists of six features (Figure 39) within an area measuring approximately 125.0 m by 90.0 m (11,250.0 m²). The site is located at 650.0 m amsl on a gently-sloping ridge. The site complex is geographically located approximately 70.0 m east of Site 2050 and 150.0 m east of the western project area boundary. Present vegetation in the area is dominated by a thick ground canopy of *lantana*, grasses, *`ilima, panini,* and wattle.

Site -2061 was interpreted during Inventory Survey as a habitation and agricultural complex dating to pre-Contact times (Brown *et al.* 1989:E-11). The site consists of a series of stacked stone enclosures, walls, and agricultural terraces. The features appear to have been constructed utilizing local natural topography and, in some cases, eroding basalt outcrops. The latter was accomplished through stacking additional basalt cobbles and boulders against and upon the outcrops. Of the six features, only Features C and E, the most intact of the features, were selected for Data Recovery.

Both features yielded evidence of traditional Native Hawaiian site occupation at, or soon after, the early Contact period. Excavations at Feature E (TU-1) led to the recovery of basalt debitage, *kukui* nut shell fragments, and three native Hawaiian plant species. Excavations at Feature C (TU-2 and TU-3) yielded one basalt flake tool, one chunk of red ocre, and *kukui* nut shell fragments. The ochre is interesting in that the red dye was utilized for tattoing, dying bark cloth, and printing color patterns, among other uses. Overall, the material record of these two features was only modest, a pattern that seems to accord with protohistoric-historic occupation of the area (see also Site -2059 above).

Overall, Site -2061 represents a protohistoric household cluster. The multi-dwelling site appears to reflect a conjugal family residential area in which multiple features were constructed and used for various purposes. The absolute number of structures composing the site could

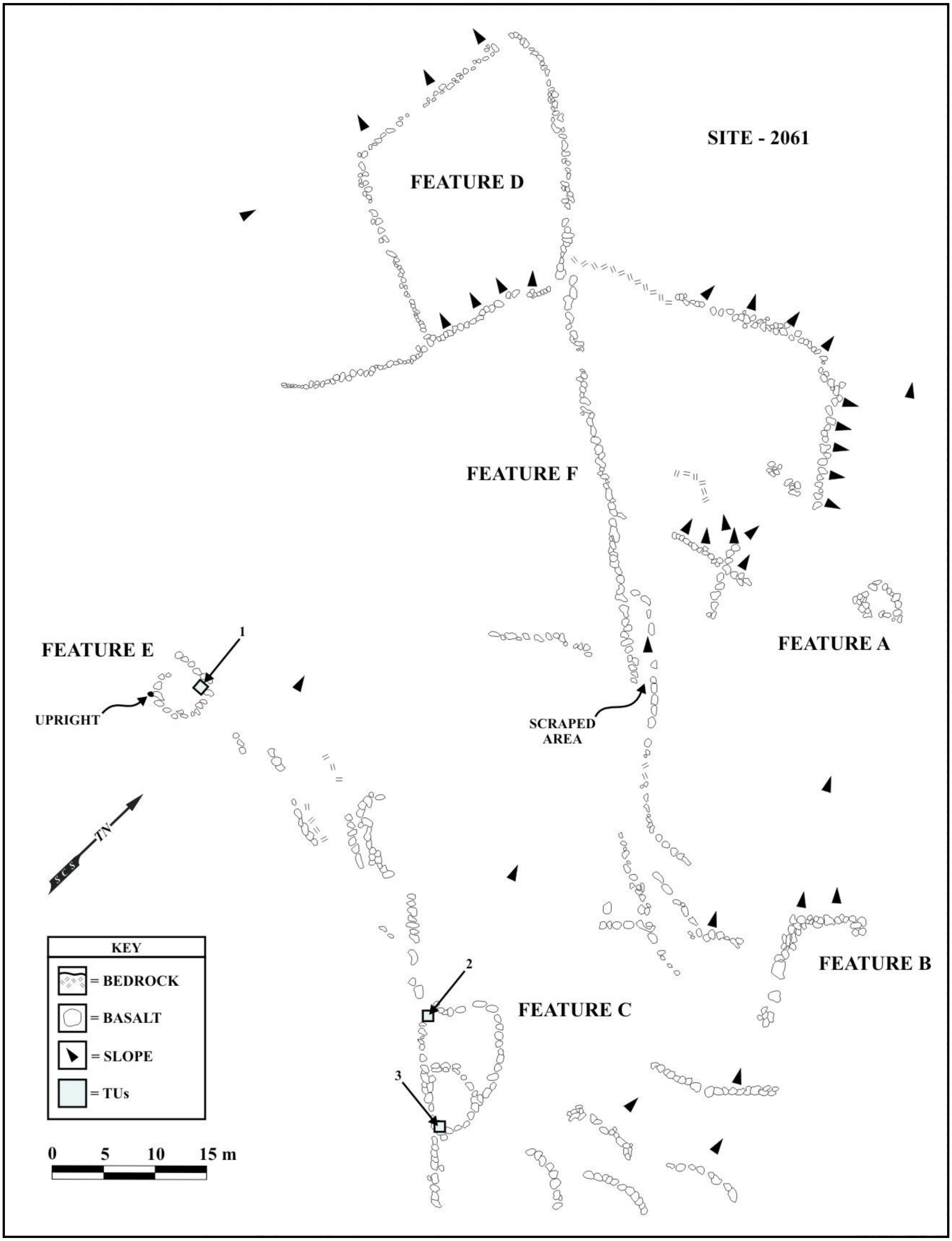


Figure 39: Site -2061 Plan View Map.

imply that this was the residence of a higher ranked individual. Based on the date of the site and the extreme poverty of recovered artifacts and midden, this site may not have been occupied for a very long time or was only occupied very sporadically.

SITE -2061 FEATURE DESCRIPTIONS

Feature C

Feature C is an irregularly-shaped enclosure (Figure 40) occupying an area of approximately 12.0 m by 9.0 m (108.0 m^2). The enclosure contains an internal terrace wall in poor condition. Facing is present on the interior, northeast corner of the feature and in sections of the south wall. Feature walls average 45 cm high and are composed of stacked basalt cobbles and boulders (Brown *et al.* 1989:E-11). TU-2 and TU-3 were excavated at Feature C.

Feature E

Feature E is a rectangular enclosure occupying an area of approximately 4.5 m by 4.0 m (18.0 m^2). Facing is present on the exterior, northeast corner of the feature. Feature E walls average 0.6 m high and are composed of stacked basalt cobbles and boulders (Brown *et al.* 1989:E-11). TU-1 was excavated at Feature E.

Figure 40: Site -2061, Feature C, TU-3. View to South.

SITE -2061 EXCAVATION

Test Unit 1 (TU-1)

One test unit (TU-1) measuring 1.0 m by 1.0 m was excavated in the northeast corner of Feature E, abutting an alignment on the interior facing of the east wall. The test unit was excavated in five arbitrary 10-cm levels to bedrock. Bedrock was exposed at a variable 25 to 40 cmbs. A small amount of cultural material was recovered from the upper 20 cm of TU-1.

The excavation of TU-1 revealed two major sedimentary layers beneath stacked architecture and above bedrock (Figure 41). Only Layer I contained cultural material. Layer I (15–30 cm thick) was a very dark brown (10YR 2/2) silt. *Kukui* shell fragments, wood charcoal, and possible basalt flakes were recovered from this upper layer. The stratum contained a pebble-cobble content of approximately 50 percent. Layer II (10–15 cm thick), a dark yellowish-brown (10YR 3/4) silt, rested directly atop bedrock and was culturally sterile. Excavation of the feature walls indicated that the larger facing stones extended to 10 to 15 cmbs while most of the fill stones rested on or near the present ground surface.

Midden

The only potential midden deposits recovered from TU-1, Feature E at Site -2061were approximately two dozen *kukui* nut shell fragments. These fragments, recovered for the most part from the first 10 cm of Layer I, were not carbonized.

Artifacts

Only two basalt flakes, possibly representing debitage from traditional stone tool manufacture and/or maintenance, were recovered from TU-1 (in Level 2 at 10–20 cmbs).

Charcoal

Several flecks of wood charcoal were encountered *in situ* in the upper 20 cm of TU-1, but these were neither concentrated nor clearly associated with any type of hearth feature. Charcoal was also collected in the screen from sediments excavated in both Levels 2 and 3 of Layer I.

Dating

Two samples of wood charcoal from TU-1 were submitted for radiocarbon dating. The first sample, from Level 1 (0–10 cmbs), dated to 220$\pm$50 B.P. At two Sigma, the age range was A.D. 1620 to 1880 while at one Sigma, the dominant range was A.D. 1730 to 1810. Both ranges were within later prehistoric-early historic times. The second sample, from Level 2 (10–20 cmbs), dated to 160$\pm$40 B.P. When calibrated, this date range was measured at A.D. 1660 to

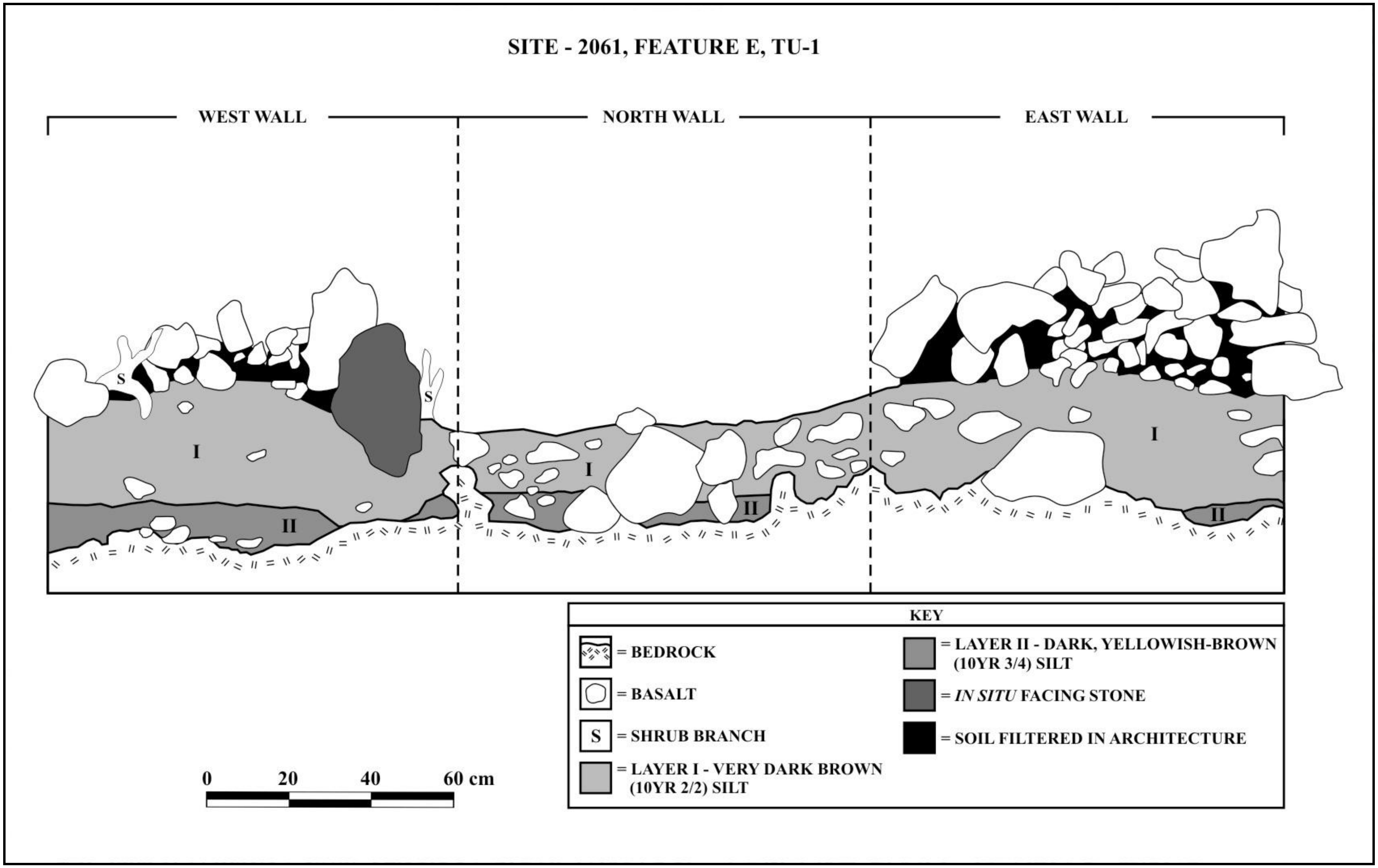


Figure 41: Site -2061, Feature E, TU-1 Profile.

1890 (one Sigma). Both of these dates are consistent with site construction/occupation at, or soon after, the later prehistoric period-early contact period. As is shown below, however, all analyzed wood charcoal samples were assessed as native species. This botanical pattern is more consistent with an earlier, rather than a later, date for human occupation of this feature. However, the lack of a deep cultural deposit at the site is consistent with late prehistoric-early historic occupation, one of many patterns in the Kēōkea site population.

Taxonomic Identification of Botanical Remains

Forty-eight pieces of wood charcoal from TU-1 weighing 4.9 g were analyzed for taxonomic affiliation from Level 3 (20–30 cmbs). Three primary taxa, all native plant species, were identified. The vast majority (44 of 48 pieces, approximately 90 percent by weight) were identified as *Chamaesyce* sp. In decreasing order by weight, the three taxa and their traditional functions are: *Chamaesyce* sp. or *`akoko* (a shrub traditionally used for firewood; n=44 pieces); *Chenopodium oahuense* or *`aheahea/`aweoweo* (a shrub whose leaves were traditionally eaten as food items; n=3 pieces); *Sida fallax* or *`ilima* (a shrub used for floor and wall habitation coverings, as well as medicine; n=1 piece).

Faunal Analysis

No faunal remains were recovered from TU-1.

Test Unit 2 (TU-2)

TU-2 was placed in the southwest corner of the Feature C enclosure. The 1.0 m by 1.0 m excavation unit was positioned against both the west and south walls of the feature. As was the pattern at this site, only a small amount of cultural material was recovered from this feature. Excavation in Feature C revealed two major sedimentary layers occurring beneath stacked architectural components and above the bedrock (Figure42). Layer I (1525 cm thick) was a very dark brown (10YR 2/2) silt that included the ground surface—where not covered by stones. Feature architecture ceased at the upper portion of this layer. All the cultural material recovered from TU-2 was from this layer. Layer II (10 cm thick) was a very dark brown (7.5YR 2.5/3) silt that rested directly atop the bedrock and was culturally sterile.

Midden

The only midden recovered from TU-2 (Feature C) was one fragment of burned *kukui* nut shell. The fragment was identified in the screen within the 15 to 25 cmbs level.

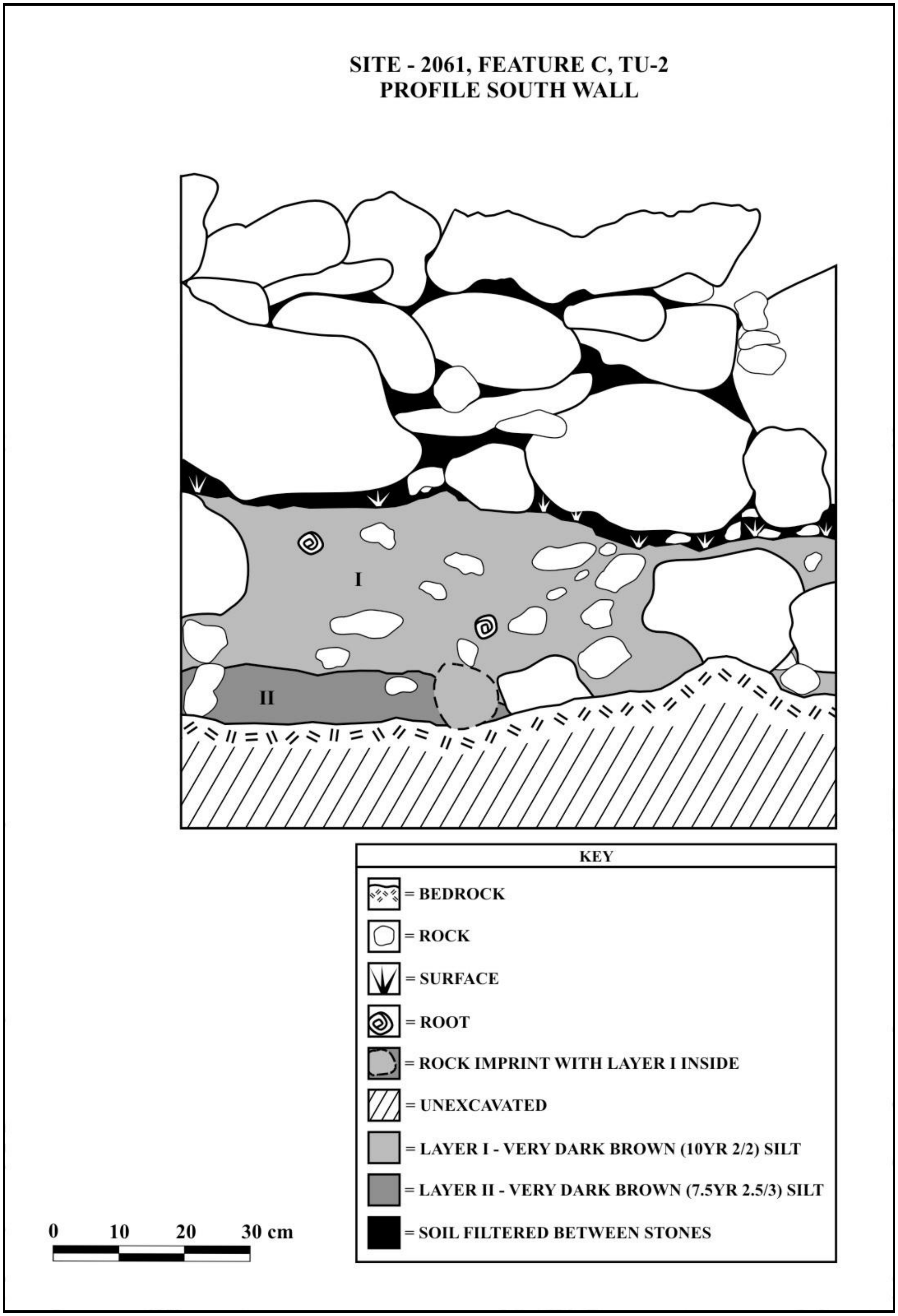


Figure 42: Site -2061, Feature C, TU-2 Profile.

Artifacts

One small basalt flake with use wear was recovered in the screen within the 15 to 25 cmbs level. This was the only example of a traditional Native Hawaiian tool recovered from TU-2.

Charcoal

Dispersed flecks of wood charcoal were encountered throughout TU-2, but these were neither concentrated nor clearly associated with any type of hearth feature. Charcoal was collected from both the screen and *in situ* from Level 2 (15–25 cmbs) and Level 3 (25–30 cmbs).

Dating

One sample of wood charcoal from TU-2 (Feature C) was submitted for radiocarbon analysis. The sample, recovered *in situ* at 26 cmbs, yielded a date of 160$\pm$40 B.P. This date is consistent that from TU-1 (Feature E; see above) and represents a late prehistoric-early historic time period (A.D. 1730–1820 at one Sigma).

Taxonomic Identification of Botanical Remains

No wood charcoal samples from TU-2 were submitted for taxonomic identification.

Faunal Analysis

No faunal remains were recovered from TU-2.

Test Unit 3 (TU-3)

TU-3 was placed in the southeast corner of Feature C in order to evaluate the proposition that this auxiliary portion of the feature represented a formalized cooking area in association with the permanent site structures. The test unit was positioned against the east and south walls of the feature.

The excavation of TU-3 revealed two major sedimentary layers beneath stacked architectural stones and above bedrock (Figure 43). Layer I (18–32 cm thick) was a very dark brown (10YR 2/2) silt that including the ground surface—where not covered by stones. One small fragment of red ocre was recovered from this layer and charcoal flecks were randomly scattered throughout. Layer II (2–20 cm thick) was a very dark brown (7.5YR 2.5/3) silt that rested directly atop the bedrock. This stratum was culturally sterile. While cultural materials were minimal in the unit, the excavation demonstrated that the larger, facing stones and smaller stacked stones composing feature architecture extended to 15 to 20 cmbs. The lack of cultural materials also suggests a late prehistoric date for the feature.

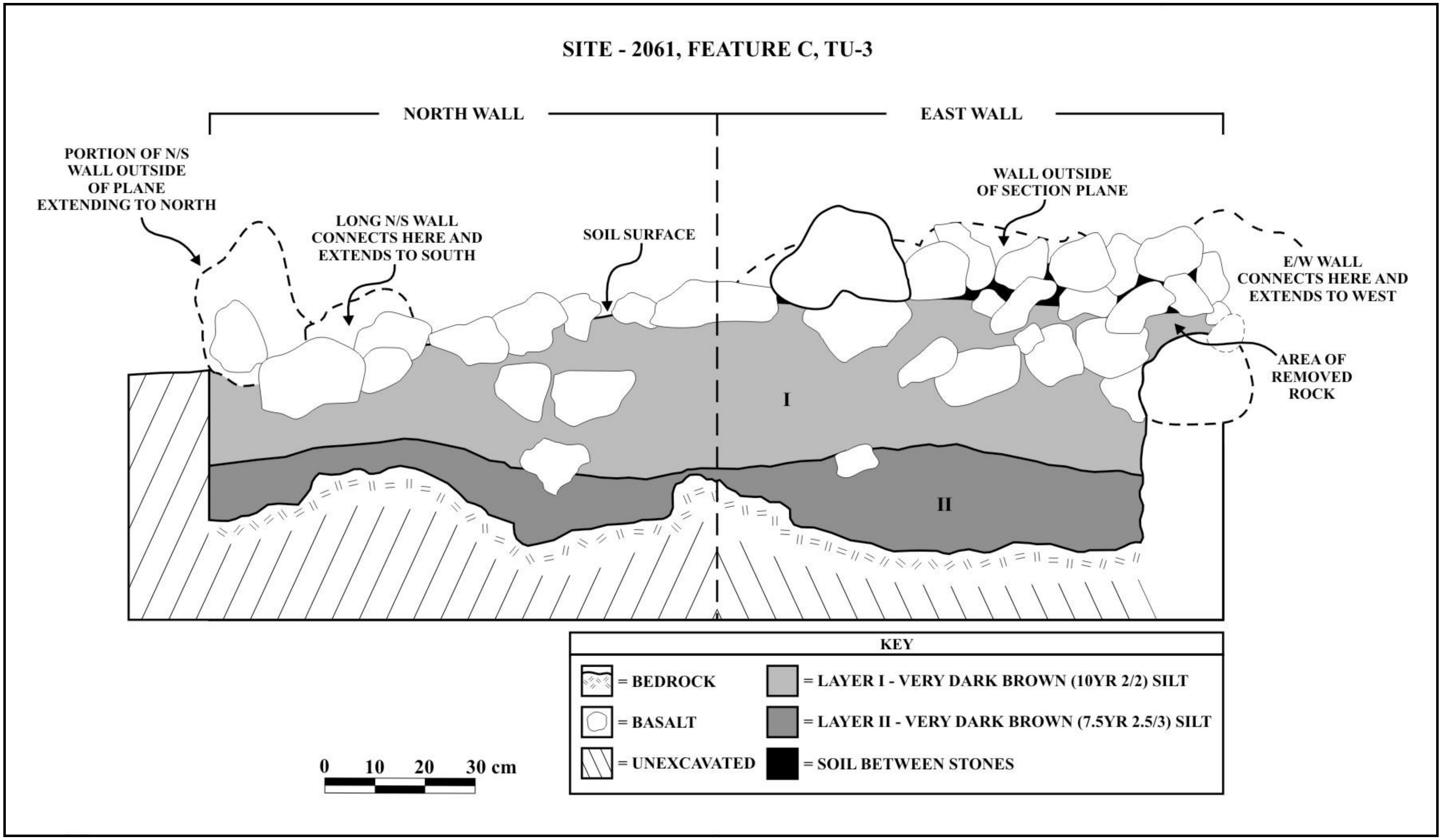


Figure 43: Site -2061, Feature C, TU-3 Profile.

Midden

No midden was recovered from TU-3.

Artifacts

The only possible example of a traditional artifact recovered from TU-3 was a single, small piece of red ocre recovered from Level 3 (20–30 cmbs). Archaeological evidence (Kirch 1985; Davis 1990) and ethnohistorical accounts (Buck 1964) of its uses by Native Hawaiians include tattooing, dying bark cloth (*kapa*), painting and printing colored patterns on household items and clothing (bark cloth), and use as fishing sinkers.

Charcoal

Flecks of wood charcoal were encountered between 10 and 30 cmbs in TU-3, but these were neither concentrated nor clearly associated with any type of hearth or combustion feature. A burned root in the southwest quadrant of Level 3 (20–30 cmbs) may represent the source of the wood charcoal in this excavation unit. Small amounts of charcoal were collected from Level 2 (10–20 cmbs) and Level 3 (20–30 cmbs).

Dating

No charcoal from TU-3 was submitted for radiocarbon analysis.

Taxonomic Identification of Botanic Remains

No wood charcoal samples from TU-3 were submitted for taxonomic identification.

Faunal Analysis

No faunal remains were recovered from TU-3.

STATE SITE 50-50-10-2065

SITE -2065 SUMMARY

Site -2065 (PHRI Site No. K-31, BPBM T-13) consists of a single, sub-rectangular enclosure (Feature A [Figure 44]) measuring approximately 10.0 m by 9.0 m (90.0 m^2). The enclosure walls have collapsed, perhaps due to pasturing in the area. According to Brown *et al.* (1989:E-14), the enclosure is surrounded by agricultural features (terraces). The enclosure was constructed on a relatively level ground surface above an existing drainage. Site -2065 is located at 698.0 m amsl, approximately 100.0 m to the south of the northern boundary of the project area and 170.0 m to the east of the western project area boundary within proposed DHHL Lot 41.

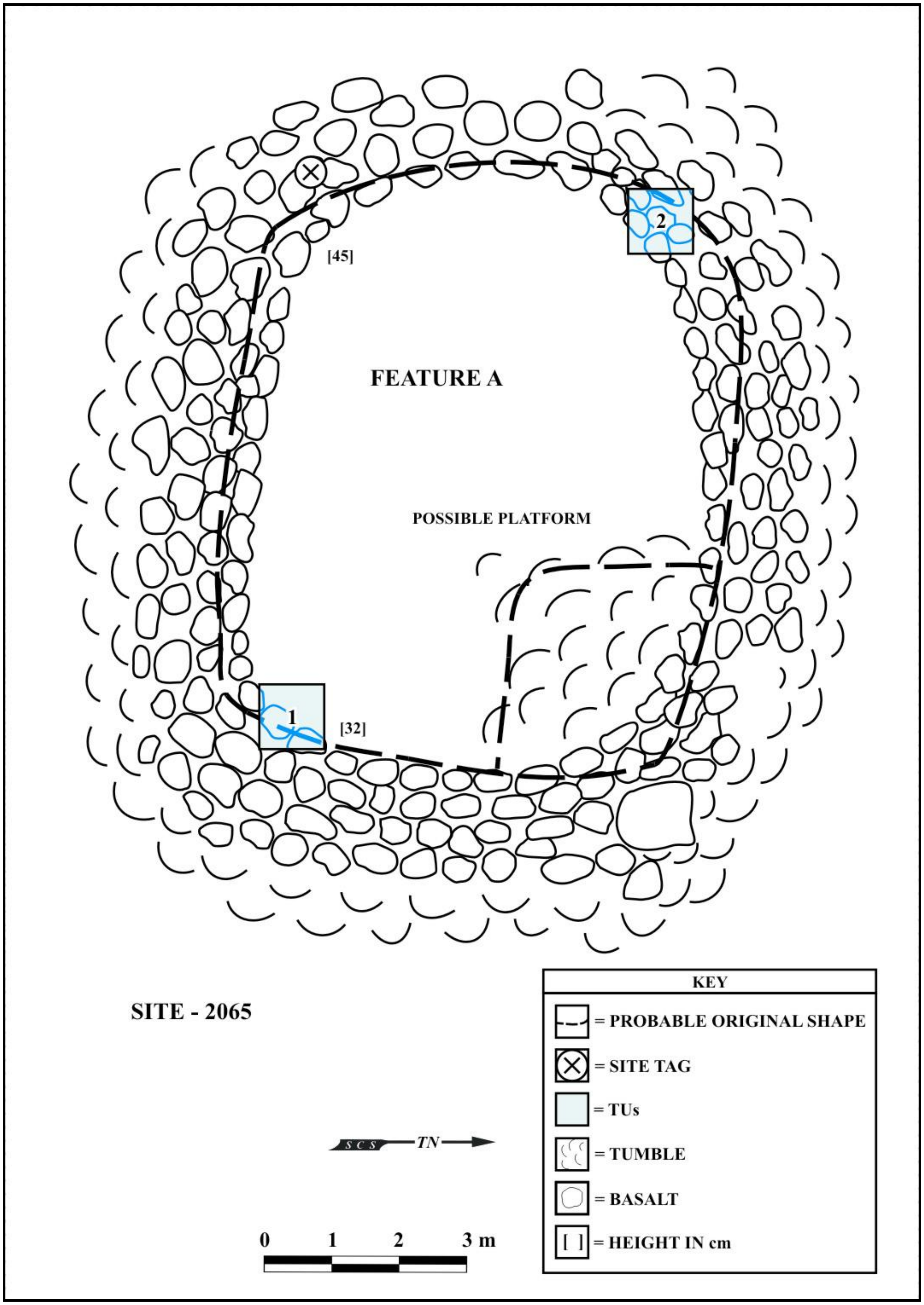


Figure 44: Site -2065 Plan View Map.

The local site landscape consists of dissected alluvial slopes. Vegetation in the area is dominated by *lantana*, grasses, and *`ilima*. Based on feature architecture, this site was assessed as a traditional, pre-Contact habitation and agricultural complex (Brown *et al.* 1989:E-14).

Two test units (TU-1 and TU-2) were excavated in the enclosure. Basalt debitage and pig remains were recovered from TU-1. The excavation of TU-2 yielded a relatively large amount of cultural material, including basalt and volcanic debitage, one core tool, one possible stone mirror fragment, *opihi* shell, red ocre, fish, chicken, and rat remains, and nine native Hawaiian plant species. Radiocarbon dating of wood charcoal samples from TU-2 intimates that the site clearly dates to the pre-Contact era, and may have been constructed and occupied from the late A.D. 1200s through the A.D. 1400 and 1500s.

SITE -2065 FEATURE DESCRIPTION

Feature A

Site -2065 consists of a sub-rectangular enclosure with mostly collapsed walls designated Feature A. The extensive wall collapse gives the feature something of an oval shape appearance in plan view, but its original shape was probably more rectangular. The exterior dimensions measure approximately 10.0 m by 9.0 m (90.0 m²). Wall heights range from 20 cm to 55 cm above ground surface. Enclosure walls were constructed of stacked basalt cobbles boulders that averaged 2.5 m wide. Some sections of formalized facing are present along the interior, eastern wall of the feature. A possible interior platform was identified by Brown *et al*. (1998:E-14) in the interior northeast corner of the feature. TU-1 and TU-2 were excavated at this site.

SITE -2065 EXCAVATIONS

Test Unit 1 (TU-1)

Two test units were excavated in the Site -2065 enclosure. The first, TU-1, measured 1.0 m by 1.0 m and was excavated in the northeast (interior) corner of the enclosure. The test unit was positioned within the feature to examine wall architecture and its relationship to possible cultural deposits. The unit was also positioned to excavate through the possible platform in the northeast (interior) corner of the feature. The excavation of TU-1 proceeded through eleven arbitrary 10-cm levels to bedrock, which was exposed at a maximum depth of 135 cmbs. The excavation of TU-1 demonstrated that architectural elements extended to approximately 25 cm to 35 cm below the ground surface, and was based in lower Layer I.

TU-1 excavations revealed four sedimentary layers (Figure 45). Layer I (40–50 cm bs) was composed of dark brown (7.5YR 3/4) silt (including the present ground surface—where not

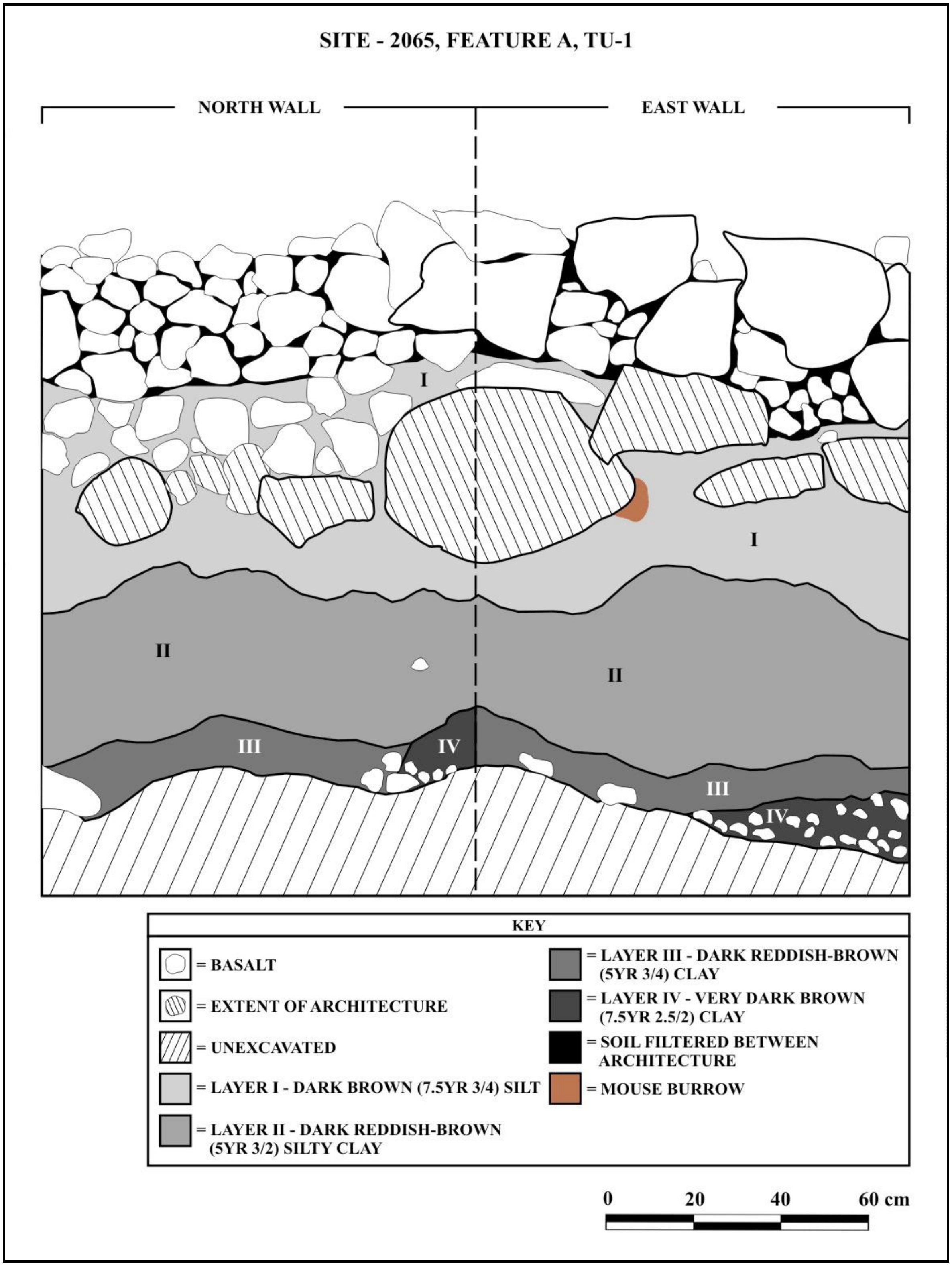


Figure 45: Site -2065, Feature A, TU-1 Profile.

covered by stones). Subangular pebbles and smaller cobbles comprised 5 to 20 percent of the matrix. This layer encompassed the base of enclosure architecture and yielded traditional artifacts and faunal remains. The field excavator interpreted the majority of rocks in this layer as being architectural elements. Layer II (25–40 cm thick) a dark reddish-brown (5YR 3/2) silty clay. Only one piece of basalt debitage was recovered from the uppermost portion of this layer. Layer III (10–15 cm thick) composed of dark reddish-brown (5YR 3/4) clay. The stratum was culturally sterile. Layer IV (10 cm thick) was consisted of a very dark brown (7.5YR 2.5/2) clay lens with gravel. Subangular pebbles and cobbles comprised at least 50 percent of the matrix. The field excavator interpreted this culturally sterile gravel and clay lens as a product of decomposing bedrock.

Midden

No midden of any class was recovered from TU-1. No charcoal was recovered from this unit, which in itself was atypical for excavations in the project area.

Artifacts

A total six pieces of basalt debitage were recovered from Levels 2, 3, and 6 of TU-1. A majority of the small debitage sample (4 of 6) was recovered from the upper 10 cm (Level 2), with single specimens (n=2) recovered from other levels.

Charcoal

No charcoal was recovered from TU-1.

Dating

No samples from TU-1 were submitted for radiocarbon analysis, this mostly due to the lack of charcoal in the unit.

Taxonomic Identification of Botanical Remains

No wood charcoal samples were analyzed for taxonomic affiliation from TU-1, again due to the lack of charcoal and botanical remains in the unit.

Faunal Analysis

Two vertebrate specimens were recovered from TU-1, Levels 3 and 4 (30–40 cmbs). One bone was identified as probable pig and one was a taxonomically-indeterminate and assessed as small/medium mammal. According to Dr. Ziegler, it is usually not possible to distinguish pre-Contact Polynesian pigs from historically introduced breeds. In this case, because the pig bone in question does not come from an abnormally large creature (sometimes an indication of historically introduced breeds), there is no way to determine whether it reflects a pre-Contact or historic occupation.

Test Unit 2 (TU-2)

The second unit (TU-2), measuring 1.0 m by 1.0 m, was positioned in the southwest, interior corner of the enclosure in order to examine architectural base construction and assess associated cultural deposits. The excavation of TU-2 demonstrated that enclosure architecture extended to approximately 25 cm to 35 cm below the ground surface and was based in Layer I.

TU-2 excavations revealed two major sedimentary layers (Figure 46). Layer I (40–50 cm thick) consisted of very dark brown (10YR 2/2) silt. This stratum encompasses the base of stacked stone enclosure architecture—mostly larger cobbles and boulders. Traditional artifacts, midden, and faunal remains were recovered from Layer I. Layer II (2540 cm thick) was a dark reddish-brown (5YR 3/3) silt and was located directly below Layer I and atop bedrock. Charcoal was very sparse in Layer II, having only been recovered from the upper portion of the layer. No other cultural materials were identified in Layer II. Cobbles and boulders were abundant in lower portions of the layer.

<u>Midden</u>

Marine shells were recovered from TU-2, Level 3 (10–30 cmbs). All the identified specimens (25.2 g total) consisted of *Cellana* sp., also known as *opihi*. There are several different species of this genus in Hawai`i, but all are marine mollusks found at or around the tidal zone. Again, their presence at this site indicates they were intentionally transported to the site presumably as subsistence items.

<u>Artifacts</u>

Traditional stone tools were recovered from Levels 2 to 4 (0–40 cmbs), and one small fragment of red ocre was recovered from Level 5 (40–50 cmbs). In addition to several pieces of small debitage (5 basalt, 1 volcanic glass; all from Level 3), two formal artifacts were also recovered. A unifacial core based on a large basalt flake was recovered from Level 1 (0–10 cmbs). This core has a prepared striking platform, indicating some degree of raw material selection and curation, rather than expedient use and discard that is common of many Native Hawaiian sites in the project area. The second formal tool is a broken fragment of a polished basalt artifact recovered from Level 3 (20–30 cmbs). This tool, which was broken on all four

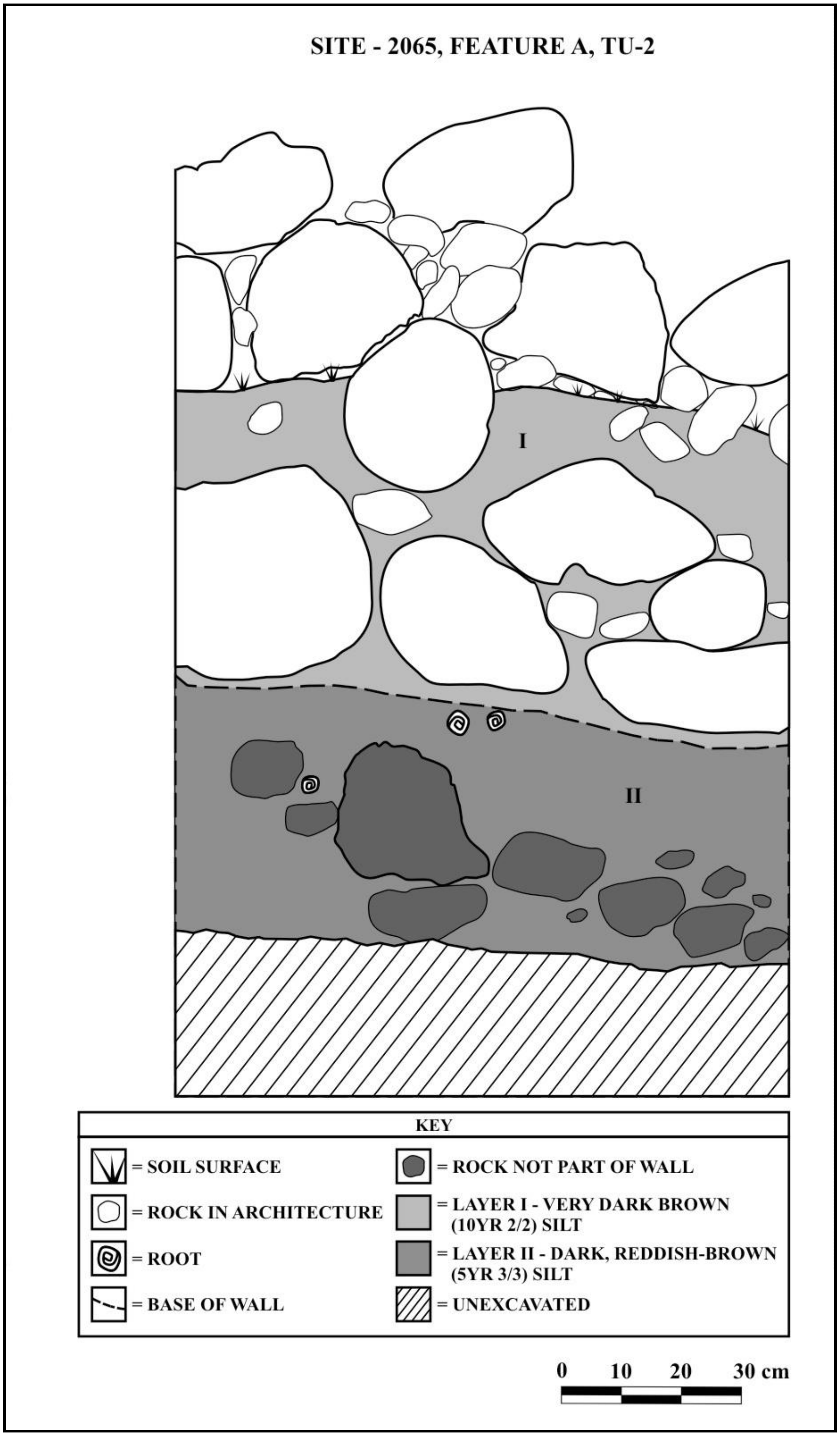


Figure 46: Site -2065, Feature A, TU-2 Profile.

sides, may be a mirror fragment. Native Hawaiians made stone mirrors in traditional times. These circular disks of finely polished dense basalt reflected light when wet (Kirch 1985).

Charcoal

Charcoal was recovered from Levels 3 through 7 (10–70 cmbs) in TU-2. The density of charcoal was highest in Level 5 (37.7 g), with Levels 3, 4, and 6 also yielding appreciable amounts (approximately 20.0 g each). Lower levels (Levels 6–7) yielded only trace amounts of charcoal (less than 1.0 g each). The quantitative distribution of charcoal correlates broadly with the distribution of cultural material and the base of the architecture, suggesting that all three are roughly contemporaneous.

Dating

Two radiocarbon dates were obtained from wood charcoal samples recovered from Level 2 and Level 6 of TU-2 at Site -2065. The sample from Level 5 (40–50 cmbs), representing the base of site architecture, measured 320±50 B.P. The second sample, from Level 1 (0–10 cmbs) or just below the ground surface, measured 490±70 B.P. It is clear that these dates are out of stratigraphic sequence with no overlap in the range of potential dates at one standard deviation. If this is not due to sampling error, then it suggests artificial soil disturbance (*e.g.,* ancient digging) or natural movement of material within the deposit (*e.g.,* bioturbation by roots or rodents). Both of these processes can move material upwards or downwards, and both are common occurrences—although difficult to detect—at many archaeological sites (Wood and Johnson 1978). In any case, these data suggest that the Site -2065 enclosure was formally constructed and in use during the pre-Contact era, perhaps as early as the late A.D. 1200s, and almost certainly by the A.D. 1400s.

Taxonomic Identification of Botanical Remains

One hundred and sixteen pieces of wood charcoal, weighing a total of 12.9 g, were taxonomically identified from Level 3 of TU-2. This was the only sample of botanical remains from TU-2 submitted for analysis. Eight of the nine taxa that were identified are native to Hawai`i. The ninth, *Bidens* sp. (n=1 specimen), has both traditional and introduced varieties in Hawai`i. The majority of specimens (67 of 116 pieces, 58% by weight) represent three taxa: *Chenopodium oahuense, Nototrichium sandwicense* and *Myoporum sandwicense*. In decreasing order by weight, the taxa present in TU-2 showed a great variety of plants and possible uses:

- *Chenopodium oahuense* (*`aheahea* or *`aweoweo*)—a shrub whose leaves were traditionally eaten as food items (39 pieces)

- *Nototrichium sandwicensus* (*kulu`i*)—a shrub with unknown uses (11 pieces)
- *Myoporum sandwicense* (*naio*)—a tree traditionally used for house posts (17 pieces)
- *Sida fallax* (*`ilima*)—a shrub used for floor and wall habitation coverings, as well as medicine (17 pieces)
- *Osteomeles anthyllidifolia* (*`ulei*)—a shrub whose wood was used for digging sticks, fishing spears, carrying poles, and musical bows; smaller branches were bent into hoops for fishing (12 pieces)
- *Chamaesyce* sp. (*`akoko*)—a shrub traditionally used for firewood (15 pieces)
- *Metrosideros polymorpha* (*`ohi`a lehua*)—a tree whose wood was traditionally used for spears and mallets, idol carvings, house posts and rafters, enclosures around temples (3 pieces)
- *Bobea* sp. (*`ahakea*)—a tree whose wood was traditionally used for canoe rims and *poi* boards (1 piece)
- *Bidens* sp. (*ko`oko`olau*)—leaves and flowers traditionally used for medicinal tea (1 piece)

Together, these wood samples reflect a wide variety of traditional uses including house and boat building, food and medicinal uses, manufacturing various kinds of tools (including fishing gear), and use as firewood. This does not necessarily mean that all these tasks were undertaken at the site, nor does it mean that all of the identified wood was introduced by, or related to, human activities. It is unlikely, for example, that boats were constructed at this upcountry location. The data are suggestive of a habitation site where multiple and varied activities took place.

<u>Faunal Analysis</u>

Twelve vertebrate specimens, representing fish, birds, and mammals, were recovered from Levels 2 through 5 (0–50 cmbs) of TU-2. A majority of this small sample (10 of 12 specimens) was recovered from Levels 2 through 4 (10–40 cmbs). Two non-diagnostic fish bones—one from each level—were recovered from Level 2 (10–20 cmbs) and Level 4 (30–40 cmbs). These fish remains—even though they cannot be positively identified to the taxon level—almost certainly represent marine species. That there are no permanent streams or water bodies in the project area, nor have there likely ever been any (given the local topography and climate), these bones almost certainly represent food items transported by humans from the coast.

Two bird bones—including one probable chicken specimen—were recovered from Level 3 (20–30 cmbs). Native Hawaiians possessed chickens in pre-Contact times. Two Polynesian Rat specimens were recovered from Level 3 (20–30 cmbs) and Level 5 (40–50 cmbs). Rats, introduced by the Polynesians, are known as a human commensal species. Rats were not traditionally eaten by ancient Hawaiians. The presence of rat remains at the site may be due to the activities of dogs or due to the bounty of sustainable grains associated with sedentary living. A high degree of sedentism typically corresponds with permanent or stable food sources in an area. The remaining specimens were taxonomically-indeterminate mammals (4 specimens) and non-diagnostic vertebrate (2 specimens).

STATE SITE 50-50-10-2072

SITE -2072 SUMMARY

Site -2072 (PHRI Site No. K-44) is a site complex consisting of four stone enclosures (Figure 47) within an area of approximately 55.0 m by 45.0 m (2,475.0 m²). According to Brown *et al.* (1989:E-17, E-20), the site complex consists of a rectangular enclosure (Feature A), a double square-and-rectangular enclosure (Feature B), and two C-shaped enclosures (Features C and D). Numerous terraces, interpreted as traditional agricultural features, are also present in the area although they were not given official feature designations. The four enclosures are built in a relatively tight cluster on a ridge descending down to the northwest, this cluster intimating a small community-type habitation locale. Site -2072 is located at 762.0 m amsl and approximately 450.0 m east of the western boundary of the project area and 70.0 m south of Site -2073. The local landscape is characterized as a dissected alluvial slope and present vegetation in the area includes *lantana*, grasses, wattle, and *`ilima*.

Site -2072 was interpreted as a traditional, pre-Contact habitation and agricultural site (Brown *et al.* 1989:E-17). Four test units were excavated at Site -2072 during this Data Recovery program: one test unit (TU-1) in Feature A, two test units (TU-3 and TU-4) in Feature B, and one test unit (TU-2) in Feature C. No testing was undertaken in Feature D. Feature A is an enclosure measuring approximately 7.5 m by 6.0 m (45.0 m²). Originally described by Brown *et al.* (1989:E-20) as rectangular, the enclosure is actually morphologically closer to being oval or sub-rectangular in shape. Feature B consists of two attached enclosures—a smaller, roughly square portion to the north, and a larger, roughly rectangular portion to the south—occupying an area of approximately 17.0 m by 13.0 m (221.0 m²). Feature C is a C-shaped enclosure with exterior dimensions measuring approximately 9.0 m by 8.5 m (76.5 m²).

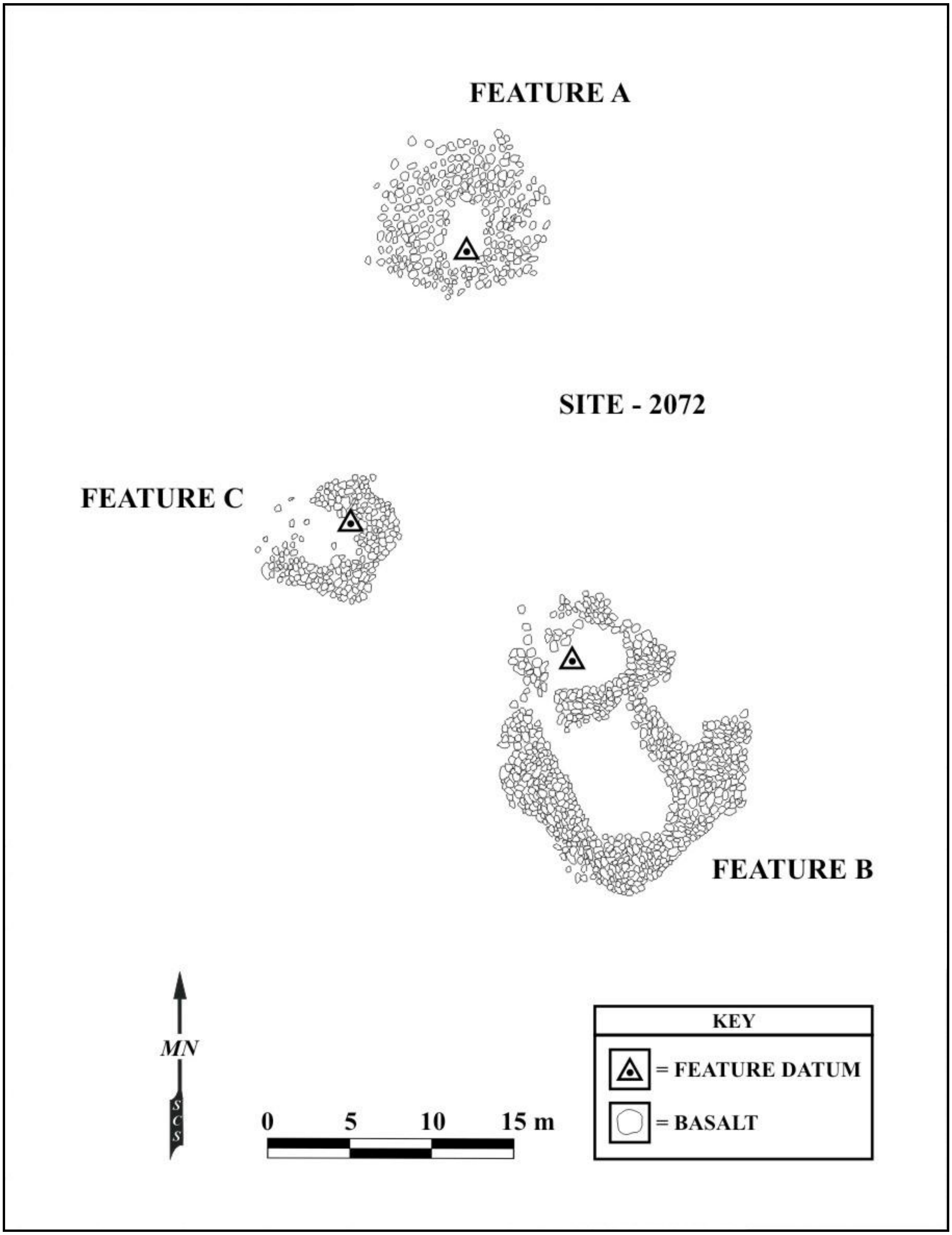


Figure 47: Site -2072 Plan View Map.

Site -2072 excavations yielded traditional stone tools composed of basalt and volcanic glass (including an adze blank fragment, one utilized flake, one core, and debitage), faunal remains (including fish and pig), and charcoal. Radiocarbon dating of wood charcoal samples from these three features resulted in a very wide range of dates, from the A.D. 1400 and 1500s to more than a millennium before present (A.D. 560–679 in Feature B). While another early date had previously been assessed for a feature in the project area (see Brown *et al*. 1997:E-20), this date is probably not truly significant as it was recovered well below, and not directly associated with, cultural material deposits. It is postulated that the site was constructed and occupied from the A.D. 1400s, with the early sample perhaps representing a natural fire event. Construction and occupation of the multi-component site suggests this to be the former location of a conjugal-family type of residential cluster.

SITE -2072 DESCRIPTIONS

Feature A

Feature A was described by Brown *et al.* (1989:E-20) as a rectangular enclosure, but its morphology (after vegetation clearing) is actually closer to an oval or sub-rectangular shape (Figure 48). The exterior dimensions of this enclosure are approximately 7.5 m by 6.0 m (45.0 m^2). Feature walls are relatively thick (2.0–3.0 m), range from 50 cm high (interior) to 110 cm high (exterior), and are comprised of stacked basalt cobbles and boulders. The structure's north and west walls are partially collapsed. The east and west interior walls of the feature are faced. Small sections of the north and south exterior walls are also faced. The northeast corner of Feature A is partially built on and against a small bedrock outcrop. TU-1 was excavated at Feature A.

Feature B

Feature B consists of two attached enclosures: a smaller, roughly square portion to the north and a larger, roughly rectangular portion to the south (Figure 49). Collectively, these enclosures occupy an area of approximately 17.0 m by 13.0 m (221.0 m^2). The smaller portion is partially built on and against a bedrock outcrop and is more poorly preserved than the larger portion. Brown *et al.* (1989:E-20) observed that the walls of this feature—especially the larger, rectangular portion—are very thick, measuring up to 4.0 m thick on the southeast side and 2.0 to 3.0 m elsewhere. These figures are slightly skewed though as upon vegetation clearing, it was apparent that the walls were measured with wall tumble. In actuality, the walls are slightly less thick then mentioned above. Wall facing is present along both the interior and exterior portions of the southeast, south, east, and west walls of the rectangular portion of the enclosure. The walls range from 60 cm (interior) to 80 cm (exterior) high and are comprised of basalt cobbles and boulders. Brown *et al.* (1989:20) also reported an opening near the southern end of the

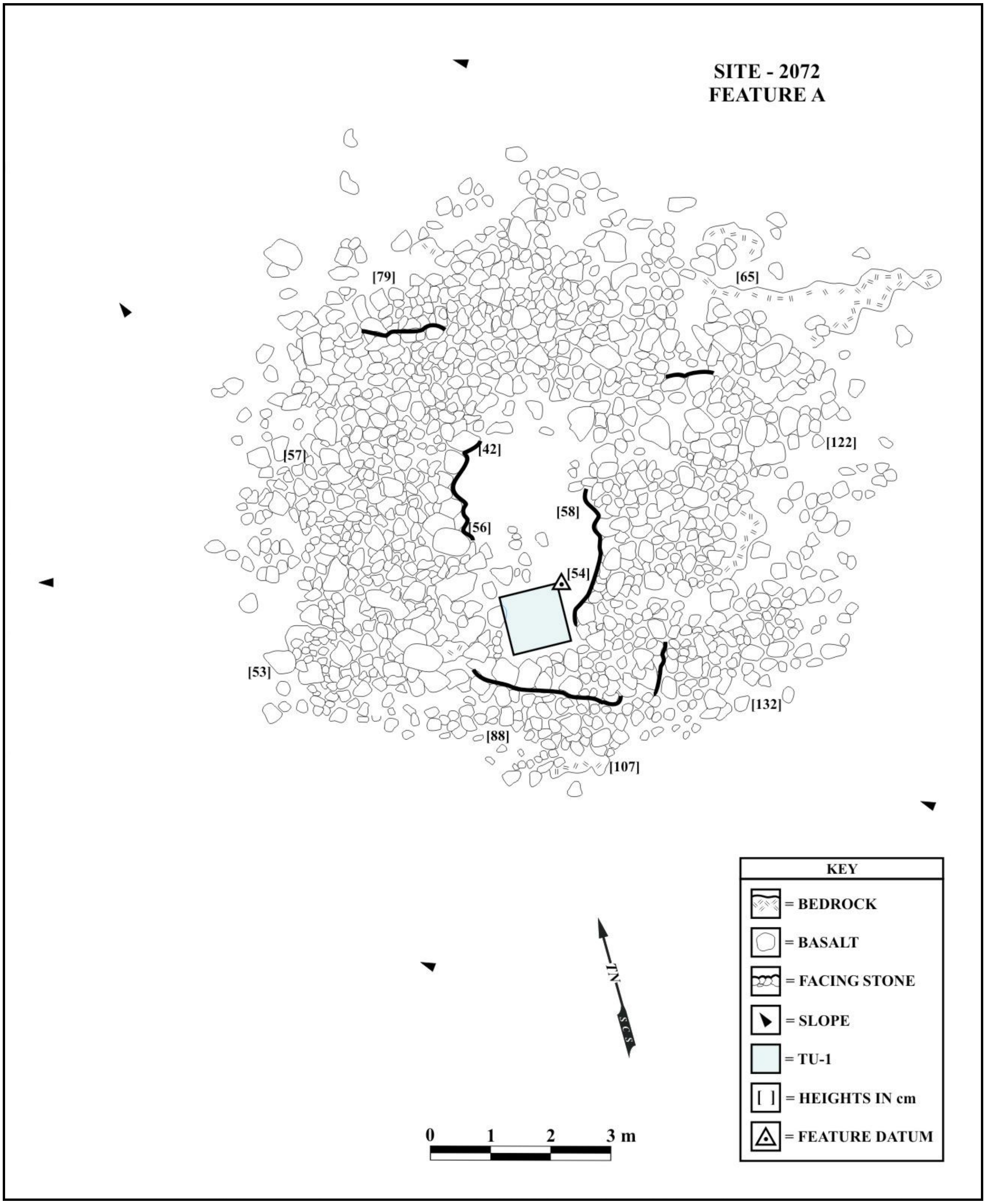


Figure 48: Site -2072, Feature A Plan View.

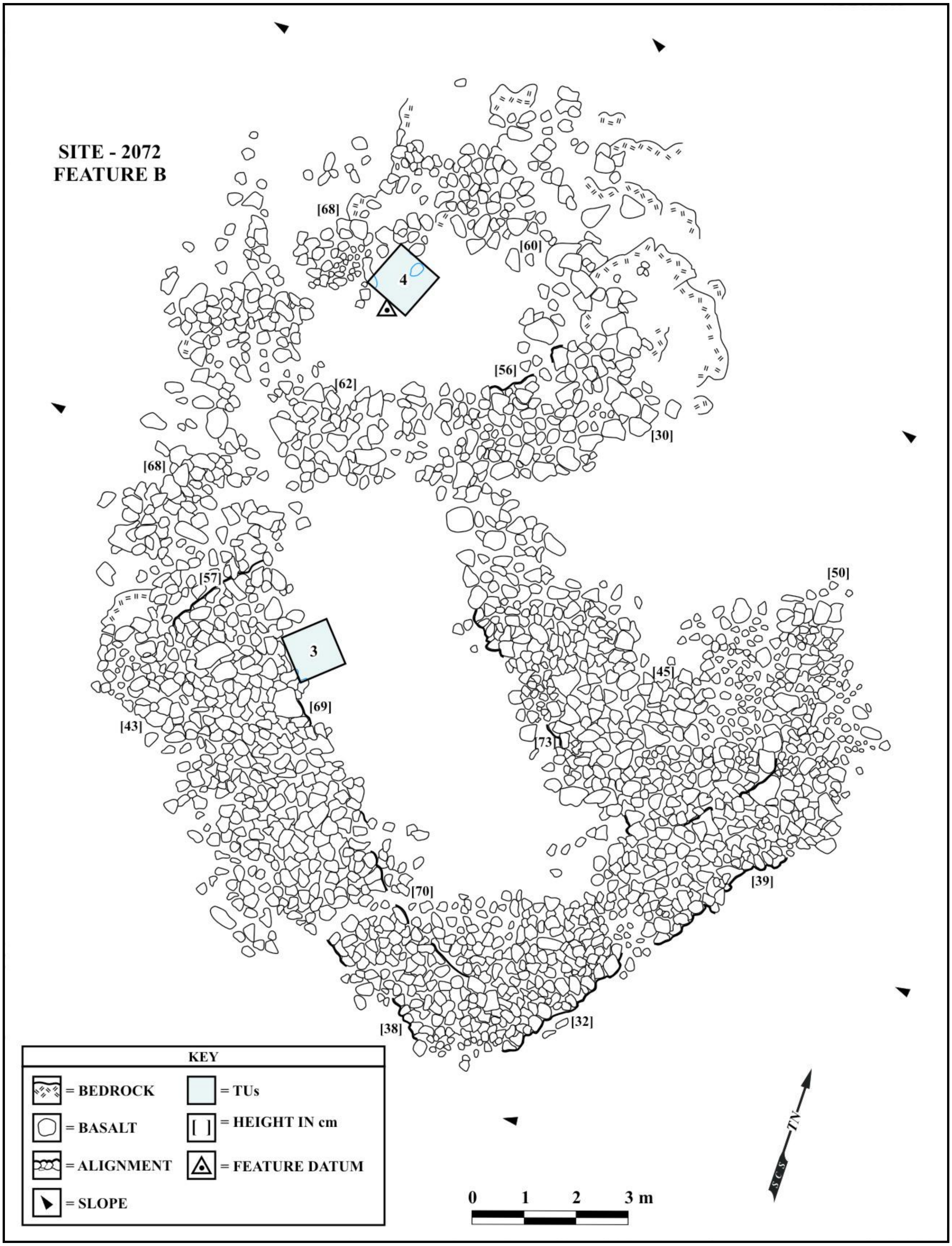


Figure 49: Site -2072, Feature B Plan View.

rectangular enclosure. Vegetation clearing and careful inspection of the 20 cm to 30 cm opening, however, failed to reveal any formal facing that might define such an opening. The opening was likely caused by wall tumble that had been partially cleared.

Feature C

Feature C is a C-shaped enclosure (Figures 50 and 51) with exterior dimensions measuring approximately 9.0 m by 8.5 m (76.5 m²). The walls are comprised of stacked basalt cobbles and boulders ranging from 80 cm to 90 cm thick and averaging 55 cm high. Wall facing is present on portions of the interior and exterior north, east, and south walls. Sizable tumble zones (*i.e.,* collapsed sections) are present along the interior walls and extending from the exterior of the north wall. TU-2 was excavated at Feature C.

Figure 50: Site -2072, Feature C. View to North.

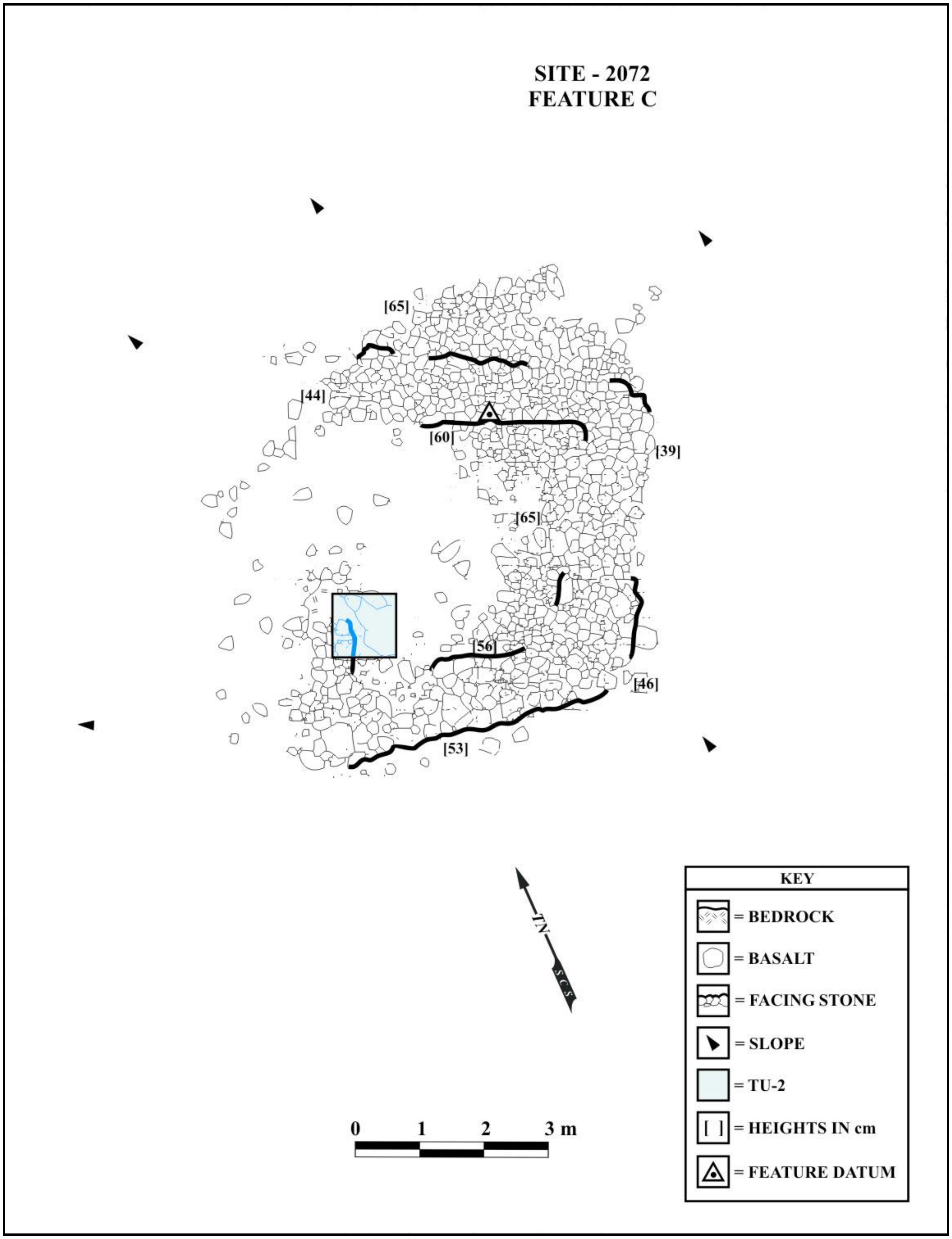


Figure 51: Site -2072, Feature C Plan View.

SITE -2072 EXCAVATIONS
Test Unit 1 (TU-1)

TU-1, a 1.0 m by 1.0 m unit, was placed in the southern end of Feature A in order to examine feature architectural base construction and to test for cultural deposits. The unit breached the south wall. The excavation of TU-1 demonstrated that feature wall architecture extended just below the present ground surface and was based in the upper levels of Layer I.

The excavation of TU-1 revealed two main sedimentary layers (Figure 52). Layer I (25–40 cm thick) was composed of dark brown (10YR 3/3) silt. In some TU-1 locations (*e.g.,* western portion of north wall), this layer rests directly on the bedrock, with no intervening second layer. Pebbles, cobbles, and boulders, including both architecture and loose rocks, comprised 15 to 30 percent of the matrix. Roots of varying size were abundant in Layer I. Traditional stone tools and charcoal were recovered from this layer. Layer II (5–15 cm thick) was a dark, yellowish- brown (10YR 3/3) silt and rested directly on bedrock. Roots were relatively rare in Layer II as compared with the overlying layer. Only a few pebbles and cobbles occurred in this layer. In some places (*e.g.,* western portion of north wall), this layer was not present. No cultural materials were recovered from Layer II.

<u>Midden</u>

Other than charcoal, no midden was recovered from TU-1.

<u>Artifacts</u>

Traditional stone tools recovered from TU-1 included one piece of basalt debitage from Level 1 (0–10 cmbs), two pieces of basalt debitage from Level 2 (10–20 cmbs), and one basalt flake with polish from Level 5 (40–50 cmbs).

<u>Charcoal</u>

A small amount of charcoal (less than 10.0 g) was recovered from Levels 2 and 3 (10–30 cmbs) in TU-1. No charcoal was recovered below 30 cmbs.

<u>Dating</u>

A wood charcoal sample from Level 2 (10–20 cmbs) in TU-1 was submitted for radiocarbon dating. The date returned a conventional date of 300$\pm$80 B.P. When calibrated, this translated into a calendric date of A.D. 1480 to 1660. This data suggests that Feature A was constructed and occupied during the 15th and 16th centuries of the pre-Contact era.

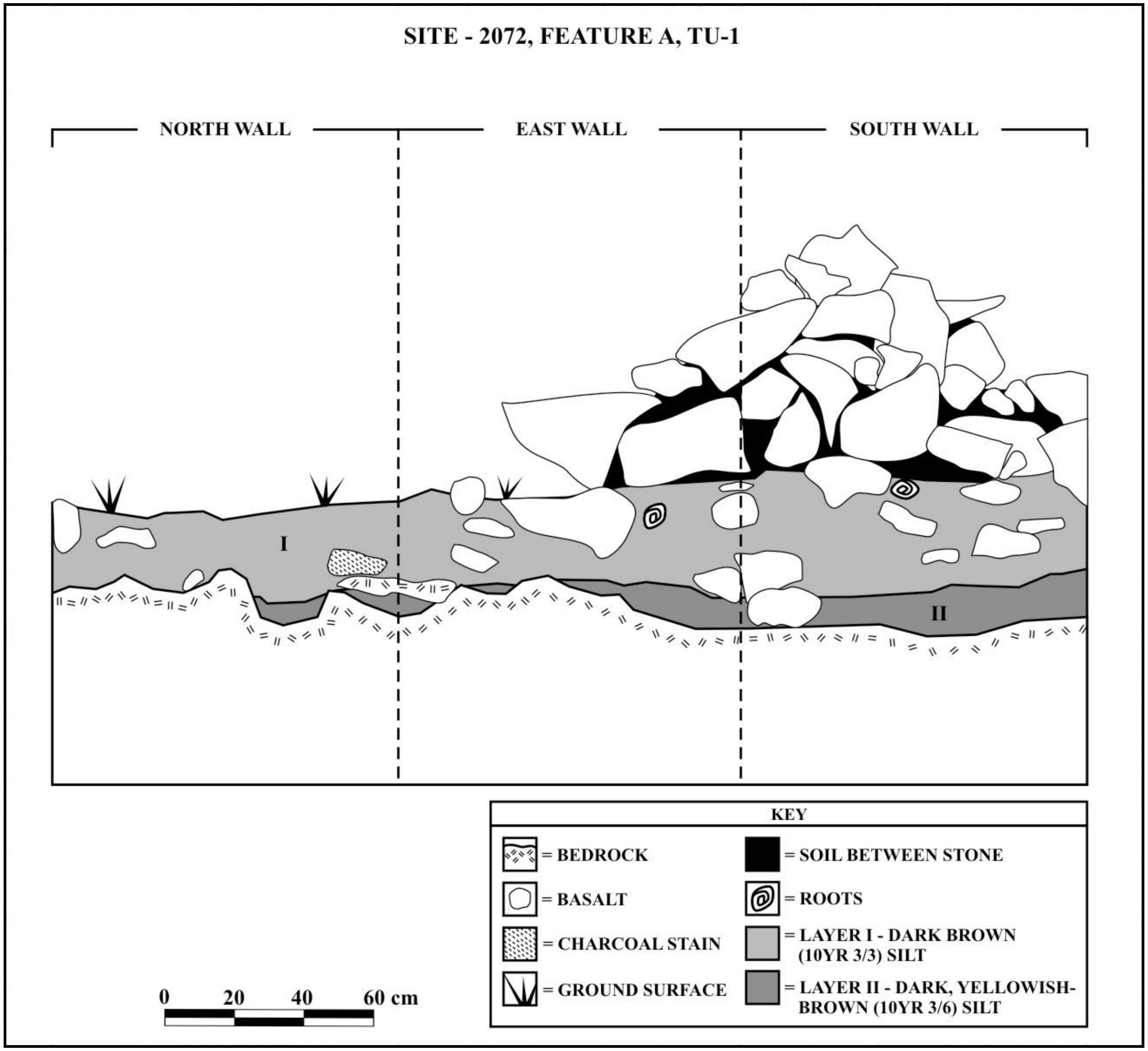


Figure 52: Site -2072, Feature A, TU-1 Profile

Taxonomic Identification of Botanical Remains

No wood charcoal samples were analyzed for taxonomic affiliation from TU-1.

Faunal Analysis

No faunal remains were recovered in TU-1.

Test Unit 2 (TU-2)

TU-2, measuring 1.0 m by 1.0 m, was placed in the southwestern, interior corner of Feature C in order to examine architectural base construction and to test for the presence/absence of cultural deposits. The test unit abutted and partially breached both the south and west walls. The excavation of TU-2 demonstrated that the wall architecture rested directly upon the bedrock within a relatively shallow sedimentary deposit. Based on these observations, Feature C may have been of relatively recent construction. An historic radiocarbon date supports this hypothesis.

Only one main sedimentary layer was present in TU-2 (Figure 53). Layer I (2–29 cm thick) was composed of very dark brown (10YR 2/2) silt. This layer encompassed feature architecture that was placed directly on the bedrock. In some locations of the feature, no soil horizons are present at all as outcropping bedrock has been directly incorporated into feature construction. Cobbles comprised 5 to 10 percent of the sedimentary matrix and roots of varying sizes were common. Flecks of charcoal were present but no other cultural materials were recovered from this layer.

Midden

Other than charcoal, no midden was recovered from TU-2.

Artifacts

No artifacts were recovered from TU-2.

Charcoal

A small amount of charcoal (less than 10.0 g) was recovered from Levels 1 through 3 (0–30 cmbs) in TU-2.

Dating

One wood charcoal sample from TU-2 was submitted for radiocarbon dating. The sample, obtained from Level 2 (10–20 cmbs), returned a conventional date of 40±60 B.P. When

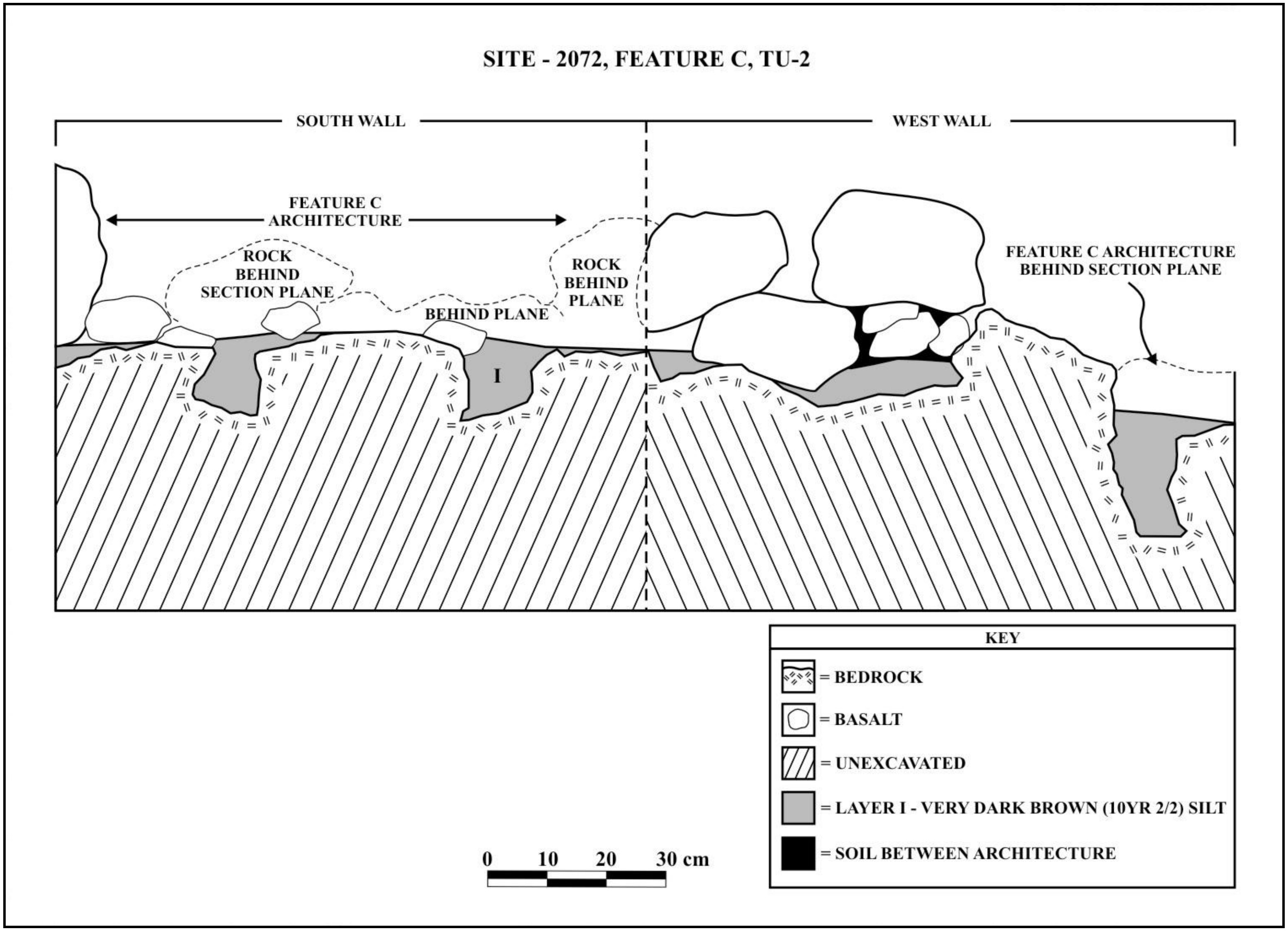


Figure 53: Site -2072, Feature C, TU-2 Profile.

calibrated, the date returned a calendric range of A.D. 1800 to 1940 at two Sigma and A.D. 1810 to 1920 at one Sigma. This range implies construction of the site in early historic times and is consistent with the stratigraphic evidence showing a very shallow deposit and the limited presence of cultural materials (only charcoal).

Taxonomic Identifications of Botanical Remains

No wood charcoal samples were analyzed for taxonomic affiliation from TU-2.

Faunal analysis

No faunal remains were recovered from TU-2.

Test Unit 3 (TU-3)

TU-3 (1.0 m by 1.0 m) was excavated in the southern, rectangular portion of Feature B in order to examine architectural base construction and to test for datable cultural deposits. The unit was placed along the interior, northern end of the rectangular enclosures west wall (*i.e.,* near the expected interior edge of the facing). Excavation revealed that feature architecture extended into the transition zone between the lowermost portion of Layer I and the uppermost level of Layer II (see below) at approximately 15 to 20 cmbs. Traditional stone tools, faunal remains, and charcoal were recovered fromTU-3.

Three sedimentary layers were identified in TU-3 (Figure 54). Layer I (15–20 cm thick) was composed of very dark, grayish-brown (10YR 3/2) silt. In some locations of the unit (*e.g.,* the entire west profile wall), this layer consisted almost entirely of architectural stones. The matrix in which the architectural stones were located consisted of approximately 5 percent pebbles, cobbles, and boulders. Very fine roots were abundant. Traditional stone tools, faunal remains, and charcoal were recovered from this layer.

Layer II (35–50 cm thick) was a very dark brown (10YR 2/2) silt, and included two additional sub-layers (designated IIA and IIB) distinguished by color variations attributed to oxidation and/or burning. Charcoal was common in this layer. Only few pebbles and cobbles were present. Layer II yielded one traditional stone tool, faunal remains, and charcoal. In the eastern half of the south wall profile, Layer II rested directly on bedrock. Layer IIA consisted of yellowish-red (5YR 4/6) silt mottled with black charcoal and charcoal stains. Layer IIB was a black (10YR 2/1) silt with abundant charcoal.

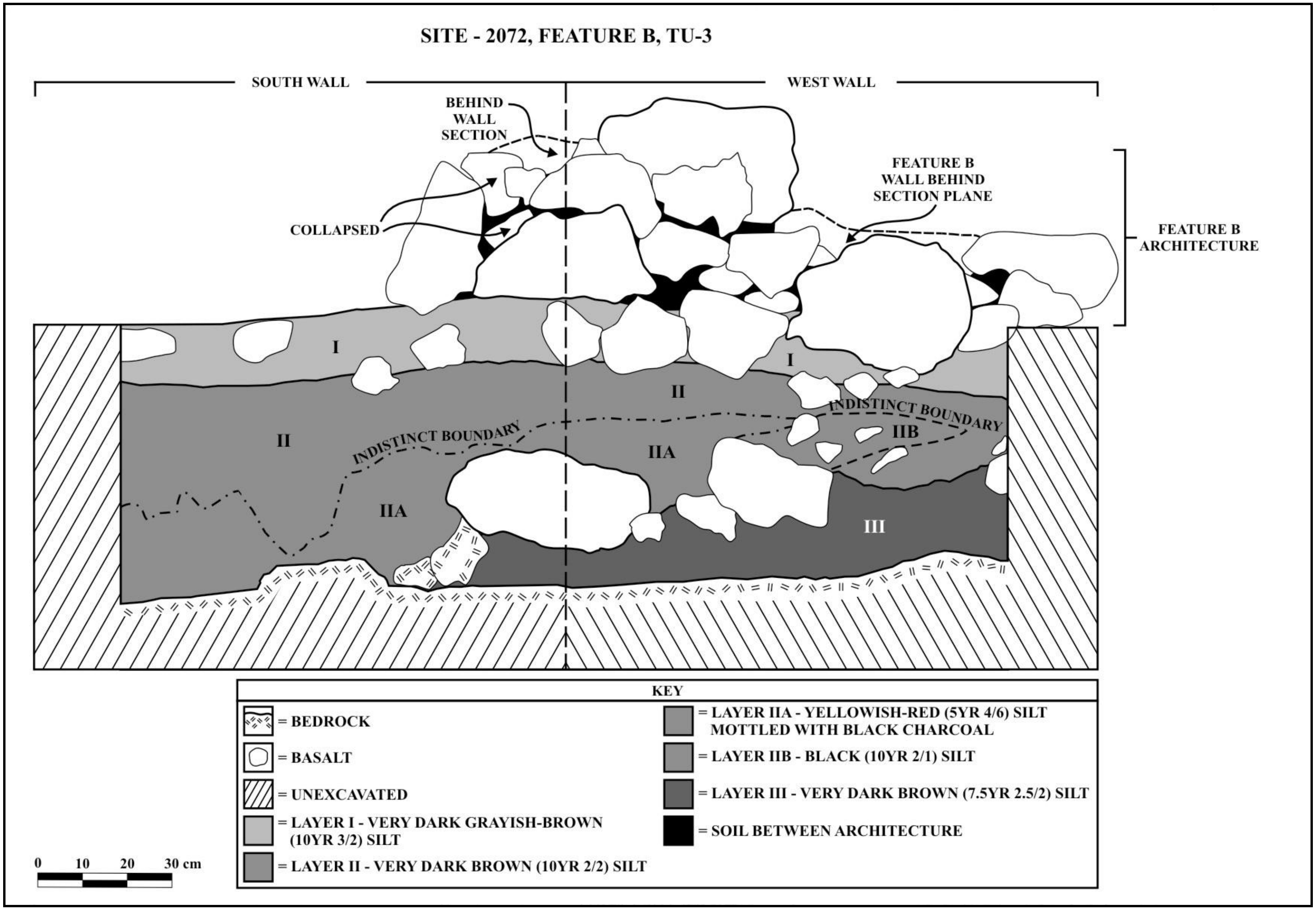


Figure 54: Site -2072, Feature B, TU-3 Profile.

Layer III (15–25 cm thick) was composed of very dark brown (7.5YR 2.5/2) compacted silt with decomposing bedrock rubble. No cultural materials were recovered from this layer. The layer was sporadic in terms of coverage. In some locations of the unit (*e.g.,* the eastern half of the south wall profile), this layer was not present. Where present, the layer rested directly on bedrock.

Midden

Other than charcoal and faunal remains, which are described below, no midden was recovered from TU-3.

Artifacts

Several traditional stone tools were recovered from the upper 20 cm (Levels 1 and 2) of TU-3. One piece of volcanic glass debitage was recovered from Level 1. Two formal stone tools, one piece of basalt debitage and four pieces of volcanic glass debitage, were recovered from Level 2. One artifact represented the proximal end of a basalt adze preform. The hafting element, or tang, was roughed out but unfinished. The second formal artifact consisted of a small volcanic glass core based on a small nodule. A single, unprepared striking platform was present.

Charcoal

A small amount of charcoal (15.9 g) was recovered from Levels 1 through 5 (0–50 cmbs) in TU-3.

Dating

No samples from TU-3 were submitted for radiocarbon dating analysis.

Taxonomic Identification of Botanical Remains

No wood charcoal samples from TU-3 were analyzed for taxonomic affiliation.

Faunal analysis

A total of five fish bones and one Polynesian Rat bone were recovered from TU-3. All Levels between 1 and 5, except Level 3, yielded one or more bone specimens. One fish bone was identifiable as a parrotfish. There are presently at least seven species of parrotfish in Hawai`i, all of which occupy inshore marine habitats. The other four recovered fish bones were not taxonomically identifiable. Given the project location's geographic location, these non-diagnostic specimens, as well as the parrotfish bone, almost certainly represent food items transported by humans from the coast. The presence of rat remains at the site is either due to the activities of dogs or simply the by-product of rats locating a sustainable resource (sedentary establishment with food).

Test Unit 4 (TU-4)

TU-4, a 1.0 m by 1.0 m unit, was placed in the northwestern portion of the small, square enclosure, extending into west wall architecture. The unit was positioned to assess base architecture and to test for datable cultural evidence. The excavation of TU-4 demonstrated that feature architecture was not constructed on the bedrock but rather rested at or very close to the modern ground surface. Other than charcoal, no cultural materials were recovered from TU-4.

Two main sedimentary layers were present in TU-4 (Figure 55). Layer I (30–40 cm thick) was composed of very dark, grayish-brown (10YR 3/2) silt. Feature architecture rested on or just below the present ground surface. The matrix consisted of 20 to 40 percent pebbles, cobbles, and boulders. Roots of varying sizes were abundant. Charcoal flecks were present in trace amounts. No cultural materials were present in Layer I. Layer II (15–30 cm thick) was a dark yellowish-brown (10YR 3/6) silt that rested directly on underlying bedrock. Charcoal was present but in minimal amounts. Roots of varying sizes were common. Pebble and cobble content was 50 percent. Layer II was sterile.

<u>Midden</u>

Other than charcoal, no midden was recovered from TU-4.

<u>Artifacts</u>

No artifacts were recovered from TU-4.

<u>Charcoal</u>

A modest amount of charcoal (36.0 g) was recovered from Levels 1 through 5 (0–50 cmbs) in TU-4.

<u>Dating</u>

Two radiocarbon dates were obtained for TU-4 (Feature B) at Site -2074. A conventional date of 220±70 B.P. was obtained from Level 2 (10–20 cmbs). When calibrated, this date provided a range of A.D. 1630 to 1820 (1 Sigma). A second, significantly older, date of 1410±40 B.P. was obtained from Level 5 (40–50 cmbs). The calendric date of this sample was returned at A.D. 560 to 670 (2 Sigma) and A.D. 610 to 657 (1 Sigma). This is quite an early date

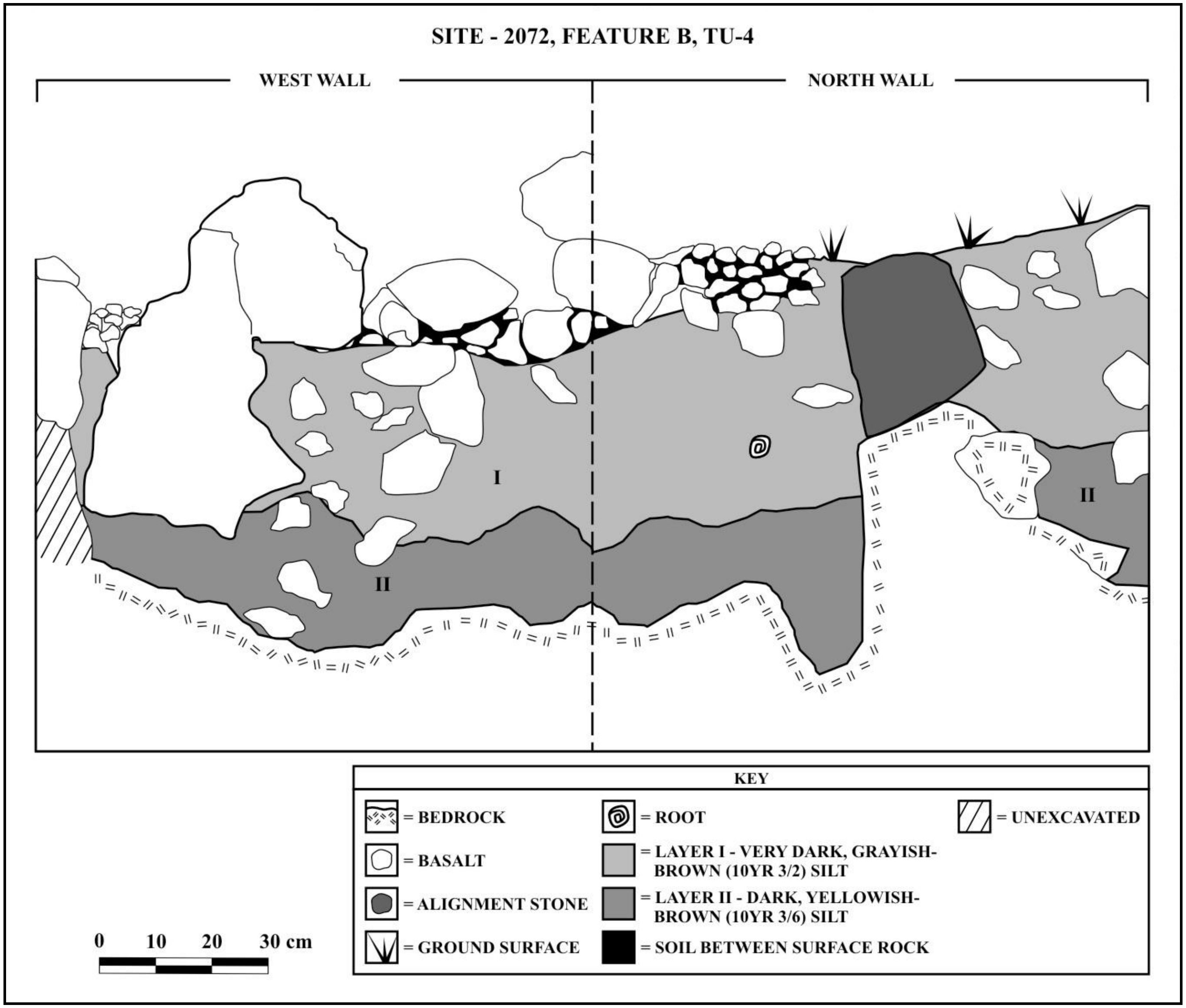


Figure 55: Site -2072, Feature B, TU-4 Profile.

for the archaeology of the area. Unfortunately, no cultural materials were recovered from TU-4, so the meaning of this date remains ambiguous (see Discussion section).

<u>Taxonomic Identification of Botanical Remains</u>

No wood charcoal samples from TU-4 were analyzed for taxonomic affiliation.

<u>Faunal Analysis</u>

No faunal remains were recovered from TU-4.

STATE SITE 50-50-10-2073

SITE -2073 SUMMARY

Site -2073 (PHRI Site No. K-45, BPBM Site No. T-60) consists of one main feature—a rectangular enclosure—and a smaller, associated feature, which may represent a religious shrine (Figure 56). The two features occupy an area of approximately 10.0 m by 8.0 m (80.0 m^2) and are located at 740.0 m amsl at the base of a small hill in a landscape characterized by dissected alluvial slopes. The site complex is located some 60.0 m southwest of Site -2074 and 390.0 m east of the project area's western boundary. Local vegetation consists of *lantana*, grasses, *`ilima, panini,* and wattle.

Based on architectural evidence gleaned during the present study, this site appears consistent with a traditional, pre-Contact habitation site, associated agricultural features, and a possible religious shrine (see Brown *et al.* 1989:E-20). The main feature (Feature A) is a raised rectangular enclosure composed of stacked stones. Immediately north of Feature A is a long, arc-shaped terrace with flat areas above and below it. One test unit (TU-1) was excavated at Feature A. The possible religious shrine or burial locus (Feature B) consists of a low, linear mound of basalt cobbles and boulders with a single, upright basalt block in the center. This feature is located approximately 4.0 m from the southwest corner of Feature A. The feature was not tested.

The test unit (TU-1) at Feature A yielded traditional tools (including a coral abrader, a basalt adze fragment, and debitage), marine mollusks and sea urchin, and bird and mammal bones. Six native Hawaiian plant species were identified from the TU-1 botanical sample. Two radiocarbon dates place the latest phase of site construction and occupation in the early A.D. 1400s to mid-1600s.

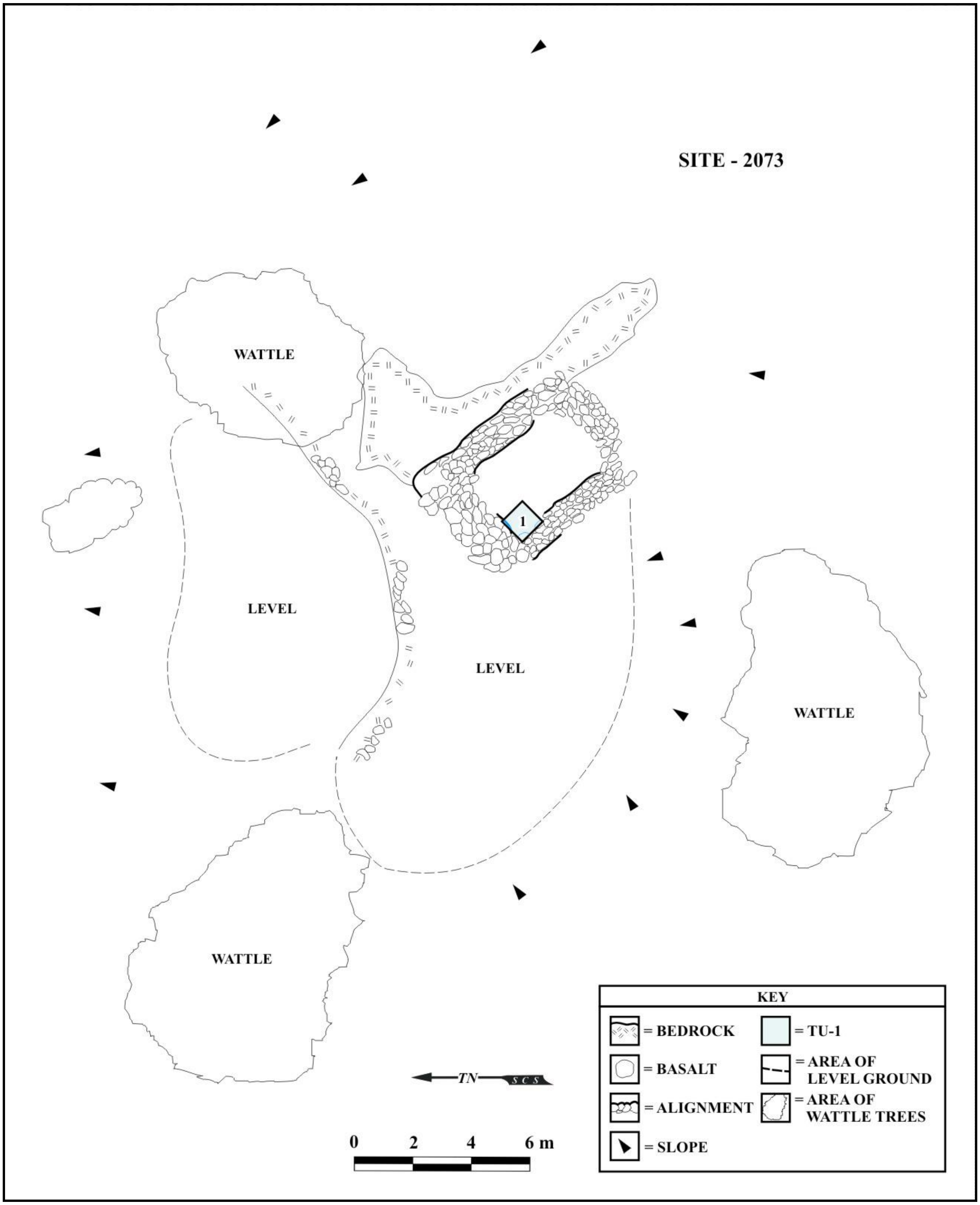


Figure 56: Site -2073, Feature A Plan View Map.

SITE -2073 DESCRIPTION

Feature A

Feature A is a rectangular enclosure (Figure 57) composed of basalt cobbles and boulders measuring approximately 7.8 m by 6.5 m (50.7 m²). Feature walls average 50 cm in height and most exhibit excellent structural integrity and facing (Brown *et al.* 1989:E-20). A portion of the northeast wall was built directly on bedrock outcropping. TU-1 was excavated in this feature.

SITE -2073 EXCAVATION

Test Unit 1 (TU-1)

One test unit (TU-1) measuring 1.0 m by 1.0 m was excavated in Feature A. The test unit was located in the west corner of Feature A, within the enclosure, and directly abutted the interior facing of the northwest and southwest walls.

Feature A excavation revealed four major sedimentary layers occurring beneath stacked feature stones and above bedrock (Figure 58). Layer I (5–15 cm thick) was composed of very dark, grayish brown (10YR 3/2) silt with 10 percent pebble content. This loose, dry sediment with poorly developed soil structure and many fine- to medium-sized roots was interpreted by

Figure 57: Site -2073, Feature A. View to East.

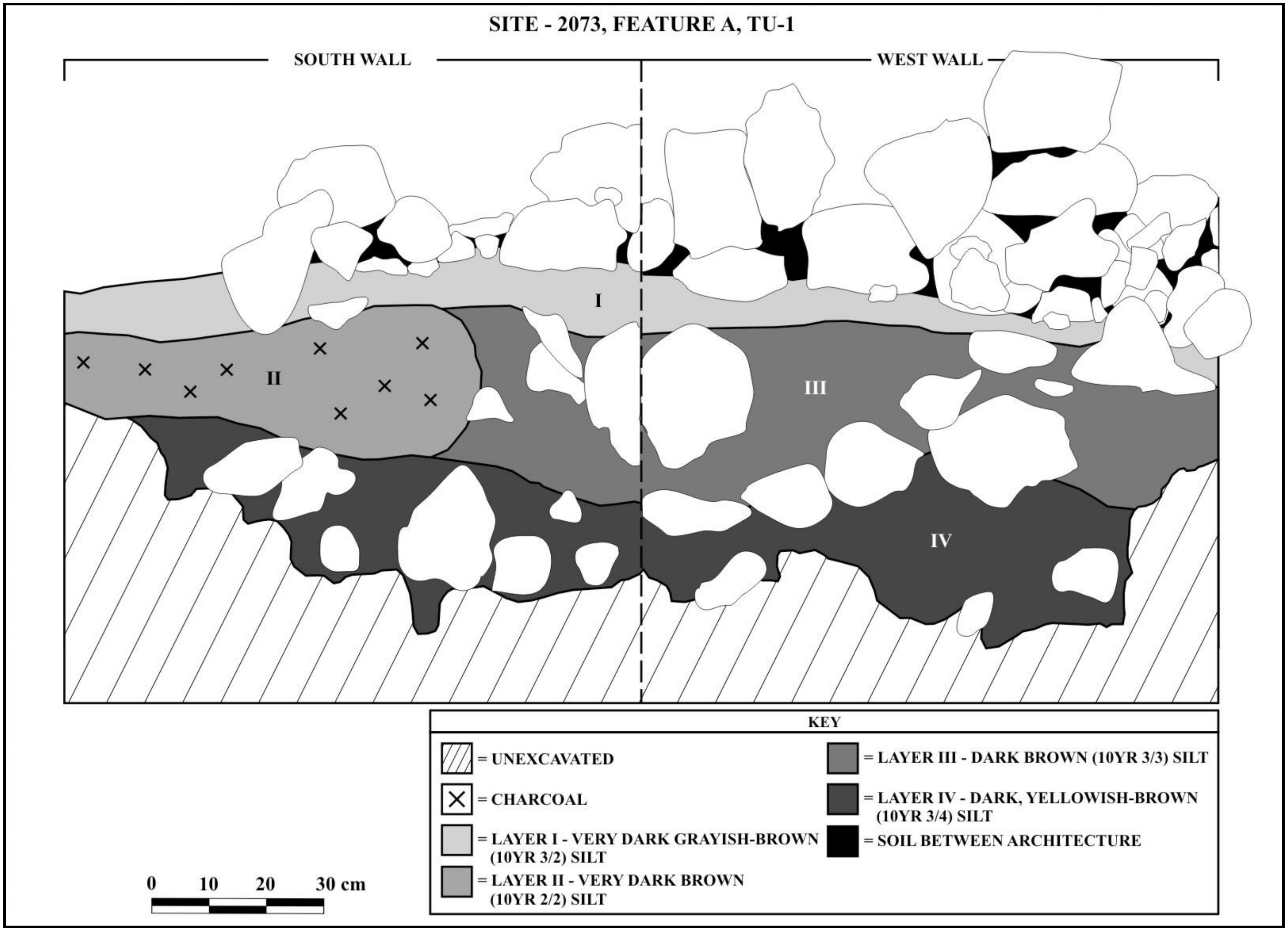


Figure 58: Site -2073, Feature A, TU-1 Profile.

the unit excavator as representing post-occupation deposition. Layer II (15–25 cm thick) consisted of very dark brown (10YR 2/2) silt with 15 percent pebble and cobble content. This layer was the main occupation deposit, and it contained abundant charcoal—some of which was concentrated in a 50 cm by 15 cm area in Level 3 (see Discussion section), traditional artifacts, and midden. The stacked stones comprising the walls of the enclosure were based in Layer II, directly associated with the cultural deposit. Layer III (20–30 cm thick) was a dark brown (10YR 3/3) silt with large cobbles and small boulders unrelated to the architecture (stacked stones). Beyond scattered flecks of charcoal, this layer was culturally sterile. Layer IV (5 cm) was the lowermost sedimentary unit, was composed of dark, yellowish-brown (10YR 3/4) silt with 25 to 30 percent pebbles and cobbles in the matrix. This layer was directly atop the bedrock and was culturally sterile.

Midden

Other than charcoal, midden recovered from TU-1 (Feature A) consisted of small amounts of marine shell and sea urchin. This material, described in detail below, is consistent with food remains from the inhabitants of Site -2073. The presence of marine resources, in particular, is significant as the site occurs at least several miles from the ocean. These foods were presumed to have been deliberately transported to the site by humans.

Artifacts

Several traditional tools, including a coral abrader, a basalt adze fragment, and four pieces of basalt debitage were recovered from TU-1. The vertical distribution of these traditional artifacts is noteworthy. With artifacts recovered from Level 1 (0–10 cmbs) through, and including, Level 4 (30–40 cmbs), there are at least 20 cm, and perhaps as many as 40 cm, separating the lowest and uppermost finds. This raises the possibility for multiple occupation episodes at this site, or, at least, a relatively lengthy period of intermittent site occupation.

Charcoal

Charcoal was recovered from Level 2 through, and including, Level 5 (0–50 cmbs), but was most abundant (by weight) in Levels 1 through 4 (10–40 cmbs). Each of these three 10-cm levels yielded 60.0 g to 90.0 g of charcoal. The charcoal was distributed more or less randomly throughout the sedimentary matrix, with no clear feature boundaries that might indicate a hearth or fire pit. One small concentration of charcoal, an area measuring approximately 50 cm by 15 cm, was located in Level 3—between 20 and 30 cmbs—directly abutting the southwest wall. This charcoal stain did not exhibit clear vertical boundaries nor other potential characteristics of a cooking fire (*e.g.*, fire-cracked rock). One hypothesis is that this material represented a 'toss zone' or discard area within the enclosure.

Dating

Two samples of wood charcoal from TU-1 (Feature A) at Site -2073 were submitted for radiocarbon analysis. The sample from Level 2 (10–20 cmbs) yielded a conventional date of 390±60 B.P. When calibrated, the date ranged from A.D. 1420 to 1640 at 2 Sigma and A.D. 1430 to 1520 at 1 Sigma. The sample from Level 5 (40–50 cmbs) produced a conventional date of 320±40 B.P. After calibration, the calendric date range was A.D. 1470 to 1650 at 2 Sigma and A.D. 1510 to 1640 at 1 Sigma. Both these dates are consistent with site construction and intensive occupation in the late A.D. 1400s through early 1600s. This pre-contact occupation is also supported by the total absence of introduced plant species among a sample of identified charcoal remains.

Taxonomic Identification of Botanical Remains

Sixteen pieces of wood charcoal from TU-1 weighing 1.4 g in total were analyzed for taxonomic affiliation (Murakami 2003). All the samples derived from Level 5 (40–50 cmbs). Six different taxa, all native to Hawai`i, were identified. In decreasing order by weight (g), the six native taxa consisted of the following:

- *Chamaesyce* sp. (*`akoko*)—a shrub traditionally used for firewood (5 pieces)
- *Chenopodium oahuense* (*`aheahea* or *`aweoweo*)—a shrub whose leaves were traditionally eaten as greens (3 pieces)
- *Osteomeles anthyllidifolia* (*`ulei*)—a shrub with various traditional uses (4 pieces)
- *Nothocestrum latifolium* (*`aiea*)—a tree traditionally used for canoes and for thatching sticks (2 pieces)
- *Myoporum sandwicense* (*naio*)—a tree traditionally used for house posts (1 piece)
- *Bobea* sp. (*`ahakea*)—a tree traditionally used for canoe rims and *poi* boards (1 piece)

The absence of introduced flora among the charcoal samples supports the pre-Contact date suggested by the radiocarbon analysis. The variety of traditional uses for these six shrubs and trees does not necessarily mean all of these activities took place at this site (*e.g.*, canoe building, house building), but they do suggest a habitation site where varied tasks were performed.

Faunal Analysis

A small amount of both vertebrates and invertebrates were identified from Levels 2 through 4 (10–40 cmbs) in TU-1. Several fragments of marine shell were recovered, including *Cypraea* sp. (a mollusk), another distinct—yet unidentified—mollusk, and an unidentified member of the Echinoidea Superfamily (*i.e.*, sea urchin). The presence of these marine species several miles from the coast indicates their introduction into the site by humans, presumably as food items. Vertebrates included bird (4 specimens), mammal (1 specimen), and indeterminate small-medium taxa (6 specimens). *Asio flammeus*, the Short-eared owl (1 specimen), is the only specimen that can be identified to species. The remaining bones are too fragmentary for more specific identification.

STATE SITE 50-50-10-2074

SITE -2074 SUMMARY

Site -2074 (PHRI Site No. K-46, BPBM Site No. T-60) consists of four features (Figure 59) on a broad, flat area of approximately 75.0 m by 90.0 m (6,750.0 m^2). The site is located at 732.0 m amsl on a dissected alluvial slope. This site complex is located some 60.0 m northeast of Site -2073 and 440.0 m east of the project area's western boundary. Local vegetation was typical for the area and includes *lantana*, grasses, *`ilima, panini,* and wattle.

Based on architectural characterizations, Site -2074 was assessed as a traditional, pre-Contact habitation site with associated agricultural features (Brown *et al.* 1989:E-20 to E-21), a common pattern for the archaeological district. Site -2074 consists of four small enclosures of various shapes (two rectangular, one C-shaped, one D-shaped) built along a row of basalt outcrops descending a gentle slope. Both of the rectangular enclosures (Features A and C) were tested during the present study. Feature A measures 6.5 m by 6.0 m (39 m^2) and Feature C measures 7.5 m by 5.5 m (41.3 m^2).

Excavations at Feature A (TU-1) yielded one basalt polishing stone and a radiocarbon date from the mid 1600s. TU-2, excavated within Feature C, was culturally sterile. Overall, Site -2074 is thought to reflect a small household cluster or conjugal residential group.

SITE -2074 FEATURE DESCRIPTIONS

Feature A

Feature A consists of a 6.5 m by 6.0 m rectangular enclosure composed of stacked basalt cobbles and boulders (Brown *et al.* 1989:E-20). The northwestern flank of the feature is in poor

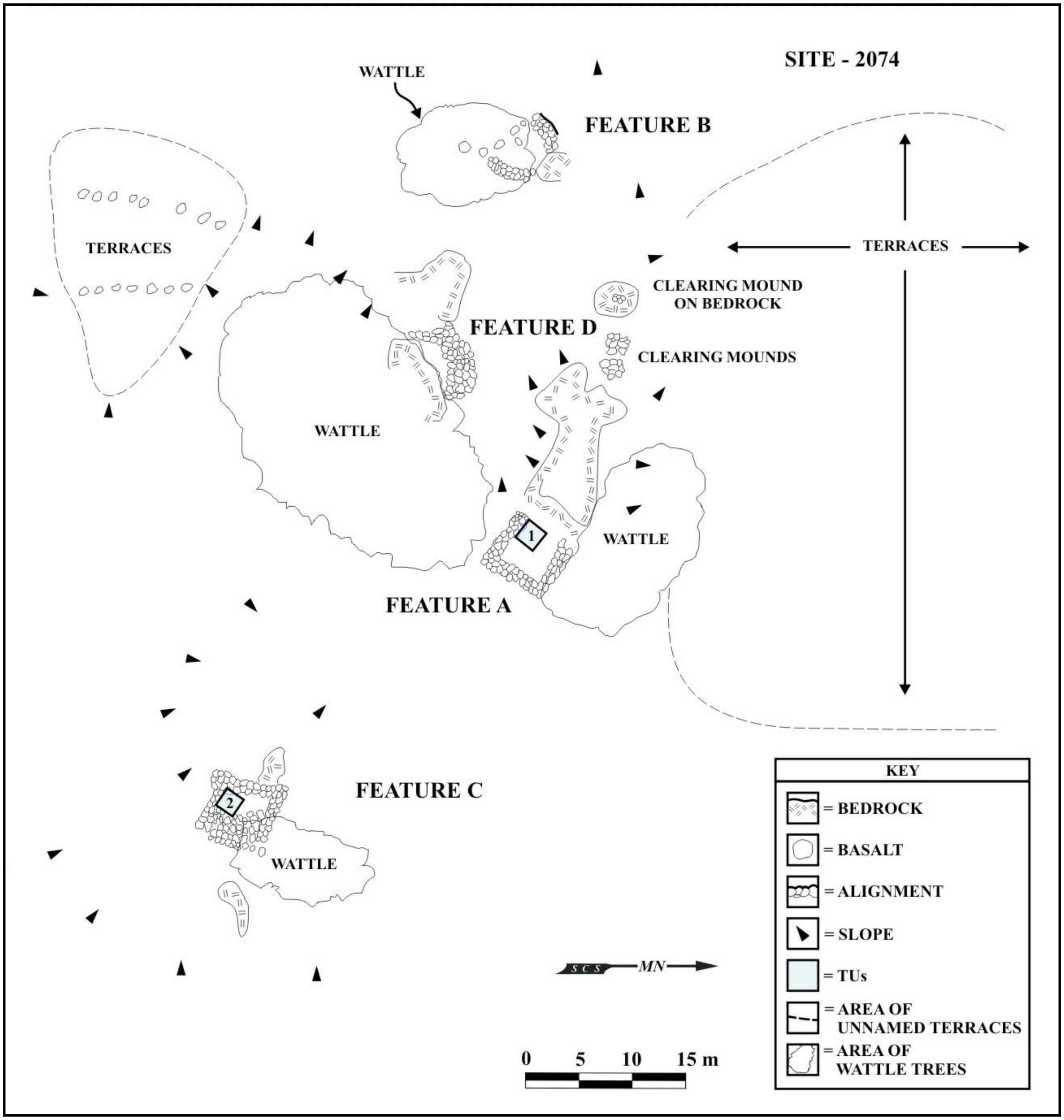


Figure 59: Site -2074 Plan View Map.

shape, having partially collapsed over time. The walls, which average approximately 50 cm high, incorporate the basalt outcrop in some places. Portions of the west and south walls are faced (Figure 60). TU-1 was excavated in Feature A.

Feature C

Feature C is a 7.5 m by 5.5 m (41.3 m²) rectangular enclosure composed of stacked basalt cobbles and boulders (Brown *et al.* 1989:E-21). With the exception of the east wall, which collapsed, the exteriors of all walls are faced and exhibit structural integrity. Portions of the west wall incorporate the bedrock outcrop. TU-2 was placed in Feature C.

SITE -2074 EXCAVATIONS

Test Unit 1 (TU-1)

TU-1, a 1.0 m by 1.0 m unit, was placed in the southwestern corner of the Feature A enclosure. The ground surface in TU-1 sloped moderately to the north-northwest and was moderately covered with tumbled stones from the partially collapsed feature. The placement of TU-1 was intended to explore feature architectural base construction of the west and south walls, both of which exhibited structural integrity, including intact facing. The test unit yielded one traditional artifact and charcoal, er which provided one radiocarbon date of feature occupation.

Figure 60: Site -2074, Feature A. View to Southwest.

The excavation of TU-1 revealed two major sedimentary layers beneath stacked feature stones and above bedrock (Figure 61). Layer I (15–30 cm thick) was composed of very dark brown (10YR 2/2) silt. One basalt artifact was recovered at 21 cmbs. The stratum contained a pebble-cobble content of 5 to 10 percent and abundant roots and rootlets. Flecks of charcoal were scattered throughout the layer. Layer II (5–15 cm thick) a dark brown (10YR 3/3) silt that rested on top of bedrock. The layer was culturally sterile but for minimal charcoal flecking. Layer II included decomposing bedrock (15% gravel content) and rootlets. The excavation of the south and west walls of the feature indicated that the larger, facing stones extended 5 to 10 cmbs, while most of the fill stones rested on or near the present ground surface.

Midden

Other than charcoal, no other midden was recovered from TU-1.

Artifacts

One traditional artifact—a basalt polishing stone—was recovered from TU-1. This artifact, fractured along its entire length, represented a fragment of a larger stone.

Charcoal

Modest concentrations of randomly-distributed wood charcoal were recovered from all levels of TU-1.

Dating

One wood charcoal sample, from Level 1 (0–10 cmbs) in TU-1, was submitted for radiocarbon analysis. The sample returned a conventional date of 110$\pm$80 B.P. When calibrated, the date provided a calendric age distribution of A.D. 1665 (2 Sigma). This date is consistent with a late pre-Contact and/or early historic era occupation of the site.

Taxonomic Identification of Botanical Remains

No wood samples from TU-1 were analyzed for taxonomic identification.

Faunal Analysis

No faunal remains were recovered from TU-1.

Test Unit 2 (TU-2)

TU-2, measuring 1.0 m by 1.0 m, was placed in the interior, southwestern corner of Feature C, abutting both the south and west walls. The test unit was placed in this location to

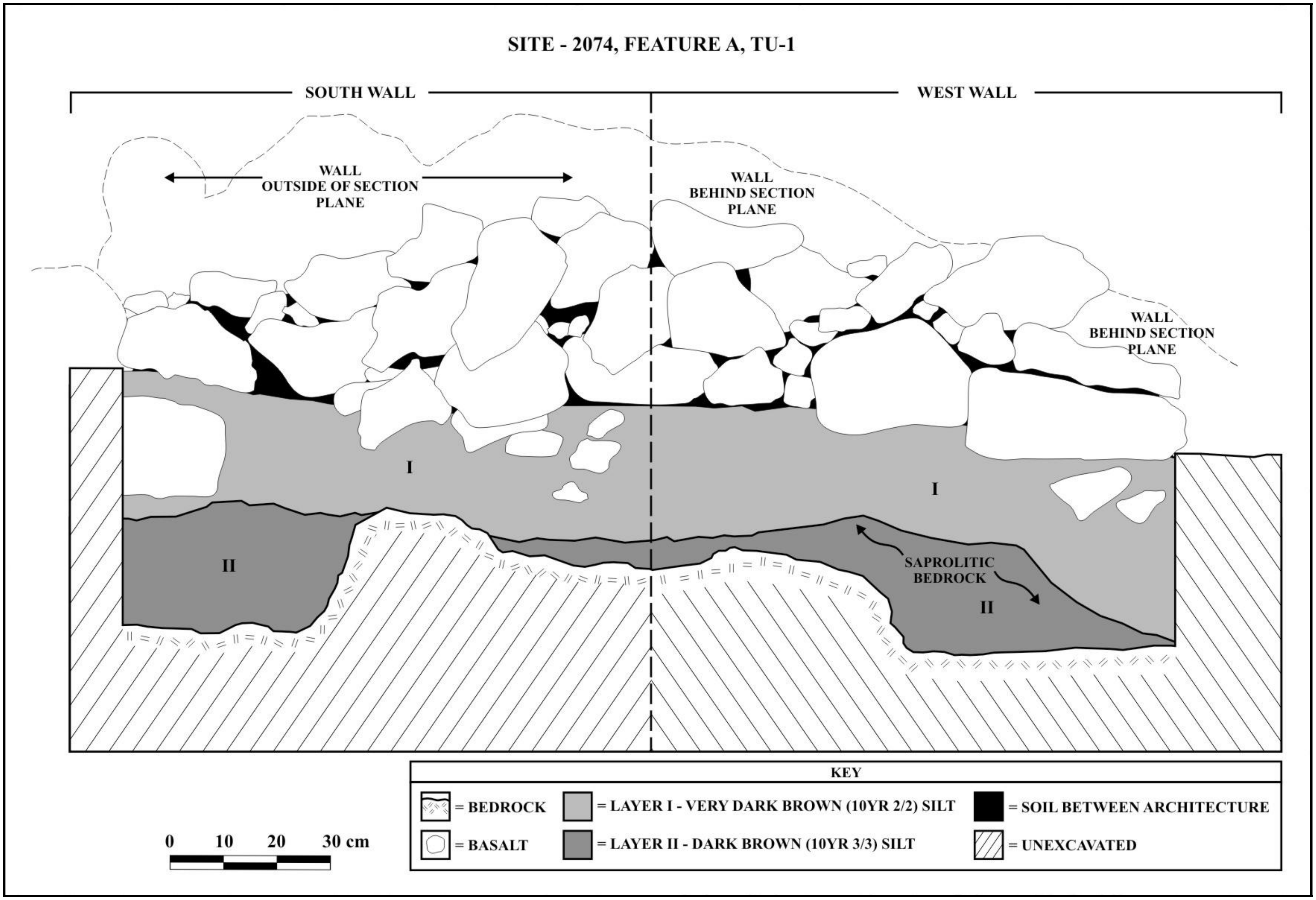


Figure 61: Site -2074, Feature A, TU-1 Profile.

frame the interior walls and to investigate the architectural construction of the wall. No traditional artifacts or other cultural materials but for charcoal flecking were identified in the unit.

Two major sedimentary layers were identified beneath the stacked architectural stones and above bedrock (Figure 62). Layer I (20–30 cm thick) was a very dark brown (10YR 2/2) silt. No cultural materials were recovered from this upper layer, which had a pebble-cobble content of 25 to 40 percent and the presence of abundant roots and rootlets. Flecks of charcoal are scattered in modest amounts through this layer. Layer II (5–10 cm thick) was composed of dark brown (10YR 3/3) silt that rested directly atop bedrock. Layer II was culturally sterile and included decomposing bedrock and flecks of charcoal. The excavation of the south and west walls of the feature indicated that the larger facing stones extended 10 to 15 cmbs, while most of the fill stones rested on or near the present ground surface.

Midden

Other than small quantities of charcoal, no other midden was recovered from TU-2.

Artifacts

No cultural materials were recovered from TU-2.

Charcoal

Randomly distributed wood charcoal was recovered from Levels 2 and 3 (10–30 cmbs) of TU-2.

Dating

No charcoal samples from TU-2 were submitted for radiocarbon dating, primarily due to the absence of any associated cultural materials in the unit.

Taxonomic Identification of Botanical Remains

No wood samples from TU-2 were analyzed for taxonomic affiliation.

Faunal Analysis

No faunal remains were recovered from TU-2.

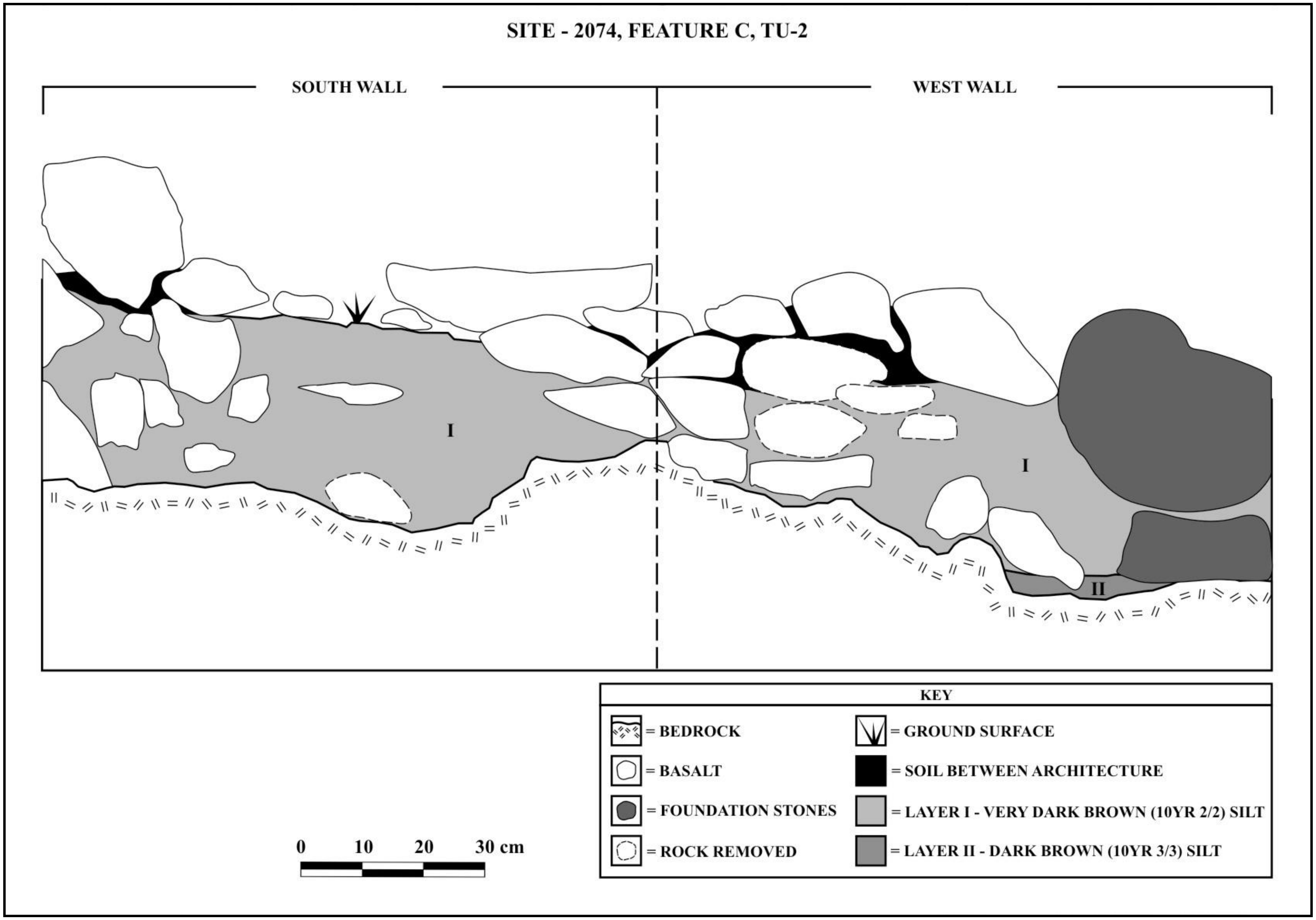


Figure 62: Site -2074, Feature C, TU-2 Profile.

STATE SITE 50-50-10-2075

SITE -2075 SUMMARY

Site -2075 (PHRI Site No. K-50) is a site complex consisting of four stone enclosures (Figure 63) within an area of approximately 72.0 m by 18.0 m (1,296.0 m²). According to Brown *et al.* (1989:E-23), the site complex consists of one rectangular enclosure (Feature A), one oval enclosure (Feature B), and two attached circular enclosures (Feature C). Numerous terraces, interpreted as traditional agricultural features, were also noted in the area but were not formally recorded during Inventory Survey. The three features were constructed on a steep slope descending to the west. Site -2075 is located at an elevation of 774.0 m amsl and lies approximately 400.0 m east of the project area's western boundary, 120.0 m west of DHHL Lot 57, and 40.0 m west (and down slope) of Site -2079. The local landscape may be characterized as dissected alluvial slopes and vegetation in the area includes *lantana*, morning glory, grasses, wattle, guava, Christmas berry, and *`ilima*.

Site -2075 was initially interpreted as a traditional, pre-Contact habitation and agricultural site (Brown *et al.* 1989:E-23). However, the small collection of structures may more accurately function as a single residential household cluster. Of the three named features (A through C), only Feature B was tested during this Data Recovery project. Feature B is an oval enclosure measuring 7.2 m by 7.0 m (50.4 m²) and is characterized by its well-constructed, well-preserved walls. One test unit (TU-1) was excavated at Feature B. Excavations yielded traditional stone tools (two pieces of debitage), faunal remains (rat), charcoal, ten native Hawaiian plant species, and one feature interpreted as a posthole. Two wood charcoal samples from Feature B (TU-1) yielded two solid pre-Contact dates in the A.D. 1280 to 1520 and A.D. 1410 to 1510 range. This residential site was occupied well before the historical period and is one of the earlier constructed and occupied sites in the Kēōkea area. The two radiocarbon samples date upper architecture and site activity, with earlier dates suspected for initial construction of the feature (the base of architecture).

SITE -2075 FEATURE DESCRIPTION

Feature B

Feature B is an oval enclosure measuring 7.2 m by 7.0 m (50.4 m²) with strong, well-preserved walls. The feature's walls were constructed of stacked cobbles and boulders reaching a maximum height of approximately 90 cm above the ground surface. A majority of the internal walls are faced. The feature has a well-defined opening, presumably an entryway, of approximately 2.0 m and occurring on its northwestern flank. TU-1 was excavated in Feature B.

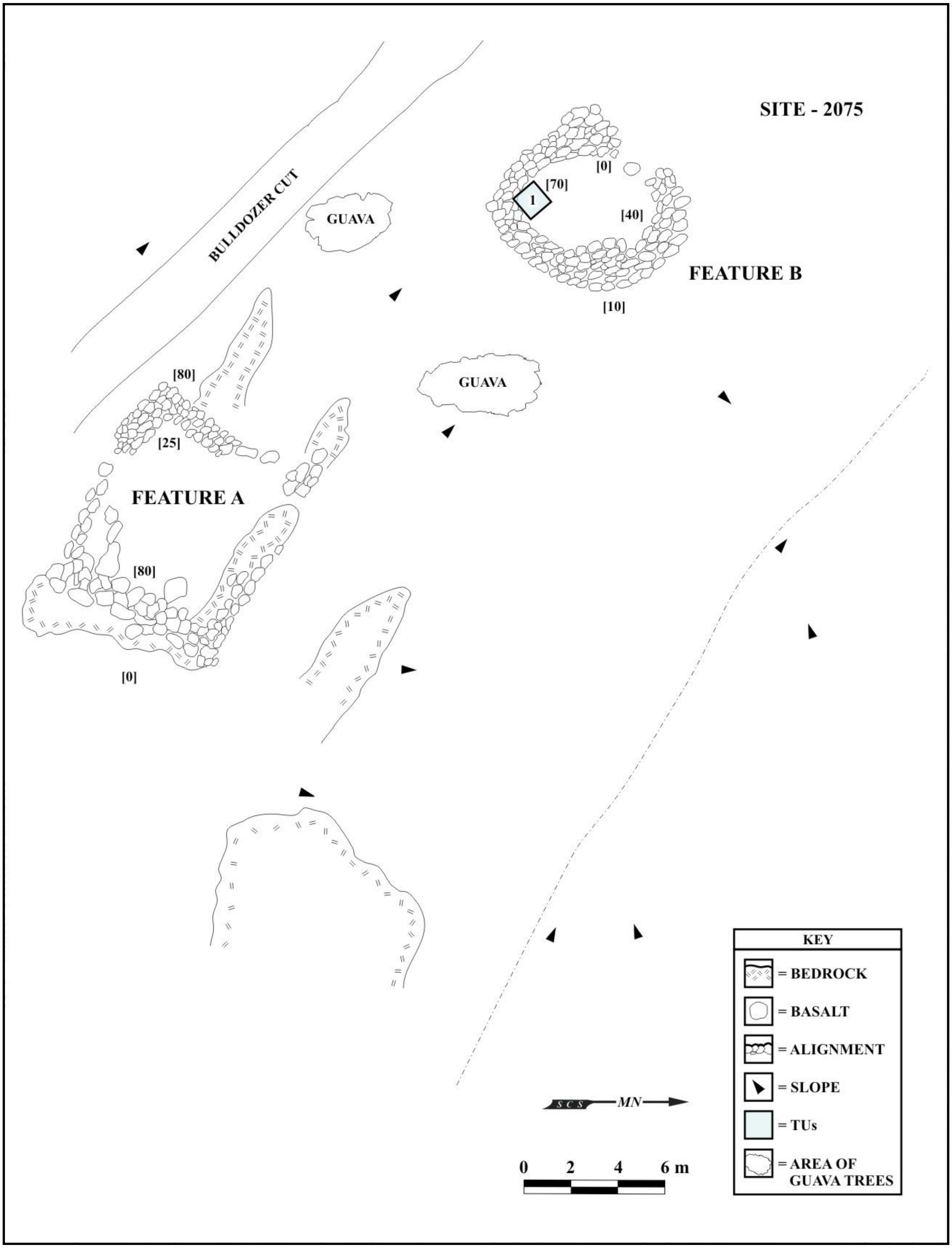


Figure 63: Site -2075 Plan View Map.

SITE -2075 EXCAVATION
Test Unit 1 (TU-1)

One test unit, measuring 1.0 m by 1.0 m, was excavated in Feature B at Site -2075 (Figure 64). The test unit was positioned within the southern corner Feature B in order to examine the wall architecture and to test for the presence/absence of datable cultural material. The unit abutted the feature's southeastern and southwestern walls. The excavation of TU-1 demonstrated that feature wall architecture extended to approximately 20 to 30 cmbs and was based in the lower portion of Layer II/upper portion of Layer III (see below).

TU-1 excavations revealed the presence of four main sedimentary layers (Figure 65). Layer I (15–20 cm thick) was composed of very dark brown (10YR 2/2) silt. In the western half of TU-1, this layer consisted mostly of large, stacked architectural boulders. In the eastern half of TU-1, there was a series of stacked paving stones, mostly cobble-sized, between 2 and 10 cmbs. Pebbles, cobbles, and boulders comprised 10 to 20 percent of the matrix and roots of varying size were abundant. Traditional stone tools, coral, and charcoal were recovered from this layer. Layer II (10–30 cm thick) was a dark brown (10YR 3/3) silt. In the western half of TU-1, this layer consisted mostly of large, stacked architectural boulders, which were based in

Figure 64: Site -2075, Feature B. View to West.

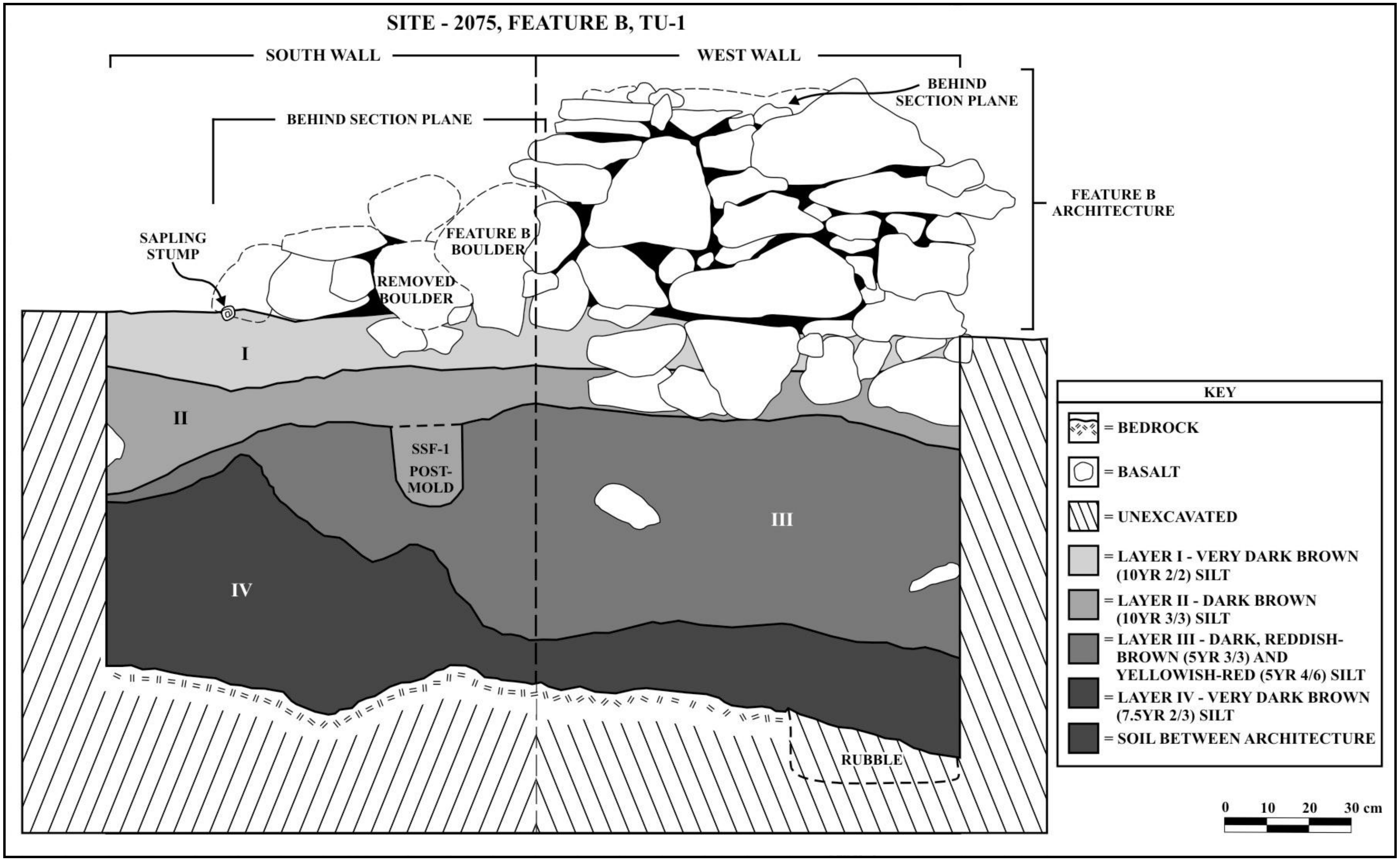


Figure 65: Site -2075, Feature B, TU-1 Profile.

the lowermost level of Layer II. Roots were fewer in this layer compared with Layer I. Pebbles, cobbles, and boulders comprised 10 to 20 percent of the matrix. Traditional stone tools, charcoal, and faunal remains were recovered in this layer. A posthole, emanating from the base of Layer II, extended into the lowermost portion of Layer III. Layer III (5–50 cm thick) was composed of mottled, dark reddish-brown (5YR 3/3) and yellowish-red (5YR 4/6) silt. The unit varied in thickness from several centimeters (southern portion of unit) to 50 cm (western portion of unit). Roots were relatively few in this layer. Pebbles and cobbles comprised 30 percent of the matrix. Flecks of charcoal and faunal remains were recovered from Layer III. Layer IV, a very dark brown (7.5YR 2/3) silt with 50 percent pebbles and gravel, varied from 15 cm to 20 cm thick (western portion of the unit) to 10 cm to 50 cm thick (southern portion of the unit). This layer included abundant roots. This layer was culturally sterile. The base of this layer was dominated by decomposing bedrock directly overlying the outcrop.

Midden

Only charcoal and faunal remains, which are described separately below, were recovered from TU-1. Several pieces of coral were observed, but not collected, from the upper 20 cm (Layer I).

Artifacts

One piece of basalt debitage and one piece of volcanic glass debitage were recovered from Level 2 (10–20 cmbs) of TU-1.

Charcoal

A moderate amount of charcoal (41.6 g) was recovered from the upper 40 cm (Levels 1 through 4) of TU-1. No charcoal was recovered below Level 4.

Dating

Two radiocarbon dates were obtained for TU-1 (Feature B) at Site -2075. One wood charcoal sample was obtained from Level 1 (0–10 cmbs) and yielded a conventional date of 500±80 B.P. When calibrated, the date range for this sample was A.D. 1280 to 1520 (2 Sigma) and A.D. 1380 to 1470 (1 Sigma). The second sample, obtained from Level 4 (30–40 cmbs), returned a date of 440±60 B.P. The calendric date range of this sample was A.D. 1390 to 1540 (2 Sigma) and A.D. 1410 to 1510 (1 Sigma). While these dates are not consistent with their stratigraphic position in the test unit (*i.e.,* the younger date is lower in the sequence), the standard deviations of the two sample do overlap. Taken together, these dates suggest that Site -2075 was constructed and occupied from the 13th to 14th centuries. This is one of the oldest dated sites in

Kēōkea directly associated with site architecture and a sustained cultural deposit. Based on the upper date, the site was abandoned in the A.D. 15th or 16th century and was not re-occupied through time.

Taxonomic Identification of Botanical Remains

A total of 174 wood charcoal samples from TU-1 were analyzed for taxonomic affiliation. These specimens were collected from Level 1 (86 specimens) and Level 4 (88 specimens). Seventy-eight of 86 specimens in Level 1 were identified to 11 separate taxonomic categories. Ten of these are native Hawaiian plants, while one (*Bidens* sp.) includes both native and introduced varieties. In descending order (by weight), the plants identified from Level 1 and their possible uses are as follows:

- *Dodonaea viscose* (*`a`ali`i*)—a shrub traditionally used for *lei* (flowers and fruit pods) and house posts (16 pieces)
- *Chamaesyce* spp. (*`akoko*)—a shrub traditionally used for firewood (17 pieces)
- *Pittosporum* sp. (*ho`awa*)—a tree with unknown traditional uses (8 pieces)
- *Sida fallax* (*`ilima*)—a shrub traditionally used for floor and wall habitation coverings, as well as medicine (5 pieces)
- *Osteomeles anthyllidifolia* (*`ulei*)—a shrub whose wood was traditionally used for digging sticks, fishing spears, carrying poles, and musical bows; smaller branches were bent into hoops for fishing (7 pieces)
- *Nothocestrum latifolium* (*`aiea*)—a tree traditionally used for canoes, firewood, and thatching sticks (8 pieces)
- *Bidens* sp. (*ko`oko`olau*)—leaves and flowers traditionally used for medicinal tea (5 pieces)
- *Chenopodium ohauense* (*`aheahea* or *`aweoweo*)—a shrub whose leaves were traditionally eaten as food items (2 pieces)
- *Bobea* sp. (*`ahakea*)—a tree whose wood was traditionally used for canoe rims and *poi* boards (5 pieces)
- *Myoporum sandwicense* (*naio*)—a tree traditionally used for house posts (4 pieces)
- *Rauvolfia sandwicensis* (*hao*)—a tree with no known traditional uses (1 piece)

In descending order (by weight), the plants identified from level 4 are as follows:

- *Myoporum sandwicense* (*naio*)—a tree traditionally used for house posts (21 pieces)
- *Sida fallax* (*`ilima*)—a shrub traditionally used for floor and wall habitation coverings, as well as medicine (11 pieces)

- *Osteomeles anthyllidifolia* (*`ulei*)—a shrub whose wood was traditionally used for digging sticks, fishing spears, carrying poles, and musical bows; smaller branches were bent into hoops for fishing (7 pieces)
- *Chamaesyce* spp. (*`akoko*)—a shrub traditionally used for firewood (8 pieces)
- *Pittosporum* sp. (*ho`awa*)—a tree with unknown traditional uses (5 pieces)
- *Chenopodium ohauense* (*`aheahea* or *`aweoweo*)—a shrub whose leaves were traditionally eaten as food items (7 pieces)
- *Psychotria* sp. (*kopiko*)—a tree traditionally used for firewood and *kapa* logs (4 pieces)
- *Rauvolfia sandwicensis* (*hao*)—a tree with no known traditional uses (1 piece)
- *Nototrichium sandwicense* (*kului*)—a shrub with no known traditional uses (1 piece)

This suite of botanical samples reflects a wide variety of traditional uses including house and boat building, food and medicine, various kinds of tools (including fishing gear), and firewood. This data suggests a habitation site where multiple and varied activities took place. The strong signal of native vegetation at the site provides further evidence for sustained occupation/activity at the site during pre-contact times.

Faunal Analysis

A total of two faunal remains (one from each level) were recovered from Level 3 (20–30 cmbs) and Level 4 (30–40 cmbs) of TU-1. Both specimens were identified as *Rattus exulans* (Polynesian rat). The presence of these remains, while small in quantity, may further suggest sustained occupation of Site -2075.

STATE SITE 50-50-10-2076

SITE -2076 SUMMARY

Site -2076 (PHRI Site No. K-51) consists of a sub-rectangular enclosure with an attached terrace or auxiliary enclosure with several surrounding terraces possibly related to traditional agriculture (Figure 66). The enclosure, designated Feature A during Inventory Survey, is located on the edge of a small, level knoll with descending slopes to the south and west. Agricultural terraces, noted but not recorded during Inventory Survey, are located some 15.0 m to the west of the enclosure. Site -2076 is located at an elevation of 783.0 m amsl and is geographically situated approximately 400.0 m east of the western boundary of the project area, 80.0 m west of DHHL Lot 58, and 80.0 m south of Site 2079. The landscape is characterized by dissected

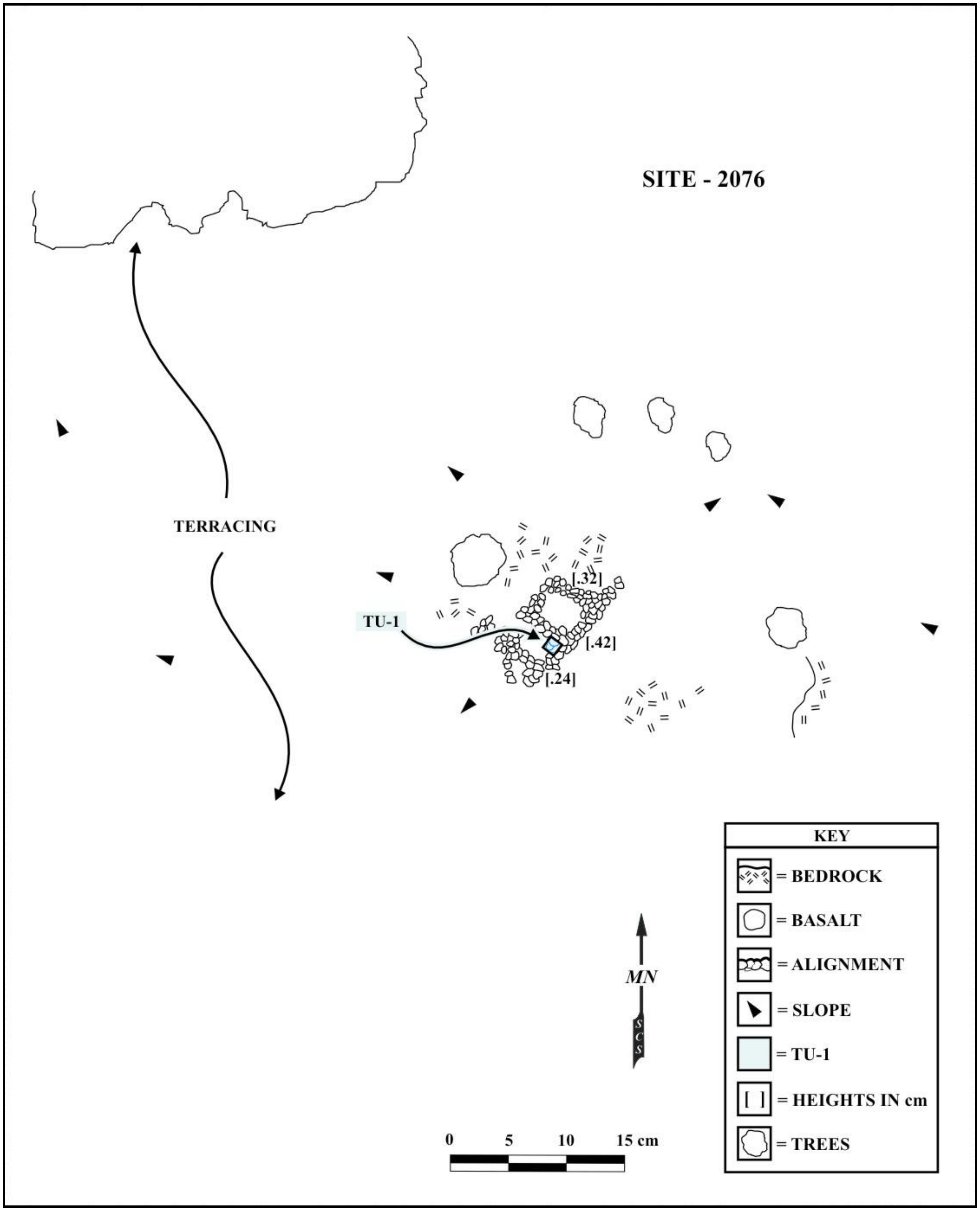


Figure 66: Site -2076 Plan View Map.

alluvial slopes and vegetation in the local area includes *lantana*, grasses, wattle, morning glory, and *panini*.

According to Brown *et al.* (1989:E-23), this site is consistent with a traditional, pre-Contact habitation and agricultural complex. Feature A, denoting the habitation component, is a sub-rectangular enclosure measuring approximately 6.0 m by 5.5 m (33.0 m^2) with an attached terrace or auxiliary enclosure occurring at a slightly lower elevation to the southwest. Together, the two components of this single structure occupy an area of approximately 12.0 m by 5.5 m (66.0 m^2). One test unit (TU-1) was excavated within the enclosure during Data Recovery. TU-1 yielded traditional artifacts (several pieces of debitage), faunal remains (including marine mollusk, fish, and rat), and charcoal. Two radiocarbon dates from the structure indicate possible site area activity between the A.D. 1300s through 1600s, with feature construction and occupation most probably occurring in the mid-late A.D. 1600s, within pre-contact times.

SITE -2076 FEATURE DESCRIPTION

Feature A

Feature A is a sub-rectangular enclosure (Figure 67) measuring approximately 6.0 m by 5.5 m with an attached terrace or auxiliary enclosure at a slightly lower elevation to the

Figure 67: Site -2076, Feature A. View to Southeast.

southwest. When combined, the two components of this single feature occupy an area of approximately 12.0 m by 5.5 m. Enclosure walls are comprised of stacked cobbles and boulders, and average 75 cm thick with a maximum height of 42 cm above the ground surface. The east wall of the main enclosure exhibits some internal facing, while most of the remaining walls are collapsed. The northwest wall of the main enclosure has completely collapsed. Agricultural features, including terraces, surround Feature A (Brown *et al.* 1989:E-23). TU-1 was excavated in Feature A.

SITE -2076 EXCAVATION
Test Unit 1 (TU-1)

One test unit (TU-1), measuring 1.0 m by 1.0 m was excavated in the southeastern (interior) corner of Feature A. The test unit was positioned to abut the dividing wall between the main enclosure and the auxiliary enclosure and to penetrate the east wall of the main enclosure. The excavation of TU-1 proceeded through five arbitrary 10-cm levels to bedrock, the latter, which was exposed at a maximum depth of 40 cmbs. This excavation demonstrated that enclosure architecture extended only 5 cm into the upper sedimentary layer, and the enclosure walls were core-filled with pebbles and small cobbles.

Two major sedimentary layers were identified in TU-1 beneath stacked architectural stones and above bedrock (Figure 68). Layer I, a very dark grayish brown (10YR 3/2) silt, measured 20 cm to 25 cm thick. Small- and medium-sized roots were abundant throughout the layer. Pebbles and cobbles comprised 50 percent of the layer matrix. Enclosure architecture was based in the upper 5 cm of this layer. This layer contained traditional artifacts and faunal material—including marine shells, and charcoal. Layer II was composed of dark, yellowish-brown (10YR 4/4) silt measuring 5 cm to 15 cm thick. Roots decreased in quantity from Layer I. Pebbles and cobbles were still abundant, but somewhat reduced compared with Layer I. Layer II rested directly atop bedrock and was culturally sterile. Charcoal was present only in trace quantities.

<u>Midden</u>

Other than charcoal, midden recovered from TU-1 consisted of several marine mollusk shells (see below). The presence of marine resources, in particular, is significant as the site occurs at least several miles from the ocean. These foods were most likely deliberately transported to the site by humans.

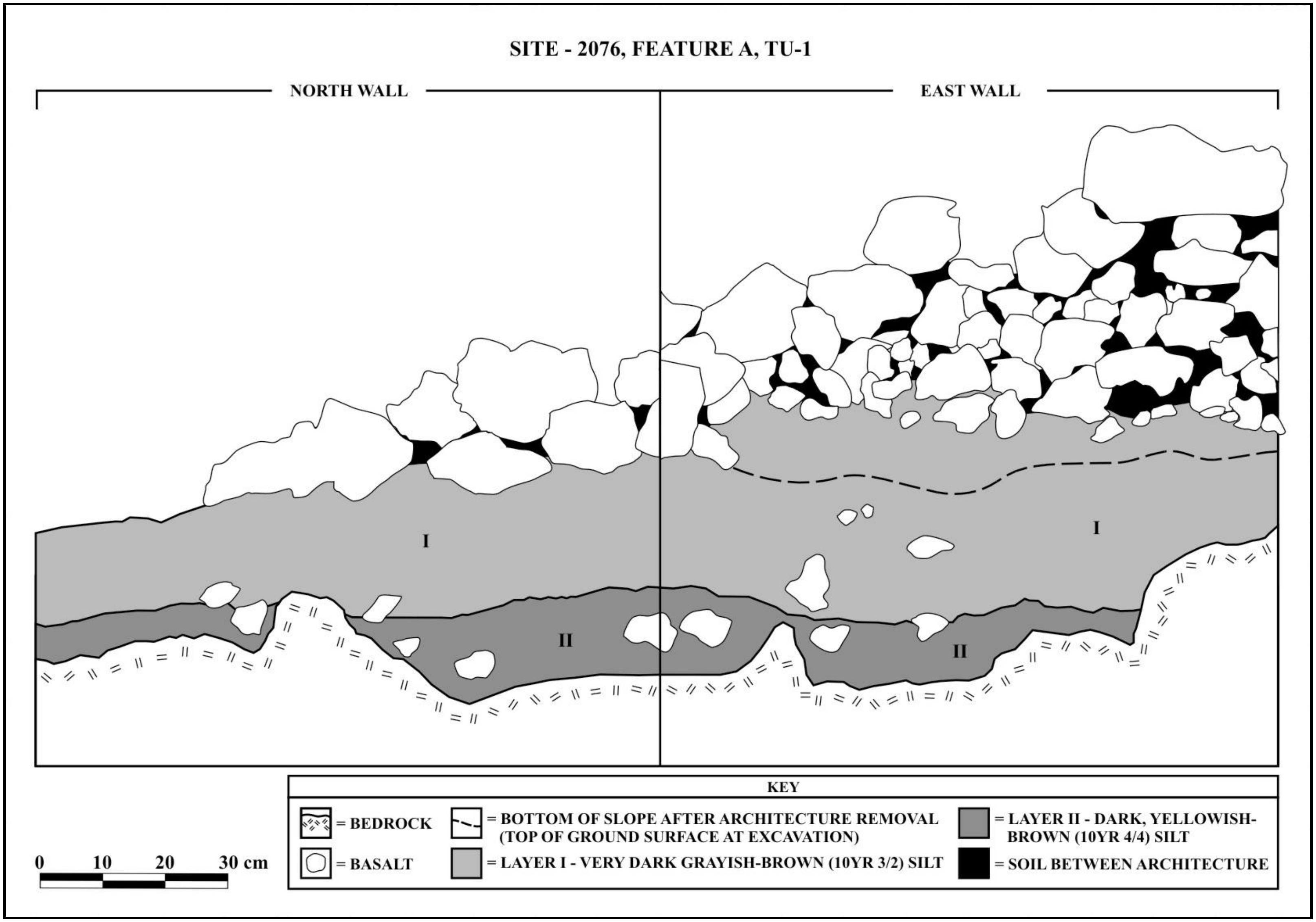


Figure 68: Site -2076, Feature A, TU-1 Profile.

Artifacts

Four pieces of debitage (two in Level 2, two in Level 3) were recovered from the upper 20 cm of TU-1. One piece of the debitage was manufactured from volcanic glass (Level 2) while the remaining three pieces were fashioned from basalt.

Charcoal

Charcoal was recovered from Level 2 through Level 4 (10–40 cmbs) and was most abundant (by weight) in Level 2 (10–20 cmbs). The charcoal was distributed more or less randomly throughout the sedimentary matrix, rather than occurring in a concentrated form indicative of a fire feature.

Dating

Two samples of wood charcoal from TU-1 were dated to 100±60 B.P. (Level 3) and 550±90 B.P. (Level 5) respectively. The date from Level 2 (10–20 cmbs) yielded a calendric date of A.D. 1670 (2 Sigma) and represents a good approximation for the age of this site as enclosure architecture was based in Level 3. The cultural deposit, composed of traditional artifacts and midden, was also derived from Levels 2 and 3. The second, older date from Level 5 occurred at least 20 cm below the cultural material, and does not necessarily date human occupation or construction of this site. The second sample yielded a date range of A.D. 1260 to 1520 (2 Sigma) and A.D. 1300 to 1440 (1 Sigma). In sum, the cultural layer excavated in TU-1 most likely represents feature construction and occupation around the mid to late A.D. 1600s, a time still firmly within the pre-Contact era.

Taxonomic Identification of Botanical Remains

No wood charcoal samples from TU-1 were analyzed for taxonomic affiliation.

Faunal Analysis

A small quantity of both vertebrate and invertebrate remains was recovered from the upper 20 cm (Levels 2–3) of TU-1. Several marine mollusk shells, identified as *Cellana sandwicensis* and *Cellana* sp., were recovered from the upper 10 cm (Level 1–2), and trace amounts of unidentified mollusk were recovered from Level 2 (10–20 cmbs). The natural habitat of *C. sandwicensis* or *`alinalina,* is at or below the zero tide mark, usually on coralline algae where there is almost constant splash. These mollusks were part of the pre-contact Hawaiian diet. Two vertebrates are also represented by single bones: a species of parrotfish (Scaridae Family) and the Polynesian Rat, *Rattus exulans*, were recovered in Levels 1 (0–10 cmbs) and 2 (10–20 cmbs), respectively. There are presently at least seven species of parrotfish in Hawai`i, all of which occupy inshore marine habitats. These bones almost certainly represent food items transported by humans from the coast. *R. exulans*, introduced by the Polynesians, is known as a human commensal species, *i.e.*, one that typically lives with and around human settlements.

STATE SITE 50-50-10-2079

SITE -2079 SUMMARY

Site -2079 (PHRI Site No. K-54, BPBM T-30) consists of two attached enclosures built on and against a bedrock outcrop (Figure 69). The attached enclosures, collectively designated Feature A during Inventory Survey (Brown *et al.* 1989:E-25), are located on the western edge of a long, level bench. Site -2079 is located at an elevation of 786.0 m amsl and is located approximately 440.0 m east of the western boundary of the project area, 80.0 m west of DHHL Lot 57, and 40.0 m east and upslope of Site -2075. The site landscape consists of dissected alluvial slopes and local vegetation in the area includes the usual overgrown regime of *lantana*, grasses, *`ilima*, and *panini*.

During Inventory Survey, this site was assessed as a traditional, pre-Contact habitation and agricultural complex (Brown *et al.* 1989:E-25). The agricultural features were not given formal feature designations. Feature A consists of two attached enclosures built partially on a small bedrock outcrop and partially against another small outcrop. Site walls are constructed of stacked basalt cobbles and boulders while incorporating the two bedrock outcrops into the construction. Together, the attached enclosures measure approximately 14.0 m by 11.0 m (154.0 m^2).

One test unit (TU-1) was excavated within the Site -2079 enclosure. The excavation yielded traditional artifacts (debitage), faunal remains (fish, rat), a single human molar, and charcoal. One radiocarbon sample from the unit suggests that the site was occupied between the A.D. 12th and 13th centuries. For a formalized Kēōkea habitation area, this date is early, but may be even earlier. The sample noted above dates occupation of the structure and did not date the actual base of architecture, or when the feature was first constructed.

SITE -2079 FEATURE DESCRIPTION

Feature A

Feature A consists of two attached enclosures built partially on and against two small bedrock outcrops. Feature walls were constructed of stacked basalt cobbles and boulders and

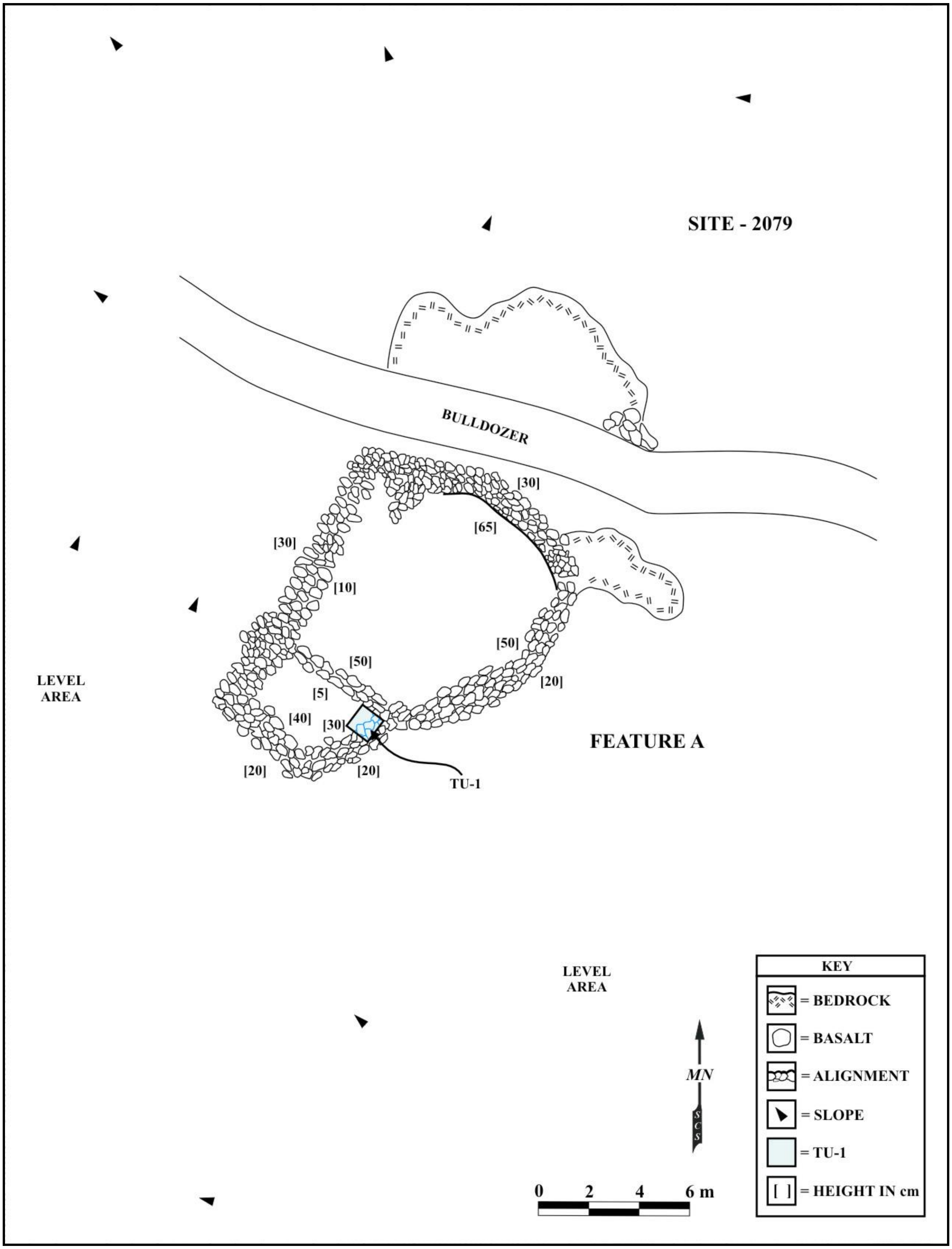


Figure 69: Site -2079 Plan View Map.

partially incorporating bedrock outcrops. Together, the attached enclosures measure approximately 14.0 m by 11.0 m (154.0 m²). The larger, irregularly-shaped enclosure incorporates a small outcrop at its northeast corner. The small, rectangular enclosure was constructed directly on a small bedrock outcrop. Portions of the northeast wall are faced on the interior. Walls average 1.5 m in thickness. Wall heights vary from 50 cm to 65 cm above the ground surface in the northern portion of the site to 20 cm to 30 cm above the ground surface in the southern portion of the site. A bulldozer cut, oriented roughly southeast to northwest, was evident immediately adjacent and north of the feature. TU-1 was excavated at Feature A.

SITE -2079 EXCAVATION

Test Unit 1 (TU-1)

One test unit (TU-1) measuring 1.0 m by 1.0 m was excavated in the eastern (interior) corner of the smaller of the two attached enclosures. The test unit abutted the northeast wall and extended into the southeast wall of the smaller enclosure in order to examine architectural base construction and to test for datable cultural deposits. The excavation of TU-1 demonstrated that enclosure architecture extended approximately 30 cm to 35 cm below the ground surface, *i.e.,* near the base of Layer I.

TU-1 excavations revealed two major sedimentary layers, with two lenses occurring between them (Figure 70). Layer I (35 cm thick) was composed of dark brown (10YR 3/3) silt. Roots were abundant throughout the layer. Subangular pebbles and cobbles comprised at least 50 percent of the matrix. This layer included stacked stone architecture, traditional artifacts, and charcoal. Vertebrate remains were recovered from the base of the layer. The excavator interpreted the majority of rocks in this layer as architectural. Layer IA (10 cm thick) was a dark, reddish-brown (5YR 3/4) silt with charcoal. Rocks and roots were few in this layer. Layer IB (8–10 cm thick) a black (10YR 2/1) silt with charcoal and was located directly below Layer IA. Rocks and roots were few in this sub-layer. Layer II (40–60 cm thick) was composed of dark, yellowish-brown (10YR 2/2) silt. Roots were few in quantity while sub-angular pebbles and cobbles comprised at least 50 percent of the matrix. The excavator interpreted the majority of rocks in this layer as only representing decomposing bedrock. There were no artifacts or charcoal in this layer, which rests directly on degraded bedrock.

<u>Midden</u>

Other than charcoal and faunal remains, which are treated separately below, no other midden was recovered from TU-1.

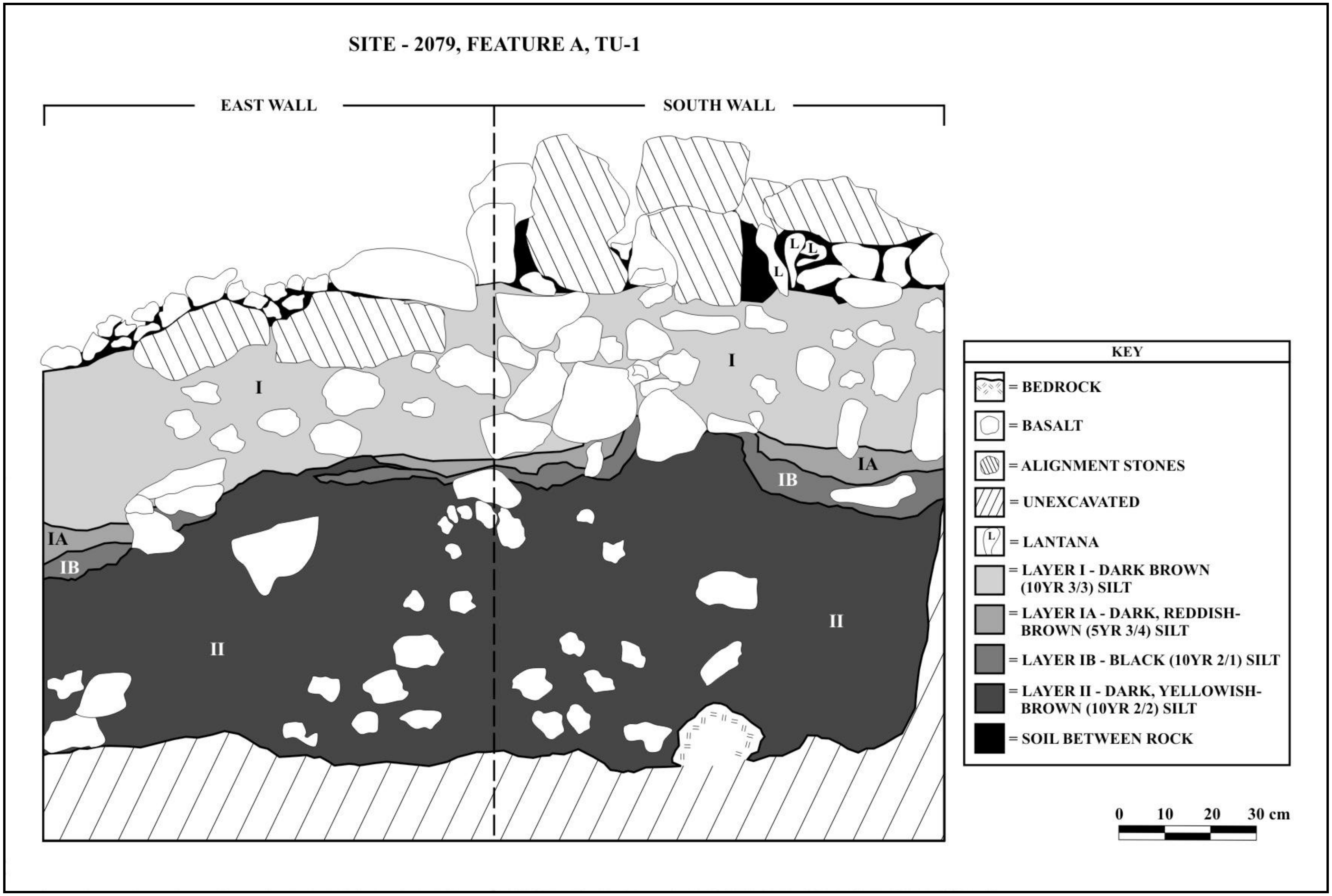


Figure 70: Site -2079, Feature A, TU-1 Profile.

Artifacts

A total of fifteen pieces of debitage was recovered from the upper 40 cm (Levels 1–4) of TU-1. Most of these flakes (12 of 15) were manufactured of volcanic glass while the remainder was basalt. The vertical distribution of these flakes suggests repeated and/or prolonged site occupation by Native Hawaiians using traditional tools.

Charcoal

Small amounts of charcoal were recovered as diffuse flecks from the upper 50 cm (Levels 1–5) of TU-1. One thin lens of charcoal, occupying an area of approximately 10 cm by 20 cm, was exposed at 40 cmbs. A portion of this lens was collected in bulk (200.0 g sample) for analysis.

Dating

One sample of wood charcoal from Level 3 (20–30 cmbs) in TU-1 (Feature A) was submitted for radiocarbon dating. The sample returned a conventional date of 700$\pm$90 B.P. When calibrated, the calendric date range was A.D. 1120 to 1430 (2 Sigma) and A.D. 1230 to 1320 (1 Sigma). The date range suggests this site is one of the earliest formal architectural features in the Kēōkea area. Traditional stone tool deposits were recovered within, as well as above and below, the dated sample. Thus, the earliest site occupation—represented by the debitage in Level 5—may actually be older than 700$\pm$90 B.P., which in itself would be somewhat an outlier for a fully developed site in Kēōkea at that time period.

Taxonomic Identification of Botanical Remains

No wood charcoal samples from this site were analyzed for taxonomic affiliation.

Faunal Analysis

A small amount of vertebrate remains was recovered from TU-1. Two fish bones, representing two different species, one specimen of the Polynesian Rat, and a human deciduous molar, most likely naturally shed and lost at the site, comprise the totality of the faunal remains.

Neither of the two fish bones could be identified beyond‘bony fish and Elasmobranch (*i.e.*, cartilaginous fish). These fish bones—even though they cannot be positively identified to taxon— certainly represent marine species. These remains represent food items transported by humans from the coast. Rats, introduced by the Polynesians, typically live with and around human settlements. Finally, the single human tooth appears to have been naturally shed at the site. In humans, deciduous molars (sometimes called ‘deciduous premolars’) are lost by the age of approximately 10–11 years of age (White 2000). This find implies that a child was present on the site at some time during its occupation. While the single human tooth does not represent a burial per se. Additional excavations in the test unit at Site 2079 failed to yield other signatures for a burial occurring in the site (burial pit, other human remains). However, the test unit only measured 1 x 1 meter in size and could have missed additional remains. As such, this single human tooth represents an isolated find. Based on recommendations of the MLIBC, Site 2079 is being considered as a traditional burial site.

STATE SITE 50-50-10-2081

SITE -2081 SUMMARY

Site -2081 (PHRI Site No. K-57) consists of a sub-rectangular enclosure (Figure 71) and several associated agricultural terraces within an area encompassing approximately 720.0 m² (24.0 m by 30.0 m). The site occurs at an elevation of 780.0 m amsl on a dissected alluvial slope landscape. The site also includes a smaller rock pile several meters to the southwest of the main enclosure. Brown *et al.* (1989:E-27) interpreted this site during Inventory Survey as a pre-Contact habitation and agricultural site. The agricultural features were not previously recorded. The main feature, the enclosure, exhibits architectural and construction features typical of others in the project area: stacked cobbles and boulders of locally available basalt, frequently placed against and upon the bedrock outcropping. The Site -2081 complex is located some 60.0 m east of Site -2072, 50.0 m west of DHHL Lot 54, and 550.0 m east of the project area's western boundary. Vegetation in the area includes *lantana*, wattle, Christmas berry, and Silky Oak.

The main site enclosure was designated Feature A. A linear rock pile located several meters southwest of the enclosure was designated Feature B. The terraces upslope (south) and down slope (north) of these features have not been assigned feature designations. Feature A was selected for testing (excavation) because it represents the most likely prehistoric habitation structure within the site complex. One test unit (TU-1) was excavated at Feature A. Excavation yielded a large amount of debitage (44 pieces), particularly when compared with other sites in the project area, and other possible artifacts (coral and red ocre). There is also possible evidence of small-scale quarrying of the eroding basalt outcrop. The site may be one candidate for a lithic workshop. Radiocarbon dating strongly intimates that the site was constructed and occupied in the A.D. 1400s to 1500s, with an earlier phase of flaking activity occurring prior to the A.D. 1400s.

SITE -2081 DESCRIPTION

Feature A

Feature A is a sub-rectangular enclosure occupying a total area of approximately 10.0 m by 8.0 m (80.0 m^2). The enclosure was built on a slope, directly beneath and against a basalt outcrop. The eroding outcrop is roughly oriented on an east-west axis. The southeast and

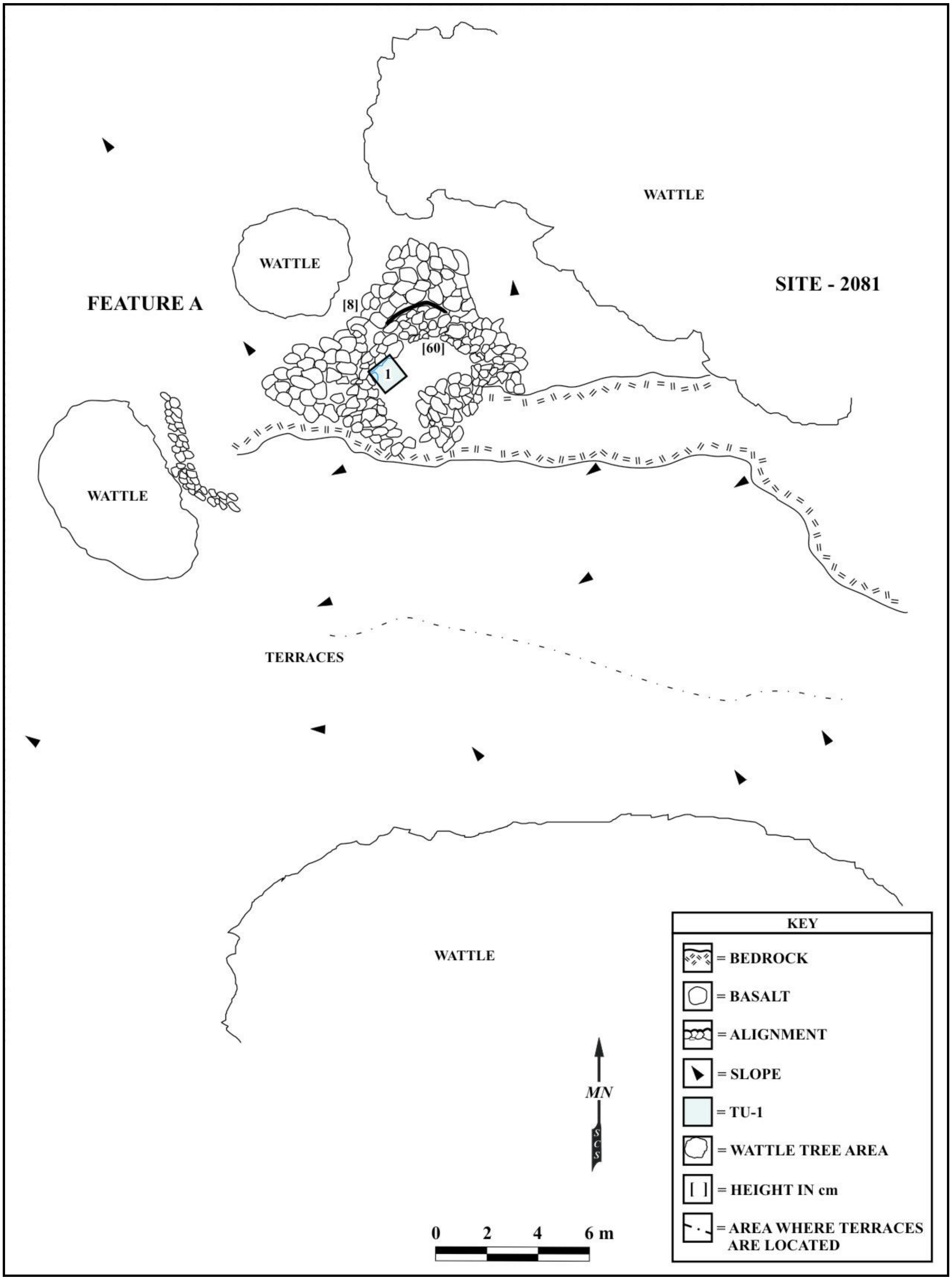


Figure 71: Site -2081 Plan View Map.

southwest walls of Feature A incorporate the outcrop (Figure 72). There is some facing on the enclosure's north corner. Enclosure walls average 80 cm high and are composed of stacked basalt cobbles and boulders (Brown *et al.* 1989:E-27). During Data Recovery, the SCS crew observed fractured and battered areas, reflecting possible quarrying of the local rock, on the outcrop face within the enclosure (see more on this below). TU-1 was excavated at Feature A.

SITE -2081 EXCAVATION
Test Unit 1 (TU-1)

A single 1.0 m by 1.0 m test unit (TU-1) was excavated at Feature A. TU-1 was located within the enclosure, abutting the interior of the west wall and partially scoring into the interior of the south wall. Traditional cultural materials—including stone tool debitage, coral, and red ocre—were recovered from all levels (0–50 cmbs), suggesting a relatively extended period of site use.

Figure 72: Site -2081, Feature A. View to Northwest.

Three main sedimentary layers were documented in TU-1 beneath stacked architecture and above bedrock (Figure 73). Layer I (10–15 cm thick) was composed of very dark grayish-brown (10YR 3/2) silt. The larger facing stones extended into the base of Layer I, while most of the fill stones rested on or near the ground surface. Traditional artifacts, fire-cracked rock, and scattered charcoal were recovered from this upper layer. Layer I contained a pebble content of 10 percent. Layer II (20–30 cm thick) was a very dark brown (7.5YR 2.5/2) silt with 15 percent pebbles and small cobbles and contained traditional artifacts, fire-cracked rock, and charcoal. Layer III (5–20 cm thick), the lowermost unit, consisted of dark yellowish-brown (10YR 3/4) silt with 20 percent pebbles and cobbles. This layer rested directly on bedrock. This layer also yielded traditional artifacts and charcoal. In fact, the lower 20 cm of TU-1—well below the base of the stacked stone enclosure walls—produced the highest density of stone tool debitage in the feature. This suggests that the site area was utilized well before it became formalized through construction of the enclosure.

Midden

Other than charcoal and associated fire-cracked rock, no midden was recovered from TU-1.

Artifacts

A total of 44 traditional artifacts were recovered from TU-1 (Feature A) at Site -2081, with finds in all levels (*i.e.*, 0–50 cmbs). Most of these artifacts (42 of 44) consisted of debitage from stone tool manufacture. A majority of the debitage was recovered from the lowest 20 cm of the excavation unit. In addition to basalt, which is locally available in the project area, volcanic glass is also represented among the debitage (4 of 44 specimens). The comparatively high amount of debitage suggests that lithic manufacture or re-working occurred on-site. One piece of coral and one piece of red ocre were also recovered from Level 2 (10–20 cmbs).

SCS crewmembers noted a resemblance between some of the basalt flakes parent material and the outcrop against which the enclosure (Feature A) was constructed. The crew suggested that the site might have functioned, at least in part, as a quarry for traditional stone tool manufacture. If so, this is an atypical quarry as it lacks any evidence whatsoever of core tools or blanks, which are usually common at such sites. The most likely hypothesis is that the outcrop was used as an informal, expedient source of sharp flakes, rather than representing a formal quarry site or raw material source for more elaborate tools (*e.g.*, adzes). Given the stratigraphic relationship between the stacked stone architecture and the traditional tools—most

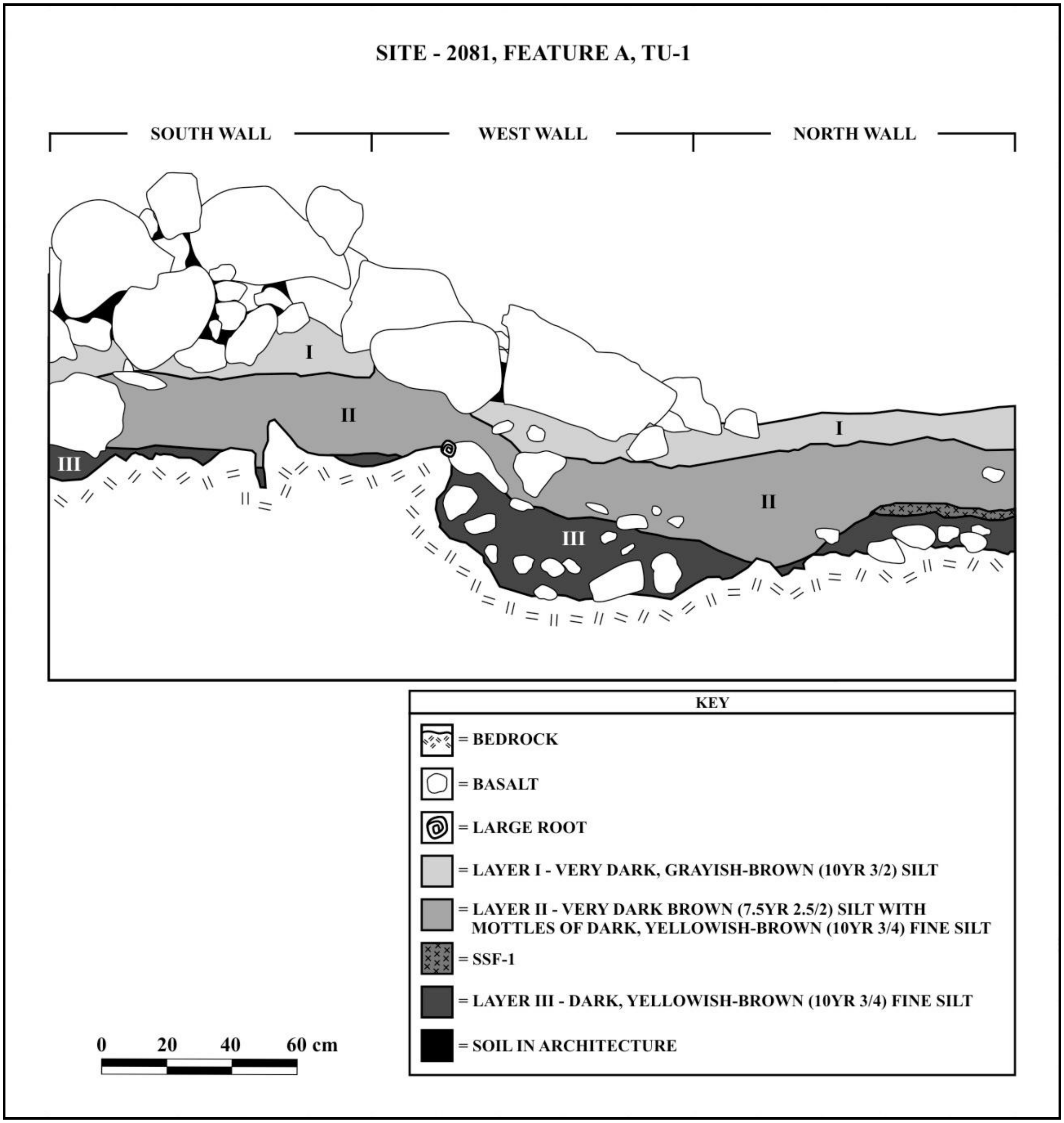


Figure 73: Site -2081, Feature A, TU-1 Profile.

of which occur well below the base of the enclosure walls—it is likely that the location served as an informal quarry long before the site was formalized through construction.

Charcoal

Charcoal was found scattered throughout every level of TU-1. The densest concentration of charcoal was in one feature, a 5 cm thick lens representing thermally-altered sediment. It was located at approximately 40 cmbs in the northeast quadrant of TU-1. The amount of charcoal (by weight) was greatest in Levels 2 through 4, *i.e.*, from 10 to 40 cmbs.

Dating

Two samples of wood charcoal from TU-1 were submitted for radiocarbon dating. The sample from Level 2 (10–20 cmbs) returned a conventional date of 430±60 B.P. When calibrated, the calendric age range was A.D. 1400 to 1640 (2 Sigma) and A.D. 1410 to 1520 (1 Sigma). The sample from Level 4 (30–40 cmbs), dating the small lens, yielded a conventional date of 410±60 B.P. This date provided a calibrated age range of A.D. 1410 to 1640 (2 Sigma) and A.D. 1430 to 1520 (1 Sigma). Both of these dates are consistent with site construction and occupation from the A.D. 1400s. The presence of debitage below these samples intimates site area activity (flaking) occurring prior to the A.D. 1300s.

Taxonomic Identification of Botanical Remains

No wood charcoal from TU-1 (Feature A) was analyzed for taxonomic affiliation.

Faunal Analysis

Unexpectedly, no faunal remains were recovered from TU-1. This is somewhat perplexing, considering the nature of the site (enclosure) and the presence of a cultural deposit. Sampling such a small portion of the site may be the primary factor in the absence of faunal remains.

STATE SITE 50-50-10-2082

SITE -2082 SUMMARY

Site -2082 (PHRI Site No. K-59) consists of a single feature—a rectangular enclosure with short sections of wall extending from the east end of the feature to the northeast—with several small agricultural terraces to the east (Figure 74). The enclosure, designated Feature A, was built into a northwest facing slope and one of the walls that extended to the northeast connects to a small basalt outcrop. Site -2082 is located at an elevation of 770.0 m amsl

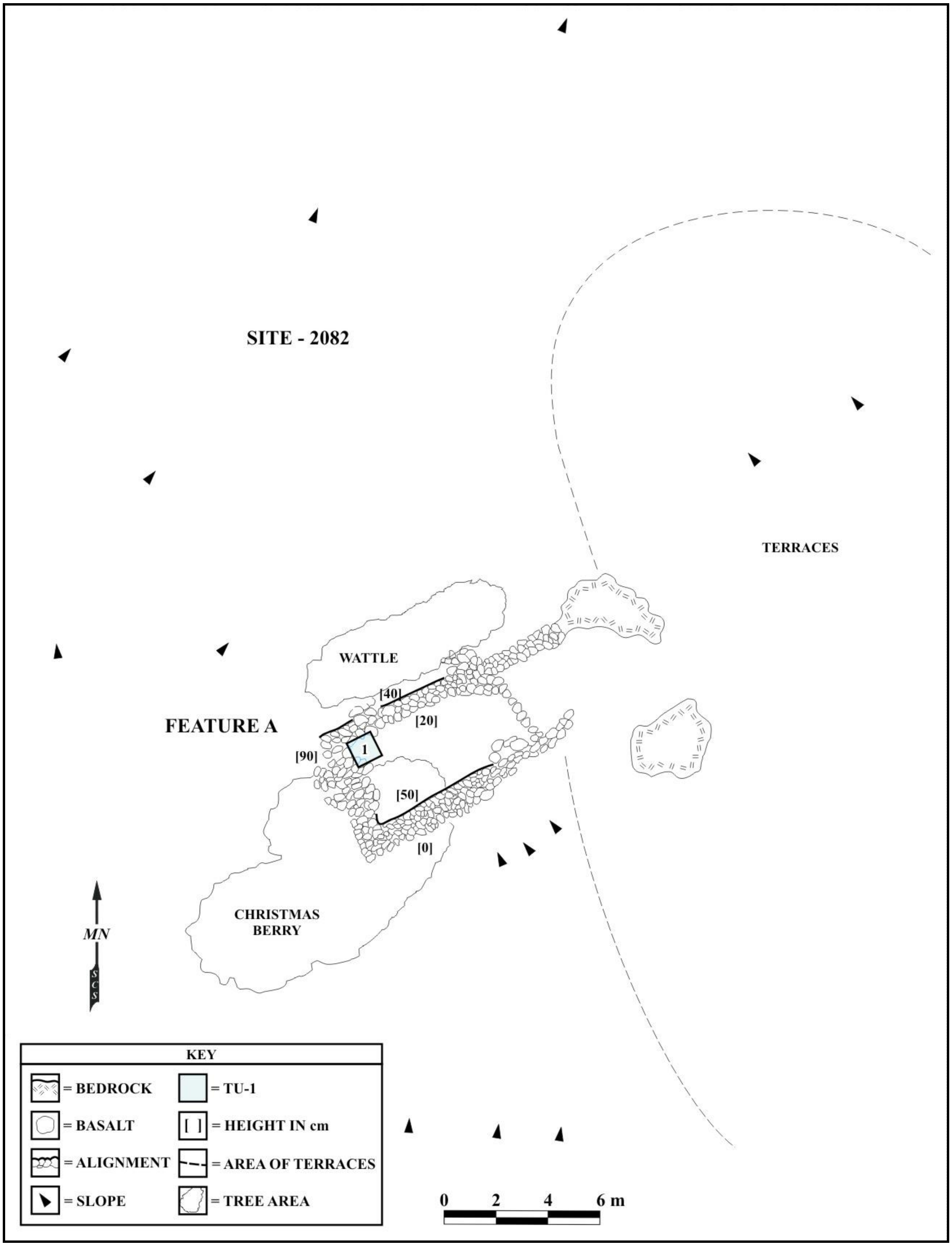


Figure 74: Site -2082 Plan View Map.

approximately 500.0 m east of the western project area boundary, 100.0 m west of DHHL Lot 52, and 50.0 m east of Site -2072. The local landscape consists of dissected alluvial slopes and vegetation in the area includes the usual combination of *lantana*, grasses, wattle, and *panini*.

Brown *et al.* (1989:E-27) interpreted Site -2072 as a traditional, pre-Contact habitation and agricultural site complex. However, the agricultural features were not recorded during Inventory Survey. Feature A is a rectangular enclosure measuring approximately 11.0 m by 5.5 m (60.5 m^2). One test unit (TU-1) was excavated within the enclosure. The excavation unit yielded traditional artifacts (including one utilized basalt flake and other debitage) and charcoal, some of which derived from a feature (SSF-1). Radiocarbon dating suggests that the site was occupied in the late A.D. 1600s into early historic times. Construction of the feature predates this time as the samples were acquired from upper level strata, above the base of architecture.

SITE -2082 FEATURE DESCRIPTION

Feature A

Feature A is a rectangular enclosure measuring approximately 11.0 m by 5.5 m. Enclosure walls are comprised of stacked basalt cobbles and boulders, with small pebbles and cobbles used as fill. The walls have a maximum thickness of 1.5 m and a maximum height of 1.1 m. Facing is present on the interior southeast wall and the exterior northwest wall. A portion of the southwest wall has collapsed. Short walls, roughly parallel to the main walls of the feature's long axis, extend to the northeast from the corners of the enclosure's eastern flank. The southeast extension is 1.5 m in length and terminates against a slight rise in the slope. The northeast extension is nearly 4.0 m in length and terminates against a small basalt outcrop. Numerous small agricultural terraces, some incorporating bedrock outcrops, are present to the east of the feature. TU-1 was excavated at Feature A.

SITE -2082 EXCAVATION

Test Unit 1 (TU-1)

One test unit (TU-1) measuring 1.0 m by 1.0 m was excavated in the northwestern corner of Feature A. The test unit abutted the west wall and extended into the north wall of the feature in order to examine architectural base construction and to test for the presence/absence of cultural material. The excavation of TU-1 demonstrated that feature architecture extended approximately 30 cm below the ground surface.

Four sedimentary layers and a feature were identified in TU-1 (Figure 75). Layer I (10–15 cm thick) was composed of very dark, grayish-brown (10YR 3/2) silt. Roots were abundant

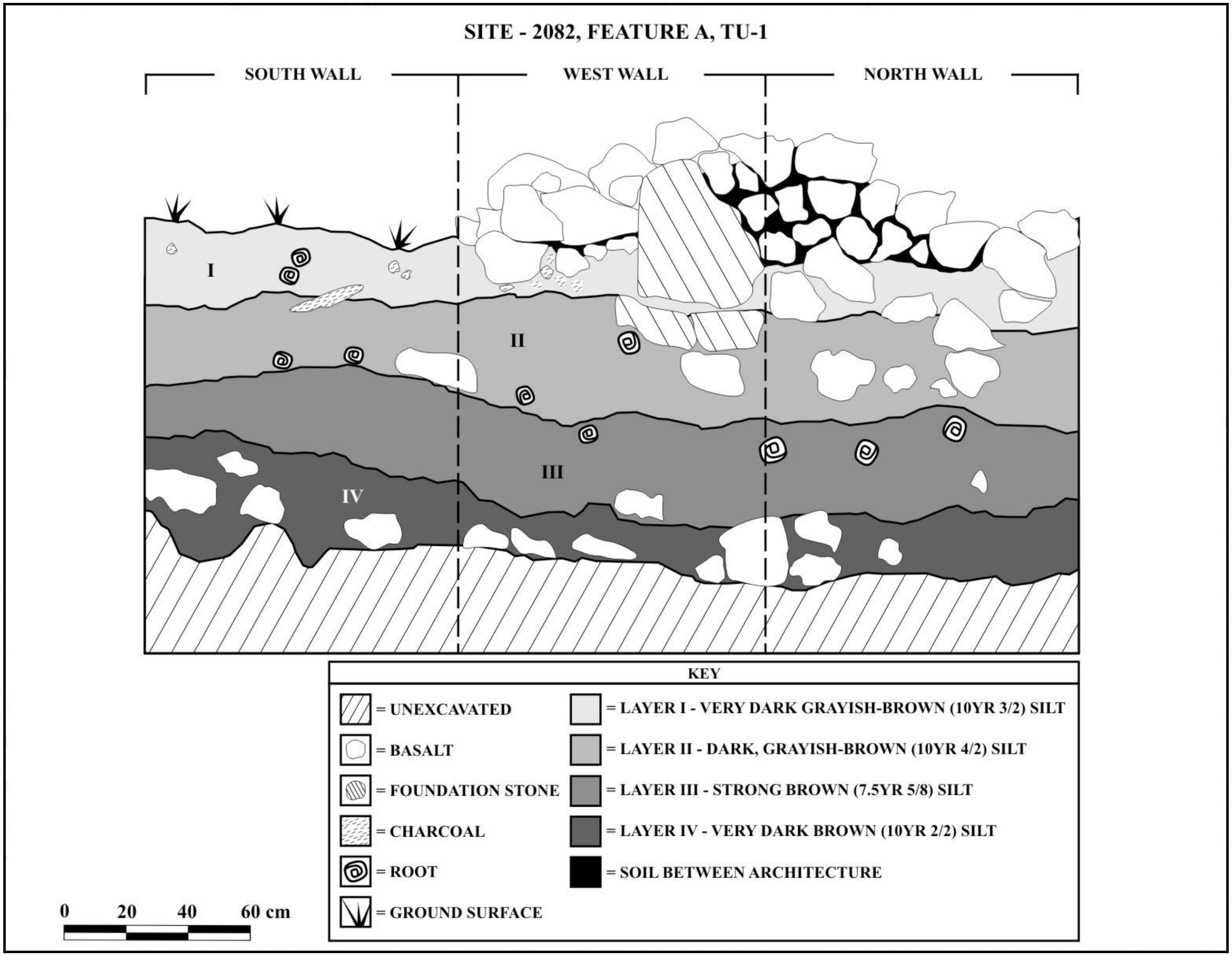


Figure 75: Site -2082, Feature A, TU-1 Profile.

throughout the layer. Pebbles and cobbles comprised 20 to 25 percent of the layer. The layer included stacked stone feature architecture, traditional artifacts, and charcoal. Layer II (1530 cm thick) was a dark grayish-brown (10YR 4/2) silt. Roots decreased in quantity from the overlying layer, but were still common. Pebbles and cobbles were still abundant, but somewhat reduced compared with Layer I. Feature architecture was based in this layer, as was a subsurface feature (SSF-1), traditional artifacts, and charcoal. Layer III (15–30 cm thick) consisted of strong brown (7.5YR 5/8) silt. Roots and pebbles/cobbles were both drastically reduced from overlying layers. No artifacts or charcoal were identified in this layer. Layer IV (15–25 cm thick) was a very dark brown (10YR 2/2) silt. Roots were few, while pebbles and cobbles occurred in moderate abundance. No artifacts or charcoal were identified in this layer, which rests directly on degraded bedrock.

The feature designated SSF-1—a semi-circular alignment of cobbles and small boulders—was encountered between 20 and 30 cmbs in the southeast quadrant of TU-1. The excavator investigated the working hypothesis that SSF-1 was a partially exposed, circular hearth. Starting at the top of Level 3 (20–30 cmbs), the excavator bisected sediment within the alignment and excavated half of the feature by level to assess the profile of the possible hearth feature. After one complete level was excavated in the southeast quadrant of TU-1, it was clear that SSF-1 was not a hearth. In short, there was no sedimentary distinction between the surrounding matrix in the rest of TU-1 and the purported buried hearth comprising SSF-1. This suggested that the alignment of stones was either fortuitous or architectural, but not fire-related. Two basalt flakes were recovered from the matrix of SSF-1, and the rocks defining SSF-1 were based in the very top of Level 5, *i.e.*, at approximately 30 cmbs. This subterranean activity locus, while not a fire-related feature, was a feature simply by the presence of the surrounding rock stones, which could have represented a clean hearth or a hearth location never utilized.

Midden

Other than charcoal, no midden was recovered from TU-1.

Artifacts

One very thick basalt flake was recovered from the upper 10 cm of TU-1. The flake tool had been unifacially retouched and probably damaged through usage. Two pieces of basalt debitage were also recovered from the feature, one each from Level 3 (20–30 cmbs) and Level 4 (30–40 cmbs).

Charcoal

Charcoal was recovered from Level 1 through and including Level 4 (0–40 cmbs) and was most abundant (by weight) in Level 3 (20–30 cmbs). The feature located in the southeast quadrant of TU-1 between 20 cm and 40 cmbs yielded the vast majority of charcoal recovered at the site. No charcoal was recovered below 40 cmbs.

Dating

Two samples of wood charcoal from TU-1 were submitted for radiocarbon analysis. The first sample, from the upper 10 cm (Level 1), yielded a conventional date of 110±60 B.P. When calibrated, the sample produced a date of A.D. 1660 (2 Sigma). This level also yielded a traditional artifact. The second sample was derived from the feature (SSF-1; see above), which was located between 20 and 40 cmbs, and also yielded traditional artifacts. The base of feature architecture was located at approximately 30 cmbs. The second sample produced a conventional date of 70±60 B.P. When calibrated, the sample returned a date range of A.D. 1795 (2 Sigma) to A.D. 1810 to 1920 (1 Sigma). Taken together, these dates suggest that Site -2082 was occupied—and the stone enclosure built—in early historic times.

Taxonomic Identification of Botanical Remains

No wood charcoal samples from TU-1 were analyzed for taxonomic affiliation.

Faunal Analysis

No faunal remains were recovered from TU-1 (Feature A).

STATE SITE 50-50-10-2098

SITE -2098 SUMMARY

Site -2098 (PHRI Site No. K-89) consists of a 100.0 m long terrace with a possible paved area, vaguely interpreted by Brown *et al*. (1989:E-34) as a “prehistoric/historic,” “agricultural/habitation/animal conrol” feature. Several short sections of wall intersecting the terrace appear to be ranch-related features constructed after the main terrace was built. Many other small terraces and rock alignments are located in the immediate area, particularly to the north of the long terrace. Site -2098 is located on a northwest-facing slope, approximately 150.0 m north of the southern boundary of the project area and within DHHL Lot 7. The local landscape around the site consists of a wattle forest.

According to Brown *et al*. (1989:E-34), the site is consistent with a traditional, pre-Contact agricultural terrace, with historic (ranching-period) additions to the main feature through time. In order to clarify the possible function of this feature and to date its construction, three stratigraphic trenches (ST-1, ST-2, and ST-3) were excavated through and transverse to the main terrace (Figures 76 and 77). Trench excavations determined the depth of the structure and yielded charcoal for dating. One radiocarbon date suggests that the main terrace was constructed around protohistoric times, when larger-scale agriculture was thought to have occurred in this upland setting as a form of agricultural intensification.

The function of this site was determined to be an agricultural complex. Wall construction, site location, and the presence of other terraces in the area support this assessment. The presence of oxidized soil in the sedimentary matrices further suggests long-term agricultural work in the area (see Kirch 1992; Dega and McGerty 2000). The final line of evidence is the complete absence of artifacts and other cultural deposits in the area. Three long trenches were excavated to expose any subterranean deposits, yet the results were negative. Agricultural sites would not be expected to yield significant cultural materials as compared with habitation loci. Overall, expectations as to the nature and timing of this site were basically met during the project. The date for construction and suggested use of the feature appears to correspond with the Kolb *et al*. (1997) model for increased size and number of agricultural sites in the area from the A.D. 1600s, this being a response to increased population and/or tribute.

SITE -2098 FEATURE DESCRIPTION

Feature A

Feature A is the main terrace and measures approximately 100.0 m long. All together, the terrace and other, associated features (*i.e.,* short wall sections and various rock alignments) occupy an area of approximately 150.0 m by 125.0 m (18,750.0 m^2). The main terrace connects sides of a collapsed lava tube. Additional walls are built along the sides of the tube and intersect with the terrace and another large terrace down slope. In some places, the terrace is up to 1.0 m wide, but more typically is 20 cm to 30 cm wide. The main terrace has a maximum height of approximately 4.0 m, but is significantly lower in most sections. Three stratigraphic trenches were excavated through and transverse to the main terrace feature. These trenches were approximately 31.0 m (ST-1), 19.0 m (ST-2), and 15.0 meters (ST-3) in length. All three trenches were oriented roughly northwest to southeast and were positioned in order to expose the base construction of the main terrace feature.

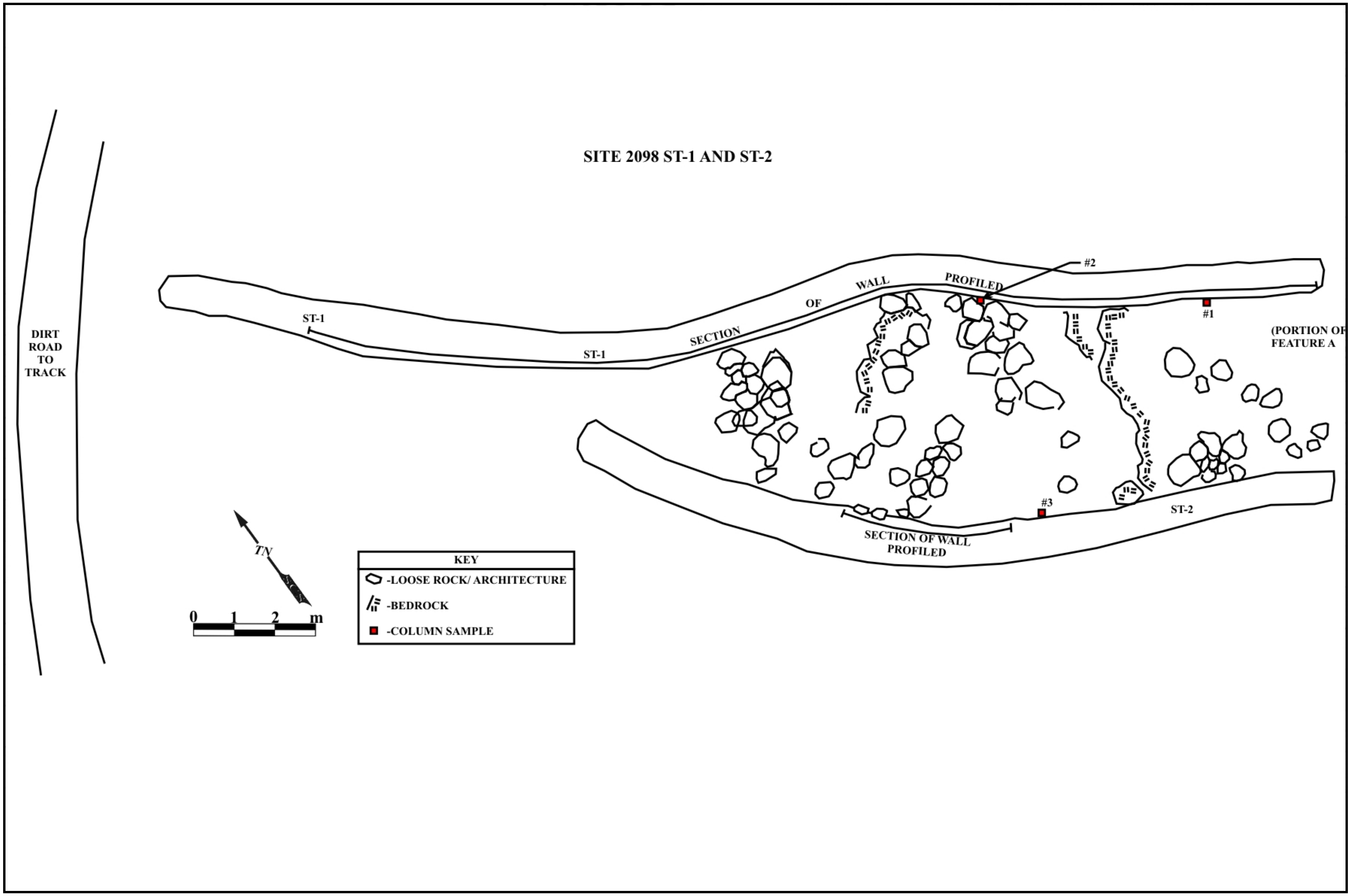


Figure 76: Site -2098, Portion of Feature A Showing Location of ST-1 and ST-2.

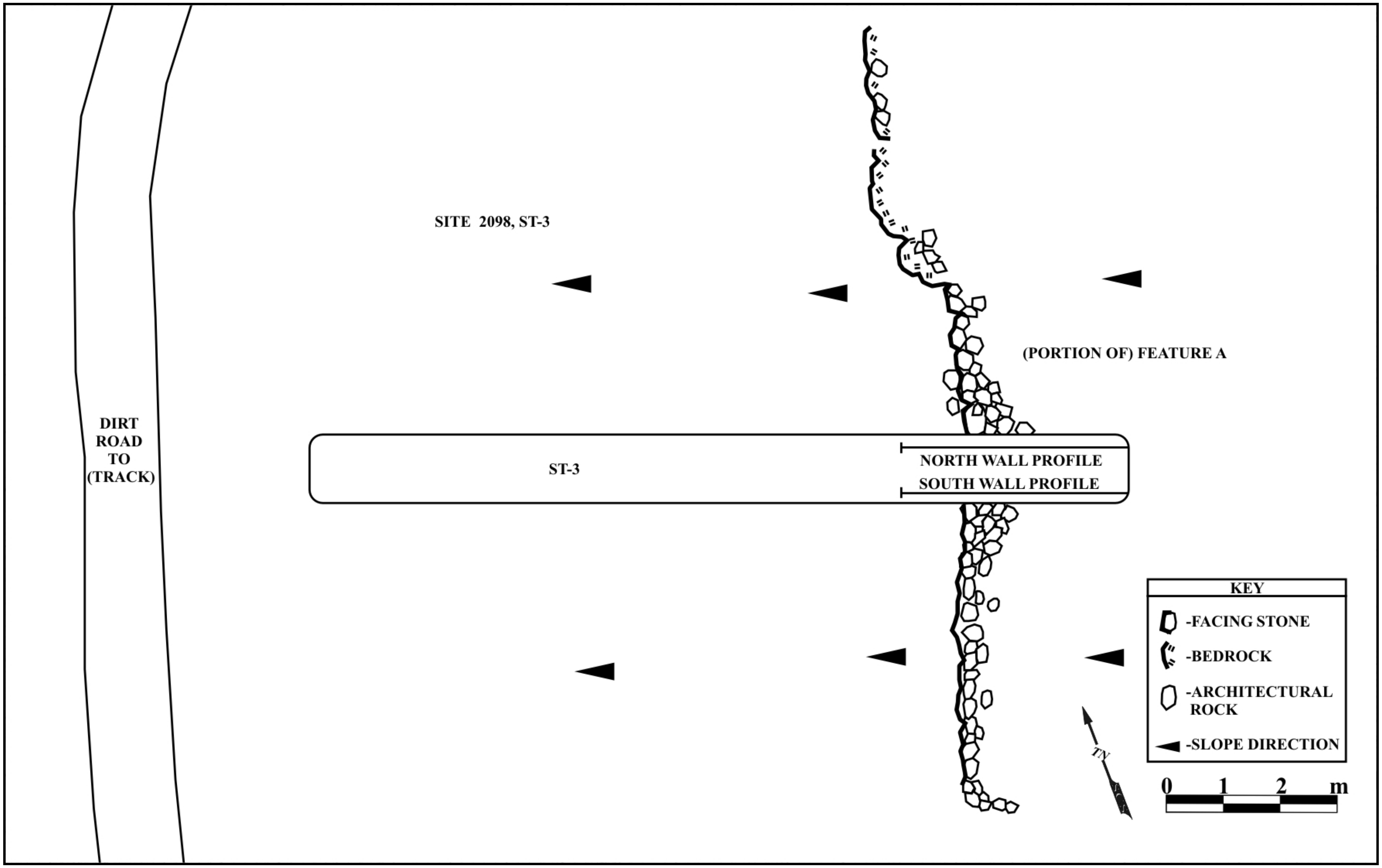


Figure 77: Site -2098, Portion of Feature A with ST-3.

SITE -2098 EXCAVATION
Stratigraphic Trench 1 (ST-1)

The northernmost and longest stratigraphic trench (ST-1) cross-cut the main terrace and several groupings of informally arranged boulders immediately to the west. This 31.0 m long trench was excavated to a maximum depth of approximately 2.0 m below surface, in some places exposing bedrock and eroding (loose) bedrock rubble between 50 and 150 cmbs. The excavation demonstrated that terrace architecture was based in the uppermost sedimentary layer (see below).

ST-1 excavation revealed a complex and varied deposit with two major sedimentary layers, with two additional, lateral facies exposed only in ST-1 (Figure 78). Layer I (0–100 cm thick) a very dark grayish brown (10YR 3/2) silt. Fine to large roots were common throughout the layer. Cobbles and boulders comprised 5 percent of the layer matrix. Occasional flecks of charcoal were present. Some evidence of oxidized soil was also present. Terrace architecture was based in this layer. Layer IA (30–40 cm thick) was a brown (10YR 4/3) silt with no rocks, was a lateral facies of Layer I located beneath a soil oxidation unit in the western portion of ST-1. Layer IB (60 cm thick) was a brown (7.5YR 5/4) to dark reddish-brown (5YR 3/3) silt with 10 percent pebbles and cobbles, was a lateral facies of Layer I located in the eastern portion of ST-1. This lateral facies included the present ground surface and rested directly upon Layer II (bedrock and decomposing bedrock). Fine to medium roots and occasional charcoal flecks were present in this layer. Layer II (5–60 cm thick) was a dark, yellowish-brown (10YR 5/4) silt with a 30 percent pebble, cobble, and boulder matrix. Few, fine to large roots were present and the lower boundary of this layer was bedrock and/or decomposing bedrock rubble.

Midden

No midden was recovered from ST-1. Only wood charcoal was present in the matrices (see below).

Artifacts

No artifacts were recovered from ST-1.

Charcoal

Wood charcoal was recovered from ST-1 in fairly uniform distribution. Charcoal was mixed into soil samples and was not separated for weight counts.

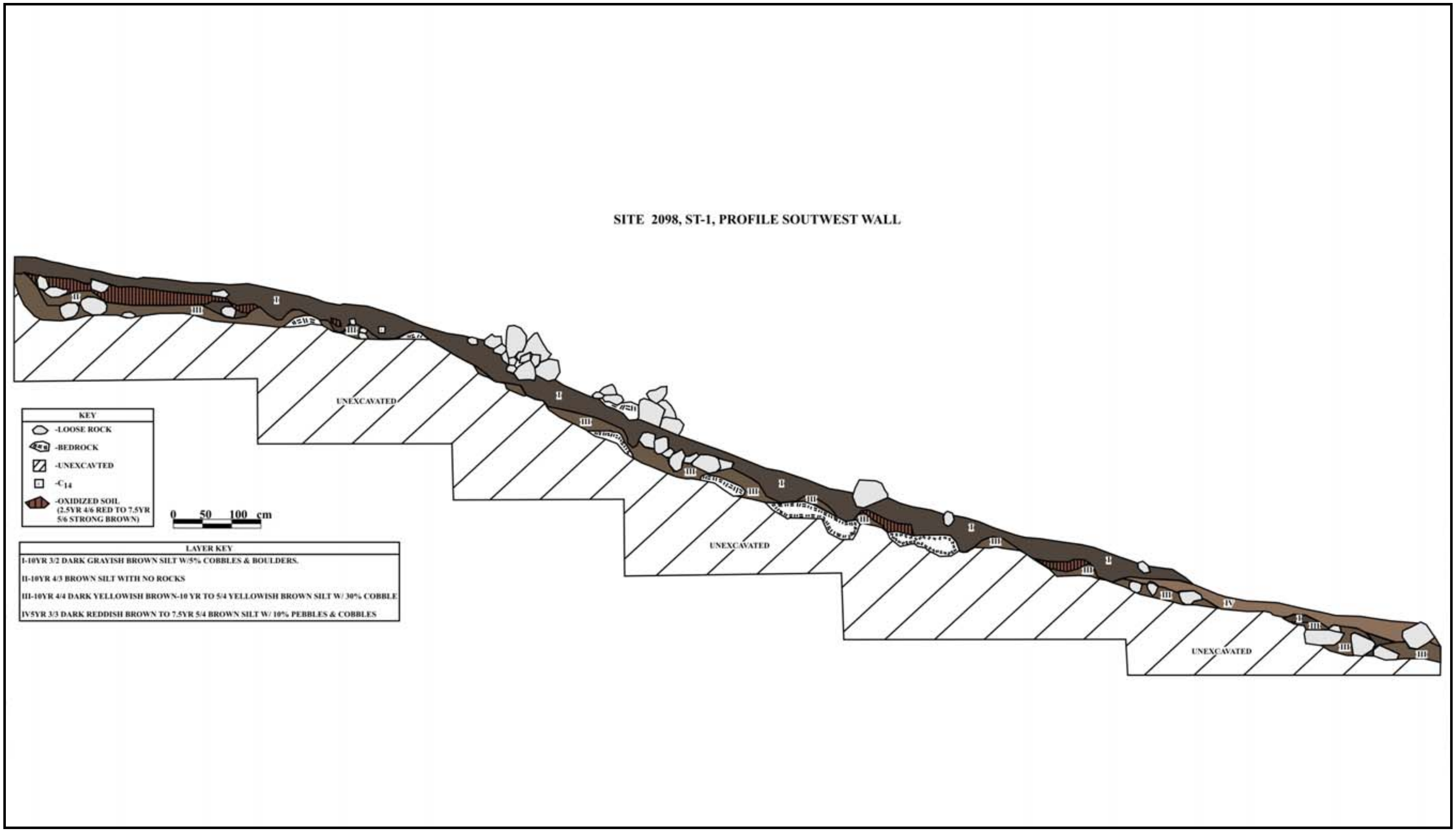


Figure 78: Site -2098, ST-1 Profile.

Dating

One radiocarbon sample was obtained from ST-1. The sample was acquired from Layer I and measured 200$\pm$40 B.P. When calibrated, the sample returned a calendric age of A.D. 1640 to 1880 (2 Sigma) and A.D. 1650 to 1810 (1 Sigma). The date suggests that the main terrace was constructed at or around the terminal pre-Contact period or shortly thereafter, during early historic times.

Taxonomic Identification of Botanical Remains

No wood charcoal from ST-1 was analyzed for taxonomic affiliation.

Faunal Analysis

No faunal remains were recovered from ST-1.

Stratigraphic Trench 2 (ST-2)

ST-2 was located approximately 5.0 m southwest of ST-1 and cross-cut the main terrace and several groupings of informally arranged boulders immediately to the west. This 19.0 m long trench was excavated to a maximum depth of approximately 2.0 m below surface, in some places exposing bedrock and eroding (loose) bedrock rubble between 50 and 150 cmbs. The excavation of ST-2 also demonstrated that terrace architecture was based in the uppermost sedimentary layer (see below).

The excavation of ST-2 revealed two major sedimentary layers (Figure 79). Layer I, a very dark grayish brown (10YR 3/2) silt, varied from 0 to 1.0 m in thickness. Fine to large roots were common throughout the layer. Cobbles and boulders comprised 5 percent of the layer. Occasional flecks of charcoal were present. Some evidence of oxidized soil was also present. Terrace architecture was based in this layer. Layer II, a dark yellowish-brown (10YR 5/4) silt with 30 percent pebbles, cobbles, and boulders, varied in thickness from 5 cm to 60 cm. Few, fine to large roots were present and the lower boundary of this layer consisted of bedrock and/or decomposing bedrock rubble.

Midden

No midden was recovered from ST-2. Charcoal was noted in small amounts in the profile.

Artifacts

No artifacts were recovered from ST-2.

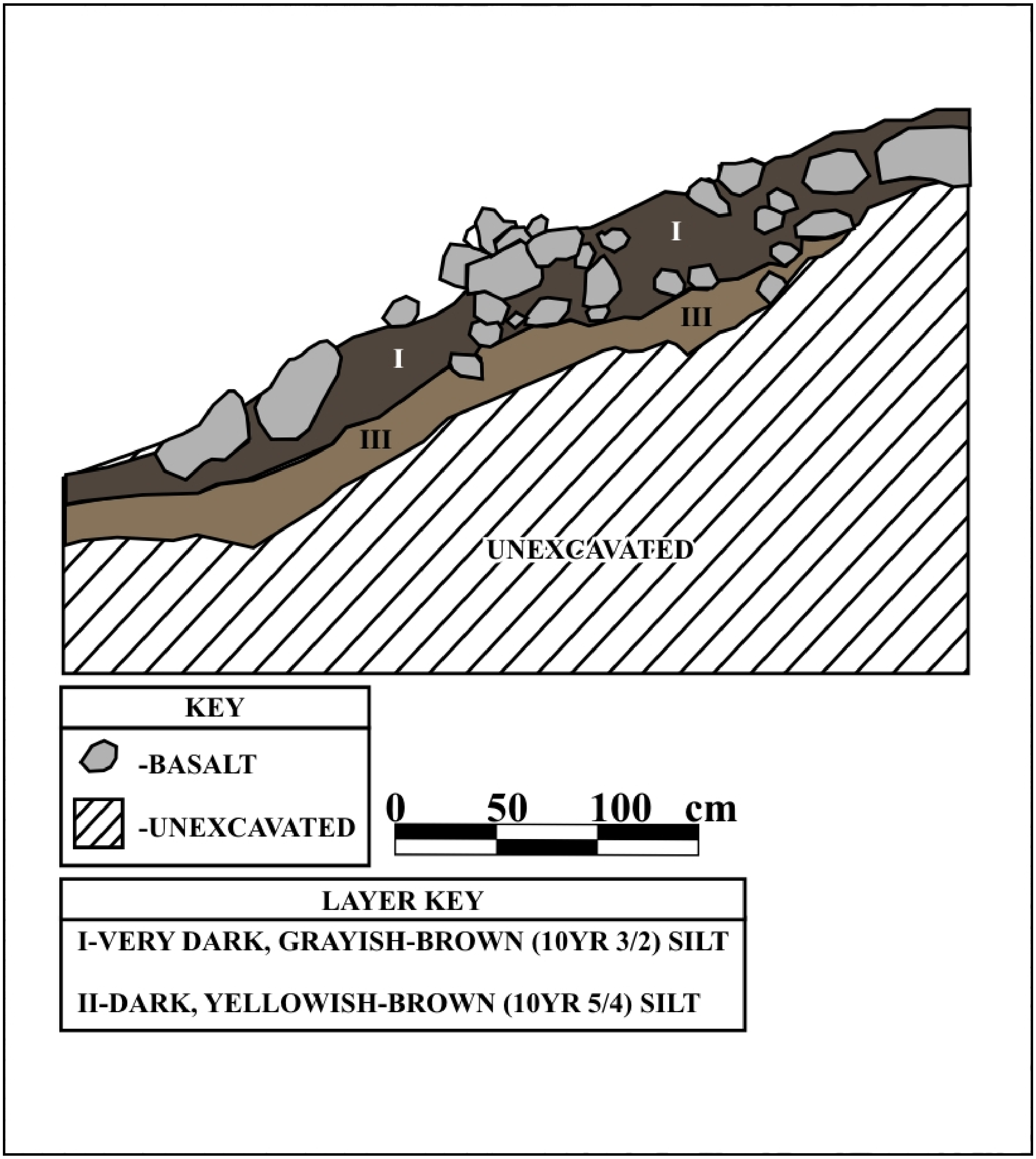


Figure 79: Site -2098, ST-2 Profile East Wall.

Charcoal

Wood charcoal present but not collected from ST-2.

Dating

No dating samples were obtained from ST-2.

Taxonomic Identification of Botanical Remains

No wood charcoal from TU-2 was analyzed for taxonomic affiliation.

Faunal Analysis

No faunal remains were recovered from ST-2.

Stratigraphic Trench 3 (ST-3)

ST-3 was located several meters southwest of ST-2 and cross-cut the main terrace and several groupings of informally arranged boulders immediately to the west. This 15-m-long trench was excavated to a maximum depth of approximately 2.0 m below surface, in some places exposing bedrock and eroding (loose) bedrock rubble between 50 and 150 cmbs. The excavation of TU-3 again demonstrated that terrace architecture was based in the uppermost sedimentary layer (see below).

The excavation of ST-3 revealed two main sedimentary layers (Figure 80). Layer I, a very dark grayish brown (10YR 3/2) silt, varied from 0 to 1.0 m in thickness. Fine to large roots were common throughout the layer. Cobbles and boulders comprised 5 percent of the layer matrix. Occasional flecks of charcoal were present. Some evidence of oxidized soil was present. Terrace architecture was again based in this layer. Layer II, a dark yellowish-brown (10YR 5/4) silt with 30 percent pebbles, cobbles, and boulders, varied in thickness from 5 cm to 60 cm. Few, fine to large roots were present and the lower boundary of this layer consisted of bedrock and/or decomposing bedrock rubble.

Midden

No midden was recovered from ST-3. However, wood charcoal was present in sediment matrices.

Artifacts

No artifacts were recovered from ST-3.

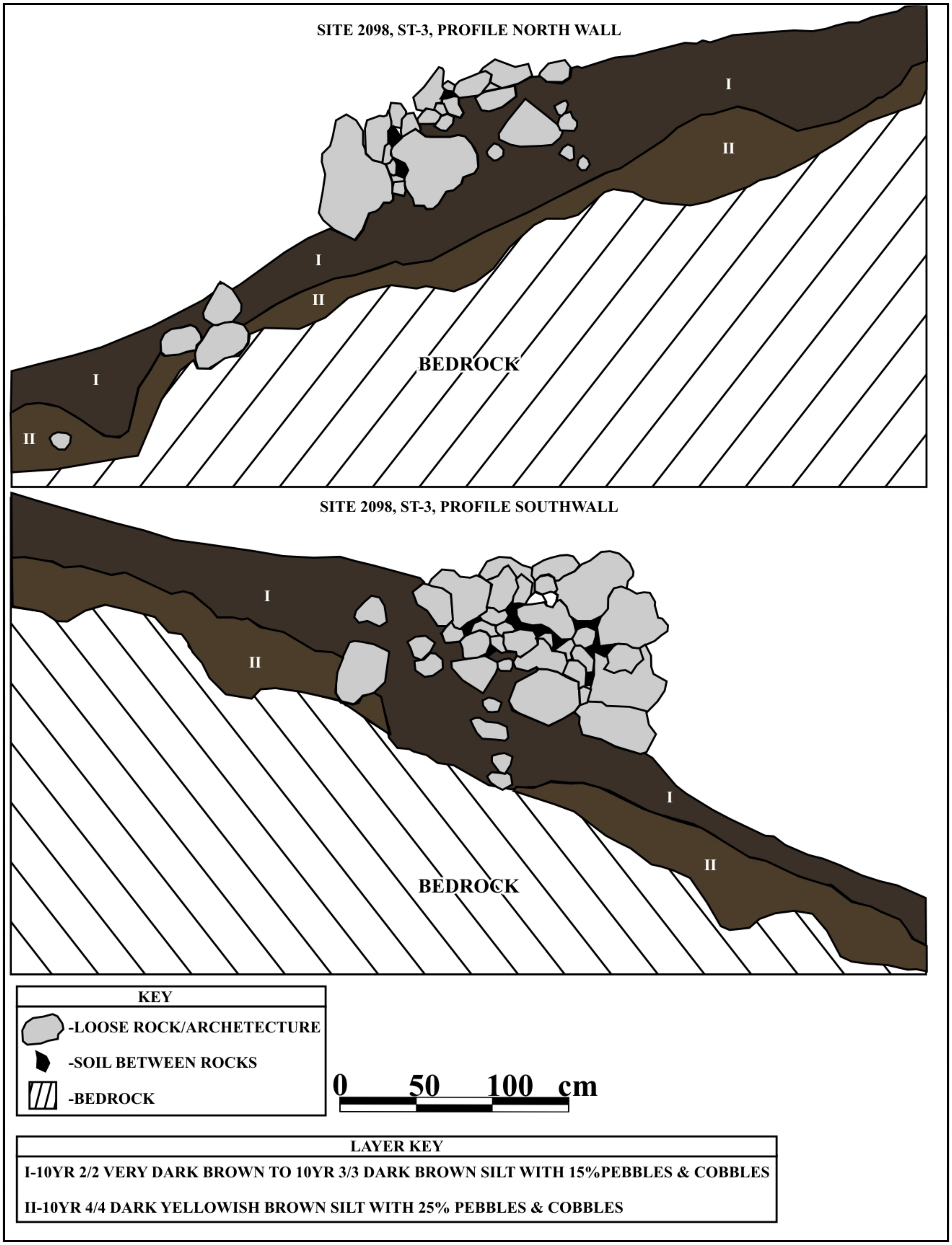


Figure 80: Site -2098, ST-3 Profiles.

Charcoal

Wood charcoal present but not collected from within sedimentary layers of ST-3.

Dating

No dating samples were obtained for ST-3.

Taxonomic Identification of Botanical Remains

No wood charcoal from ST-3 was analyzed for taxonomic designation.

Faunal Analysis

No faunal remains were recovered from ST-3.

STATE SITE 50-50-10-2331

SITE -2331 SUMMARY

Site -2331 (PHRI Site No. K-152) consists of two main features—a C-shaped enclosure and a paved, double platform—as well as associated agricultural terraces (Figure 81). The two main features occupy an area of approximately 34.0 m by 12.0 m (408.0 m²). The site itself is located at an elevation of 771.0 m amsl on a landscape characterized by dissected alluvial slopes. Agricultural terraces, possibly associated with these features, are located in the immediate vicinity, but were not recorded during Inventory Survey. The site complex is located some 400.0 m east of the project area's western boundary, 100.0 m north of DHHL Lot 76, and within the western flank of DHHL Lot 64. Vegetation in the area includes *lantana*, *`ilima*, grasses, and wattle.

The Site -2331 complex was interpreted by Brown *et al.* (1989:E-46; E-48) as a pre-Contact habitation and agricultural site. The paved, double platform, designated Feature A, measures approximately 5.9 m by 5.8 m (34.2 m²) and consists of two flat portions of basalt cobbles and boulders with a step up between them. During Data Recovery, one test unit (TU-1) was excavated at Feature A. The C-shaped enclosure (Feature B) was not tested during these investigations. The test unit placed in Feature A yielded a small amount of faunal material, including marine shell and rat, but no artifacts. Two radiocarbon dates from different levels of TU-1 indicate an A.D. 1510 to 1650 date for the upper deposits and a significantly earlier age (A.D. 1280–1400) for the lower deposits. The latter sample pre-dated architecture while the former sample dated initial feature construction.

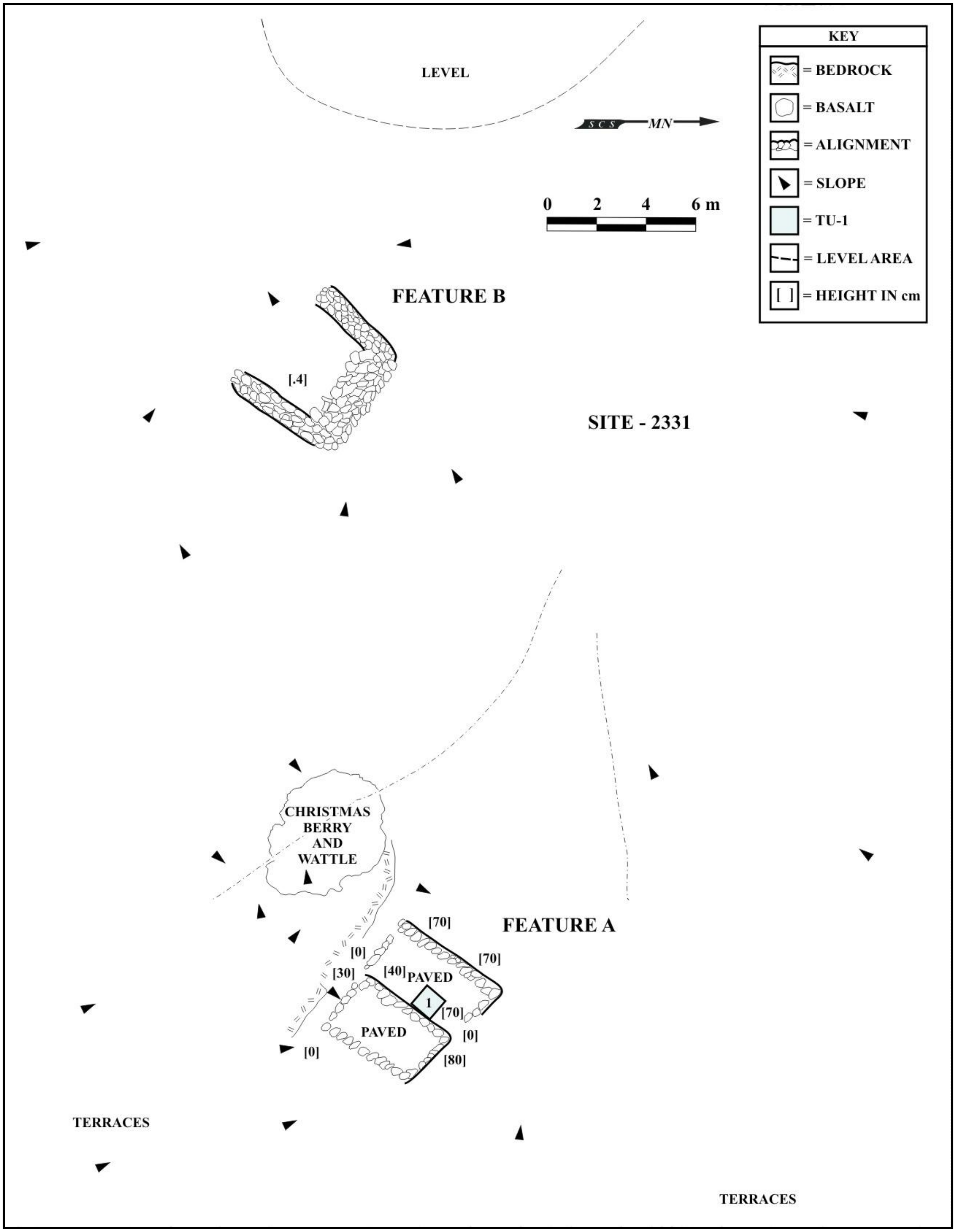


Figure 81: Site -2331 Plan View Map.

SITE -2331 FEATURE DESCRIPTION

Feature A

Feature A consists of two rectangular platforms, roughly equal in size, side-by-side and joined by a step up of some 70 cm to 80 cm. Feature construction is typical for the area: hand-stacked basalt cobbles and boulders. The exterior area of this feature measures 5.9 m by 5.8 m (34.22 m^2). The southeastern end of the feature was built into the hill slope and forming relatively level areas on top of the paved surfaces. The down slope and northwestern sides of each level area are well-faced. The lower paved area measures approximately 70 cm in height (Brown *et al.* 1989:E-48). TU-1 was excavated in Feature A.

SITE -2331 EXCAVATION

Test Unit 1 (TU-1)

One test unit (TU-1) measuring 1.0 m by 1.0 m was excavated into the northwest (lower) half of the platform pavement, abutting the step up to the upper half of the platform. The test unit was excavated through nine arbitrary 10-cm levels to bedrock, the latter was exposed at a maximum depth of 80 cmbs.

Two main sedimentary layers were documented in TU-1 beneath stacked architectural stones and above bedrock (Figure 82). Layer I, a very dark grayish brown (10YR 3/2) silt, measured 40 cm to 50 cm thick. Roots were rare in this layer but cobbles were abundant. Feature architecture was based in the upper portion of Layer I. This layer contained charcoal, faunal material, and marine shell. Layer II was composed of dark yellowish brown (10YR 4/4) silt measuring 20 cm to 30 cm thick. Roots were rare in this layer but again, rocks were abundant. This layer rested directly atop bedrock and was culturally sterile.

<u>Midden</u>

Other than charcoal, recovered midden consisted of several *Cypraea* sp. (mollusk) shell fragments recovered from Level 2 (10–20 cmbs) of TU-1. The presence of marine resources, in particular, is significant at the site as these foods were likely deliberately transported to the site by humans.

<u>Artifacts</u>

No artifacts were recovered from TU-1.

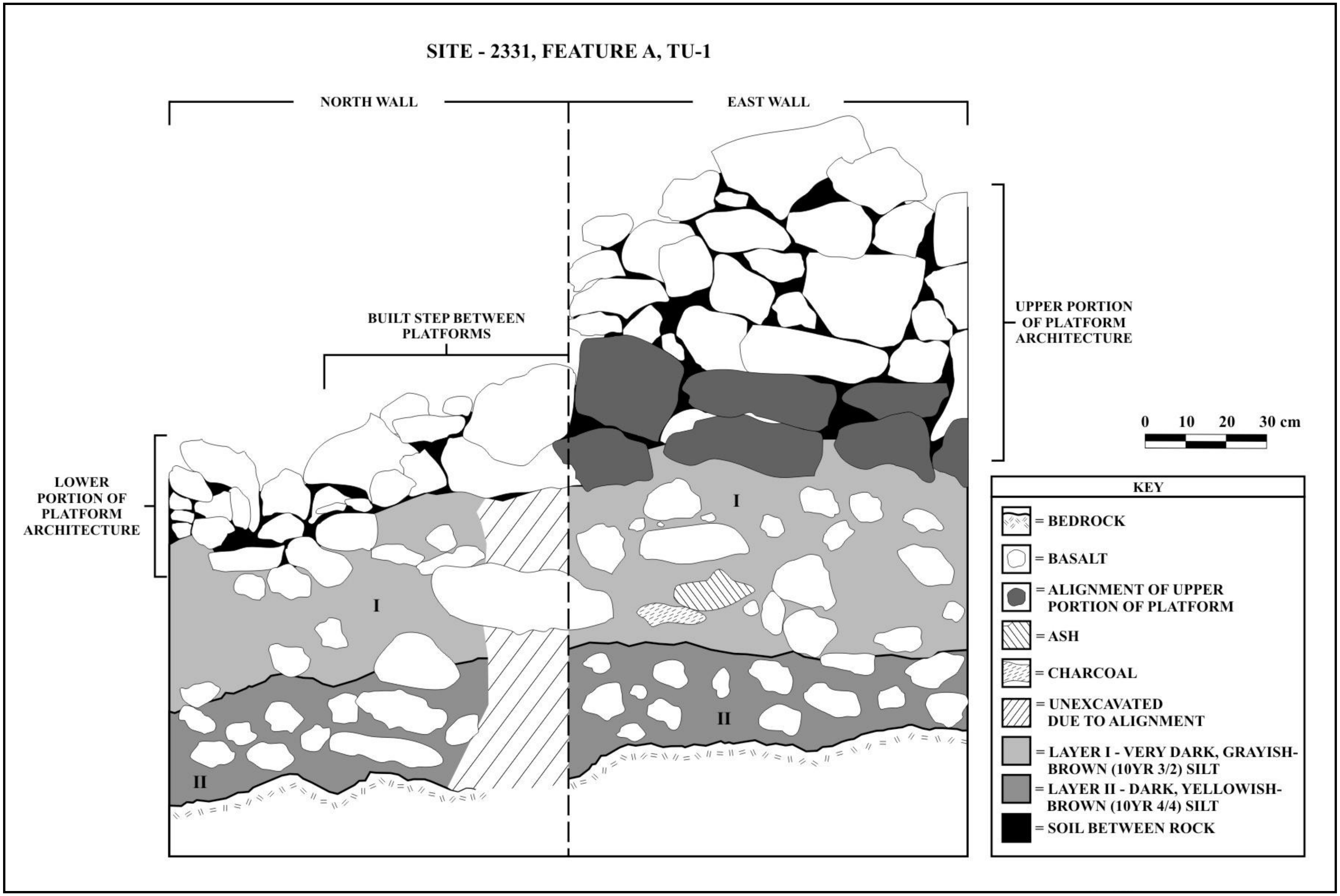


Figure 82: Site -2331, Feature A, TU-1 Profile.

Charcoal

Charcoal was recovered from Level 2 through and including Level 5 (10–50 cmbs) but was most abundant (by weight) in Level 4 (30–40 cmbs). Charcoal was present, but in very sparse quantities, below 40 cmbs, with none occurring below 50 cmbs. The possible hearth was located between 20 and 30 cmbs and also yielded charcoal. With the exception of this feature, the charcoal was distributed more or less randomly throughout the sedimentary matrix.

Dating

Two samples of wood charcoal from TU-1 (Feature A) were submitted for radiocarbon dating analysis. The first sample, from Level 1 (0–10 cmbs) returned a conventional date of 310±50 B.P. After calibration, the date range was A.D. 1450 to 1660 (2 Sigma) and A.D. 1510 to 1650 (2 Sigma). As the base of feature architecture rests in upper Layer I, this is a reasonable chronological age for the construction of Feature A. However, site activity presumably occurred prior to the site being formalized through construction. The second sample, from Level 5 (40–50 cmbs), returned an early conventional date of 630±100 B.P. The date range after calibration read A.D. 1180 to 1460 (2 Sigma) and A.D. 1280 to 1400 (1 Sigma). This early date reflects early use of the landscape prior to architectural formalization, a pattern gaining some credence with a suite of early dates recovered in Kēōkea during Data Recovery.

Taxonomic Identification of Botanical Remains

No wood charcoal samples from TU-1 were analyzed for taxonomic affiliation.

Faunal Analysis

A small quantity of both vertebrates and invertebrates were identified from excavated deposits of TU-1 between 10 and 40 cmbs in TU-1. Several fragments of *Cypraea* sp., a marine mollusk, were recovered from Level 2 (10–20 cmbs). Three mammal bones were recovered from Level 3 (20–30 cmbs), including one specimen of *Rattus exulans*, the Polynesian Rat. The other two specimens were identified as small/medium vertebrates.

DISCUSSION

The following sections provide categorized summaries of the data collected from the project area in an attempt to assess larger patterns for Kēōkea. These sections provide analysis and summary of all midden and faunal remains found at the sites, artifacts recovered, charcoal species identified, and radiocarbon dating using a large suite of samples. Following this section, the three research questions driving Data Recovery will be addressed.

FAUNAL REMAINS

The faunal record of the Kēōkea Data Recovery project was modest in terms of absolute quantity of recovered remains and variability of classes identified. Of the twenty habitation sites excavated, only 60 percent of the sites yielded faunal remains. Eight of the excavated sites did not yield any faunal remains (40%). These figures could simply be a function of sampling (see Methodology section). However, the figures detailing the minimum number of individual (MNI) counts of faunal remains recovered from the site population are significant.

A total of 117 individual vertebrates were recovered during testing (Tables 1 and 2). This figure represents a MNI of 117 and does not assess how many total bone pieces were recovered. As is shown in Table 3, terrestrial remains dominated this upland area. There is almost a 2:1 ratio of terrestrial versus marine species identified, a fairly surprising number considering the upland setting; one would expect fewer marine resources at this elevation.

In terms of absolute quantity, fish remains accounted for 22 percent of the vertebrate population while birds (29%), various domesticated mammals (41%), and generic vertebrates (8.5 %) composed the remainder. The fish group was dominated by *Scaridae* (parrot fish; near-shore, reef), however, with a large proportion of the collection was considered nondiagnostic fishbone (unidentifiable to a lower order). Ziegler notes that fish were not consumed in any great variety or number in the project area. *Scaridae*, for instance, a common reef fish, constituted the only fish identified to the family level. Bird or avifaunal remains included *Gallus gallus* (chicken), *Procellarid* (shearwater), *Porzana* sp. (rail; extinct), *Asio flammeus* (owl), and various medium-sized birds of unknown identification.

Identified mammalian classes included the always socially significant remains of *dog (Canis familiaris*), pig (*Sus scrofa*), rat (*Rattus exulans*), and unidentifiable small to medium mammal. Dog and pig remains, typically associated with males of higher social rank, were only a very modest portion of the excavated assemblage. Only three dogs, composing only 6 percent of the mammals recovered (and 2.5% of all recovered remains), were identified at three sites, one per site. Pig bones were slightly more frequent, with nine pigs being recovered from six sites, or 19 percent of the mammal population and 8 percent of all vertebrates. The hypothesis that many of these sites were occupied by lesser chiefs or were men's *hale* may need some revision. In total, Ziegler notes that pig and dog were both relatively often eaten, with pig probably being the one more commonly used. Most or all of the pig and dog remains represent grown individuals (at least several months old when killed).

Table 1: Graph Showing Amounts of all Faunal Remains Collected.

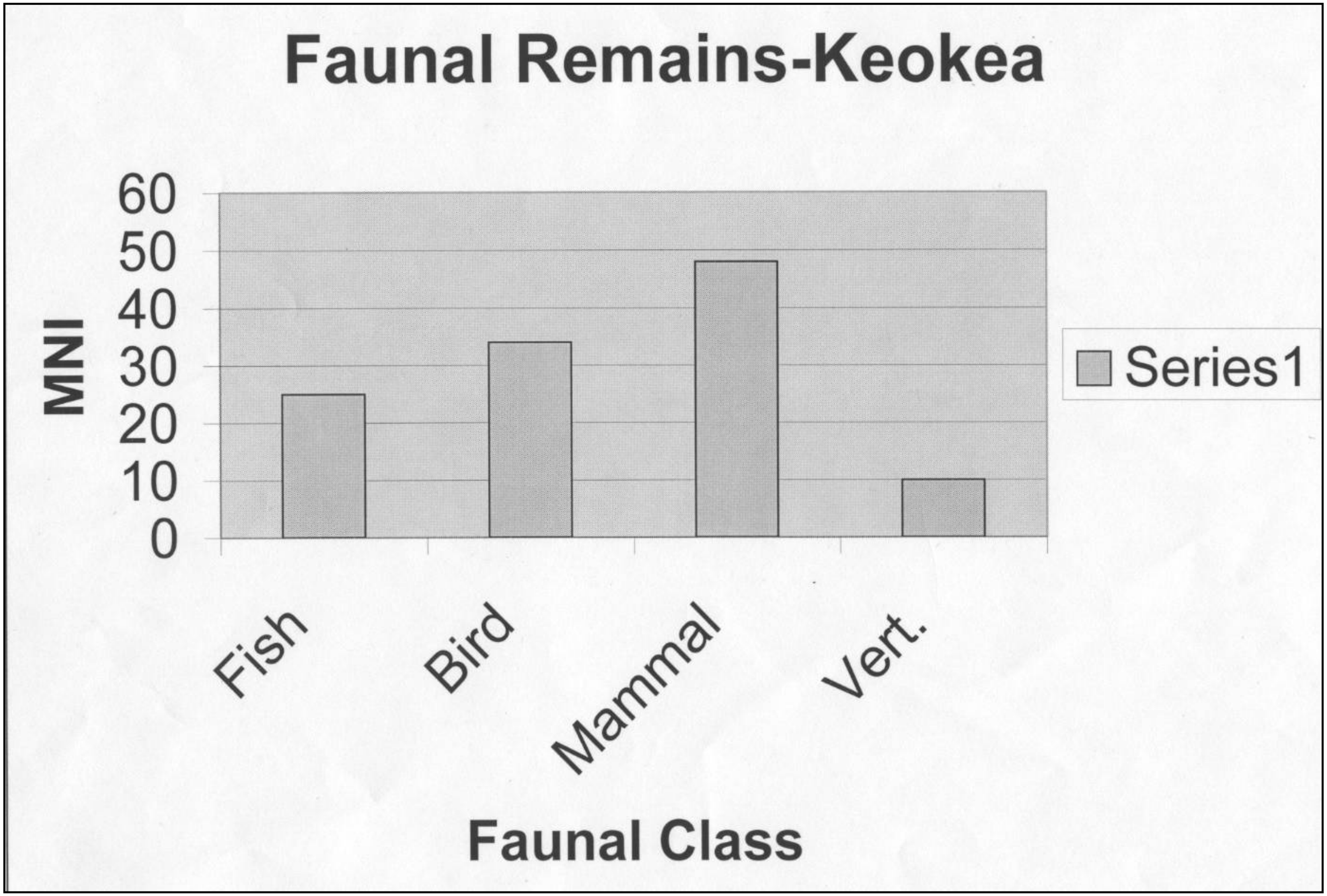


Table 2: Graph Showing Amounts of Mammal Remains Collected from the Project Area.

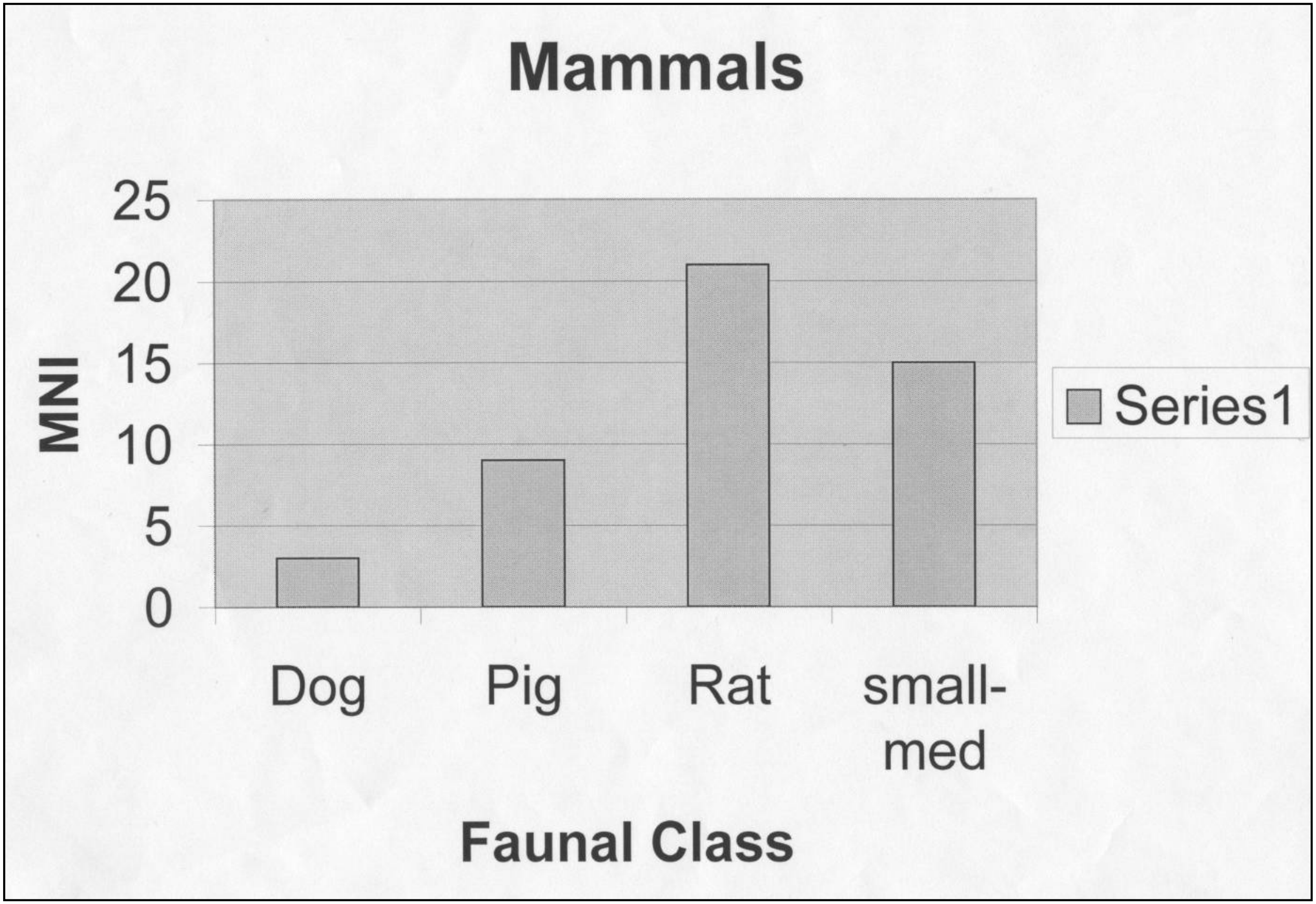


Table 3: List of Taxa Identified in Charcoal Samples from Kēōkea, Maui.

Family	Scientific Name	Common/Hawaiian Name	Origin	Habit	Ethnobotanical Uses*
Agavaceae	*Cordyline fruticosa*	*Ki*, ti	Polynesian Introduction	Shrub	House thatch, food wrappers, raincoats, and sandals from leaves; swollen fleshy roots baked for food or used to produce an alcoholic beverage
Amaranthaceae	*Nototrichium sandwicensis*	*Kulu'ī*	Native	Shrub	—
Apocynaceae	*Rauvolfia sandwicensis*	*Hao*	Native	Tree	—
Asteraceae	*Bidens* sp.	*Ko'oko'olau*	Native + Historic Introductions	Shrub	Medicinal tea from leaves and flowers
Celastraceae	*Perrottetia sandwicensis*	*Olomea*	Native	Tree	Wood used as fire plow by rubbing against softer wood to create fire
Chenopodiaceae	*Chenopodium oahuense*	*'Āheahea*, *'āweoweo*	Native	Shrub	Leaves eaten as greens
Cucurbitaceae	*Lagenaria siceraria*	*Ipu*	Polynesian Introduction	Vine	Smaller gourds used as receptacles for food or water and rattles for dances; larger gourds made into drums or as places to hold *kapa* bark cloth or other articles
Ebenaceae	*Diospyros sandwicensis*	*Lama*	Native	Tree	Houses, enclosures for idols, chisel handles from the wood; fruits eaten
Epacridaceae	*Styphelia tameiameiae*	*Kāwa'u, pūkiawe*	Native	Shrub	Smoke from the burning wood used to cleanse *kapu*; wood also used to cremate the bodies of outlaws.
Euphorbiaceae	*Aleurites moluccana*	*Kukui*	Polynesian introduction	Tree	Dyes from bark and roots; kernels burned for light or eaten as relish; net floats and dugout canoes from wood
Euphorbiaceae	*Antidesma pulvinatum*	*Hame*	Native	Tree	Wood used as anvils for beating and preparing *Touchardia* (*olon*✱) fibers; fruit yielded a red dye
Euphorbiaceae	*Chamaesyce* sp.	*'Akoko*	Native	Shrub	Firewood
Fabaceae	*Acacia koa*	*Koa*	Native	Tree	Wood used for canoes, paddles, surfboards, bowls, utensils, etc.
Malvaceae	*Sida fallax*	*'Ilima*	Native	Shrub	Floor coverings, walls using the entire plant; medicine from roots and flowers
Myoporaceae	*Myoporum sandwicense*	*Naio*	Native	Tree	Wood used for house posts
Myrsinaceae	*Myrsine lanaiensis*	*Kōlea*	Native	Tree	—
Myrtaceae	*Metrosideros polymorpha*	*'Ōhi'a lehua*	Native	Tree	Wood used for spears and mallets, idols, posts and rafters for houses, enclosures around temples
Oleaceae	*Nestegis sandwicensis*	*Olopua*	Native	Tree	Wood used for adze handles, spears, and digging sticks; kindling
Pittosporaceae	*Pittosporum* sp.	*Hō'awa*	Native	Tree	—
Pteridophyta	—	Ferns	Native + Introductions		*Cibotium* (*hapu'u*) fern pith eaten after cooking; hairs used as a dressing for wounds and to embalm the dead.
Rosaceae	*Osteomeles anthyllidifolia*	*'Ūlei*	Native	Shrub	Wood made into digging sticks, fishing spears, carrying poles, musical bow; smaller branches bent into hoops for fishing
Rubiaceae	*Bobea* sp.	*'Ahakea*	Native	Tree	Wood used for canoe rims and *poi* boards
Rubiaceae	*Canthium odoratum*	*Alahe'e*	Native	Shrub-Tree	Wood used for making '✱'✱ digging sticks and leaves made a black dye.
Rubiaceae	*Psychotria* sp.	*Kōpiko*	Native	Tree	Wood used as firewood and to make *kapa* logs
Santalaceae	*Santalum* sp.	*'Iliahi*	Native	Shrub-Tree	Wood exported from 1791 to 1840; powdered wood used to scent *kapa* cloth
Sapindaceae	*Dodonaea viscose*	*'A'ali'i*	Native	Shrub	Fruit capsule clusters and leaves made into *lei*; house posts from wood
Solanaceae	*Nothocestrum latifolium*	*'Aiea*	Native	Tree	Wood used for canoes, fire making; slender branches for thatching sticks.

* See Review of Taxa for sources.

Of particular interest, as is illustrated in Table 4, is the ubiquitous presence of rat remains in the faunal record. Rat dominates the faunal assemblage, a pattern that is not so common at coastal settlements. Rats, a Polynesian introduction, often appear among sedentary populations. The reliability of subsistence resources, such as grains, appears to be a magnet for such creatures. The amount of rat remains in the archaeological record of Kēōkea leads to several interesting hypotheses. First, there is an association between rat bones and sustained habitation areas. Second, rats are primarily attracted to enduring resources bases. The presence of agricultural-processed grains would provide such a base. This is another line of evidence that agriculture was an important component to the upland subsistence economy. As the economy flourished, so did the rat population.

In summary, Ziegler notes that the Kēōkea sample is very representative of human dietary midden, with the exception of Polynesian rat bones. The food remains are consistent with the traditional Hawaiian diet. In terms of when the sites were used, a single prehistorically extinct bird species was represented in the faunal assemblage (flightless rail of the *Porzana* sp.). There were no occurrences of vertebrate species introduced after Contact. Ziegler notes that essentially all of the excavated areas were occupied by a population carrying out a traditional Hawaiian way of life, and that the occupation occurred during the later pre-Contact period and possibly during the first several decades of the post-Contact period before historically introduced vertebrate species became common in the general project area. This interpretation, based solely on a small faunal assemblage, is in accordance with the Keokea radiocarbon dating patterns.

MIDDEN (MARINE SHELL)

A small quantity of invertebrate material was recovered from the excavated sites. The presence of such remains in an upland setting is significant nonetheless, intimating re-distribution of the marine substances to an upland setting by trade/exchange, offering, or as a upland food source carried there by locals procuring the coastal resources. This small amount of marine shell suggests that there was not a heavy reliance on both upland and coastal resources, as upland resources in the form of agricultural goods dominated the record (by proxy through the presence of large agricultural sites in the area-these remains rarely preserve in the archaeological record).

Table 4: Summary of Charcoal Taxa Identifications.

Lab Bag	Site	Feature	Unit	Layer Level	Taxa	Part	Count	Weight (g)	% Weight
66	2048	B	TU-1	I/3	*Chamaesyce* sp.	Wood	46	7.23	84.1
66	2048	B	TU-1	I/3	*cf. Dodonaea viscosa*	Wood	5	0.75	8.7
66	2048	B	TU-1	I/3	*cf. Nototrichium sandwicense*	Wood	2	0.24	2.8
66	2048	B	TU-1	I/3	*cf. Nestegis sandwicensis*	Wood	1	0.03	0.3
66	2048	B	TU-1	I/3	*cf. Psychotria* sp.	Wood	7	0.28	3.3
66	2048	B	TU-1	I/3	*Sida cf. fallax*	Wood	1	0.07	0.8
66	2048	B	TU-1	I/3	TOTAL	—	62	8.60	100.0
69	2048	A	TU-1	I/4	*Chamaesyce* spp.	Wood	4	1.46	100.0
71	2030	A	TU-1	2	*Chamaesyce* spp.	Wood	26	2.64	58.3
71	2030	A	TU-1	2	*Chenopodium oahuense*	Wood	3	0.28	6.2
71	2030	A	TU-1	2	*Myoporum sandwicense*	Wood	4	0.49	10.8
71	2030	A	TU-1	2	*Nestegis sandwicensis*	Wood	1	0.04	0.9
71	2030	A	TU-1	2	*cf. Nototrichium sandwicense*	Wood	3	0.50	11.0
71	2030	A	TU-1	2	*Perrottetia sandwicensis*	Wood	1	0.14	3.1
71	2030	A	TU-1	2	*Sida cf. fallax*	Wood	2	0.32	7.1
71	2030	A	TU-1	2	Not identified	Bark	3	0.12	2.6
71	2030	A	TU-1	2	TOTAL	—	43	4.53	100.0
92	2030	A	TU-1	5	*Chamaesyce* spp.	Wood	9	0.77	23.1
92	2030	A	TU-1	5	*Chenopodium oarhuense*	Wood	4	1.25	37.5
92	2030	A	TU-1	5	*Diospyros sandwicensis*	Wood	1	0.19	5.7
92	2030	A	TU-1	5	*cf. Nothocestrum latifolium*	Wood	1	0.04	1.2
92	2030	A	TU-1	5	*Osteomeles anthyllidifolia*	Wood	3	0.66	19.8
92	2030	A	TU-1	5	*cf. Rauvolfia sandwicensis*	Wood	1	0.12	3.6
92	2030	A	TU-1	5	*Sida cf. fallax*	Wood	1	0.16	4.8
92	2030	A	TU-1	5	*cf.* Pteridophyta	Stem	1	0.14	4.2
92	2030	A	TU-1	5	TOTAL	—	21	3.33	99.9
123	2050	A	TU-2	2	*Chamaesyce* sp.	Wood	1	7.27	100.0
137	2050	A	TU-2	5	*Chamaesyce* spp.	Wood	12	0.99	6.1
137	2050	A	TU-2	5	*Chenopodium oarhuense*	Wood	11	1.17	7.3
137	2050	A	TU-2	5	*Cordyline fruticosa*	Stem	2	0.25	1.6
137	2050	A	TU-2	5	*Diospyros sandwicensis*	Wood	15	1.73	10.7
137	2050	A	TU-2	5	*cf. Dodonaea viscosa*	Wood	26	3.28	20.4
137	2050	A	TU-2	5	*Nestegis sandwicensis*	Wood	4	0.30	1.9
137	2050	A	TU-2	5	*cf. Nothocestrum latifolium*	Wood	1	0.02	0.1
137	2050	A	TU-2	5	*cf. Nototrichium sandwicense*	Wood	29	3.90	24.2
137	2050	A	TU-2	5	*Osteomeles anthyllidifolia*	Wood	22	3.12	19.4
137	2050	A	TU-2	5	*cf. Pittosporum* sp.	Wood	4	0.15	0.9
137	2050	A	TU-2	5	*cf. Psychotria* sp.	Wood	2	0.10	0.6
137	2050	A	TU-2	5	*cf. Rauvolfia sandwicensis*	Wood	4	0.61	3.8
137	2050	A	TU-2	5	*Sida cf. fallax*	Wood	4	0.24	1.5
137	2050	A	TU-2	5	Unknown 1	Wood	3	0.15	0.9
137	2050	A	TU-2	5	Not identified	Bark	1	0.09	0.6
137	2050	A	TU-2	5	**TOTAL**		**140**	**16.10**	**100.0**

Lab Bag	Site	Feature	Unit	Layer Level	Taxa	Part	Count	Weight (g)	% Weight
176A	2050	C	TU-4	2	*Acacia koa*	Wood	1	0.02	0.1
176A	2050	C	TU-4	2	*Aleurites moluccana*	Nutshell	3	1.65	7.8
176A	2050	C	TU-4	2	*cf. Antidesma pulvinatum*	Wood	5	0.46	2.2
176A	2050	C	TU-4	2	*cf. Bobea* sp.	Wood	3	0.06	0.3
176A	2050	C	TU-4	2	*cf. Canthium odoratum*	Wood	4	0.61	2.9
176A	2050	C	TU-4	2	*Chamaesyce* spp.	Wood	34	3.21	15.2
176A	2050	C	TU-4	2	*Chenopodium oahuense*	Wood	21	2.17	10.3
176A	2050	C	TU-4	2	*Diospyros sandwicensis*	Wood	10	0.99	4.7
176A	2050	C	TU-4	2	*cf. Dodonaea viscosa*	Wood	8	0.93	4.4
176A	2050	C	TU-4	2	*Lagenaria siceraria*	Rind	2	0.12	0.6
176A	2050	C	TU-4	2	*Metrosideros polymorpha*	Wood	1	0.23	1.1
176A	2050	C	TU-4	2	*cf. Myoporum sandwicense*	Wood	21	1.15	5.4
176A	2050	C	TU-4	2	*Nestegis sandwicensis*	Wood	1	0.07	0.3
176A	2050	C	TU-4	2	*cf. Nothocestrum latifolium*	Wood	7	0.49	2.3
176A	2050	C	TU-4	2	*cf. Nototrichium sandwicense*	Wood	48	4.96	23.5
176A	2050	C	TU-4	2	*cf. Psychotria* sp.	Wood	1	0.06	0.3
176A	2050	C	TU-4	2	*cf. Rauvolfia sandwicensis*	Wood	2	0.06	0.3
176A	2050	C	TU-4	2	*cf. Santalum* sp.	Wood	2	0.18	0.8
176A	2050	C	TU-4	2	*Sida cf. fallax*	Wood	29	1.85	8.8
176A	2050	C	TU-4	2	*cf. Styphelia tameiameiae*	Wood	1	0.19	0.9
176A	2050	C	TU-4	2	Unknown 1	Wood	16	1.29	6.1
176A	2050	C	TU-4	2	Not identified	Bark	7	0.33	1.6
176A	2050	C	TU-4	2	Not identified	*cf.* Tuber	1	0.05	0.2
176A	2050	C	TU-4	2	**TOTAL**	—	**228**	**21.13**	**100.1**
176B	2050	C	TU-4	2	*Aleurites moluccana*	Wood	1	0.04	0.2
176B	2050	C	TU-4	2	*Chamaesyce* spp.	Wood	31	1.96	9.7
176B	2050	C	TU-4	2	*Chenopodium oahuense*	Wood	11	0.91	4.5
176B	2050	C	TU-4	2	*Diospyros sandwicensis*	Wood	6	0.42	2.1
176B	2050	C	TU-4	2	*cf. Dodonaea viscosa*	Wood	5	0.19	0.9
176B	2050	C	TU-4	2	*cf. Metrosideros polymorpha*	Wood	1	0.07	0.3
176B	2050	C	TU-4	2	*cf. Myoporum sandwicense*	Wood	40	4.71	23.4
176B	2050	C	TU-4	2	*cf. Myrsine lanaiensis*	Wood	3	0.13	0.6
176B	2050	C	TU-4	2	*Nestegis sandwicensis*	Wood	2	0.36	1.8
176B	2050	C	TU-4	2	*cf. Nothocestrum latifolium*	Wood	2	0.10	0.5
176B	2050	C	TU-4	2	*cf. Nototrichium sandwicense*	Wood	48	5.55	27.5
176B	2050	C	TU-4	2	*cf. Osteomeles anthyllidifolia*	Wood	9	0.46	2.3
176B	2050	C	TU-4	2	*Perrottetia sandwicensis*	Wood	1	0.02	0.1
176B	2050	C	TU-4	2	*cf. Psychotria* sp.	Wood	3	0.52	2.6
176B	2050	C	TU-4	2	*cf. Rauvolfia sandwicensis*	Wood	1	0.04	0.2
176B	2050	C	TU-4	2	*cf. Santalum* sp.	Wood	5	0.33	1.6
176B	2050	C	TU-4	2	*Sida cf. fallax*	Wood	33	2.78	13.8
176B	2050	C	TU-4	2	Unknown 1	Wood	4	0.31	1.5
176B	2050	C	TU-4	2	Unknown 2	Wood	11	0.54	2.7
176B	2050	C	TU-4	2	Unknown 3	Wood	1	0.07	0.3
176B	2050	C	TU-4	2	Not identified	Bark	9	0.65	3.2

Lab Bag	Site	Feature	Unit	Layer Level	Taxa	Part	Count	Weight (g)	% Weight
176B	2050	C	TU-4	2	**TOTAL**		**227**	**20.16**	**99.8**
221	2061	E	TU-1	3	*Chamaesyce* spp.	Wood	44	4.50	90.4
221	2061	E	TU-1	3	*Chenopodium oahuense*	Wood	3	0.41	8.2
221	2061	E	TU-1	3	*Sida cf. fallax*	Wood	1	0.07	1.4
221	2061	E	TU-1	3	**TOTAL**		**48**	**4.98**	**100.0**
248	2065	A	TU-2	3	*cf. Bidens* sp.	Wood	1	0.03	0.2
248	2065	A	TU-2	3	*cf. Bobea* sp.	Wood	1	0.07	0.5
248	2065	A	TU-2	3	*Chamaesyce* spp.	Wood	15	1.11	8.5
248	2065	A	TU-2	3	*Chenopodium oahuense*	Wood	39	4.57	34.9
248	2065	A	TU-2	3	*cf. Metrosideros polymorpha*	Wood	3	0.26	2.0
248	2065	A	TU-2	3	*cf. Myoporum sandwicense*	Wood	17	2.14	16.3
248	2065	A	TU-2	3	*cf. Nototrichium sandwicense*	Wood	11	2.26	17.2
248	2065	A	TU-2	3	*Osteomeles anthyllidifolia*	Wood	12	1.15	8.8
248	2065	A	TU-2	3	*Sida cf. fallax*	Wood	17	1.25	9.5
248	2065	A	TU-2	3	Unknown 4	Wood	1	0.08	0.6
248	2065	A	TU-2	3	Not identified	Parenchyma	3	0.19	1.4
248	2065	A	TU-2	3	TOTAL		120	13.11	99.9
339	2073	A	TU-1	6	*cf. Bobea* sp.	Wood	1	0.04	2.9
339	2073	A	TU-1	6	*Chamaesyce* sp.	Wood	5	0.44	31.4
339	2073	A	TU-1	6	*Chenopodium oahuense*	Wood	3	0.38	27.1
339	2073	A	TU-1	6	*cf. Myoporum sandwicense*	Wood	1	0.11	7.9
339	2073	A	TU-1	6	*cf. Nothocestrum latifolium*	Wood	2	0.18	12.9
339	2073	A	TU-1	6	*Osteomeles anthyllidifolia*	Wood	4	0.25	17.9
339	2073	A	TU-1	6	TOTAL		16	1.40	100.1
349	2075	B	TU-1	I/1	*cf. Bidens* sp.	Wood	5	0.18	1.8
349	2075	B	TU-1	I/1	*cf. Bobea* sp.	Wood	5	0.15	1.5
349	2075	B	TU-1	I/1	*Chamaesyce* spp.	Wood	17	2.25	22.0
349	2075	B	TU-1	I/1	*Chenopodium oahuense*	Wood	2	0.18	1.8
349	2075	B	TU-1	I/1	*cf. Dodonaea viscosa*	Wood	16	3.46	33.8
349	2075	B	TU-1	I/1	*cf. Myoporum sandwicense*	Wood	4	0.10	1.0
349	2075	B	TU-1	I/1	*cf. Nothocestrum latifolium*	Wood	8	0.54	5.3
349	2075	B	TU-1	I/1	*Osteomeles anthyllidifolia*	Wood	7	0.60	5.9
349	2075	B	TU-1	I/1	*cf. Pittosporum* sp.	Wood	8	1.30	12.7
349	2075	B	TU-1	I/1	*cf. Rauvolfia sandwicensis*	Wood	1	0.08	0.8
349	2075	B	TU-1	I/1	*Sida cf. fallax*	Wood	5	0.61	6.0
349	2075	B	TU-1	I/1	Unknown 4	Wood	5	0.55	5.4
349	2075	B	TU-1	I/1	Unknown 5	Wood	3	0.22	2.1
349	2075	B	TU-1	I/1	**TOTAL**		**86**	**10.22**	**100.1**
361	2075	B	TU-1	I/4	*Chamaesyce* spp.	Wood	8	0.60	7.1
361	2075	B	TU-1	I/4	*Chenopodium oahuense*	Wood	7	0.33	3.9
361	2075	B	TU-1	I/4	*cf. Myoporum sandwicense*	Wood	21	2.08	24.8
361	2075	B	TU-1	I/4	*cf. Nototrichium sandwicense*	Wood	1	0.06	0.7
361	2075	B	TU-1	I/4	*Osteomeles anthyllidifolia*	Wood	7	1.04	12.4
361	2075	B	TU-1	I/4	*cf. Pittosporum* sp.	Wood	5	0.57	6.8

Lab Bag	Site	Feature	Unit	Layer Level	Taxa	Part	Count	Weight (g)	% Weight
361	2075	B	TU-1	I/4	*cf. Psychotria* sp.	Wood	4	0.25	3.0
361	2075	B	TU-1	I/4	*cf. Rauvolfia sandwicensis*	Wood	1	0.10	1.2
361	2075	B	TU-1	I/4	*Sida cf. fallax*	Wood	11	1.37	16.3
361	2075	B	TU-1	I/4	Unknown 4	Wood	18	1.57	18.7
361	2075	B	TU-1	I/4	Unknown 5	Wood	5	0.43	5.1
361	2075	B	TU-1	I/4	TOTAL		88	8.40	100.0

The total amount of invertebrate remains recovered from the twenty habitation sites excavated in Kēōkea totaled 92.9 g. By way of comparison, limited excavations at one permanent habitation enclosure situated near the coastline in Makena yielded 2,812.0 g (Cordero and Dega 2001). Only 17.6 g of terrestrial faunal remains were recovered from the same coastal site while a much more diverse and expanded faunal count was recovered from upland Kēōkea sites. These contrasts crystallize local consumption patterns.

Invertebrate remains were not recovered from all Kēōkea excavation sites. Shell midden was only recovered from the following sites (40% of the sites): Site 2047, Site 2030, Site 2050, Site 2059, Site 2065, Site 2073, Site 2076, and Site 2331. Of the recovered shells, *Cellana* sp. was the most common, with the total variability between invertebrate classes in the overall shell population being minimal. *Cellana* sp. and *Cellana sandwicensis* are opihi shells commonly found on basalt substrates at and below the zero tide mark (Kay 1979:46). This shell type belongs to the *Patellidae* family which commonly "live along exposed, rocky, surf-swept shorelines. . ." (Kay 1979:43).

Again the importance of the shell assemblage in the upland permanent habitation loci is greater when considering the dominant subsistence diet of local residents and/or the possible transport of coastal resources to upland settings. As is evidenced below, the local upland subsistence economy was indeed focused on land fauna and agriculture. The importation of coastal resources appears minimal in this sample of the upland archaeological record. However, the mere presence of coastal species intimates either an upland-coastal trade and exchange network or the limited exploitation of coastal resources by upland residents. Further data sets shed light on both these propositions.

BURIALS

A total of twelve known burial or possible burial sites have been documented on the Kēōkea parcel (MNI=13). Seven of the burial loci were documented during Inventory Survey (Brown *et al.* 1989) and five were documented during this Data Recovery project. Four of the sites (-2029, -2084, -2089, and -2097) were assessed as ‘possible’ burials, with human remains not having been confirmed through excavation. Of the other eight known burials, Site -2028 yielded two child phalanges associated with a dated cultural deposit (A.D. 1640–1890) and Site -2034 yielded a tooth and phalange dated by association with a cultural deposit to A.D. 1420 to 1660. Site -2050 and -2079 were associated with a traditional cultural layer (pre-A.D. 1778) while one burial (Site -2049) post-dated the traditional-period occupation layer [Site -2079 only yielded a single adult tooth however and thus, is not considered as a burial per se]. Of the remaining sites (Sites -2311, -2339, and -2032), no temporal information is available. Of the known burials, half (n=4; -2049, -2050, -2079, and -2032) were of adult age while one represented a child (Site -2028). No other information is available from the other burials as excavation work ceased immediately upon recognition that the remains were indeed human. Other salient information regarding these burials is presented in a separate Burial Treatment Plan (Dega 2004).

The burials are thought to represent several different time periods. Four burial loci (Site -2028, -2034, -2050, and -2079) were directly associated with traditional-period occupation layers. These burials are estimated to have been interred during pre-contact site occupation and were not necessarily associated with site abandonment. At these four sites, occupation continued for some duration after the burial had been interred. One site (-2049) contained the only secure burial identified during this project that post-dated the cultural deposit. This burial post-dated the site’s proto-historic layer and was estimated to be associated with post-contact times. Four other burials were not amenable to temporal evaluation and another four burials were only assessed as ‘possible’ burials and were not further investigated.

ARTIFACTS

Perhaps the most salient pattern of the artifact assemblage was the overall poverty of artifacts recovered during Data Recovery testing. In locations with well-constructed house sites, one would have expected a greater quantity of artifacts recovered from such contexts. However, such was not the case. This pattern is repetitive for both Waiohuli and Kēōkea. The reasons for the poverty of artifacts may be multi-fold. First, sampling issues may be a prime factor for these results. Testing was extremely limited at each site and was focused moreso on obtaining dates for site occupation (see Cordy 2002). Test units were exclusively placed at redundant locations against interior walls of habitation sites. Second, the lack of artifacts may suggest that residents utilized a quiver of perishable artiacts that may have not preserved through time. Organic tools and other woody remanants are typically not well preserved in the upland archaeological record. Finally, there may be an argument made, although less supported, that occupation of these sites was not as intensive over the *longue duree* as expected. There may well have been several limited occupations and re-occupations of these sites through time. Also, that this area could be considered a periphery to the "core" political and socio-economic seats of Wailuku, Lahaina, and Hana may allow for interpreting the poverty of artifacts as a function of limited occupation of the sites through time. Additional testing at these sites or adjacent Kula sites may allow for more fully addressing the many questions surrounding artifact ubiquity.

Within the present sample, traditional artifacts dominated site artifact assemblages. Surprisingly, no historic-period artifacts were recovered from any excavated site. As shown by radiocarbon dating (see below), some of these sites were occupied into historic times, yet a reliance on traditional tools and activities continued unabated into the historic period. Only Site -2059 contained debris of modern times, two sherd fragments recovered from the surface of the site.

A total 197 traditional artifacts were recovered during the Kēōkea Project and analyzed by Dr. Robert Spear of SCS. Spear notes that the artifacts were derived from five raw material types: basalt, volcanic glass, coral, marine shell, and ochre (Tables 5 and 6). Of the 197 traditional artifacts, 138 (70.0%) were composed of basalt. Seven artifact types were identified within the 138 basalt artifacts recovered. These include debitage (n=120), flakes with polish (n=7), adze blanks (n=4), cores (n=2), edge altered flakes (n=2), fragments of polished stone (n=2), and a polishing stone. Of the remaining 59 artifacts, 48 were composed of volcanic glass, including 46 pieces of debitage and 2 cores. Seven samples of ochre were recovered, as were 3 coral abraders and 1 coral manuport. Red ocre, or hematite, is a reddish volcanic material that results from weathering. Archaeological evidence (Kirch 1985; Davis 1990) and ethnohistorical accounts (Buck 1964) of its uses by Native Hawaiians include tattooing, dying bark cloth (*kapa*), painting and printing colored patterns on household items and clothing (bark cloth), and for use as fishing sinkers. The three marine shell artifacts recovered consisted of 1 octopus lure, 1 shell scraper, and 1 piece of modified shell.

Spear concludes that due to the sampling methods employed during this project, no useful discussion relating to recovered artifacts and site activities can be presented for any specific site with any degree of precision. Taken as a whole, the artifact population indicates production and processing activities. The three shell artifacts document access to marine resources, either

Table 5: Graph Showing the Amount of Different Lithic Artifacts Collected.

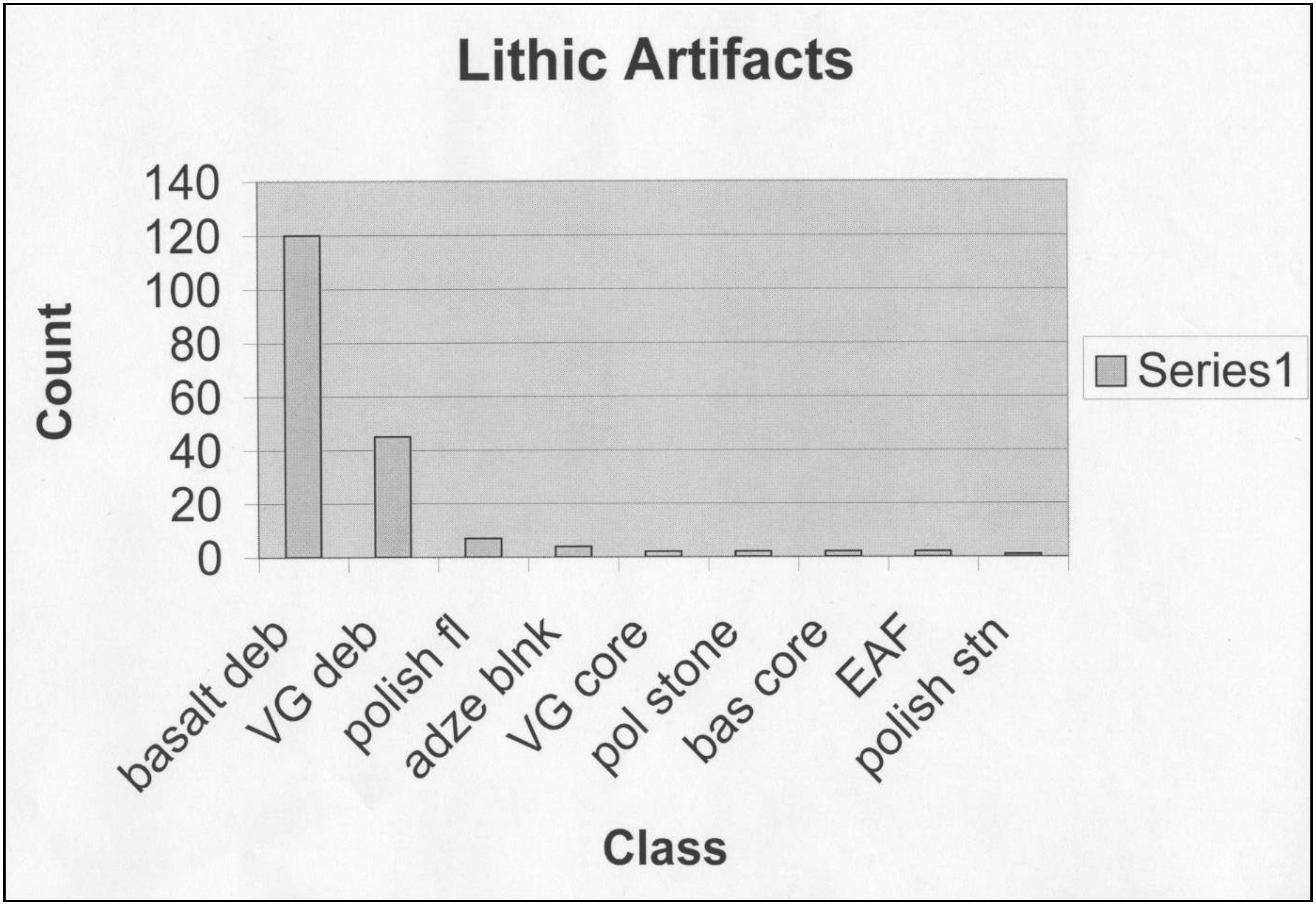
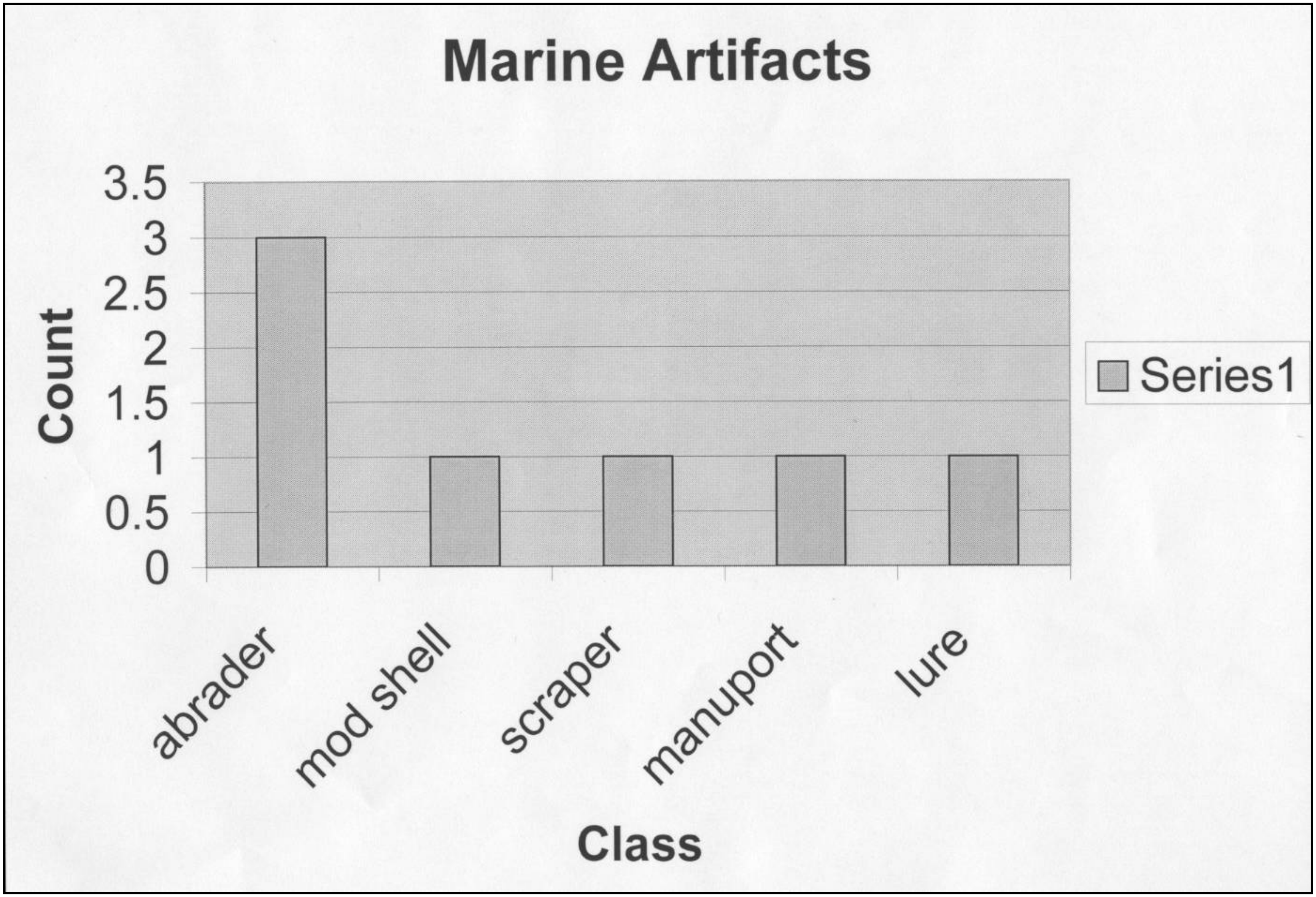


Table 6: Graph Showing Distribution of Marine Artifacts.



directly or indirectly. Fifteen artifacts types were categorized out of the entire collection. The most artifact types identified at any site was seven, with 72 percent of the sites having only three or fewer types.

Traditional artifacts found during testing at Kēōkea were primarily composed of basalt and volcanic glass (i.e., adze blanks, polishing stones) and debitage that may have been utilized in cutting or scraping functions (for food preparation, harvesting). Supplementing the dominant stone tool assemblage were a few coral abraders, a modified marine shell (scraper), and non-tool artifacts such as *ocre* (used as a coloring agent) and modified marine shell. The database shows an overwhelming dependence on terrestrial resource tool manufacture.

TAXA CHARCOAL IDENTIFICATION

This section of the study presents the results of taxa identification in charcoal samples from Kēōkea, Maui. The identification of charcoal found in archaeological contexts can provide insight into the vegetation of the surrounding area at the time of a fire event. This information can then be used to interpret the environment as well as possible cultural uses of specific plants. A study of multiple charcoal samples may reveal changes in vegetation or firewood use through time. This study sought to extract the environmental and possibly the cultural history of the project area from the charcoal samples.

METHODS

Thirteen charcoal samples were examined for taxa identification. The freshly fractured transverse and tangential facets of each charcoal piece were viewed under magnification of a dissecting microscope. Taxa identifications were made by comparing the anatomical characteristics seen during examination against those of known woods in the Pacific Islands Wood Collection at the Department of Botany, University of Hawai`i, and published descriptions. All charcoal samples were analyzed by Gail Murakami of the International Archaeological Research Institute, Inc. (IARII) based in Honolulu, O`ahu.

Twenty-six woody taxa were subject to identification in the samples from the Kēōkea project on Maui. The identification performed for this project did not lead to the assessment of all recovered charcoal samples but rather, an approximately 20 percent sample of all recovered wood charcoal. In addition, *Aleurites moluccana* (*kukui*) nutshell was identified. Parenchyma tissue, bark and fern stems were also recognized but not identified further to taxa. Five woody taxa remain unidentified. The identified charcoal taxa, listed in Table 1, are described in the review that follows. The summary of results is presented in Table 2 and the occurrence of taxa among the samples analyzed is shown in Table 7. The notation *cf.* in Tables 2 and 3 indicates that the charcoal resembles the taxon specified but its exact identity is uncertain at this time.

REVIEW OF TAXA

The following section provides an overview of the types of taxa identified in the Kēōkea sample and provides background to their geographic location, morphology, and potential uses.

Agavaceae
Cordyline fruticosa (L.) A. Chev. (*Kī*, ti)

This Polynesian introduction is a shrub cultivated in the mesic valleys and forests of all the main Hawaiian Islands except Kaho`olawe. The leaves, arranged in a close spiral at the tips of the stems, were used for house thatch, food wrappers, raincoats, and sandals (Wagner *et al*. 1990:1348–1349). The swollen fleshy roots were baked for food or used to produce an alcoholic beverage (Neal 1965:203). Charred stem of *kī*, identified only in Lab Bag 137 (Feature A, TU-2, Level 5) from Site 8, constitutes 1.6 percent of the sorted sample weight.

Amaranthaceae
Nototrichium sandwicense (A. Gray) Hillebr. (*Kulu'ī*)

This endemic shrub or small tree, 1 to 7 m tall, has been found on all of the main Hawaiian Islands in dry forests, exposed ridges, and lava fields at 0 to 750 m elevations (Wagner *et al.* 1990:194). Wood charcoal resembling *kulu'ī*, found in seven samples from five sites, ranges in percent sorted weight from 0.7 to 27.5 and averages 15.3 percent.

Apocynaceae
Rauvolfia sandwicensis A. DC (*Hao*)

This endemic species is a tree or shrub, 3.0 m to 10.0 m tall, found primarily in mesic forests but also in dry forest or dry shrubland and on lava flows, on all the main Hawaiian islands except Kaho`olawe at 100 to 800 m elevations (Wagner *et al.* 1990: 220). Wood charcoal resembling *hao* was seen in six samples from three sites. The percent sorted sample weight ranges from 0.2 to 3.8 and averages 1.6 percent.

Asteraceae
Bidens sp. (*Ko'oko'olau*)

Twenty native and three naturalized species of this genus occur in the Hawaiian Islands. The native species are perennials that become woody shrubs up to 4.0 m tall (Wagner *et al*. 1990:270–282). In the past, the leaves of some species, brewed as a tea, were used medicinally (Neal 1965:717). Wood charcoal resembling *Bidens* constitutes 0.2 percent of the sorted sample

Table 7: Occurrence of Taxa among Selected Charcoal Samples from Sites -2048, -2030, and -2050 in percent weight.

Site:	2048		2030		2050			
Feature:	B	A	A		A		C	
Unit:	TU-1	TU-1	TU-1		TU-2		TU-4	
Layer/level:	I/3	I/4	2	5	2	5	2	
Taxa	66	69	71	92	123	137	176A	176B
Acacia koa	—	—	—	—	—	—	0.1	—
Aleurites moluccana nutshell	—	—	—	—	—	—	7.8	—
cf. Aleurites moluccana	—	—	—	—	—	—	—	0.2
cf. Antidesma pulvinatum	—	—	—	—	—	—	2.2	—
cf. Bidens sp.	—	—	—	—	—	—	—	—
cf. Bobea sp.	—	—	—	—	—	—	0.3	—
cf. Canthium odoratum	—	—	—	—	—	—	2.9	—
Chamaesyce spp.	84.1	100.0	58.3	23.1	100.0	6.1	15.2	9.7
Chenopodium oahuense	—	—	6.2	37.5	—	7.3	10.2	4.5
Cordyline fruticosa	—	—	—	—	—	1.6	—	—
Diospyros sandwicensis	—	—	—	5.7	—	10.7	4.7	2.1
cf. Dodonaea viscosa	8.7	—	—	—	—	20.4	4.4	0.9
Lagenaria siceraria rind	—	—	—	—	—	—	0.6	—
cf. Metrosideros polymorpha	—	—	—	—	—	—	1.1	0.3
cf. *Myoporum sandwicense*	—	—	10.8	—	—	—	5.4	23.4
cf. *Myrsine lanaiensis*	—	—	—	—	—	—	—	0.6
Nestegis sandwicensis	0.3	—	0.9	—	—	1.9	0.3	1.8
cf. Nothocestrum latifolium	—	—	—	1.2	—	0.1	2.3	0.5
Nototrichium sandwicensis	2.8	—	11.0	—	—	24.2	23.5	27.5
cf. Osteomeles anthyllidifolia	—	—	—	19.8	—	19.4	—	2.3
cf. Perrottetia sandwicensis	—	—	3.1	—	—	—	—	0.1
cf. Pittosporum sp.	—	—	—	—	—	0.9	—	—
cf. Psychotria sp.	3.3	—	—	—	—	0.6	0.3	2.6
cf. Rauvolfia sandwicensis	—	—	—	3.6	—	3.8	0.3	0.2
cf. Santalum sp.	—	—	—	—	—	—	0.8	1.6
Sida cf. *fallax*	0.8	—	7.1	4.8	—	1.5	8.8	13.8
cf. Styphelia tameiameiae	—	—	—	—	—	—	0.9	—
Unknown 1	—	—	—	—	—	0.9	6.1	1.5
Unknown 2	—	—	—	—	—	—	—	2.7
Unknown 3	—	—	—	—	—	—	—	0.3
Unknown 4	—	—	—	—	—	—	—	—
Unknown 5	—	—	—	—	—	—	—	—
Bark	—	—	2.6	—	—	0.6	1.6	3.2
Parenchyma	—	—	—	—	—	—	—	—
Pteridophyta (fern)	—	—	—	4.2	—	—	—	—
cf. Tuber	—	—	—	—	—	—	0.2	—

Site:	**2061**	**2065**	**2073**	**2075**	
Feature:	**E**	**A**	**A**	**B**	
Unit:	**TU-1**	**TU-2**	**TU-1**	**TU-1**	
Layer/level:	**3**	**3**	**6**	**I/1**	**I/4**
Taxa Lab Bag #:	**221**	**248**	**339**	**349**	**361**
Acacia koa	—	—	—	—	—
Aleurites moluccana nutshell	—	—	—	—	—
cf. *Aleurites moluccana*	—	—	—	—	—
cf. *Antidesma pulvinatum*	—	—	—	—	—
cf. *Bidens* sp.	—	0.2	—	1.8	—
cf. *Bobea* sp.	—	0.5	2.9	1.5	—
cf. *Canthium odoratum*	—	—	—	—	—
Chamaesyce spp.	90.4	8.5	31.4	22.0	7.1
Chenopodium oahuense	8.2	34.9	27.1	1.8	3.9
Cordyline fruticosa	—	—	—	—	—
Diospyros sandwicensis	—	—	—	—	—
cf. Dodonaea viscosa	—	—	—	33.8	—
Lagenaria siceraria rind	—	—	—	—	—
cf. Metrosideros polymorpha	—	2.0	—	—	—
cf. Myoporum sandwicense	—	16.3	7.9	1.0	24.8
cf. Myrsine lanaiensis	—	—	—	—	—
Nestegis sandwicensis	—	—	—	—	—
cf. Nothocestrum latifolium	—	—	12.9	5.3	—
Nototrichium sandwicensis	—	17.2	—	—	0.7
cf. Osteomeles anthyllidifolia	—	8.8	17.9	5.9	12.4
cf. Perrottetia sandwicensis	—	—	—	—	—
cf. Pittosporum sp.	—	—	—	12.7	6.8
cf. Psychotria sp.	—	—	—	—	3.0
cf. Rauvolfia sandwicensis	—	—	—	0.8	1.2
cf. Santalum sp.	—	—	—	—	—
Sida cf. fallax	1.4	9.5	—	6.0	16.3
cf. Styphelia tameiameiae	—	—	—	—	—
Unknown 1	—	—	—	—	—
Unknown 2	—	—	—	—	—
Unknown 3	—	—	—	—	—
Unknown 4	—	0.6	—	5.4	18.7
Unknown 5	—	—	—	2.1	5.1
Bark	—	—	—	—	—
Parenchyma	—	1.4	—	—	—
Pteridophyta (fern)	—	—	—	—	—
cf. Tuber	—	—	—	—	—

weight from Site -31 (Feature A, TU-2, Level 3) and 1.8 percent of the sample from Site 50 (Feature B, TU-1, Layer I, Level 1).

Celastraceae

Perrottetia sandwicensis A. Gray (*Olomea*)

This endemic species ranges in habit from a shrub to small tree up to 8 m tall and is common in wet forests at 300.0 m to 1,250.0 m elevations on all of the main islands except Ni`ihau and Kaho`olawe (Wagner *et al*. 1990:531). The wood was used to make fire by rubbing against the softer *hau* (*Hibiscus tiliaceus*) wood (Malo 1951:21; Rock 1974:269). Wood charcoal resembling *olomea* constitutes 3.1 percent sorted weight of the sample from Site 7 (Feature A, TU-1, Level 2) and 0.1 percent of the sample from Site 8 (Feature C, TU-4, Level 2).

Chenopodiaceae

Chenopodium oahuense (Meyen) Aellen (*‘Āheahea*, *‘āweoweo*)

This endemic species is usually a shrub in the coastal lowlands but may become arborescent at higher elevations (Hillebrand 1888:380). Its known distribution in the main Hawaiian Islands includes coastal, dry forest, and subalpine shrubland at zero to 2,520.0 m elevation (Wagner *et al*. 1990:538). The early Hawaiian settlers may have cooked the leaves and eaten them as greens (Hillebrand 1888:380; Malo 1951:23) but the soft wood was probably discarded. *‘Āheahea* wood charcoal was identified in 10 samples from six sites. The percent sorted sample weight ranges from 1.8 to 37.5 and averages 14.2.

Cucurbitaceae

Lagenaria siceraria (Molina) Standl. (*Ipu*)

The early settlers of the Hawaiian Islands brought with them the fruit of this annual spreading vine, a native of tropical Asia or Africa (Neal 1965:810). The smaller gourds were once used as receptacles for food or water and rattles for dances while the larger gourds were made into drums or served as places to hold *kapa* bark cloth or other articles (Pukui and Elbert 1986:103). Pieces of *ipu* rind constitute 0.6 percent sorted weight of the sample from Feature C, Test Unit 4, Level 2 of Site 8.

Ebenaceae

Diospyros sandwicensis (A. DC) Fosb. (*Lama*)

This small endemic tree, 2 to 10 m tall, is found in wet or dry regions of all the main Hawaiian Islands (Rock 1913:395; Wagner *et al.* 1990:587). Its hard wood was once used for houses, enclosures for certain idols (Malo 1951:21), and chisel handles (Buck 1957:38). Hillebrand (1888:275) reported that the small fruits were eaten by the natives. *Lama* wood charcoal, identified in the four samples from Sites 7 and 8, ranges in percent sorted sample weight from 2.1 to 10.7 with an average of 5.8.

<u>Epacridaceae</u>

Styphelia tameiameiae (Cham. & Schlechtend.) F.v. Muell. (*Pūkiawe*, *kāwa‘u*)

The indigenous *pukiawe* is most often seen as a spreading shrub but may be tree-like in upper elevations or dwarfed and trailing in bogs. It has been recorded from all of the main Hawaiian Islands except Ni`ihau and Kaho`olawe at 15.0 m to 3,230.0 m elevations (Wagner *et al*. 1990:590–591). On Maui this species is known as *kāwa‘u*. In ancient times, smoke from the burning wood was used to cleanse *kapu* and enable a high-ranking chief to mingle among the common people without harm to them or himself (Neal 1965:663-664). The wood was also used to cremate the bodies of outlaws (Malo 1951:20). Wood charcoal resembling *kāwa‘u*, found in the sample from Feature C of Site 8, constitutes 0.9 percent of the sorted sample weight.

<u>Euphorbiaceae</u>

Aleurites moluccana (L.) Willd. (*Kukui*)

Once cultivated, this Polynesian introduction has escaped into the native forest where the pale foliage of the trees (Wagner *et al*. 1990:598) can be seen in abundance in moist gulches and valleys. Dyes were once extracted from the bark and roots (Buck 1957:187), the oily kernel was burned for light (Buck 1957:107) or eaten as a relish after baking (Buck 1957:48), and net floats and dugout canoes were made from the soft wood (Buck 1957:297). Charred *kukui* nutshells and charcoal resembling *kukui* wood were found only in one of the two samples from Feature C of Site 8. The percent sorted weight is 7.8 g for the nutshell and 0.2 g for the wood charcoal.

Antidesma pulvinatum Hillebr. (*Hame*)

These endemic trees are 2.0 m to 12.0 m tall and are occasional in dry to mesic forests on O`ahu, Moloka`i, Maui, and Hawai`i Island. This species is found in elevations ranging from 30.0 to 1,200.0 m with the extremes in elevation occurring on Hawai`i Island. The wood was once used as an anvil for beating and preparing *olonā* (*Touchardia*) fibers and the fruit yielded a red dye (Wagner *et al*. 1990: 601). Wood charcoal resembling *hame*, found in one of the two samples from Feature C of Site 8, constitutes 2.2 percent of the sorted sample weight.

Chamaecyse spp. (*‘Akoko*)

The distribution of the 15 endemic shrubs and small trees in this genus range from coastal environments to upper forest zones on the main Hawaiian Islands (Wagner *et al*. 1990:602-617; Rock 1913:243-262) and was valued for firewood by the Hawaiians (Hillebrand 1888:396). The milky sap was once considered a possible source for rubber (Rock 1913:261). *'Akoko* wood charcoal was identified in all 13 samples analyzed. The percent sorted sample weight ranges from 6.1 to 100 with an average of 42.8.

<u>Fabaceae</u>
Acacia koa A. Gray (*Koa*)

One of the largest endemic trees in Hawai`i, *koa* may attain 35 m in height at higher elevations (Wagner *et al*. 1990:641-642) and not branch until 12 m or more above the ground (Rock 1913:175). This straight trunk was especially useful for canoes as well as paddles and surfboards (Malo 1951:126, 223). *Koa* trees, which are also found at lower elevations in the dry regions, have a distribution range of 60 to 2,060 m on all the main islands except Ni`ihau and Kaho`olawe (Wagner *et al*. 1990:641). *Koa* wood charcoal constitutes 0.1 percent sorted weight of Lab Bag 176A from Feature C of Site 8.

<u>Malvaceae</u>
Sida fallax Walp. (*'Ilima*)

This indigenous shrub was planted in the past as it is today near houses to provide flowers for *lei* making (Neal 1965:553). It has been found growing naturally along coasts, on open lava fields, in dry to mesic forests on all of the main Hawaiian Islands (Wagner *et al*. 1990:898). The entire plant had many uses for the native Hawaiians. The erect stems were tied to the frame of the sleeping house upon which *pili* grass (*Heteropogon contortus*) was lashed. Whole *'ilima* bushes tied together were also used to secure mounds of taro plantings in swampy areas. The prostrate coastal *'ilima* was used as floor coverings under mats (Handy and Handy 1972:228). The roots and flowers were used medicinally (Neal 1965:553). Wood charcoal resembling *'ilima,* found in 10 samples from six sites, ranges in percent sorted sample weight from 0.8 to 16.3 with an average of 7.0.

<u>Myoporaceae</u>
Myoporum sandwicense A. Gray (*Naio*)

The habit of this indigenous tree ranges from a shrub 1 m tall in coastal areas to a 15.0 m tall tree at higher elevation. Its elevational distribution has been documented as 0 to 2,380 m on all the main Hawaiian Islands except Kaho`olawe (Wagner *et al*. 1990:928–929). The fragrant wood was once used by Hawaiians for house posts (Buck 1957:83) and was harvested during the sandalwood trade with China when the supply of native sandalwood became low (Rock 1974:429). Wood charcoal resembling *naio* was found in seven samples from five sites. The percent sorted sample weight ranges from 1.0 g to 24.8 g with an average of 12.8 g.

Myrsinaceae

Myrsine lanaiensis Hillebr. (*Kōlea*)

These endemic small trees stand 3.0 m to 6.0 m tall and inhabit the dry forest to occasionally mesic forest with a range of 300.0 m to 1,000.0 m in elevation on all the main islands except Ni`ihau and Kaho`olawe (Wagner *et al*. 1990:941–942). Wood charcoal closely resembling *kōlea* constitutes 0.6 percent sorted weight in one of the two samples from Feature C of Site 8.

Myrtaceae

Metrosideros polymorpha Gaud. (*‘Ōhi‘a lehua*)

This endemic species ranges in habit from prostrate shrubs to tall trees and in distribution from sea level to 2,200.0 m elevation in many ecological situations on all of the main Hawaiian Islands (Wagner *et al*. 1990:967). The hard wood was once used for making spears and mallets, idols, posts and rafters for houses, and enclosures around temples (Buck 1957:87; Malo 1951:20; Neal 1965:638). Wood charcoal resembling *‘ōhi‘a lehua*, found in three samples from two sites, ranges in percent sorted sample weight from 0.3 g to 2.0 g with an average of 1.1 g.

Oleaceae

Nestegis sandwicensis (A.Gray) Degener, I. Degener & L. Johnson (*Olopua*)

This endemic tree which may be up to 25.0 m tall is found scattered to locally common in dry to mesic forests at 30.0 m to 1,300.0 m elevation on all the main islands except Ni`ihau and Kaho`olawe (Wagner *et al*. 1990:992). In ancient times, the wood was made into adze handles, spears, and digging sticks (Neal 1965:677). *Olopua* wood burns with a hot flame even when green and may have been used as kindling (Malo 1951:25). *Olopua* wood charcoal, found five samples from three sites, ranges in percent sorted sample weight from 0.3 g to 1.9 g with an average of 1.0 g.

Pittosporaceae

Pittosporum sp. (*H✡‘awa*)

There are four endemic species of this genus found on the island of Maui. Two species, *Pittosporum argentifolium* and *P. terminalioides*, are trees found in the dry to mesic forests. *P. confertiflorum* occurs in dry to mesic forests and *P. glabrum* is found in mesic to wet environments (Wagner *et al*. 1990:1039–1043, 1047). Wood charcoal resembling *hō‘awa* was found in three samples from two sites. The percent sorted sample weight ranges from 0.9 g to 12.7 g with an average of 6.8 g.

Pteridophyta

Several genera of native ferns form large erect stems (caudex). The inner portion of the caudex is composed of a starchy pith that was eaten after cooking by humans or eaten raw by pigs. The fine golden hairs of *Cibotium* (*hapu'u*) were used as a dressing for wounds and to embalm the dead (Neal 1965:10). Charcoal resembling a fern stem was seen in Feature A of Site 7 and constitutes 4.2 percent of the sorted sample weight.

Rosaceae

Osteomeles anthyllidifolia Lindl. (*'Ūlei*)

This indigenous plant can often be found sprawling among the rocks along the coasts but may become an erect shrub up to 3.0 m tall in other environments. *Osteomeles* is found on all the main islands except Ni`ihau and Kaho`olawe and ranges in distribution from sea level to 2,300.0 m in elevation (Wagner *et al*. 1990:1104–1105). In the past, the hard wood was used to make digging sticks (*'ō'ō*), fishing spears, carrying poles (*'auamo*), and a musical bow (*'ukeke*) (Buck 1957:12, 357, 14, 388). The flexible smaller branches were bent into hoops for fishnets (Neal 1965:387). Wood charcoal resembling *'ūlei* was found in seven samples from five sites. The percent sorted sample weight ranges from 2.3 g to 19.8 g and averages 12.4 percent.

Rubiaceae

Bobea sp. (*'Ahakea*)

This endemic tree that may be up to 10.0 m tall occurs in dry to occasionally mesic forest at 250.0 m to 580.0 m elevation in the Puna and South Kona districts of Hawai`i and on Maui (Wagner *et al*. 1990:1118). The yellow wood was made into *poi* boards, paddles, and rims on canoes (Malo 1951:20). Wood charcoal resembling *'ahakea,* found in four samples from four sites, ranges in percent sorted weight from 0.3 g to 2.9 g with an average of 1.3 g.

Canthium odoratum (G. Forster) Seem. (*Alahe'e*)

This indigenous shrub or small tree is usually 3.0 m to 6.0 m tall but may be up to 15.0 m. It has been found in dry shrublands and dry to mesic forests at 10.0 to 1,160.0 meter elevation on all of the main islands except Ni`ihau and Kaho`olawe (Wagner *et al*. 1990:1119). Its hard wood was once used for making *'ō'ō* digging sticks and its leaves made a black dye (Handy and Handy 1972:117; Pukui and Elbert 1986:17; Rock 1974:437). Wood charcoal resembling *alahe'e* constitutes 2.9 percent sorted weight of one of the two samples from Feature C of Site 8.

Psychotria sp. (*Kōpiko*)

This large genus is distributed over tropical regions of both the New and Old Worlds. The 11 species of *Psychotria* in Hawai`i are small to medium-sized endemic trees that are found in the mesic to wet forests. Two species, *P. hawaiiensis* (*kōpiko ʻula*) and *P. mauiensis* (*ʻōpiko*), are known from Hawai`i. These species range from shrubs to trees up to 20.0 m tall and occur in mesic to wet and sometimes dry to mesic forests (Wagner *et al*. 1990:1160–1170). The wood was previously used as firewood and to make *kapa* logs (Malo 1951:21). Wood charcoal resembling *kōpiko* was found in five samples from three sites. The percent sorted sample weight ranges from 0.3 g to 3.3 g and averages 2.4 percent.

<u>Santalaceae</u>

Santalum sp. (*ʻIliahi*, sandalwood)

In a recent treatment of *Santalum* four species endemic to Hawai`i are recognized. Various species of these trees or shrubs can be found from sea level up to alpine shrubland at 2700 m elevation. The fragrant wood was exported from 1791 to 1840, by which time the forests were depleted (Wagner *et al*. 1990:1222). Earlier the powdered wood was used to scent *kapa* cloth (Buck 1957:209). Wood charcoal resembling *ʻiliahi*, found in the two samples from Feature C of Site 8, constitutes 0.8 g and 1.6 percent sorted sample weight.

<u>Sapindaceae</u>

Dodonaea viscosa Jacq. (*ʻAʻaliʻi*)

These indigenous shrubs or small trees are 2.0 m to 8.0 m tall and range in distribution from coastal dunes to dry, mesic, and wet forest, at 3.0 m to 2,350.0 m elevations (Wagner *et al*. 1990:1227–1228). The red papery fruit capsule clusters and leaves of some varieties were made into *lei* (Pukui and Elbert 1986:3). The trunks were once used for house posts (Buck 1974:279). Wood charcoal resembling *ʻaʻali`i* was found in five samples from three sites. The percent sorted sample weight ranges from 0.9 g to 33.8 g and averages 13.6 g.

<u>Solanaceae</u>

Nothocestrum latifolium A. Gray (*ʻAiea*)

This endemic small tree has been recorded as up to 10.0 m in height and to occur in dry to mesic forests at 460.0 m to 1,530.0 m elevations on Kaua`i, O`ahu, Moloka`i, Lāna`i and Maui (Wagner *et al*. 1990:1263). The soft wood was used for canoes (Malo 1951:21), fire making and the slender branches for thatching sticks (Pukui & Elbert 1986:10). Wood charcoal resembling *`aiea* was found in six samples from four sites. The percent sorted sample weight ranges from 0.1 g to 12.9 g and averages 3.7 g.

DISCUSSION

Taxa identified in the 13 samples analyzed include seven native shrubs, 14 native trees, three Polynesian introductions, and one fern. Also in the samples is a probable native shrub. The native shrubs identified are *ʻakoko* (*Chamaesyce*), *ʻāheahea* (*Chenopodium oahuense*), *ʻaʻaliʻi* (*Dodonaea viscosa*), *kuluʻī* (*Nototrichium* sp.), *ʻūlei* (*Osteomeles anthyllidifolia*), *ʻiliahi* (*Santalum* sp.), *ʻilima (Sida fallax)*, and *pūkiawe* (*Styphelia tameiameiae*). The *Bidens* shrub, identified only at the genus level, probably is the native *koʻokoʻolau* since the historically introduced species of the same genera tend to be herbaceus and not produce much wood. Native trees in the sample are *koa* (*Acacia koa*), *hame* (*Antidesma pulvinatum*), *ʻahakea* (*Bobea*), *alaheʻe* (*Canthium odoratum*), *lama* (*Diospyros sandwicensis*), *naio* (*Myoporum sandwicense*), *kōlea* (*Myrsine lanaiensis*), *ʻōhiʻa lehua* (*Metrosideros polymorpha*), *olopua* (*Nestegis sandwicensis*), *olomea* (*Perrottetia sandwicensis*), *hōʻawa* (*Pittosporum* sp.), *kōpiko* (*Psychotria* sp.), *ʻaiea* (*Nothocestrum latifolium*), and *hao* (*Rauvolfia sandwicensis*). The Polynesian introductions identified in this report are *kukui* (*Aleurites moluccana*), *kī* (*Cordyline fruticosa*), and *ipu* (*Lagenaria siceraria*).

This assemblage and the lack of historic introductions suggest that the samples date to a time when these native species were prevalent and when invasive historic introductions such as *koa haole* (*Leucaena leucocephala*) or *kiawe* (*Prosopis pallida*) were absent or rare. Taxa found in higher frequencies among the samples, *ʻakoko*, *ʻilima* and *āheahea*, further suggest that they may have grown in a lowland dry shrubland community (see Wagner *et al.* 1990: 71–72). Taxa identified in the samples and known from lowland plant communities include shrubs: *ʻakoko*, *ʻūlei*, *ʻāheahea*, *ʻilima*, *ʻaʻaliʻi*, *pūkiawe* and *ʻiliahi*, and trees: *naio*, *ʻaiea*, *alaheʻe*, *hao* and *lama*.

The frequency of shrubs in the samples may be indicative of their use as kindling as well as their abundance in the environment. However, the woods laid on top of the kindling may have been reduced to ash and thus, are not well represented in the charcoal assemblage. Woods of higher density such as *lama*, *naio*, and *olopua*, may have provided a longer burning fire. The trees, like the shrubs, identified in the charcoal samples are also known from lowland dry communities but when these taxa are predominant in the vegetation, the community may be more precisely designated as lowland dry forests (see Wagner *et al*. 1990:72–75). The native lowland dry forests are the most diverse of native communities, containing a variety of shrubs, trees, lianas, and ferns.

The Polynesian introductions identified in this study had uses in the daily lives of the human inhabitants. It can be imagined that an *ipu* container, after long use, finally contributed to the fire. In a similar fashion, the Polynesian introductions *kī* and *kukui* and the native *koa* may have ended up in the fire after other uses. It is likely that the area around the fire may have been an area of various human activities or at least a repository of refuse from those activities.

The presence of *ipu* in the charcoal samples also suggests cultivation in the project area. The single possible tuber identification may indicate sweet potato cultivation as well as directly the cooking and eating of the tuber. *ʻĀheahea*, identified in 10 of the 13 samples analyzed may have been allowed to grow in fallowed fields or other disturbed areas to provide edible greens.

This study of 13 samples suggests that at the time the fires were built, the landscape was covered with a dryland vegetation that probably consisted of abundant shrubs with scattered trees. A number of the trees found in the samples may have been collected near dryland forests, probably during travels to and from upper elevation resources. The high diversity of these vegetation types is reflected in the assemblage, although single samples of higher taxa count may be the cumulative result of multiple fire events. Refuse from other human activities also adds to the diversity from the native vegetation seen in these samples. Although some displacement would be expected, cultivation of crops on the scale that may have existed during the time represented by these samples probably did little to alter the diversity of the natural environment and certainly added to the quality of life of the human inhabitants.

RADIOCARBON DATING

A large suite of 44 charcoal samples were processed for dating the excavated sites in Kēōkea. Several patterns in the dates are evident, with more patterns in site chronology being elucidated below when the research questions are addressed. First, the dates run across a long timeline for use of the Kēōkea landscape. The earliest date is A.D. 560 to 670 (pre-dating a habitation site) while later dates are present from the late 1700s-early 1800s (habitation and agriculture). Second, most of the dates form two clusters, in the A.D. 1400 to 1600 range and the A.D. 1700 to 1800 range, although much continuous occupation of the earlier sites is suggested and this "line" is blurred at most sites. Outliers in this range are substantial, with six dates documenting habitation or "activity" prior to A.D. 1400 (or generally within the A.D.1100–1350 range). This is the first time that a substantial sample of dates provides data for earlier formalized occupation of the upland landscape. Formalization is intimated through the construction of numerous well-built enclosures, many forming clusters indicative of residential clusters.

Other patterns are worth noting. First, there is a significant occupation component occurring prior to the A.D. 1400s, this is more in line with Kolb's assessment and contradicts the Waiohuli data slightly. Early Kēōkea activity is shown by site construction (formidable construction of house sites) from the 13th century. Second, there is an increase in the number of constructed sites from the A.D. 15th century. This may be an indicator for the upland expansion model. Third, the greatest numbers of sites were dated from the 17th century into early historic times. This is the proposed "intensification of agriculture" phase. If the argument is meant to imply that agricultural intensification was required for an increase in local population numbers, this proposition may hold valid. Finally, three modern dates were gleaned from the samples and may represent bioturbation or some contamination. The dates firmly show that once the early historic period hits, there appears to an almost immediate phase of de-population for the Kēōkea area. This pattern has held true for Waiohuli and the intermediate area between Waiohuli and Kēōkea.

Overall, the dates show that the Kēōkea landscape has been utilized on a continuous basis to various degrees over a c. 700 year period (the very earliest date has been removed from this analysis unless it can be supported by other redundant dates). It is worth noting that some of the sites mentioned above may have been constructed, abandoned, and then re-used later in time. Formalization of occupation through the construction of numerous habitation structures, agricultural features, and ceremonial loci appeared to first peak in the A.D. 1400s and continued slowly through protohistoric times. There is no one radical spike in the compiled dates to suggest an immediate or sudden rush in occupation or use of the area; rather, the area appears to have been gradually settled through time. If there is a "spike" in occupation, it occurred later. There remains little empirical evidence that any of the sites were occupied post early 1800s. No historic materials were excavated in the sample. Kēōkea abandonment appears to have occurred from the late 1700s-early 1800s and been fairly rapid. This abandonment "spike" is the only real immediate occupational transformation of the landscape through the c. 700-year occupation period. This spike presumably represents a negative demographic shift in the population of the area, either due to the influx of disease dessimating the population or reasons related to a changing economy and/or political system of Maui itself.

SITE STRATIGRAPHY

The predominant characterization of the landscape is one of dissected alluvial and volcanic slopes, with Kēōkea elevations extending from 2,225 to 2,850 feet amsl. Soils within the project area, as noted by Brown *et al*. (1989:2) are dominated by the Pu`u Pa-Kula Pane association of well-drained and moderate to moderately fine-textured subsoils (silty clay and silt). Soils in the project area are primarily derived from from the decomposition of underlying lava (read: bedrock). Volcanic ash and the underlying lava compose the Kula and Hana volcanic series and date to 8,000 and 4,000 years old (Brown *et al*. 1989:2). Sediments, particulate matter transported and deposited from one location to another (Stein and Farrand 2001:6-7), are a minority in the project area due to the dearth of transport mechanisms such as perennial or even non-perennial streams. Aolian transport of sediment could be the major transfer mechanism for local sediments.

While soil science was not a focus of this project, several patterns in Kēōkea stratigraphy were evident that shed some light on the nature of cultural deposits and archaeological sites in the area. First, silt is the primary deposition unit on the parcel. Variations on identified silt strata only relate to hue differentials (dark brown to grey) and textual differences wherein some clay was present. Silty clay was the second most common depositional unit. Other variations in the soil consist of several volcanic ash pockets (silty sediment) and saprolitic infusions of underlying bedrock into lower strata. Saprolitic materials were only present in the lowest levels of units and where the soil met bedrock.

A second pattern is that soils of varying texture tended to overlay bedrock at depths ranging from very shallow (near surface) to, on average, only a meter or so below surface. The greatest depth achieved was in the 1.50+m range while bedrock was noticeable on the surface of the project area. In this sense, soil deposits are shallow and were most likely re-invented through time to increase their nutritional value for cultivation. By way of comparison, sandy and gley sediments occurring along coastlines often occur to 4.0 mbs. The limited nature of soil deposits is a function of the presence of bedrock and project area topography. No perennial streams that could disseminate or "pond" sediments through alluvial actions are present in Kēōkea. Thus, one great soil accumulating mechanism is absent in the project area. The lack of soil depth certainly aids in the ease of excavation yet also may restrict the depth of deposits. This depth restriction may be one reason that several features (food preparation areas; hearths) overlap in site stratigraphy and/or these features may have been re-used through time.

KĒŌKEA CULTIVATION: WATER RESOURCES

The silty soil identified across Kēōkea appears readily amenable to cultivation, as is simply interpreted through assessing the immense ground cover across the project area parcel and the rich nutrients in the soil. Concomitant with the cultivation potential of the soil are water resources. As stated above, there are no perennial drainages coursing through the project area. Upland water drainage on a non-perennial basis seems minimal as well, as observed through the various low, dissected swales of the project area, none showing intensive cuts indicative of fast-moving water erosion systems. The question during fieldwork remained: What was the available water resource to feed cultivation? The answer was found each morning: “mountain dew” or fog drip as it is often called.

In one of the few Hawaiian references found on the topic, Ziegler (2002:82) provides an illustration of fog drip from Lana`i Island.  Essentially, similar processes are at work in Kula.  Fog drip results from condensation of moist ocean air on night-cooled vegetation.  Ancient habitatants on Lana`i are known to have obtained potable water by shaking dew from dense plant cover into containers or by collecting that condensing on oiled tapa spread on the ground overnight. Importantly, Ziegler (2002:82) also states that “it has been estimated that in certain localities throughout the main islands this unmeasured fog drip may amount to at least twice the amount of rainfall officially recorded by gauges.”

Another reference for fog drip, from Blumenstock and Price (1994:108) illustrates that “mountain slopes and crests within the cloud belt are frequently exposed to contact with fog or cloud mists carried by the wind.” Experiments conducted on Lana`i Island showed that fog drip may contribute two-thirds as much water to vegetation and soil in an area as rainfall itself and more even when rainfall is light (*ibid.*). Blumenstock and Price (1994:108) state that “substantial quantities of ‘fog drip’ have been collected during periods when no measureable precipitation was recorded in rain gauges” at a site. Thus, the Kula area cloud belt seems to readily accomplish a natural irrigation function for cultivation endeavors. This may be one of the main reasons why cultivation was so successful in the region over time.

SITE ARCHITECTURE

According to the calculations of Brown *et al*. (1989:14), the built Keoke landscape was formalized primarily through enclosure architecture. In Kēōkea, 139 features or 65.88% of all features recorded during Inventory Survey were enclosures. The second most frequent class of formal types was overhangs (9.95%), followed by terraces (8.05%), walls (7.58%), and platforms (2.84%). The term “enclosure” may be slightly misleading, however, as enclosures related to habitation and those denoting garden planting areas were both present across the parcel.

Overall, site architecture was fairly homogenous, with the little variation relating to structural depth and more formalization through wall facing. Structures were built either on or incorporating portions of natural bedrock or were free-standing within the area’s shallow soil deposits. Testing revealed that most site architecture was based on or near the surface or in

Layers I or II of the soil profile. In some instances, site architecture directly correlated with a cultural deposit while in other cases, a sterile soil layer was present between architecture and underlying cultural deposits. One pattern seemed to be that cultural activity was present at some site loci prior to being formalized through architecture at a later date. Such is certainly the case at several sites with deposits dating to pre-A.D. 1200. Of interest was that site architecture, predominantly composed of basalt cobbles and boulders, appears fairly consistent along the entire Kula belt from Waiohuli through Kēōkea. More discussions on site architecture follow below.

ADDRESSING THE RESEARCH QUESTIONS

Three research questions, also addressed during Data Recovery work in Waiohuli, have driven this project (see Cordy 2002). While the nature of excavations was not best suited to address these questions, some patterns within each query are amenable to discussion. The results herein are similar to the results gleaned from Waiohuli. This seems to have been primarily due to similar methodologies employed in both areas during Data Recovery.

(1) CLARIFY THE NATURE AND CHRONOLOGY OF AGRICULTURAL SITES IN THE PROJECT AREA

This avenue of inquiry was implemented to further understand the function and age of agricultural sites in terms of the overall settlement pattern of the upland K□∩kea area. Previous work in the area found that the uplands began to be utilized for agriculture from the c. A.D. 1200s, with some possibility of earlier farming. The Kolb *et al*. (1997) model further proposes that as population expanded in the uplands from the c. A.D. 1400s through historic times, agricultural field areas increased concomitantly. The construction of large garden enclosures appear to show late prehistoric (c. A.D. 1600s) agricultural intensification.

The present research involved the investigation of one large agricultural feature at Site -2098 [Note: Site -2054, assessed as a graden enclosure, was re-interpreted during this work to represent a ranching wall]. The primary Site -2098 feature consists of a *c*. 100 m long terrace with later historic-period additions to the terrace. The terrace and associated features (i.e., short wall sections and various rock alignments) occupy an area of approximately 18,750 m². Three stratigraphic trenches were excavated through different portions of the main terrace. The excavations were unremarkable but for several patterns. First, the complete lack of artifacts and midden at the site supports the interpretation that this site was agricultural in function. Second, well dispersed charcoal flecking, indicative of land clearance through burning, was observed in each trench. Third, oxidized soil layers were documented in each trench. The presence of oxidized and reduced soil suggests long-term cultivation at the site (see Kirch 1992; Dega and McGerty 2000). Finally, radiocarbon dating of a charcoal sample from ST-1 yielded a cultivation and construction date of A.D. 1640-1880 (2 Sigma) and A.D. 1650-1810 (1 Sigma). The date argues for construction of the main terrace in protohistoric times. This date accords with the Kolb *et al*. (1997) postulation for late, pre-contact agricultural intensification of the area. The sample is small however (n=1) and should not be stressed too much.

Chronology

A second line of evidence, albeit indirect, for the timing of agriculture in the Kēōkea area, can be seen through a brief analysis of dated habitation sites containing associated agricultural features. This line of evidence uses habitation enclosures and such which are typically surrounded on their periphery by small mounds and terraces representing gardening or small-scale agricultural pursuits. The samples dating the habitation loci may be indirectly used to date the associated agricultural features. First, a majority of the habitation sites were dated to the 17th century and into late prehistoric/early historic times. The second largest grouping of dates clustered in the 15th century, a time when upland expansion is proposed. A few of the sites were dated to the A.D. 1200s to 1400s. These sites were associated with small-scale agricultural features. Based on the radiocarbon dates and the habitation/agricultural association, agricultural endeavors increased concomitantly in the 15th century and again in the 17th century, the latter marking a proposed time of upland intensification. Large agricultural features such as those composing Site -2098 were primarily constructed during this later time period. The limited agricultural data from Kēōkea thus provides modest support of the Kolb *et al*. (1997) model for upland expansion and intensification through time.

To continue, six sites, located across various portions of the landscape, were thought to have been related to small-scale agriculture during initial settlement of the area from c 1100s-1400s. Formidable construction of house sites and, as assumed, adjacent agricultural features, shows an earlier component to the landscape than previously recognized. Second, a majority of the sites were constructed in the A.D. 1600-1800 range and reflect definite correlations between house sites and agricultural features. This would support the intensification phase of land use. However, there is almost as large a proportion of habitation and associated agricultural features constructed in in the A.D.1400-1600s. Overall, there is simply not enough empirical data to refine when the majority of agricultural sites were constructed and how they specifically relate to the Kolb *et al*. (1997) model of early land use, upland population increase, and agricultural intensification.

Overall in terms of chronology, multiple phases of agricultural use on the parcel are inferred through the analysis and dating of predominantly permanent habitation sites and one large agricultural terrace system. Unlike the data from Waiohuli, these phases cannot be explicitly defined for Kēōkea yet. Future work in Kēōkea could test the model that the first phase involves small-scale agriculture from the *c*. 1200s to 1400s and was evidenced by dispersed burn layers representing initial clearance of the dryland forest. The second phase by-passed an intermediate phase and included intensification in the form of creating garden enclosures within pre-existing fields. This phase is proposed to have occurred c. 1600s-1700s. Many gaps in the overall chronology of both Kēōkea and Waiohuli the area remain.

Site-Landscape

The second portion of this research into Kēōkea agricultural loci involved a brief study of agricultural site locations across the landscape. The Kēōkea parcel was divided by the field crew into several natural, elemental regimes by elevation, geology, and topography. The general nature of the project area was one of grasslands sloping east/northeast toward the coastline, with shallow gulches and swales penetrating and incising the dissected grassland slopes. The project area varied from 1800-3000 ft. above mean sea level (amsl) but did not really play a factor in exhibiting the variable presence/absence of soil deposits amenable to agricultural pursuits.

Agricultural soil-filled terraces, walls, and garden enclosures denoting larger planting areas were common across the breadth of the project area. Due to the fairly equal dispersal of sites across the landsacpe, there was no real pattern per elevation. One positive pattern was that larger agricultural systems were present in shallow swales. Garden enclosures were identified on low ridges, across swales, and on flatly sloping terrain. Smaller agricultural features such as rock mounds (rock mulch for sweet potato), alignments, and smaller terraces were common near habitation loci, the latter predominantly occurring on the top of low ridges above swales.

Within project area gulches or swales, a hybrid of the two elevational zones occur. In some gulch locations, soil deposits are substantial enough to support small-scale, soil-filled terrace and planting areas. In other locations not containing extensive soil deposits, small planting areas occur only in limited frequency. Also pertinent to the SOW was a correlation between micro-topographical variables and the presence/absence and types of agricultural sites. Minor patterns were observed in agricultural site location: 1) gulches contained limited concentrations of small areas of soil-filled terraces and planting areas; gradual slopes (elevation below 2,000 ft) contained few planting areas and more frequently, mounds; gradual slopes further inland (2,000–3,000 ft) contained soil-filled terraces and garden enclosures-large planting areas; rocky slopes contained mounds and small planting areas; and lastly, rocky, low ridges contained, almost exclusively, small planting areas. This pattern appears similar to that of Waiohuli in that the primary determinant of the presence/absence of certain agricultural site types was probably dependent upon the presence/absence of sufficient soil deposits, these varying per elevational context (e.g., more soil at upper elevations and thus, more garden enclosures, large planting areas, etc.). In turn, soil formation is determined by many other factors, including slope, flora, hydrology, and the presence/absence of underlying C-horizon bedrock. This pattern appears to hold true for Kēōkea, even though few agricultural sites were studied in this program.

(2) EVALUATE POPULATION GROWTH PATTERNS IN THE PROJECT AREA

Recent archaeological work in the Waiohuli and Kēōkea uplands led to the interpretation that few house sites were occupied in the area in the A.D. 1200 to 1300s, but from the A.D. 1400s through early historic times, there was a marked increase in the number of occupied house sites. Kolb *et al*. (1997) postulate that this pattern is reflective of population growth in the uplands.

This second line of inquiry was primarily geared toward obtaining datable samples from permanent habitation sites in order to contribute to the suite of previously dated sites in upland K□∩kea and Waiohuli. In acquiring further dating samples from permanent habitation sites within upland K□∩kea, patterns reflecting the history of population growth in this general area were to become more established through the analysis of modal date ranges.

Three main topics were to be viewed to analyze population growth and ranking patterns within Kēōkea. These included: house labor expenditures (suggesting rank), the temporal affiliations of the house sites, and a cumulative probability distribution graph, the latter two combined for analytical purposes. Cumulative probability distribution analysis is in an analytical technique designed to infer population growth and settlement as based upon a suite of an area's radiocarbon dates. In lieu of the probability distribution graph, we have utilized a multi-plot function from OxCal to obtain the same results.

Permanent Habitation: Ranking

In judging the rank of each housing locus across the landscape by construction technology, a remarkable homogeneity in form and construction was found in the studied architectural remains. Not all of this homogeneity can be assumed to relate to a restricted range of social status. Indeed, much of the observed homogeneity in this case can be attributed to technological functions and aspects of the natural environment. A vast majority of the investigated permanent habitation features were enclosures. The remaining habitation features included a platform, one wall, and several terraces. The main construction technique of the enclosures involved a "frame and fill" strategy. This technique may be attributed to a common and widespread method for constructing permanent features composed of stones, thereby determining the technological functioning of individual building materials. Other homogeneous aspects may be attributed to local availability of raw materials, evident in building material types (limited to only basalt stones) and building material size (predominately 0.30 to 0.40 m for construction cobbles).

Based upon labor expenditure, the present data set accords with the one offered by Kolb *et al*. (1997). However, there is slight disparity in the absolute number of structures at several sites. Of the site population subject to testing during Data Recovery, nine sites were single component sites (one feature), five sites contained two structures, three sites had three structures, two sites were composed of four structures, one site contained five structures (Site -2032), and one site was composed of six structures (Site -2061). In the overall "permanent habitation" population (n=39), 51 percent of the sites were composed of single structure sites. Nine sites contained 2 structures, seven sites were composed of three or four structures, and three sites contained five or six structures. Thus, there is indeed some disparity in the absolute number of structures per each site. This could be a function of how the sites were grouped during Inventory Survey (how "site" is defined and demarcated on the ground by the survey crew; in an opposing methodology, Kolb *et al*. 1999 demarcated all features first then later grouped them according to "site"). This could also show that some house sites had a greater number of structures (read: increased labor expenditure) involved in their construction, this leading to the conclusion that the residences were occupied by chiefs, or for that matter, any rank above commoner. The greatest number of structures at any single "site" was six features; typically, higher chiefs had at least 10-12 structures (see Kolb *et al*. 1997:96). The disparity between a single structure and those sites with five or six structures could lead to the inference that lesser chiefs occupied the latter sites, and *maka`ainana* or commers would have constructed 1-2 structures for their house sites. However, based on the material record and dates of the sites, it appears most likely that the sites with greater site structures may simply reflect a conjugal residential group or extended family grouping (see below). Like the data from Waiohuli, there appears to be no significant difference in rank between the commoner households. In all, the prominent people of the uplands of Waiohuli and Kēōkea seem to have been some commoners who had somewhat greater labor invested in their housing.

Population Growth in Upland Waiohuli

Several constrictions were placed upon site radiocarbon dates prior to inducing the analytical distribution method (Cordy 2002). First, two charcoal samples were to be dated from each excavated feature, one from a basal architectural context of a permanent habitation and one from an upper context. The two dates would presumably bracket construction, use, and abandonment of a structure. This was not always possible, however, as charcoal was not always available from both contexts to provide a date. Second, dates from upper layers containing historic materials (*e.g.*, temporally diagnostic artifacts) were not to be processed. Only one feature yielded two sherds so this was not problemmatical. Third, dates from permanent habitation layers containing historic artifacts throughout the stratigraphic column, and associated with the permanent habitation structure, were not to be processed as well. This scenario did not occur. Finally, samples from layers that pre-dated permanent habitation deposits were not to be processed. Contrary to this missive, several samples pre-dating architecture were processed to assess the timing and nature of intermittent exploitation of the area proposed at pre-A.D. 1200. The entire suite of processed dates stands at 44, with most of the samples having been subject to charcoal identification (Gail Murakami) and all having endured chronometric, extending counting, or AMS procedures.

Table 8 summarizes the provenience of the radiocarbon samples and how they may relate to the questions of dating basal and upper layers of site architecture. By extension, the following table depicts how one may evaluate the hypothesis of population growth in upland Kēōkea based on bracketed radiocarbon dates.

Table 8: Dated Samples and Stratigraphic Relationships to Architecture.

Site Number: 50-50-10-#	Provenience: Feature, Test Unit, Layer/Level, Depth cmbs	Architectural Association	Conventional Age (1 Sigma) (A.D.)
2046	Fe. B, TU-1, I/2, 10–20 cmbs	Dates base of architecture	1810–1920 1690–1730
2047	Fe. A, TU-1, I/3, 20–30 cmbs	Dates base of architecture	1400–1495
2047	Fe. B, TU-2, I/3 20–30 cmbs	Upper architectural layer	1510–1670
2047	Fe. B, TU-2, I/5 44–54 cmbs	Feature (hearth); mid-architecture	1550–1640
2047	Fe. B, TU-2, I/7, 60–70 cmbs	Dates base of architecture	1630–1820

2049	Fe. B, TU-1, I/3, 20–30 cmbs	Dates post-architecture activity	1630–1670
2049	Fe. B, TU-1, I/4, 32 cmbs	Dates post-architecture activity	1730–1820
2030	Fe. A, TU-1, I/1, 0-10 cmbs	Dates base of architecture	1510–1600
2030	Fe. A, TU-1, I/4, 30–40 cmbs	Dates base of architecture	1510–1640
2030	Fe. B, TU-3, I/2, 10–20 cmbs	Dates architecture	103.09$\pm$0.81 pMC (modern)
2050	Fe. A, TU-2, I/2, 26 cmbs	Dates base of architecture	1720–1820
2050	Fe. A, TU-2, I/5, 42–72 cmbs	Dates base of architecture	1490–1650
2050	Fe. A, TU-3, I/3, 20–30 cmbs	Dates original architecture prior to later improvements	1430–1520
2050	Fe. A, TU-3, I/3-4, 24–34 cmbs	Dates original architecture prior to later improvements; feature	1480–1640
2050	Fe. C, TU-4, I/5, 42 cmbs	Dates base of architecture	1740–1800

2061	Fe. E, TU-1, I/1, 0–10 cmbs	Dates site occupation, post-construction	1730–1810
2061	Fe. E, TU-1, I/2, 10–20 cmbs	Dates site occupation, post-construction	1660–1890
2061	Fe. C, TU-2, I/3 26 cmbs	Dates site occupation, post-construction	1730–1820
2065	TU-2, I/5 40–50 cmbs	Dates base of architecture	1510–1640
2065	TU-2, I/1, 0–10 cmbs	Dates upper architecture	1390–1480
2032 2032	Fe. A, TU-3, I/2, 10–20 cmbs Fe. B, TU-2, I/2, 15–20 cmbs	Dates site occupation, post-construction Feature; base of architecture	1810–1930 118.19+0.74pMC (modern)
2072	Fe. A, TU-1, I/2, 10–20 cmbs	Dates base of architecture	1480–1660
2072	Fe. C, TU-2, I/2, 10–20 cmbs	Dates base of architecture	1810–1920
2072	Fe. B, TU-4, I/2 10–20 cmbs	Dates base of architecture	1630–1820
2072	Fe. B, TU-4, I/5 40–50 cmbs	Activity pre-dating architecture	610–657
2073	Fe. A, TU-1, I/2, 10–20 cmbs	Dates upper architecture	1430–1520
2073	Fe. A, TU-1, I/5, 40–50 cmbs	Dates upper architecture and site activity	1510–1640
2074	Fe. A, TU-1, I/1, 0–10 cmbs	Dates base of architecture	1665

2075	Fe. B, TU-1, I/1, 0–10 cmbs	Dates upper architecture	1380–1470
2075	Fe. B, TU-1, I/4 30–40 cmbs	Dates architecture and site activity	1410–1510
2076	Fe. A, TU-1, I/2 10–20 cmbs	Post-dates architecture	1810–1930
2076	Fe. A, TU-1, I/4, 30–40 cmbs	Pre-dates architecture	1300–1440
2079	Fe. A, TU-1, I/3, 20–30 cmbs	Post-dates base architecture	1230–1320
2081	Fe. A, TU-1, I/2, 10–20 cmbs	Dates base of architecture	1410–1520
2081	Fe. A, TU-1, I/4, 30–40 cmbs	Pre-dates architecture	1430–1520
2082	Fe. A, TU-1, I/1 0–10 cmbs	Post-Dates architecture	1660 (2 sigma)
2082	Fe. A, TU-1, I/5 44–54 cmbs	Feature (hearth); mid-base of architecture	1810–1920
2059	Fe. A, TU-1, I/2 10–20 cmbs	Dates architecture and site activity	100.0$\pm$0.9pMC (modern)
2098	Fe. A, ST-1, Layer I, 10–20 cmbs	Dates terrace architecture	1650–1810
2035	Fe. A, TU-1, I/2, 10–20 cmbs	Dates mid-architecture	1630–1820
2035	Fe. A, TU-1, I/4, 30–40 cmbs	Dates base of architecture	1490–1660
2331	Fe. A, TU-1, I/1 0–10 cmbs	Dates base of architecture	1510–1650
2331	Fe. A, TU-1, I/5 40–50 cmbs	Pre-dates architecture	1280–1400

*Note: feature=architecture: assumed relationship between activity and architecture

As seen in the above table, nineteen dates of the total forty-four dates (equaling 43% of the radiocarbon population) are precisely associated with basal architecture of permanent habitation structures and one sample (for Site -2098; 2.2% sample) dates the base architecture of an agricultural terrace. All twenty of these radiocarbon samples date initial rock construction of the respective feature. Eleven of the radiocarbon samples (25%) date site occupation or site activities post-dating feature construction and pre-dating site abandonment. Nine of the radiocarbon samples post-date feature construction and show activity near the terminus of site occupation. Finally, four of the radiocarbon samples pre-date site or feature construction and are argued to represent intermiitent exploitation of the area prior to formalization. Formalization of site activity is inferred to have occurred through feature construction.

Other methodological patterns should be noted prior to the illustrations being presented below. First, none of the sites provide radiocarbon dates that stretch from pre-construction (A) to basal architecture contexts (B) to mid-upper architectural levels (C) to post-construction activity (D). Only one site (Site -2076) provides a date for pre-construction and post-construction activities at a site. Eight sites can be dated by more than one phase (a combination of A, B, C, or D) and thirteen sites provide only single dates from sites or component features. Thus, statistical bracketing of site events is not really possible for thirteen of the sites. One site (Site -2059) only yielded a modern/contaminated date so is released from this radiocarbon discussion. Of the eight sites with bracketed dates, three sites bracket pre-construction and basal construction, one site brackets pre- and post-construction, three sites bracket basal and mid-upper architecture/occupation, and one site brackets mid-upper to post-construction feature activities. All samples that date pre-construction phases have another associated phase of site occupation, whether it be site construction or post-construction activity. Seven of eleven samples from basal architectural contexts only date initial construction of a site/feature. Four of six samples dating post-construction activities at a site are also singular dates.

While this text is probably bewildering, it goes toward explaining why only certain samples in the radiocarbon population can actually be utilized to date different phases of site construction, utilization, or abandonment. These data, in turn, allow one to estimate population increase or decrease, as based on a simple premise: the more structures built on a landscape during certain times means that more people occupy an area, and less structures built during certain times means less people live in the area. There are many *caveats* for this premise, but they may be addressed elsewhere.

The following tables consist of several multi-plot diagrams. These Oxcal diagrams combine the various radiocarbon divisions noted above (base of construction dates, pre-architecture dates, etc.) to allow for visually showing trends in the radiocarbon data sets. Tables 9 through 12 illustrate the distribution of radiocarbon dates per "event". The general patterns gleaned from these illustrations are summarized below.

Table 9 shows the distribution of four samples dating pre-Construction activities in the project area. One date is an obvious outlier, that for Site -2072. This date measures *c*. A.D. 600 to 650 and if culturally produced, could reflect clearing or a small-scale combustion event. This sample would pre-date formalization of Site -2072 through architecture by some 800 years. This date is a definite outlier and appears to be too early, even for colonization of the Hawaiian Islands. Judiciously, this date should be viewed with extreme caution unless multiple, redundant

Table 9: Table Showing Distribution of Radiocarbon Dates from Preconstruction Depths.

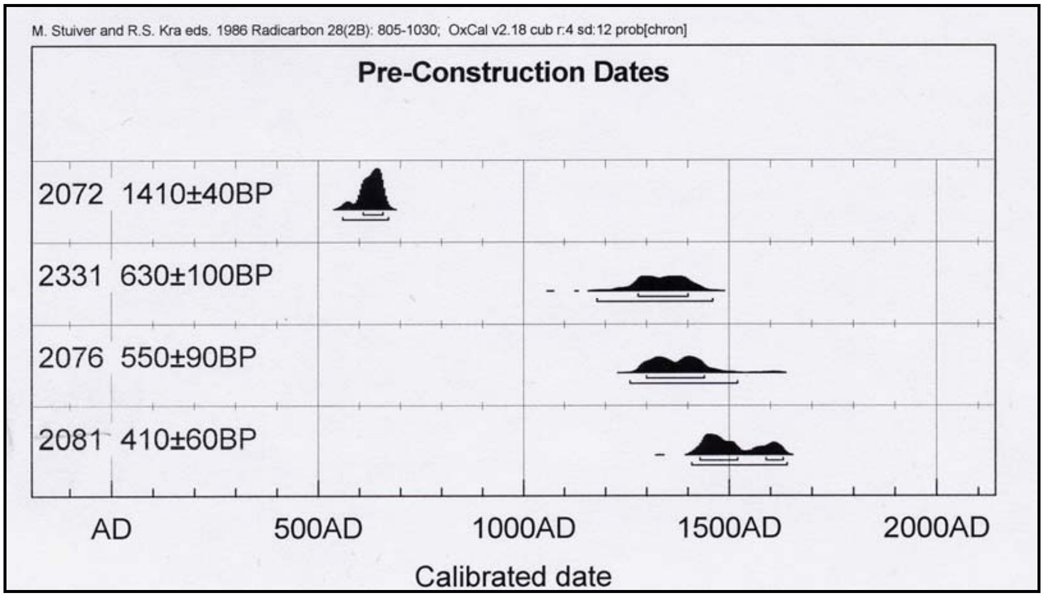
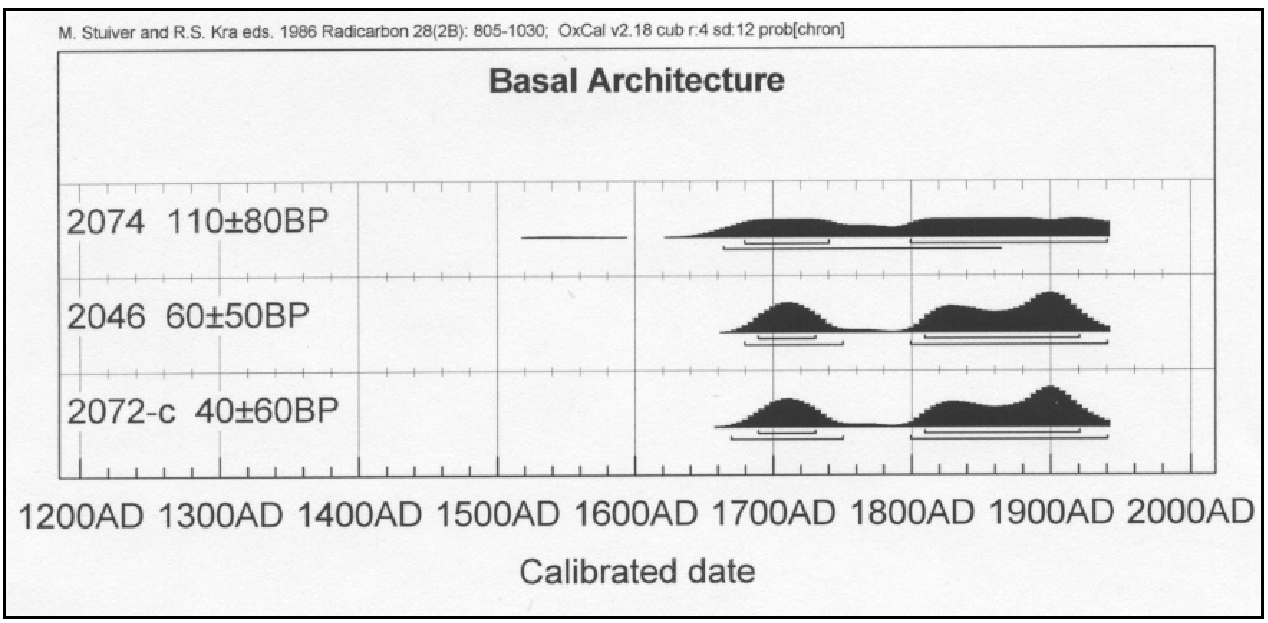


Table 10: Table Showing Distribution of Dates from the Base of the Architecture.



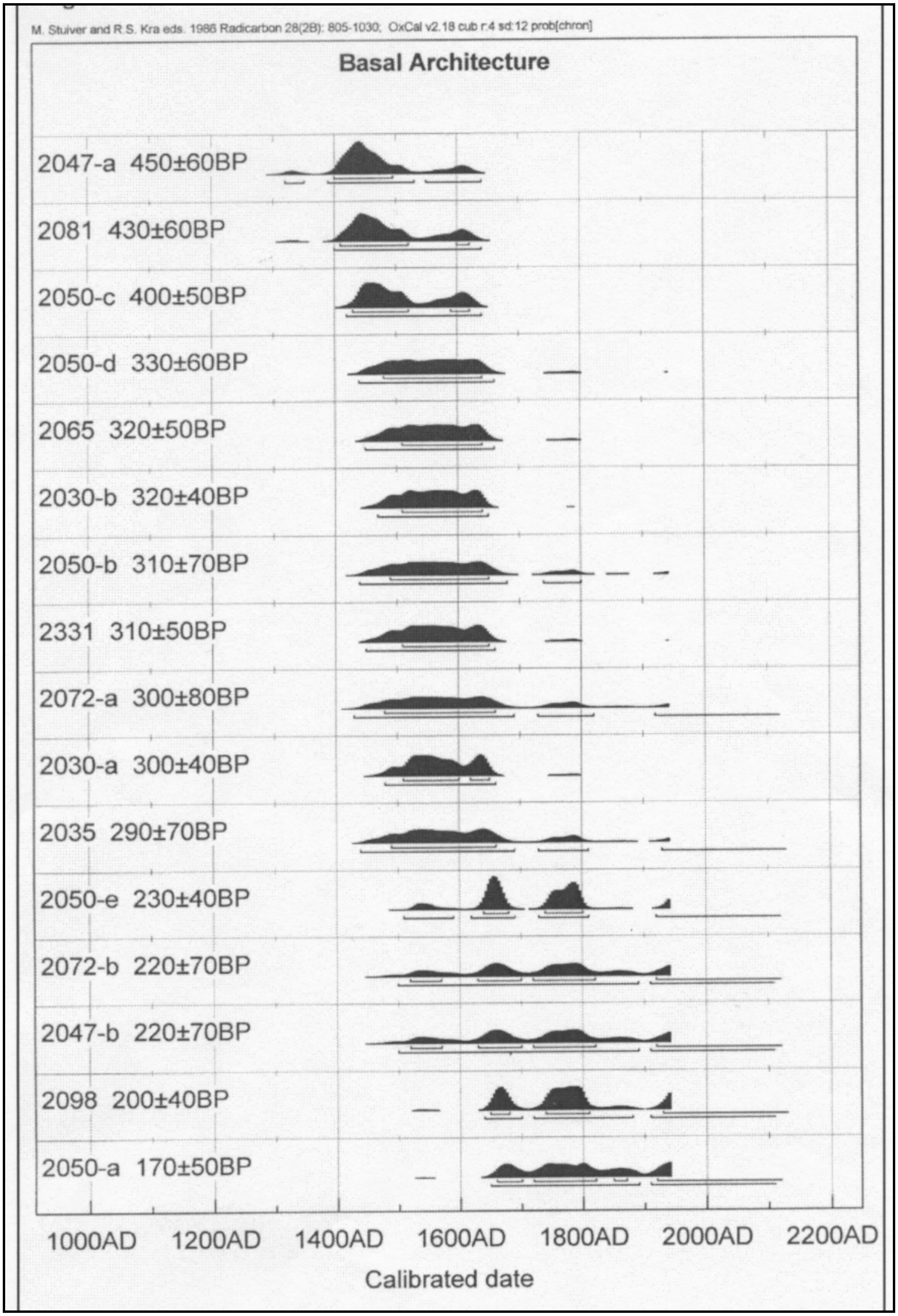

M. Stuiver and R.S. Kra eds. 1986 Radicarbon 28(2B): 805-1030; OxCal v2.18 cub r:4 sd:12 prob[chron]
Basal Architecture
2047-a 450±60BP
2081 430±60BP
2050-c 400±50BP
2050-d 330±60BP
2065 320±50BP
2030-b 320±40BP
2050-b 310±70BP
2331 310±50BP
2072-a 300±80BP
2030-a 300±40BP
2035 290±70BP
2050-e 230±40BP
2072-b 220±70BP
2047-b 220±70BP
2098 200±40BP
2050-a 170±50BP
1000AD
1200AD
1400AD
1600AD
1800AD
2000AD
2200AD
Calibrated date

Table 11: Table Showing Distribution of Dates from the Mid-to-Upper Architecture Depth.

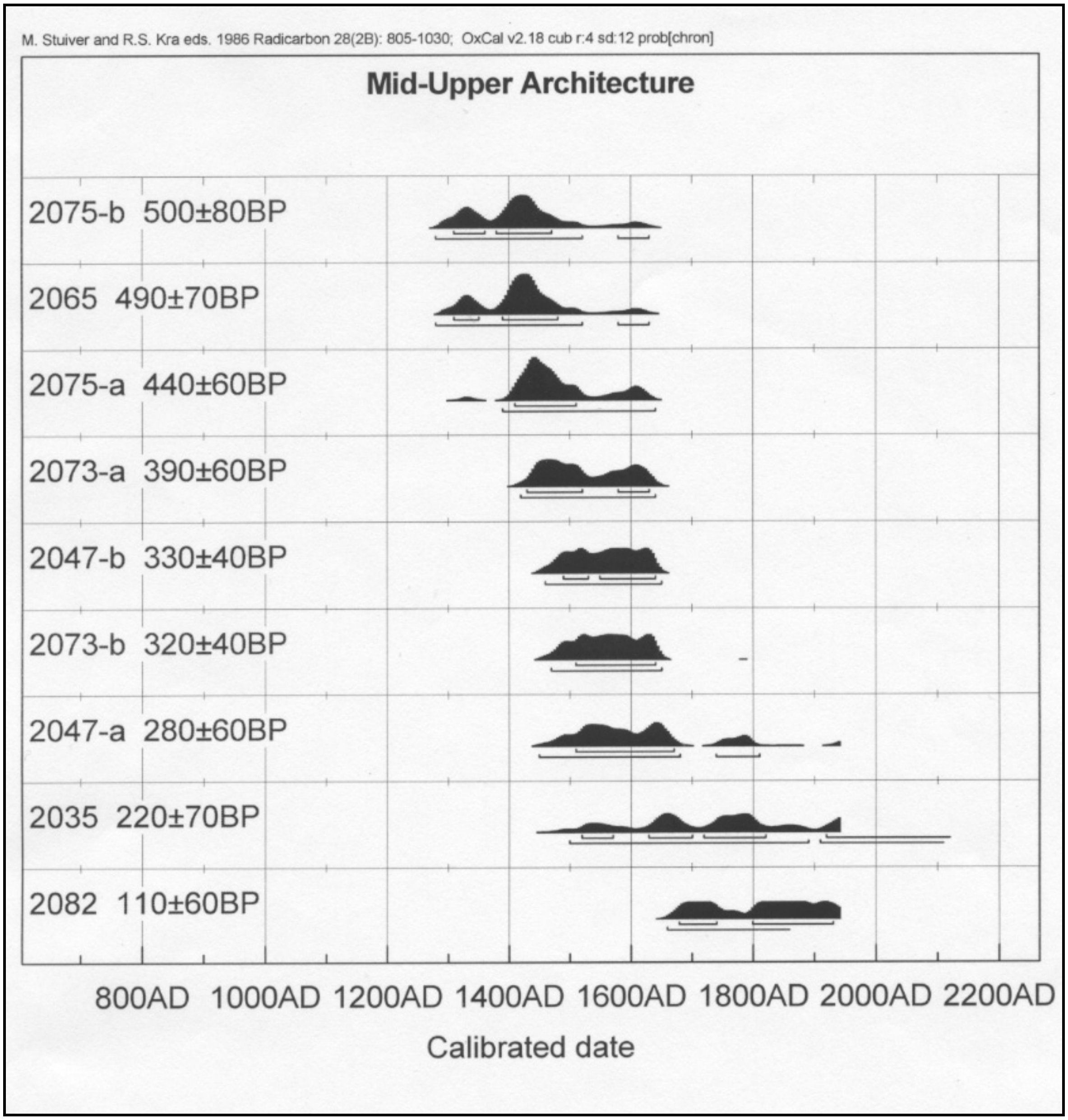
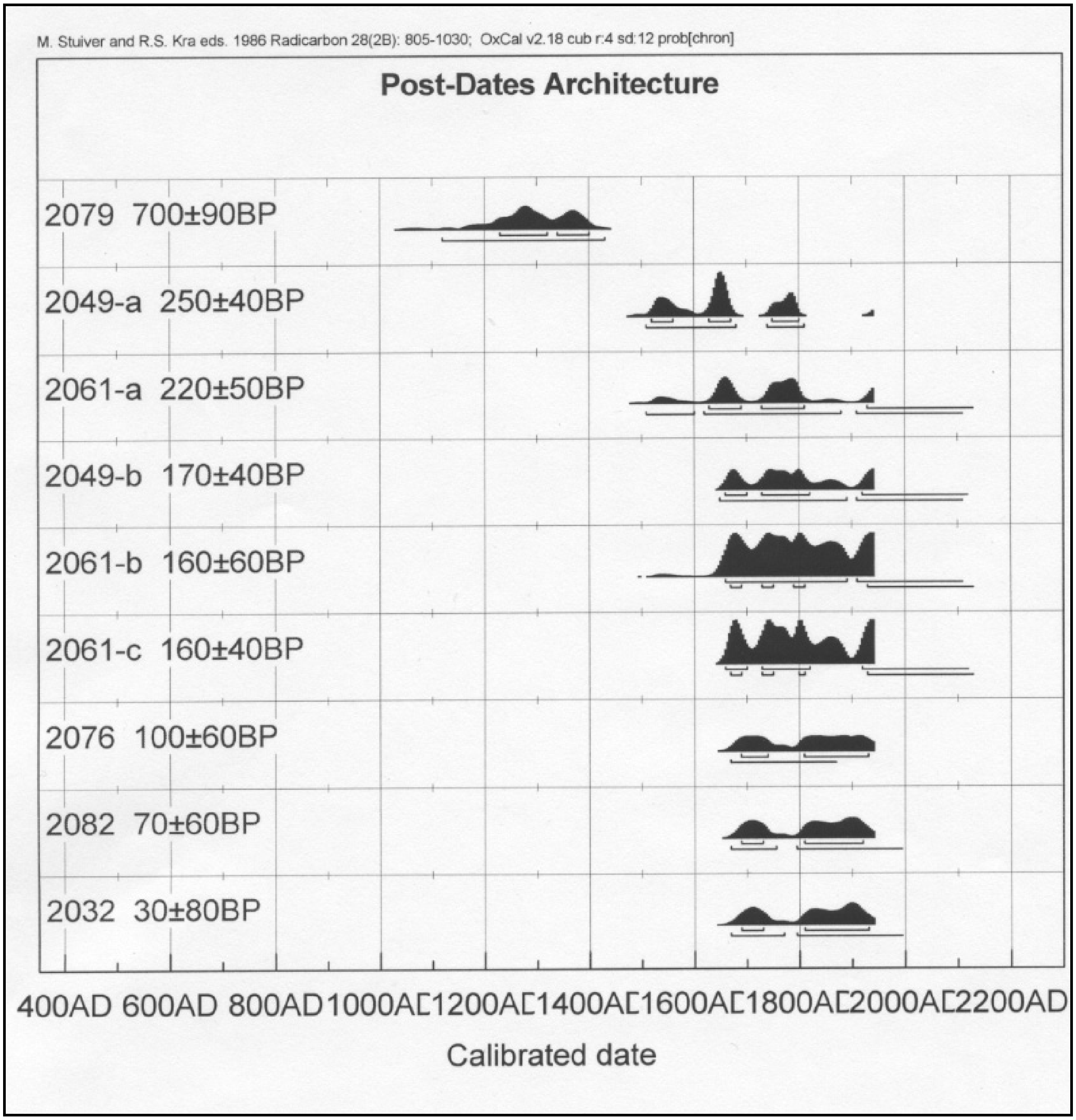


Table 12: Table Showing Distribution of Dates from Depths that Post-Dated the Architecture.



dates from this provience are acquired and support the original date. The other three samples are all pre-contact and pre-date construction between A.D. 1300 and 1480. These three samples more securely date intermittent activity prior to site formalization. Two of these sites (Site -2081 and -2331) pre-date basal architecture for the specific site which was dated to the early-mid 1400s and 1500 to 1600s respectively. The Site -2081 samples show activity occurring at the site very near the time of construction. The Site -2331 samples show activity occurring some 100 to 150 years prior to architecture being present at the site. The samples from Site -2076 pre-date and post-date construction, with a *c*. 450 year gap between pre-architecture activity and near site abandonment. This gap alludes to multiple use of the site location over time. Overall, this small sample of pre-construction dates depicts very limited activity in Kēōkea prior to the construction of site/feature architecture. It is imperative to note, however, that samples pre-dating architecture were not a focus of the research design/SOW and thus, the sample was minimal. Additional samples acquired in the future from definite pre-construction levels may more securely date Kēōkea area activities prior to any site construction.

Table 10 illustrates a suite of nineteen radiocarbon samples dating initial construction of eleven sites and their component features (a Site -2032 date was removed from analysis). Overall, the distribution reflects several trends of note. First, the dates of site or feature construction fall into several convenient time periods. Sixteen of the dated samples show definitive site or feature construction prior to contact. Eleven of the samples date features constructed in the A.D. 1400 to 1600 range while five samples show feature construction from the early 1600s to late 1700s. Three samples stretch protohistoric and historic times from the late 1600s/early 1700s possibly through the 1800s. These samples do show a post-contact composition to the Kēōkea landscape. Second, multiple features composing a single site have different dates, implying that all site features were not constructed at the same time and may be additive to original site construction. Site -2047 provides such an example wherein one feature at the site was initially constructed in the early to mid 1400s while a second feature was constructed in the 1600 to 1700s. Site -2050 shows two features constructed in the early to mid 1400s, one in the 1500s, and one in the mid-1600s to late 1700s. Either the site was subject to additive construction through time, during continual occupation, or at some point, the site was perhaps abandoned and re-utilized with new features being constructed. The overall pattern shows the majority of the tested sites were constructed in the A.D. 1400 to 1600 range, with only modest construction occurring post A.D. 1600.

Table 11 illustrates site activity occurring in mid-upper architectural reaches, the context post-dating initial construction and pre-dating terminal occuption. Several patternn are noteworthy. First, the sites dating this activity do not easily fall into several ranges, they rather blend through time. Four sites show protracted development in the A.D. 1400s, three sites have such development in the 1500s through early 1600s, and two sites have such dates from the 1700 to 1800s. A total of three sites yielded dates from basal and mid-upper architecture layers: Sites -2047, -2065, and -2035. Site -2047, with initial construction dated from the early A.D. 1400s and 1600s also yielded pre-abandonment dates in the A.D. 1500s to 1600s. Site -2035 was constructed in *c*. A.D. 1490 to 1660, with occupation being dated in continuing at least through this mid-upper architectural layer at A.D. 1630 to the early 1800s (Note: Site -2065 yielded almost inverse dates and dates site activity from the early 1400s through the early 1600s). Overall, site activity is assumed to have been fairly unabated from the A.D. 1400 to 1600s, with several protohistoric-early historic outliers.

The final illustration, Table 12, shows site activity just prior to abandonment and post any architectural elements having been introduced to the respective sites. The nine dated samples show intriguing patterns. First, the sample from Site -2079 shows post-architecture occupation of the site from A.D. 1230 to 1320 (1 Sigma). The presence of a cultural deposit pre-dating this sample provenience demonstrates that the site is actually older than the date given herein. No samples of basal architecture were dated however. Nonetheless, Site -2079 dates to at least the early 13th century, making it one of the oldest permanent habitation sites with architecture dated in the Kula area. The other eight dates showing site activity just prior to site abandonment are fairly even in distribution and occur *c*. late 1600s-early 1800s. Only two of the sites (Site -2082, -2032) show any serious occupation into historic times (Site -2082, *c*. 1795 at 2 Sigma). Historic occupation of the Kēōkea parcel was minimal, at best, from the early 1800s. This leads to the inference that population numbers in the area declined sharply after contact.

The above illustrations are one method to assess questions of demographic distribution through time on the Keoke parcel. The underlying premise is that more structures=greater population and less structures=smaller population. In brief, the data show that the Kēōkea area was not a heavily built landscape prior to the A.D. 1400s. Only Site -2079 shows evidence for earlier, formalized occupation of Kēōkea. Use of the area prior to the A.D. 1400s may have been sporadic, with no real long-term commitment to the landscape beyond possible intermittent resource exploitation. Between the A.D. 1400 and 1600s, a more permanent population established themselves in Kēōkea through the construction of permanent residential clusters, *heiau*, and small-scale agricultural features. This occupation continued fairly unabated through the A.D. 1600s and 1700s when additional habitation structures or clusters were constructed. The earlier sites still appear to have been occupied even as new house sites were being constructed at later dates. Concomitant with 1600s+ building of house sites was the construction of larger agricultural features such as garden enclosures are large terrace systems. Initial construction of Site -2098, a large agricultural terrace system, was dated herein to the late 1600 to 1700s. Post-contact, settlement of Kēōkea seems to have been reduced to an extremely modest level and by the early 1800s, there is almost no archaeological evidence for sustained or continued occupation of Kēōkea.

Thus, a sparse population exploiting the landscape prior to the A.D. 1400s (with one outstanding exception) was presumably drawn into the population movement on Kēōkea in the A.D. 1400 to 1600 range. The population of Kēōkea appears to have stabilized through the late 1700s. De-population is suggested for the early portion of the 19th century when archaeological evidence for continued, permanent occupation of Kēōkea is virtually non-existent. There appears to be a gradual phase of settlement from the A.D. 1400s through 1600s+ followed 400 years later by a fairly abrupt decrease in population.

(3) EVALUATE PIG AND DOG CONSUMPTION PATTERNS IN PERMANENT HOUSE SITES WITHIN THE PROJECT AREA

Background

This question delves a bit deeper into assessing social ranking per individual households or household clusters using faunal remains. Kolb *et al*. (1997) explored the pattern that higher ranked individuals consumed more pigs and dogs than commoners. While acknowledging sample size and provenience issues, one problem of addressing this question in the present study, Kolb *et al*. (1997) found that a majority of the habitation sites had no dog or pig remains, some house sites yielded small amounts of dog remains, and several sites also contained only small amounts of pig remains. The data was interpreted by Kolb *et al*. (1997) to mean that most of the house sites belonged to commoners-lesser chiefs. In total though, they found no difference in household consumptive practices versus social ranking. In Waiohuli, a similar study was done. The research by Dunn *et al*. (1999) revealed a similar pattern: pig and dog remains were recovered from habitation structures but infrequently and in no great quantities. In essence the pattern was that there was no real pattern. Kolb *et al*. (1997) also noted limited actual consumption of pig and dog occurring within the habitation sites, an occurrence substantiated in Waiohuli. This may have been partially attributable to the idea that mammals (particularly pigs) were frequently used as ritual offerings and feasting but were only occasionally consumed by commoners (Kolb *et al*. 1997:247). In the Waihuli faunal dataset, there is no evidence to suggest that any of the sites were chiefly residences. It was postulated by Dunn *et al*. (1999) that each permanent habitation site researched in Waiohuli was a commoner residence.

Kēōkea

Following the Scope of Work, at least two test units were excavated within each permanent habitation feature within the site population (N=21) to evaluate pig and dog consumption patterns at the sites, among other analyses. Table 13 provides a listing of permanent habitation sites that yielded faunal remains and the MNI of pig and dog remains recovered from each site.

Table 13: Frequency of Pig and Dog Remains at Permanent Habitation Sites.

State Site No.	Test Unit #	Pig remains (MNI)	Dog remains (MNI)
2047	TU-2, TU-3	2	1
2030	TU-1, TU-3	2	1
2050	TU-2, TU-3	3	1
2065	TU-1	1	—
2032	TU-2	1	—
TOTALS	8 Test Units	MNI=9	MNI=3

Table 13 illustrates how improverished the sites were in terms of yielding these two classes of faunal remains. Based on this limited sample, pig clearly dominates these important faunal categories in a 3:1 ratio. Pig remains also appeared at several more sites than dog remains, leading to the tentative interpretation that pigs were more common than dogs in the area (at least in terms of consumption). Only five of twenty-one excavated sites (24%) yielded pig or dog remains. This pattern was similar to that of previous upland research (Kolb *et al*. 1997; Dunn *et al*. 1999). There is no pattern to suggest that pig and dog bones were only recovered in the largest site features. However, both classes of remains were only found in enclosures and in direct relationship to a cultural deposit also containing charcoal and other midden. This strongly infers that the remains served a consumptive purpose.

Site -2047 and Site -2050 are the only two sites that yielded <u>both</u> pig and dog remains. As illustrated above, dog remains were sparse and occurred at only three sites (14%). Pig remains were slightly more common and occurred at five sites (24%). Does this apparent poverty of remains and concentration at a small percentage of sites allow for the inference that these were habitation loci for higher ranked individuals? Due to the dearth of remains (sample size issues), one could state that like the previous two studies, the sites may have been occupied by commoners or lesser chiefs. However, there is little hard evidence in hand to sway this argument either way. The presence of pig and dog remains at Site -2047, at the least, provides additional evidence (with that from site re-analysis) that the structure may have been a men's *hale* and not simpy a "permanent habitation" site as interpreted by Brown *et al*. (1989:E-1). This thread will be investigated further.

In terms of consumptive practices through time, several patterns are evident from this small sample of pig and dog remains. First, dog remains were not recovered from layers pre-dating the A.D. 1600s. Two of the dated layers yielding dog bones dated to late prehistoric/early historic times. Second, pig bones were recovered from earlier dated contexts. A majority of the pig remains were excavated from layers dated from the A.D. 1200 to 1400s and the 1400s to 1600s. Only one layer containing a pig bone was later, and yielded a modern (contaminated) date. The two test units sharing pig and dog remains were dated to later periods *c*. 1600s to 1800s. Based on this small sample, pigs were consumed from an earlier date than dogs. The earliest evidence for pig consumption in Kēōkea comes from Layer 3 of TU-1 at Site -2065 which dated from A.D. 1200 to 1400s. Dog remains were discovered from a layer dating to A.D. 1630 to 1820, the earliest these remains appeared.

While pig and dog consumptory patterns per individual permanent habitation site was somewhat amenable to evaluation, the results of the investigation were problematical, this simply due to the lack of substantial remains recovered during site excavation. The sample size for recovered pig and dog remains was minimal. This may be rectified in the future if more units are excavated at less habitation sites.

Site Architecture and Chronology

In order to address basic questions of site and component feature chronology (when sites were construction, utilized, and abandoned), radiocarbon samples must be taken from proper contexts. The precise context, or provenience, allows the researcher to directly correlate the dating sample with architectural events. Dated samples from cultural deposits provide additional evidence for when a site or feature were utilized. Analysis of the deposits may address what activities occurred at a site through time. During this study, test units were only placed directly adjacent to or through site or feature architecture. Singular test units placed in the center of features and that appear to "float in space" are not conducive to address important questions related to site construction. One cannot also address population or landscape models through floating test units, unless these units are tied to architecture. Each test unit excavated during this project was directly tied to site/feature architecture. As such, several salient patterns were wrought from the data.

First, of the radiocarbon population, only four of the dates were acquired from contexts that pre-date construction. These dates reflect some of the oldest dates acquired from the project area in the 6th and 7th century (Site -2072) and other "early" dates from the 13th and 14th century (Site -2079, Site -2076, and Site- 2331). These dates depict activity in the future location of the site, or when the site was later formalized through architecture. The remainder of the sites directly equate with initial construction (dating the base of site architecture) or occupation of the sites (cultural layers prior to abandonment of the site; post-construction). The dates show the earliest site to have been constructed in the 13th century (Site -2079; A.D. 1230–1320), with two other sites also showing early formalized habitation in the area (Site -2075 A.D. 1380–1470; Site -2065 A.D. 1390–1480 at 2 Sigma). As noted above, the remainder of the sites were constructed and occupied during two intervals: A.D. 1400 to 1600 (n=8) and A.D. 1600 to 1800 (n=8). Two sites (Site -2072 and Site -2050) show several site construction/occupation episodes from the A.D. 1400s through the late 1700s/early 1800s. Based exclusively on this data, it appears as though the Kēōkea parcel contained formalized habitation structures prior to the A.D. 1400s, with most of the sites being built and occupied between A.D. 1400 and 1800, or traditional times through protohistoric times. The single agriculture site investigated herein yielded a date of A.D. 1640 to 1880 (A.D. 1650–1810 at 1 Sigma), which corresponds to the Kolb *et al*. (1997) interpretation for later agricultural intensification of the project area (Note: the single date should not be overstressed as it represents only one date and thus, may reflect sampling error).

Other patterns are available to evaluation when comparing the dates of site construction. Briefly, when comparing site size versus temporal period and geographic area, the patterns were random. The data speak to the notion that site size did not regularly increase or decrease through time; it was fairly stable. The largest site size range for traditional-period sites was a 12.0 m^2 site and 154.0 m^2 site while during protohistoric times, the greatest site range varied from 18.0 m^2 to 300.0 m^2. The 300.0 m^2 feature at Site -2050 was dated from A.D. 1720 to 1820 and is thought to have functioned as a *heiau* or *men's hale*, not a "permanent habitation" locus as noted by Brown *et al*. (1989:E-5). Overall, the sites themselves show remarkable homogeneity in building construction methods through time as well, a pattern noted by Dunn *et al*. (1999) for neighboring Waiohuli. The sites were also randomly located throughout Kēōkea in that larger sites did not occur at higher or lower elevations than small sites.

Sites ranged from single feature structures to multiple structures. There was no obvious patterning in Kēōkea per number of structures verus geographic area as both single and multiple-feature sites were documented across the parcel. However, of several investigated sites, several clusters are noteworthy. Site -2050 contained three major features related to habitation/ceremony. Site -2061 contained four substantial habitation/ceremonial structures (four enclosures) measuring 14.0 m² to 30.08 m². Site -2032 was composed of four habitation enclosures ranging in size from 16.0 m² to 68.0 m². These sites appear to reflect the proto-type Hawaiian residence or conjugal family habitation area where several activity areas as their respective strcutures are present within the overall residential household. The size variants between these conjugal structures may reflect different activities performed by the family, such that one enclosure may have been the primary residence or sleeping area, a second small enclosure may have been used for food preparation, and so one. These three sites show a commitment to long-term occupation of the landscape.

Finally, based on site size, several sites may be re-evaluated per function. For instance, Cordy (1981:59–85) and Kolb *et al*. (1997:95–125) propose models of site size and morphology versus site function. Table 14 below illustrates these site types versus size (Note: other factors such as site shape and material culture also form the interepretations and both are taken from the above references).

Table 14: Site/Feature Size versus Site/Feature Function.

Type of Site	**Size of Site (Cordy 1981)**	**Size of Site (Kolb *et al*. 1997)**	**Comment**
Permanent Habitation	24–66 m²	17/24-66/89 m²	*Kauhale/pa hale*; sleeping, eating, cooking houses
Ancillary Structures	Less than 16 m²	Less than 16 m²	Cook houses, work areas, storage, shrines;
Men's *Hale*	74–144 m²; 108–195 m²	42–96 m² (enclosure); 72–144 m² (platform)	Associated with primary structures 17–89 m²
Small House and Work Area	70–221 m²	—	Habitation, ancillary, and small-scale agriculture
Religious Sites: small *heiau*; medium-sized *heiau*	Less than 200 m²; 200–500 m²	Less than 200 m²; 200–500 m²	Molohai Heiau (Site -1037); Kaumiumimua Heiau (Site -3332); Site -1038

When cursorily re-assessing the Kēōkea data compared to these criteria, several elicit patterns are present. First, the majority of the sites excavated during Data Recovery consisted of multi-component sites with most component features measuring within the above sizes for ancillary structures, primary structures, and perhaps men's *hale* or ceremonial enclosures. In a word, many of the sites (*e.g*., Site -2072) represent household clusters. Second, at least seven structures at seven sites may not, in fact, be "permanent habitation" loci, as interpreted by Brown *et al*. (1989). Rather, the features may represent ceremonial or specialized activity areas. The features in question include a 120.0 m² enclosure at Site -2047, a 130.0 m² enclosure at Site -2030, a 300.0 m² enclosure at Site -2050, a 307.5 m² enclosure at Site -2061, a 221.0 m² enclosure at Site -2072, a 102.4 m² enclosure at Site -2075, and a 154.0 m² enclosure at Site -2079. With the exception of Site -2079, none of these features exist as the sole components to a site, being one of either two, three, four, or six total features at the respective site. Based on the above table, these seven features perhaps should not be considered permanent habitation features or their functional interpretion should be refined. The enclosure at Site -2072 is a large feature (221.0 m²) and also yielded the greatest concentration of pig and dog bone. This feature may be interepreted to be a men's *hale*. Curiously, a notch occurs along the northern flank of the site. This characteristic may suggest the feature to be a medium-sized community *heiau*. Based on the sizes of the other enclosures, they may be re-interpreted to be religious features, men's or women's *hale*, or other community-type activity areas.

A vast majority of the investigated sites consisted of enclosures measuring squarly within the dimensions described above for permanent habitation residences (17–89 m²). Only one site in the population was a platform and only several habitation terraces were present. Also, almost all of the habitation clusters were associated with small-scale agricultural walls, alignments, and mounds surrounding the site clusters. This basically allowed the residential clusters to be fairly self-contained units that could also provide as food distributor's to chiefs or others. The importance of offerings may have at least partially fueled larger-scale agricultural production from the A.D. 1600s. The other was population expansion.

As noted above, several *heiau* are present in Kēōkea: Sites -1037, -1038, and -3332. Combined with a re-interpretation of several site features noted above, there is the possibility that there may be more than eight *heiau* or community-based ceremonial structures in Kēōkea. These *heiau* are not notoriously large but all fit into the small to medium-sized *heiau* classification. Most of these potential *heiau* occur in association with residential structures, such as primary residences and ancillary activity structures, on ridges or flat slopes. The *heiau* appear to be directly associated with community-based ceremony, with none appearing to be *luakini* heiau (see also Kolb *et al*. 1997:122). Further determinations on the function and chronology of these enclosures measuring over 100.0 m² awaits additional testing. Needless to say, the presence of multiple *heiau* on the Kēōkea parcel attests to their importance for a fairly sizeable local prehistoric population.

EXECUTIVE SUMMARY

In retrospective, the current project appears to have been more a Phase II Inventory Survey than a Data Recovery project. Data Recovery sites were re-located, many were mapped and recorded (for the first time), and only limited testing was completed at a sample of the sites. All the sites subject to re-mapping and testing were previously interpreted by Brown *et al*. (1989) to be “permanent habitation” locales; one agricultural site was tested. The ultimate goal of the project was to address three questions formed by Cordy (2002) relating to settlement pattern, chronology, and social status in upland Kula. The methods employed were somewhat divorced from the data needed to accurately address the questions. Nonetheless, the project may hopefully contribute to the database of upcountry Kula in terms of chronology, material culture, and analyzed structures. Several salient patterns have emerged from this study which, in a perfect world, may be re-assessed during additional work on the Kēōkea parcel.

Only a sparse population exploited the Kēōkea landscape prior to the A.D. 1400s (with one outstanding exception), this small population having been drawn into the population movement in Kēōkea occurring during the A.D. 1400 to 1600 range. The population of Kēōkea appears to have stabilized through the late 1700s. Depopulation is suggested for the early portion of the 19th century when archaeological evidence for continued permanent occupation of Kēōkea is virtually non-existent. There appears to be gradual and continuous settlement for the area from the A.D. 1400s followed some 400 years later by a fairly abrupt decrease in population. Second, there was only scant hard evidence to suggest the differences between households of chiefs and those of commoners. The chiefs, if any occupied the area, were certainly lesser chiefs, with a majority of the population being *maka`ainana* living in 2-3 structure clusters. Several sites did contain up to five and six structures, implying some form of social differentiation. Third, the architecture itself was fairly homogeneous throughout the project area, with no one form of “form and fit” strategy dominating another. Fourth, agricultural pursuits appear to have flourished in association with habitation; a symbiotic relationship was formed. Prior to the A.D. 1400s, only small terraces were identified in terms of formalized architectural structures. The terraces grew and expanded with population in the A.D. 1400-1600 interim and rapidly expanded in size and number from the A.D. 1600s. Agricultural site construction decreased concomitant with population decline in the late 1700s-early 1800s. The present dataset accords with the Kolb *et al*. (1997) model for the timing of upland settlement and the nature of such settlement, perhaps moreso than the data derived from the neighboring Waiohuli study completed by Dunn *et al*. (1999).

Marine species are present in site midden as food resources and as artifacts, although in small quanitity. The small amount of marine food remains suggests a heavy reliance on terrestrial species and crops and very low dependence upon coastal resources. However, even the terrestrial faunal counts were only very modest. Only 60 percent of the excavated sites yielded any faunal remains at all and only MNI 117 was recovered, most of these being vertebrates and birds. The percentage of dog and pig remains was low, almost too low to make assessments of social stratification. Rat remains dominated assemblages, a trait common to more sedentary populations. The idea is forwarded here that the presence of the rats assumes a stable agricultural base, as the rats would be drawn to perennial grain sources and by extension, sedentary populations.

Twelve known or possible burials were identified on the Kēōkea landscape. Based on stratigraphic positioning with dated layers, the burials were interred during pre-contact and protohistoric times. The burials were identified within structures and were all re-buried on site. All the burial sites are being preserved in perpetuity.

A total of 197 traditional-period artifacts and two modern "artifacts" (two sherds) were recovered during limited testing. The traditional artifacts were derived from basalt, volcanic glass, coral, marine shell, and ocre. The assemblage was dominated by basalt debitage, indicative of tool manufacturing or re-working activities. The database exhibited an overwhelming dependence on terrestrial tool manufacture, this being expected considering the location of the upland parcel. Of additional interest was the poverty of artifacts and remains recovered during the course of excavation work. On a landscape occupied for a suggested 400 years with formal architecture abounding through swales and on ridge fingers, the dearth of material culture stands out in ambiguity. While painless to declare sampling as the cause of such attrition, can other reasons be forwarded? In a word, no. Certainly secular areas of activity within structures may yield higher absolute artifact and midden counts, yet these were generally not found during the present study. As it stands now, the poverty of material culture may be a direct result of the sampling strategy employed during this project. In the section below, there is some mention as to correcting this situation through additional, areal testing.

Finally, the macrobotanical database revealed that the lack of historic introductions in the samples suggests that a majority of the charcoal dates to a time when native species were prevalent and historic introductions were rare. Based on the presence of several species (*i.e., `akoko, `ilima, aheahea*), the Kēōkea landscape was one of lowland dry shrubland community during traditional occupation. Agriculture flourished in the area, however, and primarily capitalized on the major concentrations of fog drip prevalent in the area.

The present study has hopefully added to multiple datasets related to past activities in this upland Kula area. The potential for understanding the history of Kēōkea through archaeology, oral history, archival searches, and paleoenvironmental analyses remains explosive. That the future residents of Kēōkea have preserved over 46 acres of archaeological sites shows a magnificent commitment to the history of their land and the land of their ancestors.

RECOMMENDATIONS

The established Historic Preserve Area (HPA; *c*. 46 acres) has assured that additional research on various site classes in Kēōkea may be undertaken in the future and that all site classes, particularly burials, are preserved in perpituity. The site types investigated herein are well represented in the HPA and are amenable to either immediate or protracted investigations in the future.

That sites are well-dispersed throughout the Kēōkea parcel is known. Research has concentrated on the built landscape of the parcel. However, as is often the case, non-architectural sites may occur across other areas of the parcel. Site types such as habitation or burial loci may be present on the parcel yet not defined by architecture. It is our recommendation that Archaeological Monitoring be conducted in conjunction with any major land altering activities on the parcel. At the least, initial monitoring of major landscape altering activities near known sites could occur to assess the presence/absence of significant sites in the immediate area of the work. Monitoring should be conducted by an archaeologist intimate with the nature of sites/deposits in the area and one that has the ability to realize and fully assess the significance of a site/deposit if one should be present.

The Historic Preserve Area has led to the perpetual preservation of multiple habitation, burial, and agricultural sites. It is suggested herein that the true picture of Kēōkea will not be known until additional testing is undertaken at habitation loci to more fully address some of the questions posed here. That several site clusters (*e.g*., Site -2050) are present in the Historic Preserve Area would allow researchers/students to excavate from a wider base and more accurately document intra-household activities through time. Questions of social stratification and population/de-population of the area would also be more amenable to evaluation. The Historic Preserve Area would thus focus as not only a place to preserve ancient cultural sites of Hawaiians occupying the land, but could provide an important educational vehicle if an archaeological project is completed as part of a field school or other scientific endeavor. The sites would preserved remain in perpetuity; yet, open to scientific inquiry.

Finally, there are now three fairly solid datasets from Inventory Survey and Data Recovery work that has occurred in the Kula uplands of Maui from 1989 through present times. In total, some 2,700 continguous acres have been surveyed, assessed, and been subject to limited testing. From these projects, a total of 108 sites were identified in Kēōkea, 51 sites in Waiohuli, and 219 sites documented in the area occurring between the former two parcels. Coterminously, the site population stands at 378 archaeological sites composed of 2,000+ features. Data Recovery by SCS is scheduled for mid-2004 within the former Kolb *et al*. (1997) project area. While Kolb *et al*. (1997) have provided superior background studies and sysntheses of this upland landscape, they did so without the benefit of much additional archaeological work occurring after the completion of their project.

The present document provides a brief glimpse into the archaeology of Kēōkea. However, there is more that can be accomplished to justify the years of archaeological toiling throughout Kula. In the near future, perhaps after another phase of Data Recovery on DHHL parcels has been completed in Fall 2004, a manuscript will be published that succinctly brings together the archaeological results for this 2,700 acres of land in upcountry Maui. The tome will be more synthesis and less descriptive, with analytical results available to address and form archaeological models applicable to upcountry Maui and most inland areas of the Hawaiian Islands. Certainly this would be an ambitious project. Yet, based upon the hours, day, weeks, and months of archaeological work previously afforded in Kula, this appears to be one fitting way to bring the large corpus of data and researchers together.

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APPENDIX A: TRADITIONAL ARTIFACTS

Lab Bag	Site	Feature	Unit	Layer	Artifact No.	Artifact Type	Length cm	Width cm	Thick. cm	Lot Count	Remarks
441	I.S.O.	-	-	Surface	1	Basalt Adze Blank	8.13	8.48	3.20	1	Early stage blank based on thick flake; piece mostly unifacially worked, but with some bifacial flaking
1	2046	B	TU-1	Arch	2	Basalt Adze Blank	6.46	3.14	2.07	1	Small adze blank based on reworked adze as shown by 2 polished surfaces
5	2047	A	TU-1	I/3	3	Volcanic Glass Core	1.56	1.07	0.90	1	Small nodule; single, unprepared striking platform
10	2047	A	TU-1	4	4	Modified Marine Shell	1.50	1.20	0.42	1	Non-diagnostic shell worked to a rough oval shape
17	2047	B	TU-2	4	-	Basalt Debitage	-	-	-	3	One IF; 2 NDF
17	2047	B	TU-2	4	-	Volcanic Glass Debitage	-	-	-	1	One NDF
22	2047	B/SF-1	TU-2	1 East	5	Basalt Flake with Polish	1.48	1.60	0.18	1	One polished surface
33	2047	B/SF-1	TU-2	2 West	-	Basalt Debitage	-	-	-	1	One IF
46	2047	B	TU-2	6	-	Volcanic Glass Debitage	-	-	-	1	One SF
43	2047	B	TU-2	6	-	Basalt Debitage	-	-	-	1	One IF
75	2030	A	TU-1	2	-	Volcanic Glass Debitage	-	-	-	2	Two NDF
76	2030	A	TU-1	2	-	Basalt Debitage	-	-	-	4	One IF; 1 PF; 2 NDF
77	2030	A	TU-1	2	6	Polished Basalt Stone	-	-	0.67	1	Small fragment, polished on 2 facets; possible mirror fragment
79	2030	A	TU-1	3	-	Volcanic Glass Debitage	-	-	-	4	One IF; 3 NDF
84	2030	A	TU-1	4	-	Volcanic Glass Debitage	-	-	-	1	One NDF
87	2030	A	TU-1	4	-	Basalt Debitage	-	-	-	1	One IF
91	2030	A	TU-1	5	-	Basalt Debitage	-	-	-	4	One PF; 3 NDF

94	2030	A	TU-2	2	-	Volcanic Glass Debitage	-	-	-	1	One IF
97	2030	A	TU-2	3	-	Basalt Debitage	-	-	-	1	One IF
102	2030	A	TU-2	4	-	Basalt Debitage	-	-	-	1	One NDF
442	2030	A	TU-1	2	7	Marine Shell Scraper	6.10	4.80	-	1	*Cellana sandwicensis* utilized around at least 1/4 of its edge

PF = Primary Flake; SF = Secondary Flake; IF = Interior Flake; NDF = Non-Diagnostic Flake

I.S.O. = Isolated Find

Lab Bag	**Site**	**Feature**	**Unit**	**Layer**	**Artifact No.**	**Artifact Type**	**Length cm**	**Width cm**	**Thick. cm**	**Lot Count**	**Remarks**
110	2050	A	TU-1	I/2	-	Basalt Debitage	-	-	-	4	One IF; 3 NDF
110	2050	A	TU-1	I/2	-	Volcanic Glass Debitage	-	-	-	1	One SF
121	2050	A	TU-1	4	-	Basalt Debitage	-	-	-	1	One NDF
130	2050	A	TU-2	3	-	Basalt Debitage	-	-	-	1	One NDF
140	2050	D	TU-3	2	-	Basalt Debitage	-	-	-	1	One IF
140	2050	D	TU-3	2	-	Volcanic Glass Debitage	-	-	-	2	One IF; 1 NDF
144	2050	D	TU-3	2	-	Volcanic Glass Debitage	-	-	-	2	One IF; 1 NDF
144	2050	D	TU-3	3	-	Basalt Debitage	-	-	-	5	One IF; 2 SF; 2 NDF
144	2050	D	TU-3	3	8	Basalt Flake with Polish	1.03	0.83	0.26	1	One polished facet
154	2050	D	TU-3	4	-	Basalt Debitage	-	-	-	3	One SF; 2 NDF
154	2050	D	TU-3	4	-	Volcanic Glass Debitage	-	-	-	1	One NDF
154	2050	D	TU-3	1 West	-	Volcanic Glass Debitage	-	-	-	1	One IF
158	2050	D/SF-1	TU-3	1 West	-	Basalt Debitage	-	-	-	1	One IF
169	2050	C	TU-4	Surface	9	Coral Abrader	-	-	2.72	1	Fragment of larger tool; piece has 5 worked facets

170	2050	C	TU-4	Surface	10	Basalt Core	6.80	6.71	5.74	1	Based on nodule; multiple, unprepared striking platform
171	2050	C	TU-4	1	11	Ocre Mineral	-	-	-	1	Small nodule
174	2050	C	TU-4	1	-	Basalt Debitage	-	-	-	1	One NDF
178	2050	C	TU-4	2	-	Volcanic Glass Debitage	-	-	-	2	One SF; 1 NDF
180	2050	C	TU-4	2	-	Basalt Debitage	-	-	-	1	One NDF
187	2050	C	TU-4	3	-	Basalt Debitage	-	-	-	2	One SF; 1 NDF
445	2050	C	TU-5	2	28	Marine Shell Octopus Lure	-	-	-	1	Fragment of *Cypraea mauritiana*
444	2050	C	TU-5	2	-	Basalt Debitage	-	-	-	1	One IF
446	2050	C	TU-5	3	-	Basalt Debitage	-	-	-	1	One NDF associated with one fractured basalt pebble
449	2050	C	TU-5	3	29	Basalt Flake with Polish	1.04	1.75	0.16	1	One polished facet
203	2050	B	TU-6	2	12	Coral Abrader	3.66	3.18	2.50	1	One worked facet
208	2059	A	TU-1	2	-	Basalt Debitage	-	-	-	3	One PF; 2 NDF

PF = Primary Flake; SF = Secondary Flake; IF = Interior Flake; NDF = Non-Diagnostic Flake

I.S.O. = Isolated Find

Lab Bag	**Site**	**Feature**	**Unit**	**Layer**	**Artifact No.**	**Artifact Type**	**Length cm**	**Width cm**	**Thick. cm**	**Lot Count**	**Remarks**
223	2061	E	TU-1	3	-	Basalt Debitage	-	-	-	2	One IF; 1 NDF
226	2061	C	TU-2	2 East	13	Basalt Flake with Polish	2.63	3.80	0.55	1	One worked surface
236	2061	C	TU-3	I/4	14	Ocre Mineral	-	-	-	1	One small piece
238	2065	A	TU-1	2	-	Basalt Debitage	-	-	-	4	One IF; 1 SF; 1 PF; 1 NDF
240	2065	A	TU-1	3	-	Basalt Debitage	-	-	-	1	One IF
241	2065	A	TU-2	3	-	Basalt Debitage	-	-	-	5	One IF; 4 NDF
242	2065	A	TU-1	6	-	Basalt Debitage	-	-	-	1	One NDF
243	2065	A	TU-2	2	15	Basalt Core	9.43	5.94	4.80	1	Based on large flake; core has single prepared striking platform

247	2065	A	TU-2	3	-	Volcanic Glass Debitage	-	-	-	1	One PF
250	2065	A	TU-2	4	16	Polished Basalt Stone	-	-	1.50	1	Fragment of large artifact; broken on all four sides; possible mirror fragment
259	2065	A	TU-2	6	17	Ocre Mineral	-	-	-	1	-
266	2032	B	TU-2	I/3	18	Basalt Flake with Polish	3.12	4.05	0.73	1	Two polished facets
280	2032	A	TU-3	3	19	Basalt Flake with Polish	-	-	-	1	One NDF
289	2072	A	TU-1	2	-	Basalt Debitage	-	-	-	1	One IF
290	2072	A	TU-1	3	-	Basalt Debitage	-	-	-	2	Two NDF
295	2072	A	TU-1	6	20	Basalt Flake with Polish	2.14	0.83	0.40	1	Two polished facets
298	2072	B	TU-3	I/1	-	Volcanic Glass Debitage	-	-	-	1	One NDF
299	2072	B	TU-3	I/2	21	Basalt Adze Blank	5.12	2.42	1.26	1	Proximal end of adze preform; roughed out tang
300	2072	B	TU-3	I/2	-	Volcanic Glass Debitage	-	-	-	4	One PF; 3 NDF
300	2072	B	TU-3	I/2	22	Volcanic Glass Core	2.37	2.04	1.16	1	Based on small nodule; single, unprepared striking platform
303	2072	B	TU-3	I/2	-	Basalt Debitage	-	-	-	1	One IF
325	2073	A	TU-1	2	23	Coral Abrader	2.89	2.33	1.00	1	One worked facet
329	2073	A	TU-1	3	-	Basalt Debitage	-	-	-	3	One IF; 2 NDF
332	2073	A	TU-1	4	24	Basalt Adze Blank	-	-	-	1	Three polished facets on small piece
337	2073	A	TU-1	5	-	Basalt Debitage	-	-	-	1	One SF
342	2074	A	TU-1	I/4	25	Basalt Polishing Stone	-	-	2.84	1	Fragment of larger stone; broken around entire edge

PF = Primary Flake; SF = Secondary Flake; IF = Interior Flake; NDF = Non-Diagnostic Flake

I.S.O. = Isolated Find

Lab Bag	Site	Feature	Unit	Layer	Artifact No.	Artifact Type	Length cm	Width cm	Thick. cm	Lot Count	Remarks
350	2075	B	TU-1	I/2	-	Volcanic Glass Debitage	-	-	-	1	One NDF
351	2075	B	TU-1	I/2	-	Basalt Debitage	-	-	-	1	One NDF
362	2076	A	TU-1	2	-	Basalt Debitage	-	-	-	1	One NDF
365	2076	A	TU-1	2	-	Volcanic Glass Debitage	-	-	-	1	One NDF
368	2076	A	TU-1	3	-	Basalt Debitage	-	-	-	2	One IF; 1 NDF
374	2079	A	TU-1	2	-	Volcanic Glass Debitage	-	-	-	3	Three NDF
377	2079	A	TU-1	3	-	Volcanic Glass Debitage	-	-	-	3	Three NDF
379	2079	A	TU-1	4	-	Basalt Debitage	-	-	-	3	One IF; 1 SF; 1 NDF
380	2079	A	TU-1	4	-	Volcanic Glass Debitage	-	-	-	4	Four NDF
385	2079	A	TU-1	5	-	Volcanic Glass Debitage	-	-	-	2	One SF
388	2081	A	TU-1	2	-	Basalt Debitage	-	-	-	1	One IF
390	2081	A	TU-1	3	-	Coral Manuport	-	-	-	1	Raw material
391	2081	A	TU-1	3	26	Red Ocre Mineral	-	-	-	1	One small nodule
392	2081	A	TU-1	2	-	Volcanic Glass Debitage	-	-	-	1	One NDF
394	2081	A	TU-1	4	-	Volcanic Glass Debitage	-	-	-	3	One IF; 2 NDF
395	2081	A	TU-1	4	-	Basalt Debitage	-	-	-	5	One IF; 2 PF; 2 NDF
398	2081	A	TU-1	5	-	Basalt Debitage	-	-	-	25	One IF; 2 PF; 22 NDF
400	2081	A	TU-1	6	-	Basalt Debitage	-	-	-	7	Seven NDF
401	2082	A	TU-1	2	27	Edge Altered Basalt Flake	7.39	6.04	4.64	1	Very thick flake (SF); 1 altered edge - convex, unifacial, retouched
404	2082	A/SSF-1	TU-1	1	-	Basalt Debitage	-	-	-	1	One IF

407	2082	A/SSF-1	TU-1	2	-	Basalt Debitage	-	-	-	1	-
456	2034	A	TU-1	1	-	Basalt Debitage	-	-	-	4	Two IF; 2 NDF
456	2034	A	TU-1	1	-	Volcanic Glass Debitage	-	-	-	2	One IF; 1 NDF
457	2034	A	TU-1	1	30	Edge Altered Basalt Flake	6.00	8.12	2.69	1	Based on IF; 1 altered edge - straight, unifacial, use-wear; 5.17 cm

PF = Primary Flake; SF = Secondary Flake; IF = Interior Flake; NDF = Non-Diagnostic Flake

I.S.O. = Isolated Find

Lab Bag	Site	Feature	Unit	Layer	Artifact No.	Artifact Type	Length cm	Width cm	Thick. cm	Lot Count	Remarks
417	2035	A	TU-1	I/2	-	Basalt Debitage	-	-	-	2	One SF; 1 NDF
420	2035	A	TU-1	I/3	-	Basalt Debitage	-	-	-	3	One IF; 2 NDF
421	2035	A	TU-1	I/3	-	Volcanic Glass Debitage	-	-	-	1	One IF
425	2035	A	TU-1	I/4	-	Basalt Debitage	-	-	-	1	One NDF
427	2035	A	TU-1	I/5	-	Basalt Debitage	-	-	-	1	One SF

PF = Primary Flake; SF = Secondary Flake; IF = Interior Flake; NDF = Non-Diagnostic Flake

I.S.O. = Isolated Find

APPENDIX B: VERTEBRATE REAMINS

SITE 2074		FEATURE TOTAL
Feature	A	
Test Unit	1	
Layer/Level	4	
AVES		
Medium Bird	1	1
TOTAL VERTEBRATES	1	1

SITE 2047											FEATURE TOTAL
Feature	B	B	B	B	B	B	B	B	B	B	
Subfeature	--	1	1	1	--	--	--	2	--	--	
Test Unit	2	2	2	2	2	2	2	2	2	2	
Layer/Level	4	2/EAST	2/EAST	2/WEST	5	6	I/7	2	8	9	
BONY FISHES											
Non-Diagnostic Elements	--	--	--	1	--	--	1**	1**	1	1	5
TOTAL BONY FISHES	--	--	--	1	--	--	1	1	1	1	5
AVES											
Gallus gallus	1*	--	--	--	--	1**	--	--	--	--	2
Medium Bird	1	--	--	--	--	--	--	--	--	--	1
Medium/Large Bird	--	--	--	--	1	--	--	--	--	--	1
TOTAL AVES	2	--	--	--	1	1	--	--	--	--	4
MAMMALIA											
Canis familiaris	--	--	--	--	--	1	--	--	--	--	1
Sus scrofa	--	1	1	--	--	--	--	--	--	--	2
Small/Medium Mammal	--	--	--	1	1	--	--	--	--	--	2
TOTAL MAMMALIA	--	1	1	1	1	1	--	--	--	--	5
Medium Vertebrate	1	1	1	--	--	--	--	--	--	--	3
TOTAL VERTEBRATES	3	2	2	2	2	2	1	1	1	1	17

* = Artifact included

** = Contains positive and tentative identifications

SITE 2030							FEATURE TOTAL
Feature	A	A	A	A	A	A	
Test Unit	1	1	1	1	2	2	
Layer/Level	2	3	4	5	3	4	
BONY FISHES							
Non-Diagnostic Elements	1	--	--	--	--	--	1
TOTAL BONY FISHES	1	--	--	--	--	--	1
AVES							
Gallus gallus	--	--	1**	--	--	--	1
Medium Bird	--	--	1	1	--	--	2
TOTAL AVES	--	--	2	1	--	--	3
MAMMALIA							
Rattus exulans	--	--	1	--	2	1	4
Sus scrofa	--	--	--	1	--	1	2
Small/Medium Mammal	--	1**	--	1**	--	--	2
TOTAL MAMMALIA	--	1	1	2	2	2	8
TOTAL VERTEBRATES	1	1	3	3	2	2	12

** = Contains positive and tentative identifications

SITE 2030		FEATURE TOTAL
Feature	B	
Test Unit	3	
Layer/Level	4	
MAMMALIA		
Canis familiaris	1	1
TOTAL VERTEBRATES	1	1

SITE 2050							FEATURE TOTAL
Feature	A	A	A	A	A	A	
Test Unit	1	1	1	2	2	2	
Layer/Level	2	3	4	2	3	4	
BONY FISHES							
Non-Diagnostic Elements	--	--	1	1	1	--	3
TOTAL BONY FISHES	--	--	1	1	1	--	3
AVES							
Medium Procellarid	--	--	--	--	1	--	1
Gallus gallus	--	--	--	1**	1**	--	2
Medium Bird	--	--	--	--	1	--	1
TOTAL AVES	--	--	--	1	3	--	4
MAMMALIA							
Rattus exulans	1	1	1	--	--	--	3
Canis familiaris	--	--	--	1	--	--	1
Sus scrofa	--	--	--	1	1	--	2
Small/Medium Mammal	--	--	--	1	--	1	2
Medium Mammal	--	--	--	1	--	--	1
TOTAL MAMMALIA	1	1	1	4	1	1	9
TOTAL VERTEBRATES	1	1	2	6	5	1	16

** = Contains positive and tentative identifications

SITE 2050		FEATURE TOTAL
Feature	B	
Test Unit	6	
Layer/Level	3	
MAMMALIA		
Rattus exulans	1	1
TOTAL VERTEBRATES	1	1

SITE 2050							FEATURE TOTAL
Feature	C	C	C	C	C	C	
Test Unit	4	4	4	4	4	5	
Layer/Level	1	2/SIDE A	2/SIDE B	3	4	3	
BONY FISHES							
Non-diagnostic Elements	1	1	--	--	1	--	3
TOTAL BONY FISHES	1	1	--	--	1	--	3
AVES							
Medium Procellarid	--	--	--	--	1	--	1
Gallus gallus	1**	1**	--	1**	--	--	3
Porzana sp.	--	--	--	--	1	--	1
Small Bird	--	--	--	--	--	1	1
Medium Bird	--	--	--	1	--	--	1
TOTAL AVES	1	1	--	2	2	1	7
MAMMALIA							
Rattus exulans	--	1**	1**	1	--	--	3
Small/Medium Mammal	--	1	1	--	--	--	2
TOTAL MAMMALIA	--	2	2	1	--	--	5
Medium Vertebrate	--	1	1	--	--	--	2
TOTAL VERTEBRATES	2	5	3	3	3	1	17

** = Contains positive and tentative identifications

SITE 2050							FEATURE TOTAL
Feature	D	D	D	D	D	D	
Subfeature	--	--	--	--	--	1	
Test Unit	3	3	3	3	3	3	
Layer/Level	3	4	4	4	4	1/WEST	
Depth	--	20bs	22bs	25bs	20-30bs	30-40bs	
BONY FISHES							
Non-Diagnostic Elements	1	--	--	--	1	1	3
TOTAL BONY FISHES	1	--	--	--	1	1	3
AVES							
Medium Procellarid	1	--	--	--	1	--	2
Gallus gallus	--	1**	1**	1**	1**	1**	5
Medium Bird	1**	--	1	--	1	--	3
TOTAL AVES	2	1	2	1	3	1	10
MAMMALIA							
Rattus exulans	1	--	--	--	--	--	1
Sus scrofa	--	1**	--	--	--	--	1
TOTAL MAMMALIA	1	1	--	--	--	--	2
Small/Medium Vertebrate	--	--	--	--	1	--	1
TOTAL VERTEBRATES	4	2	2	1	5	2	16

** = Contains positive and tentative identifications

SITE 2065								
Feature	A	A	A	A	A	A	A	**FEATURE TOTAL**
Test Unit	1	1	2	2	2	2	2	
Layer/Level	3	4	2	3	4	5	6	
BONY FISHES								
Non-Diagnostic Elements	--	--	--	1	--	1	--	2
TOTAL BONY FISHES	--	--	--	1	--	1	--	2
AVES								
Gallus gallus	--	--	--	1**	--	--	--	1
Medium Bird	--	--	--	1	--	--	--	1
TOTAL AVES	--	--	--	2	--	--	--	2
MAMMALIA								
Rattus exulans	--	--	--	1	--	1	--	2
Sus scrofa	1**	--	--	--	--	--	--	1
Small/Medium Mammal	--	1**	--	1	1**	--	1	4
Medium Mammal	--	--	1	--	--	--	--	1
TOTAL MAMMALIA	1	1	1	2	1	1	1	8
Small/Medium Vertebrate	--	--	--	1	--	--	--	1
Medium Vertebrate	--	--	--	--	--	1	--	1
TOTAL VERTEBRATES	1	1	1	6	1	3	1	14

** = Contains positive and tentative identifications

SITE 2032			
Feature	B	B	**FEATURE TOTAL**
Test Unit	2	2	
Layer/Level	I/3	I/4	
BONY FISHES			
Non-Diagnostic Elements	--	1	1
TOTAL BONY FISHES	--	1	1
MAMMALIA			
Rattus exulans	--	1	1
Sus scrofa	1	--	1
TOTAL MAMMALIA	1	1	2
TOTAL VERTEBRATES	1	2	3

SITE 2072					
Feature	B	B	B	B	FEATURE TOTAL
Test Unit	3	3	3	3	
Layer/Level	I/1	I/2	I/4	I/5	
BONY FISHES					
Scaridae	1	--	--	--	1
Non-Diagnostic Elements	1	1	1	1	4
TOTAL BONY FISHES	2	1	1	1	5
MAMMALIA					
Rattus exulans	--	1	--	--	1
TOTAL MAMMALIA	--	1	--	--	1
TOTAL VERTEBRATES	2	2	1	1	6

SITE 2073				
Feature	A	A	A	FEATURE TOTAL
Test Unit	1	1	1	
Layer/Level	3	4	5	
AVES				
Asio flammeus	--	1	--	1
Medium Bird	1	1	1	3
TOTAL AVES	1	2	1	4
MAMMALIA				
Small/Medium Mammal	1**	--	--	1
TOTAL MAMMALIA	1	--	--	1
Small/Medium Vertebrate	1	--	--	1
TOTAL VERTEBRATES	3	2	1	6

** = Contains positive and tentative identifications

SITE 2075			
Feature	B	B	FEATURE TOTAL
Test Unit	1	1	
Layer/Level	I/3	I/4	
MAMMALIA			
Rattus exulans	1	1	2
TOTAL VERTEBRATES	1	1	2

SITE 2076			
Feature	A	A	FEATURE TOTAL
Test Unit	1	1	
Layer/Level	2	3	
BONY FISHES			
Scaridae	1	--	1
TOTAL BONY FISHES	1	--	1
MAMMALIA			
Rattus exulans	--	1	1
TOTAL MAMMALIA	--	1	1
TOTAL VERTEBRATES	1	1	2

SITE 2079			
Feature	A	A	FEATURE TOTAL
Test Unit	1	1	
Layer/Level	3	5	
ELASMOBRANCH	--	1	1
BONY FISHES			
Non-diagnostic Elements	--	1	1
TOTAL BONY FISHES	--	1	1
MAMMALIA			
Rattus exulans	1	--	1
TOTAL MAMMALIA	1	--	1
TOTAL VERTEBRATES	1	2	3

SITE 2034		
Feature	A	FEATURE TOTAL
Test Unit	1	
Layer/Level	1	
TOTAL AVES	1	1
MAMMALIA		
Rattus/Mus sp.	1	1
TOTAL MAMMALIA	1	1
TOTAL VERTEBRATES	2	2

SITE 2035		FEATURE TOTAL
Feature	A	
Test Unit	1	
Layer/Level	4	
MAMMALIA		
Rattus exulans	1	1
TOTAL MAMMALIA	1	1
Small/Medium Vertebrate	1	1
TOTAL VERTEBRATES	2	2

APPENDIX C: INVERTEBRATE REMAINS

SITE 2047			
FEATURE	A	A	**FEATURE TOTAL (grams)**
TEST UNIT	1	1	
LAYER/LEVEL	I/3	4	
MOLLUSCA			
Cypraea sp.	1.5	--	1.5
Non-Diagnostic Shell	--	3.0*	3.0
TOTAL INVERTEBRATES	1.5	3.0	3.5

* = Artifact included

SITE 2047														
FEATURE	B	B	B	B	B	B	B	B	B	B	B	B	B	**FEATURE TOTAL (grams)**
SUBFEATURE	--	--	--	--	--	--	--	1	1	1	1	1	2	
TEST UNIT	2	2	2	2	2	2	2	2	2	2	2	2	2	
LAYER/LEVEL	I/3	4	5	6	I/7	8	9	1	1/EAST	2/EAST	1/WEST	2/WEST	2	
MOLLUSCA														
Nerita picea	--	0.1	--	--	--	--	--	--	--	--	--	--	--	0.1
Theodoxus neglectus	--	--	--	0.5	--	--	--	--	--	--	--	0.2	--	0.7
Mitrella bella	--	--	--	--	--	--	--	--	--	--	T	--	--	T
Amastra cylindrica	--	--	0.3	--	0.2	--	--	--	--	--	--	--	--	0.5
Carelia sinclari	--	--	--	--	--	--	0.1	--	--	--	--	--	--	0.1
Isognomon sp.	--	--	--	--	--	--	--	--	0.1	--	T	--	--	0.1
Isognomon californicum	--	--	--	--	--	0.4	--	0.3	--	--	--	0.6	--	1.3
Tellina palatam	--	--	--	--	--	--	--	--	--	--	--	1.1	--	1.1
Non-Diagnostic Shell	T	--	--	T	--	--	T	T	--	--	--	--	--	T
TOTAL MOLLUSCA	T	0.1	0.3	0.5	0.2	0.4	0.1	0.3	0.1	--	T	1.9	--	3.9
VERMETIDAE	--	5.9	--	--	--	--	--	--	--	--	--	--	--	5.9
CRUSTACEA	--	--	--	--	--	--	--	--	--	T	--	--	T	T
ECHINOIDEA	--	0.7	0.2	0.4	--	0.3	0.1	1.9	--	0.3	0.1	--	0.8	4.8
TOTAL INVERTEBRATES	T	6.7	0.5	0.9	0.2	0.7	0.2	2.2	0.1	0.3	0.1	1.9	0.8	14.6

SITE 2030							FEATURE TOTAL (grams)
FEATURE	A	A	A	A	A	A	
TEST UNIT	1	1	1	1	2	2	
LAYER/LEVEL	2	3	4	5	3	4	
MOLLUSCA							
Cellana sandwicensis	9.6*	--	--	--	--	--	9.6
Turbo sandwicensis	--	--	--	--	1.3	0.1	1.4
Cypraea sp.	0.7	2.0	1.3	--	--	0.6	4.6
Drupa sp.	--	1.0	--	--	--	--	1.0
Carelia sinclari	--	--	--	0.3**	--	0.1	0.4
Tellina palatam	--	--	--	0.5	--	--	0.5
Non-Diagnostic Shell	0.4	--	0.2	--	--	1.6	2.2
TOTAL MOLLUSCA	10.7	3.0	1.5	0.8	1.3	2.4	19.7
CRUSTACEA	--	T	--	0.1	--	--	0.1
ECHINOIDEA	T	0.2	0.2	--	--	0.1	0.5
TOTAL INVERTEBRATES	10.7	3.2	1.7	0.9	1.3	2.5	20.3

* = Artifact included

** = Contains positive and tentative identifications

T = Trace element; less than 0.1 gram

SITE 2050							FEATURE TOTAL (grams)
FEATURE	A	A	A	A	A	A	
TEST UNIT	1	1	2	2	2	2	
LAYER/LEVEL	2	3	2	3	4	5	
MOLLUSCA							
Cellana sp.	--	--	0.4	--	--	0.1	0.5
Theodoxus neglectus	0.1	--	--	--	--	--	0.1
Cypraea sp.	0.5	--	--	--	--	--	0.5
Conus sp.	--	--	--	--	2.1	--	2.1
Tellina palatam	--	--	--	--	0.5	--	0.5
TOTAL MOLLUSCA	0.6	--	0.4	--	2.6	0.1	3.7
ECHINOIDEA	0.1	0.1	0.2	0.3	--	--	0.7
TOTAL INVERTEBRATES	0.7	0.1	0.6	0.3	2.6	0.1	4.4

SITE 2050						FEATURE TOTAL (grams)
FEATURE	C	C	C	C	C	
TEST UNIT	4	4	4	5	5	
LAYER/LEVEL	1	2/SIDE B	4	2	3	
MOLLUSCA						
Turbo sandwicensis	--	--	--	0.3	0.7	1.0
Cypraea sp.	--	--	0.4	--	--	0.4
TOTAL MOLLUSCA	--	--	0.4	0.3	0.7	1.4
ECHINOIDEA	1.4	0.5	--	--	--	1.9
TOTAL INVERTEBRATES	1.4	0.5	0.4	0.3	0.7	3.3

SITE 2050						FEATURE TOTAL (grams)
FEATURE	D	D	D	D	D	
SUBFEATURE	--	--	1	1	1	
TEST UNIT	3	3	3	3	3	
LAYER/LEVEL	3	4	1/WEST	2/WEST	1/EAST	
MOLLUSCA						
Cellana sp.	8.0	--	--	0.1	--	8.1
Cellana sandwicensis	--	0.3	--	--	--	0.3
Conus sp.	1.7	0.4	--	--	--	2.1
Amastra cylindrica	--	--	--	--	0.1	0.1
Non-Diagnostic Shell	0.3	T	T	--	--	0.3
TOTAL MOLLUSCA	10.0	0.7	T	0.1	0.1	10.9
ECHINOIDEA	0.1	0.8	0.4	0.1	0.7	2.1
Echinometra mathaei	1.6	0.1	0.1	--	--	1.8
TOTAL INVERTEBRATES	11.7	1.6	0.5	0.2	0.8	14.8

T = Trace element; less than 0.1 gram

SITE 2059		FEATURE TOTAL (grams)
FEATURE	A	
TEST UNIT	1	
LAYER/LEVEL	3	
MOLLUSCA		
Cellana sp.	2.8	2.8
TOTAL INVERTEBRATES	2.8	2.8

SITE 2065		FEATURE TOTAL (grams)
FEATURE	A	
TEST UNIT	2	
LAYER/LEVEL	3	
MOLLUSCA		
Cellana sp.	25.2	25.2
TOTAL INVERTEBRATES	25.2	25.2

SITE 2073			FEATURE TOTAL (grams)
FEATURE	A	A	
TEST UNIT	1	1	
LAYER/LEVEL	3	4	
MOLLUSCA			
Cypraea sp.	1.1	0.2	1.3
Non-Diagnostic Shell	--	T	T
TOTAL MOLLUSCA	1.1	0.2	1.3
ECHINOIDEA	--	0.1	0.1
TOTAL INVERTEBRATES	1.1	0.3	1.4

T = Trace element; less than 0.1 gram

SITE 2076			FEATURE TOTAL (grams)
FEATURE	A	A	
TEST UNIT	1	1	
LAYER/LEVEL	2	3	
MOLLUSCA			
Cellana sp.	2.7	--	2.7
Cellana sandwicensis	0.6	--	0.6
Non-Diagnostic Shell	--	T	T
TOTAL INVERTEBRATES	3.3	T	3.3

T = Trace element; less than 0.1 gram

SITE 2034		FEATURE TOTAL (grams)
FEATURE	A	
TEST UNIT	1	
LAYER/LEVEL	1	
MOLLUSCA		
Cellana sandwicensis	0.4	0.4
TOTAL INVERTEBRATES	0.4	0.4

SITE 2035		FEATURE TOTAL (grams)
FEATURE	A	
TEST UNIT	1	
LAYER/LEVEL	3	
MOLLUSCA		
Cypraea sp.	0.3	0.3
TOTAL INVERTEBRATES	0.3	0.3

APPENDIX D: RADIOCARBON TABLE

State Site Number: **50-50-10-#**	**Beta Lab ID Number**	**Provenience:** **Feature, Test Unit, Depth cmbs**	**Calibrated Age (1 Sigma)** **(A.D.)**	**Calibrated Age** **(2 Sigma)** **(A.D.)**	**Conventional Age (BP)**	**13C/12C Ratio**
2046	178342	Fe. B, TU-1, 10–20 cmbs	1810–1920 1690–1730	1800–1940 1680–1750	60±50	-13.1
2047	178343	Fe. A, TU-1, 20–30 cmbs	1400–1495	1390–1530	450±60	-24.4
2047	178344	Fe. B, TU-2, 20–30 cmbs	1510–1670	1450–1680	280±60	-20.3
2047	178345	Fe. B, TU-2, 44–54 cmbs	1550–1640	1460–1650	330±40	-24.0
2047	178346	Fe. B, TU-2, 60–70 cmbs	1630–1820	1500–1890	220±70	-23.2
2049	178347	Fe. B, TU-1, 20–30 cmbs	1630–1670	1510–1680	250±40	-24.3
2049	178348	Fe. B, TU-1, 32 cmbs	1730–1820	1650–1890	170±40	-11.2
2030	178349	Fe. A, TU-1, 0–10 cmbs	1510–1600	1480–1660	300±40	-25.3
2030	178350	Fe. A, TU-1, 30–40 cmbs	1510–1640	1470–1650	320±40	-24.5
2030	178351	Fe. B, TU-3, 10–20 cmbs	103.09±0.81 pMC (modern)	—	103.09±0.81pMC	-25.0
2050	178352	Fe. A, TU-2, 26 cmbs	1720–1820	1650–1890	170±50	-23.9
2050	178353	Fe. A, TU-2,	1490–1650	1440–1680	310±70	-24.6

		42–72 cmbs				
2050	178354	Fe. A, TU-3, 20–30 cmbs	1430–1520	1420–1640	400±50	-24.4
2050	178355	Fe. A, TU-3, 24–34 cmbs	1480–1640	1440–1660	330±60	-23.9
2050	178357	Fe. C, TU-4	1740–1800	1730–1810	230±40	-24.5
2059	178358	Fe. A, TU-1, 10–20 cmbs	101.5±0.9pMC	—	100±0.9pMC	-17.5
2061	178359	Fe. E, TU-1, 0–10 cmbs	1730–1810	1620–1880	220±50	-14.3
2061	178360	Fe. E, TU-1, 10–20 cmbs	1660–1890	1730–1750 1670–1690	160±60	-11.1
2061	178361	Fe. C, TU-2, 26 cmbs	1730–1820	1730–1750 1670–1690	160±40	-11.1
2065	178362	TU-2, 40–50 cmbs	1510–1640	1280–1520	490±70	-23.8
2065	178363	TU-2, 0–10 cmbs	1390–1480	1450–1660	320±50	-23.3
2032 2032	178364 178365	Fe. A, TU-3, 10-20 cmbs Fe. B, TU-2, 15-20 cmbs	118.19±0.74pMC (modern) 1810–1930	— 1795	118.19±.74pMC 30±80	-23.9 -10.5
2072	178366	Fe. A, TU-1, 10–20 cmbs	1480–1660	1430–1690	300±80	-25.0
2072	178367	Fe. C, TU-2, 10–20 cmbs	1810–1920	1500–1890	220±70	-24.4

2072	178368	Fe. B, TU-4, 10–20 cmbs	610–657	560–670	1410±40	-23.2
2072	178369	Fe. B, TU-4, 40–50 cmbs	1690–1920	1800–1940	40±60	-25.3
2073	178370	Fe. A, TU-1, 10–20 cmbs	1430–1520	1420–1640	390±60	-24.4
2073	178371	Fe. A, TU-1, 40–50 cmbs	1510–1640	1470–1650	320±40	-25.9
2074	178372	Fe. A, TU-1, 0–10 cmbs	1800–1949	1665	110±80	-12.2
2075	178373	Fe. B, TU-1, 0–10 cmbs	1380–1470	1390–1640	440±60	-27.4
2075	178374	Fe. B, TU-1, 30–40 cmbs	1410-1510	1280-1520	500±80	-24.8
2076	178375	Fe. A, TU-1, 10-20 cmbs	1810–1930	1670	100±60	-24.9
2076	178376	Fe. A, TU-1, 30–40 cmbs	1300-1440	1260-1520	550±90	-24.4
2079	178377	Fe. A, TU-1, 20–30 cmbs	1230–1320	1120–1430	700±90	-23.7
2081	178378	Fe. A, TU-1, 10–20 cmbs	1410–1520	1400–1640	430±60	-24.1
2081	178379	Fe. A, TU-1, 30–40 cmbs	1430–1520	1410–1640	410±60	-24.1
2082	178380	Fe. A, TU-1, 0–10 cmbs	1800–1930	1660	110±60	-16.1
2082	178381	Fe. A, TU-1, 44–54 cmbs	1810–1920	1795	70±60	-23.5
2098	178382	Fe. A, ST-1,	1740-1810	1720-1880	200±40	-19.8

		10–20 cmbs				
2035	178383	Fe. A, TU-1, 10–20 cmbs	1720–1820	1500–1890	220±70	-24.6
2035	178384	Fe. A, TU-1, 30–40 cmbs	1490–1660	1440–1690	290±70	-24.9
2331	178385	Fe. A, TU-1, 0–10 cmbs	1510–1650	1450–1660	310±50	-25.5
2331	178386	Fe. A, TU-1, 40–50 cmbs	1280–1400	1180–1460	630±100	-23.2

Take photos and attach to this worksheet. May use Photo Documentation Technical Note.

Purpose of Worksheet:

This worksheet shall be used in the Pacific Islands Area for conservation planning purposes to conduct and document an investigation to identify cultural resources that are, or may be, in the conservation planning project area.

The investigation includes a review of existing information (steps 1 and 2) which is completed in the office before step 3 the client interview and step 4, the field inspection, is conducted.

No specialized training is required to complete steps 1 and 2. Step 3, the client interview should be conducted in conjunction with step 4, the field inspection, so the client is available to point out any previously known cultural resources.

A field inspection is conducted to examine previously known cultural resources identified in steps 1, 2, and 3 and to also survey the project area to locate new cultural resources. The field inspection should be conducted by a staff person(s) with NRCS PIA cultural resources training (Cultural Resources Modules 1-8).

When should this Worksheet be Completed:

This worksheet shall be completed by the NRCS planner during Phase I of the NRCS conservation planning process (Collection and Analysis - Understanding the Problems and

What this Information is Used for:

The worksheet shall be used by the NRCS planner to complete the cultural resources evaluation for the Resource Problem Worksheet (Conservation Planning Technical Note No. 1).

The information collected shall also be used to inform the client of the presence/absence of cultural resources within the conservation plan project area.

Pursuant to NRCS' General Manual 450, Part 405.1.D(2)(i), it is NRCS' responsibility to advise the client that should they choose to implement any conservation practices recommended in the NRCS Conservation Plan, the client must adhere to all state and local historic preservation law. This Cultural Resources Technical Note #1 serves as NRCS' notification to the client of the necessity of adhering to state and local historic preservation law relative to the presence/absence of cultural resources within the conservation plan area. The NRCS advises the client to consult with the SHPO (State Historic Preservation Office) prior to the implementation of conservation practices contained within the conservation plan. In securing permits, should they be required by state and local law, the client may wish to furnish the data collected on this form to the state or local permitting office as part of a permit application.

Client Signature & Date ***(required for CTA-only plans)*** **:**

3/17/2020

I certify that NRCS has advised me of my responsibility to adhere to state and local historic preservation law and conduct any consultations with the SHPO, as applicable.

Filing:

This worksheet should be printed out and filed in the client's conservation plan file folder.

Definitions: