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STATE OF HAWAII
LAND USE COMMISSION

Kaawanui Solar Project

SPECIAL PERMIT/USE PERMIT/
CLASS IV PERMIT APPLICATION

MAKAWELI, ISLAND OF KAUAʻI, HAWAIʻI

EXHIBITS

aes Hawaiʻi

JANUARY 2026

Exhibit A

Required Application Attachments

Exhibit A1

Applicant Authorization and Supporting Documentation

AUTHORIZATION OF APPLICANT

I. APPLICANT.

Name: KAAWANUI SOLAR, LLC,
a Delaware limited liability company

Address: c/o Kaawanui Solar, LLC
Attn.: Nick Molinari
1003 Bishop Street
Suite 1600, Pauahi Tower
Honolulu, HI 96813

Email: nick.molinari@aes.com

II. AUTHORIZED AGENT.

a. Name: Max W. J. Graham, Jr., Esq.
Michael J. Belles, Esq.
Ian K. Jung, Esq.

Address: Belles Graham LLP
3135 Akahi Street, Suite A
Lihue, Kauai, Hawaii 96766

Telephone: (808) 246-6962
(808) 246-6961

Email: mwg@kauai-law.com
mjb@kauai-law.com
ikj@kauai-law.com

b. Name: Benjamin M. Matsubara, Esq.
Curtis T. Tabata, Esq.

Address: Matsubara Kotake & Tabata
888 Mililani Street, Suite 308
Honolulu, Hawaii 96813-2931

Telephone: (808) 526-9566
Email: bmatsubara@m-klawyers.com
ctabata@m-klawyers.com

c. Name: Group 70 International, Inc.

Address: 111 S. King Street, Suite 170
Honolulu, Hawaii 96813

Telephone: (808) 523-5866
Email: tracyc@g70.design
barbaran@g70.design

III. PROPERTY.

Parcel 6/Parcel 10
Makaweli, Waimea, Kauai, Hawaii
Kauai Tax Map Key No. (4) 1-7-006:006 (por.) and 010 (por.)

IV. AUTHORIZATION.

The Applicant hereby authorizes the Authorized Agent to act on the Applicant's behalf and to file and process on the Applicant's behalf any and all applications necessary to obtain governmental permits relating to the proposed Application on the Subject Property, including, but not limited to, the following:

1. Building permits, grading permits, use permits, variance permits, zoning permits, and Special Management Area permits issued by any department, agency, board or commission of the County of Kauai.

2. Permits issued by the Department of Health of the State of Hawaii.

3. Permits issued by the Board of Land and Natural Resources of the State of Hawaii and/or the Department of Land and Natural Resources of the State of Hawaii.

4. Permits issued by the Land Use Commission of the State of Hawaii.

DATED: 12/29/2025.

APPLICANT:

KAAWANUI SOLAR, LLC,
a Delaware limited liability company

By: ACE DEVCO NC, LLC,
a Delaware limited liability company
Its Member

By Nick Molinari

Its Senior Director, Project Development

Attachments
- Kaawanui Solar, LLC DCCA Business Registration
- ACE DevCo NC, LLC DCCA Business Registration
- ACE Development Company, LLC DCCA Business Registration
- Incumbency Certificate of ACE Development Company, LLC and its Subsidiaries (*Kaawanui Solar, LLC and ACE DevCo NC, LLC*)

DCCA State of Hawaii

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Website URL: http://hbe.ehawaii.gov/documents

Business Information

MASTER NAME	KAAWANUI SOLAR, LLC
BUSINESS TYPE	Foreign Limited Liability Company (LLC)
FILE NUMBER	336361 C6
STATUS	Active
ORGANIZED IN	Delaware UNITED STATES
REGISTRATION DATE	Nov 26, 2024
PRINCIPAL ADDRESS	2180 SOUTH 1300 EAST, SUITE 500 SALT LAKE CITY, Utah 84106 UNITED STATES
MAILING ADDRESS	2180 SOUTH 1300 EAST, SUITE 500 SALT LAKE CITY, Utah 84106 UNITED STATES
TERM	AT-WILL
MANAGED BY	MEMBER(S)
AGENT NAME	CORPORATION SERVICE COMPANY
AGENT ADDRESS	1003 BISHOP STREET SUITE 1600 PAUAHI TOWER HONOLULU, Hawaii 96813 UNITED STATES

Annual Filings

FILING YEAR	DATE RECEIVED	STATUS
2025		Not Filed

Officers

NAME	OFFICE	DATE
ACE DEVCO NC, LLC	MEM	Nov 26, 2024

Trade Names

NAME	TYPE	CATEGORY	REGISTRATION DATE	EXPIRATION DATE	STATUS
KA MANA O KA LĀ O KA'AWANUI	Trade Name	NO CATEGORY SELECTED	Dec 3, 2024	Dec 2, 2029	Active

DCCA State of Hawaii

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Website URL: http://hbe.ehawaii.gov/documents

Business Information

MASTER NAME	ACE DEVCO NC, LLC
BUSINESS TYPE	Foreign Limited Liability Company (LLC)
FILE NUMBER	276487 C6
STATUS	Active
ORGANIZED IN	Delaware UNITED STATES
REGISTRATION DATE	May 17, 2022
PRINCIPAL ADDRESS	2180 SOUTH 1300 EAST SUITE 500 SALT LAKE CITY, Utah 84106 UNITED STATES
MAILING ADDRESS	2180 SOUTH 1300 EAST SUITE 500 SALT LAKE CITY, Utah 84106 UNITED STATES
TERM	AT-WILL
MANAGED BY	MEMBER(S)
AGENT NAME	CORPORATION SERVICE COMPANY
AGENT ADDRESS	1003 BISHOP STREET SUITE 1600 PAUAHI TOWER HONOLULU, Hawaii 96813 UNITED STATES

Annual Filings

FILING YEAR	DATE RECEIVED	STATUS
2025	Jun 19, 2025	Processed
2024	Jun 11, 2024	Processed
2023	May 26, 2023	Processed

Officers

NAME	OFFICE	DATE
ACE DEVELOPMENT COMPANY, LLC	MEM	Oct 6, 2025

DCCA State of Hawaii

Downloaded on October 13, 2025.
The information provided below is not a certification of good standing and does not constitute any other certification by the State.
Website URL: http://hbe.ehawaii.gov/documents

Business Information

MASTER NAME	ACE DEVELOPMENT COMPANY, LLC
BUSINESS TYPE	Foreign Limited Liability Company (LLC)
FILE NUMBER	356408 C6
STATUS	Active
ORGANIZED IN	Delaware UNITED STATES
REGISTRATION DATE	Oct 6, 2025
PRINCIPAL ADDRESS	2180 SOUTH 1300 EAST, SUITE 500 SALT LAKE CITY, Utah 84106 UNITED STATES
MAILING ADDRESS	2180 SOUTH 1300 EAST, SUITE 500 SALT LAKE CITY, Utah 84106 UNITED STATES
TERM	AT-WILL
MANAGED BY	MEMBER(S)
AGENT NAME	CORPORATION SERVICE COMPANY
AGENT ADDRESS	1003 BISHOP STREET SUITE 1600 PAUAHI TOWER HONOLULU, Hawaii 96813 UNITED STATES

Officers

NAME	OFFICE	DATE
AES CLEAN ENERGY DEVELOPMENT, LLC	MEM	Oct 6, 2025
AES CLEAN ENERGY DEVELOPMENT HOLDINGS, LLC	MEM	Oct 6, 2025
PIP5 LUMOS LLC	MEM	Oct 6, 2025

INCUMBENCY CERTIFICATE OF

ACE DEVELOPMENT COMPANY, LLC

AND ITS SUBSIDIARIES

The undersigned, being the duly appointed and acting General Counsel & Secretary of ACE Development Company, LLC, a Delaware limited liability company (the "Company"), does hereby certify that:

The following person is an authorized representative and agent of the Company, ACE DevCo NC, LLC, and Kaawanui Solar, LLC who serves in the position and with the title as listed below, with the same powers and authorities for the subsidiaries ("Subsidiaries") of the Company, which Subsidiaries include without limitation those identified in Exhibit A, attached hereto and incorporated herein by this reference, with the following individual being authorized to execute (a) the application and any related materials for the County Use Permit for the Kaawanui Solar Project, (b) the application and any related materials for the Class IV Zoning Permit for the Kaawanui Solar Project (c)) the application and any related materials for the State Special Permit for the Kaawanui Solar Project, and (d) other approved documents on behalf of the Company and each of its Subsidiaries, with true and correct signatures for each of the authorized representatives being set forth beside the individual's name and title below:

Name	Position
Nick Molinari	Senior Director, Development

For purposes of this Certificate, Subsidiaries shall mean, refer to and encompass all entities controlled by the Company, whether such control is held by the Company directly or through any number of one or more subsidiaries of the Company,

Executed and certified this 17th day of November, 2025.



Sean McBride
General Counsel & Secretary

EXHIBIT A

Included within the Subsidiaries of ACE Development Company, LLC, are the following specifically identified entities, which do not constitute an exhaustive list of all the Subsidiaries of ACE Development Company, LLC:

Kaawanui Solar, LLC
ACE DevCo NC, LLC

Exhibit A2

Landowner Authorization and Supporting Documentation

AUTHORIZATION OF OWNER

I. OWNER.

Name: ROBINSON FAMILY PARTNERS,
a Hawaii general partnership

Address: P. O. Box 690088
Makaweli, Kauai, Hawaii 96769

Telephone: (808) 335-3133

II. AUTHORIZED AGENT.

a. Name: Kaawanui Solar, LLC,
a Delaware limited liability company

Address: c/o Kaawanui Solar, LLC
Attn.: Nick Molinari
1003 Bishop Street
Suite 1600, Pauahi Tower
Honolulu, HI 96813

Email: nick.molinari@aes.com

b. Name: Max W. J. Graham, Jr., Esq.
Michael J. Belles, Esq.
Ian K. Jung, Esq.

Address: Belles Graham LLP
3135 Akahi Street, Suite A
Lihue, Kauai, Hawaii 96766

Telephone: (808) 246-6962
(808) 246-6961

Email: mwg@kauai-law.com
mjb@kauai-law.com
ikj@kauai-law.com

EXHIBIT "A2"

c. Name: Benjamin M. Matsubara, Esq.
Curtis T. Tabata, Esq.

Address: Matsubara Kotake & Tabata
888 Mililani Street, Suite 308
Honolulu, Hawaii 96813-2931

Telephone: (808) 526-9566
Email: bmatsubara@m-klawyers.com
ctabata@m-klawyers.com

d. Name: Group 70 International, Inc.

Address: 111 S. King Street, Suite 170
Honolulu, Hawaii 96813

Telephone: (808) 523-5866
Email: tracyc@g70.design
barbaran@g70.design

III. PROPERTY.

Parcel 6/Parcel 10
Makaweli, Waimea, Kauai, Hawaii
Kauai Tax Map Key No. (4) 1-7-006:006 (por.) and 010 (por.)

IV. AUTHORIZATION.

The Owner hereby authorizes the Authorized Agent to act on the Owner's behalf and to file and process on the Owner's behalf any and all applications necessary to obtain governmental permits relating to the proposed Application on the Subject Property, including, but not limited to, the following:

1. Building permits, grading permits, use permits, variance permits, zoning permits, and Special Management Area permits issued by any department, agency, board or commission of the County of Kauai.

2. Permits issued by the Department of Health of the State of Hawaii.

3. Permits issued by the Board of Land and Natural Resources of the State of Hawaii and/or the Department of Land and Natural Resources of the State of Hawaii.

4. Permits issued by the Land Use Commission of the State of Hawaii, including the petition for Special Permit pursuant to HRS Section 205-6 for this project, and that Owner, as sole fee simple owner of the Property, acknowledges that it, and its successors, shall be bound by the special permit and the conditions imposed by the Land Use Commission in approving the Special Permit

successors, shall be bound by the special permit and the conditions imposed by the Land Use Commission in approving the Special Permit

The Owner also acknowledges that (1) it has entered into that certain Option Agreement with Kaawanui Solar, LLC ("Kaawanui") that provides Kaawanui the right to enter into an Easement Agreement with the Owner for the above-referenced Property for a Construction Term of 3 years, with two options to extend the Construction Term for 6 months each and an Operating Term of 25 years, with three options to extend the Operating Term for 5 years each, for a maximum total Easement Agreement term of 44 years, and (2) the land uses described in the petition for Special Permit are consistent with the allowed land uses in the Option Agreement and future Easement Agreement.

DATED: 12/29/25.

OWNER:

ROBINSON FAMILY PARTNERS,
a Hawaii general partnership

By _____

Its Chairman of Management Committee

STATE OF Hawaii)
) SS:
COUNTY OF Kauai)

On this 29 day of December, 2025, before me appeared Alan Robinson, to me personally known, who, being by me duly sworn or affirmed, did say that such person executed the foregoing AUTHORIZATION OF APPLICANT dated December 29, 2025, which document consists of 4 page(s), as the free act and deed of such person, and if applicable, in the capacities shown, having been duly authorized to execute such instrument in such capacities.

KEITH R. YAP NOTARY 12-140 PUBLIC STATE OF HAWAII

Name of Notary: Keith R. Yap
Notary Public, in and for said County and State.

My commission expires: April 8, 2028

Doc Date: 12/29/2025 # Pages: 4
Name: Keith R. Yap 5th Circuit
Doc. Description: Authorization of Owner

12/29/25
Signature Date

NOTARY CERTIFICATION

KEITH R. YAP NOTARY 12-140 PUBLIC STATE OF HAWAII

Exhibit A3

Lessee Authorization and Supporting Documents

AUTHORIZATION OF LESSEE

I. LESSEE.

Name: GAY & ROBINSON, INC.,
a Hawaii corporation

Address: P. O. Box 156
Kaumakani, Kauai, Hawaii 96747

Telephone: (808) 335-3133

II. AUTHORIZED AGENT.

a. Name: Kaawanui Solar, LLC,
a Delaware limited liability company

Address: c/o Kaawanui Solar, LLC
Attn.: Mr. Nick Molinari
1003 Bishop Street
Suite 1600, Pauahi Tower
Honolulu, HI 96813

Email: nick.molinari@aes.com

b. Name: Max W. J. Graham, Jr., Esq.
Michael J. Belles, Esq.
Ian K. Jung, Esq.

Address: Belles Graham LLP
3135 Akahi Street, Suite A
Lihue, Kauai, Hawaii 96766

Telephone: (808) 246-6962
(808) 246-6961

Email: mwg@kauai-law.com
mjb@kauai-law.com
ikj@kauai-law.com

c. Name: Benjamin M. Matsubara, Esq.
Curtis T. Tabata, Esq.

Address: Matsubara Kotake & Tabata
888 Mililani Street, Suite 308
Honolulu, Hawaii 96813-2931

EXHIBIT "A3"

Telephone: (808) 526-9566
Email: bmatsubara@m-klawyers.com
ctabata@m-klawyers.com

d. Name: Group 70 International, Inc.

Address: 111 S. King Street, Suite 170
Honolulu, Hawaii 96813

Telephone: (808) 523-5866
Email: tracyc@g70.design
barbaran@g70.design

III. PROPERTY.

Parcel 6/Parcel 10
Makaweli, Waimea, Kauai, Hawaii
Kauai Tax Map Key No. (4) 1-7-006:006 (por.) and 010 (por.)

IV. AUTHORIZATION.

The Lessee hereby authorizes the Authorized Agent to act on the Lessee's behalf and to file and process on the Lessee's behalf any and all applications necessary to obtain governmental permits relating to the proposed Application on the Subject Property, including, but not limited to, the following:

1. Building permits, grading permits, use permits, variance permits, zoning permits, and Special Management Area permits issued by any department, agency, board or commission of the County of Kauai.

2. Permits issued by the Department of Health of the State of Hawaii.

3. Permits issued by the Board of Land and Natural Resources of the State of Hawaii and/or the Department of Land and Natural Resources of the State of Hawaii.

4. Permits issued by the Land Use Commission of the State of Hawaii, including the petition for Special Permit pursuant to HRS Section 205-6 for this project.

DATED: December 29, 2025.

LESSEE:

GAY & ROBINSON, INC.,
a Hawaii corporation

By _____
Its PRESIDENT

STATE OF Hawaii)
) SS:
COUNTY OF Kauai)

On this 29 day of December, 20 25, before me appeared Brian Yamase, to me personally known, who, being by me duly sworn or affirmed, did say that such person executed the foregoing AUTHORIZATION OF APPLICANT dated December 29, 20 25, which document consists of 3 page(s), as the free act and deed of such person, and if applicable, in the capacities shown, having been duly authorized to execute such instrument in such capacities.

KEITH R. YAP NOTARY 12-140 PUBLIC STATE OF HAWAII

Name of Notary: Keith R. Yap
Notary Public, in and for said County and State.

My commission expires: April 8, 2028

Doc Date: December 29, 2025 # Pages: 3
Name: Keith R. Yap 5th Circuit
Doc. Description: Authorization of Lessee
Signature 12/29/2025 Date
NOTARY CERTIFICATION

KEITH R. YAP NOTARY 12-140 PUBLIC STATE OF HAWAII

Exhibit A4

Memorandum of Option Agreement

LAND COURT | REGULAR SYSTEM

RETURN BY (X) MAIL ( ) PICK-UP

TMK Nos: **(4) 1-7-006-010** and **(4) 1-7-006-006** This document contains _6_ pages

MEMORANDUM OF OPTION AGREEMENT

THIS **MEMORANDUM OF OPTION AGREEMENT** (this "***Memorandum***") is entered into as of December 30, 2025 (the "***Effective Date***"), by and between **ROBINSON FAMILY PARTNERS**, a Hawaii general partnership, whose address is P.O. Box 690088, Makaweli, Hawaii 96769 (the "***Owner***"), and **KAAWANUI SOLAR, LLC,** a Delaware limited liability company, whose address is 2180 South 1300 East, Suite 500, Salt Lake City, Utah 84106 ("***Developer***"). Owner and Developer are at times collectively referred to hereinafter as the "***Parties***" or individually as a "***Party***".

WHEREAS, Owner and Developer have entered into an Option Agreement dated 12/30/25 with respect to the Property more specifically described herein (as heretofore or hereinafter amended, restated, or supplemented from time to time, the "***Option Agreement***"); and

WHEREAS, Owner and Developer desire to set forth certain terms and conditions of the Option Agreement in a manner suitable for recording in the Bureau of Conveyances of the State of Hawaii in order to provide record notice of the Option Agreement and Developer's rights in and to the land subject to the Option Agreement, as provided herein.

NOW, THEREFORE, in consideration of the mutual covenants contained in the Option Agreement, and other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the Parties hereto agree and stipulate as follows:

EXHIBIT "A4"

1. **Defined Terms; Exhibits.** Unless otherwise set forth herein, all defined terms used in this Memorandum shall have the same meanings given to such terms in the Option Agreement. All Exhibits referenced herein are attached hereto and are incorporated herein by this reference.

2. **Property.** Owner is the fee simple owner of those certain parcels of real property located on the Island of Kaua'i, State of Hawaii, comprising approximately 5,006.74 acres, having Tax Map Key Nos.: **(4) 1-7-006-010** and **(4) 1-7-006-006**, and more particularly described in **Exhibit (1)** attached hereto and made a part hereof (the "***Parent Property***").

3. **Grant of Option.** Owner hereby grants to Developer, pursuant to the Option Agreement, an exclusive and irrevocable option (the "***Option***") to obtain an easement encumbering up to 225 acres of real property in the aggregate (the "***Property***") described in **Exhibit (2)**, attached hereto and made a part hereof, within the Parent Property on the terms and conditions set forth in the Option Agreement. The entire Option Agreement is hereby incorporated into this Memorandum by reference. Notwithstanding anything to the contrary contained herein, the provisions of this Memorandum do not in any way alter, amend, supplement, change, or affect the terms, covenants, or conditions of the Option Agreement, all of which terms, covenants, and conditions shall remain in full force and effect. In the event of any conflict between the terms of this Memorandum and the Option Agreement, the terms of the Option Agreement shall prevail.

4. **Option Term; Easement Term.** The term of the Option Agreement shall be for a period of up to five (5) years following the Effective Date of the Option Agreement and shall consist of an initial three (3) year period, which may be extended up to an additional two (2) periods of one (1) year each. The Option Term may be renewed and extended as further described in the Option Agreement. If Developer exercises its Option, the term of the easement encumbering the Property shall consist of a construction term of three (3) years, with two optional (2) extensions of six (6) months each, and an operating term of up to forty (40) years, consisting of an initial operating term of twenty-five (25) years and three (3) extensions of five (5) years each, such that the total term of the easement may run for a term of up to forty-four (44) years.

5. **Successors and Assigns.** The terms of this Memorandum and the Option Agreement are covenants running with the land and inure to the benefit of, and are binding upon, the Parties and their respective successors and assigns, including all subsequent owners of all or any portion of the Property. References to Developer and Owner include their respective successors and assigns. References to the Option Agreement includes any amendments thereto.

6. **Counterparts.** This Memorandum may be executed in counterparts, each of which shall be an original but all of which together shall constitute one and the same agreement. This Memorandum is solely for notice and recording purposes and shall not be construed to

alter, modify, expand, diminish, or supplement the provisions of the Option Agreement or Easement.

7. **Miscellaneous.** This Memorandum is executed for the purpose of recording in the official land records where the Property is located, in order to provide public record notice of the Option Agreement and Developer's rights in and to the land subject to the Option Agreement. All persons are hereby put on notice of and shall have a duty to inquire regarding the Option Agreement and all of the provisions thereof and the rights, title, interests, and claims of Developer in and to the Property. Any right, estate, claim, or interest in the Property first attaching to the Property and recorded from and after the Effective Date shall be subordinate to the terms of the Option Agreement.

[*signatures appear on the following page*]

EXHIBIT "A4"

IN WITNESS WHEREOF, the Parties have executed this Memorandum as of the date first written above.

OWNER:

ROBINSON FAMILY PARTNERS, a Hawaii general partnership

By: _____
Name: Alan Robinson
Its: Chairman of Management Committee

DEVELOPER:

KAAWANUI SOLAR, LLC,
a Delaware limited liability company

By: _____
Name: Sean McBride
Its: Secretary & General Counsel

EXHIBIT "A4"

ACKNOWLEDGEMENT OF OWNER

STATE OF HAWAII)
) SS.
COUNTY OF Kauai)

On this 29 day of December, 2025, before me personally appeared Alan Robinson, who being by me duly sworn, did say that he is the Chairman of the Management Committee, and executed the foregoing instrument as the free act and deed of the general partnership, and if applicable in the capacities shown, having been duly authorized to execute such instrument in such capacity.

Document Description: Memorandum of Option Agreement

12/29/2025
Notary Signature and Date

Name (printed): Keith R. Yap

My Commission Expires: April 8, 2028

(SEAL)

KEITH R. YAP
NOTARY
12-140
PUBLIC
STATE OF HAWAII

Doc Date: Undated at Signing # Pages: 6
Name: Keith R. Yap 5th Circuit
Doc. Description: Memorandum of Option Agreement
12/29/2025
Signature Date

NOTARY CERTIFICATION

KEITH R. YAP
NOTARY
12-140
PUBLIC
STATE OF HAWAII

EXHIBIT "A4"

ACKNOWLEDGEMENT OF DEVELOPER

STATE OF UTAH)
: ss
COUNTY OF SALT LAKE)

The foregoing instrument was acknowledged before me on December 30, 2025, by Sean McBride as General Counsel of Kaawanui Solar LLC, a Delaware limited liability company.

NOTARY PUBLIC
Residing at: 297 E 900 N BHC UT 84010

My Commission Expires:

1/21/26

CRYSTAL BLAISDELL
Notary Public State of Utah
My Commission Expires on:
November 21, 2026
Comm. Number: 728025

EXHIBIT "A4"

Exhibit A5

Adjacent Property Index

ADJACENT PROPERTY INDEX

TMK	OWNER/ADDRESS
(4) 1-7-005:005	ESTATE OF ALICE ROBINSON P O BOX 690088 MAKAWELI HI 96769
(4) 1-7-006:011	HELEN ROBINSON DECEASED P O BOX 690106 MAKAWELI HI 96769
(4) 1-7-006:012 CPR No. 0001	RANDALL S WEIR REVOCABLE TRUST 6332 MAKANA ROAD KAPAA HI 96746
(4) 1-7-006:012 CPR No. 0002	KENNETH & JUDITH COOK 1996 TRUST 1600 TROUSDALE DRIVE BURLINGAME CA 94010
(4) 1-7-006:012 CPR No. 0003	MELISSA J WEIR-KELEKOMA REVOCABLE TRUST P O BOX 690116 MAKAWELI HI 96769
(4) 1-7-006:013 CPR Nos. 0001 & 0002	GROSSMAN/LYONS REVOCABLE TRUST 2011 CUMMINGS DRIVE LOS ANGELES CA 90027
(4) 1-7-006:014	PAKALA LLC P O BOX 25993 HONOLULU HI 96825
(4) 1-7-006:015	DAVID & PAM MCDOWELL REVOCABLE TRUST P O BOX 690113 MAKAWELI HI 96769
(4) 1-7-006:018	FOXCROFT FAMILY TRUST 4212 HENNING COURT CONCORD CA 94521

TMK	OWNER/ADDRESS
(4) 1-8-016:026	JAMES H KNAPP P O BOX 319 HANAPEPE HI 96716
(4) 1-8-016:027	ISAAC LAGMAY C/O ISAAC LAGMAY & TEAL LAGMAY P O BOX 684 KALAHEO HI 96741
(4) 1-8-016:028	SIRMON WRIGHT P O BOX 972 HANAPEPE HI 96716
(4) 1-8-016:029	ARTHUR & SARAH STYAN FAMILY TRUST P O BOX 402 HANAPEPE HI 96716
(4) 1-8-016:030	MYRIAN A BARINO P O BOX 968 HANAPEPE HI 96716
(4) 1-8-016:031	GEORGE L SWAIN P O BOX 51006 ELEELE HI 96705
(4) 1-8-016:032	JOHNNIE J SIMBRE P O BOX 304 HANAPEPE HI 96716
(4) 1-8-016:033	GERALD R HURD P O BOX 50978 ELEELE HI 96705
(4) 1-8-016:034	JONATHAN HURD REVOCABLE LIVING TRUST P O BOX 104 HANAPEPE HI 96716

Exhibit B

Economic Impact Analysis

FINAL

Economic Impact Report for Kaawanui Solar

August 2025

EXECUTIVE SUMMARY

This Economic Impact Report was conducted to assess the economic impacts the proposed Kaawanui Solar project would have on the economy of the County of Kaua‘i and the fiscal revenue of the State of Hawai‘i and County of Kaua‘i governments. Potential economic and fiscal impacts assessed for various aspects of the project are: 1) the pre-development period which is currently underway and is anticipated to have a duration of approximately 2.5 years, 2) the construction period which has an estimated duration of 18 months, 3) the operations period, which would have a duration of 25 years, 4) annual easement payments that would be made to the landowner to support economic activities elsewhere in the County of Kaua‘i, and 5) decommissioning of the project, which is estimated to take place over the course of 1 year. Table ES-1 shows total economic impacts in the short-term (including pre-development and construction), long-term (including operations and economic activity derived from easement payments), and for decommissioning. Table ES-2 shows total fiscal revenue in the short-term, long-term, and for decommissioning.

Table ES-1. Economic Impacts[1]

Project Phase[2]	Jobs	Labor Income	Economic Output
Short-term[2]	747	$54,694,116	$130,676,330
Long-term [2,3]	244	$18,511,553	$68,123,824
Decommissioning	73	$4,694,046	$17,918,283
Totals	**1,064**	**$77,899,714**	**$216,718,437**

Notes: [1]Includes direct, indirect, and induced impacts.
[2]Short-term includes pre-development and construction. Long-term includes project operations and effects of easement payments.
[3] Long-term impacts are shown on a total basis, for the project duration.

Table ES-2. Fiscal Impacts

Project Phase[1]	State of Hawai‘i Government Revenue	County Government Revenue
Short-term[1]	$5,416,852	$1,827,201
Long-term[1,2]	$3,567,162	$1,658,243
Decommissioning	$729,477	$302,447
Totals	**$9,713,491**	**$3,787,891**

Notes: [1]Short-term includes pre-development and construction. Long-term includes project operations and effects of easement payments.
[2] Long-term impacts are shown on a total basis, for the project duration.

Economic Impact Report
for Kaawanui Solar
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Abbreviations and Acronyms

Acronym	Definition
%	percent
$s	dollars
AES	AES Hawai‘i
BESS	Battery Energy Storage System
CCD	Census County Division
EIR	Economic Impact Report
GET	General Excise Tax
IMPLAN	Impact Analysis for Planning
JEDI	Jobs and Economic Development Impacts
KIUC	Kaua‘i Island Utility Cooperative
NREL	National Renewable Energy Laboratory
PV	Photovoltaic
ROI	Region of Influence

1 Introduction

AES Hawai‘i (AES) is proposing to construct a photovoltaic (PV) facility and battery energy storage system (BESS) in Kaumakani, Kaua‘i, Hawai‘i on roughly 220 acres of land that is managed by Gay & Robinson, Inc. The purpose of the proposed project is to provide additional variable renewable energy generation, increase storage capacity, and implement the power purchase agreement between AES and the Kaua‘i Island Utility Cooperative (KIUC). The proposed project is expected to displace the use of 12.9 million gallons of diesel per year and will allow KIUC to make progress toward achieving the State of Hawai‘i's Clean Energy Initiative renewable portfolio standards and reduce costs for KIUC members.

This Economic Impact Report (EIR) was conducted to assess and report on the impacts the proposed Kaawanui Solar project would have on the County of Kaua‘i economy, where the project would take place. Additionally, fiscal benefits to both the State of Hawai‘i and County of Kaua‘i governments are presented. This EIR assesses the impacts for six distinct aspects of the project over various timeframes; these timeframes are based on planning assumptions and are subject to change. The six aspects of the project covered in this EIR are described below:

1. *Pre-development.* This aspect of the project is currently underway and relates to activities such as permitting and technical studies. The pre-development period extends approximately 2.5 years (from the middle of 2024 to the beginning of 2027).
2. *Construction.* This aspect of the project would include preparation of baseline structures, interconnections, and installation of solar panels. The construction period is expected to last approximately 18 months (from early 2027 to the middle of 2028).
3. *Operations*. This aspect of the project would include solar plant operations and maintenance and would take place over a 25-year period (from mid-2028 to mid-2052).
4. *Easement payments*. AES would pay grant of easement payments for the land to Gay & Robinson, Inc. for the duration of the project. Easement payments would be made annually during the 25-year operational period. AES would also pay property taxes at the project site throughout the project lifespan.
5. *Decommissioning.* When the operations phase is complete, AES will remove structures and remediate the land. This aspect of the project would take approximately one year (over the 2052-2053 period).

Impacts are presented in terms of jobs, labor income, economic output, State of Hawai‘i government revenue, and County of Kaua‘i government revenue. Primary input data for the analysis were provided by AES and estimates of impacts were calculated using the Impact Analysis for Planning (IMPLAN) economic model, which was fitted with the most recent available data for the County of Kaua‘i, in conjunction with estimates developed using the National Renewable Energy Laboratory (NREL) Jobs and Economic Development Impacts (JEDI) model.

In addition to the economic benefits quantified in this report, in compliance with HRS §205-4.5(a)(21), the project will involve partnering with a Kaua‘i-based agricultural operator. Project land would be made available at no cost to the agricultural partner to conduct compatible agricultural activities.

2 Approach to Analysis

2.1 Region of Influence

The Region of Influence (ROI) considered in this EIR is the County of Kauaʻi, which is the location of the proposed project. Fiscal impacts that would accrue to the State of Hawaiʻi government are those that would be generated by economic activity that would take place within the County of Kauaʻi. Some economic benefits may spill over into locations outside of the ROI, as workers are likely to spend portions of their income elsewhere, such as Honolulu, Hawaiʻi, and Maui Counties, but these potential spill-over effects would likely be minimal and are not captured in this report.

2.2 Input Data and Modeling Procedures

Primary data on project expenditures and employment, with details on the split between local and non-local expenditures, were provided by AES. These data were used in conjunction with the NREL JEDI model to develop inputs for the IMPLAN model. The intent of the JEDI model, for solar projects, is to establish a general profile of investments to show the economic effects that would be expected during the construction and operations of a solar project. Though the NREL conducted extensive research in developing the JEDI model, the model is not designed to provide an exact forecast and does not provide county-level information (NREL, 2025). To prepare more precise and county-specific results, the IMPLAN model, fitted with year 2023 data for the County of Kauaʻi, was utilized for the final step in modeling. The IMPLAN model is an economic input-output modeling application, which develops detailed data sets at various levels of geography on an annual basis (IMPLAN, 2025); it is the current industry standard for economic modeling.

Input data on industry expenditures related to pre-development, including the description of activities, were provided by AES. The local expenditures value was split between multiple IMPLAN sectors – about 75% to the environmental consulting sector and architectural and engineering sectors, and about 25% to travel and legal services sectors.

Input data for construction were anchored in AES provided estimates of local construction expenditures. The NREL JEDI model was then used to establish an expenditures vector for that spending. Guided by the NREL JEDI model, total construction expenditures were applied to IMPLAN sectors with approximately 85% applied to the construction of power facilities sector, about 10% applied to wholesale trade sectors, and about 5% applied to retail trade and other services related sectors.

For operations, data on anticipated direct employment was provided by AES and were input into the Electric Power Generation – Solar sector of the IMPLAN model. IMPLAN calculated overall operations impacts based on anticipated direct employment.

For impacts related to easement payments to support economic activity, AES provided information on the anticipated annual easement payments to Gay & Robinson, Inc. under the assumption Gay & Robinson, Inc. would utilize these payments to fund their existing real estate activities. Easement payment data was input into the IMPLAN model, into the real estate rental and leasing sector, to generate estimates of increased economic activity attributable to AES easement payments.

For decommissioning, AES provided anticipated expenditures and described the nature of decommissioning activities, which would relate to both the removal of structures and the remediation of land. The value of these expenditures was input into the IMPLAN model in the waste management and remediation sector.

2.3 Economic Result Variables

Economic variables that are presented as results include jobs, labor income, and economic output. Each of these variables consists of a direct, indirect, and induced element. Estimated results for the variables were calculated by the IMPLAN model using the input data described above in Section 2.2. Increases in the result variables are considered beneficial as they tend to be associated with higher living standards.

Direct impacts are associated with the proposed project itself and include workers directly associated with initial project-related expenditures, the incomes earned by those workers, and the economic output generated by these initial project-related expenditures.

Indirect impacts are generated by the businesses that would supply goods and services that would facilitate various aspects of the project. Indirect jobs include jobs at companies that supply goods and services that support direct activities. Indirect jobs extend to include jobs related to the manufacture of products, to the extent that activity may occur in the County of Kauaʻi. Indirect labor income includes the income earned by people working indirect jobs. Indirect economic output includes the total sales volume related to the supply of goods and services net intermediate purchases.

Induced impacts are the result of spending of the wages and salaries of the direct and indirect workers on items such as food, housing, transportation, and medical services. This spending creates induced employment, labor income, and economic output in nearly all sectors of the economy, especially service sectors.

2.3.1 Jobs

Job impacts represent the number of jobs that would be created or sustained within the ROI as a result of the proposed project. The IMPLAN model generates job numbers that include both full-time and part-time jobs, including jobs that may be short-term. Short-term jobs may include, for example, construction trades specialists such as carpenters that may only conduct part of the construction work.

2.3.2 Labor Income

Labor income impacts represent the income generated through the jobs that would be created or sustained as a result of the construction, operations, and other related economic activity in the ROI. All labor income estimates were calculated by the IMPLAN model based on either planned expenditures (for construction) or anticipated direct employment (for operations). Results were calculated in 2025 $s.

2.3.3 Economic Output

Economic output equals the total value of production, by industry, in a calendar year. It can also be described as annual revenues plus net change in inventory. Results were calculated in 2025 $s.

2.4 Fiscal Result Variables

Fiscal variables that are presented as results include State of Hawaiʻi government revenue and County of Kauaʻi government revenue. Each of these consists of multiple sources of revenue as described below in Section 2.4.1 and Section 2.4.2. Increases in government revenue are generally considered beneficial as governments can use revenue to fund public services and capital expenditures. Also, when governments spend the revenue that they receive from the project, additional jobs, labor income, and economic output would be generated; however, effects of government expenditures are not captured in this EIR.

2.4.1 State of Hawai‘i Government Revenue

Revenue that would be accrued by the State of Hawai‘i government as a result of project related economic activity are presented in four categories: 1) General Excise Tax (GET) and Use Tax, 2) Corporate Profits Tax, 3) Personal Income Tax, and 4) Other. Estimates were calculated by the IMPLAN model based on incomes, spending of incomes, and industry expenditures. Results were calculated in 2025 $s.

2.4.2 County of Kaua‘i Revenue

Revenue that would be accrued by the County of Kaua‘i government as a result of project related economic activity are presented in two categories: 1) Property Tax, and 2) Other. Estimates of property tax that would be paid by AES directly on land used for the project (technically a ‘land tax’) were provided by AES. Other revenue to the County of Kaua‘i calculated by the IMPLAN model include, but are not limited to, sales tax revenue and revenue from licenses and fees. Results were calculated in 2025 $s.

3 Economic Background

Table 3-1 provides population data for 2010, 2015, 2020, and 2023 for the State of Hawai‘i, the County of Kaua‘i, and each of the Census County Divisions (CCDs) in the County of Kaua‘i, along with average annual growth rates from 2010 to 2020 and 2020 to 2023. As of 2023, the population for the State of Hawai‘i was about 1.45 million, with 73,610 of that population residing in the County of Kaua‘i (about 5.1% of the State population). The Kaumakani-Hanapēpē CCD, where the proposed project would occur, had a 2023 population of 3,985, making up about 5.4% of the County of Kaua‘i population. Population growth rates state and county-wide were lower from 2020 to 2023 than they were from 2010 to 2020. The Kaumakani-Hanapēpē CCD population grew at an average annual rate of 1.41% from 2010-2020 exceeding the state and county rates but declined at an average annual rate of more than 3% from 2020 to 2023, falling from 4,389 to 3,985.

Table 3-1. Population Totals and Anuual Growth Rates by Area

	2010	2015	2020	2023	Average Annual Growth Rate 2010-2020	Average Annual Growth Rate 2020-2023
State of Hawai‘i	1,333,591	1,406,299	1,420,074	1,445,635	0.65%	0.60%
County of Kaua‘i	65,460	69,691	71,949	73,610	0.99%	0.77%
‘Ele‘ele-Kalāheo	8,409	8,480	9,306	8,600	1.07%	-2.53%
Hanalei	7,126	7,248	6,560	7,650	-0.79%	5.54%
Kapa‘a	8,091	8,489	7,623	8,335	-0.58%	3.11%
Kaumakani-Hanapēpē	3,845	3,922	4,389	3,985	1.41%	-3.07%
Kekaha-Waimea	4,679	4,901	5,152	5,622	1.01%	3.04%
Kōloa-Po‘ipū	5,720	6,073	6,550	6,685	1.45%	0.69%
Līhu‘e	6,534	7,178	7,736	6,517	1.84%	-5.25%
Puhi-Hanamaulu	8,530	10,430	10,848	10,407	2.72%	-1.36%
Wailua-Anahola	12,526	12,970	13,785	15,809	1.01%	4.89%

Source: U.S. Census, 2010, 2015, 2020, 2023

Table 3-2 provides labor statistics for the State of Hawai‘i and the County of Kaua‘i for the years 2018 to 2024. The labor statistics include the size of the labor force, the total number of employed individuals, the total number of unemployed individuals, and the unemployment rate. Unemployment rates for both the State and the County of Kaua‘i were generally low from 2018 to 2019 but surged in 2020 due to business closures and travel restrictions forced by the COVID-19 pandemic. Since 2020, the County of Kaua‘i unemployment rate has been in decline and, as of 2024, was back to low, pre-pandemic, levels.

Table 3-2. State of Hawai‘i and County of Kaua‘i Labor Statistics, 2018-2024

	2018	2019	2020	2021	2022	2023	2024
State of Hawai‘i							
Labor force	693,429	688,531	666,109	669,407	673,003	677,984	680,307
Employment	676,788	671,166	588,617	629,377	650,910	658,177	660,079
Unemployment	16,641	17,365	77,492	40,030	22,093	19,807	20,228
Unemployment rate	2.4%	2.5%	11.6%	6.0%	3.3%	2.9%	3.0%
County of Kaua‘i							
Labor force	37,536	37,776	36,458	36,215	36,491	36,863	36,259
Employment	36,625	36,834	30,567	33,295	35,256	35,910	35,312
Unemployment	911	942	5,891	2,920	1,235	953	947
Unemployment rate	2.4%	2.5%	16.2%	8.1%	3.4%	2.6%	2.6%

Source: U.S. Bureau of Labor Statistics, 2025

4 Economic Impact Results

4.1 Pre-Development

4.1.1 Jobs

Table 4-1 shows that over the 2.5-year pre-development period there would be an estimated total of 21 jobs generated or sustained from Kaawanui Solar pre-development – 13 of the jobs would be direct, 5 indirect, and 3 induced.

Table 4-1. Jobs

	Total
Direct	13
Indirect	5
Induced	3
Total	**21**

Note: Some totals may not appear to sum from their parts due to rounding.

4.1.2 Labor Income

Table 4-2 shows that over the 2.5-year pre-development period, there would be an estimated total of $1.2 million in labor income generated or sustained from Kaawanui Solar pre-development – $0.76 million would be direct, $0.26 million indirect, and $0.17 million induced.

Table 4-2. Labor Income (2025 $s)

	Total
Direct	$760,320
Indirect	$262,361
Induced	$174,142
Total	**$1,196,823**

Note: Some totals may not appear to sum from their parts due to rounding.

4.1.3 Economic Output

Table 4-3 shows that over the 2.5-year pre-development period there would be an estimated total of $3.3 million in economic output generated or sustained from Kaawanui Solar pre-development – $2.0 million would be direct, $0.73 million indirect, and $0.57 million induced.

Table 4-3. Economic Output (2025 $s)

	Total
Direct	$2,047,040
Indirect	$725,395
Induced	$567,254
Total	**$3,339,689**

Note: Some totals may not appear to sum from their parts due to rounding.

4.2 Construction

4.2.1 Jobs

Table 4-4 shows that over the 18-month construction period there would be an estimated total of 726 jobs generated or sustained from Kaawanui Solar construction – 529 of the jobs would be direct, 57 indirect, and 140 induced.

Table 4-4. Jobs

	Total
Direct	529
Indirect	57
Induced	140
Total	**726**

Note: Some totals may not appear to sum from their parts due to rounding.

4.2.2 Labor Income

Table 4-5 shows that over the 18-month construction period there would be an estimated total of $53.5 million in labor income generated or sustained from Kaawanui Solar construction – $42.3 million would be direct, $3.4 million indirect, and $7.7 million induced.

Table 4-5. Labor Income (2025 $s)

	Total
Direct	$42,325,173
Indirect	$3,436,290
Induced	$7,735,829
Total	**$53,497,292**

Note: Some totals may not appear to sum from their parts due to rounding.

4.2.3 Economic Output

Table 4-6 shows that over the 18-month construction period, there would be an estimated total of $127.3 million in economic output generated or sustained from Kaawanui Solar construction – $89.6 million would be direct, $12.5 million indirect, and $25.2 million induced.

Table 4-6. Economic Output (2025 $s)

	Total
Direct	$89,613,956
Indirect	$12,524,961
Induced	$25,197,724
Total	**$127,336,640**

Note: Some totals may not appear to sum from their parts due to rounding.

4.3 Operations

4.3.1 Jobs

Table 4-7 shows there would be an estimated total of 4 jobs generated or sustained from Kaawanui Solar operations annually, for a 25-year period – 2 of the jobs would be direct, 1 indirect, and 1 induced. Over the course of the 25 years, there would be an estimated overall total of 104 jobs.

Table 4-7. Jobs, Annual & 25-Year Total

	Annual	Total
Direct	2	53
Indirect	1	25
Induced	1	27
Total	**4**	**104**

Note: Some totals may not appear to sum from their parts due to rounding.

4.3.2 Labor Income

Table 4-8 shows there would be a total increase of $0.41 million in labor income generated or sustained from Kaawanui Solar operations annually, for a 25-year period – $0.30 million of the labor income would be direct, $58,745 indirect, and another $59,820 induced. Over the course of the 25 years, there would be an estimated overall total of $10.4 million in labor income generated or sustained.

Table 4-8. Labor Income, Annual & 25-Year Total (2025 $s)

	Annual	Total
Direct	$296,390	$7,409,750
Indirect	$58,745	$1,468,636
Induced	$59,820	$1,495,510
Total	**$414,956**	**$10,373,896**

Note: Some totals may not appear to sum from their parts due to rounding.

4.3.3 Economic Output

Table 4-9 shows there would be a total increase of $1.6 million in economic output generated or sustained from Kaawanui Solar operations annually, for a 25-year period – $1.2 million of the economic output would be direct, $0.17 million indirect, and another $0.19 million induced. Over the course of the 25 years, there would be an estimated overall total of $40.3 million in economic output generated or sustained.

Table 4-9. Economic Output, Annual & 25-Year Total (2025 $s)

	Annual	Total
Direct	$1,248,056	$31,201,410
Indirect	$170,892	$4,272,292
Induced	$194,734	$4,868,341
Total	**$1,613,682**	**$40,342,042**

Note: Some totals may not appear to sum from their parts due to rounding.

4.4 Easement Payments

4.4.1 Jobs

Table 4-10 shows there would be an estimated total of 6 jobs generated or sustained from Kaawanui Solar easement payments to support economic activity annually, for 25 years – about 3 of the jobs would be direct, about 2 indirect, and about 1 induced. Over the course of the 25 years, there would be an estimated overall total of 128 jobs.

Table 4-10. Jobs, Annual & 25-Year Total

	Annual	Total
Direct	3	77
Indirect	2	43
Induced	1	21
Total	**6**	**140**

Note: Some totals may not appear to sum from their parts due to rounding.

4.4.2 Labor Income

Table 4-11 shows there would be a total increase of $325,506 in labor income generated or sustained from Kaawanui Solar easement payments to support economic activity annually, for 25 years – $187,905 of the labor income would be direct, $90,624 indirect, and another $46,977 induced. Over the course of the 25 years, there would be an estimated overall total of $8.1 million in labor income generated or sustained.

Table 4-11. Labor Income, Annual & 25-Year Total (2025 $s)

	Annual	Total
Direct	$187,905	$4,697,622
Indirect	$90,624	$2,265,611
Induced	$46,977	$1,174,425
Total	**$325,506**	**$8,137,657**

Note: Some totals may not appear to sum from their parts due to rounding.

4.4.3 Economic Output

Table 4-12 shows there would be a total increase of $1.1 million in economic output generated or sustained from Kaawanui Solar easement payments to support economic activity annually, for 25 years – $0.66 million of the economic output would be direct, $0.30 million indirect, and approximately $0.15 million induced. Over the course of the 25 years, there would be an estimated overall total of $27.8 million in economic output generated or sustained.

Table 4-12. Economic Output, Annual & 25-Year Total (2025 $s)

	Annual	Total
Direct	$660,000	$16,500,000
Indirect	$298,117	$7,452,921
Induced	$153,154	$3,828,861
Total	**$1,111,271**	**$27,781,782**

Note: Some totals may not appear to sum from their parts due to rounding.

4.5 Decommissioning

4.5.1 Jobs

Table 4-13 shows that over the 1-year decommissioning period there would be an estimated total of 73 jobs generated or sustained from decommissioning of Kaawanui Solar– 40 of the jobs would be direct, 20 indirect, and 12 induced.

Table 4-13. Jobs

	Total
Direct	40
Indirect	20
Induced	12
Total	**73**

Note: Some totals may not appear to sum from their parts due to rounding.

4.5.2 Labor Income

Table 4-14 shows that over the 1-year decommissioning period there would be a total increase of $4.7 million in labor income generated or sustained from decommissioning of Kaawanui Solar– $2.8 of the labor income would be direct, $1.2 million indirect, and another $0.67 million induced.

Table 4-14. Labor Income (2025 $s)

	Total
Direct	$2,827,099
Indirect	$1,195,005
Induced	$671,942
Total	**$4,694,046**

Note: Some totals may not appear to sum from their parts due to rounding.

4.5.3 Economic Output

Table 4-15 shows that over the 1-year decommissioning period there would be a total increase of $17.9 million in economic output generated or sustained from decommissioning of Kaawanui Solar– $12.0 million of the economic output would be direct, $3.7 million indirect, and another $2.2 million induced.

Table 4-15. Economic Output (2025 $s)

	Total
Direct	$12,000,000
Indirect	$3,729,978
Induced	$2,188,305
Total	**$17,918,283**

Note: Some totals may not appear to sum from their parts due to rounding.

5 Fiscal Impact Results

5.1 Pre-Development

Table 5-1 shows that over the 2.5-year pre-development period there would be a total of approximately $0.16 million in State of Hawai‘i government revenue generated or sustained from Kaawanui Solar pre-development. The majority of this revenue ($0.11 million) would be generated through GET.

Table 5-1. State of Hawai‘i Government Revenue (2025 $s)

	Total
GET & Use	$114,191
Corporate Profit	$3,871
Personal Income	$41,348
Other	$5,436
Total	**$164,846**

Note: Some totals may not appear to sum from their parts due to rounding.

Table 5-2 shows that over the 2.5-year pre-development period there would be a total of approximately $66,407 in County government revenue generated or sustained from Kaawanui Solar pre-development. The majority of this revenue ($52,159) would be generated through property taxes.

Table 5-2. County Government Revenue (2025 $s)

	Total
Property	$52,159
Other	$14,248
Total	**$66,407**

Note: Some totals may not appear to sum from their parts due to rounding.

5.2 Construction

Table 5-3 shows that over the 18-month construction period there would be a total of approximately $5.3 million in State of Hawai‘i government revenue generated or sustained from Kaawanui Solar project construction. The majority of this revenue ($3.0 million) would be generated through GET.

Table 5-3. State of Hawai‘i Government Revenue (2025 $s)

	Total
GET & Use	$2,995,048
Corporate Profit	$256,642
Personal Income	$1,832,297
Other	$168,019
Total	**$5,252,006**

Note: Some totals may not appear to sum from their parts due to rounding.

Table 5-4 shows that over the 18-month construction period there would be a total of approximately $1.8 million in County of Kaua‘i government revenue generated or sustained from Kaawanui Solar project construction. The majority of this revenue ($1.4 million) would be generated through property taxes.

Table 5-4. County of Kaua‘i Government Revenue (2025 $s)

	Total
Property	$1,368,055
Other	$392,739
Total	**$1,760,794**

Note: Some totals may not appear to sum from their parts due to rounding.

5.3 Operations

Table 5-5 shows there would be a total of approximately $104,567 in State of Hawai‘i government revenue generated or sustained from Kaawanui Solar project operations, annually for 25 years. The majority of this revenue ($84,142) would be generated through GET. Over the course of the 25 years, there would be an estimated overall total of $2.6 million in State of Hawai‘i government revenue.

Table 5-5. State of Hawai‘i Government Revenue, Annual & 25-Year Total (2025 $s)

	Annual	Total
GET & Use	$84,142	$2,103,560
Corporate Profit	$3,276	$81,910
Personal Income	$13,686	$342,161
Other	$3,462	$86,553
Total	**$104,567**	**$2,614,183**

Note: Some totals may not appear to sum from their parts due to rounding.

Table 5-6 shows there would be a total of approximately $52,746 in County of Kaua‘i government revenue generated or sustained from Kaawanui Solar project operations, annually for 25 years. The majority of this revenue ($42,653) would be generated through property taxes. Over the course of the 25 years, there would be an estimated overall total of $1.3 million in County of Kaua‘i government revenue.

Table 5-6. County of Kaua‘i Government Revenue, Annual & 25-Year Total (2025 $s)

	Annual	Total
Property[1]	$42,653	$1,066,325
Other	$10,093	$252,322
Total[2]	**$52,746**	**$1,318,647**

Notes: [1]Includes estimated annual on-site property tax payments of approximately $35,200.
[2]Some totals may not appear to sum from their parts due to rounding.

5.4 Easement Payments

Table 5-7 shows there would be a total of $34,654 in State of Hawai‘i government revenue generated or sustained from Kaawanui Solar project easement payments to support economic activity, annually for 25 years. The majority of this revenue ($21,134) would be generated through GET. Over the course of the 25 years, there would be an estimated overall total of $0.87 million in State of Hawai‘i government revenue.

Table 5-7. State of Hawai‘i Government Revenue, Annual & 25-Year Total (2025 $s)

	Annual	Total
GET & Use	$21,134	$528,355
Corporate Profit	$1,807	$45,176
Personal Income	$10,627	$265,681
Other	$1,085	$27,133
Total	**$34,654**	**$866,344**

Note: Some totals may not appear to sum from their parts due to rounding.

Table 5-8 shows there would be a total of $13,584 in County of Kaua‘i government revenue generated or sustained from Kaawanui Solar project easement payments to support economic activity, annually for 25 years. The majority of this revenue ($10,619) would be generated through property taxes. Over the course of the 25 years, there would be an estimated overall total of $0.34 million in County of Kaua‘i government revenue.

Table 5-8. County of Kaua‘i Government Revenue, Annual & 25-Year Total (2025 $s)

	Annual	Total
Property	$10,619	$265,472
Other	$2,965	$74,124
Total	**$13,584**	**$339,596**

Note: Some totals may not appear to sum from their parts due to rounding.

5.5 Decommissioning

Table 5-9 shows that over the 1-year decommissioning period there would be a total of approximately $0.73 million in State of Hawai‘i government revenue generated or sustained from Kaawanui Solar project decommissioning. The majority of this revenue ($0.52 million) would be generated through GET.

Table 5-9. State of Hawai‘i Government Revenue (2025 $s)

Tax Category	Total
GET & Use	$521,310
Corporate Profit	$26,779
Personal Income	$157,536
Other	$23,852
Total	**$729,477**

Note: Some totals may not appear to sum from their parts due to rounding.

Table 5-10 shows that over the 1-year decommissioning period there would be a total of approximately $0.30 million in County of Kaua‘i government revenue generated or sustained from Kaawanui Solar project decommissioning. The majority of this revenue ($0.24 million) would be generated through property taxes.

Table 5-10. County of Kaua‘i Government Revenue (2025 $s)

Tax Category	Total
Property	$238,120
Other	$64,327
Total[2]	**$302,447**

Note: Some totals may not appear to sum from their parts due to rounding.

6 References

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U.S. Census Bureau. 2015.American Community Survey 5-year estimates for 2015. Available online at: https://data.census.gov/cedsci/advanced

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U.S. Census Bureau. 2023.American Community Survey 5-year estimates for 2023. Available online at: https://data.census.gov/cedsci/advanced

U.S. Bureau of Labor Statistics. 2025. Local Area Unemployment Statistics for the State of Hawai‘i and County of Kaua‘i. Available online at: https://www.bls.gov/lau/

Exhibit C

Project Figures



Exhibit C1 **Project Location**



Exhibit C2 **Traditional Moku and Ahupua‘a of the Project Site**



Exhibit C3 **Tax Map Key**

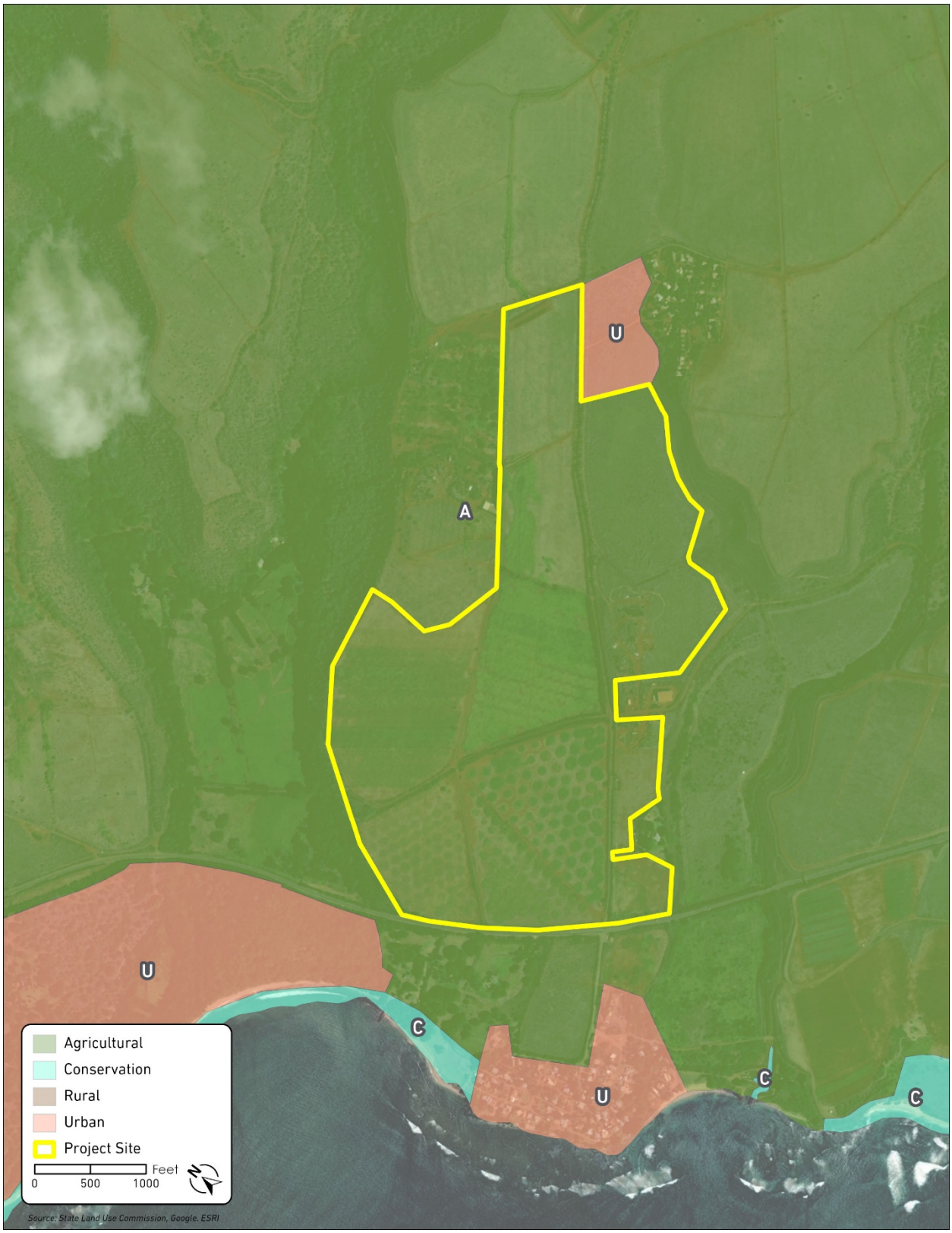

Exhibit C4 **State Land Use Districts**

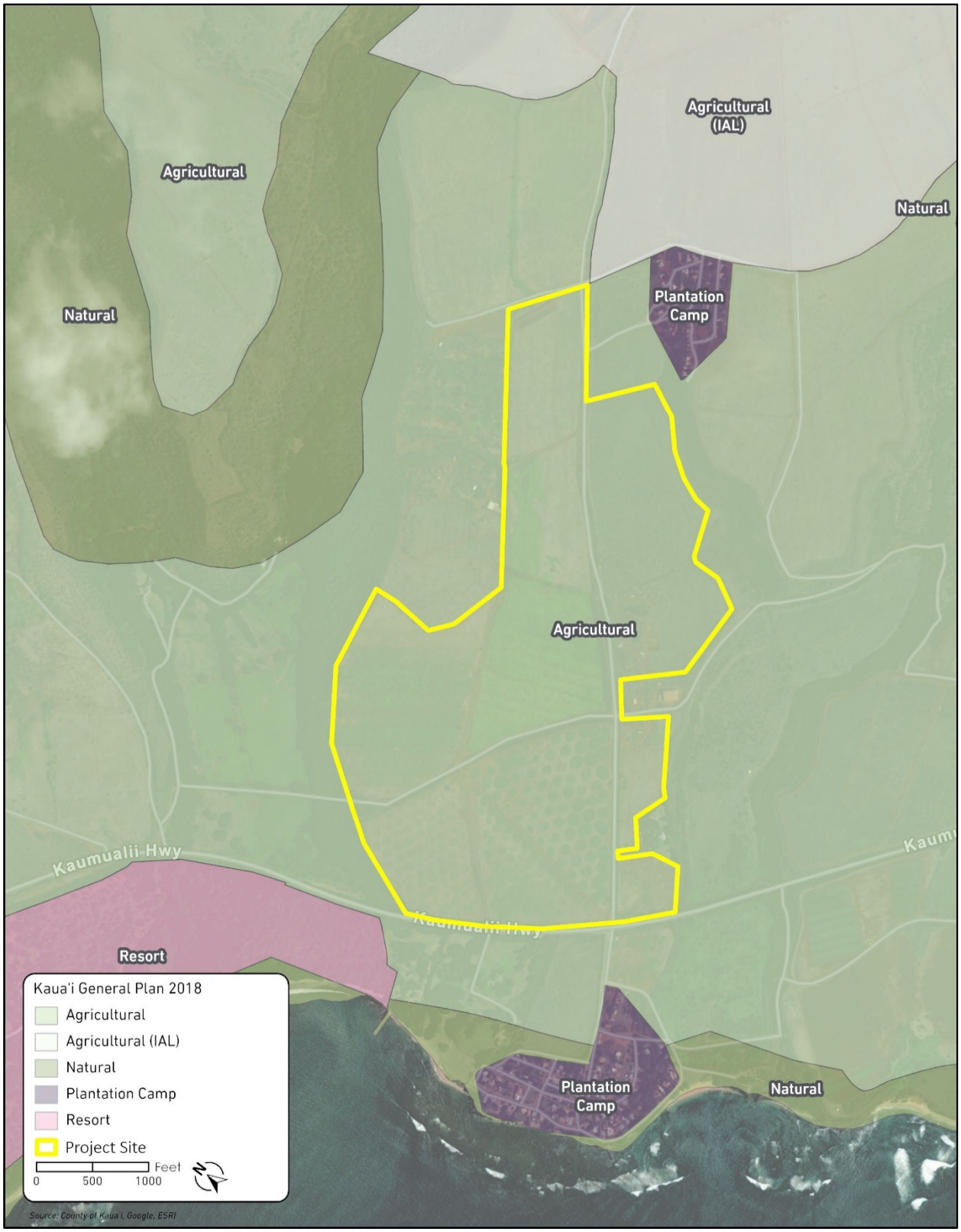

Exhibit C5 **County of Kaua‘i General Plan Land Use Designations**

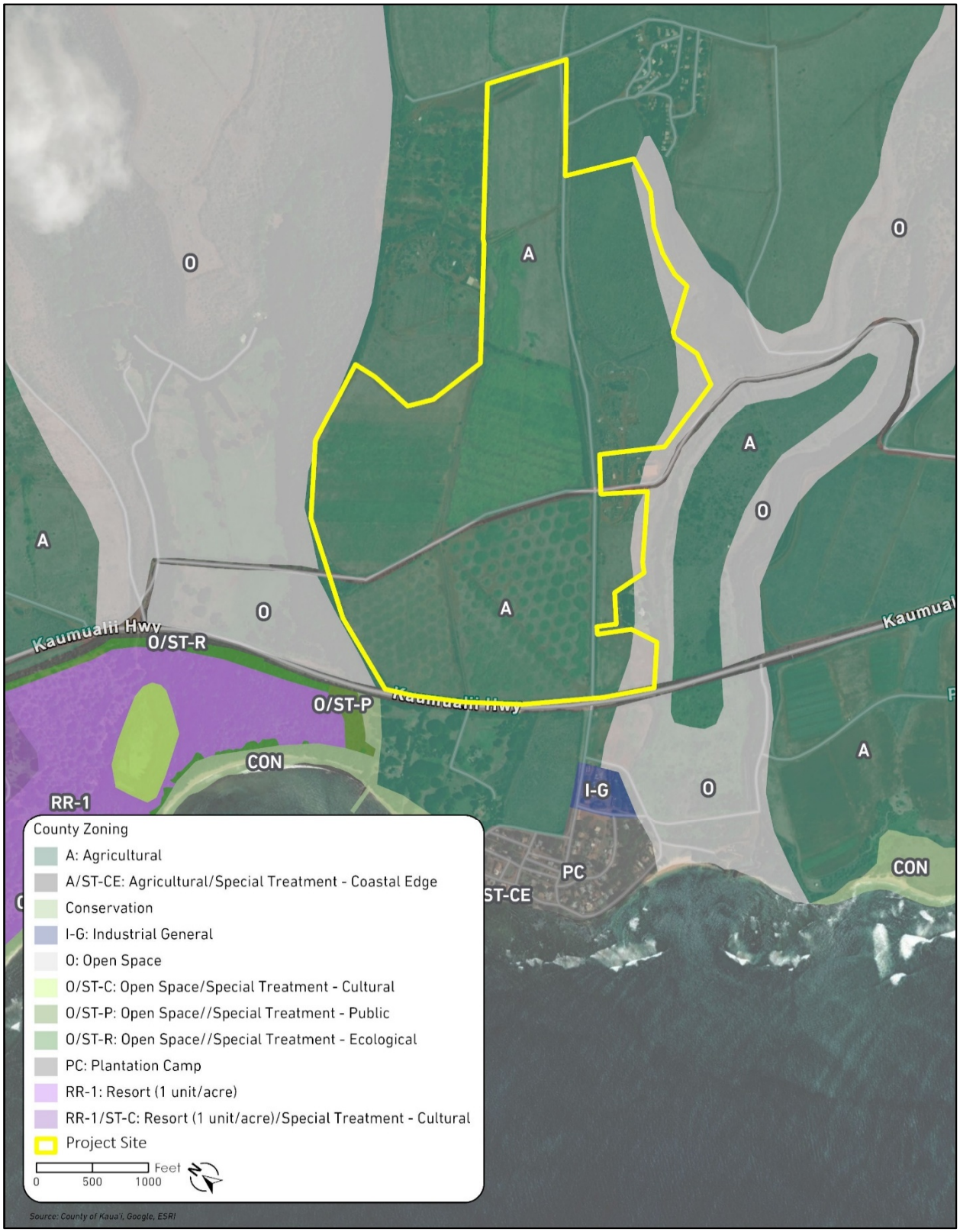

Exhibit C6 **County of Kaua‘i Zoning Map**

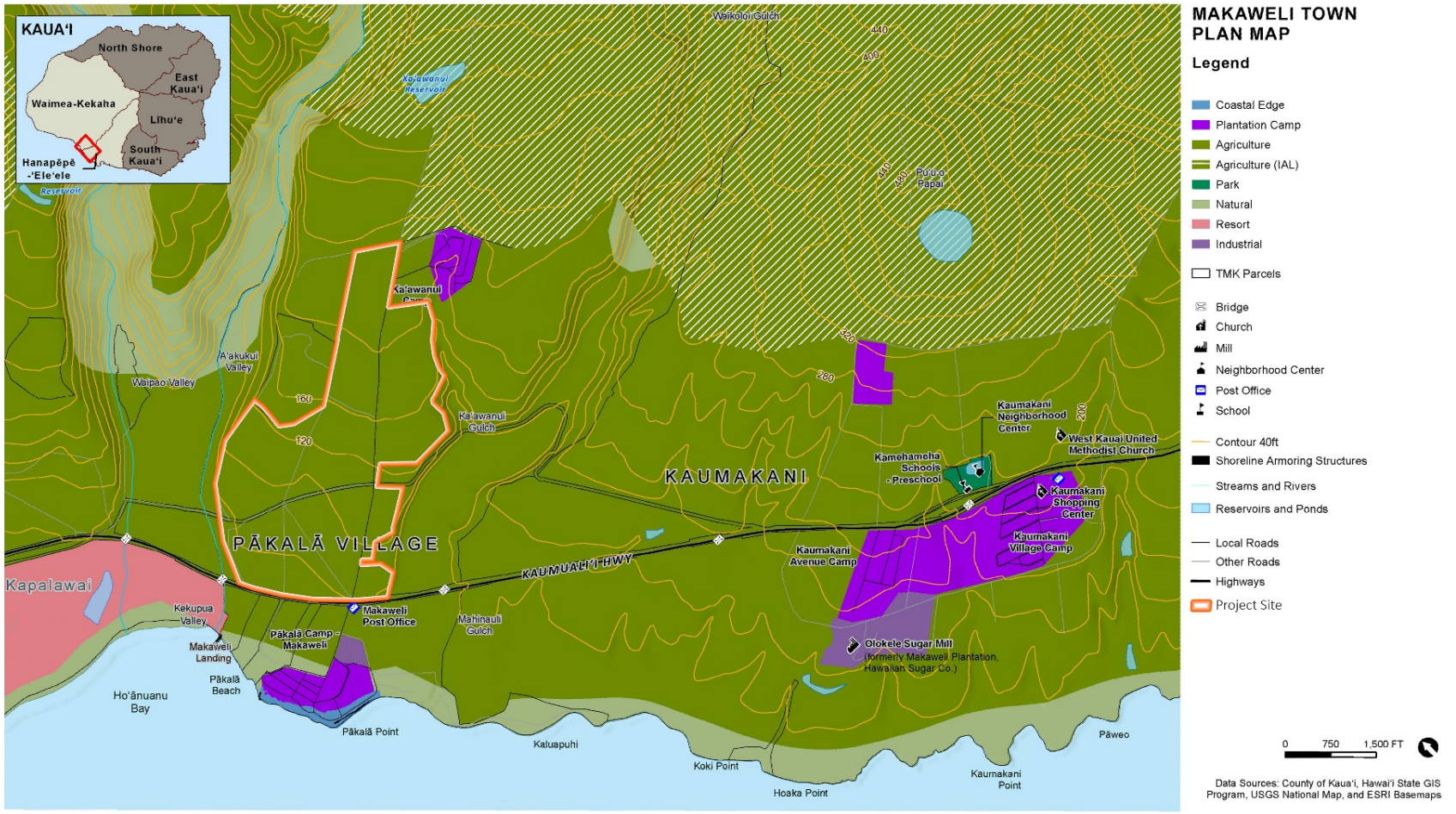

FIGURE 15 | Makaweli Town Plan Map

Exhibit C7 **Makaweli Town Plan Map with Project Site**

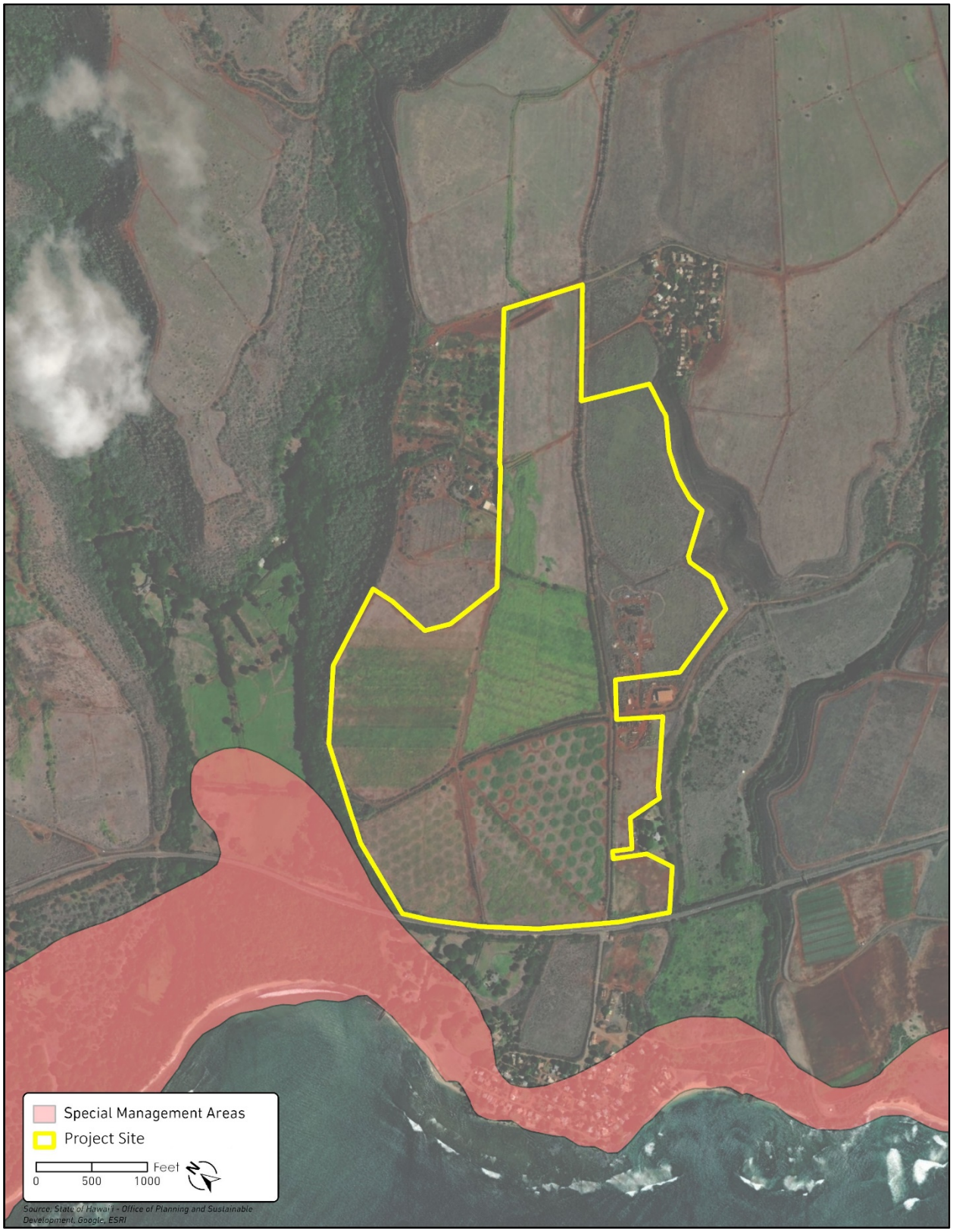

Exhibit C8 **Special Management Area**

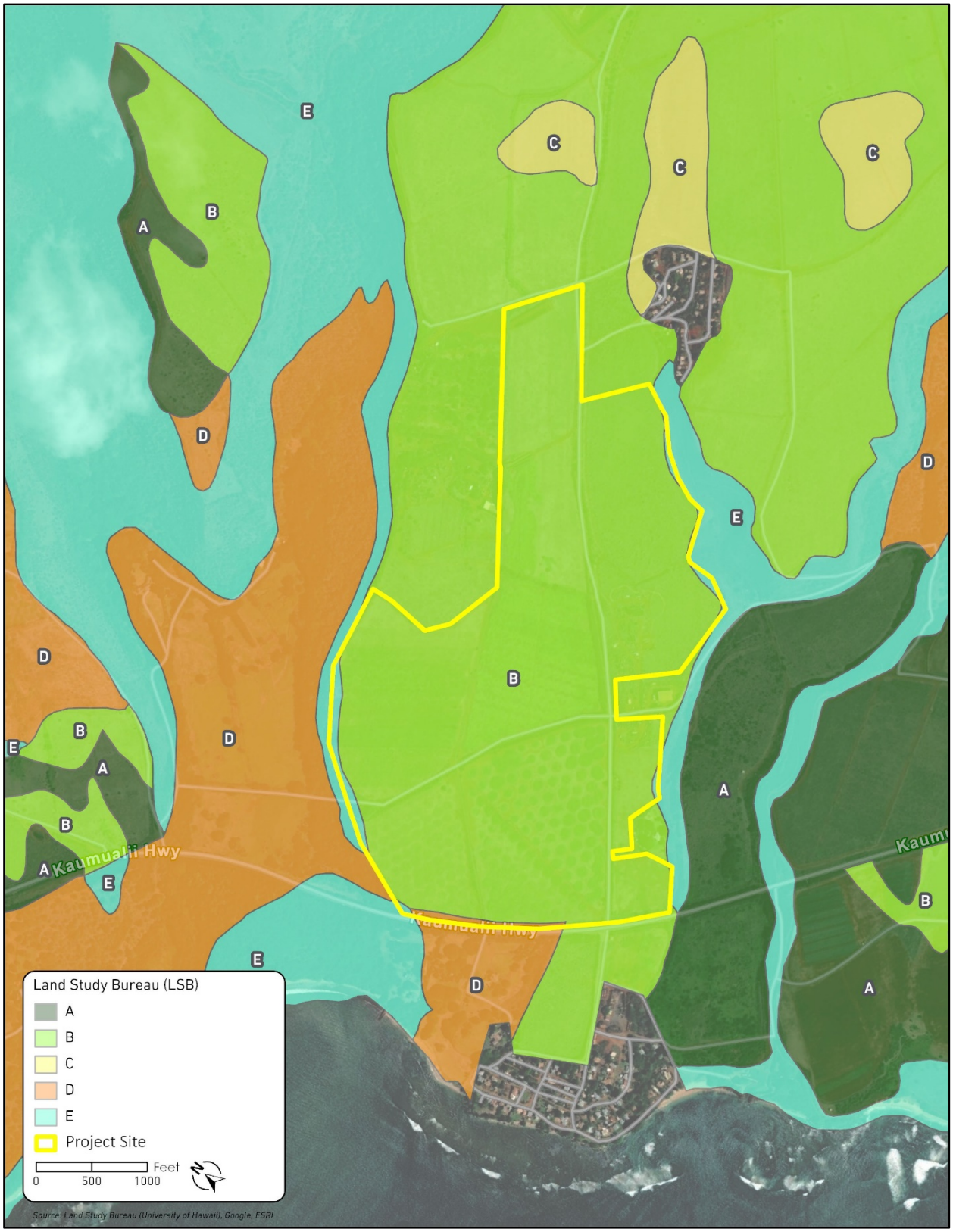

Exhibit C9 **Land Study Bureau Classification**

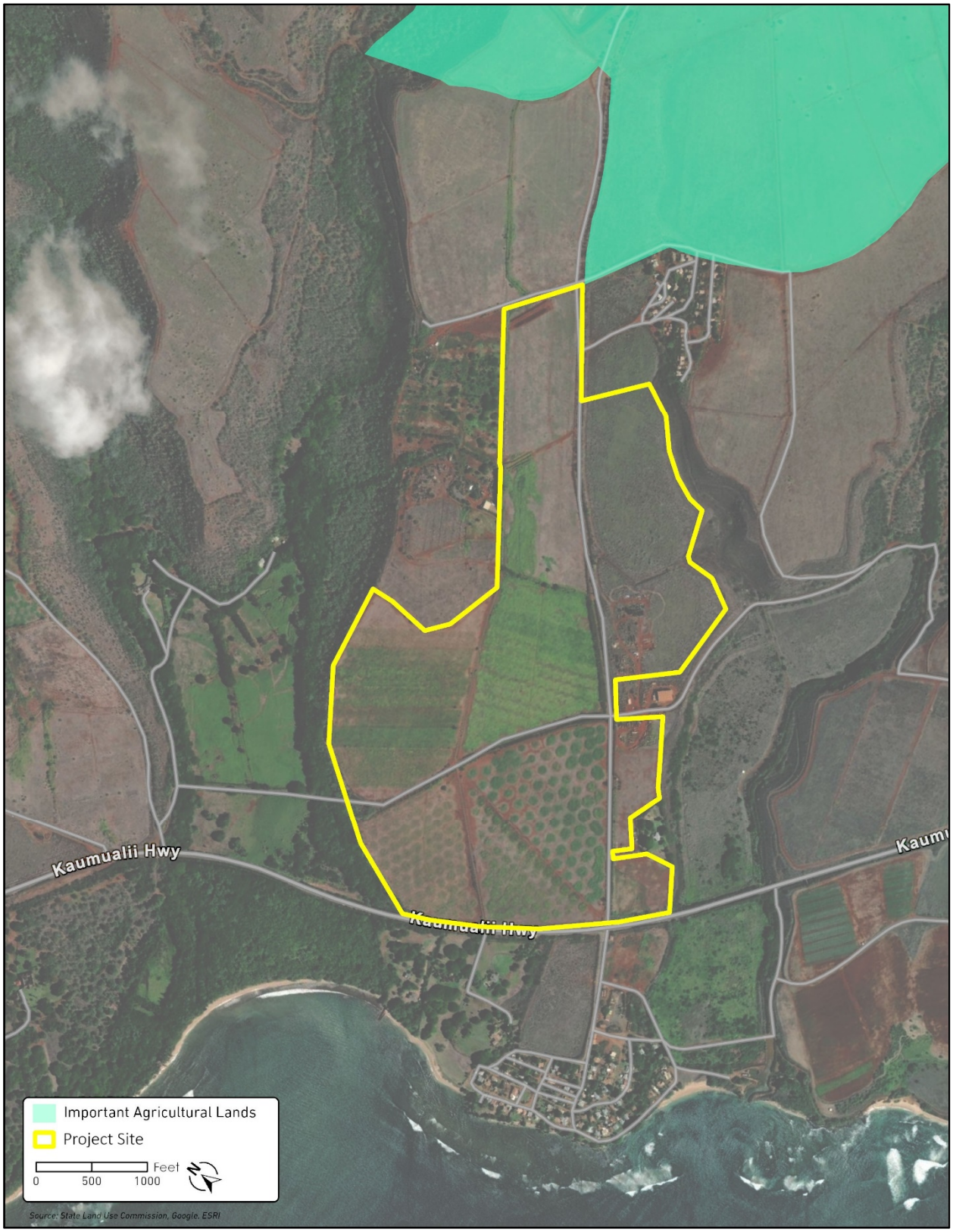

Exhibit C10 **Important Agricultural Lands**

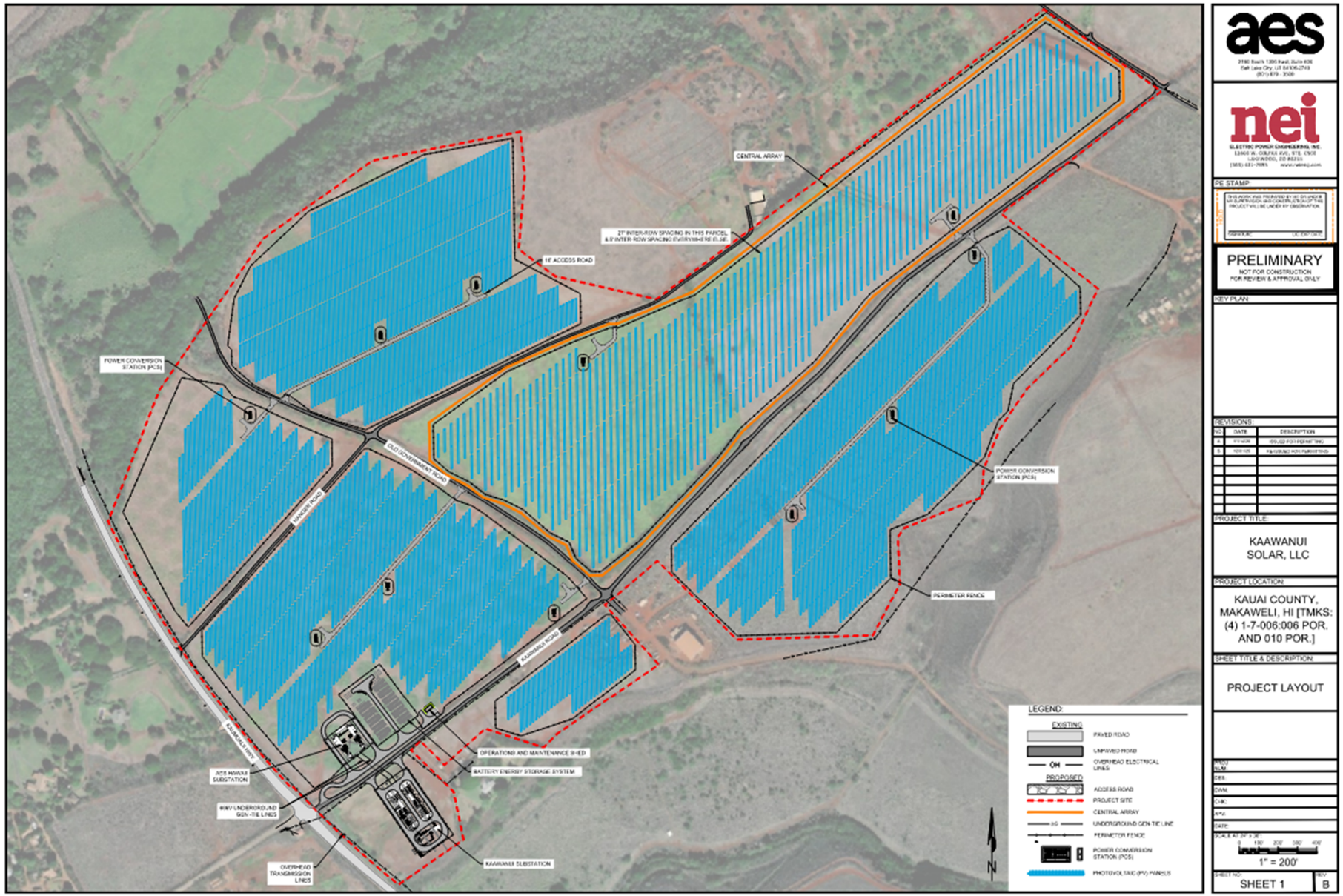

Exhibit C11 **Project Layout**

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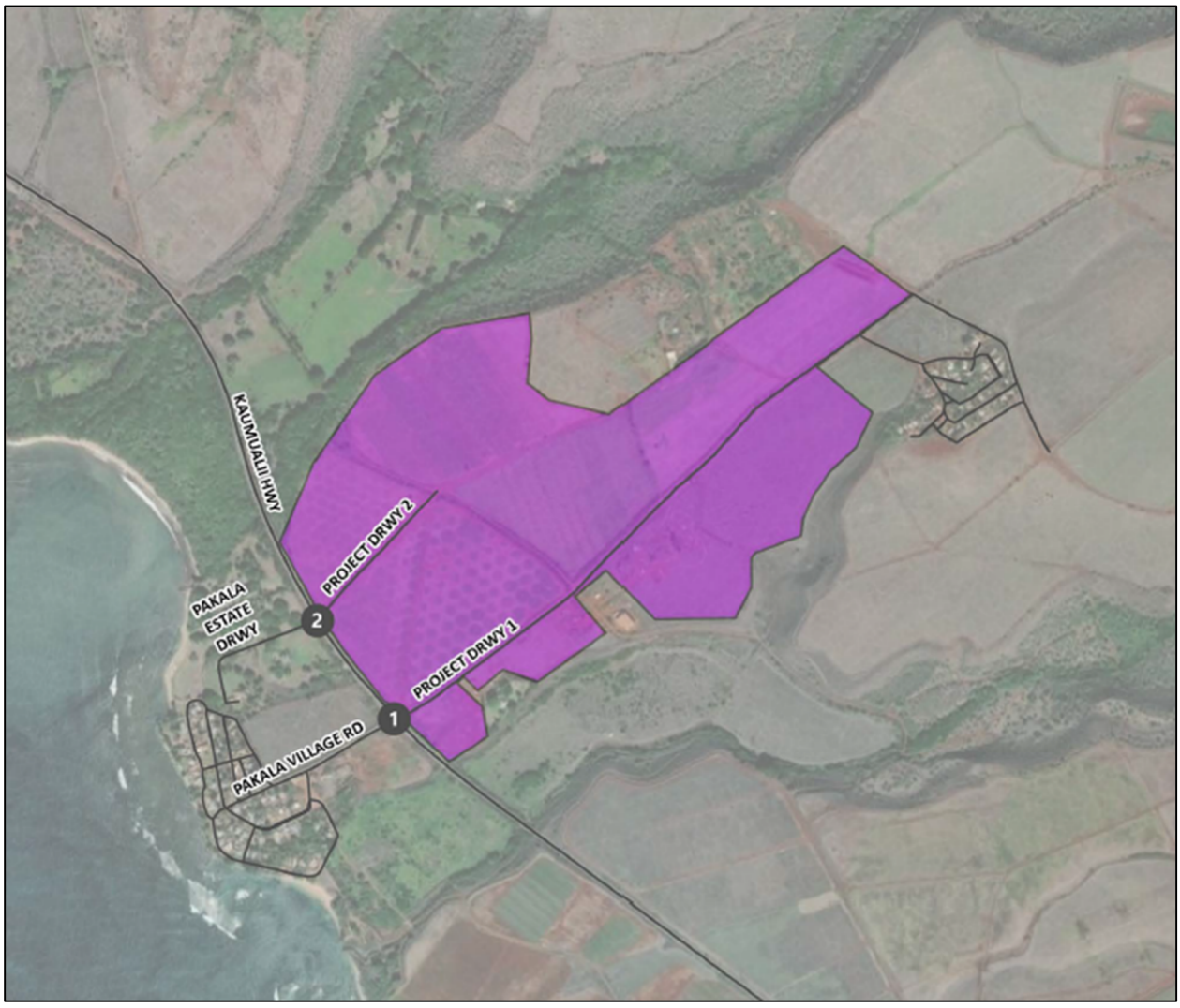

Source: Fehr & Peers, 2025

Exhibit C12 **Access Map**

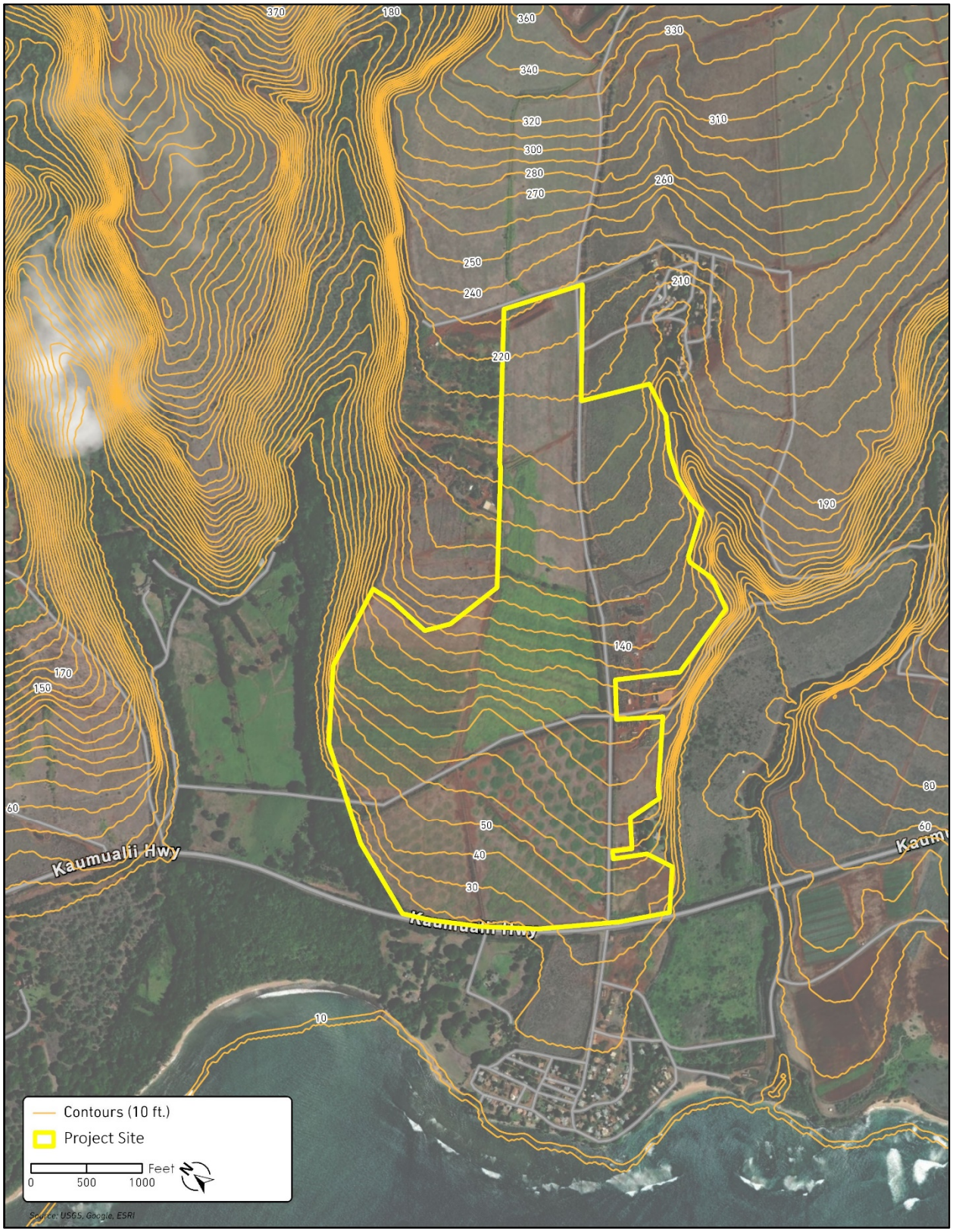

Exhibit C13 **Topography**

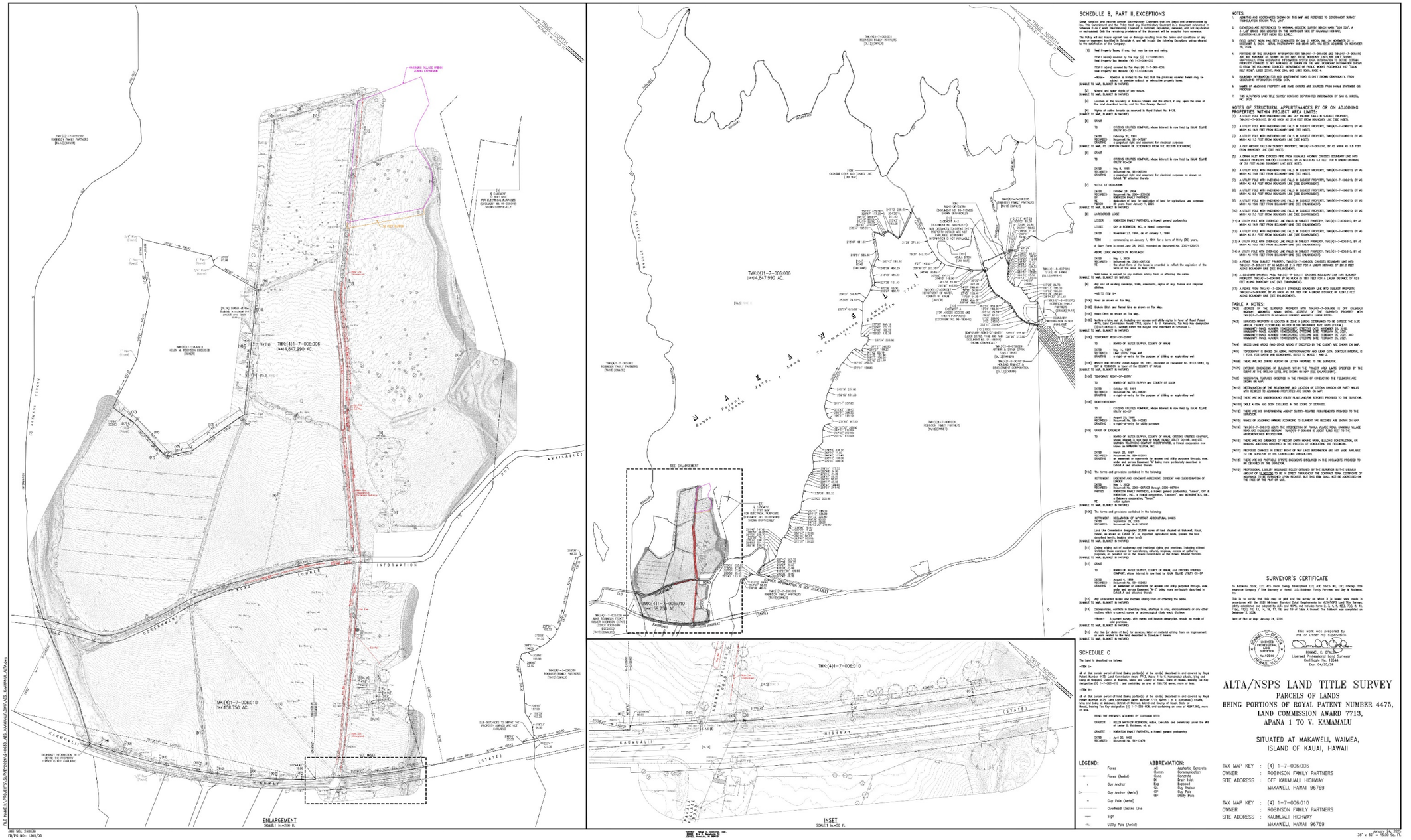

Exhibit C14 **ATLA Survey**

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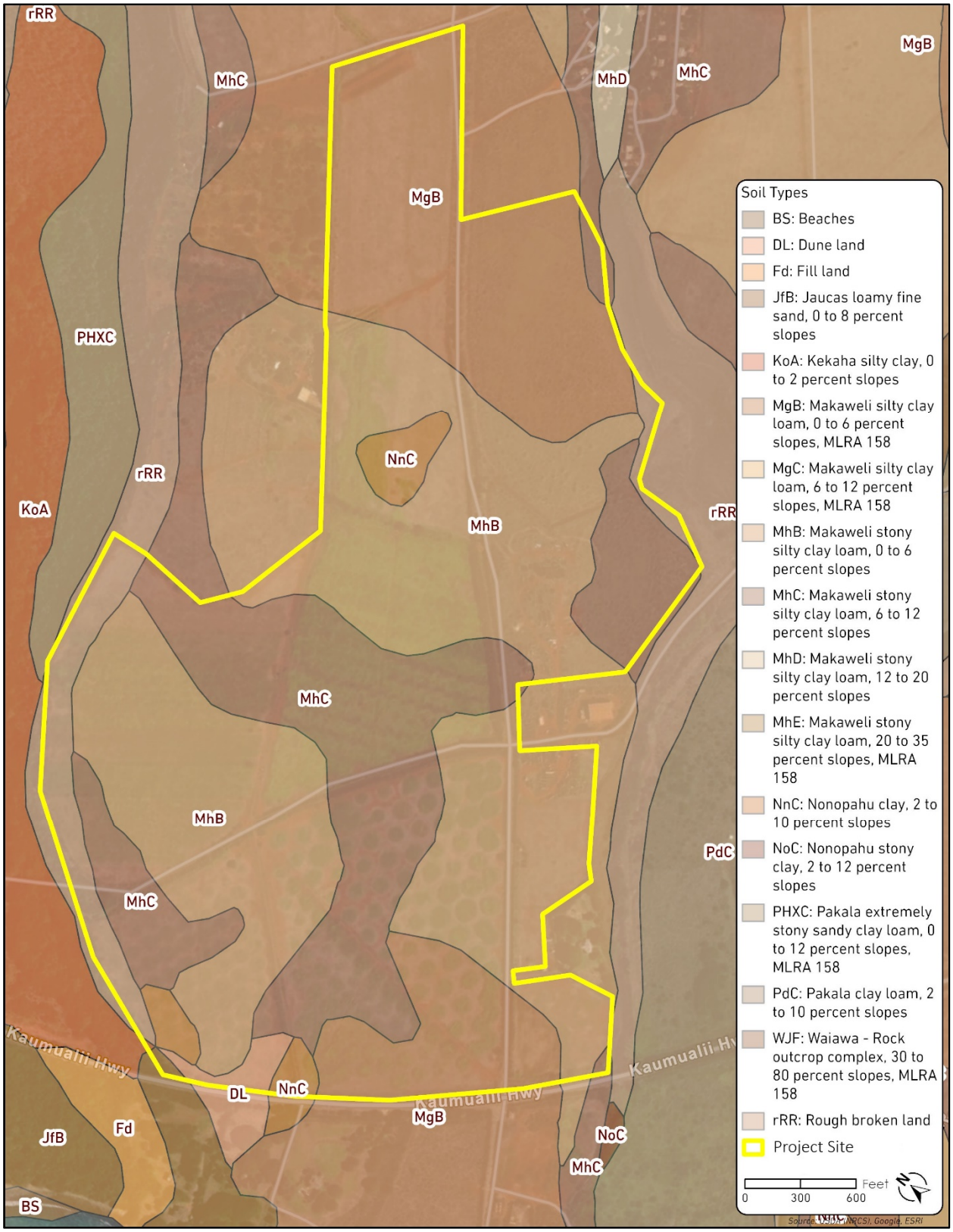


Exhibit C15 **Soils Map**

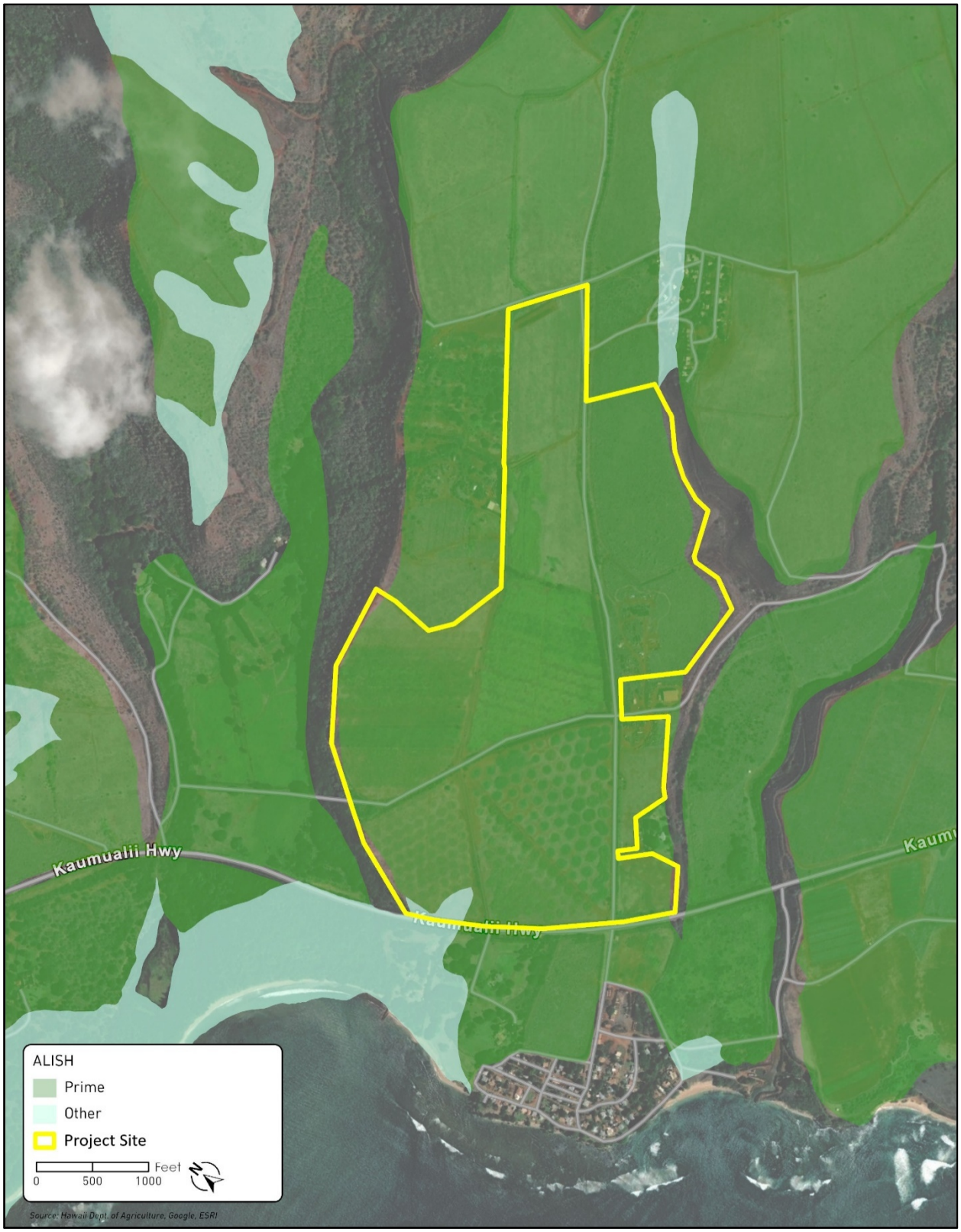


Exhibit C16 **Agricultural Lands of Importance to the State of Hawai'i**

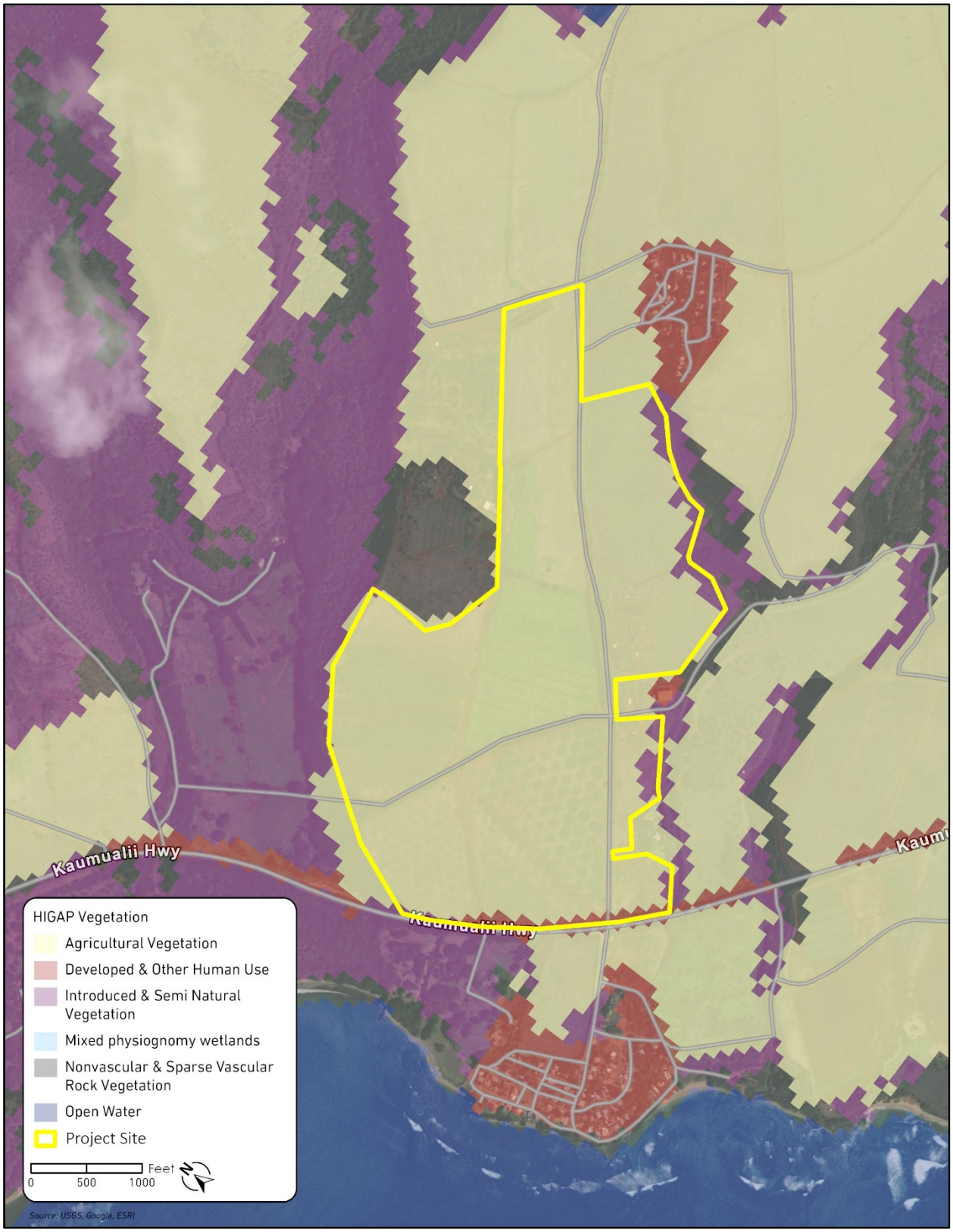
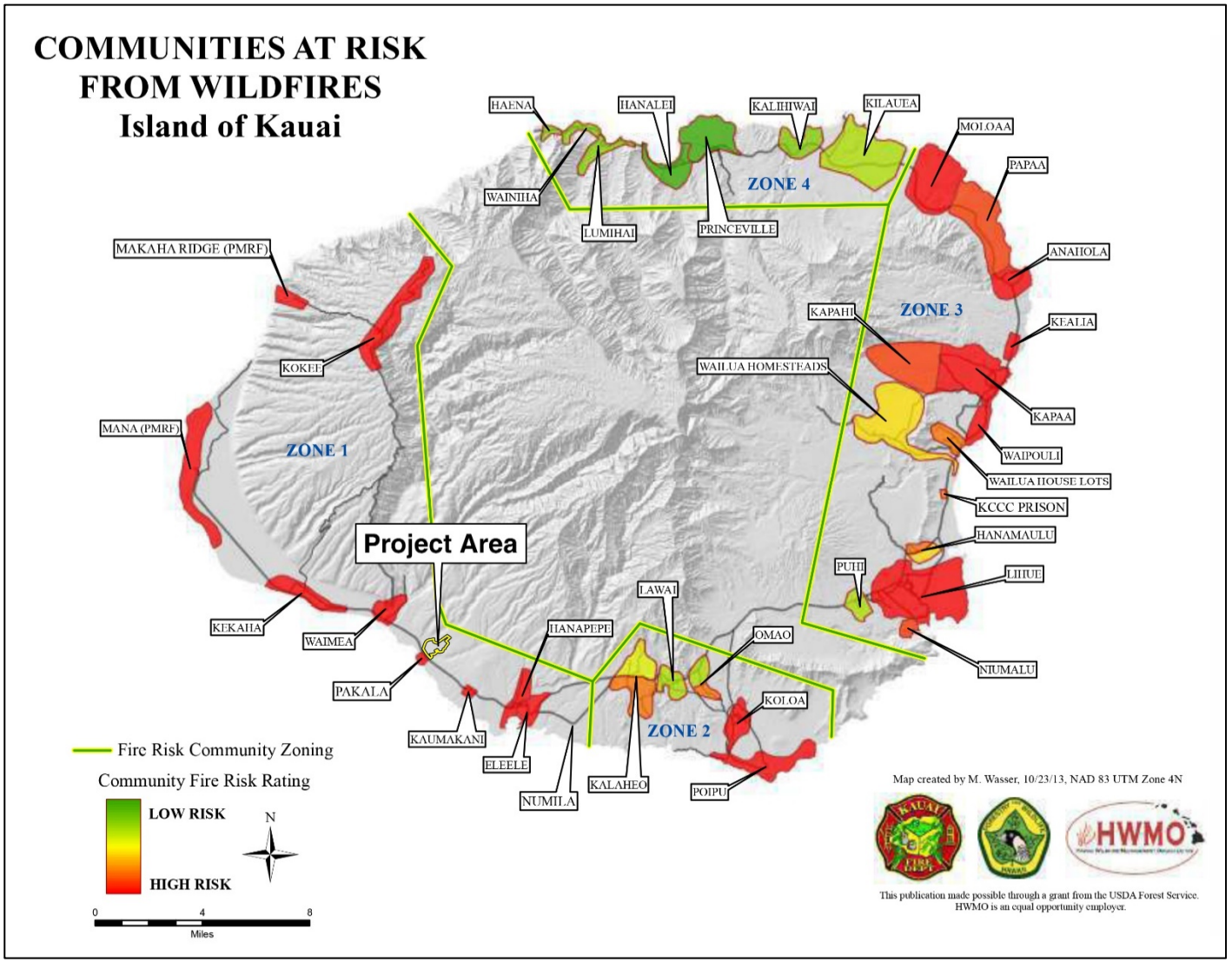
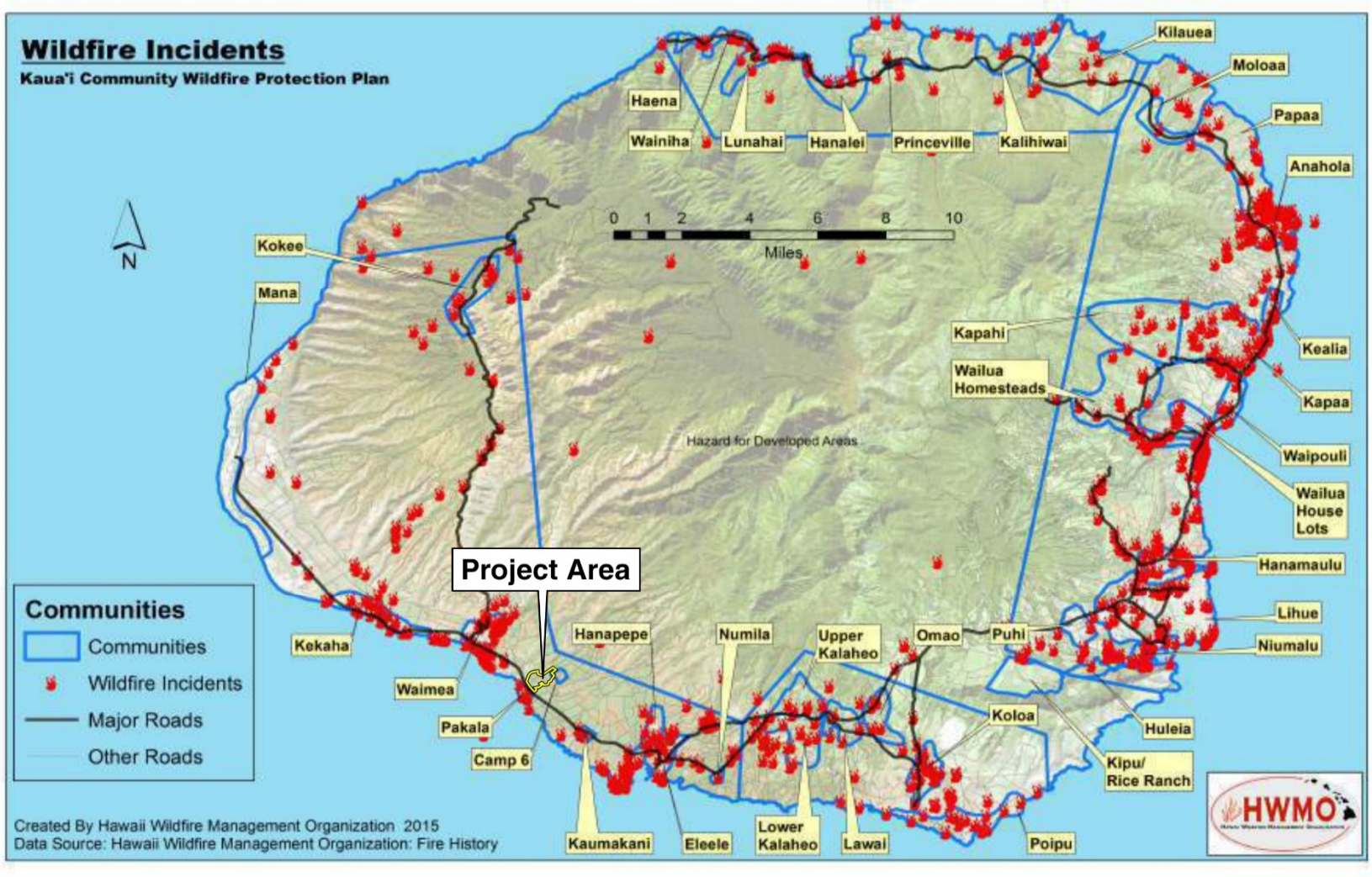


Exhibit C17 **Hawai'i Gap Analysis Project Land Cover and Vegetation Map**



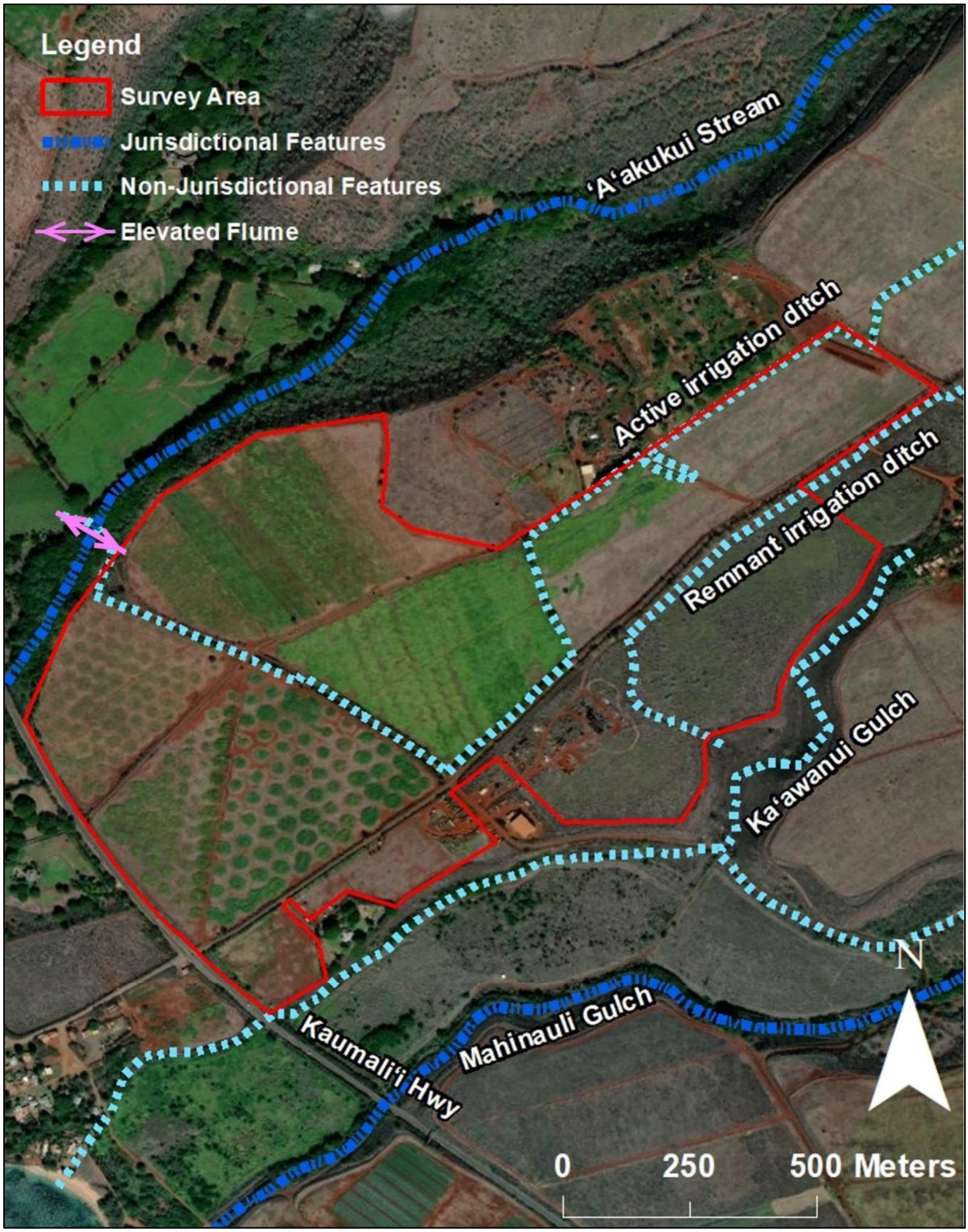
Source: HWMO, 2024

Exhibit C18 **Island of Kaua‘i’s 2013 Communities at Risk from Wildfires**



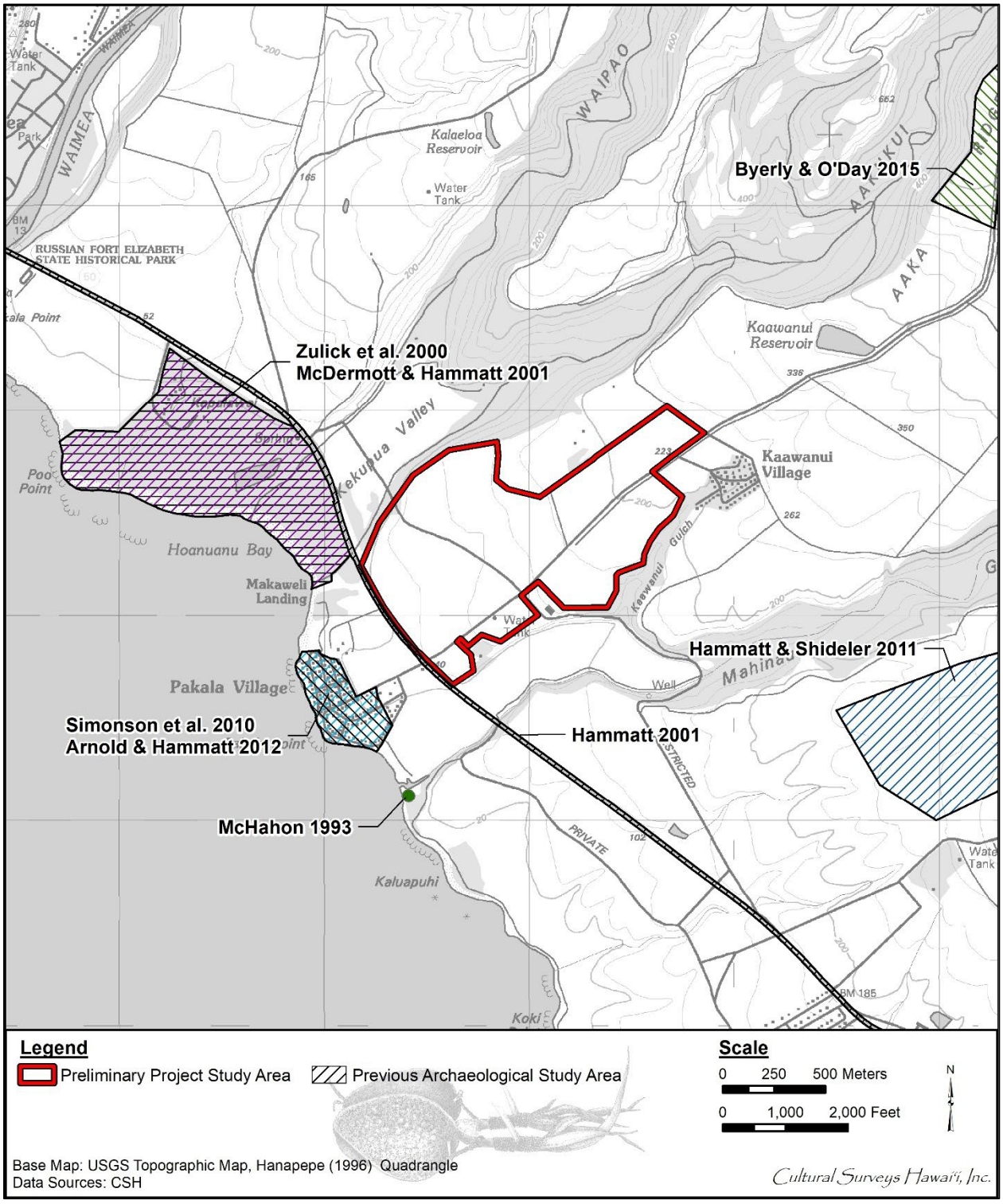
Source: HWMO, 2024

Exhibit C19 **Island of Kaua'i's Wildfire Incident**



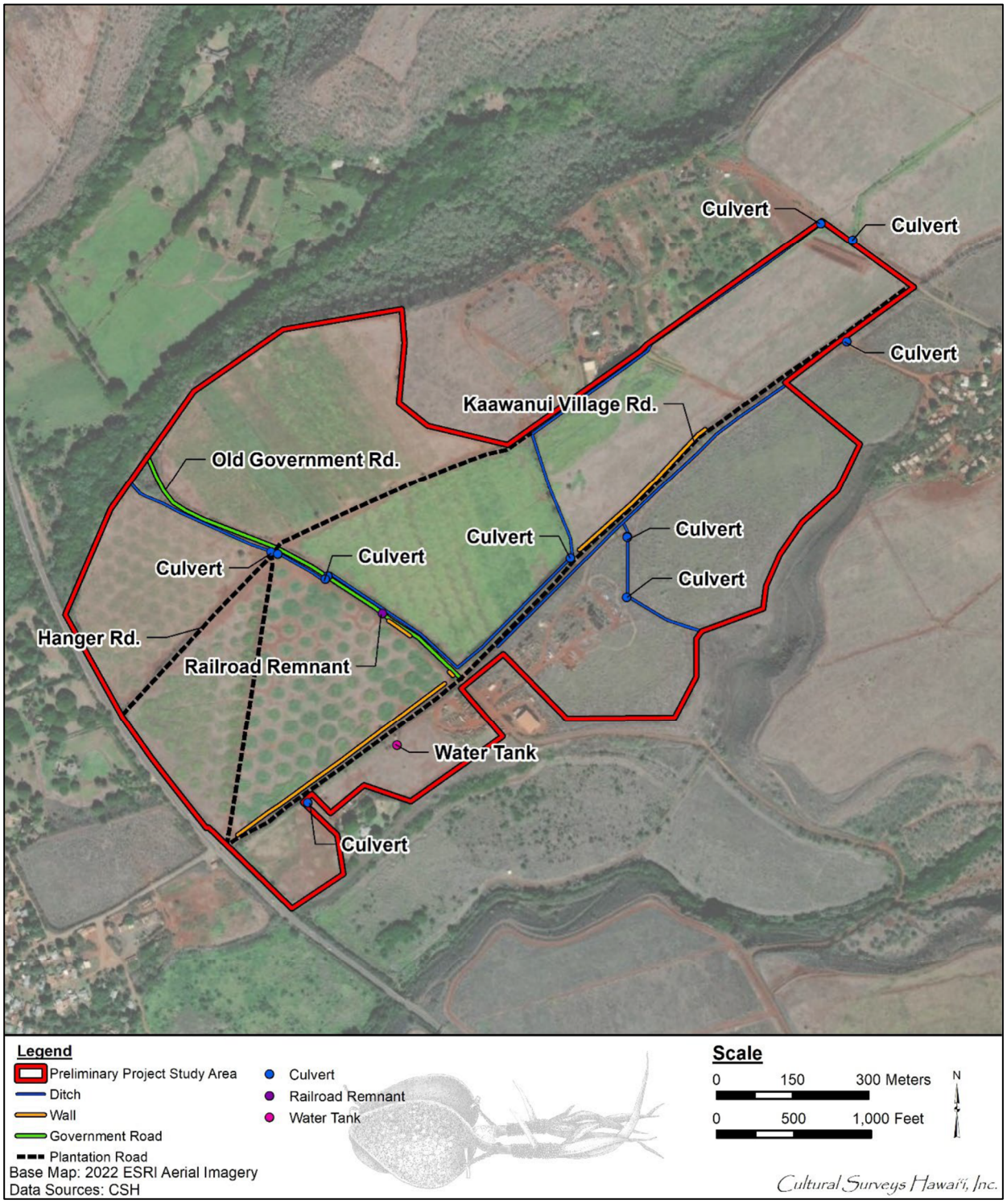
Source: AECOS, 2025

Exhibit C20 **Water Features and their Jurisdictional Status in the Project Site**



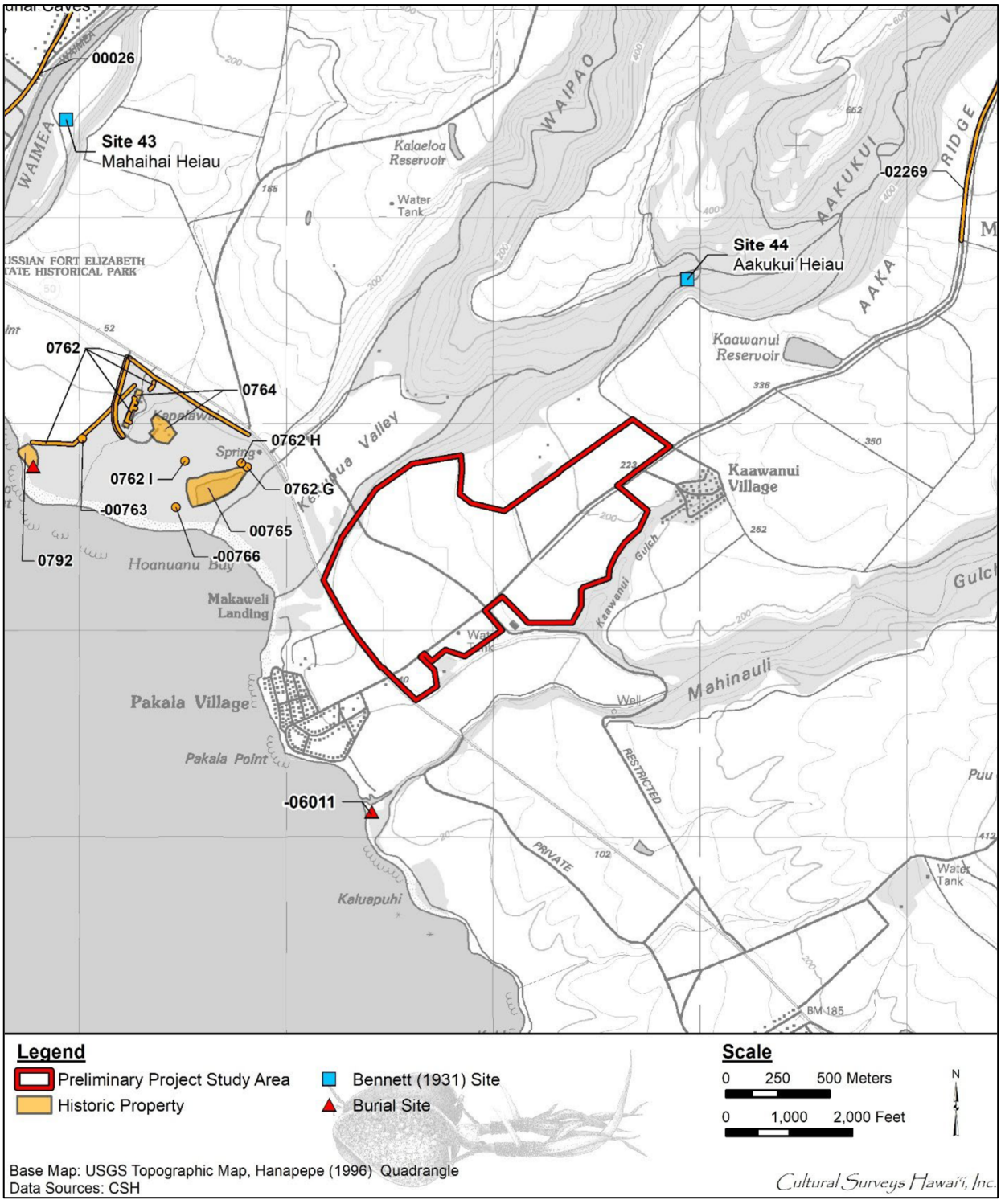
Source: CSH,2025

Exhibit C21 **Previous Archaeological Studies Conducted in the Vicinity of the Project Site**



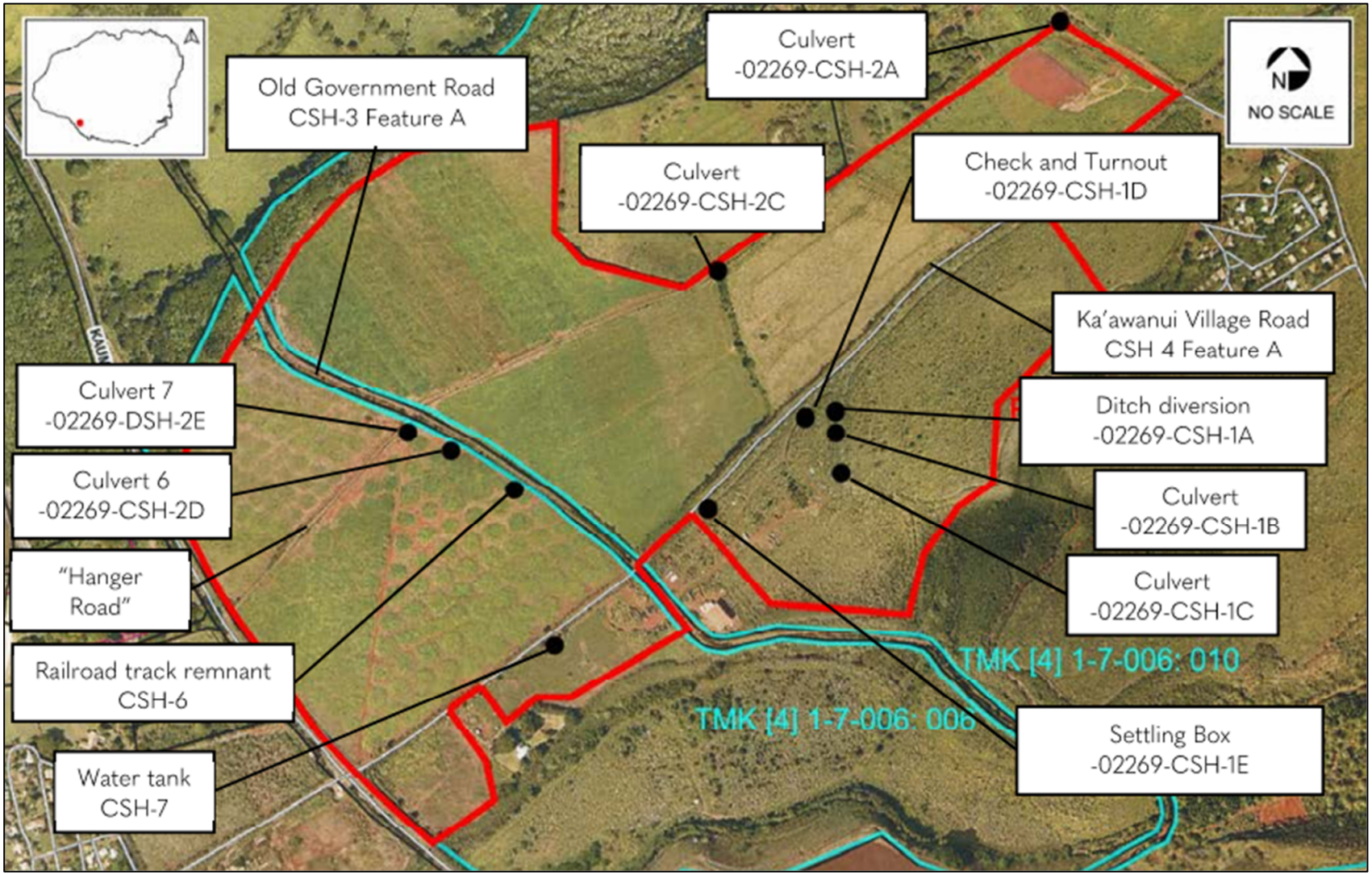
Source: CSH, 2025

Exhibit C22 **Documented Historical Features**



Source: CSH, 2025

Exhibit C23 **Previous Archaeological Sites Documented in the Vicinity of the Project Site**



Source: MASON, 2025

Exhibit C24 **Architectural Features Identified in the RLS**

Zoning District	Day Hours (7 AM to 10 PM)	Night Hours (10 PM to 7 AM)
CLASS A Residential, Conservation, Preservation, Public Space, Open Space	55 dBA (Exterior)	45 dBA (Exterior)
CLASS B Multi-Family Dwellings, Apartments, Business, Commercial, Hotel, Resort	60 dBA (Exterior)	50 dBA (Exterior)
CLASS C Agriculture, Country, Industrial	70 dBA (Exterior)	70 dBA (Exterior)

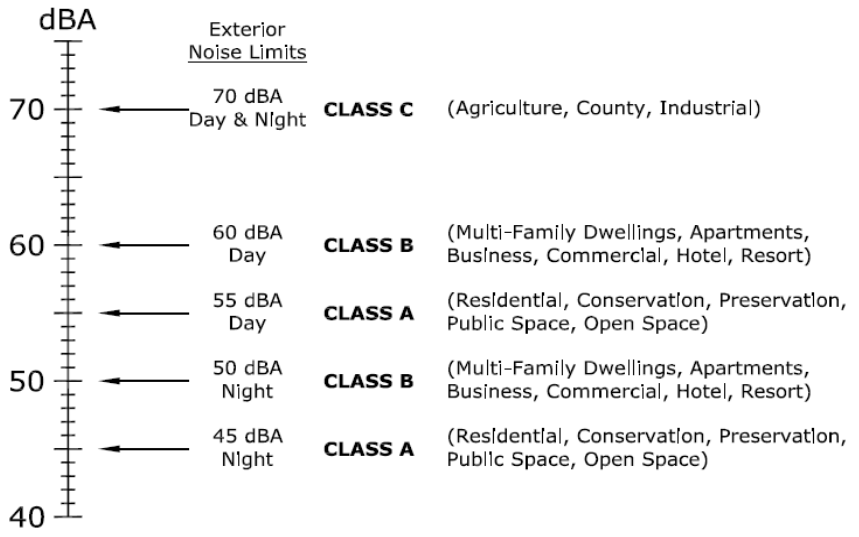


Exhibit C25 **Hawai'i Maximum Permissible Sound Levels for Various Zoning Districts**

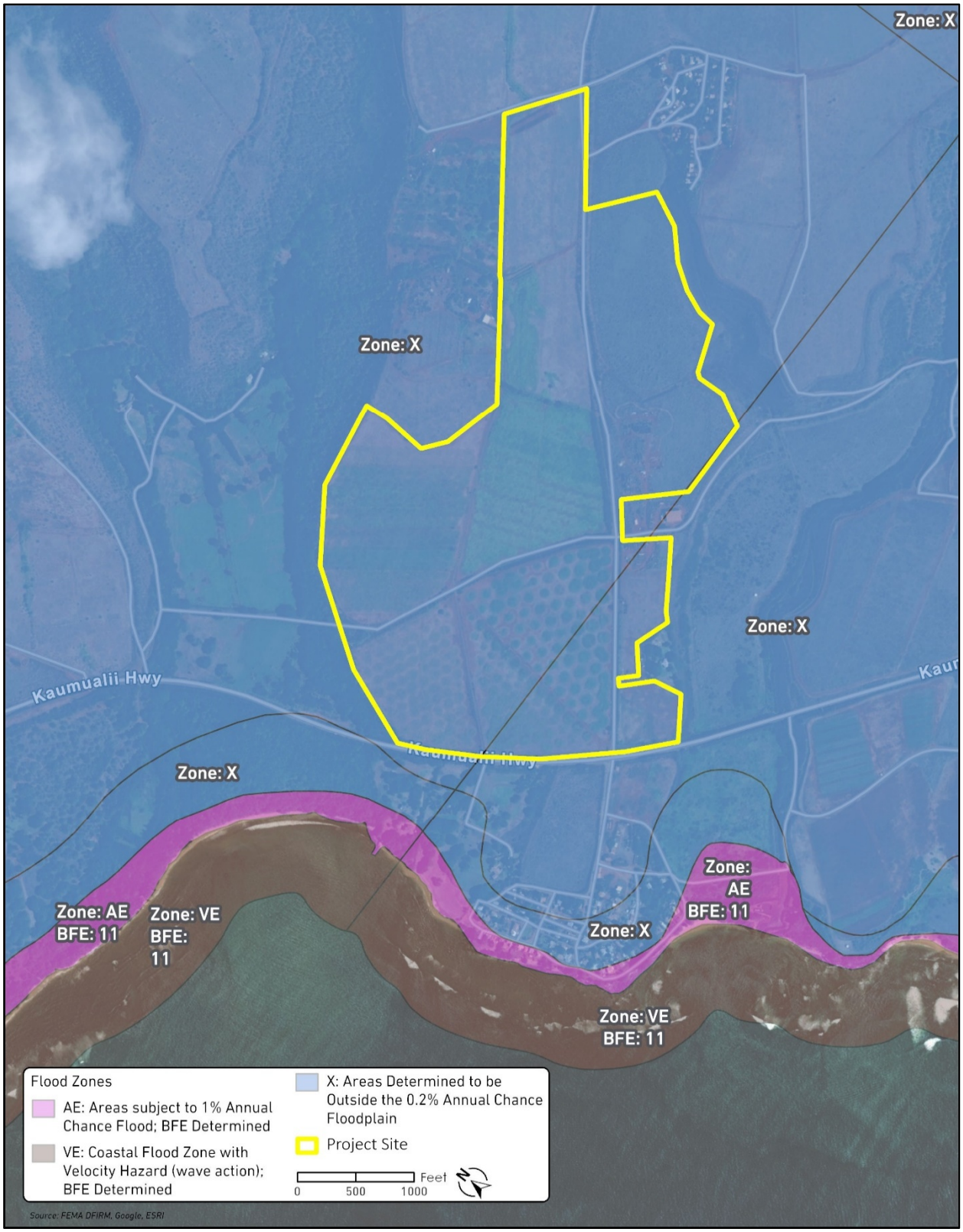


Exhibit C26 **Flood Zone Map**

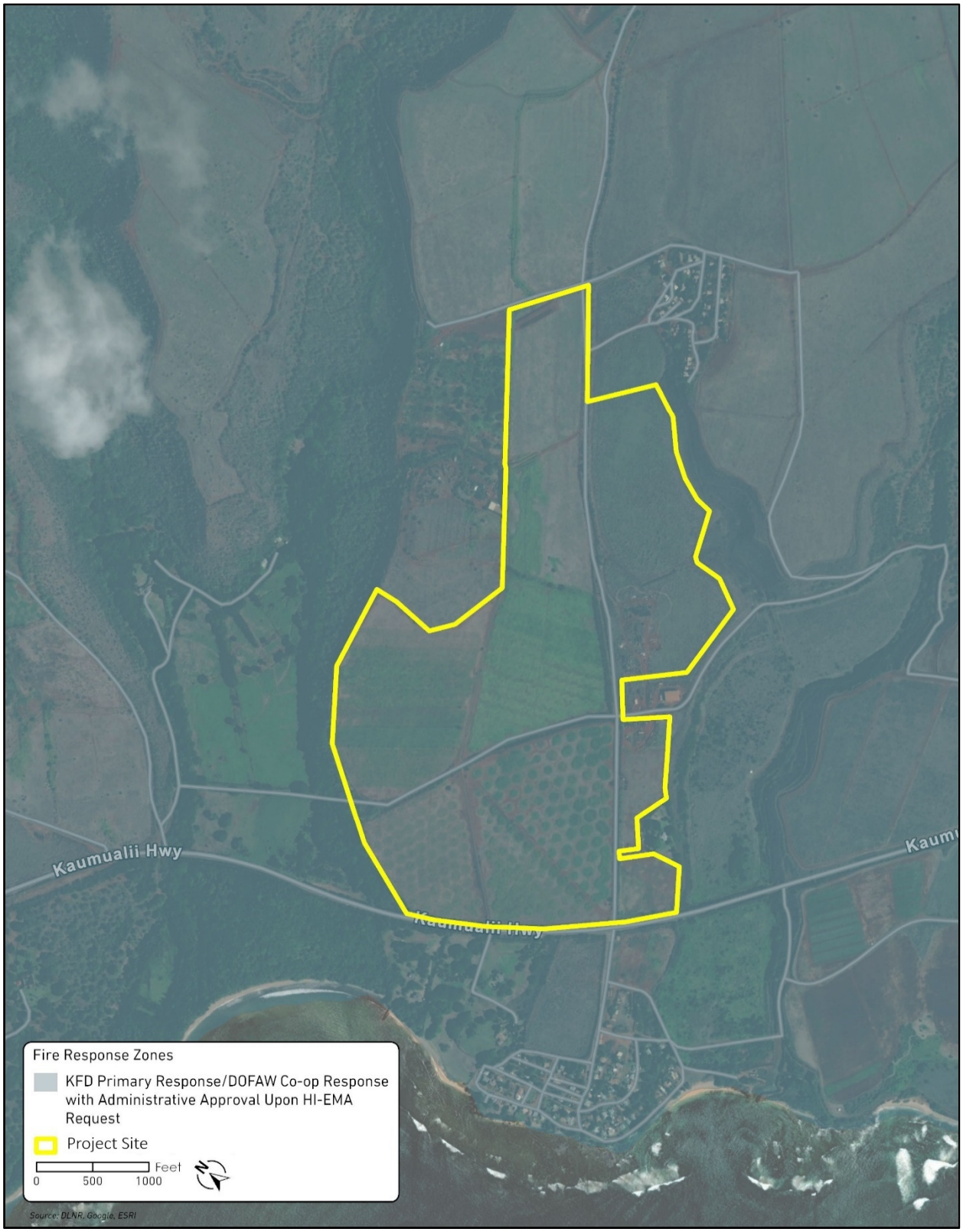


Exhibit C27 **Fire Response Zones**

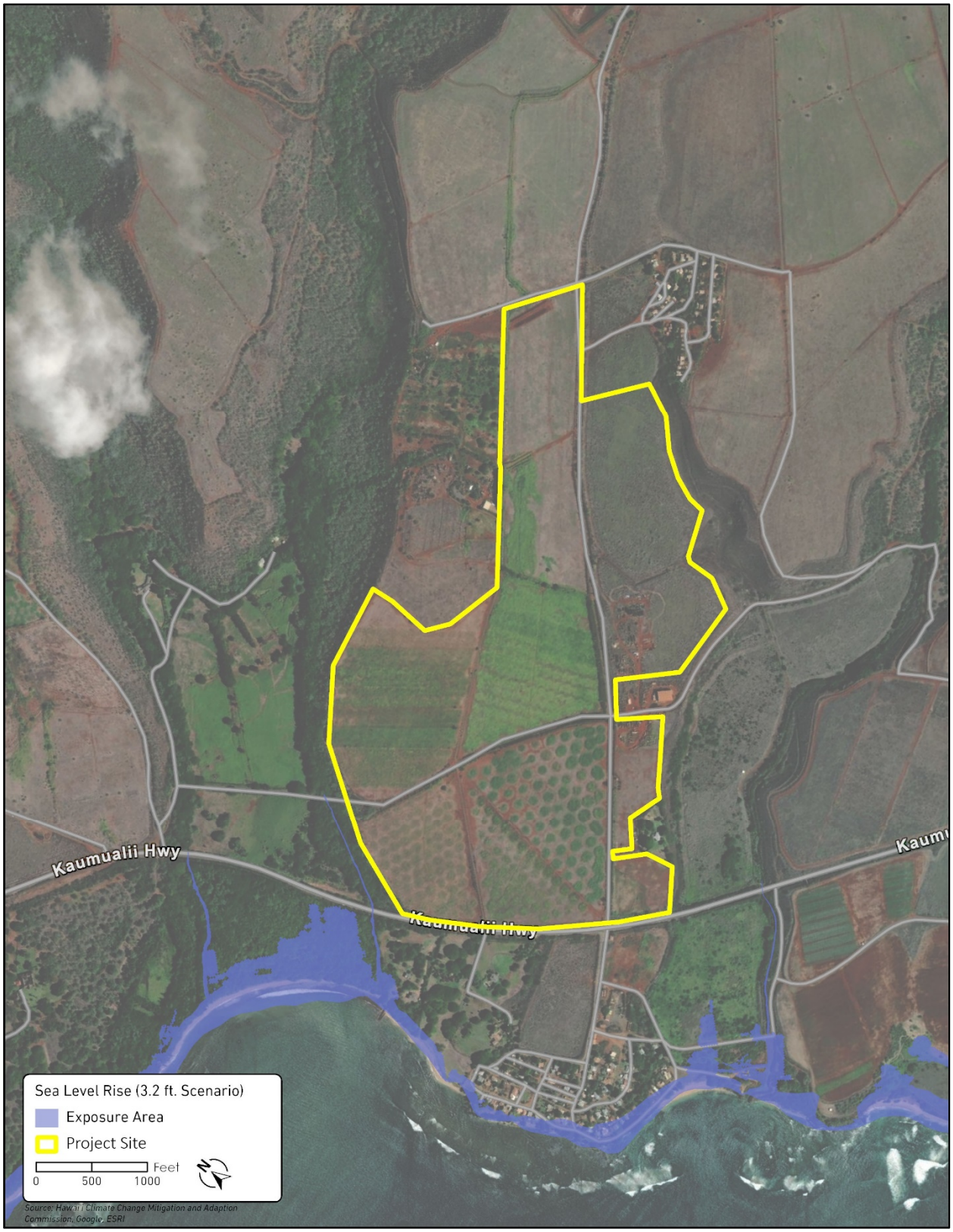
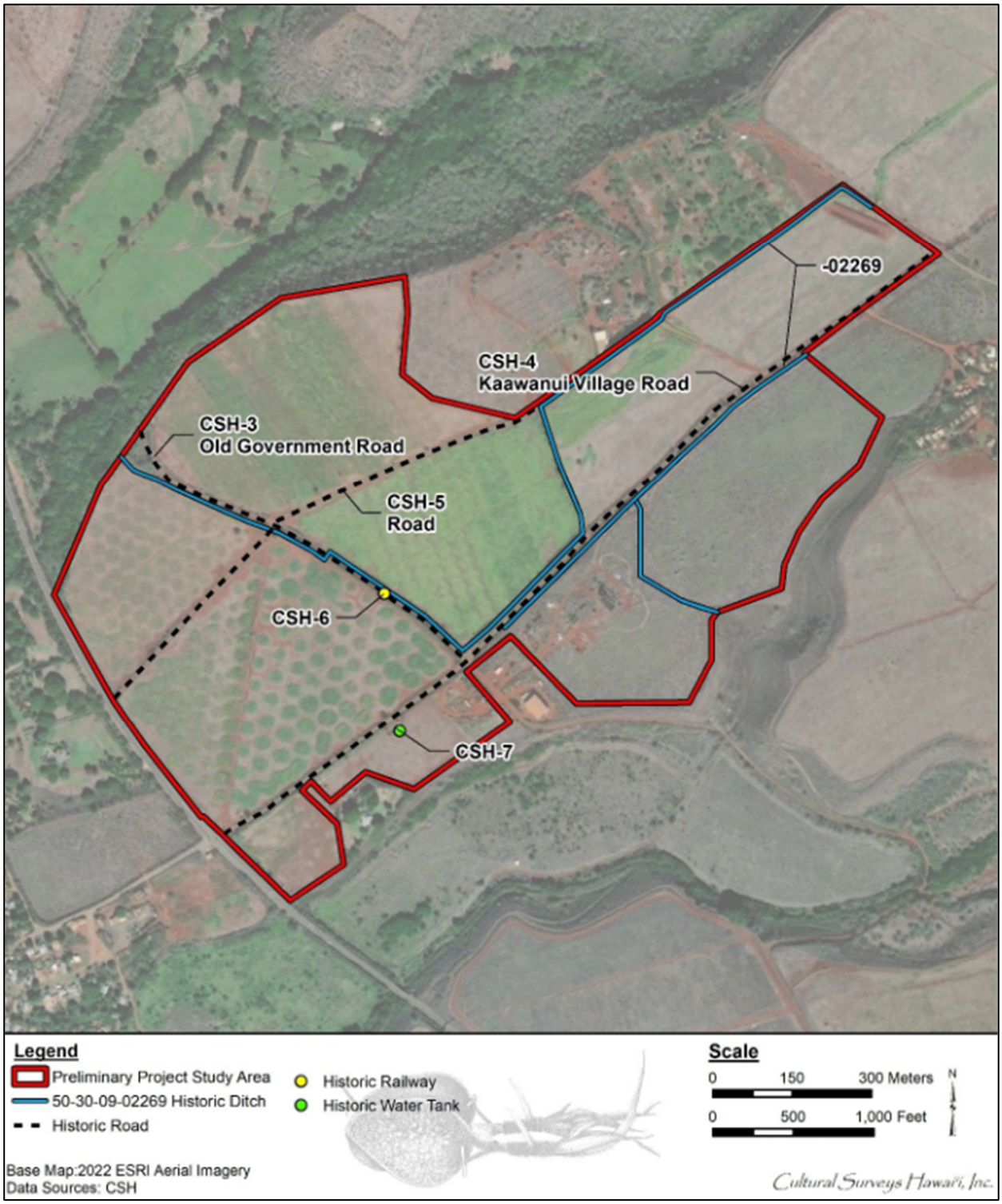


Exhibit C28 **Sea Level Rise Exposure Map**



Source: CSH, 2025

Exhibit C29 Results from 1999 Cultural Study Conducted in the Vicinity of the Project Site

Exhibit D

Site Photos

Kaawanui Solar Project

Representative Photographs of Project Site





Photograph 1. Photo overlooking a fallow field within the Project Site; view to the southwest



Photograph 2. Photo overlooking an irrigated field within the Project Site; view to the northeast



Photograph 3. Photo showing sprinkler irrigation in a field within the Project Site; view to the west



Photograph 4. Photo of an overgrown field east of Kaawanui Road; view to the west



Photograph 5. Photo overlooking the Old Government Road from the Hanger Road intersection; view to west



Photograph 6. Photo overlooking a section of Kaawanui Road within the Project Site (note the overhead transmission line along road shoulder); view to the northeast



Photograph 7. Photo overlooking the lower portion of Hanger Road within the Project Site; view to the southwest



Photograph 8. Photo overlooking the dirt cane road within the Mango Tree Pen; view to the north



Photograph 9. Photo from the Makaweli Post Office looking towards Kaawanui Road; view to the northeast.

Exhibit E

Site Development Plan Set

COUNTY USE / STATE SPECIAL USE/ ZONE IV
PERMIT DRAWING SET
KAAWANUI SOLAR
WEST KAUAI, HAWAII

PROJECT TEAM INFORMATION		
FIRM NAME	PROJECT ROLE	CONTACT NAME
KAAWANUI SOLAR, LLC	DEVELOPER/APPLICANT	MEGAN KĀNE
G70	AGENT/PLANNER	TRACY CAMUSO
NEI	PV/BESS/HV	JEFF SIGL
3J	CIVIL	AARON MURPHY

SHEET LIST	
SHEET NO.	SHEET TITLE
	TITLE SHEET
SHEET 1	PROJECT LAYOUT
SHEET 2	ELECTRICAL COLLECTOR SYSTEM AND INTERCONNECTION LAYOUT
SHEET 3	TYPICAL POWER CONVERSION STATION
SHEET 4	TYPICAL SOLAR PHOTOVOLTAIC MODULE AND TRACKER
SHEET 5	BATTERY ENERGY STORAGE SYSTEM
SHEET 6	AES HAWAII SUBSTATION
SHEET 7	KAAWANUI SUBSTATION
SHEET 8	TYPICAL OVERHEAD INTERCONNECTION LINES STRUCTURE
SHEET 9	INTERNAL ACCESS ROUTE AND PERIMETER FENCE
	PROJECT SITE METES AND BOUNDS

PROJECT INFORMATION

PROJECT SITE

TAX MAP KEY:	(4) 1-7-006:006 (POR.) 010 (POR.)
OWNER:	ROBINSON FAMILY PARTNERS
DEVELOPER/APPLICANT:	KAAWANUI SOLAR, LLC
PARCEL AREA	5006.740
PROJECT SITE:	269.195 ACRES

SURVEY INFORMATION

PREPARED BY:	SAM O. HIROTA, INC.
SURVEY DATE:	COMPLETED DECEMBER 3, 2024



aes
2180 South 1300 East, Suite 600
Salt Lake City, UT 84106-2749
(801) 679 - 3500

nei
ELECTRIC POWER ENGINEERING, INC.
12600 W. COLFAX AVE, STE. C500
LAKEWOOD, CO 80215
(303) 431-7895 www.neieng.com

PE STAMP:

HOLD

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION AND CONSTRUCTION OF THIS PROJECT WILL BE UNDER MY OBSERVATION.

SIGNATURE LIC. EXP. DATE

PRELIMINARY

NOT FOR CONSTRUCTION
FOR REVIEW & APPROVAL ONLY

KEY PLAN:

REVISIONS:

NO.	DATE	DESCRIPTION
A	11/14/25	ISSUED FOR PERMITTING
B	12/01/25	RE-ISSUED FOR PERMITTING

PROJECT TITLE:

KAAWANUI SOLAR, LLC

PROJECT LOCATION:

KAUAI COUNTY, MAKAWELI, HI [TMKS: (4) 1-7-006:006 POR. AND 010 POR.]

SHEET TITLE & DESCRIPTION:

PROJECT LAYOUT

PROJ NUM:

DES:

DWN:

CHK:

APV:

DATE:

SCALE AT 24" x 36":

0 100' 200' 300' 400'

1" = 200'

SHEET NO: SHEET 1

REV: B



LEGEND:

EXISTING

- PROJECT SITE

PROPOSED

- ACCESS ROAD
- PERIMETER FENCE
- POWER CONVERSION STATION (PCS)
- MV — UNDERGROUND ELECTRICAL COLLECTOR LINES (MEDIUM VOLTAGE)
- OH — EXISTING OVERHEAD KIUC TRANSMISSION LINE (HIGH-VOLTAGE)
- U/G — UNDERGROUND GEN-TIE LINE

aes
2180 South 1300 East, Suite 600
Salt Lake City, UT 84106-2749
(801) 679 - 3500

nei
ELECTRIC POWER ENGINEERING, INC.
12600 W. COLFAX AVE, STE. C500
LAKEWOOD, CO 80215
(303) 431-7895 www.neieng.com

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KAUAI COUNTY, MAKAWELI, HI [TMKS: (4) 1-7-006:006 POR. AND 010 POR.]

SHEET TITLE & DESCRIPTION:

ELECTRICAL COLLECTOR SYSTEM AND INTERCONNECTION LAYOUT

PROJ NUM:

DES:

DWN:

CHK:

APV:

DATE:

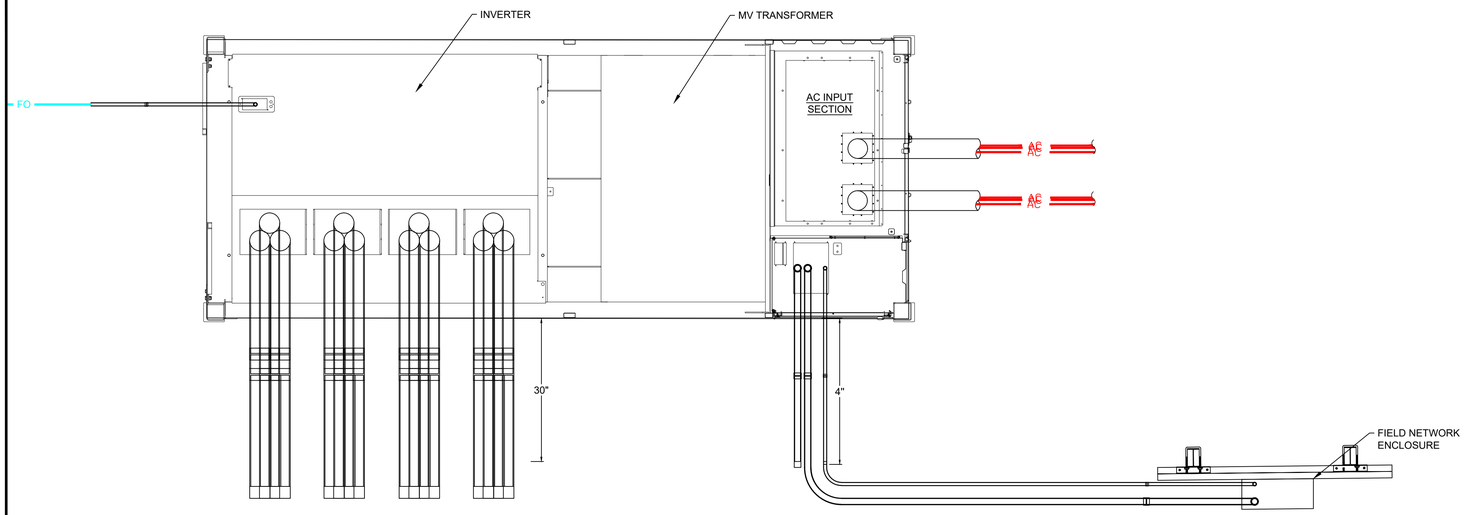
SCALE AT 24" x 36":

0 100' 200' 300' 400'

1" = 200'

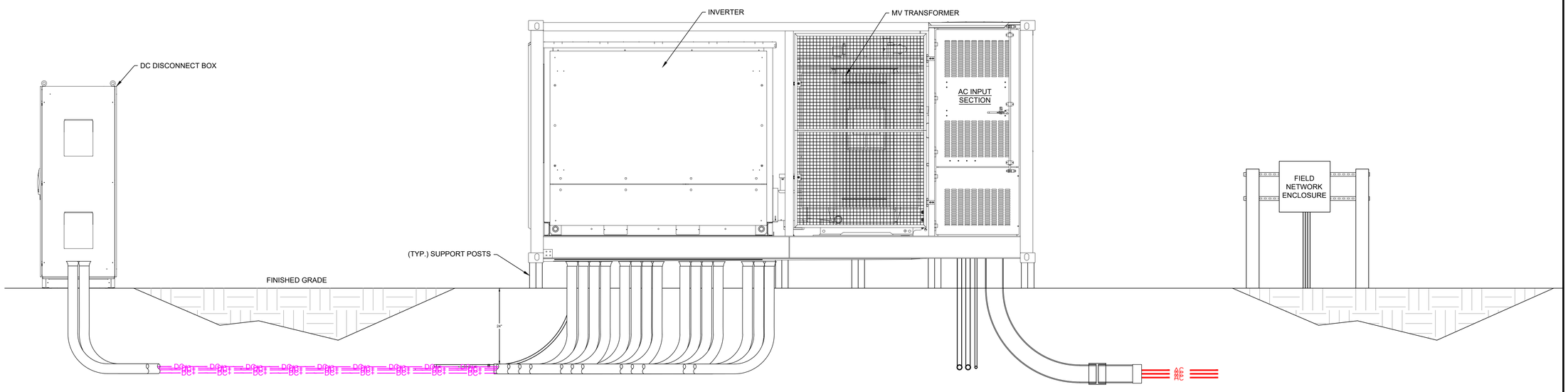
SHEET NO: SHEET 2

REV: B



1 POWER CONVERSION STATION (TOP VIEW)

SCALE: NTS



1 POWER CONVERSION STATION (SIDE VIEW)

SCALE: NTS

LEGEND

DC+ DC+	DC FEEDER CABLE
AC	MV FEEDER
FO	FIBER OPTIC CABLE IN HDPE
LV	LOW VOLTAGE CABLING

aes
2180 South 1300 East, Suite 600
Salt Lake City, UT 84106-2749
(801) 679 - 3500

nei
ELECTRIC POWER ENGINEERING, INC.
12600 W. COLFAX AVE, STE. C500
LAKEWOOD, CO 80215
(303) 431-7895 www.neleng.com

PE STAMP:

HOLD

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SIGNATURE LIC. EXP. DATE

PRELIMINARY
NOT FOR CONSTRUCTION
FOR REVIEW & APPROVAL ONLY

KEY PLAN:

REVISIONS:

NO.	DATE	DESCRIPTION
A	11/14/25	ISSUED FOR PERMITTING

PROJECT TITLE:

KAAWANUI SOLAR, LLC

PROJECT LOCATION:

KAUAI COUNTY, MAKAWELI, HI [TMKS: (4) 1-7-006:006 POR. AND 010 POR.]

SHEET TITLE & DESCRIPTION:

TYPICAL POWER CONVERSION STATION

PROJ NUM:

DES:

DWN:

CHK:

APV:

DATE:

SCALE AT 24" x 36":

NTS

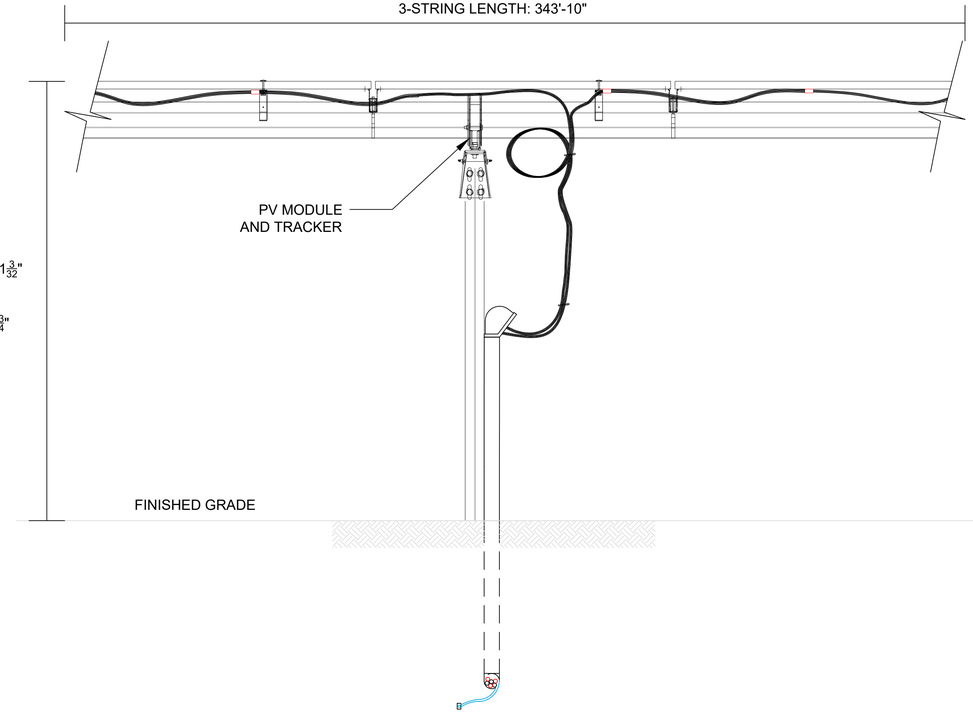
SHEET NO: SHEET 3

REV: A

1-STRING LENGTH: 118'-10 $\frac{1}{2}$"

2-STRING LENGTH: 230'-8 $\frac{1}{8}$"

3-STRING LENGTH: 343'-10"



MAXIMUM HEIGHT (MAXIMUM PILE PROJECTION AND 52° ROTATION): 7' 11 $\frac{3}{32}$"

MINIMUM HEIGHT (MINIMUM PILE PROJECTION AND 0° ROTATION): 4' 2 $\frac{3}{4}$"

aes
2180 South 1300 East, Suite 600
Salt Lake City, UT 84106-2749
(801) 679 - 3500

nei
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12600 W. COLFAX AVE, STE. C500
LAKEWOOD, CO 80215
(303) 431-7895 www.neieng.com

PE STAMP:

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NOT FOR CONSTRUCTION
FOR REVIEW & APPROVAL ONLY

KEY PLAN:

REVISIONS:

NO.	DATE	DESCRIPTION
A	11/14/25	ISSUED FOR PERMITTING

PROJECT TITLE:

KAAWANUI SOLAR, LLC

PROJECT LOCATION:

KAUAI COUNTY, MAKAWELI, HI [TMKS: (4) 1-7-006:006 POR. AND 010 POR.]

SHEET TITLE & DESCRIPTION:

TYPICAL SOLAR PHOTOVOLTAIC MODULE AND TRACKER

PROJ NUM:

DES:

DWN:

CHK:

APV:

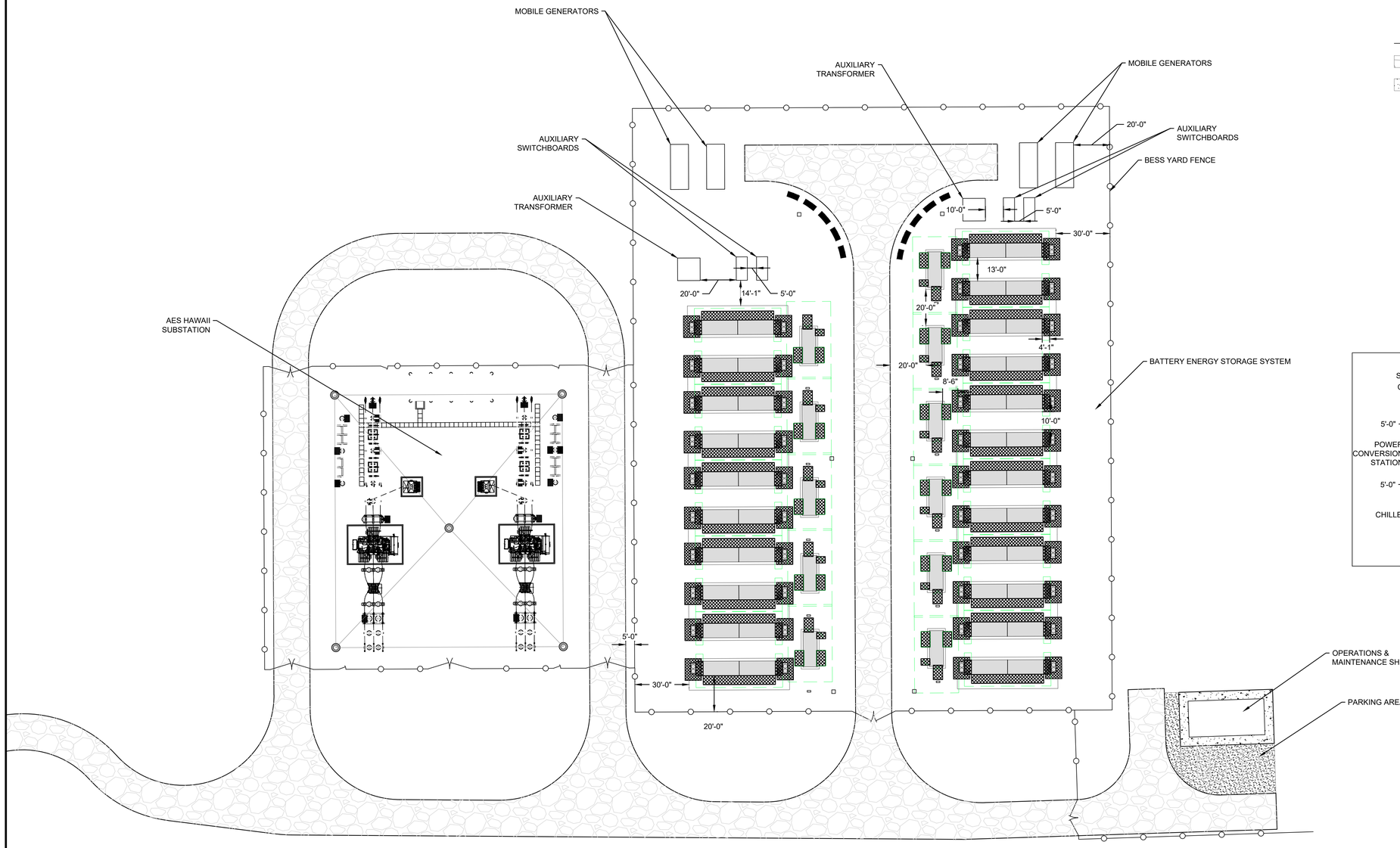
DATE:

SCALE AT 24" x 36":

NTS

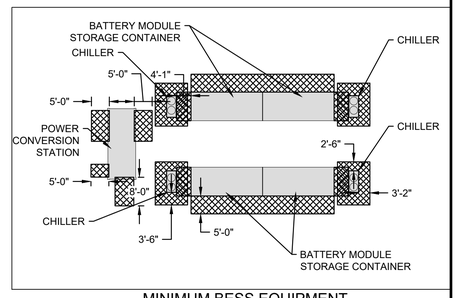
SHEET NO: SHEET 4

REV: A



LEGEND:

- SITE FENCE
- PROPOSED SITE ROAD
- PARKING AREA



MINIMUM BESS EQUIPMENT CLEARANCES

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KEY PLAN:

REVISIONS:

NO.	DATE	DESCRIPTION
A	11/14/25	ISSUED FOR PERMITTING
B	12/01/25	RE-ISSUED FOR PERMITTING

PROJECT TITLE:

KAAWANUI SOLAR, LLC

PROJECT LOCATION:

KAUAI COUNTY, MAKAWELI, HI [TMKS: (4) 1-7-006:006 POR AND 010 POR.]

SHEET TITLE & DESCRIPTION:

BATTERY ENERGY STORAGE SYSTEM

PROJ NUM:

DES:

DWN:

CHK:

APV:

DATE:

SCALE AT 24" x 36":
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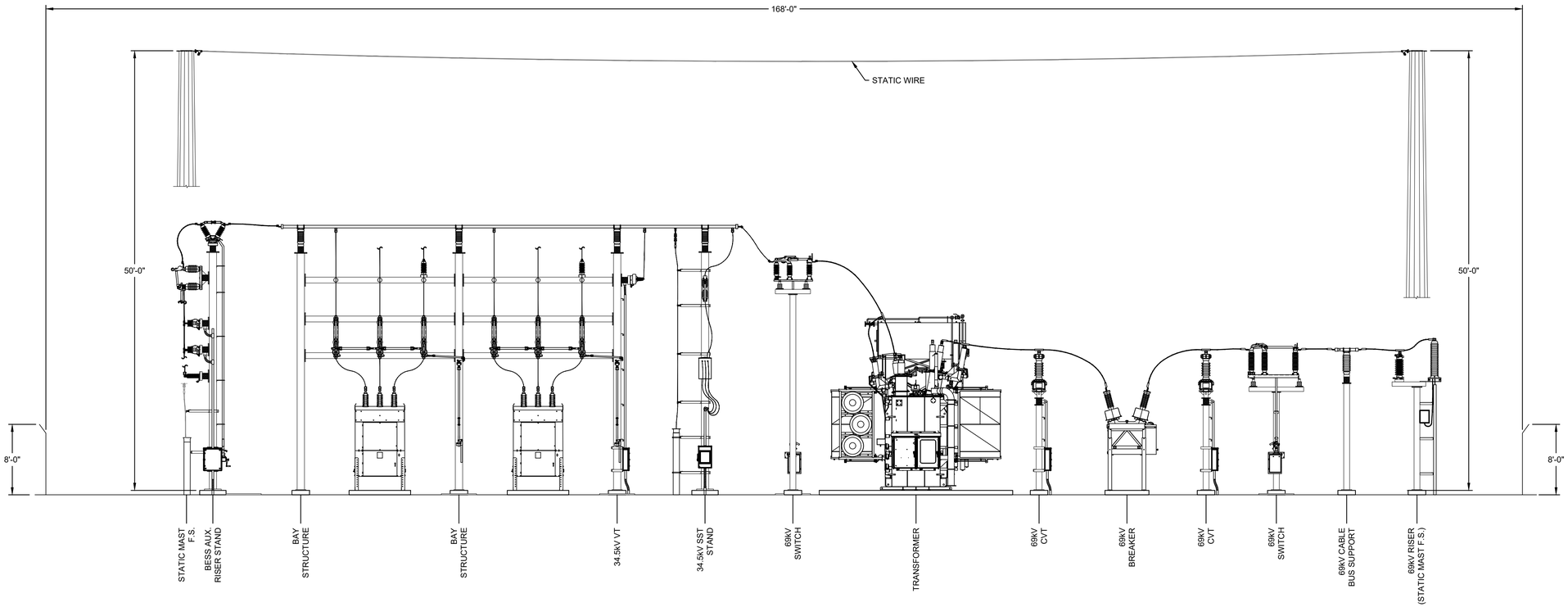
1" = 30'

SHEET NO: SHEET 5

REV: B



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KEY PLAN:

REVISIONS:

NO.	DATE	DESCRIPTION
A	11/14/25	ISSUED FOR PERMITTING
B	12/01/25	RE-ISSUED FOR PERMITTING
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-	-	-
-	-	-
-	-	-
-	-	-

PROJECT TITLE:

KAAWANUI SOLAR, LLC

PROJECT LOCATION:

KAUAI, HAWAII

SHEET TITLE & DESCRIPTION:

AES HAWAII
SUBSTATION

PROJ NUM:	-
DES:	-
DWN:	-
CHK:	-
APV:	-
DATE:	-

SCALE AT 24" x 36":
0 40' 80' 120' 160'
1" = 80'

SHEET NO: SHEET 6
REV: B

AES Titleblock 24X36 v210209

PLOTTED: 11/26/2025 9:15 AM
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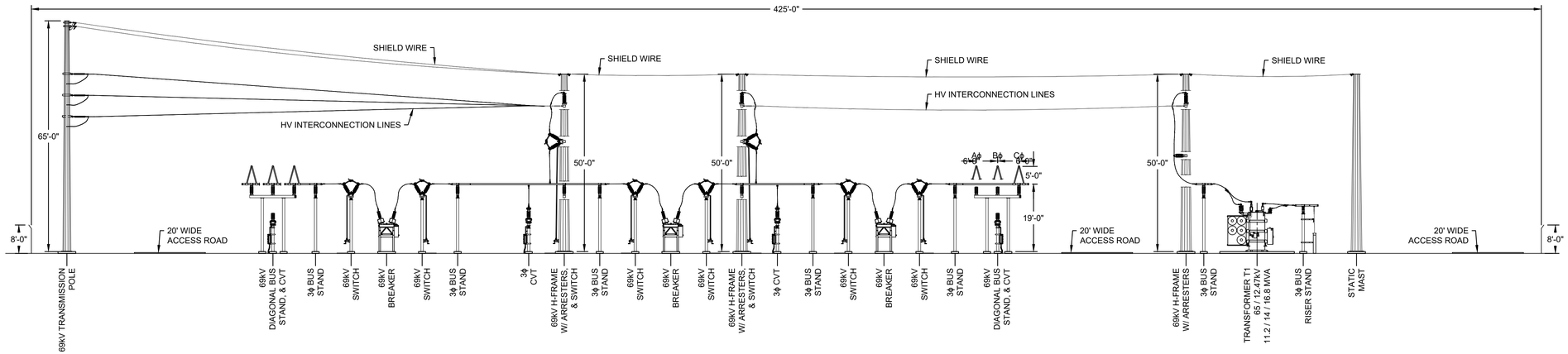
Xrefs: C:\Users\kbeckmann\AES Hawaii\AES Hawaii - Documents\Templates\nei_logo.png

AES Titleblock 24X36 v210209



NOTE:
THIS IS KIUC INFRASTRUCTURE THAT WILL BE BUILT BY AES. AES WILL TRANSFER OWNERSHIP TO KIUC BEFORE COMMERCIAL OPERATIONS.

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Salt Lake City, UT 84106-2749
(801) 679 - 3500

nei
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(303) 431-7895 www.neieng.com

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KEY PLAN:

REVISIONS:

NO.	DATE	DESCRIPTION
A	11/14/25	ISSUED FOR PERMITTING
B	12/01/25	RE-ISSUED FOR PERMITTING
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-	-	-
-	-	-

PROJECT TITLE:

KAAWANUI SOLAR, LLC

PROJECT LOCATION:

KAUAI, HAWAII

SHEET TITLE & DESCRIPTION:

KAAWANUI SUBSTATION

PROJ NUM:	-
DES:	-
DWN:	-
CHK:	-
APV:	-
DATE:	-

SCALE AT 24" x 36":
0 5' 10' 25' 40'
1:200

SHEET NO: SHEET 7
REV: B

PLOTTED: 11/26/2025 9:16 AM
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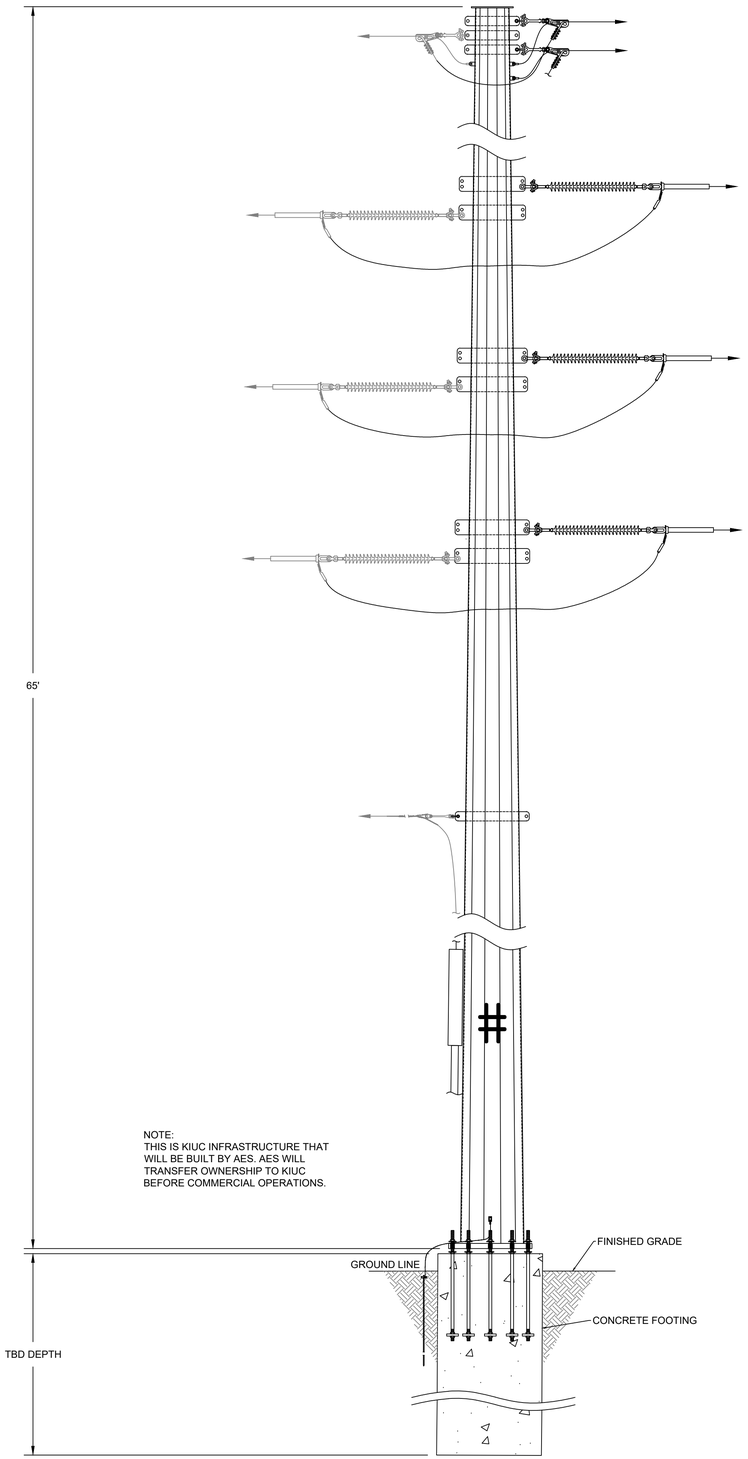
XREFs: C:\Users\Administrator\Desktop\Kaawanui Substation Drawings



OVERHEAD INTERCONNECTION LINES
(HIGH VOLTAGE) STRUCTURE DETAIL

aes
2180 South 1300 East, Suite 600
Salt Lake City, UT 84106-2749
(801) 679 - 3500

nei
ELECTRIC POWER ENGINEERING, INC.
12600 W. COLFAX AVE, STE. C500
LAKEWOOD, CO 80215
(303) 431-7895 www.neieng.com

KEY PLAN:

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REVISIONS:

NO.	DATE	DESCRIPTION
A	11/14/25	ISSUED FOR PERMITTING
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-	-	-
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-	-	-
-	-	-
-	-	-
-	-	-

PROJECT TITLE:

KAAWANUI SOLAR, LLC

PROJECT LOCATION:

KAUAI, HAWAII

SHEET TITLE & DESCRIPTION:

TYPICAL OVERHEAD INTERCONNECTION LINES STRUCTURE

PROJ NUM:	-
DES:	-
DWN:	-
CHK:	-
APV:	-
DATE:	-

SCALE AT 24" x 36":

NTS

SHEET NO: SHEET 8

REV: A

AES Titleblock 24X36 v210209

PLOTTED: 11/14/2025 2:36 PM
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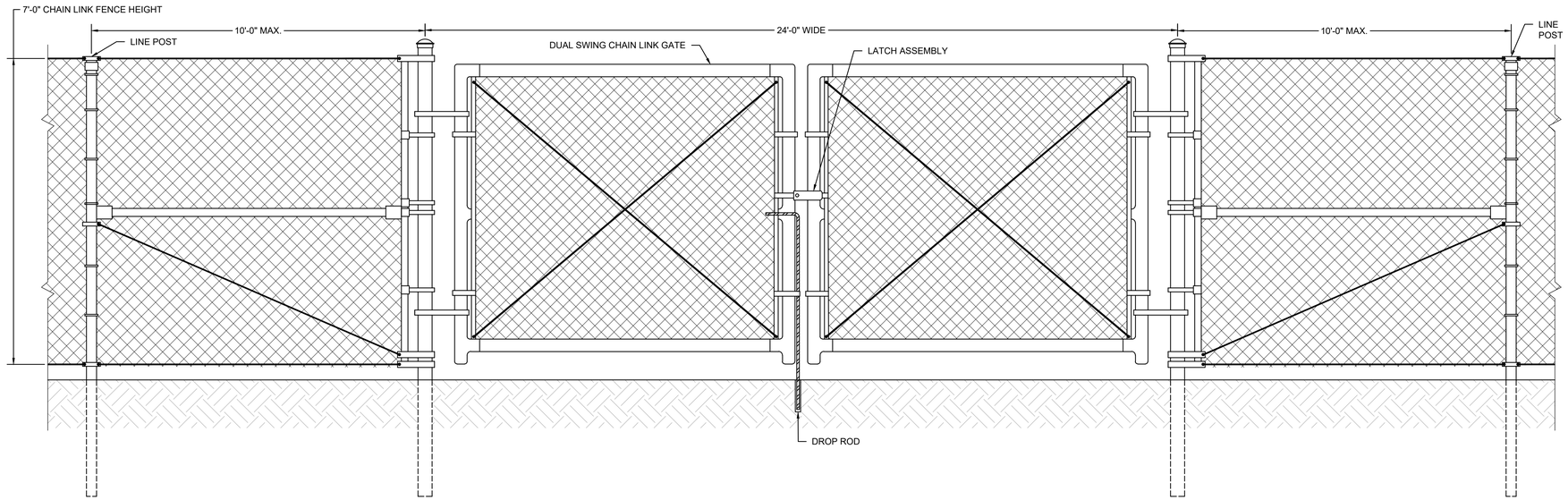
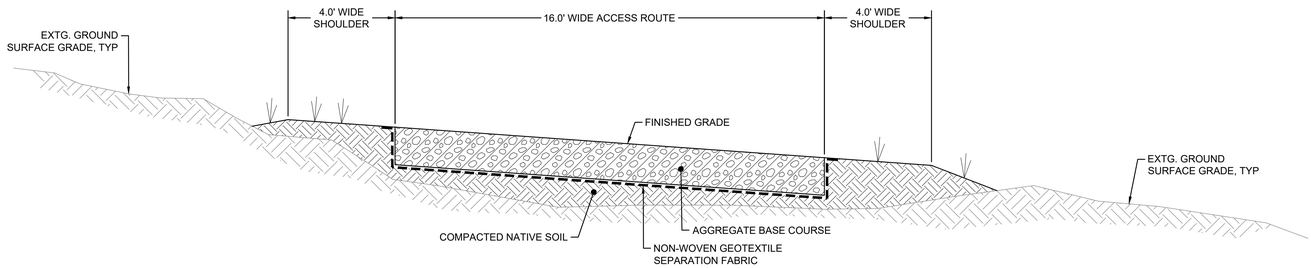
Xrefs: T1.4x4 ANSI.dwg, T1.4x4 Notes.dwg, T1.4x4.dwg



FENCE NOTES:
1. AN APPROXIMATELY 8-FOOT-TALL CHAIN LINK FENCE WITH BARBED WIRE (OR SIMILAR) WILL SURROUND THE SWITCHYARD IN ACCORDANCE WITH KIUC'S SECURITY SPECIFICATIONS.

TYPICAL PERIMETER FENCE AND GATE



INTERNAL ACCESS ROAD NOTES:
1. THE INTERNAL ACCESS ROUTES FOR THE SUBSTATION AND SWITCHYARD WOULD BE APPROXIMATELY 20-25 FEET WIDE (PLUS 4 TO 5-FOOT SHOULDERS); THOSE PORTIONS WITHIN THE SWITCHYARD WOULD USE AC PAVEMENT.

TYPICAL INTERNAL ACCESS ROAD

aes
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Salt Lake City, UT 84106-2749
(801) 679 - 3500

3J CONSULTING
CIVIL ENGINEERING
WATER RESOURCES
COMMUNITY PLANNING

PE STAMP:

AARON J MURPHY
LICENSED PROFESSIONAL ENGINEER
No. 18606-C
HAWAII, USA

PRELIMINARY
NOT FOR CONSTRUCTION
FOR REVIEW & APPROVAL ONLY

REVISIONS:

NO.	DATE	DESCRIPTION

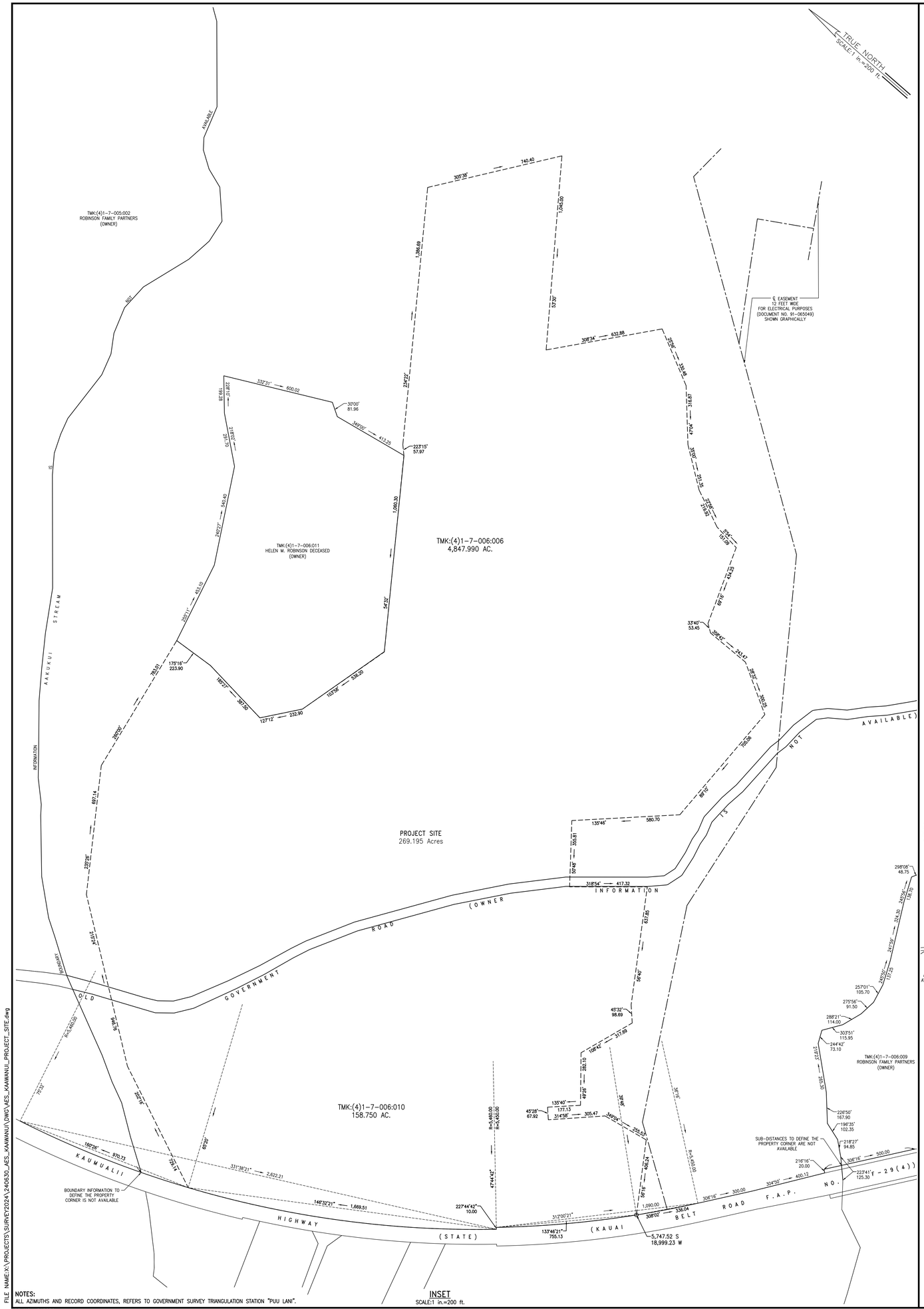
PROJECT TITLE:
KAAWANUI SOLAR, LLC

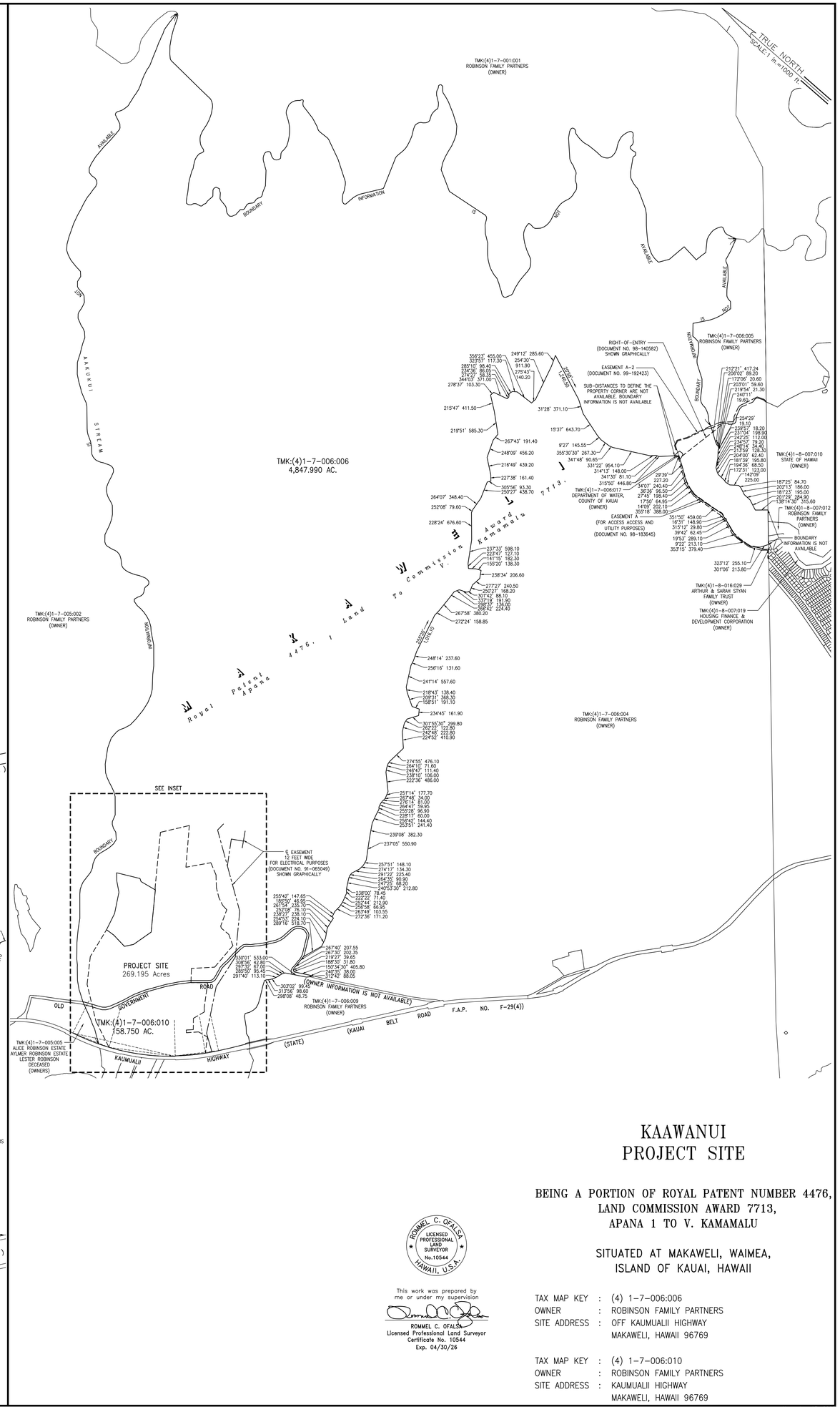
PROJECT LOCATION:
MAKAWELI, WAIMEA, KAUAI, HAWAII

SHEET TITLE & DESCRIPTION:
INTERNAL ACCESS ROUTE AND PERIMETER FENCE

PROJ NUM: 25001
DES: TEG
DWN: TEG
CHK: ARD, AJM
APV:
DATE: 11/06/2025
SCALE AT 24" x 36":
30% DESIGN

SHEET NO: **SHEET 9**
REV:





KAAWANUI
PROJECT SITE

BEING A PORTION OF ROYAL PATENT NUMBER 4476,
LAND COMMISSION AWARD 7713,
APANA 1 TO V. KAMAMALU

SITUATED AT MAKAWELI, WAIMEA,
ISLAND OF KAUAI, HAWAII

TAX MAP KEY : (4) 1-7-006:006
OWNER : ROBINSON FAMILY PARTNERS
SITE ADDRESS : OFF KAUMUALII HIGHWAY
MAKAWELI, HAWAII 96769

TAX MAP KEY : (4) 1-7-006:010
OWNER : ROBINSON FAMILY PARTNERS
SITE ADDRESS : KAUMUALII HIGHWAY
MAKAWELI, HAWAII 96769

ROMMEL C. OFALSA
LICENSED PROFESSIONAL LAND SURVEYOR
No. 10544
HAWAII, U.S.A.

This work was prepared by
me or under my supervision

ROMMEL C. OFALSA
Licensed Professional Land Surveyor
Certificate No. 10544
Exp. 04/30/26

NOTES:
ALL AZIMUTHS AND RECORD COORDINATES, REFERS TO GOVERNMENT SURVEY TRIANGULATION STATION "PUU LANI".

FILE NAME:X:\PROJECTS\SURVEY2024\240630_AES_KAAWANUI\DWG\AES_KAAWANUI_PROJECT_SITE.dwg

JOB NO.: 240630
FB/PG NO.: 1305/05

SAM O. HIROTA, INC.
884 S. Beretania St.
Honolulu, HI 96813

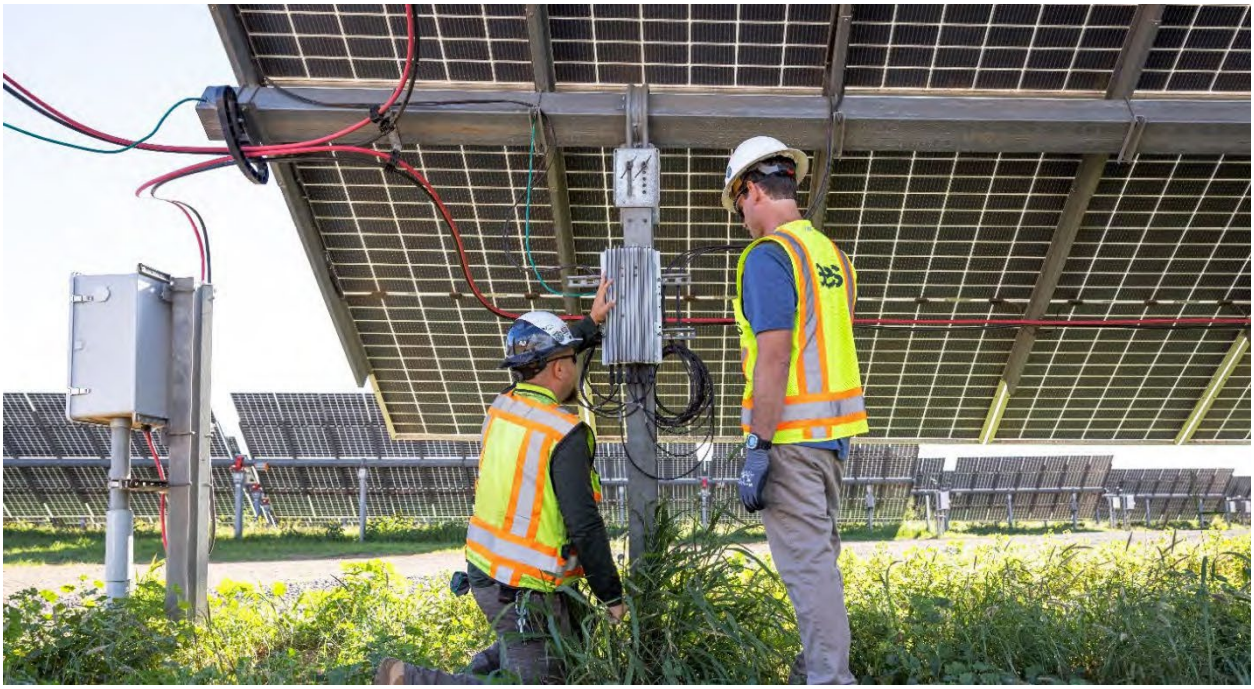
November 13, 2025
36" x 46" = 11.50 Sq. Ft.

Exhibit F

Representative Equipment Photos



Photograph of typical solar photovoltaic modules on a single-axis tracking system *(West Line Solar, AZ)*



Photograph of typical DC collection cabling system and disconnect switch stations (*Kūihelani Solar + Storage, HI*)

Representative Photographs of Solar Photovoltaic Modules and Single-Axis Tracking System



Photograph of typical Power Conversion Station within the PV arrays *(Solverde Solar, CA)*



Photograph of typical battery racks within a storage container (*Kūihelani Solar + Storage, HI*)

Representative Photographs of Power Conversion Station and Battery Energy Storage System



Photograph of typical Project substation (*Kūihelani Solar + Storage, HI*)



Photograph of typical switchyard (*Kūihelani Solar + Storage, HI*)

Representative Photographs of Typical Substation and Switchyard



Photograph of typical sheep grazing operation within solar facility (*Lāwa'i Solar + Storage, HI*)



Photograph of typical sheep grazing operation within solar facility (*West O'ahu Solar + Storage, HI*)

Representative Photographs of Compatible Agricultural Activities with AES Solar Facilities

Exhibit G

Stormwater Management Design Memo

TECHNICAL MEMORANDUM

3J CONSULTING
9600 SW NIMBUS AVENUE, STE 100
BEAVERTON, OREGON 97008
PH: (503) 946.9365
WWW.3J-CONSULTING.COM

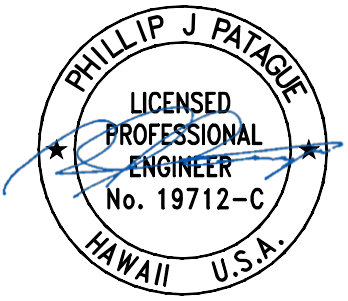
To: Mike Houser
Development Engineer
AES Clean Energy – The AES Corporation
282 Century Place, Suite 2000
Louisville, CO 80027

From: Phillip Patague, PE
Senior Water Resources Engineer

CC: Aaron Murphy, PE

Date: December 30, 2025

Project Name: **Kaʻawanui PV+AC-Coupled BESS**
Project No: **25001**
Subject: **Stormwater Management (30% Review)**



EXPIRES: 04/30/26
Digitally Signed 2025.12.30 10:39:15-08'00'

Introduction

Project Description

Kaʻawanui PV+AC-Coupled BESS project is a proposed solar development located east of Kaumualiʻi Highway near Kaʻawanui Village. The approximate center of the project site is 21°56'29.7"N 159°38'22.4"W within Kauaʻi County, Hawaiʻi. The project proposes solar panels installed on ground-mounted single-axis tracking systems, various pads for electrical equipment, and utilities on 250+ acres of open land. The equipment will consist of switchgears, transformers, inverters, and battery energy storage systems (BESS).

Stormwater Requirements & Report Purpose

Due to the amount of proposed impervious area generated by this project, stormwater management facilities are also proposed to meet County water quality and quantity standards. These facilities will be installed downstream of new impervious surfaces (i.e., concrete equipment pads and gravel access roads). Other onsite areas where only solar panels are proposed will drain offsite without stormwater management, because the arrays within these areas will be spaced such that runoff/hydrologic characteristics are unaltered. Onsite runoff discharges to nearby Mahinauli Gulch and Aʻakukui Valley, which drain southwest toward the Pacific Ocean.

This memorandum was prepared to discuss the sizing of stormwater management facilities to comply with Kauaʻi County's *Storm Water Runoff System Manual* (2001). Future updates will include pertinent analyses and sizing calculations regarding the proposed drainage systems and erosion control measures.

Existing Conditions

Existing land use consists of current and former agricultural uses and undeveloped areas. Existing land cover consists primarily of grass, shrubs, and crops. The site generally drains from northeast to southwest and sheds toward Aʻakukui Valley to the northwest and Mahinauli Gulch to the southeast. There are onsite ditches for irrigation and drainage that capture and convey runoff. There is a local depression on the downstream end of the site near Kaumualii Highway that collects runoff. Outflows from this depression is controlled by an existing 15" cross culvert that discharges to the southwest across the highway. Once the cross culvert is submerged, surface water follows an overland flow path toward Aʻakukui Valley to the north.

Proposed Conditions

Land disturbing activities, including grading and construction, will primarily be limited to proposed gravel access roads, other gravel areas, and concrete equipment pads. Mowing and grubbing of existing grassy and vegetated areas will be mitigated as much as possible. Proposed impervious areas will drain to detention ponds for stormwater management. Each pond will include a permanent storage volume for water quality purposes, which will drain down via infiltration.

Roadside ditches are proposed to capture and convey contributing runoff to stormwater management facilities; cross culverts will connect ditches at several locations. Proposed cutoff ditches will capture runoff from unaltered contributing areas to divert runoff around new impervious areas; these ditches will discharge to armored outfalls prior to drainage to receiving waterbodies. Full details regarding the conveyance analysis of proposed storm drainage systems will be included in the final Stormwater Management Memo.

Stormwater Management

Proposed Facilities

Proposed impervious areas will drain to eight (8) Detention Ponds for water quality and quantity management. Each pond will consist of a permanent storage volume for water quality purposes and will drain down via infiltration. In accordance with County Standards, the storage volume must be sized to capture one-half inch of runoff per acre that is made impermeable by development.

Runoff in excess of the water quality volume will be released via overflow weirs to match existing peak flows. Per County Standards, proposed release rates will be mitigated to existing peak flows for the 2-yr storm since the contributing drainage area for each pond is less than 100 acres. Pond routing, via a storage-indication method, will be provided in future iterations of this memo to refine detention volumes and specify outflow characteristics.

Water Quantity Sizing

For preliminary water quantity sizing, the Detention Ponds were sized to capture the expected increase in runoff for their contributing drainage areas. Table 1 below outlines the contributing areas for each Detention Pond in existing and proposed conditions. Runoff volumes were estimated using the NRCS Curve Number (CN) Method based on the contributing 2-yr, 24-hr precipitation depth. Using gridded precipitation data from NOAA Atlas 14, the spatially-averaged 2-yr, 24-hr precipitation depth was estimated to be 4.1 inches.

CN values depend on underlying hydrologic soil group (HSG), land cover, and antecedent moisture condition. NRCS Web Soil Survey indicates that the project site is underlain with C type soils. Antecedent moisture condition is assumed to be average (AMC II). In existing conditions, the contributing areas are assumed to be grasslands/range. In proposed conditions, the surfaces will be either gravel or concrete. Due to these contributing factors, the CNs for grasslands/range, gravel, and concrete are 74, 89, and 98, respectively.

Stormwater Facility	Contributing Drainage Areas (sf)			
	Existing	Proposed Conditions		
	Range/Total	Concrete	Gravel	Total
Pond 1	92,418	1,272	91,146	92,418
Pond 2	163,625	41,911	121,714	163,625
Pond 3	34,551	2,040	32,511	34,551
Pond 4	9,471	680	8,791	9,471
Pond 5	27,768	1,360	26,408	27,768
Pond 6	8,899	680	8,219	8,899
Pond 7	42,125	2,040	40,085	42,125
Pond 8	9,003	680	8,323	9,003

Table 1 – Contributing Drainage Areas

Table 2 outlines the required and proposed detention volumes. Tentatively, each pond will have a maximum depth of 3 ft, which will include a required freeboard of 1 ft. The proposed detention volumes in Table 2 will be provided below the freeboard.

Stormwater Facility	Existing Runoff (cf)	Proposed Runoff (cf)	Required Detention (cf)	Provided Detention (cf)
Pond 1	12,862	22,566	9,704	12,878
Pond 2	22,772	43,085	20,313	26,289
Pond 3	4,809	8,560	3,751	3,854
Pond 4	1,318	2,356	1,038	1,402
Pond 5	3,865	6,857	2,993	3,392
Pond 6	1,239	2,217	978	2,455
Pond 7	5,863	10,401	4,538	5,785
Pond 8	1,253	2,242	989	2,141

Table 2 – Detention Sizing

Water Quality Sizing

The estimated permanent storage volumes for water quality (WQ) for each pond is shown in Table 3 below. The WQ volumes are equivalent to one-half inch of runoff per acre that is made impermeable by development. A low-flow outlet pipe and overflow weir are tentatively proposed to control outflows. To reiterate, the WQ volumes shown below will be contained below the weir crest and will be completely infiltrated. The invert of the outflow pipe is tentatively proposed at 1 ft above the bottom of each pond; the table below includes detained volumes below the outflow pipes. The detained volumes will be infiltrated.

Stormwater Facility	Proposed Impervious	WQ Volumes (cf)	
		Required	Provided
Pond 1	92,418	3,851	5,901
Pond 2	163,625	6,818	12,422
Pond 3	34,551	1,440	1,638
Pond 4	9,471	395	532
Pond 5	27,768	1,157	1,424
Pond 6	8,899	371	1,027
Pond 7	42,125	1,755	2,561
Pond 8	9,003	375	814

Table 3 – Water Quality Volumes

Conveyance Analysis

Tentatively, proposed roadside ditches along the access roads will have a maximum depth of 2 ft, side slopes of 2:1 side slopes, and bottom width of 1 ft. The ditches will be riprap-lined to mitigate erosion and to dissipate flow velocities during larger storm events. 18" cross culverts will connect ditches at multiple locations.

The most downstream ditches, which will run parallel to Kaumuali'i Highway, are expected to capture and convey runoff from more than 100 acres. As a result, these ditches and the connecting culvert crossing at Hanger Road will be sized to convey contributing runoff during the 100-yr, 24-hr storm. Tentatively, the ditches will have a maximum depth of 2 ft, side slopes of 2:1 side slopes, and bottom width of 4 ft. The preliminary Hanger Road crossing will consist of four (4) 24" culverts.

A comprehensive conveyance analysis of the proposed storm drain systems will be performed for the 100-yr storm event. The results will be provided in future iterations of this memo and will inform armoring design details for riprap-lined conveyances and outfalls.

Lastly, 3J prepared a 2D H&H report for this project site in existing conditions dated February 12, 2025. The results of a 2D hydraulic analysis within that report indicated there were onsite overland paths onsite that may experience erosive velocities. Tentatively, riprap armoring is proposed for those flow paths. Future iterations of the Stormwater Management Memo will include updated hydraulic modeling to inform armoring design.

Conclusions

Runoff from proposed impervious surfaces will drain to Detention Ponds for stormwater management. Required water quality runoff volumes will be infiltrated and an overflow weir will bypass larger flows. The ponds will store the expected increase in runoff, due to the development, during the 2-yr storm. Cutoff ditches will divert upstream flows around proposed impervious areas to armored outfalls. Onsite areas in which only solar arrays are proposed will drain offsite without management; it is assumed that the runoff characteristics for these areas will be unchanged. The conveyance analysis, pond routing calculations, and armoring sizing will be discussed in future iterations of the Stormwater Management Memo.

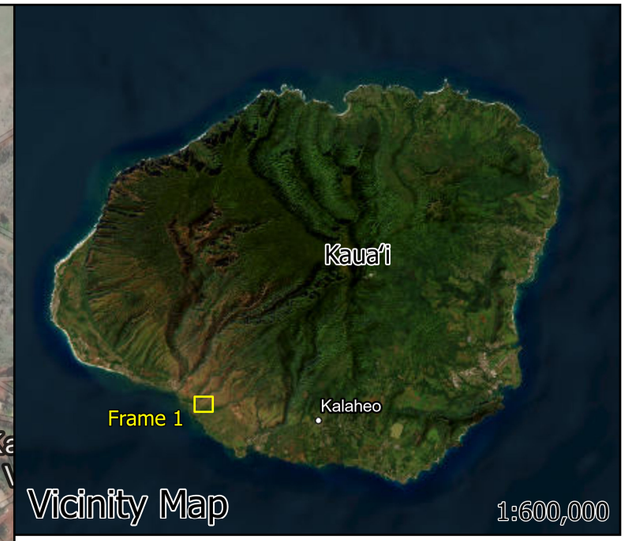
Attachments

1. Project Location Map
2. Site Plans (for reference only)
3. Proposed Conditions Exhibit
4. Hydrologic Soil Group
5. Curve Numbers
6. NOAA Precipitation Map
7. 100-yr Velocity Map (from 2D H&H Report)

- - - E N D O F D O C U M E N T - - -

Project Location Map





Legend

Project Site

Resource Mapping Hawaii, Maxar, Earthstar Geographics, Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community

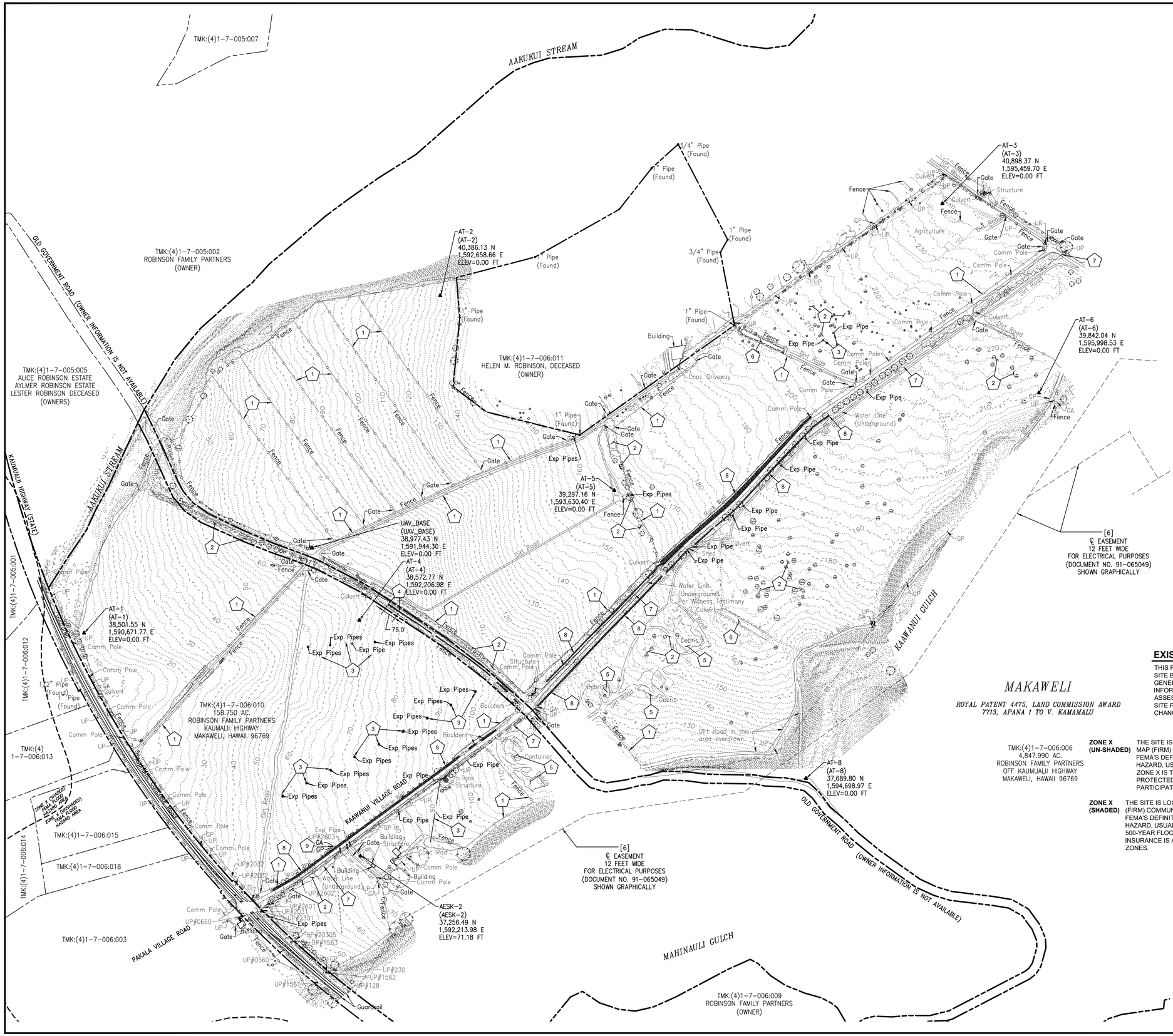
Kaʻawanui PV+AC-Coupled BESS

Project Location Map

Civil Engineering | Water Resources
Community Planning

Site Plans

(for reference only)



LEGEND

- EXISTING RIGHT-OF-WAY LINE
- EXISTING TMK BOUNDARY LINE
- EXISTING EASEMENT LINE
- EXISTING IRRIGATION DITCH/CHANNEL
- EXISTING DIRT/GRAVEL ROAD
- EXISTING FENCELINE
- EXISTING VEGETATION
- EXISTING AGRICULTURAL AREA
- EXISTING BOULDER/ROCK WALL
- EXISTING OVERHEAD ELECTRIC LINE
- EXISTING WATER MAIN LINE
- EXISTING FEMA FLOOD HAZARD BOUNDARY
- EXISTING SURFACE MAJOR CONTOUR
- EXISTING SURFACE MINOR CONTOUR

DEMOLITION KEY NOTES

1. REMOVE EXISTING FENCING, POSTS, CONCRETE FOOTINGS, GATES, AND ALL ASSOCIATED APPURTENANCES, DISPOSE OF FENCING OFFSITE, UNLESS OTHERWISE DIRECTED BY KAAWANUI SOLAR, LLC (AES).
   NOTE: LIVESTOCK IS PRESENT, COORDINATE ALL FENCE REMOVAL ACTIVITY PRIOR TO REMOVAL.
2. REMOVE/CLEAR EXISTING VEGETATION AS NECESSARY IN AREAS IDENTIFIED FOR INSTALLATION OF ACCESS ROADS, DRAINAGE SWALES, AND SOLAR ARRAY EQUIPMENT.
3. REMOVE EXISTING IRRIGATION SYSTEM AS DISCOVERED ONSITE. DISPOSE OF MATERIALS OFFSITE, UNLESS OTHERWISE DIRECTED BY KAAWANUI SOLAR, LLC (AES).
4. REMOVE ROCK/ BOULDER WALL PER EXTENTS SHOWN. DISPOSE OF ROCK/BOULDERS OFFSITE, UNLESS OTHERWISE DIRECTED BY KAAWANUI SOLAR, LLC (AES).
5. REMOVE DEBRIS ONSITE AS NECESSARY IN AREAS IDENTIFIED FOR INSTALLATION OF ACCESS ROADS, DRAINAGE SWALES, AND SOLAR ARRAY EQUIPMENT.
6. DECOMMISSION AND BACKFILL EXISTING IRRIGATION STORAGE BASIN/ FACILITY. SEE SITE PLANS FOR GRADING INFORMATION.
7. PROTECT EXISTING 8-INCH WATER MAIN ALONG KAAWANUI VILLAGE ROAD.
8. PROTECT EXISTING ROCK/BOULDER WALL AND VEGETATION BUFFER ALONGSIDE KAAWANUI VILLAGE ROAD.
9. REMOVE AND REPLACE UTILITY GUY POLE AND ASSOCIATED GUY WIRE/ ANCHOR FOR UTILITY POLE #2603. PROTECT EXISTING UTILITY POLE #2603 DURING CONSTRUCTION AND POLE RELOCATION.

EXISTING CONDITIONS PLAN

THIS PLAN HAS BEEN PREPARED FOR ILLUSTRATIVE PURPOSES ONLY. SITE BACKGROUND INFORMATION AND FEATURES HAVE BEEN GENERATED FROM A COMBINATION OF TOPOGRAPHIC SURVEY INFORMATION, PUBLIC GIS DATA SOURCES, AERIAL PHOTOS, TAX ASSESSOR MAPS, AND PHYSICAL SITE OBSERVATIONS. PROPOSED SITE FEATURES ARE PRELIMINARY IN NATURE AND SUBJECT TO CHANGE. NO WARRANTY OR GUARANTEE IS EXPRESSED OR IMPLIED.

ZONE X (UN-SHADED) THE SITE IS LOCATED WITHIN ZONE X (UN-SHADED) PER FLOOD INSURANCE RATE MAP (FIRM) COMMUNITY-PANEL NUMBER **1500020259G & 1500020267F**
FEMA'S DEFINITION OF ZONE X (UN-SHADED) IS AN AREA OF MINIMAL FLOOD HAZARD, USUALLY DEPICTED ON FIRMS AS ABOVE THE 500-YEAR FLOOD LEVEL. ZONE X IS THE AREA DETERMINED TO BE OUTSIDE THE 500-YEAR FLOOD AND PROTECTED BY LEVEE FROM 100-YEAR FLOOD. IN COMMUNITIES THAT PARTICIPATE IN THE NFIP, FLOOD INSURANCE IS AVAILABLE TO ALL PROPERTY

ZONE X (SHADED) THE SITE IS LOCATED WITHIN ZONE X (SHADED) PER FLOOD INSURANCE RATE MAP (FIRM) COMMUNITY-PANEL NUMBER **1500020259G & 1500020267F**
FEMA'S DEFINITION OF ZONE X (SHADED) IS AN AREA OF MODERATE FLOOD HAZARD, USUALLY THE AREA BETWEEN THE LIMITS OF THE 100-YEAR AND 500-YEAR FLOODS. IN COMMUNITIES THAT PARTICIPATE IN THE NFIP, FLOOD INSURANCE IS AVAILABLE TO ALL PROPERTY OWNERS AND RENTERS IN THESE ZONES.

N
W E
S

SCALE: 1" = 250'
0 250 500 FT

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

04/30/2026
SIGNATURE LIC. EXP. DATE

aes
2180 South 1300 East, Suite 600
Salt Lake City, UT 84106-2749
(801) 679 - 3500

3J CONSULTING
CIVIL ENGINEERING
WATER RESOURCES
COMMUNITY PLANNING
9600 SW NIMBUS AVE, SUITE 100; BEAVERTON, OR 97008

PE STAMP:

AARON J MURPHY
LICENSED PROFESSIONAL ENGINEER
No. 18686-C
STATE OF HAWAII

PRELIMINARY
NOT FOR CONSTRUCTION
FOR REVIEW & APPROVAL ONLY

REVISIONS:

NO.	DATE	DESCRIPTION

PROJECT TITLE:

KAAWANUI SOLAR, LLC

PROJECT LOCATION:

MAKAWELI, WAIMEA, KAUAI, HAWAII

SHEET TITLE & DESCRIPTION:

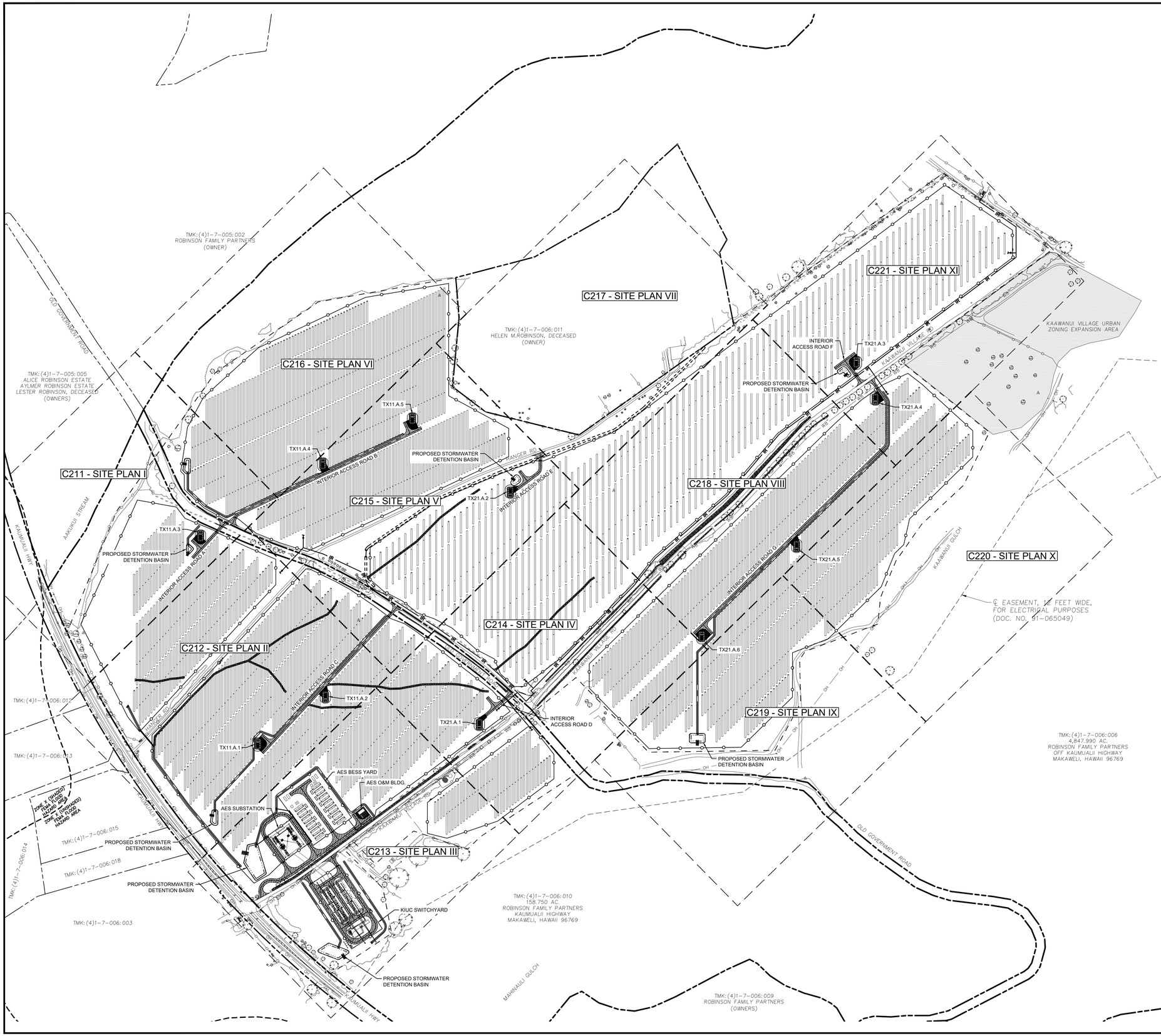
EXISTING CONDITIONS & DEMOLITION PLAN

PROJ NUM:	25001
DES:	TEG
DWN:	TEG
CHK:	ARD, AJM
APV:	
DATE:	08/19/2025

SCALE AT 24" x 36":

30% DESIGN

SHEET NO: C100 REV:



LEGEND

- EXISTING RIGHT-OF-WAY LINE
- EXISTING TMK BOUNDARY LINE
- EXISTING EASEMENT LINE
- EXISTING IRRIGATION DITCH/CHANNEL
- EXISTING DIRT/GRAVEL ROAD
- EXISTING FENCELINE
- EXISTING VEGETATION
- EXISTING AGRICULTURAL AREA
- EXISTING BOULDER/ROCK WALL
- EXISTING OVERHEAD ELECTRIC LINE
- EXISTING WATER MAIN LINE
- EXISTING FEMA FLOOD HAZARD BOUNDARY
- EXISTING SURFACE MAJOR CONTOUR
- EXISTING SURFACE MINOR CONTOUR
- PROPOSED LEASE BOUNDARY/ LIMITS OF DISTURBANCE (L.O.D.)
- KAAWANUI VILLAGE URBAN ZONING EXPANSION AREA
- PROPOSED ARRAY AREA PERIMETER FENCE
- PROPOSED PV ARRAY AREA ACCESS ROAD
- PROPOSED HEAVY HAUL ACCESS ROAD
- PROPOSED UNDERGROUND IRRIGATION MAIN
- PROPOSED ABOVE GRADE IRRIGATION CHANNEL
- PROPOSED STORMWATER DETENTION BASIN
- PROPOSED RIPRAP ARMORING

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STATE OF HAWAII

PRELIMINARY
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REVISIONS:

NO.	DATE	DESCRIPTION

PROJECT TITLE:

KAAWANUI SOLAR, LLC

PROJECT LOCATION:

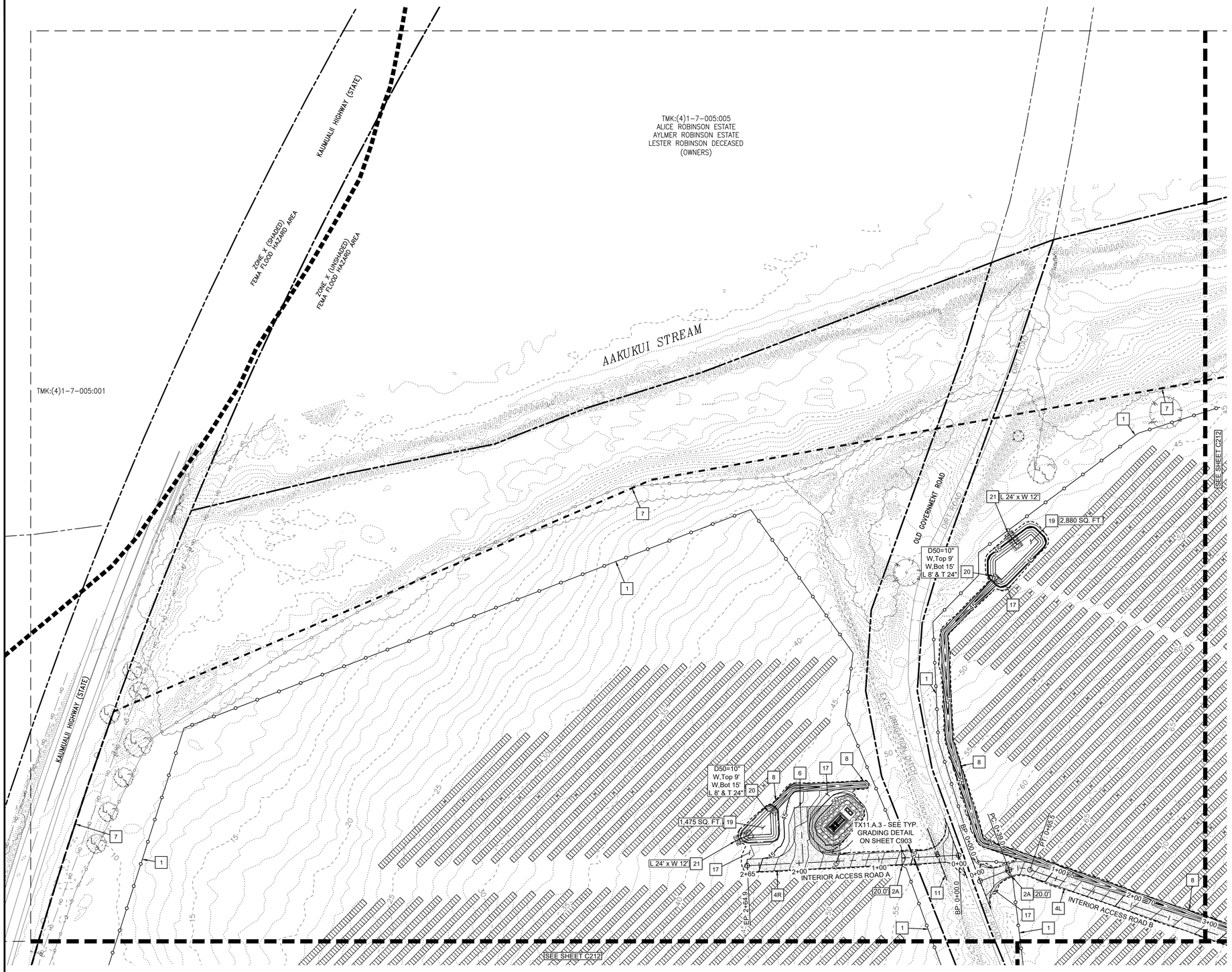
MAKAWELI, WAIMEA, KAUAI, HAWAII

SHEET TITLE & DESCRIPTION:

OVERALL SITE PLAN

PROJ NUM: 25001
DES: TEG
DWN: TEG
CHK: ARD, AJM
APV:
DATE: 08/19/2025
SCALE AT 24" x 36":
30% DESIGN

SHEET NO: C210 REV:



CONSTRUCTION KEY NOTES

1. CONSTRUCT 7.0' NOMINAL HEIGHT CHAIN LINK PERIMETER SECURITY FENCE TO ALIGNMENT SHOWN. SEE DETAIL 1, ON SHEET C901.
2A. CONSTRUCT DUAL SWING ACCESS GATE, PER WIDTH NOTED, AT LOCATION SHOWN. SEE DETAIL 2, ON SHEET C901.
2B. CONSTRUCT DUAL SWING ACCESS GATE, PER WIDTH NOTED, FOR AGRICULTURE HARVESTING ACCESS, AT LOCATION SHOWN. SEE DETAIL 2, ON SHEET C901.
3. CONSTRUCT SINGLE SWING ACCESS GATE, PER WIDTH NOTED, AT LOCATION SHOWN. SEE DETAIL 4, ON SHEET C901.
4L/4R. CONSTRUCT PV ARRAY GRAVEL ACCESS ROAD (SHED [L = LEFT/ R = RIGHT] IN DIRECTION OF INCREASE STATIONING). SEE DETAIL 2, ON SHEET C902.
5. CONSTRUCT HEAVY HAUL GRAVEL ACCESS ROAD. SEE DETAIL 6, ON SHEET C902.
6. CONSTRUCT APPROVED FIRE TURNAROUND AT LOCATION SHOWN. SEE TYPICAL DIMENSION DETAIL 4, ON SHEET C902.
7. PROPOSED LIMITS OF SOLAR DEVELOPMENT. SEE TMK PLAN, SHEET C050, FOR MORE INFORMATION.
8. CONSTRUCT STANDARD STORM DRAINAGE SWALE, TO LIMITS SHOWN. SEE DETAIL 2, ON SHEET C902, ALSO DETAIL 3, ON SHEET C903.
9. INSTALL DUCTILE IRON STORM DRAIN CULVERT AT LOCATION SHOWN. BACKFILL PER DETAIL 1, ON SHEET C902.
10. INSTALL 24" CONCRETE AREA DRAIN WITH H-25 RATED COVER, AT LOCATION SHOWN.
11. INSTALL DUCTILE IRON CULVERT AND CROSSING AT EXISTING/PROPOSED IRRIGATION CHANNEL, AT LOCATION SHOWN. BACKFILL PER DETAIL 1, ON SHEET C902.
12. CONSTRUCT ROCK-LINED IRRIGATION CHANNEL, TO LIMITS SHOWN. SEE DETAIL 4, ON SHEET C903.
13. INSTALL 10-INCH DIAMETER POLYETHYLENE (PE) PIPE FOR IRRIGATION MAIN LINE AT LOCATION SHOWN AND PER LENGTH NOTED. BACKFILL AND STANDARD BURIAL DEPTH PER DETAIL 3, ON SHEET C904.
14. INSTALL IRRIGATION VALVE AND LATERAL CONNECTION FOR CONNECTION TO FIELD IRRIGATION SYSTEM.
15. MASS GRADING IN AREA INDICATED FOR INSTALLATION OF SOLAR MODULE RACKING. SEE EARTHWORK GENERAL NOTES, DETAIL 2 ON SHEET C904, FOR INFORMATION ON SUBGRADE PREPARATION.
16. CONSTRUCT RIPRAP ARMORED CHANNEL TO EXTENTS SHOWN. INSTALL GEOTEXTILE FABRIC UNDER RIPRAP FOR STABILIZATION. SEE DETAIL 1, ON SHEET C903.
17. ALL AREAS DISTURBED FOR GRADED DAYLIGHT SLOPES AND SWALES TO BE ROCKED FOR FINAL STABILIZATION: 3" D50 ROCK OVER ANCHORED NON-WOVEN GEOTEXTILE SEPARATION FABRIC.
18. CONSTRUCT STORM CUTOFF SWALE PER DETAIL 2, ON SHEET C903.
19. INSTALL STORMWATER DETENTION BASIN. SEE DETAIL 1, ON SHEET C904.
20. INSTALL RIPRAP OUTFALL PROTECTION AT LOCATION SHOWN, PER DIMENSIONS (TOP WIDTH, BOTTOM WIDTH, LENGTH), THICKNESS AND ROCK SIZE NOTED. SEE DETAIL 3, ON SHEET C902.
21. INSTALL OVERFLOW WEIR AND LOW-FLOW STORM DRAIN PIPE OUTLET AT LOCATION SHOWN, AND PER DIMENSIONS NOTED, FOR STORMWATER DETENTION BASIN. SEE DETAIL 1, SHEET C904.

SCALE: 1" = 60'
0 60 120 FT

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04/30/2026
SIGNATURE LIC. EXP. DATE

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PE STAMP:

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LICENSED PROFESSIONAL ENGINEER
No. 18586-C
HAWAII, U.S.A.

PRELIMINARY
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REVISIONS:

NO.	DATE	DESCRIPTION

PROJECT TITLE:

KAAWANUI SOLAR, LLC

PROJECT LOCATION:

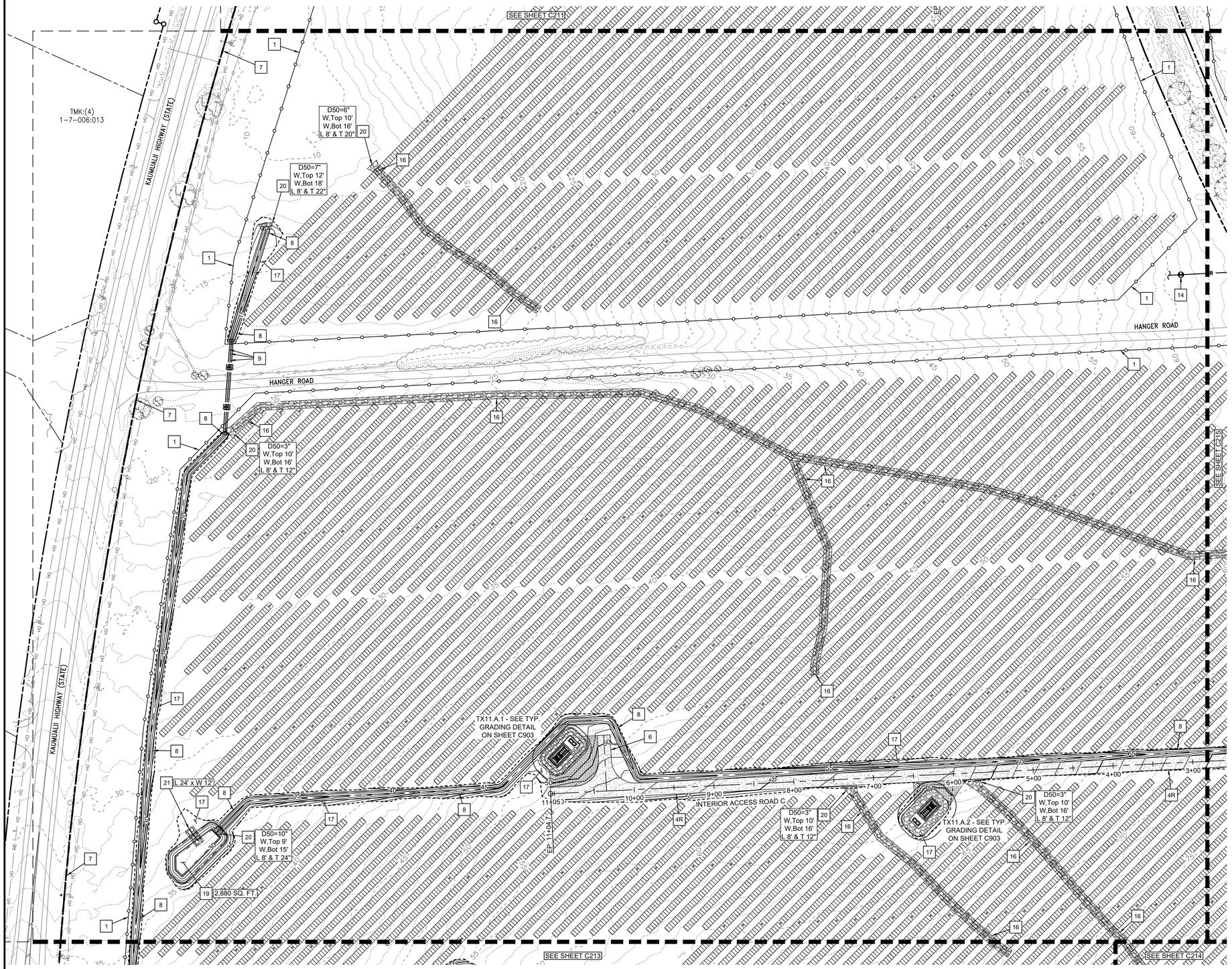
MAKAWELI, WAIMEA, KAUAI, HAWAII

SHEET TITLE & DESCRIPTION:

SITE PLAN I

PROJ NUM: 25001
DES: TEG
DWN: TEG
CHK: ARD, AJM
APV:
DATE: 12/30/2025
SCALE AT 24" x 36":
30% DESIGN

SHEET NO: C211 REV:



CONSTRUCTION KEY NOTES

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2A	CONSTRUCT DUAL SWING ACCESS GATE, PER WIDTH NOTED, AT LOCATION SHOWN. SEE DETAIL 2, ON SHEET C901.
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4L 4R	CONSTRUCT PV ARRAY GRAVEL ACCESS ROAD (SHED [L = LEFT/ R = RIGHT] IN DIRECTION OF INCREASE STATIONING). SEE DETAIL 2, ON SHEET C902.
5	CONSTRUCT HEAVY HAUL GRAVEL ACCESS ROAD. SEE DETAIL 6, ON SHEET C902.
6	CONSTRUCT APPROVED FIRE TURNAROUND AT LOCATION SHOWN. SEE TYPICAL DIMENSION DETAIL 4, ON SHEET C902.
7	PROPOSED LIMITS OF SOLAR DEVELOPMENT. SEE TMK PLAN, SHEET C050, FOR MORE INFORMATION.
8	CONSTRUCT STANDARD STORM DRAINAGE SWALE, TO LIMITS SHOWN. SEE DETAIL 2, ON SHEET C902, ALSO DETAIL 3, ON SHEET C903.
9	INSTALL DUCTILE IRON STORM DRAIN CULVERT AT LOCATION SHOWN. BACKFILL PER DETAIL 1, ON SHEET C902.
10	INSTALL 24" CONCRETE AREA DRAIN WITH H-25 RATED COVER, AT LOCATION SHOWN.
11	INSTALL DUCTILE IRON CULVERT AND CROSSING AT EXISTING/PROPOSED IRRIGATION CHANNEL, AT LOCATION SHOWN. BACKFILL PER DETAIL 1, ON SHEET C902.
12	CONSTRUCT ROCK-LINED IRRIGATION CHANNEL, TO LIMITS SHOWN. SEE DETAIL 4, ON SHEET C903.
13	INSTALL 10-INCH DIAMETER POLYETHYLENE (PE) PIPE FOR IRRIGATION MAIN LINE AT LOCATION SHOWN AND PER LENGTH NOTED. BACKFILL AND STANDARD BURIAL DEPTH PER DETAIL 3, ON SHEET C904.
14	INSTALL IRRIGATION VALVE AND LATERAL CONNECTION FOR CONNECTION TO FIELD IRRIGATION SYSTEM.
15	MASS GRADING IN AREA INDICATED FOR INSTALLATION OF SOLAR MODULE RACKING. SEE EARTHWORK GENERAL NOTES, DETAIL 2 ON SHEET C904, FOR INFORMATION ON SUBGRADE PREPARATION.
16	CONSTRUCT RIPRAP ARMORED CHANNEL TO EXTENTS SHOWN. INSTALL GEOTEXTILE FABRIC UNDER RIPRAP FOR STABILIZATION. SEE DETAIL 1, ON SHEET C903.
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18	CONSTRUCT STORM CUTOFF SWALE PER DETAIL 2, ON SHEET C903.
19	INSTALL STORMWATER DETENTION BASIN. SEE DETAIL 1, ON SHEET C904.
20	INSTALL RIPRAP OUTFALL PROTECTION AT LOCATION SHOWN, PER DIMENSIONS (TOP WIDTH, BOTTOM WIDTH, LENGTH), THICKNESS AND ROCK SIZE NOTED. SEE DETAIL 3, ON SHEET C902.
21	INSTALL OVERFLOW WEIR AND LOW-FLOW STORM DRAIN PIPE OUTLET AT LOCATION SHOWN, AND PER DIMENSIONS NOTED, FOR STORMWATER DETENTION BASIN. SEE DETAIL 1, SHEET C904.

SCALE: 1" = 60'

0 60 120 FT

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04/30/2026

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PE STAMP:

AARON J MURPHY
LICENSED PROFESSIONAL ENGINEER
No. 18586
STATE OF HAWAII

PRELIMINARY
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FOR REVIEW & APPROVAL ONLY

REVISIONS:

NO.	DATE	DESCRIPTION

PROJECT TITLE:

KAAWANUI SOLAR, LLC

PROJECT LOCATION:

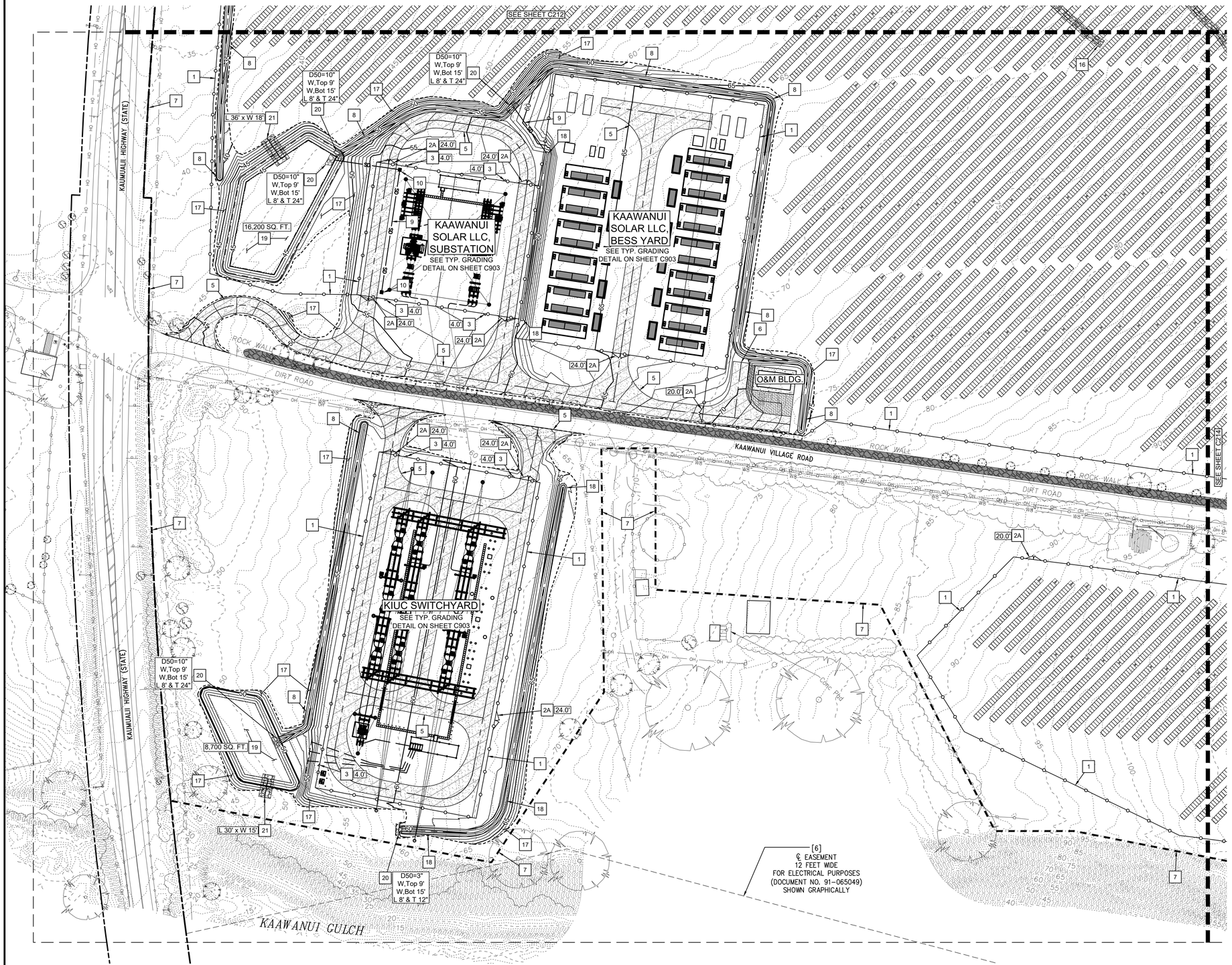
MAKAWELI, WAIMEA, KAUAI, HAWAII

SHEET TITLE & DESCRIPTION:

SITE PLAN II

PROJ NUM: 25001
DES: TEG
DWN: TEG
CHK: ARD, AJM
APV:
DATE: 12/30/2025
SCALE AT 24" x 36":
30% DESIGN

SHEET NO: C212 REV:



CONSTRUCTION KEY NOTES

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4L. CONSTRUCT PV ARRAY GRAVEL ACCESS ROAD (SHED [L = LEFT/ R = RIGHT] IN DIRECTION OF INCREASE
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5. CONSTRUCT HEAVY HAUL GRAVEL ACCESS ROAD. SEE DETAIL 6, ON SHEET C902.
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8. CONSTRUCT STANDARD STORM DRAINAGE SWALE, TO LIMITS SHOWN. SEE DETAIL 2, ON SHEET C902, ALSO DETAIL 3, ON SHEET C903.
9. INSTALL DUCTILE IRON STORM DRAIN CULVERT AT LOCATION SHOWN. BACKFILL PER DETAIL 1, ON SHEET C902.
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HAWAII, USA

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REVISIONS:

NO.	DATE	DESCRIPTION

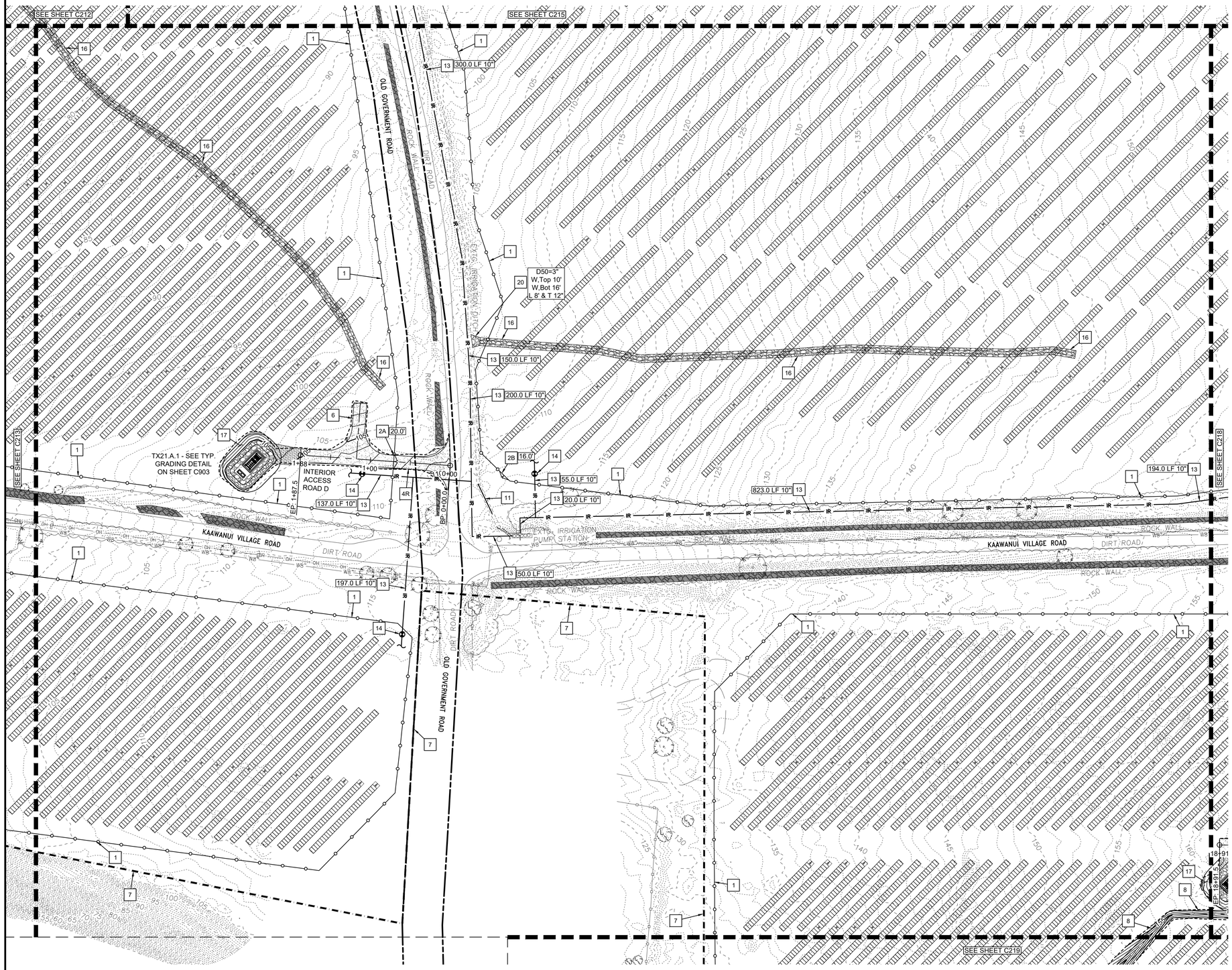
PROJECT TITLE:
KAAWANUI SOLAR, LLC

PROJECT LOCATION:
MAKAWELI, WAIMEA, KAUAI, HAWAII

SHEET TITLE & DESCRIPTION:
SITE PLAN III

PROJ NUM: 25001
DES: TEG
DWN: TEG
CHK: ARD, AJM
APV:
DATE: 12/30/2025
SCALE AT 24" x 36":
30% DESIGN

SHEET NO: C213
REV:



CONSTRUCTION KEY NOTES

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13. INSTALL 10-INCH DIAMETER POLYETHYLENE (PE) PIPE FOR IRRIGATION MAIN LINE AT LOCATION SHOWN AND PER LENGTH NOTED. BACKFILL AND STANDARD BURIAL DEPTH PER DETAIL 3, ON SHEET C904.
14. INSTALL IRRIGATION VALVE AND LATERAL CONNECTION FOR CONNECTION TO FIELD IRRIGATION SYSTEM.
15. MASS GRADING IN AREA INDICATED FOR INSTALLATION OF SOLAR MODULE RACKING. SEE EARTHWORK GENERAL NOTES, DETAIL 2 ON SHEET C904, FOR INFORMATION ON SUBGRADE PREPARATION.
16. CONSTRUCT RIPRAP ARMORED CHANNEL TO EXTENTS SHOWN. INSTALL GEOTEXTILE FABRIC UNDER RIPRAP FOR STABILIZATION. SEE DETAIL 1, ON SHEET C903.
17. ALL AREAS DISTURBED FOR GRADED DAYLIGHT SLOPES AND SWALES TO BE ROCKED FOR FINAL STABILIZATION: 3" D50 ROCK OVER ANCHORED NON-WOVEN GEOTEXTILE SEPARATION FABRIC.
18. CONSTRUCT STORM CUTOFF SWALE PER DETAIL 2, ON SHEET C903.
19. INSTALL STORMWATER DETENTION BASIN. SEE DETAIL 1, ON SHEET C904.
20. INSTALL RIPRAP OUTFALL PROTECTION AT LOCATION SHOWN, PER DIMENSIONS (TOP WIDTH, BOTTOM WIDTH, LENGTH), THICKNESS AND ROCK SIZE NOTED. SEE DETAIL 3, ON SHEET C902.
21. INSTALL OVERFLOW WEIR AND LOW-FLOW STORM DRAIN PIPE OUTLET AT LOCATION SHOWN, AND PER DIMENSIONS NOTED, FOR STORMWATER DETENTION BASIN. SEE DETAIL 1, SHEET C904.

SCALE: 1" = 60'
0 60 120 FT

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

04/30/2026
SIGNATURE LIC. EXP. DATE

aes
2180 South 1300 East, Suite 600
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COMMUNITY PLANNING
9600 SW NIMBUS AVE, SUITE 100; BEAVERTON, OR 97008

PE STAMP:

AARON J MURPHY
LICENSED PROFESSIONAL ENGINEER
No. 18696
HAWAII, U.S.A.

PRELIMINARY
NOT FOR CONSTRUCTION
FOR REVIEW & APPROVAL ONLY

REVISIONS:

NO.	DATE	DESCRIPTION

PROJECT TITLE:

KAAWANUI SOLAR, LLC

PROJECT LOCATION:

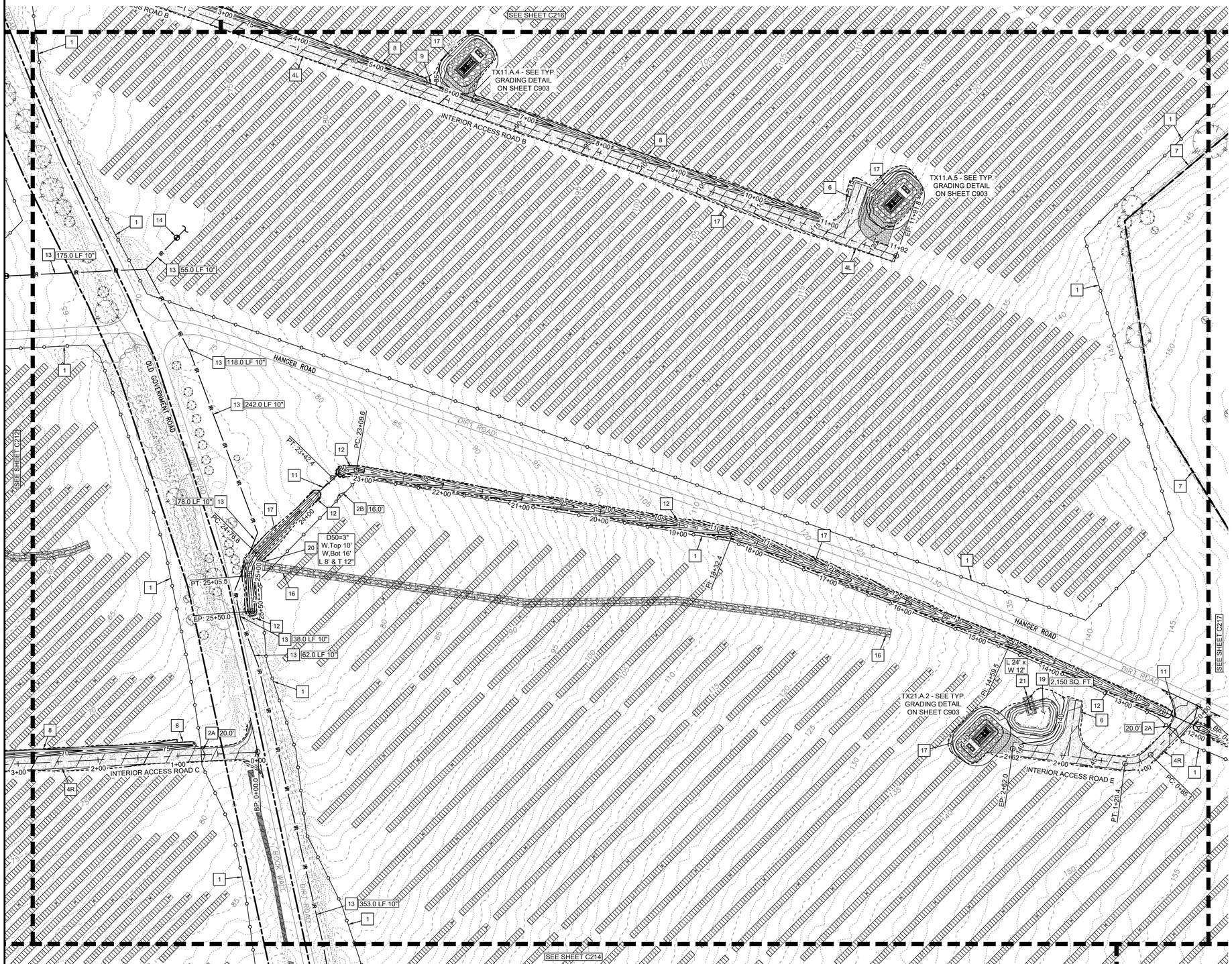
MAKAWELI, WAIMEA, KAUAI, HAWAII

SHEET TITLE & DESCRIPTION:

SITE PLAN IV

PROJ NUM: 25001
DES: TEG
DWN: TEG
CHK: ARD, AJM
APV:
DATE: 12/30/2025
SCALE AT 24" x 36":
30% DESIGN

SHEET NO: C214
REV:



CONSTRUCTION KEY NOTES

1. CONSTRUCT 7.0' NOMINAL HEIGHT CHAIN LINK PERIMETER SECURITY FENCE TO ALIGNMENT SHOWN. SEE DETAIL 1, ON SHEET C901.
2A. CONSTRUCT DUAL SWING ACCESS GATE, PER WIDTH NOTED, AT LOCATION SHOWN. SEE DETAIL 2, ON SHEET C901.
2B. CONSTRUCT DUAL SWING ACCESS GATE, PER WIDTH NOTED, FOR AGRICULTURE HARVESTING ACCESS, AT LOCATION SHOWN. SEE DETAIL 2, ON SHEET C901.
3. CONSTRUCT SINGLE SWING ACCESS GATE, PER WIDTH NOTED, AT LOCATION SHOWN. SEE DETAIL 4, ON SHEET C901.
4L. CONSTRUCT PV ARRAY GRAVEL ACCESS ROAD (SHED [L = LEFT/ R = RIGHT] IN DIRECTION OF INCREASE
4R. STATIONING). SEE DETAIL 2, ON SHEET C902.
5. CONSTRUCT HEAVY HAUL GRAVEL ACCESS ROAD. SEE DETAIL 6, ON SHEET C902.
6. CONSTRUCT APPROVED FIRE TURNAROUND AT LOCATION SHOWN. SEE TYPICAL DIMENSION DETAIL 4, ON SHEET C902.
7. PROPOSED LIMITS OF SOLAR DEVELOPMENT. SEE TMK PLAN, SHEET C050, FOR MORE INFORMATION.
8. CONSTRUCT STANDARD STORM DRAINAGE SWALE, TO LIMITS SHOWN. SEE DETAIL 2, ON SHEET C902, ALSO DETAIL 3, ON SHEET C903.
9. INSTALL DUCTILE IRON STORM DRAIN CULVERT AT LOCATION SHOWN. BACKFILL PER DETAIL 1, ON SHEET C902.
10. INSTALL 24" CONCRETE AREA DRAIN WITH H-25 RATED COVER, AT LOCATION SHOWN.
11. INSTALL DUCTILE IRON CULVERT AND CROSSING AT EXISTING/PROPOSED IRRIGATION CHANNEL, AT LOCATION SHOWN. BACKFILL PER DETAIL 1, ON SHEET C902.
12. CONSTRUCT ROCK-LINED IRRIGATION CHANNEL, TO LIMITS SHOWN. SEE DETAIL 4, ON SHEET C903.
13. INSTALL 10-INCH DIAMETER POLYETHYLENE (PE) PIPE FOR IRRIGATION MAIN LINE AT LOCATION SHOWN AND PER LENGTH NOTED. BACKFILL AND STANDARD BURIAL DEPTH PER DETAIL 3, ON SHEET C904.
14. INSTALL IRRIGATION VALVE AND LATERAL CONNECTION FOR CONNECTION TO FIELD IRRIGATION SYSTEM.
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SCALE: 1" = 60'
0 60 120 FT

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REVISIONS:

NO.	DATE	DESCRIPTION

PROJECT TITLE:

KAAWANUI SOLAR, LLC

PROJECT LOCATION:

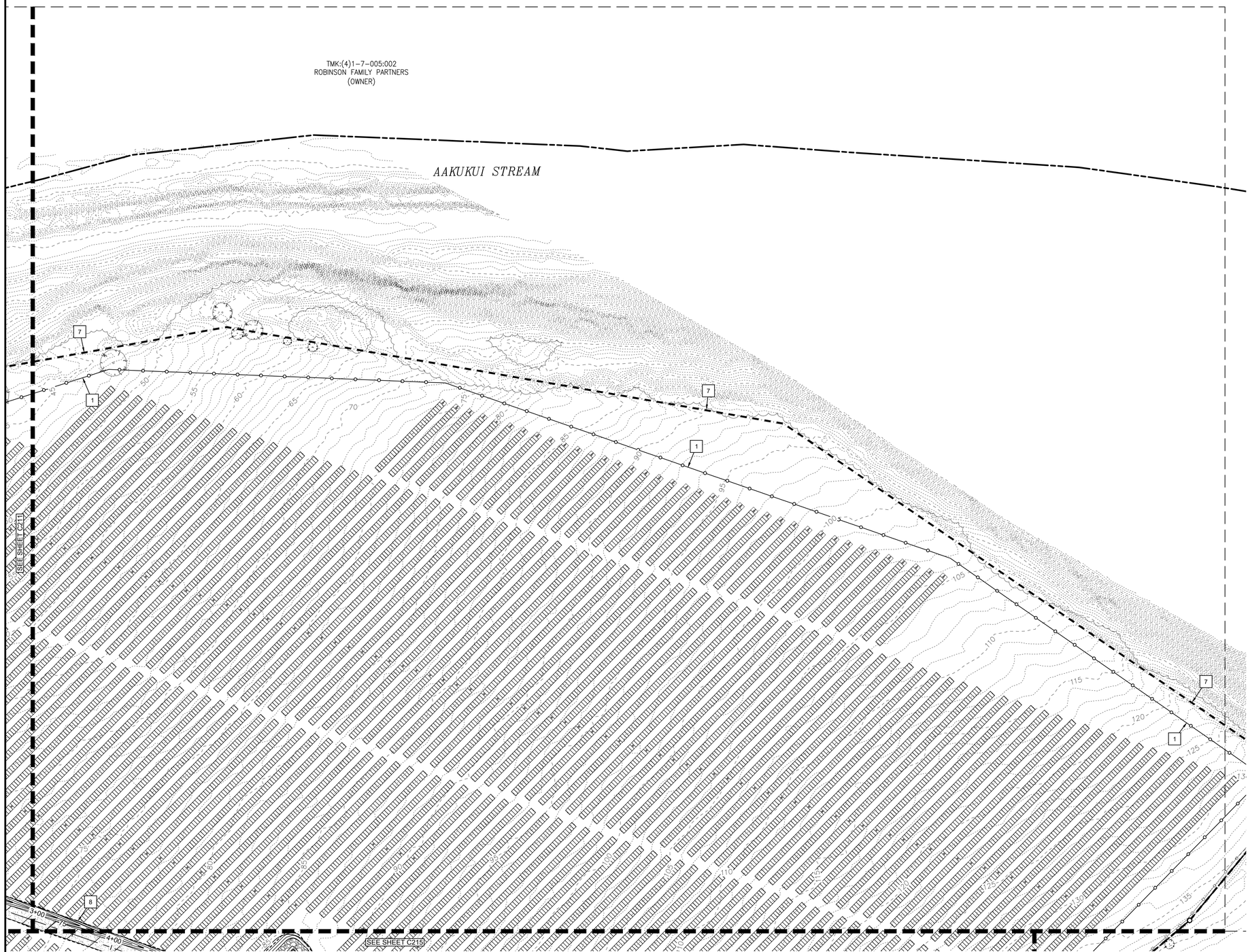
MAKAWELI, WAIMEA, KAUAI, HAWAII

SHEET TITLE & DESCRIPTION:

SITE PLAN V

PROJ NUM: 25001
DES: TEG
DWN: TEG
CHK: ARD, AJM
APV:
DATE: 12/30/2025
SCALE AT 24" x 36":
30% DESIGN

SHEET NO: C215 REV:



CONSTRUCTION KEY NOTES

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4L 4R	CONSTRUCT PV ARRAY GRAVEL ACCESS ROAD (SHED [L = LEFT/ R = RIGHT] IN DIRECTION OF INCREASE STATIONING). SEE DETAIL 2, ON SHEET C902.
5	CONSTRUCT HEAVY HAUL GRAVEL ACCESS ROAD. SEE DETAIL 6, ON SHEET C902.
6	CONSTRUCT APPROVED FIRE TURNAROUND AT LOCATION SHOWN. SEE TYPICAL DIMENSION DETAIL 4, ON SHEET C902.
7	PROPOSED LIMITS OF SOLAR DEVELOPMENT. SEE TMK PLAN, SHEET C050, FOR MORE INFORMATION.
8	CONSTRUCT STANDARD STORM DRAINAGE SWALE, TO LIMITS SHOWN. SEE DETAIL 2, ON SHEET C902, ALSO DETAIL 3, ON SHEET C903.
9	INSTALL DUCTILE IRON STORM DRAIN CULVERT AT LOCATION SHOWN. BACKFILL PER DETAIL 1, ON SHEET C902.
10	INSTALL 24" CONCRETE AREA DRAIN WITH H-25 RATED COVER, AT LOCATION SHOWN.
11	INSTALL DUCTILE IRON CULVERT AND CROSSING AT EXISTING/PROPOSED IRRIGATION CHANNEL, AT LOCATION SHOWN. BACKFILL PER DETAIL 1, ON SHEET C902.
12	CONSTRUCT ROCK-LINED IRRIGATION CHANNEL, TO LIMITS SHOWN. SEE DETAIL 4, ON SHEET C903.
13	INSTALL 10-INCH DIAMETER POLYETHYLENE (PE) PIPE FOR IRRIGATION MAIN LINE AT LOCATION SHOWN AND PER LENGTH NOTED. BACKFILL AND STANDARD BURIAL DEPTH PER DETAIL 3, ON SHEET C904.
14	INSTALL IRRIGATION VALVE AND LATERAL CONNECTION FOR CONNECTION TO FIELD IRRIGATION SYSTEM.
15	MASS GRADING IN AREA INDICATED FOR INSTALLATION OF SOLAR MODULE RACKING. SEE EARTHWORK GENERAL NOTES, DETAIL 2 ON SHEET C904, FOR INFORMATION ON SUBGRADE PREPARATION.
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SCALE: 1" = 60'
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PE STAMP:

AARON J MURPHY
LICENSED PROFESSIONAL ENGINEER
No. 18595
STATE OF HAWAII

PRELIMINARY
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FOR REVIEW & APPROVAL ONLY

REVISIONS:

NO.	DATE	DESCRIPTION

PROJECT TITLE:

KAAWANUI SOLAR, LLC

PROJECT LOCATION:

MAKAWELI, WAIMEA, KAUAI, HAWAII

SHEET TITLE & DESCRIPTION:

SITE PLAN VI

PROJ NUM: 25001
DES: TEG
DWN: TEG
CHK: ARD, AJM
APV:
DATE: 12/30/2025
SCALE AT 24" x 36":
30% DESIGN

SHEET NO: C216
REV:



CONSTRUCTION KEY NOTES

1. CONSTRUCT 7.0' NOMINAL HEIGHT CHAIN LINK PERIMETER SECURITY FENCE TO ALIGNMENT SHOWN. SEE DETAIL 1, ON SHEET C901.
2A. CONSTRUCT DUAL SWING ACCESS GATE, PER WIDTH NOTED, AT LOCATION SHOWN. SEE DETAIL 2, ON SHEET C901.
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12. CONSTRUCT ROCK-LINED IRRIGATION CHANNEL, TO LIMITS SHOWN. SEE DETAIL 4, ON SHEET C903.
13. INSTALL 10-INCH DIAMETER POLYETHYLENE (PE) PIPE FOR IRRIGATION MAIN LINE AT LOCATION SHOWN AND PER LENGTH NOTED. BACKFILL AND STANDARD BURIAL DEPTH PER DETAIL 3, ON SHEET C904.
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SCALE: 1" = 60'
0 60 120 FT

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04/30/2026
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PE STAMP:

AARON J MURPHY
LICENSED PROFESSIONAL ENGINEER
No. 18696
STATE OF HAWAII

PRELIMINARY
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FOR REVIEW & APPROVAL ONLY

REVISIONS:

NO.	DATE	DESCRIPTION

PROJECT TITLE:

KAAWANUI SOLAR, LLC

PROJECT LOCATION:

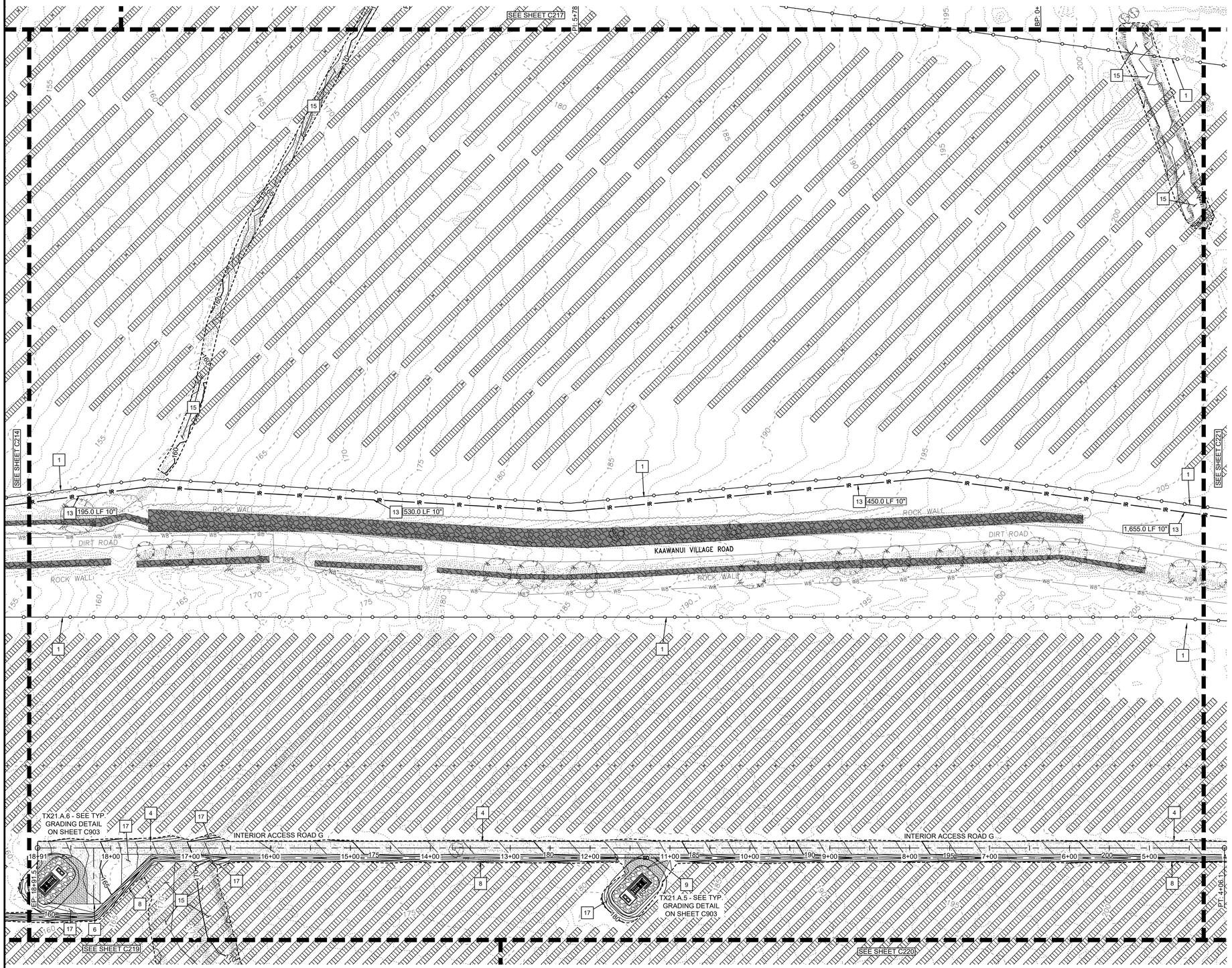
MAKAWELI, WAIMEA, KAUAI, HAWAII

SHEET TITLE & DESCRIPTION:

SITE PLAN VII

PROJ NUM: 25001
DES: TEG
DWN: TEG
CHK: ARD, AJM
APV:
DATE: 12/30/2025
SCALE AT 24" x 36":
30% DESIGN

SHEET NO: C217 REV:



CONSTRUCTION KEY NOTES

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8. CONSTRUCT STANDARD STORM DRAINAGE SWALE, TO LIMITS SHOWN. SEE DETAIL 2, ON SHEET C902, ALSO DETAIL 3, ON SHEET C903.
9. INSTALL DUCTILE IRON STORM DRAIN CULVERT AT LOCATION SHOWN. BACKFILL PER DETAIL 1, ON SHEET C902.
10. INSTALL 24" CONCRETE AREA DRAIN WITH H-25 RATED COVER, AT LOCATION SHOWN.
11. INSTALL DUCTILE IRON CULVERT AND CROSSING AT EXISTING/PROPOSED IRRIGATION CHANNEL, AT LOCATION SHOWN. BACKFILL PER DETAIL 1, ON SHEET C902.
12. CONSTRUCT ROCK-LINED IRRIGATION CHANNEL, TO LIMITS SHOWN. SEE DETAIL 4, ON SHEET C903.
13. INSTALL 10-INCH DIAMETER POLYETHYLENE (PE) PIPE FOR IRRIGATION MAIN LINE AT LOCATION SHOWN AND PER LENGTH NOTED. BACKFILL AND STANDARD BURIAL DEPTH PER DETAIL 3, ON SHEET C904.
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PE STAMP:

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No. 18595-C
HAWAII, USA

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REVISIONS:

NO.	DATE	DESCRIPTION

PROJECT TITLE:

KAAWANUI SOLAR, LLC

PROJECT LOCATION:

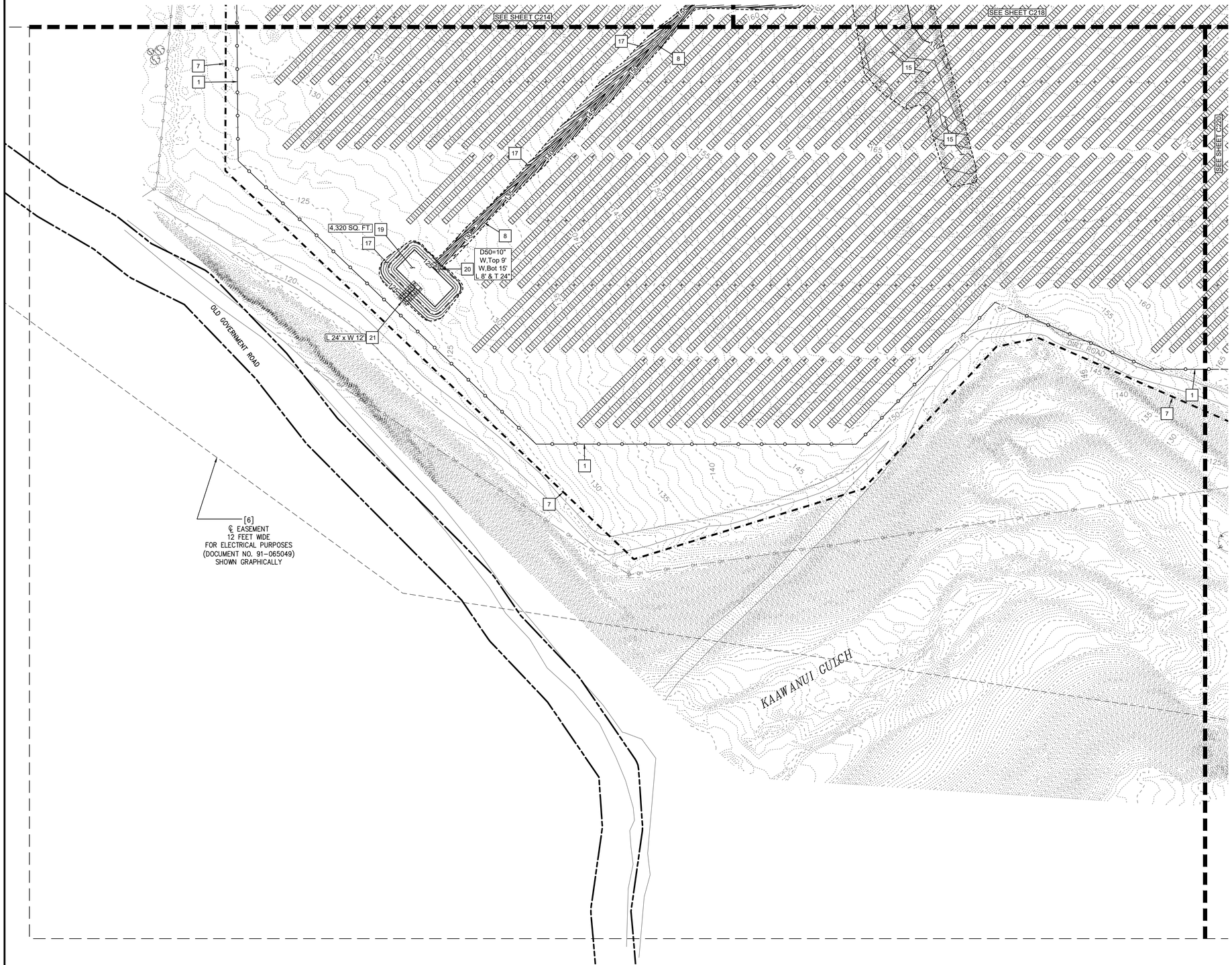
MAKAWELI, WAIMEA, KAUAI, HAWAII

SHEET TITLE & DESCRIPTION:

SITE PLAN VIII

PROJ NUM: 25001
DES: TEG
DWN: TEG
CHK: ARD, AJM
APV:
DATE: 12/30/2025
SCALE AT 24" x 36":
30% DESIGN

SHEET NO: C218
REV:



CONSTRUCTION KEY NOTES

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N W E S

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FOR REVIEW & APPROVAL ONLY

REVISIONS:

NO.	DATE	DESCRIPTION

PROJECT TITLE:

KAAWANUI SOLAR, LLC

PROJECT LOCATION:

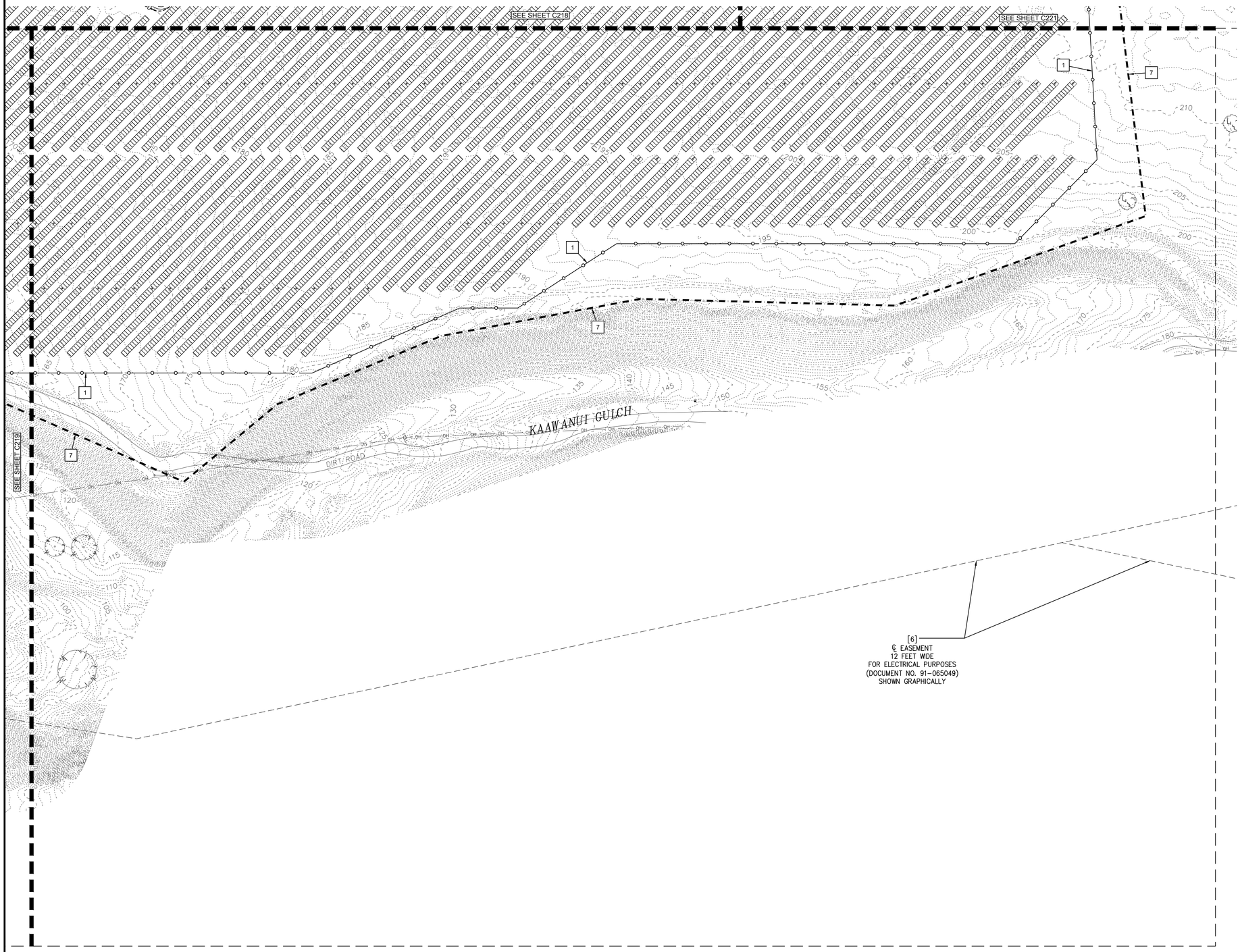
MAKAWELI, WAIMEA, KAUAI, HAWAII

SHEET TITLE & DESCRIPTION:

SITE PLAN IX

PROJ NUM: 25001
DES: TEG
DWN: TEG
CHK: ARD, AJM
APV:
DATE: 12/30/2025
SCALE AT 24" x 36":
30% DESIGN

SHEET NO: C219 REV:



CONSTRUCTION KEY NOTES

1	CONSTRUCT 7.0' NOMINAL HEIGHT CHAIN LINK PERIMETER SECURITY FENCE TO ALIGNMENT SHOWN. SEE DETAIL 1, ON SHEET C901.
2A	CONSTRUCT DUAL SWING ACCESS GATE, PER WIDTH NOTED, AT LOCATION SHOWN. SEE DETAIL 2, ON SHEET C901.
2B	CONSTRUCT DUAL SWING ACCESS GATE, PER WIDTH NOTED, FOR AGRICULTURE HARVESTING ACCESS, AT LOCATION SHOWN. SEE DETAIL 2, ON SHEET C901.
3	CONSTRUCT SINGLE SWING ACCESS GATE, PER WIDTH NOTED, AT LOCATION SHOWN. SEE DETAIL 4, ON SHEET C901.
4L 4R	CONSTRUCT PV ARRAY GRAVEL ACCESS ROAD (SHED [L = LEFT/ R = RIGHT] IN DIRECTION OF INCREASE STATIONING). SEE DETAIL 2, ON SHEET C902.
5	CONSTRUCT HEAVY HAUL GRAVEL ACCESS ROAD. SEE DETAIL 6, ON SHEET C902.
6	CONSTRUCT APPROVED FIRE TURNAROUND AT LOCATION SHOWN. SEE TYPICAL DIMENSION DETAIL 4, ON SHEET C902.
7	PROPOSED LIMITS OF SOLAR DEVELOPMENT. SEE TMK PLAN, SHEET C050, FOR MORE INFORMATION.
8	CONSTRUCT STANDARD STORM DRAINAGE SWALE, TO LIMITS SHOWN. SEE DETAIL 2, ON SHEET C902, ALSO DETAIL 3, ON SHEET C903.
9	INSTALL DUCTILE IRON STORM DRAIN CULVERT AT LOCATION SHOWN. BACKFILL PER DETAIL 1, ON SHEET C902.
10	INSTALL 24" CONCRETE AREA DRAIN WITH H-25 RATED COVER, AT LOCATION SHOWN.
11	INSTALL DUCTILE IRON CULVERT AND CROSSING AT EXISTING/PROPOSED IRRIGATION CHANNEL, AT LOCATION SHOWN. BACKFILL PER DETAIL 1, ON SHEET C902.
12	CONSTRUCT ROCK-LINED IRRIGATION CHANNEL, TO LIMITS SHOWN. SEE DETAIL 4, ON SHEET C903.
13	INSTALL 10-INCH DIAMETER POLYETHYLENE (PE) PIPE FOR IRRIGATION MAIN LINE AT LOCATION SHOWN AND PER LENGTH NOTED. BACKFILL AND STANDARD BURIAL DEPTH PER DETAIL 3, ON SHEET C904.
14	INSTALL IRRIGATION VALVE AND LATERAL CONNECTION FOR CONNECTION TO FIELD IRRIGATION SYSTEM.
15	MASS GRADING IN AREA INDICATED FOR INSTALLATION OF SOLAR MODULE RACKING. SEE EARTHWORK GENERAL NOTES, DETAIL 2 ON SHEET C904, FOR INFORMATION ON SUBGRADE PREPARATION.
16	CONSTRUCT RIPRAP ARMORED CHANNEL TO EXTENTS SHOWN. INSTALL GEOTEXTILE FABRIC UNDER RIPRAP FOR STABILIZATION. SEE DETAIL 1, ON SHEET C903.
17	ALL AREAS DISTURBED FOR GRADED DAYLIGHT SLOPES AND SWALES TO BE ROCKED FOR FINAL STABILIZATION: 3" D50 ROCK OVER ANCHORED NON-WOVEN GEOTEXTILE SEPARATION FABRIC.
18	CONSTRUCT STORM CUTOFF SWALE PER DETAIL 2, ON SHEET C903.
19	INSTALL STORMWATER DETENTION BASIN. SEE DETAIL 1, ON SHEET C904.
20	INSTALL RIPRAP OUTFALL PROTECTION AT LOCATION SHOWN, PER DIMENSIONS (TOP WIDTH, BOTTOM WIDTH, LENGTH), THICKNESS AND ROCK SIZE NOTED. SEE DETAIL 3, ON SHEET C902.
21	INSTALL OVERFLOW WEIR AND LOW-FLOW STORM DRAIN PIPE OUTLET AT LOCATION SHOWN, AND PER DIMENSIONS NOTED, FOR STORMWATER DETENTION BASIN. SEE DETAIL 1, SHEET C904.

SCALE: 1" = 60'
0 60 120 FT

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

04/30/2026
SIGNATURE LIC. EXP. DATE

aes
2180 South 1300 East, Suite 600
Salt Lake City, UT 84106-2749
(801) 679 - 3500

3J CONSULTING
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9600 SW NIMBUS AVE, SUITE 100; BEAVERTON, OR 97008

PE STAMP:

AARON J MURPHY
LICENSED PROFESSIONAL ENGINEER
No. 18595 C
HAWAII, USA

PRELIMINARY
NOT FOR CONSTRUCTION
FOR REVIEW & APPROVAL ONLY

REVISIONS:

NO.	DATE	DESCRIPTION

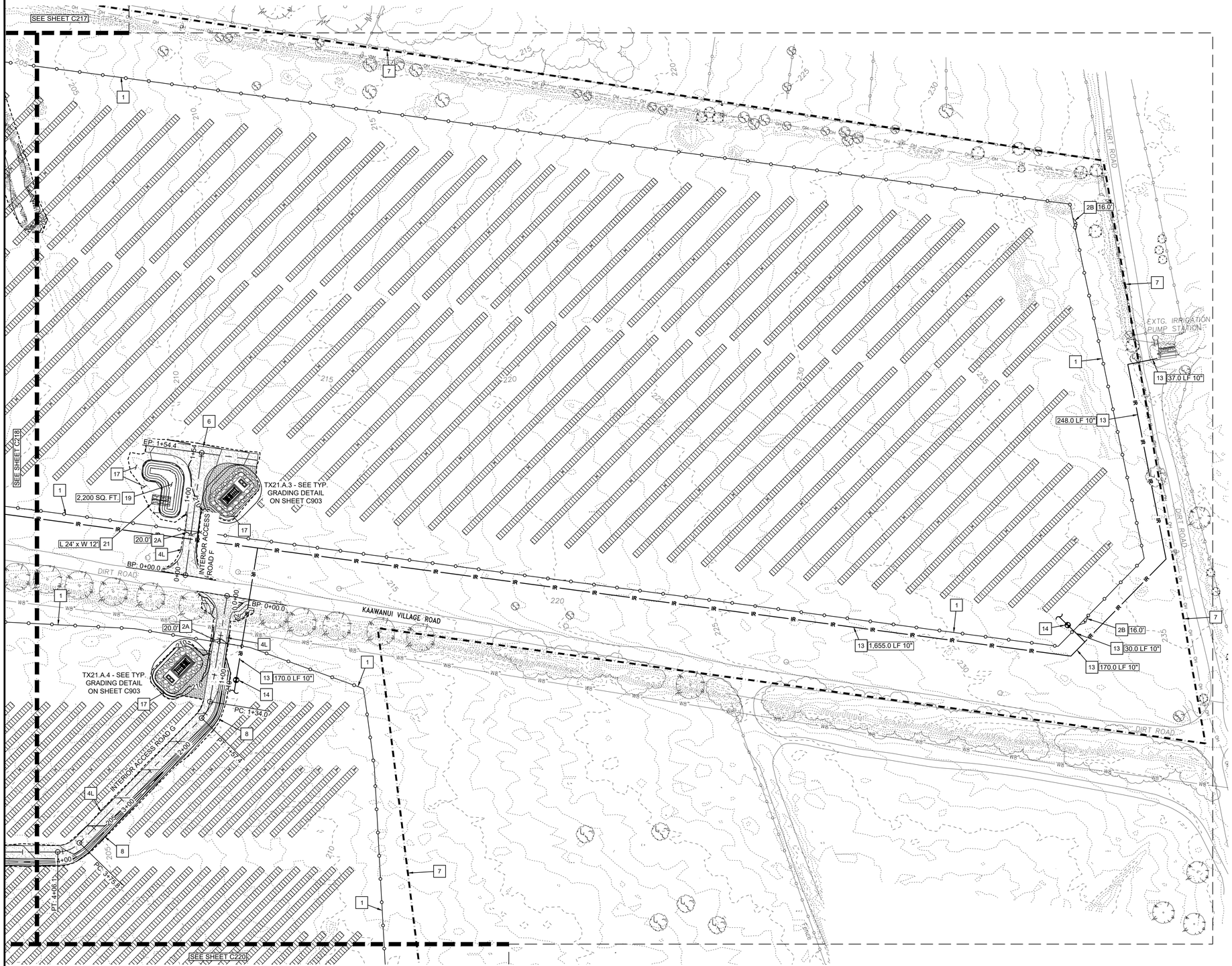
PROJECT TITLE:
KAAWANUI SOLAR, LLC

PROJECT LOCATION:
MAKAWELI, WAIMEA, KAUAI, HAWAII

SHEET TITLE & DESCRIPTION:
SITE PLAN X

PROJ NUM: 25001
DES: TEG
DWN: TEG
CHK: ARD, AJM
APV:
DATE: 12/30/2025
SCALE AT 24" x 36":
30% DESIGN

SHEET NO: C220 REV:



CONSTRUCTION KEY NOTES

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SCALE: 1" = 60'

0 60 120 FT

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

04/30/2026

SIGNATURE LIC. EXP. DATE

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PE STAMP:

AARON J MURPHY
LICENSED PROFESSIONAL ENGINEER
No. 18686-C
HAWAII, USA

PRELIMINARY
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REVISIONS:

NO.	DATE	DESCRIPTION

PROJECT TITLE:

KAAWANUI SOLAR, LLC

PROJECT LOCATION:

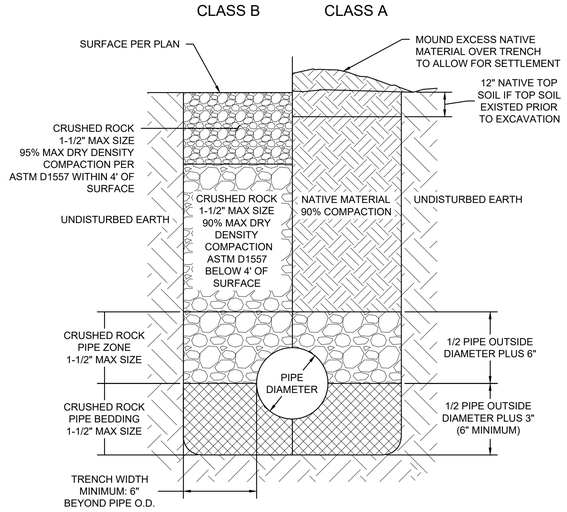
MAKAWELI, WAIMEA, KAUAI, HAWAII

SHEET TITLE & DESCRIPTION:

SITE PLAN XI

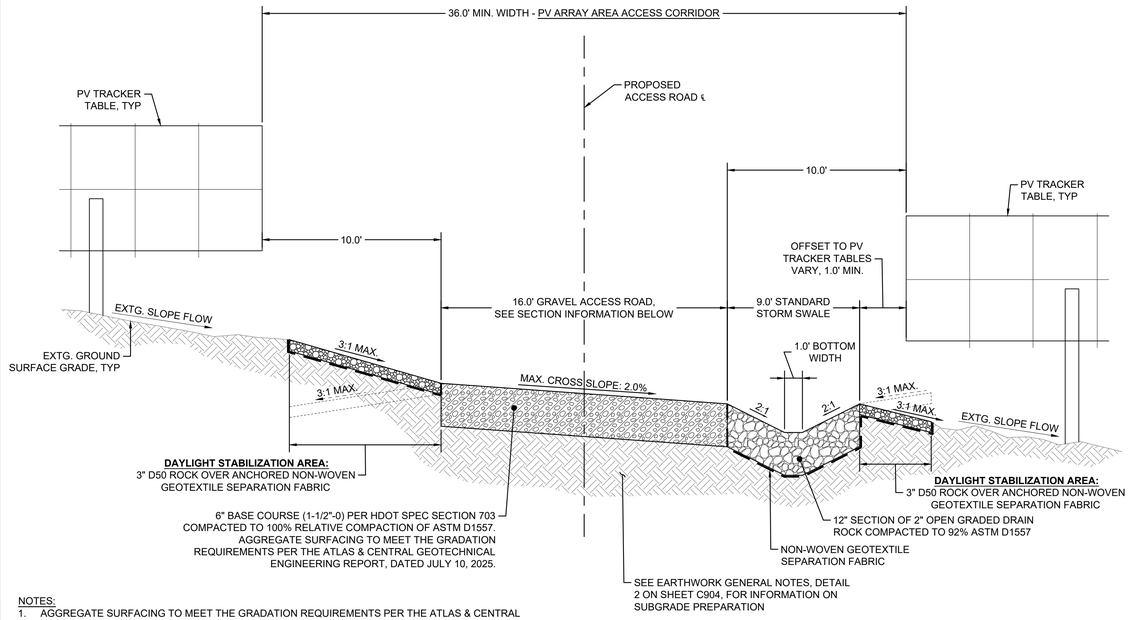
PROJ NUM: 25001
DES: TEG
DWN: TEG
CHK: ARD, AJM
APV:
DATE: 12/30/2025
SCALE AT 24" x 36":
30% DESIGN

SHEET NO: C221 REV:



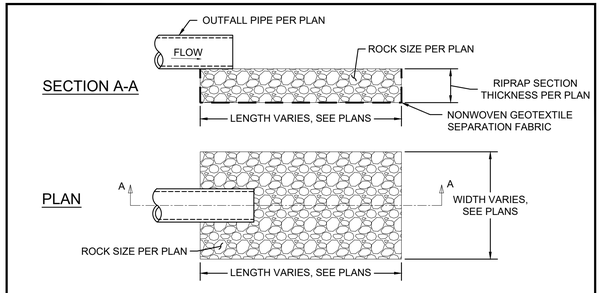
NOTES:
1. IF REQUIRED, TRENCH STABILIZATION SHALL BE SPECIFIED SEPARATELY AND PLACED PRIOR TO PLACEMENT OF BEDDING MATERIAL.
2. ALL UTILITY BACKFILL TO BE PLACED IN LIFTS OF NO MORE THAN 8 INCHES, MOISTURE CONDITIONED WITHIN 3 PERCENT OF OPTIMUM MOISTURE CONTENT AND COMPACTED TO 90% RELATIVE COMPACTION OF ASTM D1557
3. STORM LINES IN CLASS B TRENCH WITH LESS THAN 1' OF COVER SHALL HAVE CDF BACKFILL FROM TOP OF PIPE ZONE TO SUBGRADE. CDF BACKFILL TO BE ASTM C150, 100-200PSI.
4. COMPACTION TEST FREQUENCY REQUIRED PER GEOTECHNICAL RECOMMENDATIONS.
5. DECREASE MAXIMUM LIFT THICKNESS TO AID COMPACTION AS NEEDED.

NOT TO SCALE	
DETAIL NUMBER 1	**PIPE TRENCH BACKFILL DETAIL**

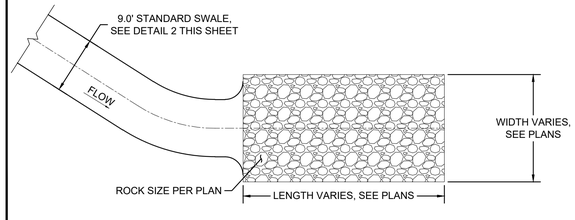


NOTES:
1. AGGREGATE SURFACING TO MEET THE GRADATION REQUIREMENTS PER THE ATLAS & CENTRAL GEOTECHNICAL ENGINEERING REPORT, DATED JULY 10, 2025.
2. MATERIAL SHALL BE COMPACTED TO AT LEAST 100% RELATIVE COMPACTION (ASTM D1557). MATERIAL SHALL BE PLACED IN COMPACTED LIFT THICKNESS FROM 3 TO 6 INCHES.
3. ROLL AND COMPACT AT LEAST 1 FOOT OF SHOULDER WIDTH, PER THE ATLAS & CENTRAL GEOTECHNICAL ENGINEERING REPORT, DATED JULY 10, 2025.
4. SEE EARTHWORK GENERAL NOTES, DETAIL 2 ON SHEET C904, FOR INFORMATION ON SUBGRADE PREPARATION.

NOT TO SCALE	
DETAIL NUMBER 2	**STANDARD ACCESS CORRIDOR CROSS SECTION DETAIL**

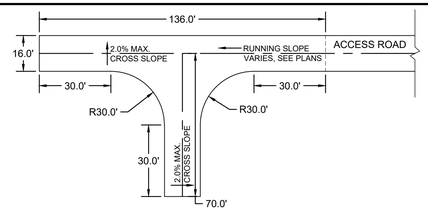


OUTFALL PROTECTION AT PIPE OUTFALL
(N.T.S.)

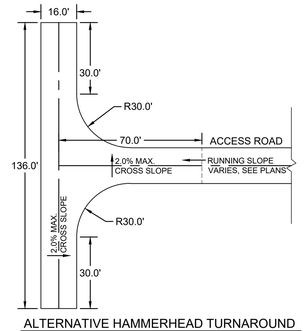


OUTFALL PROTECTION AT SWALE TERMINATION
(N.T.S.)

NOT TO SCALE	
DETAIL NUMBER 3	**VELOCITY DISSIPATION DEVICE/ RIPRAP OUTFALL PROTECTION DETAIL**



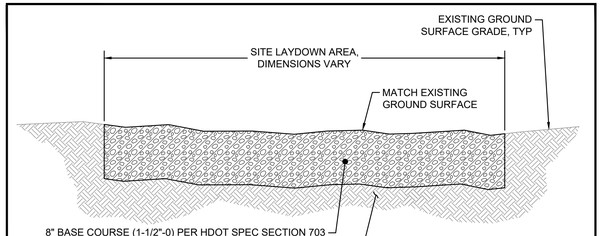
ALTERNATIVE HAMMERHEAD TURNAROUND
(N.T.S.)



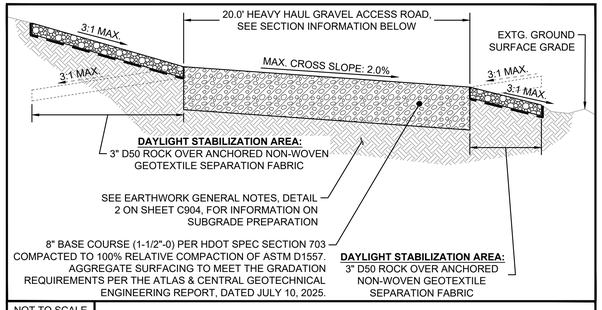
ALTERNATIVE HAMMERHEAD TURNAROUND
(N.T.S.)

NOTES:
1. AREA OF TURNAROUND IS TO BE PERMANENTLY MAINTAINED, CLEARED, AND UNOBSTRUCTED AT ALL TIMES.
2. RUNNING SLOPE VARIES, SEE ACCESS ROAD CENTERLINE SLOPE ON PLANS. CROSS SLOPE MAXIMUM TO BE 2.0%. DRAINAGE IS REQUIRED TO PREVENT PONDING.

NOT TO SCALE	
DETAIL NUMBER 4	**TYPICAL FIRE TURNAROUND DIMENSION DETAIL**



NOT TO SCALE	
DETAIL NUMBER 5	**SITE LAYDOWN AREA SURFACE TREATMENT DETAIL**



NOT TO SCALE	
DETAIL NUMBER 6	**HEAVY HAUL GRAVEL ACCESS ROAD SECTION DETAIL**

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

04/30/2026

SIGNATURE LIC. EXP. DATE

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PE STAMP:

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LICENSED PROFESSIONAL ENGINEER
No. 18696 C
OREGON
04/30/2026

PRELIMINARY
NOT FOR CONSTRUCTION
FOR REVIEW & APPROVAL ONLY

REVISIONS:

NO.	DATE	DESCRIPTION

PROJECT TITLE:

KAAWANUI SOLAR, LLC

PROJECT LOCATION:

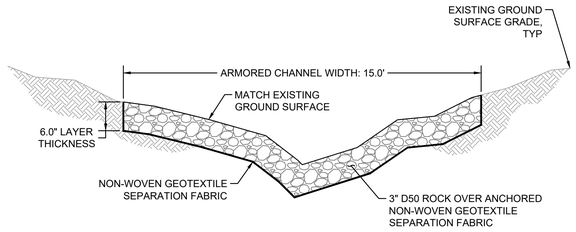
MAKAWELI, WAIMEA, KAUAI, HAWAII

SHEET TITLE & DESCRIPTION:

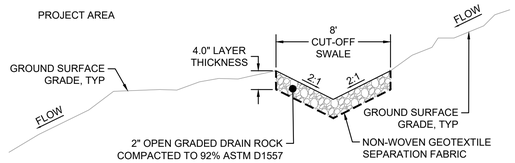
CIVIL DETAILS II

PROJ NUM: 25001
DES: TEG
DWN: TEG
CHK: ARD, AJM
APV:
DATE: 08/19/2025
SCALE AT 24" x 36":
30% DESIGN

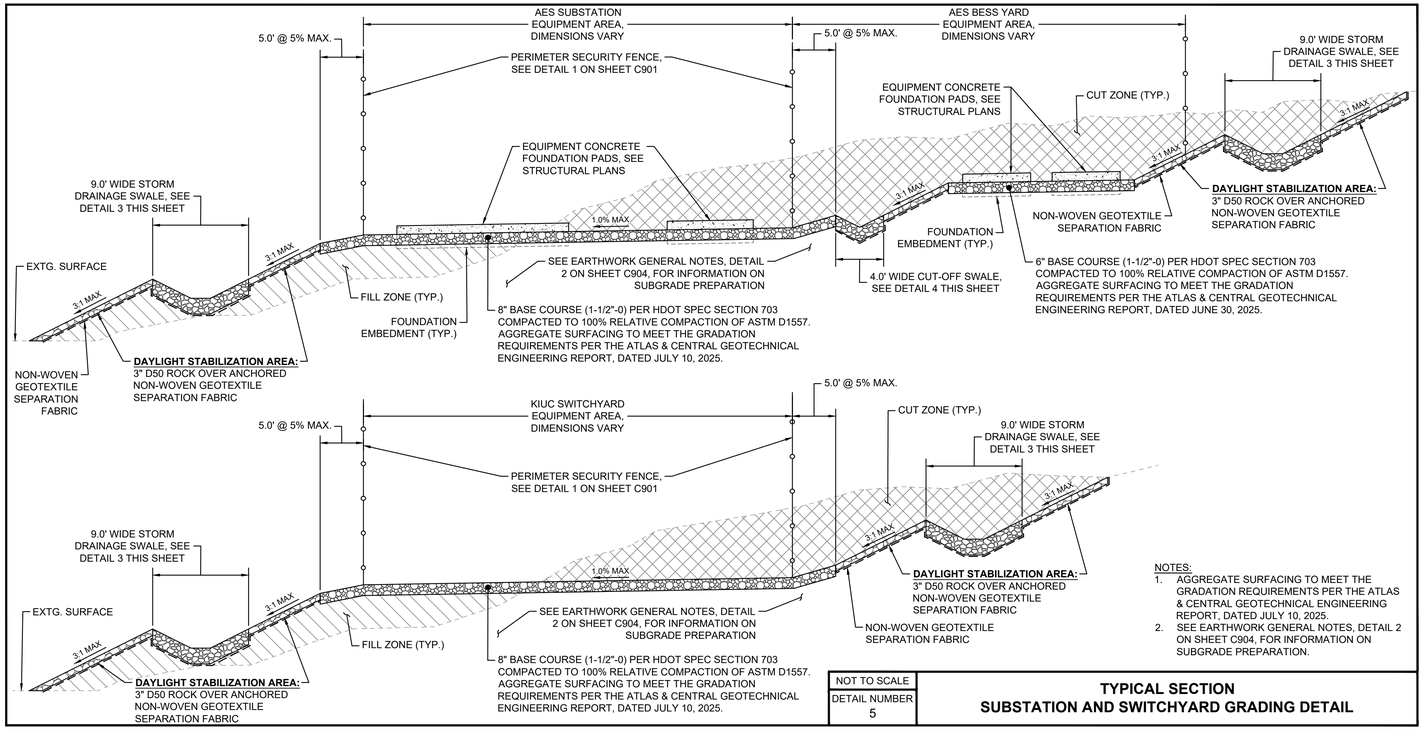
SHEET NO: C902 REV:



NOT TO SCALE	
DETAIL NUMBER 1	**ARMORED CHANNEL SECTION**

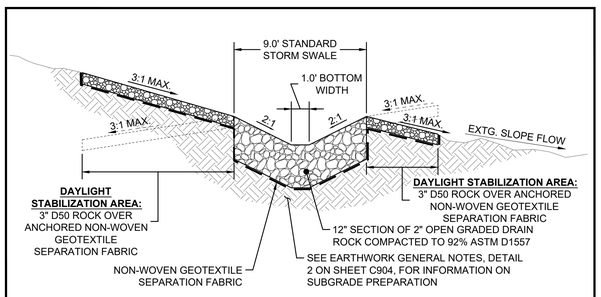


NOT TO SCALE	
DETAIL NUMBER 2	**CUT-OFF SWALE**

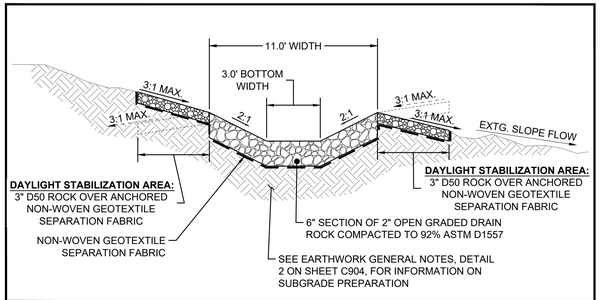


NOTES:
1. AGGREGATE SURFACING TO MEET THE GRADATION REQUIREMENTS PER THE ATLAS & CENTRAL GEOTECHNICAL ENGINEERING REPORT, DATED JULY 10, 2025.
2. SEE EARTHWORK GENERAL NOTES, DETAIL 2 ON SHEET C904, FOR INFORMATION ON SUBGRADE PREPARATION.

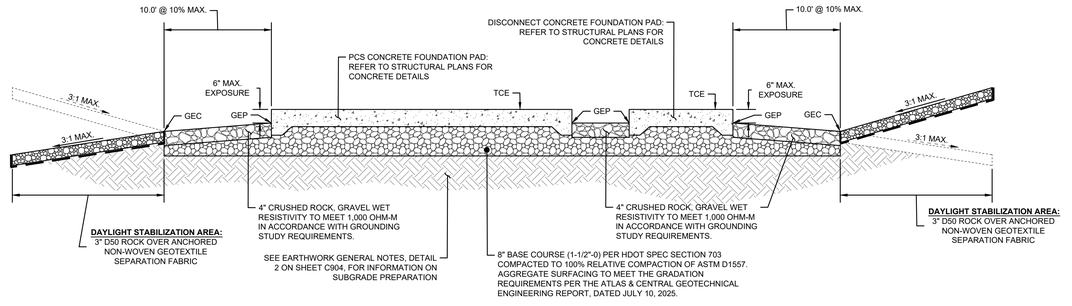
NOT TO SCALE	
DETAIL NUMBER 5	**TYPICAL SECTION SUBSTATION AND SWITCHYARD GRADING DETAIL**



NOT TO SCALE	
DETAIL NUMBER 3	**STAND-ALONE STANDARD STORM SWALE**



NOT TO SCALE	
DETAIL NUMBER 4	**ROCK-LINED IRRIGATION CANAL DETAIL**



NOTES:
(SEE PCS PAD GRADING DETAILS) - TO BE PROVIDED AT 60%
1. TCE - TOP CONCRETE ELEVATION
2. GEC - GRAVEL ELEVATION AT CORNER
3. GEP - GRAVEL ELEVATION AT PAD

NOTES:
1. AGGREGATE SURFACING TO MEET THE GRADATION REQUIREMENTS PER THE ATLAS & CENTRAL GEOTECHNICAL ENGINEERING REPORT, DATED JULY 10, 2025.
2. SEE EARTHWORK GENERAL NOTES, DETAIL 2 ON SHEET C904, FOR INFORMATION ON SUBGRADE PREPARATION.

NOT TO SCALE	
DETAIL NUMBER 6	**TYPICAL SECTION PCS (POWER CONVERSION STATION) PAD GRADING DETAIL**

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

04/30/2026

SIGNATURE LIC. EXP. DATE

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2180 South 1300 East, Suite 600
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STATE OF UTAH

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REVISIONS:

NO.	DATE	DESCRIPTION

PROJECT TITLE:

KAAWANUI SOLAR, LLC

PROJECT LOCATION:

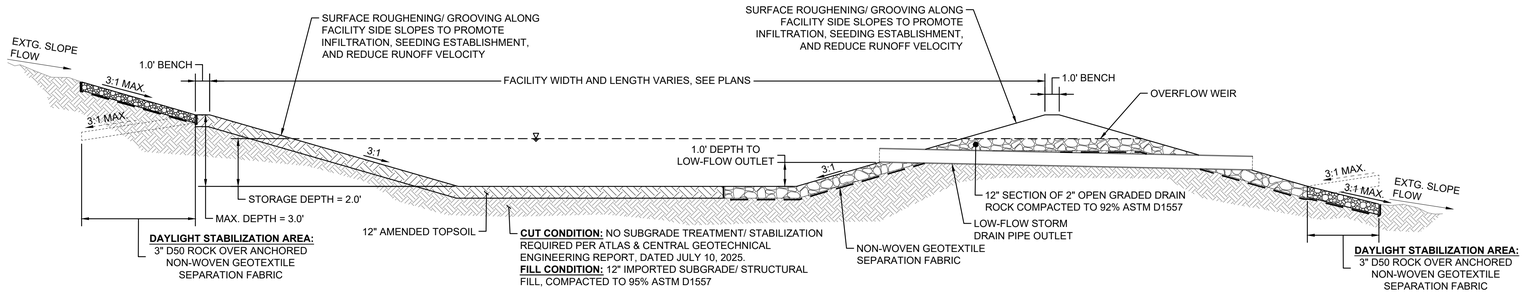
MAKAWELI, WAIMEA, KAUAI, HAWAII

SHEET TITLE & DESCRIPTION:

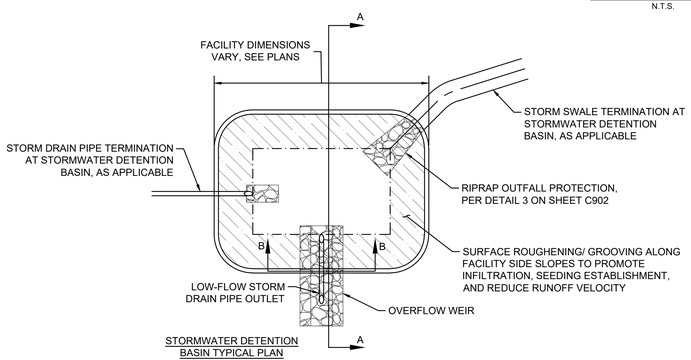
CIVIL DETAILS III

PROJ NUM: 25001
DES: TEG
DWN: TEG
CHK: ARD, AJM
APV:
DATE: 08/19/2025
SCALE AT 24" x 36":
30% DESIGN

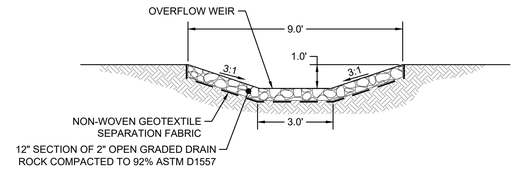
SHEET NO: C903 REV:



STORMWATER DETENTION BASIN TYPICAL SECTION 'A-A'
N.T.S.



STORMWATER DETENTION BASIN TYPICAL PLAN
N.T.S.



STORMWATER DETENTION BASIN TYPICAL SECTION 'B-B'
N.T.S.

NOT TO SCALE	
DETAIL NUMBER 1	**STORMWATER DETENTION BASIN DETAIL**

EARTHWORK NOTES FOR SERVICE ROAD CONSTRUCTION SUBGRADE PREPARATION:

PER ATLAS & CENTRAL GEOTECHNICAL ENGINEERING REPORT, DATED JULY 10, 2025

1. DESIGNATED AGGREGATE ROADWAY AREAS SHALL BE PROOF ROLLED BY THE APPLICATION OF 30 COVERAGES OF A HEAVY RUBBER-TIRED ROLLER WITH FOUR TIRES ABREAST AND EACH TIRE LOADED TO 30,000 LBS AND INFLATED TO 150 PSI. THE TOP LAYER OF SUBGRADE TO WHICH THE SURFACE COURSE IS LAID AND EACH LIFT OF SURFACE COURSE SHOULD BE PROOF ROLLED.
2. ROLL AND COMPACT AT LEAST 1 FOOT OF SHOULDER WIDTH.
3. THE SURFACE GEOMETRY OF THE ROAD SHOULD BE DESIGNED SUCH THAT DRAINAGE AWAY FROM THE ROAD SURFACE IS PROVIDED AT ALL POINTS.
4. NATIVE SOIL IS VERY STIFF, AND WE DO NOT RECOMMEND SUBGRADE TREATMENT/ STABILIZATION OF ANY KIND, INCLUDING GEOTEXTILES, CEMENT, OR LIME.
5. IN NATIVE COMPACTED ROADWAYS, COMPACTION EFFORTS AND CONSTRUCTION TRAFFIC MAY RESULT IN THE DEVELOPMENT OF LOW SPOTS UNLESS AN EQUIVALENT VOLUME OF COMPACTED SOILS IS REPLACED. THIS IS OFTEN OF PARTICULAR CONCERN IN AREAS OF HIGH TRAFFIC THAT WERE RUTTED AND DISTURBED DURING CONSTRUCTION, NATIVE COMPACTED ROADWAYS, AND TRENCHES. AREAS WHERE UNSUITABLE CONDITIONS ARE LOCATED SHOULD BE REPAIRED BY REPLACING THE MATERIALS WITH PROPERLY COMPACTED FILL IN ACCORDANCE WITH THE GEOTECHNICAL REPORT. FINAL SURFACE ELEVATIONS SHALL ADHERE TO THE FINAL GRADING DESIGN.
6. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING ACCESS ROADS IN A SERVICEABLE CONDITION THROUGHOUT THE DURATION OF CONSTRUCTION AND THEY MUST BE RE-EVALUATED AT THE END OF CONSTRUCTION TO CONFIRM COMPLIANCE WITH THE SPECIFIED SECTION THICKNESS, AGGREGATE GRADATION, AND PERFORMANCE REQUIREMENTS. FINAL ACCEPTANCE TESTING OR VISUAL INSPECTION MAY BE REQUIRED TO VERIFY THAT ROADWAY CONDITIONS HAVE NOT DETERIORATED DUE TO CONSTRUCTION TRAFFIC AND CONTAMINATION.

TABLE A - FILL MATERIALS

PER ATLAS & CENTRAL GEOTECHNICAL ENGINEERING REPORT, DATED JULY 10, 2025

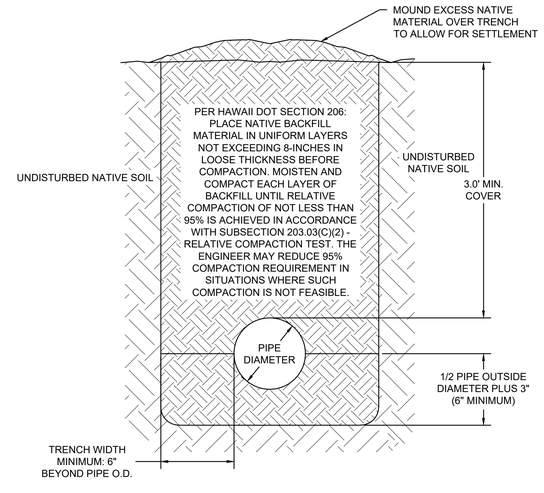
LOCATION	DESCRIPTION	UNIFIED SOIL CLASSIFICATION SYSTEM (USCS) TYPE(S)	COMPACTION CRITERIA	MOISTURE RANGE	MAX. LOOSE LIFT THICKNESS
MASS GRADING & ROADWAY EMBANKMENTS / AROUND AND ABOVE SHALLOW FOUNDATIONS/ PV PILE AREAS	COMMON FILL	GP, GW, GM, GC, SP, SW, SM, SC, CL & ML	90% D1557	+/- 2% OF OPTIMUM	8" or 4" FOR HAND OPERATED MACHINES
BELOW FOUNDATION AREAS/ SLABS	STRUCTURAL FILL	GP, GW, GM, SP, SW, SM	95% D1557	+/- 2% OF OPTIMUM	8" or 4" FOR HAND OPERATED MACHINES
SERVICE ROADS/ LAYDOWN AREAS	AGGREGATE SURFACING	GW or GP	100% D1557	+/- 2% OF OPTIMUM	8" or 4" FOR HAND OPERATED MACHINES

EARTHWORK NOTES FOR MAT AND SHALLOW FOOTING FOUNDATION SUBGRADE PREPARATION:

PER ATLAS & CENTRAL GEOTECHNICAL ENGINEERING REPORT, DATED JULY 10, 2025

1. PREPARE THE BEARING SURFACES USING A SMOOTH-BLADED EXCAVATOR BUCKET.
2. VERIFY THAT THE SUBGRADE IS EITHER COMPACTED STRUCTURAL FILL OR UNDISTURBED NATIVE SOIL BY MANUAL PROBING OR PROOF ROLLING WITH ONE PASS OF A LOADED TANDEM AXLE DUMP TRUCK AT SPEEDS BETWEEN 2.5 AND 3.5 MILES PER HOUR.
   2.1. FOR STRUCTURE FOUNDATIONS, THE SUBGRADE IS CONSIDERED TO EXTEND 5 FEET BEYOND FOUNDATION LINES.
3. SUBGRADE MATERIALS THAT PROBE EASILY OR EXHIBIT EXCESSIVE DEFLECTION AND/OR RUTTING DURING PROOF ROLLING NEED TO BE SCARIFIED, AERATED, MOISTURE CONDITIONED TO WITHIN +/- 2% OF OPTIMUM MOISTURE AND RECOMPACTED.
4. FOR SHALLOW FOUNDATIONS, COVER PREPARED BEARING SURFACES WITH 6 INCHES OF STRUCTURAL FILL COMPACTED TO 95% RELATIVE COMPACTION (ASTM D1557).
5. COMPACT AREAS WITHIN 5 FEET OF SHALLOW FOUNDATIONS, TO A DEPTH EQUAL TO THE BEARING SURFACE, TO 90% OF ASTM D1557 FOR COHESIVE SOILS AND 95% ASTM D1557 FOR COHESIONLESS MATERIALS.
6. HORIZONTAL LAYERS OF STRUCTURAL FILL SHALL BE PLACED IN LOOSE LIFTS NO GREATER THAN 8 INCHES THICK WHEN COMPACTED WITH HEAVY EQUIPMENT, OR NO GREATER THAN 4 INCHES THICK WHEN COMPACTED WITH HAND-OPERATED EQUIPMENT.
7. ALL FILL MATERIALS SHALL BE FREE FROM TOPSOIL, ORGANICS, AND DELETERIOUS MATERIALS. IN ADDITION, ALL AREAS RECEIVING FILL SHALL BE FREE FROM TOPSOIL, ORGANICS, AND DELETERIOUS MATERIALS.
8. ALL FILL MATERIALS SHOULD BE MOISTURE CONDITIONED TO A MOISTURE CONTENT THAT WILL READILY FACILITATE OBTAINING THE SPECIFIED COMPACTION. FOR FINE-GRAINED SOILS, THE MOISTURE CONTENT SHALL BE AT LEAST 2 PERCENT WET OF OPTIMUM.
9. GROUND WATER IS VERY DEEP, IN-SITU MOISTURE CONTENTS ARE VERY LOW AND THERE IS NO NEED FOR A VAPOR BARRIER.
10. CORROSION PROPERTIES OF IMPORTED SOILS SHOULD BE TESTED FOR ADHERENCE WITH CONSTRUCTION MATERIAL DESIGN.
11. THE SURFICIAL FINE-GRAINED SITE SOILS ARE SUSCEPTIBLE TO DISTURBANCE UNDER HEAVY WHEEL LOADS WHEN WET.
    11.1. EARTHWORK ACTIVITIES SHOULD NOT TAKE PLACE DURING PERIODS OF HEAVY PRECIPITATION WITHOUT CONSIDERATION FOR USE OF SPECIALIZED EQUIPMENT OR AN UNDERSTANDING THAT SUBGRADE REPAIR/REHABILITATION WILL BE REQUIRED TO PROVIDE SUPPORT OF ROADWAYS OR STRUCTURES.
    11.2. DURING PROLONGED WET WEATHER, IT MAY BE NECESSARY TO EXCLUSIVELY USE LOW GROUND PRESSURE (TRACK-MOUNTED) EQUIPMENT TO LOAD REMOVED MATERIAL INTO TRUCKS SUPPORTED ON GRAVEL HAUL ROADS, USE GRAVEL WORKING PADS, AND EMPLOY OTHER METHODS TO REDUCE GROUND DISTURBANCE DURING PILE AND PANEL INSTALLATION.
12. THE GROUND SURFACE IN WORKING AREAS SHOULD BE GRADED SUCH THAT AREAS OF PONDED WATER DO NOT DEVELOP. MEASURES SHOULD BE TAKEN TO PREVENT SURFACE WATER FROM COLLECTING IN EXCAVATIONS AND TRENCHES. MEASURES SHOULD BE IMPLEMENTED TO REMOVE SURFACE WATER FROM WORK AREAS.
13. FILL MATERIALS ARE LISTED IN TABLE A. ANY SOIL NOT CONTAINING PLASTIC FINES AND MEETING THE USCS REQUIREMENTS THAT CAN BE COMPACTED TO THE SPECIFIED COMPACTION IS SUFFICIENT FOR EACH FILL TYPE.
14. SEE ATLAS & CENTRAL GEOTECHNICAL ENGINEERING REPORT, DATED JULY 10, 2025, FOR INFORMATION REGARDING FILL MATERIAL TESTING REQUIREMENTS.

NOT TO SCALE	
DETAIL NUMBER 2	**EARTHWORK GENERAL NOTES**



NOTES:
1. IF REQUIRED, TRENCH STABILIZATION SHALL BE SPECIFIED SEPARATELY AND PLACED PRIOR TO PLACEMENT OF BEDDING MATERIAL.
2. ALL UTILITY BACKFILL TO BE PLACED IN LIFTS OF NO MORE THAN 8 INCHES
3. COMPACTION TEST FREQUENCY REQUIRED PER GEOTECHNICAL RECOMMENDATIONS.
4. DECREASE MAXIMUM LIFT THICKNESS TO AID COMPACTION AS NEEDED.

NOT TO SCALE	
DETAIL NUMBER 3	**IRRIGATION MAIN TRENCH BACKFILL DETAIL**

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

04/30/2026

SIGNATURE LIC. EXP. DATE

aes
2180 South 1300 East, Suite 600
Salt Lake City, UT 84106-2749
(801) 679 - 3500

3J CONSULTING
CIVIL ENGINEERING
WATER RESOURCES
COMMUNITY PLANNING
9600 SW NIMBUS AVE, SUITE 100; BEAVERTON, OR 97008

PE STAMP:

AARON J MURPHY
LICENSED PROFESSIONAL ENGINEER
No. 18696-C
HAWAII, U.S.A.

PRELIMINARY
NOT FOR CONSTRUCTION
FOR REVIEW & APPROVAL ONLY

REVISIONS:

NO.	DATE	DESCRIPTION

PROJECT TITLE:

KAAWANUI SOLAR, LLC

PROJECT LOCATION:

MAKAWELI, WAIMEA, KAUAI, HAWAII

SHEET TITLE & DESCRIPTION:

CIVIL DETAILS IV

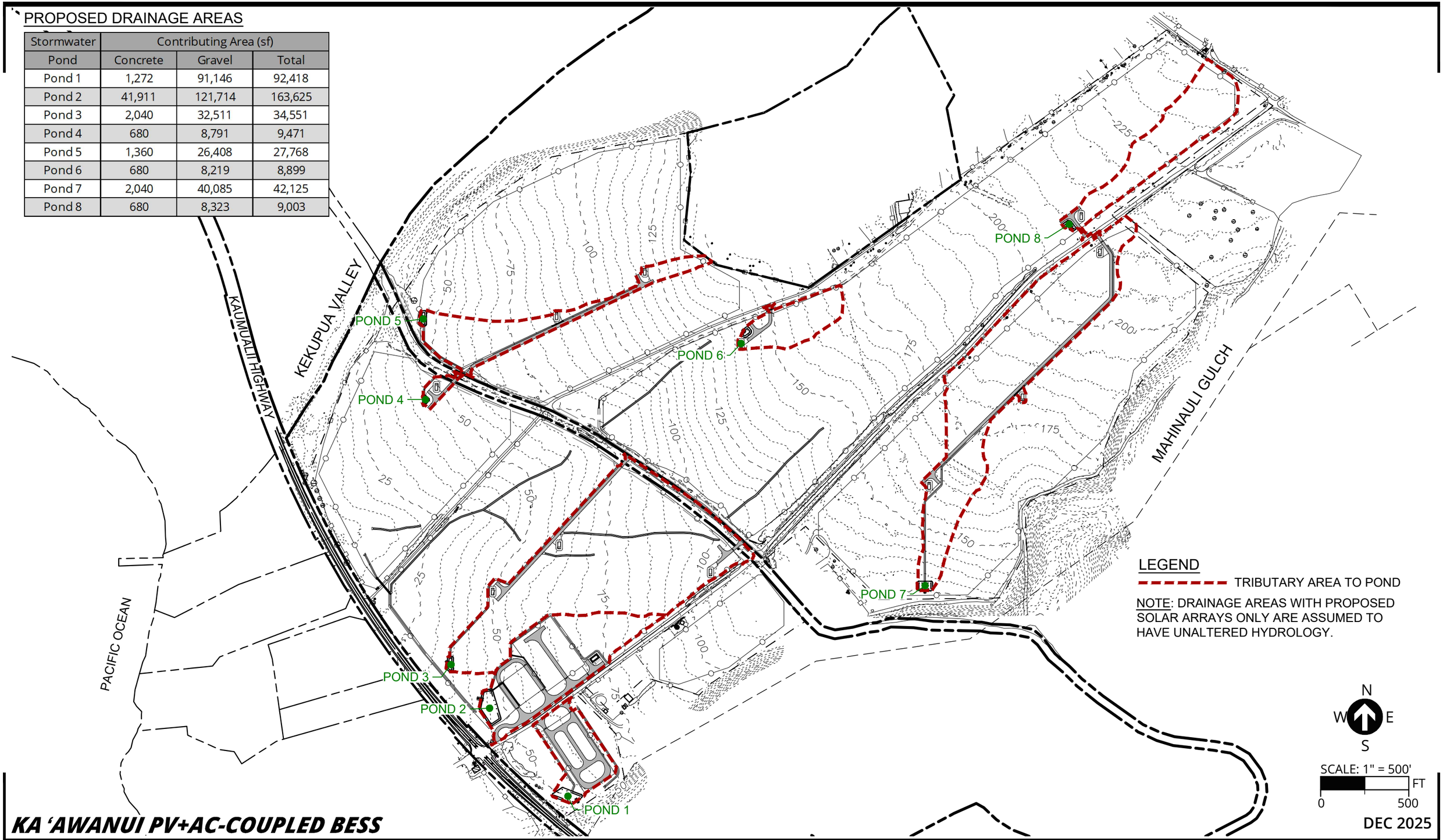
PROJ NUM: 25001
DES: TEG
DWN: TEG
CHK: ARD, AJM
APV:
DATE: 08/19/2025
SCALE AT 24" x 36":
30% DESIGN

SHEET NO: C904 REV:

Proposed Conditions Exhibit

PROPOSED DRAINAGE AREAS

Stormwater	Contributing Area (sf)		
Pond	Concrete	Gravel	Total
Pond 1	1,272	91,146	92,418
Pond 2	41,911	121,714	163,625
Pond 3	2,040	32,511	34,551
Pond 4	680	8,791	9,471
Pond 5	1,360	26,408	27,768
Pond 6	680	8,219	8,899
Pond 7	2,040	40,085	42,125
Pond 8	680	8,323	9,003



LEGEND

TRIBUTARY AREA TO POND

NOTE: DRAINAGE AREAS WITH PROPOSED SOLAR ARRAYS ONLY ARE ASSUMED TO HAVE UNALTERED HYDROLOGY.

N
W E
S

SCALE: 1" = 500'
0 500 FT

DEC 2025

KA 'AWANUI PV+AC-COUPLED BESS

KAAWANUI SOLAR, LLC

PROPOSED CONDITIONS EXHIBIT
1 of 3

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PROPOSED DRAINAGE AREAS

Stormwater	Contributing Area (sf)		
Pond	Concrete	Gravel	Total
Pond 1	1,272	91,146	92,418
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Pond 4	680	8,791	9,471
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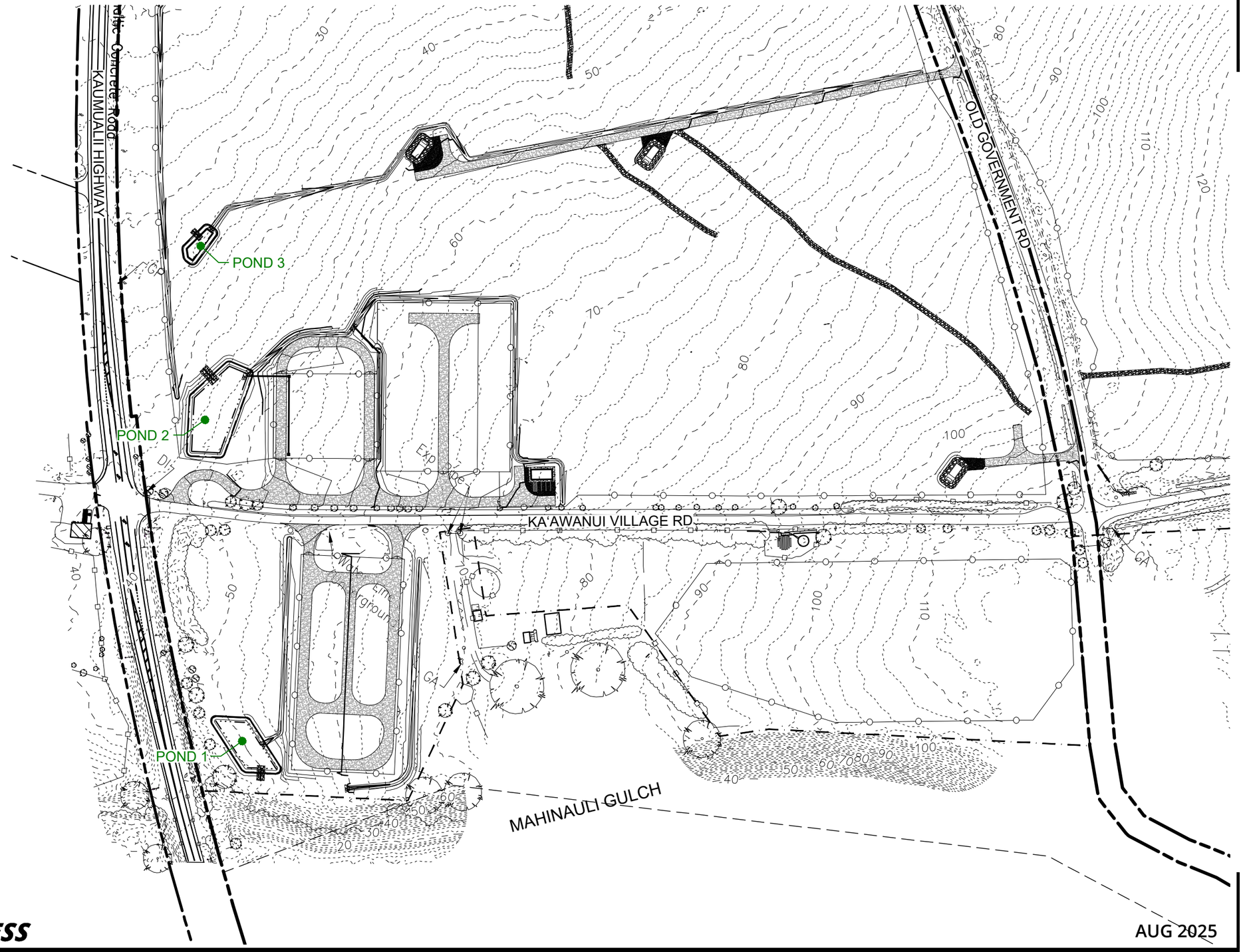
Pond 6	680	8,219	8,899
Pond 7	2,040	40,085	42,125
Pond 8	680	8,323	9,003

POND DIMENSIONS

	Pond 1	
Depth	Area	Volume
ft	sf	cf
0	5376	0
1	6425	5901
2	7529	12878
3	8691	20988

	Pond 2	
Depth	Area	Volume
ft	sf	cf
0	11714	0
1	13130	12422
2	14603	26289
3	16132	41656

	Pond 3	
Depth	Area	Volume
ft	sf	cf
0	1363	0
1	1913	1638
2	2518	3854
3	3180	6703



SCALE: 1" = 200'

0 200 FT

KA 'AWANUI PV+AC-COUPLED BESS

AUG 2025

KAAWANUI SOLAR, LLC

PROPOSED CONDITIONS EXHIBIT
Sheet 2 of 3

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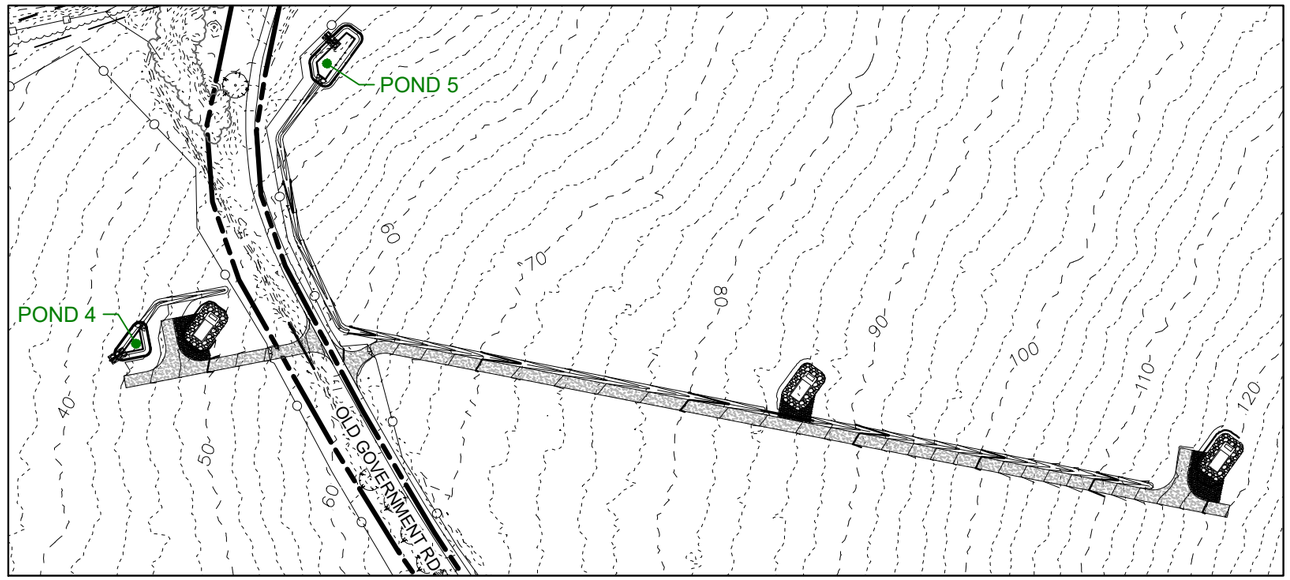
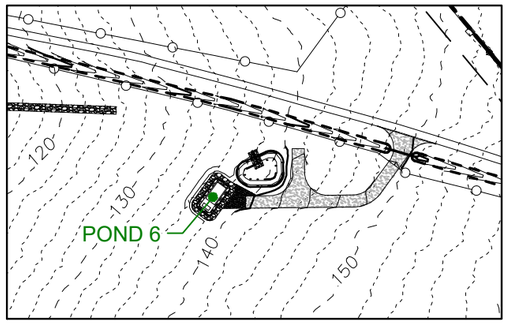


POND 4 & 5 LOCATIONS
SCALE: 1" = 200'



POND 6 LOCATION
SCALE: 1" = 200'

PROPOSED DRAINAGE AREAS

Stormwater	Contributing Area (sf)		
Pond	Concrete	Gravel	Total
Pond 1	1,272	91,146	92,418
Pond 2	41,911	121,714	163,625
Pond 3	2,040	32,511	34,551
Pond 4	680	8,791	9,471
Pond 5	1,360	26,408	27,768
Pond 6	680	8,219	8,899
Pond 7	2,040	40,085	42,125
Pond 8	680	8,323	9,003

POND DIMENSIONS

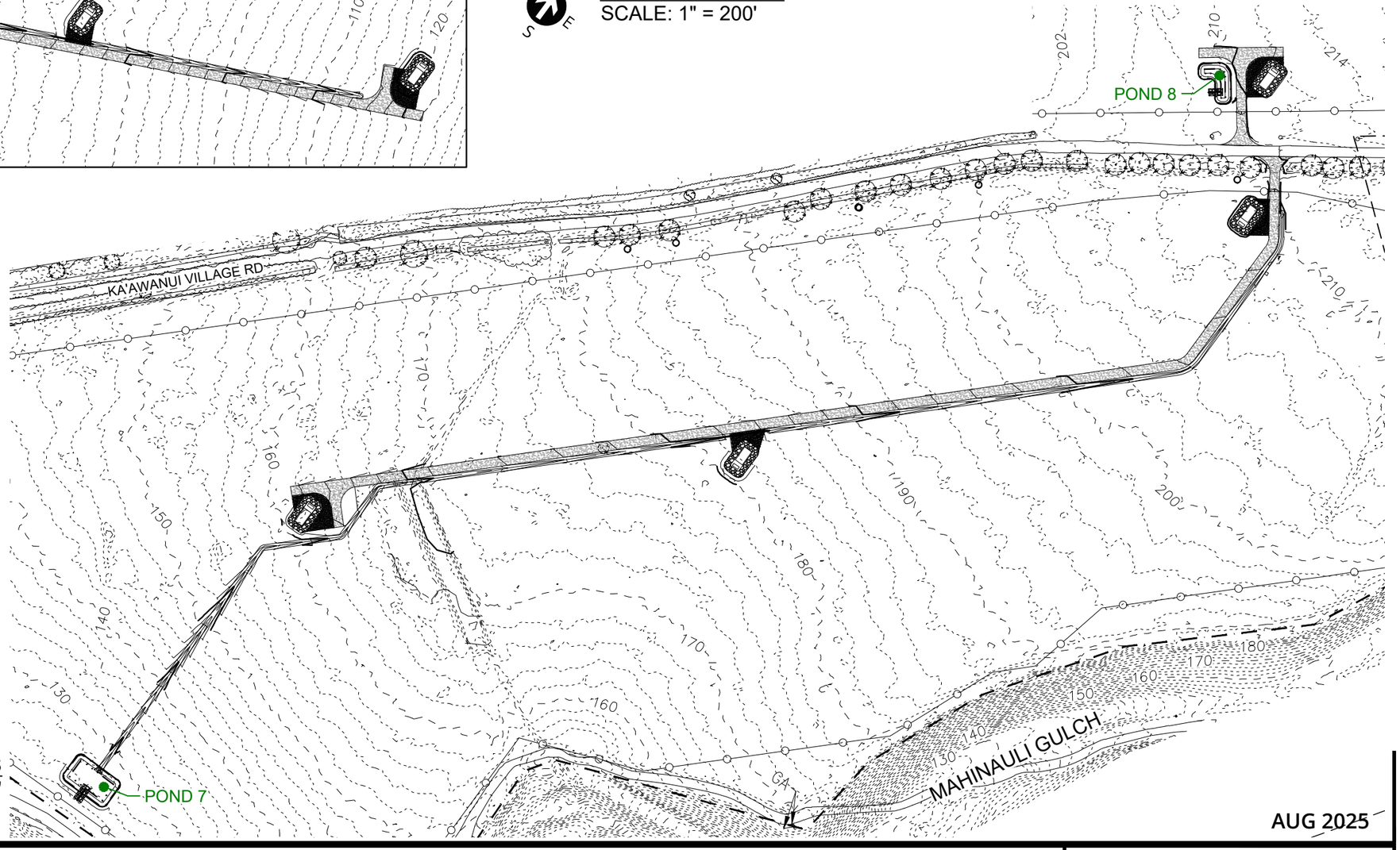
	Pond 4	
Depth	Area	Volume
ft	sf	cf
0	377	0
1	687	532
2	1053	1402
3	1476	2667

	Pond 7	
Depth	Area	Volume
ft	sf	cf
0	2244	0
1	2878	2561
2	3569	5785
3	4316	9727

	Pond 5	
Depth	Area	Volume
ft	sf	cf
0	1166	0
1	1682	1424
2	2253	3392
3	2282	5659

	Pond 8	
Depth	Area	Volume
ft	sf	cf
0	571	0
1	1056	814
2	1598	2141
3	2196	4038

	Pond 6	
Depth	Area	Volume
ft	sf	cf
0	839	0
1	1214	1027
2	1643	2455
3	2132	4343



POND 7 & 8 LOCATIONS
SCALE: 1" = 200'

KA 'AWANUI PV+AC-COUPLED BESS

AUG 2025

KAAWANUI SOLAR, LLC

PROPOSED CONDITIONS EXHIBIT
Sheet 3 of 3

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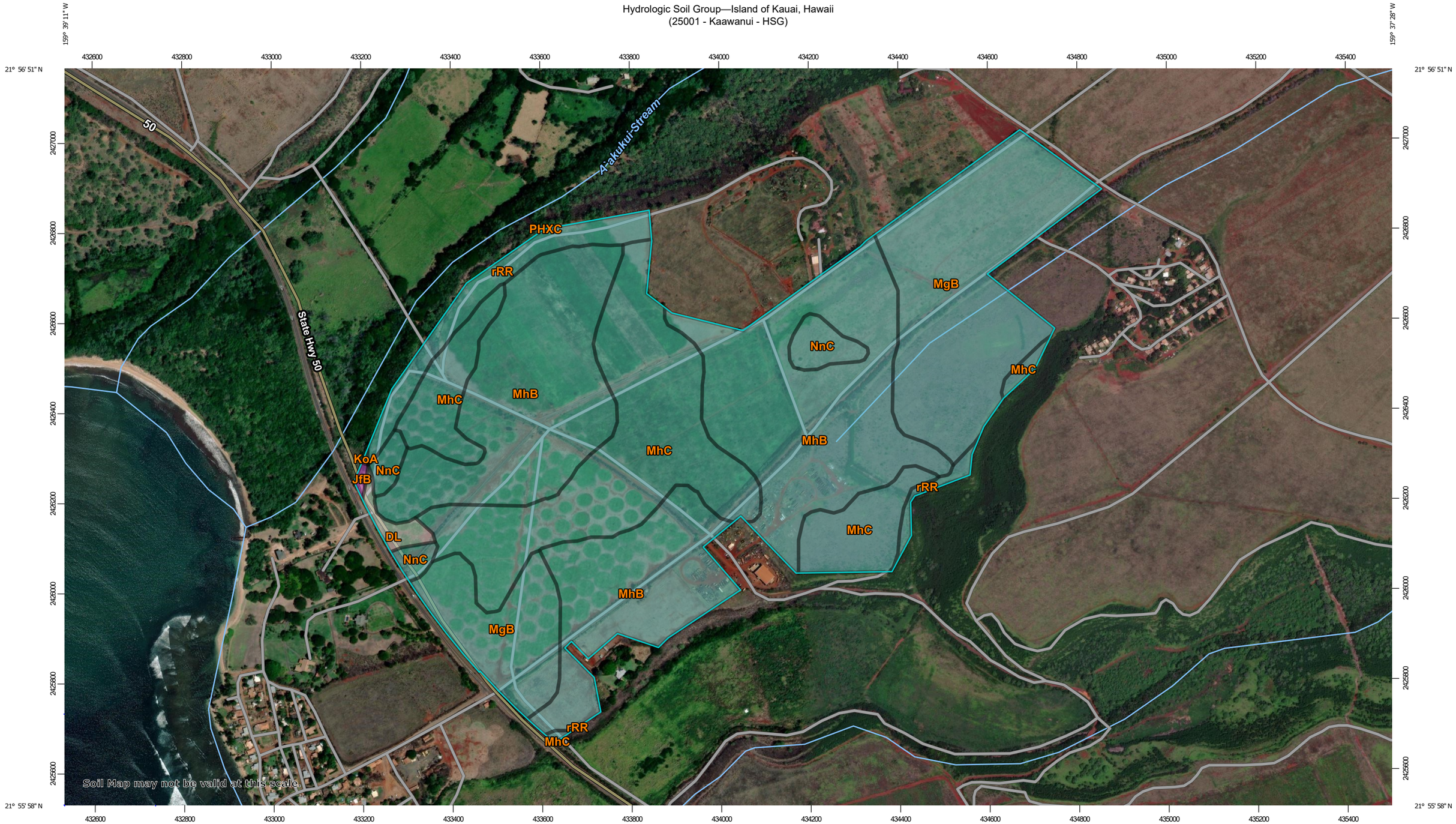
Hydrologic Soil Group

Hydrologic Soil Group—Island of Kauai, Hawaii
(25001 - Kaawanui - HSG)



Map Scale: 1:8,000 if printed on B landscape (17" x 11") sheet.

N

Meters: 0 100 200 400 600

Feet: 0 350 700 1400 2100

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 4N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Island of Kauai, Hawaii
Survey Area Data: Version 19, Sep 11, 2024

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jan 29, 2017—Oct 11, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
DL	Dune land		2.1	0.8%
JfB	Jaucas loamy fine sand, 0 to 8 percent slopes	A	0.3	0.1%
KoA	Kekaha silty clay, 0 to 2 percent slopes	C	0.1	0.0%
MgB	Makaweli silty clay loam, 0 to 6 percent slopes, MLRA 158	C	63.4	23.5%
MhB	Makaweli stony silty clay loam, 0 to 6 percent slopes	C	119.8	44.5%
MhC	Makaweli stony silty clay loam, 6 to 12 percent slopes	C	65.2	24.2%
NnC	Nonopahu clay, 2 to 10 percent slopes	C	6.5	2.4%
PHXC	Pakala extremely stony sandy clay loam, 0 to 12 percent slopes, MLRA 158	B	0.0	0.0%
rRR	Rough broken land	C	11.8	4.4%
Totals for Area of Interest			**269.2**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Curve Numbers

Table 2-2a Runoff curve numbers for urban areas [1/]

Cover description: Cover type and hydrologic condition	Average percent impervious area [2/]	Curve numbers for hydrologic soil group: A	B	C	D
Fully developed urban areas (vegetation established)					
Open space (lawns, parks, golf courses, cemeteries, etc.) [3/]:					
Poor condition (grass cover < 50%)		68	79	86	89
Fair condition (grass cover 50% to 75%)		49	69	79	84
Good condition (grass cover > 75%)		39	61	74	80
Impervious areas:					
Paved parking lots, roofs, driveways, etc. (excluding right-of-way)		98	98	98	98
Streets and roads:					
Paved; curbs and storm sewers (excluding right-of-way)		98	98	98	98
Paved; open ditches (including right-of-way)		83	89	92	93
Gravel (including right-of-way)		76	85	89	91
Dirt (including right-of-way)		72	82	87	89
Western desert urban areas:					
Natural desert landscaping (pervious areas only) [4/]		63	77	85	88
Artificial desert landscaping (impervious weed barrier, desert shrub with 1- to 2-inch sand or gravel mulch and basin borders)		96	96	96	96
Urban districts:					
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential districts by average lot size:					
1/8 acre or less (town houses)	65	77	85	90	92
1/4 acre	38	61	75	83	87
1/3 acre	30	57	72	81	86
1/2 acre	25	54	70	80	85
1 acre	20	51	68	79	84
2 acres	12	46	65	77	82
Developing urban areas					
Newly graded areas (pervious areas only, no vegetation) [5/]		77	86	91	94
Idle lands (CN's are determined using cover types similar to those in table 2-2c).					

[1] Average runoff condition, and $I_a = 0.2S$.

[2] The average percent impervious area shown was used to develop the composite CN's. Other assumptions are as follows: impervious areas are directly connected to the drainage system, impervious areas have a CN of 98, and pervious areas are considered equivalent to open space in good hydrologic condition. CN's for other combinations of conditions may be computed using figure 2-3 or 2-4.

[3] CN's shown are equivalent to those of pasture. Composite CN's may be computed for other combinations of open space cover type.

[4] Composite CN's for natural desert landscaping should be computed using figures 2-3 or 2-4 based on the impervious area percentage (CN = 98) and the pervious area CN. The pervious area CN's are assumed equivalent to desert shrub in poor hydrologic condition.

[5] Composite CN's to use for the design of temporary measures during grading and construction should be computed using figure 2-3 or 2-4 based on the degree of development (impervious area percentage) and the CN's for the newly graded pervious areas.

Table 2-2c Runoff curve numbers for other agricultural lands [1/]

Cover description		Curve numbers for hydrologic soil group			
Cover type	Hydrologic condition	A	B	C	D
Pasture, grassland, or range—continuous forage for grazing. [2/]	Poor	68	79	86	89
	Fair	49	69	79	84
	Good	39	61	74	80
Meadow—continuous grass, protected from grazing and generally mowed for hay.	—	30	58	71	78
Brush—brush-weed-grass mixture with brush the major element. [3/]	Poor	48	67	77	83
	Fair	35	56	70	77
	Good	30 [4/]	48	65	73
Woods—grass combination (orchard or tree farm). [5/]	Poor	57	73	82	86
	Fair	43	65	76	82
	Good	32	58	72	79
Woods. [6/]	Poor	45	66	77	83
	Fair	36	60	73	79
	Good	30 [4/]	55	70	77
Farmsteads—buildings, lanes, driveways, and surrounding lots.	—	59	74	82	86

1 Average runoff condition, and $I_a = 0.2S$.

2 *Poor:* <50%) ground cover or heavily grazed with no mulch.
Fair: 50 to 75% ground cover and not heavily grazed.
Good: > 75% ground cover and lightly or only occasionally grazed.

3 *Poor:* <50% ground cover.
Fair: 50 to 75% ground cover.
Good: >75% ground cover.

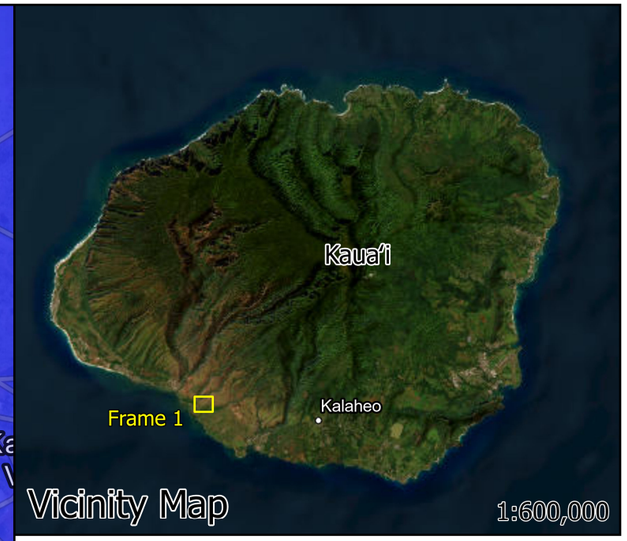
4 Actual curve number is less than 30; use CN = 30 for runoff computations.

5 CN's shown were computed for areas with 50% woods and 50% grass (pasture) cover. Other combinations of conditions may be computed from the CN's for woods and pasture.

6 *Poor:* Forest litter, small trees, and brush are destroyed by heavy grazing or regular burning.
Fair: Woods are grazed but not burned, and some forest litter covers the soil.
Good: Woods are protected from grazing, and litter and brush adequately cover the soil.

NOAA Precipitation Map





Legend

Project Site

2-yr, 24-hr Precip (in), NOAA Atlas 14

4.145

3.977

Resource Mapping Hawaii, Maxar, Earthstar Geographics, Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community

Kaʻawanui PV+AC-Coupled BESS

NOAA Precipitation Map

Civil Engineering | Water Resources
Community Planning

100-yr Velocity Map

From 2D Analysis results from
"Hydrology & Hydraulic Report for AES Ka'awanui Solar + BESS"
(3J Consulting, February 2025)

BC 1
BC 2
BC 3
BC 4
BC 5
BC 6
Makaweli
Mahinauli Gulch
Kaumu
Frame 1



Legend

- Project Site
- Boundary Conditions (BC) Lines
- 5-ft Contours

100-yr Velocity (fps)

0 - 1 | 1 - 2 | 2 - 3 | 3 - 4 | 4 - 5 | > 5

N

0 250 500 1,000 1,500 2,000 ft

Resource Mapping Hawaii, Maxar, Earthstar Geographics, Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community

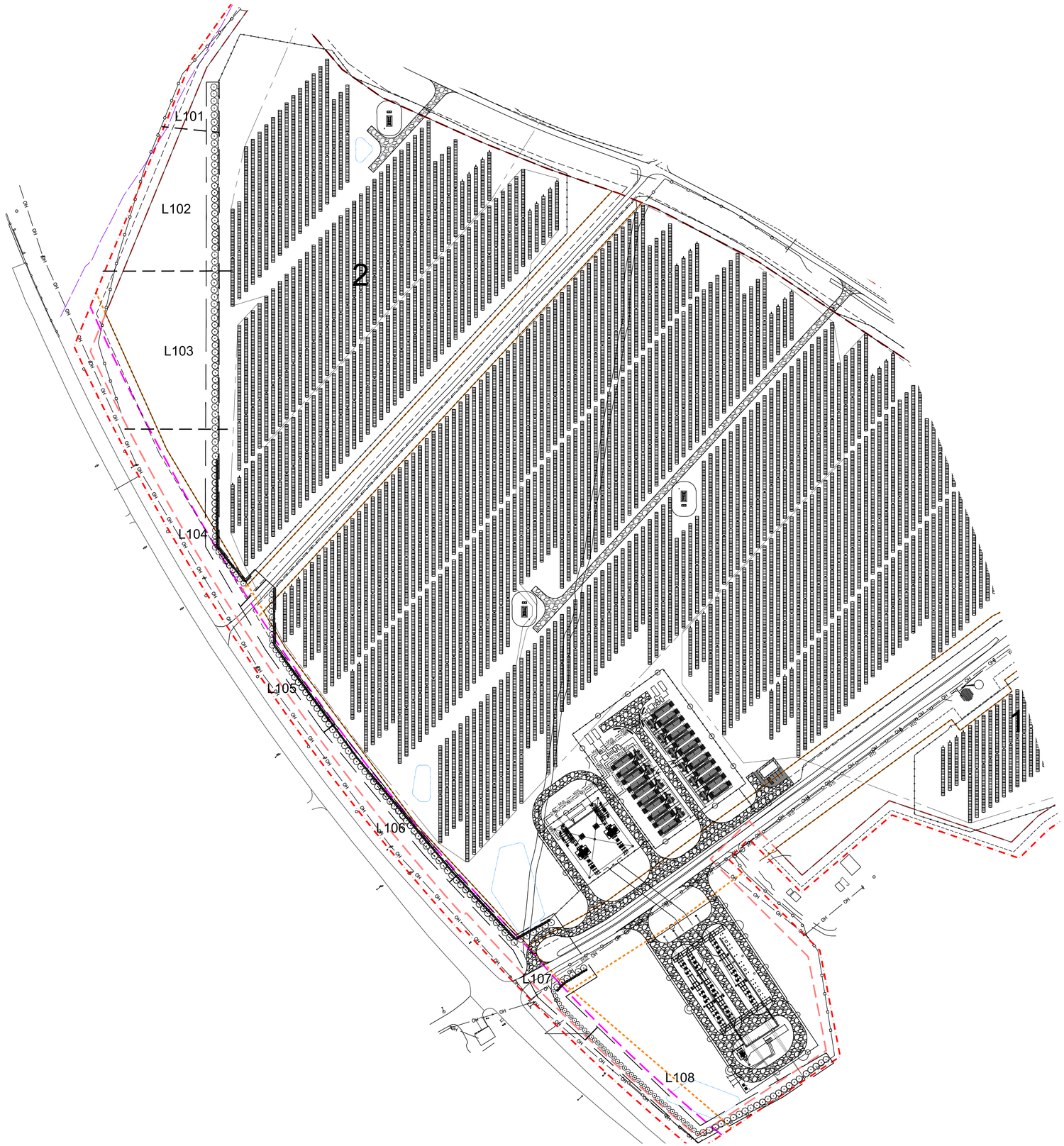
AES Kaawanui Solar + BESS

Hydraulic Results Maps - Project Site

Civil Engineering | Water Resources
Community Planning

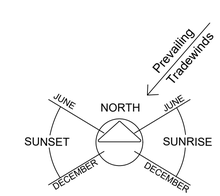
Exhibit H

Landscape Draft Plan Set



PLANT MATERIAL SYMBOL REFERENCE LEGEND

- ALAHE'E
  PSYDRAX ODORATA
  (INDIGENOUS) - 15 GAL.
- KOKI'O KE'OKE'O
  HIBISCUS ARNOTTIANUS
  (ENDEMIC) -15 GAL.
- KOU
  CORDIA SUBCORDATA
  (INDIGENOUS) - 15 GAL.
- MILO
  THESPESIA POPULNEA
  (INDIGENOUS) - 15 GAL.
- 'A'ALI'I
  DODONAEA VISCOSA
  (INDIGENOUS) - 3 GAL.
- KULU'I
  NOTOTRICHIUM SANDWICENSE
  (ENDEMIC) - 3 GAL.



0 60' 120' 240'
Scale: 1" = 120' - 0"

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DESIGN CORPORATION
CASSANDRO
po box 1105, kailua, hi 96734
tel: 808.254.8702

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2180 South 1300 East, Suite 600
Salt Lake City, UT 84106-2749
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HAWAII, U.S.A.

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PROJECT TITLE

KAAWANUI SOLAR, LLC

KAUAI COUNTY, MAKAWELI, HI

TMKS: (4) 1-7-006:006 POR. AND 010 POR.)

DATE: 15 SEPTEMBER 2025
SCALE: AS NOTED
JOB NO.: 2025-220
REVISION:

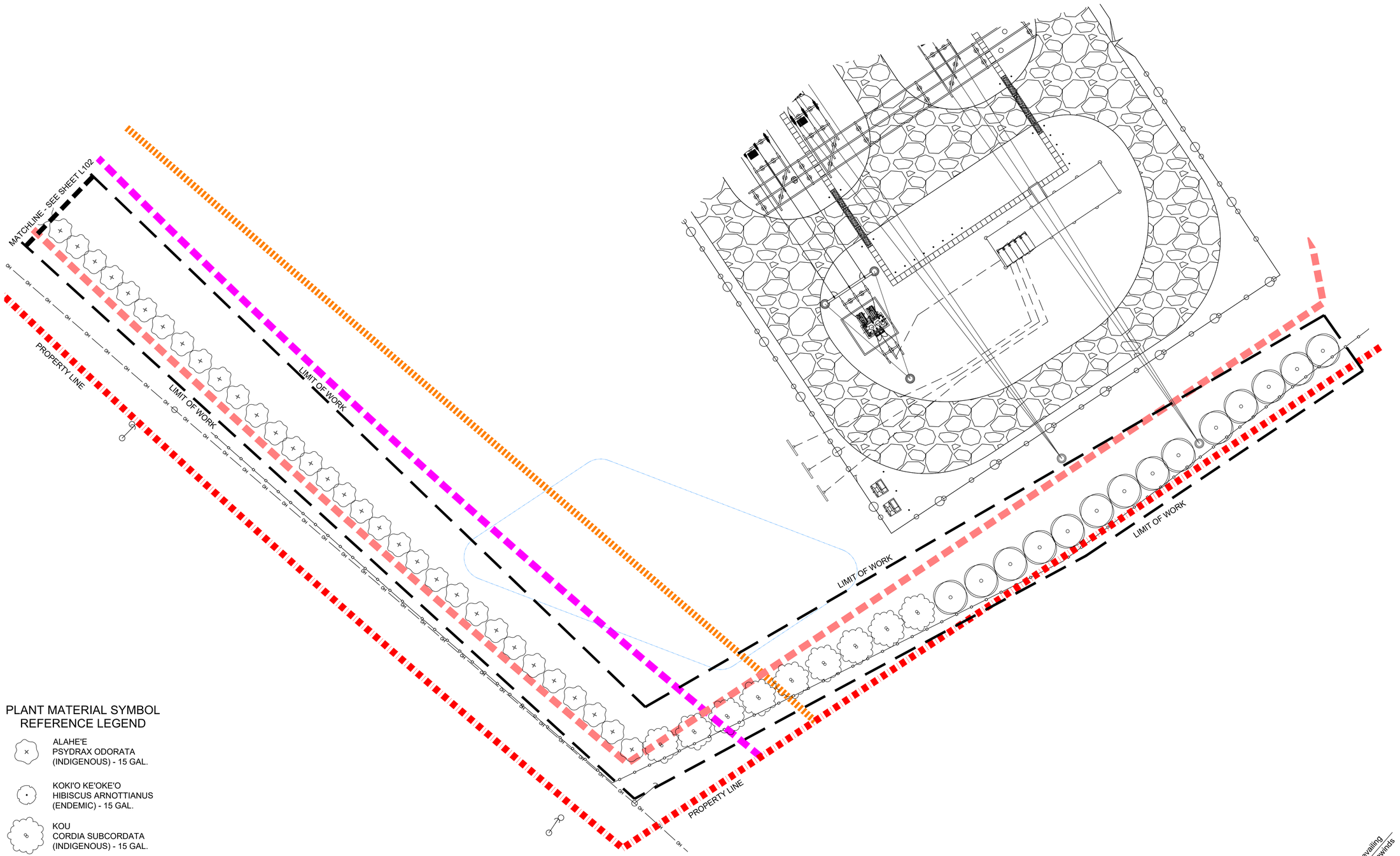
SHEET TITLE

Preliminary Landscape Overall Site Plan

SHEET NUMBER

L100

OF SHEETS



PLANT MATERIAL SYMBOL REFERENCE LEGEND

- ALAHE'E
  PSYDRAX ODORATA
  (INDIGENOUS) - 15 GAL.
- KOKI'O KE'OKE'O
  HIBISCUS ARNOTTIANUS
  (ENDEMIC) - 15 GAL.
- KOU
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  (INDIGENOUS) - 15 GAL.
- MILO
  THESPESIA POPULNEA
  (INDIGENOUS) - 15 GAL.
- 'A'ALI'I
  DODONAEA VISCOSA
  (INDIGENOUS) - 3 GAL.
- KULU'I
  NOTOTRICHIUM SANDWICENSE
  (ENDEMIC) - 3 GAL.

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PROJECT TITLE

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KAUAI COUNTY, MAKAWELI, HI

TMKS: (4) 1-7-006:006 POR. AND 010 POR.)

DATE: 15 SEPTEMBER 2025
SCALE: AS NOTED
JOB NO: 2025-226
REVISION:

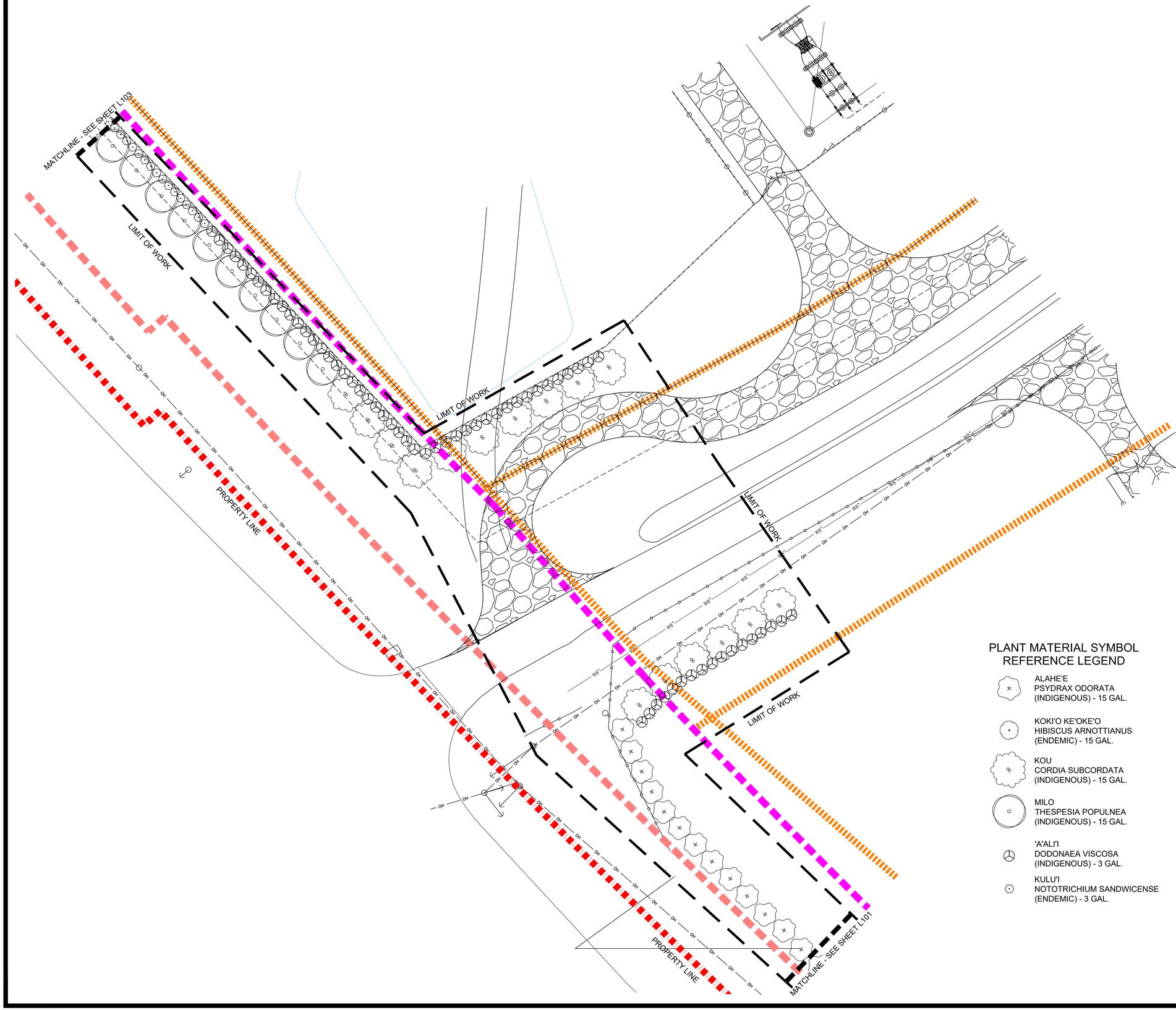
SHEET TITLE

Preliminary Landscape Site Plan

SHEET NUMBER

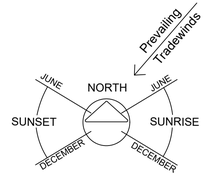
L101

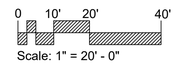
OF SHEETS



PLANT MATERIAL SYMBOL REFERENCE LEGEND

- ALAHE'E
  PSYDRAX ODORATA
  (INDIGENOUS) - 15 GAL.
- KOKI'O KE'OKE'O
  HIBISCUS ARNOTTIANUS
  (ENDEMIC) - 15 GAL.
- KOU
  CORDIA SUBCORDATA
  (INDIGENOUS) - 15 GAL.
- MILO
  THESPESIA POPULNEA
  (INDIGENOUS) - 15 GAL.
- 'A'ALI'I
  DODONAEA VISCOSA
  (INDIGENOUS) - 3 GAL.
- KULU'I
  NOTOTRICHIUM SANDWICENSE
  (ENDEMIC) - 3 GAL.





Scale: 1" = 20' - 0"

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PROJECT TITLE

KAAWANUI SOLAR, LLC
KAUAI COUNTY, MAKAWELI, HI

TMKS: (4) 1-7-006:006 POR. AND 010 POR.)

DATE:	15 SEPTMEBER 2025
SCALE:	AS NOTED
JOB NO:	2025-220
REVISION	

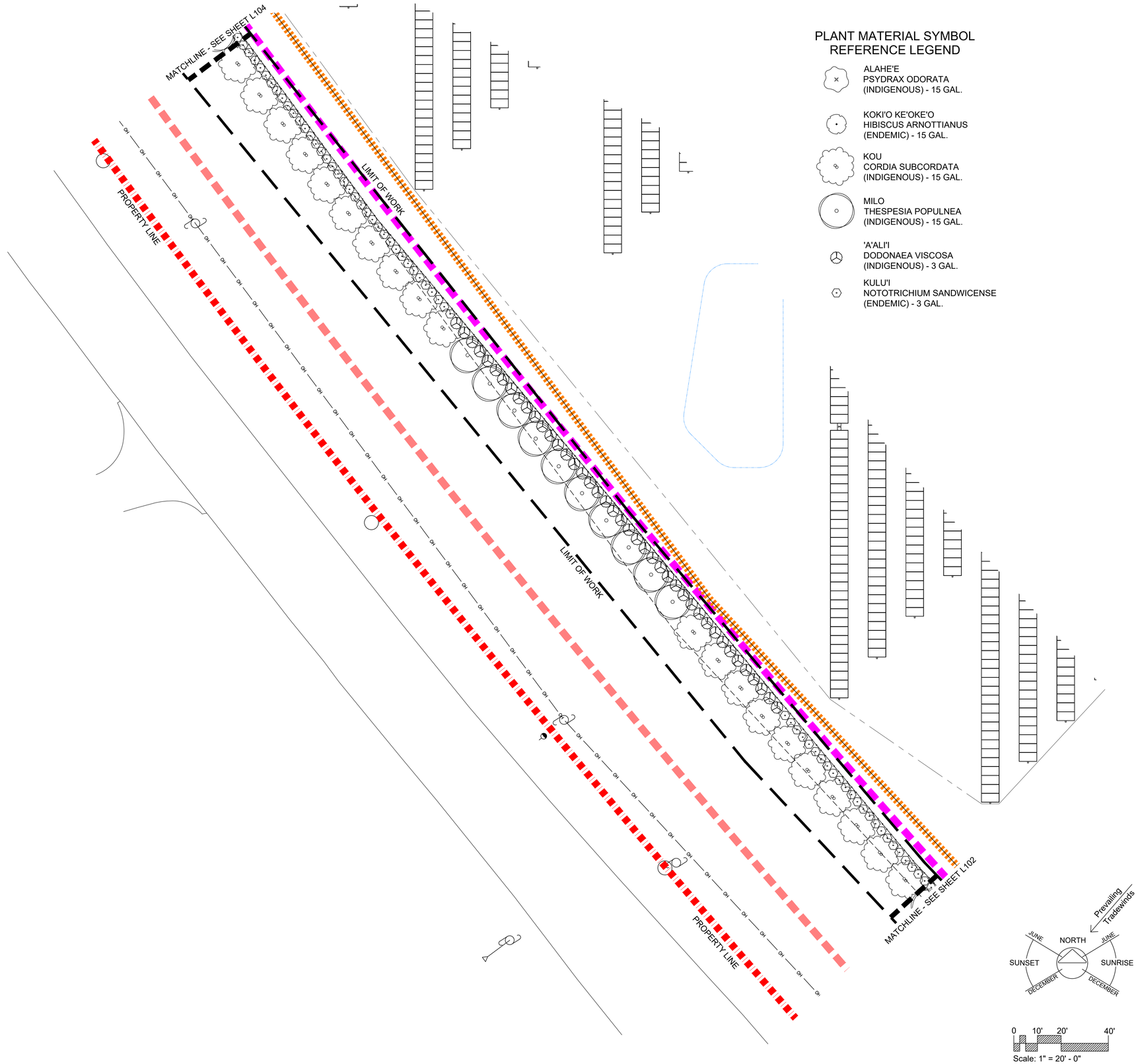
SHEET TITLE

Preliminary Landscape
Site Plan

SHEET NUMBER

L102

OF SHEETS



PLANT MATERIAL SYMBOL REFERENCE LEGEND

ALAHE'E
PSYDRAX ODORATA
(INDIGENOUS) - 15 GAL.

KOKI'O KE'OKE'O
HIBISCUS ARNOTTIANUS
(ENDEMIC) - 15 GAL.

KOU
CORDIA SUBCORDATA
(INDIGENOUS) - 15 GAL.

MILO
THESPESIA POPULNEA
(INDIGENOUS) - 15 GAL.

'A'ALI'I
DODONAEA VISCOSA
(INDIGENOUS) - 3 GAL.

KULU'I
NOTOTRICHIUM SANDWICENSE
(ENDEMIC) - 3 GAL.

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CASSANDRO
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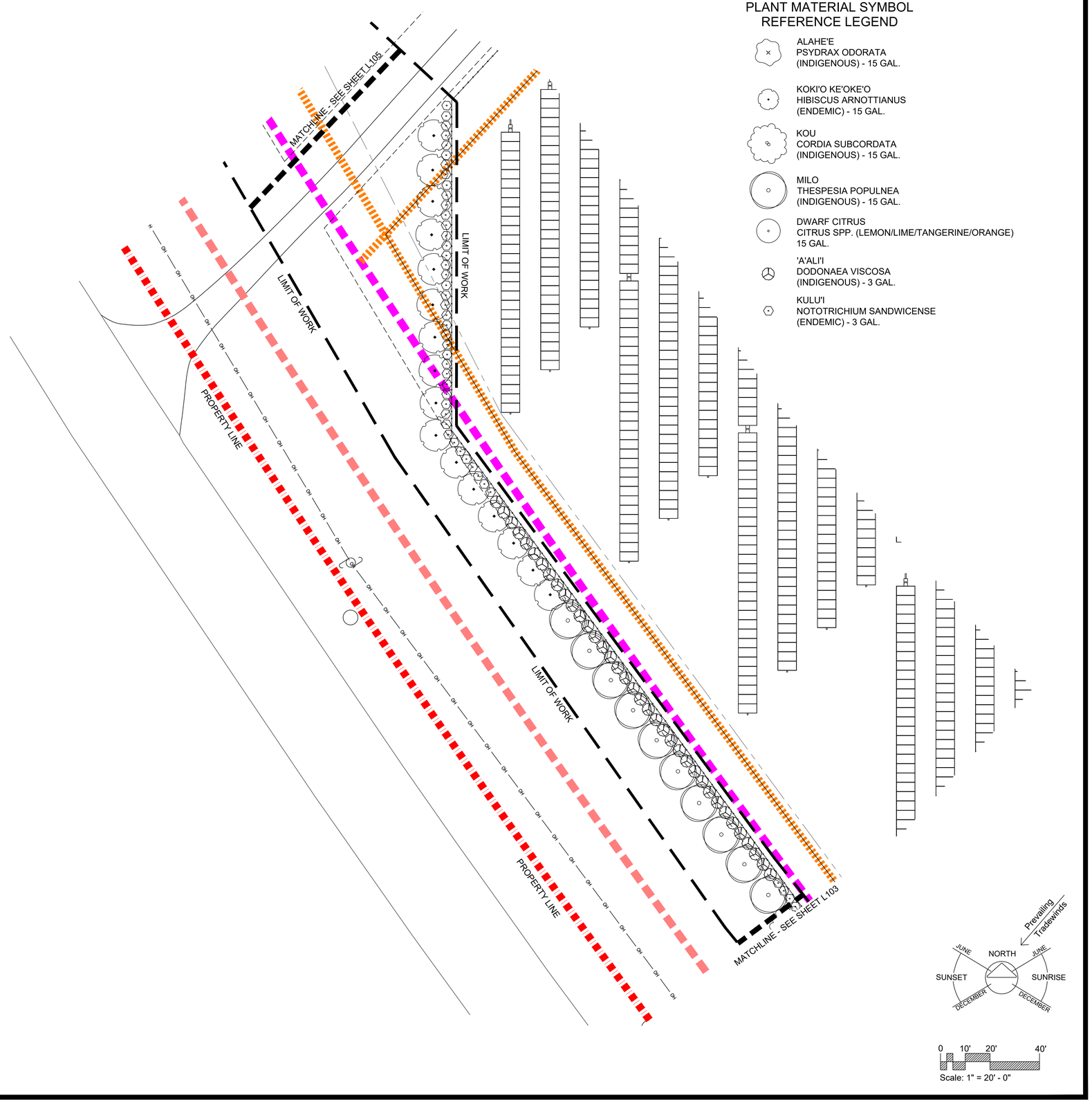
KAAWANUI SOLAR, LLC
KAUAI COUNTY, MAKAWELI, HI
TMKS: (4) 1-7-006:006 POR. AND 010 POR.)

DATE: 15 SEPTMEBER 2025
SCALE: AS NOTED
JOB NO.: 2025-220
REVISIONS:

SHEET TITLE
Preliminary Landscape Site Plan

SHEET NUMBER
L103

OF SHEETS



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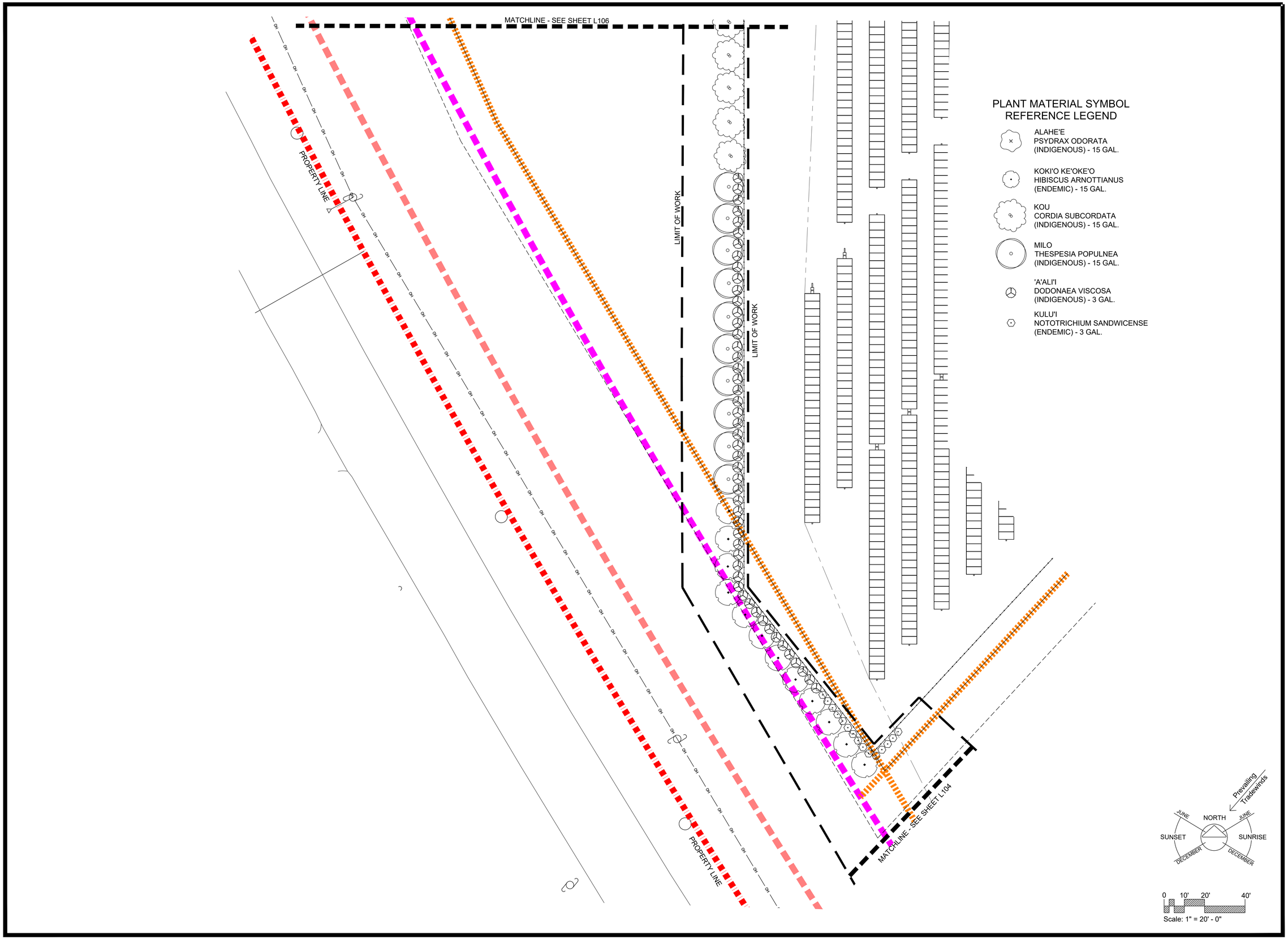
KAUAI COUNTY, MAKAWELI, HI
TMKS: (4) 1-7-006:006 POR. AND 010 POR.)

DATE: 15 SEPTMEMBER 2025
SCALE: AS NOTED
JOB NO: 2025-220
REVISION:

SHEET TITLE
Preliminary Landscape
Site Plan

SHEET NUMBER
L104

OF SHEETS



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KAUAI COUNTY, MAKAWELI, HI

TMKS: (4) 1-7-006:006 POR. AND 010 POR.)

DATE: 15 SEPTMEMBER 2025
SCALE: AS NOTED
JOB NO.: 2025-20
REVISION:

SHEET TITLE

Preliminary Landscape Site Plan

SHEET NUMBER

L105

OF SHEETS

MATCHLINE - SEE SHEET L107

PROPERTY LINE

LIMIT OF WORK

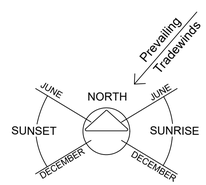
MATCHLINE - SEE SHEET L105

PROPERTY LINE

LIMIT OF WORK

PLANT MATERIAL SYMBOL REFERENCE LEGEND

- ALAHE'E
  PSYDRAX ODORATA
  (INDIGENOUS) - 15 GAL.
- KOKI'O KE'OKE'O
  HIBISCUS ARNOTTIANUS
  (ENDEMIC) - 15 GAL.
- KOU
  CORDIA SUBCORDATA
  (INDIGENOUS) - 15 GAL.
- MILO
  THESPESIA POPULNEA
  (INDIGENOUS) - 15 GAL.
- 'A'ALI'I
  DODONAEA VISCOSA
  (INDIGENOUS) - 3 GAL.
- KULU'I
  NOTOTRICHIUM SANDWICENSE
  (ENDEMIC) - 3 GAL.



0 10' 20' 40'

Scale: 1" = 20' - 0"

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TMKS: (4) 1-7-006:006 POR. AND 010 POR.)

DATE:	15 SEPTEMBER 2025
SCALE:	AS NOTED
JOB NO.:	2025-220
REVISION:	

SHEET TITLE

Preliminary Landscape Site Plan

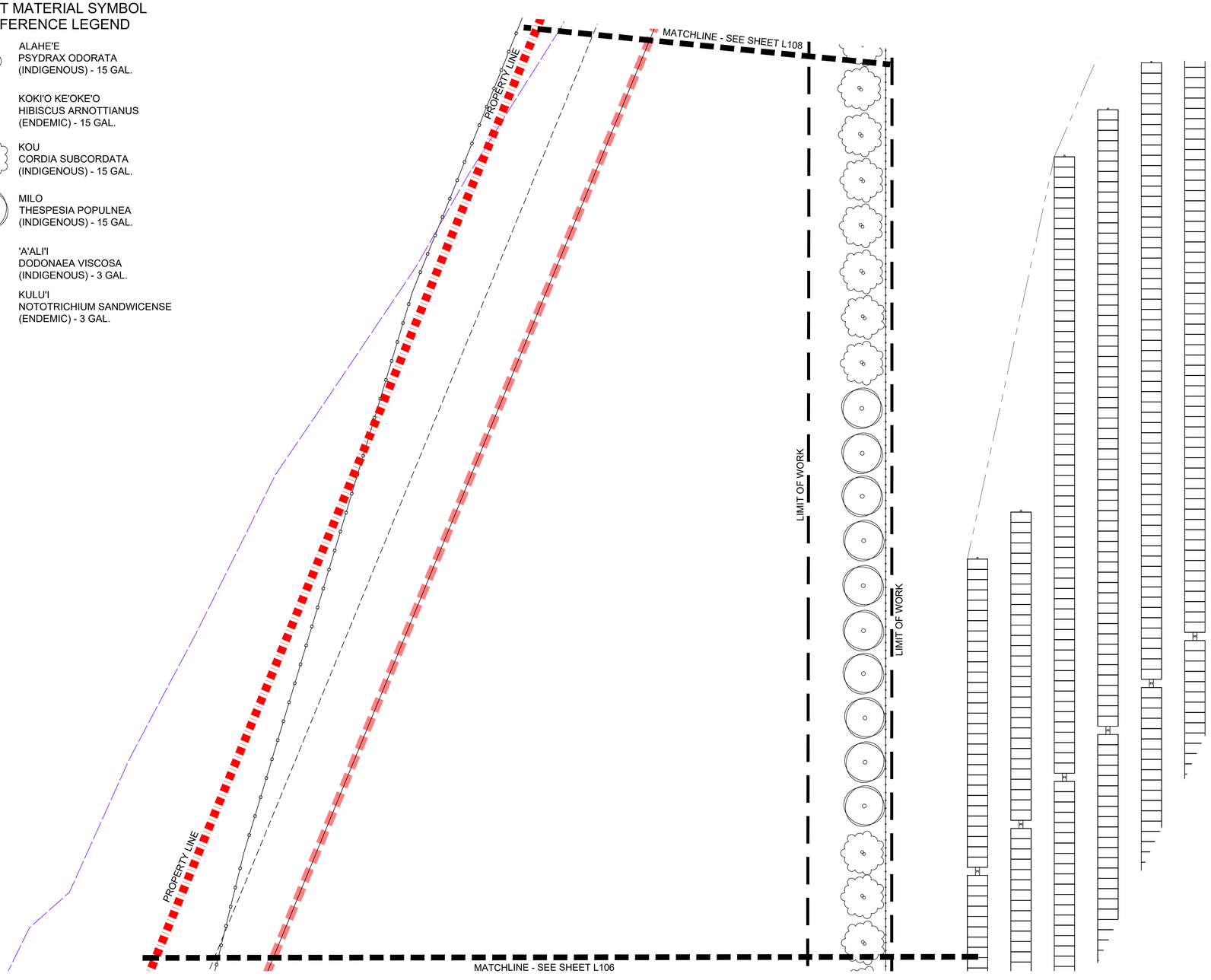
SHEET NUMBER

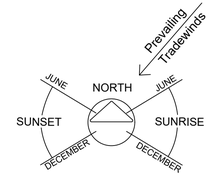
L106

OF SHEETS

PLANT MATERIAL SYMBOL REFERENCE LEGEND

- ALAHE'E
  PSYDRAX ODORATA
  (INDIGENOUS) - 15 GAL.
- KOKI'O KE'OKE'O
  HIBISCUS ARNOTTIANUS
  (ENDEMIC) - 15 GAL.
- KOU
  CORDIA SUBCORDATA
  (INDIGENOUS) - 15 GAL.
- MILO
  THESPESIA POPULNEA
  (INDIGENOUS) - 15 GAL.
- 'A'ALI'I
  DODONAEA VISCOSA
  (INDIGENOUS) - 3 GAL.
- KULU'I
  NOTOTRICHIUM SANDWICENSE
  (ENDEMIC) - 3 GAL.





0 10' 20' 40'

Scale: 1" = 20' - 0"

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KAUAI COUNTY, MAKAWELI, HI
TMKS: (4) 1-7-006:006 POR. AND 010 POR.)

DATE: 15 SEPTMEMBER 2025
SCALE: AS NOTED
JOB NO: 2025-220
REVISION:

SHEET TITLE
Preliminary Landscape Site Plan

SHEET NUMBER
L107

OF SHEETS

PLANT MATERIAL SYMBOL REFERENCE LEGEND

ALAHE'E
PSYDRAX ODORATA
(INDIGENOUS) - 15 GAL.

KOKI'O KE'OKE'O
HIBISCUS ARNOTTIANUS
(ENDEMIC) - 15 GAL.

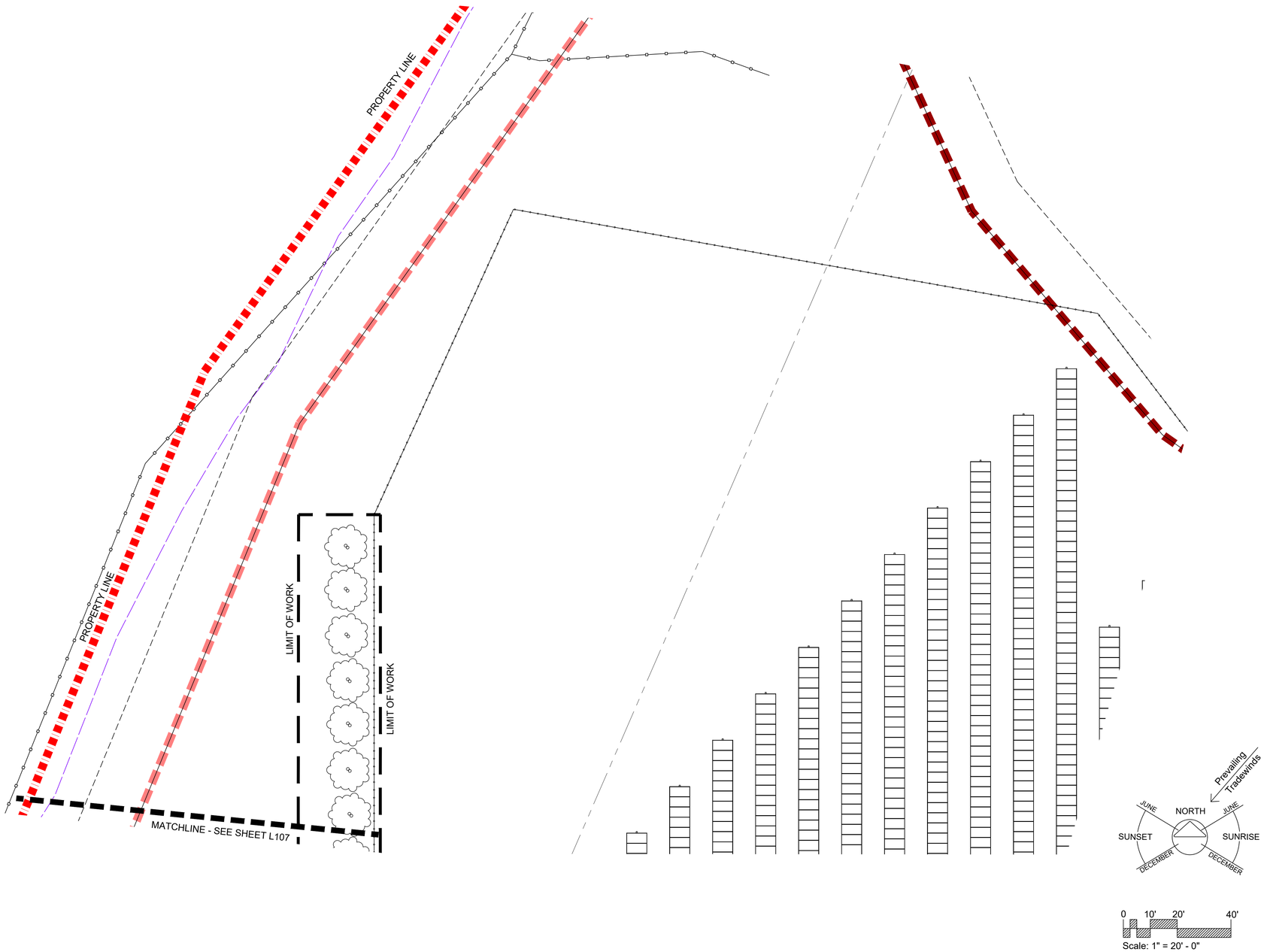
KOU
CORDIA SUBCORDATA
(INDIGENOUS) - 15 GAL.

MILO
THESPESIA POPULNEA
(INDIGENOUS) - 15 GAL.

DWARF CITRUS
CITRUS SPP. (LEMON/LIME/TANGERINE/ORANGE)
15 GAL.

'A'ALI'I
DODONAEA VISCOSA
(INDIGENOUS) - 3 GAL.

KULU'I
NOTOTRICHIUM SANDWICENSE
(ENDEMIC) - 3 GAL.



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PROJECT TITLE

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KAUAI COUNTY, MAKAWELI, HI

TMKS: (4) 1-7-006:006 POR. AND 010 POR.)

DATE: 15 SEPTMEMBER 2025
SCALE: AS NOTED
JOB NO.: 2025-220
REVISION:

SHEET TITLE

Preliminary Landscape Site Plan

SHEET NUMBER

L108

OF SHEETS

Exhibit I

Agriculture Plan



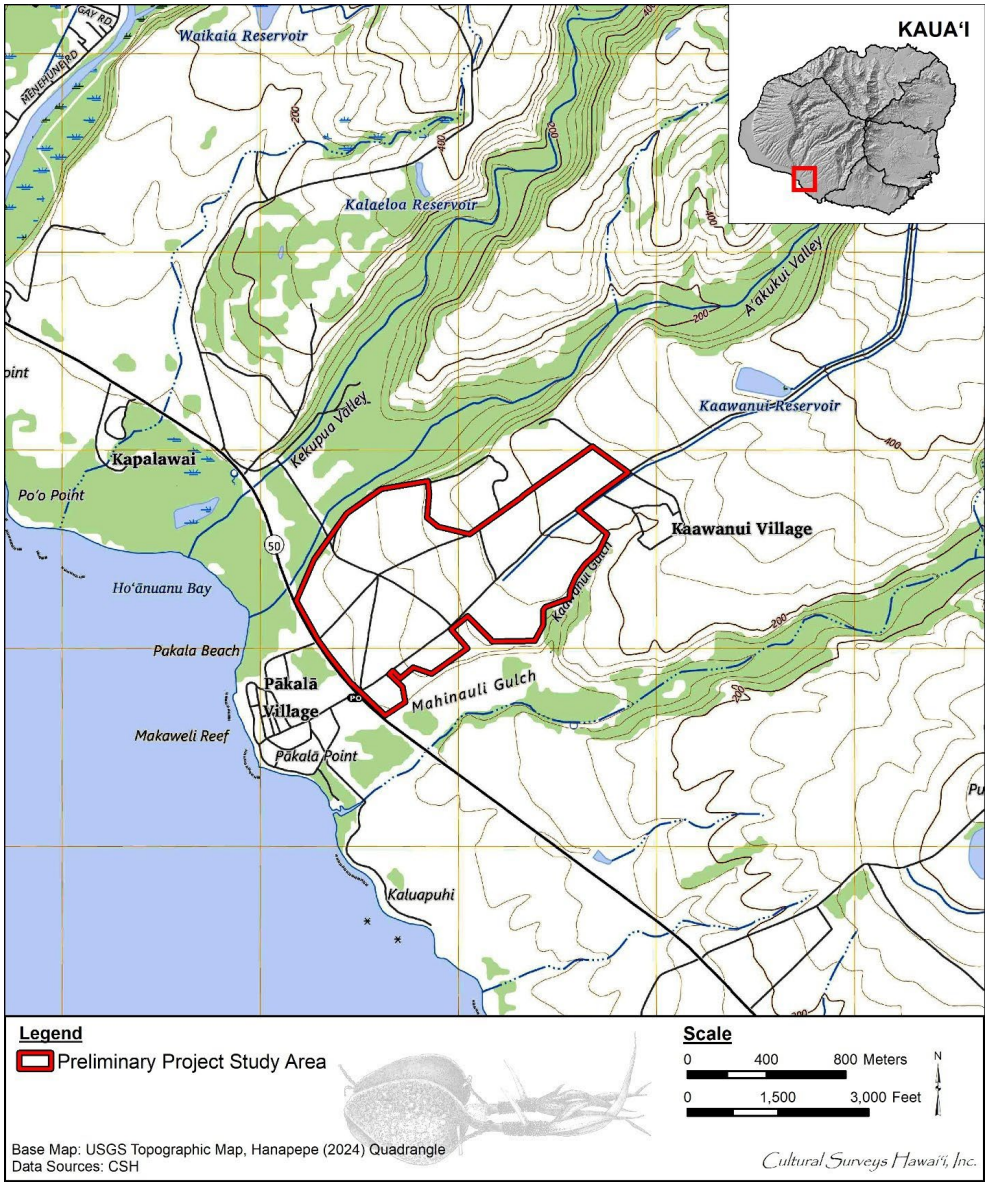


Compatible Agriculture Plan

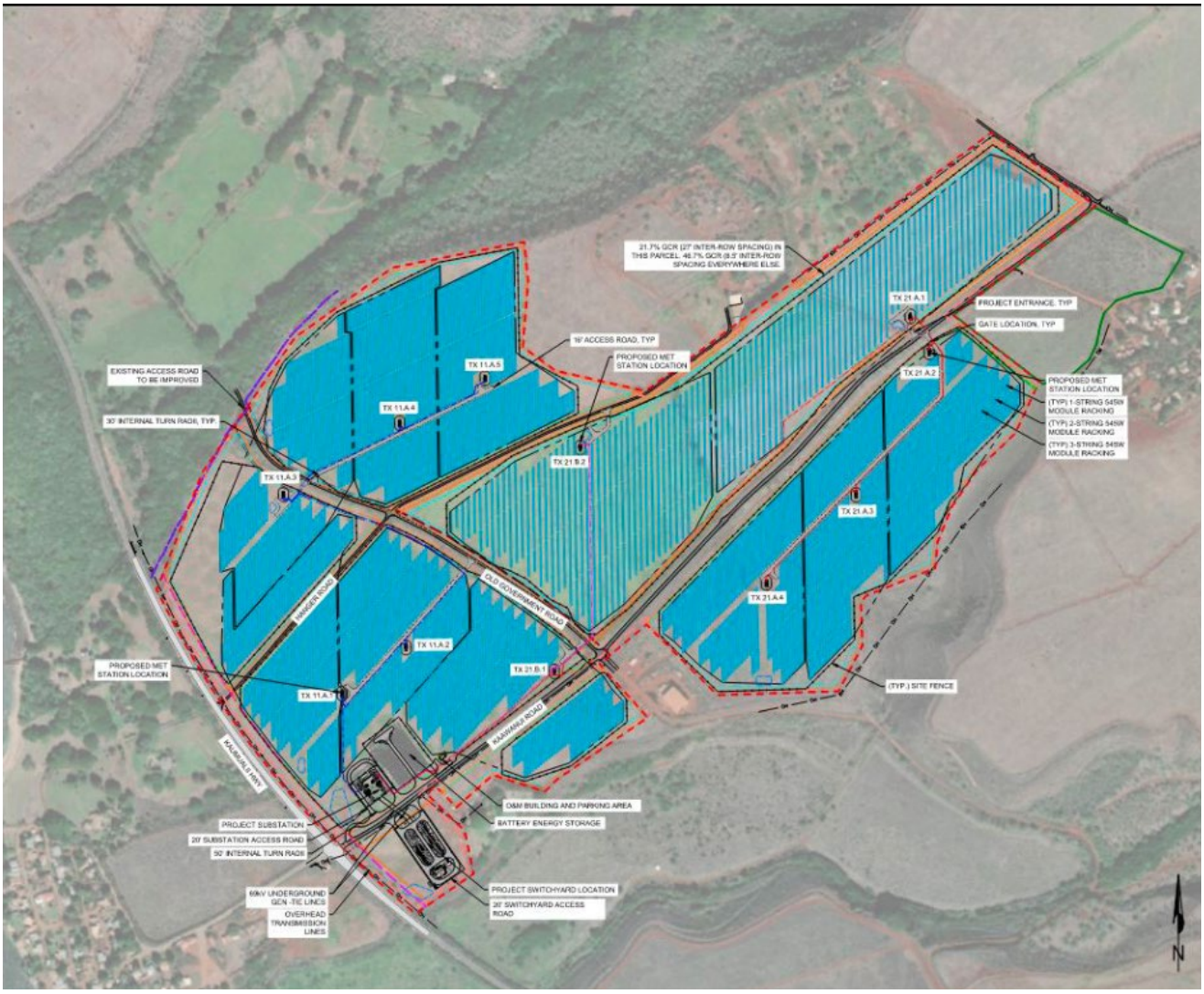
Kaawanui Solar, LLC

Solar Project Overview

Kaawanui Solar, LLC (AES) is proposing a 43-megawatt (MW) photovoltaic array paired with a 4-hour battery energy storage system (BESS) to be located on approximately 269 acres of land owned by Robinson Family Partners (RFP) and managed by Gay & Robinson, Inc. (G&R), in Makaweli, on the southwest coast of Kaua‘i. The Project Site, outlined in red below, is comprised of portions of TMKs (4) 1-7-006:006 and 010. It is bounded on the southwest by Kaumuali‘i Highway, on the southeast by Ka‘awanui Gulch, on the northwest by Kekupua Valley, and on the northeast by other agricultural parcels owned by RFP and managed by G&R.



The Project will be developed and operated by AES. It will deliver power at a low, fixed price to Kaua‘i Island Utility Cooperative’s (KIUC) island-wide electrical grid over a 25-year contract term. The Project will include the design and construction of a switchyard, named the “Kaawanui Substation,” which will allow the Project to connect to KIUC’s electrical grid. The Project is anticipated to enter commercial operation in 2028.



Current Project Design

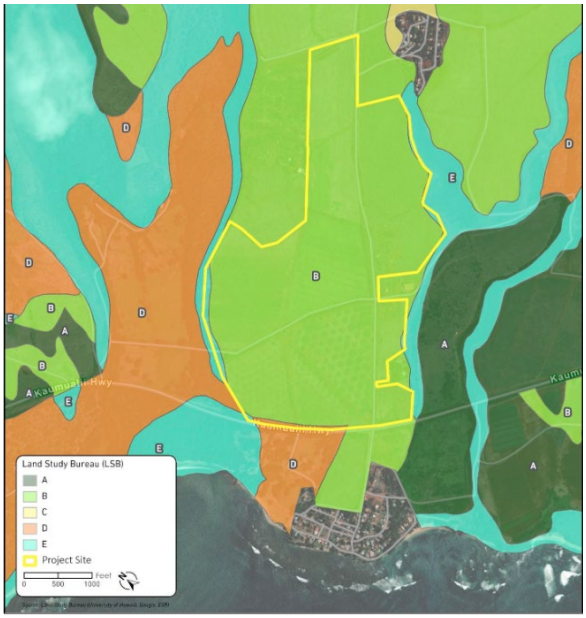
Food and Energy Security

Energy and food independence have been key drivers of Hawai‘i policy and development over the last 50 years. Since 2015, when Governor David Ige signed legislation making Hawai‘i the first state in the nation to commit to 100% renewable energy by 2045, competition has grown between the State’s agricultural and energy players. Because the islands have limited land area, ground-mounted solar arrays often overlap with farmland, prompting debates about whether land should be prioritized for food production or clean energy generation. Government agencies and commissions have started to inject influence where possible to ensure the highest and best use of land to serve the state’s residents.

Project Permitting Requirement

No federal permits or approvals are required to construct the Kaawanui Solar project, nor will it be funded by a federal agency. No Project development will occur in Waters of the United States (WOTUS), including wetlands, streams, and gulches. As such, no federal agency is involved, and the National Environmental Policy Act (NEPA) and associated federal requirements will not apply.

Pursuant to Hawai‘i Revised Statutes (HRS), § 205-2, agricultural districts “shall include” solar energy facilities, provided that they are sited on land with soil classified by the LSB as having an overall/master productivity rating class of B, C, D, or E. Further, the law requires solar facilities occupying more than 20 acres of land with an LBS class of B or C to obtain a State Special Permit (SSP). The Project would involve solar development on more than 20 acres of land with an LSB rating of B, so an SSP is required.



LSB Soil Classification Map in Project Area

The Hawai‘i State Special Permit (SSP) requirement for solar on agricultural lands stems from the 1960s Land Use Law, but its role has grown as solar development accelerated in the 2000s. Today, SSPs are the critical gatekeeping process determining whether large-scale solar farms can coexist with agricultural priorities, with the Land Use Commission playing a decisive role in balancing clean energy goals with farmland protection. It is a requirement that the area occupied by a solar energy facility that requires an SSP be made available for compatible agricultural activities at a lease rate at least 50% below fair market rent for comparable properties.

Historical and Current Agricultural Uses

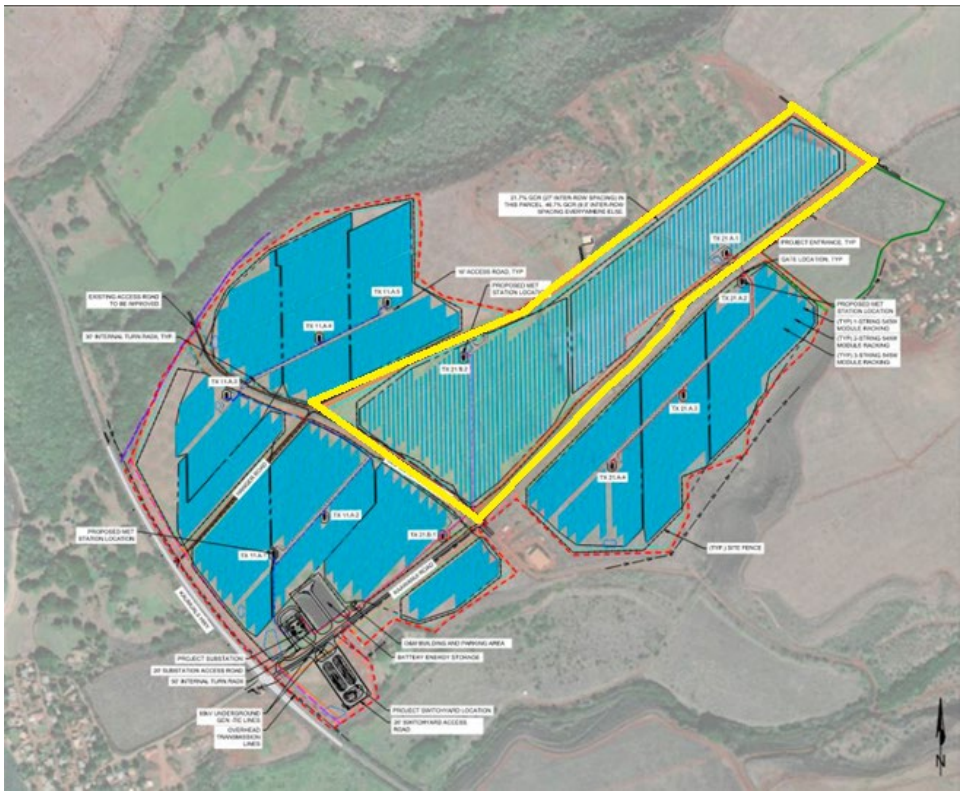
The Robinson family's land in Makaweli has traditionally been used for sugarcane plantations, cattle ranching, and housing for employees and their families, reflecting Hawai‘i's broader agricultural and ranching traditions. The Robinson family’s connection to Makaweli dates to the mid-19th century, when Elizabeth Sinclair, the family matriarch, purchased the land in 1866 from King Kamehameha V. These lands became central to the cultivation of sugarcane, which dominated Kaua‘i’s economy throughout the late 19th and early 20th centuries. However, in 2009, Gay and Robinson Inc. (G&R), the family-owned company, had to close its sugar operations due to the industry's economic decline. In response to this challenge, the company pivoted to focus on continuing its ranching operation and leasing land to various agricultural organizations to cultivate a diverse array of vegetables, fruits, seed crops, and more, while maintaining its plantation housing.

Design Considerations

AES understands that operating a successful agricultural operation around a solar facility can be challenging. Agricultural cultivation under normal conditions is challenging enough, but when environmental variables such as limited sunlight and rotating infrastructure are added, it can make an already difficult enterprise even more challenging. For these reasons, it was important to AES that the Project design maximize contiguous space for agricultural cultivation and enable as many agricultural uses as possible. A few design considerations have been made to ensure flexibility.

AES engineered the Project with enlarged corridors between rows of solar panels in the biggest array within the Project area. Where solar projects typically have 8.5-foot to 20-foot inter-row spacing depending on equipment selection and topography, the central array of the Kaawanui Solar project (outlined below in yellow) has 27-foot inter-row spacing when panels are in flat stow. This maximum design accommodation will allow the agricultural partner to consider not only rotational grazing of livestock in this area of the Project but also planted crops with opportunity for mechanical planting and harvesting, a form of agricultural management that is rarely available within solar projects.

Uniquely, this Project will have two different inter-row spacing ratios across the Project site: 27 feet in the central array, comprising approximately 62.8 fenced acres, and 8.5 feet in the surrounding arrays, comprising approximately 148 fenced acres.

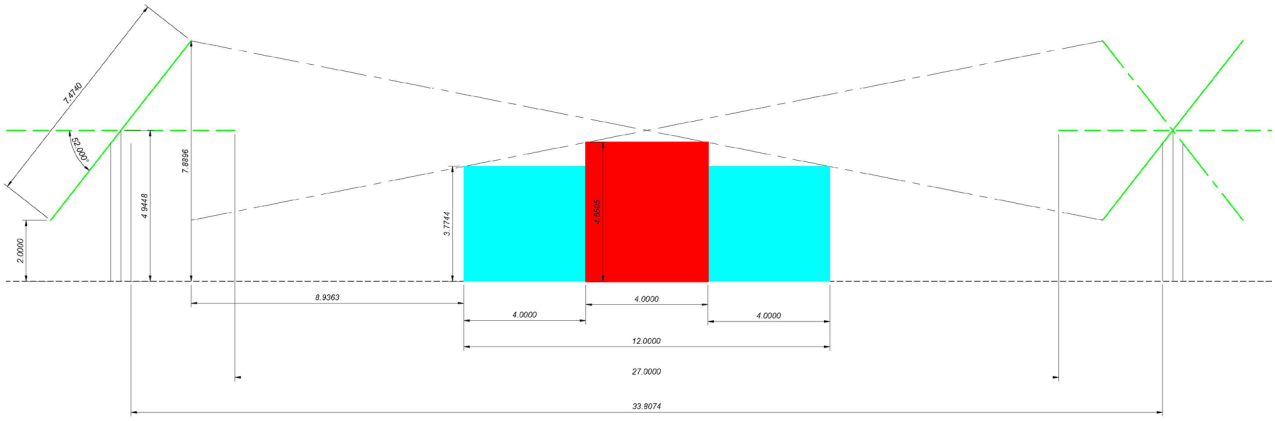


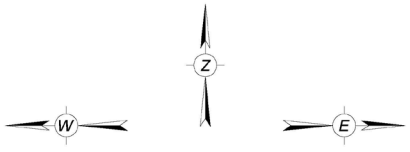
Current Project Design with Central Array Highlighted

When considering the racking system and solar panels slated for the project, as well as the unique inter-row spacing, AES quantified the land available for agricultural production into two "workable space" calculations. Defining compatible agriculture in this way enabled AES to ensure delivery of the contracted energy to KIUC (i.e., agricultural activities wouldn't interfere with the operation of the solar facility) and to ensure the safety of agricultural operations while the facility is in use.

The central array, with inter-row spacing of 27 feet, provides a 12-foot-wide workable agricultural corridor between adjacent rows of panels. This is the workable space where the agricultural partner could plant crops, for example. The sunbeams, depicted as diagonal dashed lines below, indicate the maximum height of the agricultural product before harvesting is required. In this case, a 12-foot-wide corridor allows a maximum crop height of 3.78 feet. Drawing in the agricultural corridor to the centerline of the available space allows for increased crop or stationary livestock height of up to about 4.56 feet.

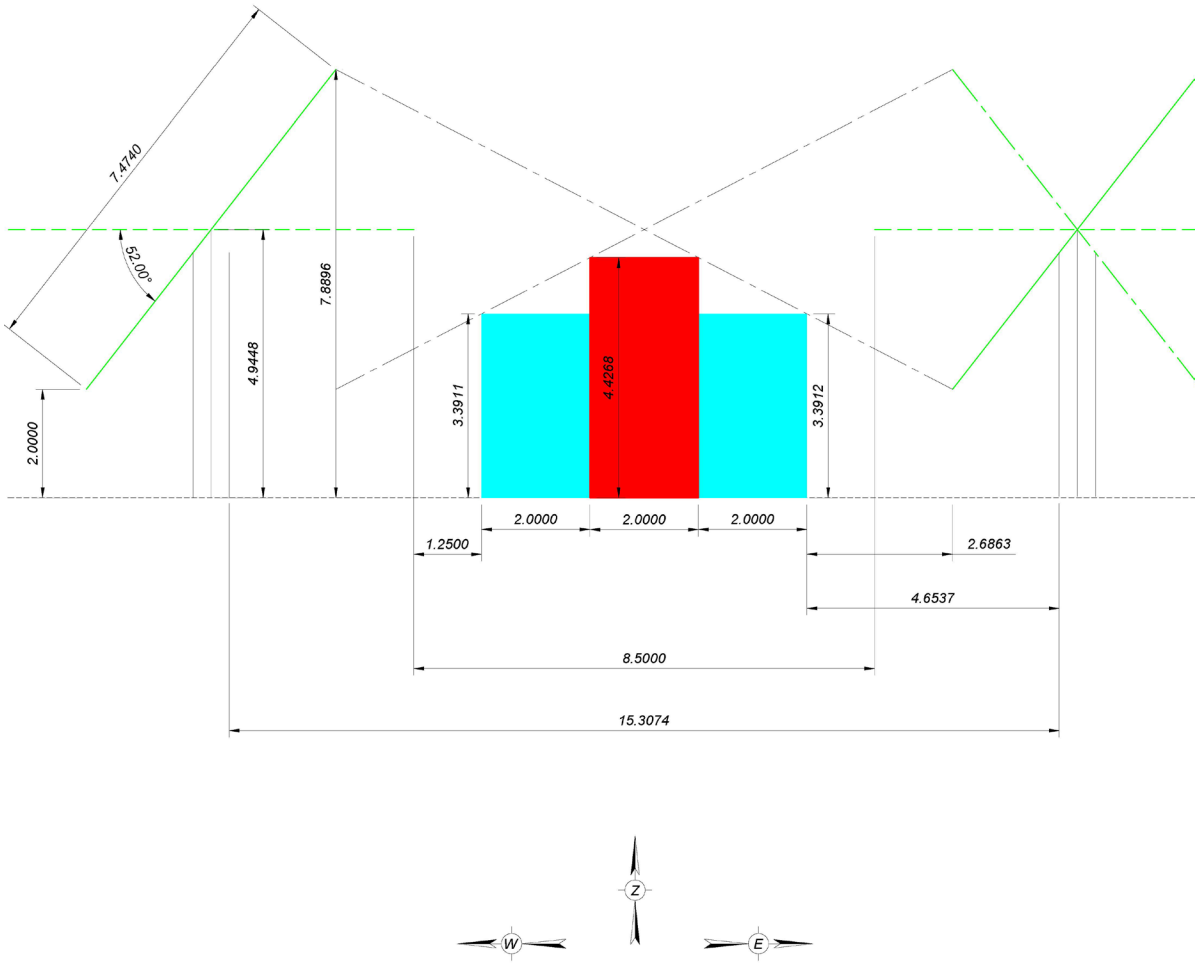
Note that approximately 9 feet of space is available on either side of the agricultural corridor, as built into the Project design. This area is reserved for use by either the AES Operations & Maintenance Team or the agricultural partner to service the Project components, crops, or land.





Workable space with 27-foot inter-row spacing

To maintain the large 27-foot inter-row spacing in the central array, the inter-row spacing throughout the remaining project area was adjusted to the minimum space possible while maintaining the required maintenance clearances. This inter-row spacing adjustment allows AES to keep the Project components within the land made available by RFP for the Project. Potential agricultural uses in these areas are somewhat more size-constrained, with a 6-foot-wide by 3.40-foot-high workable space.



Workable space with 8.5-foot inter-row spacing

Availability of Water

Time and again, water is the limiting factor when assessing compatible agricultural activities in and around a solar project. Oftentimes, solar installations are considered for agricultural land when water availability is nonexistent, as an alternative land use given the water constraint. A lack of water eliminates many potentially compatible agricultural activities from the outset.

Land manager G&R owns the existing irrigation ditch system that delivers water mauka to makai through the Robinson family land at Makaweli. Through negotiations, AES has secured an annual water allotment and a per-gallon rate from G&R, which we can pass through to any agricultural partner we work with during the solar project's operation. The allotment will assure the agricultural partner that they can sustain their agricultural investment year over year and will open AES up to as many agricultural partnerships as possible.

AES is committed to covering the costs to reroute the existing irrigation infrastructure around the new Project infrastructure, in a revised design that works for both the agricultural partner and the AES O&M Team. AES will contract with an irrigation design firm to assist with planning once the 60% Project engineering is complete. It is anticipated that irrigation planning within the Project area will commence around Q3 2026.

Kawailana Inc. and Agricultural Collaboration

From the outset, AES recognized that the Robinson family would be the ideal agricultural partner for the Project. Their longstanding reputation for land stewardship—managing extensive tracts of land with a focus on agricultural production, conservation, and renewable energy—makes them well-suited for this role. No one understands the Makaweli landscape better than the Robinsons.

During the project's early development, a branch of the Robinson family expressed interest in serving as the agricultural partner. Their expertise stems from their active involvement with the Olokele and G&R sugar plantations, and their own ranching operations, which include cattle, sheep, and large exotic animals.

With over 50 years of experience in agriculture and renewable energy on the islands of Kauaʻi and Niʻihau, they have demonstrated their commitment to sustainability. This includes their installation of the first solar-powered communications system on Niʻihau in the early 1970s and their 2005 achievement of making Niʻihau School the State’s first fully solar-powered school.

After the plantation's closure, this branch of the family transitioned from G&R and established Kawailana Inc. (Kawailana) in 2009. This separate Kauaʻi-based entity was established to augment their commitment to the family legacy, land, and community by leveraging their expertise in all areas. As it expands its operations, Kawailana is focused on preserving and

perpetuating self-sufficiency island-wide. In partnership, AES and Kawailana have developed the following agriculture plan for the Project.

Proposed Agricultural Activities

Sheep grazing is a tried-and-true compatible agricultural activity with a solar project. The sheep act as natural mowers, stabilizing soil and promoting regeneration while also mitigating fire risk by grazing vegetation to appropriate heights. Sheep also have the perfect temperament to graze without damaging infrastructure or harming workers moving around the Project site.

From day one of Project operation, sheep grazing will be deployed within the 62.8-acre central PV array. Kawailana anticipates a 3- to 5-year ramp-up period based on an initial investment of 100 sheep (95 females and 5 males) and a historical herd growth rate of 80% annually. Anticipated herd growth numbers for the ramp-up period are as follows.

OPERATION YEAR	HERD SIZE	HERD INVESTMENT	HERD AT YEAR END	SALES POTENTIAL	ACRES GRAZED
1	0 sheep	100 sheep	140 sheep	40 sheep	35
2	140 sheep	0 sheep	196 sheep	56 sheep	50
3	196 sheep	0 sheep	274 sheep	78 sheep	65
4	274 sheep	0 sheep	384 sheep	109 sheep	91
5	384 sheep	0 sheep	537 sheep	153 sheep	128

Assuming three sheep can maintain ground cover on 1 acre, by year 3 of operation, the herd will be large enough to expand beyond the central array into the surrounding arrays. The sheep's daily movement, their maximum size, and the rotational grazing plan across the Project site make this activity compliant with the workable space parameters (27-foot row spacing and 8.5-foot row spacing) established by the Project design. Kawailana also has access to nearby slaughter facilities and sales channels, enabling it to market to local eateries and supermarkets, as well as to consumers directly, making this a complete farm-to-table business venture from the outset.

Kawailana plans to diversify livestock operations to include poultry after the initial 5-year sheep ramp-up period. This venture will require a higher up-front capital investment. Chicken and egg production via mobile chicken coops that can move between rows of solar panels within the central array would need to be custom-ordered. Additionally, egg-washing stations, such as the one pictured below, would need to be purchased.



Example of an egg washing station

The capital investment for this business stream is about 9 times that of the sheep operation, so the success of the sheep operation will dictate the pace at which this business stream can roll out. This form of free-range grazing would also help maintain vegetation in the areas the coops roam and regenerate the soil with nutrients.

The final component of the proposed agriculture plan for the Project is Kawailana's aspiration to plant crops within the Project area. Though the scope of research on agrovoltaics is growing, with organizations like the Hawai‘i Agriculture Research Center (HARC), with whom AES partners on research initiatives and with which RFP has previously engaged, very few solar project agricultural partners to date have successfully scaled to a planted-crop business line. Kawailana is excited about the possibilities at Kaawanui, and AES looks forward to supporting their efforts.

Based on existing HARC research, Kawailana would likely start by planting leafy green varieties such as spinach and lettuce. Dry-land kalo and asparagus have also been known to thrive on the land and/or have performed favorably in HARC trials within the solar array microclimates, since certain varieties are low-growing and don’t need much direct sunlight. Kawailana anticipates consulting with HARC as they prepare to start a crop cultivation initiative.

Kawailana's capital investment for this venture will be the highest of the proposed agricultural uses. Upfront investment for a mechanical harvester, tractor, and production facility equipment is anticipated at about $400,000. Kawailana would begin crop cultivation only once revenue from livestock sales covered a significant portion of the upfront machinery investment.



Example of a mechanical harvester

The crop cultivation would also start small. Trial plantings of various crops, along with market demand, would inform Kawailana's decision to scale. Adjustments would be made as necessary to identify the best crops for the unique solar microclimate.

Personnel

Across all agricultural uses, Kawailana anticipates needing 3-8 full-time employees to manage the compatible agricultural operation. Kawailana anticipates using existing employees across the suite of Robinson family businesses to meet staffing needs. This will alleviate the stress of sourcing labor externally.

Exhibit J

Compatible Agriculture Plan Feasibility Assessment

Scott E. Enright Company, LLC

Kaawanui Solar + Storage

Compatible Agriculture Plan Feasibility Assessment

Prepared for Kaawanui Solar, LLC
December 12, 2025

Experience and Background

Scott Enright served as the Director for the Hawaii Department of Agriculture (HDOA) and as Chairperson of the Hawaii Board of Agriculture (BOA) from January 1, 2014, to January 1, 2019. Previously, he served as Deputy Director of the HDOA from January 1, 2012, to January 1, 2014. In that capacity, he was the Administrator of HDOA's Divisions of Plant Industry and Agricultural Development. Additionally, he managed the USDA Specialty Crop Block Grant funding program and directed Human Resources. He also directed bio-security programs, led initiatives to revitalize the state's livestock industry with special focus on developing the dairy industry and grass-fed beef industry, and provided direction for improving infrastructure for irrigation systems statewide. Mr. Enright currently is an agricultural consultant for Scott E. Enright Company, LLC with clients that include: Hawaii Sustainable Beef Enterprises, Meadow Gold Dairies, Villa Rose/Waialua Eggs, AES, Mahi Pono, Waimea Water Services, and Dentons Law Corporation.

Other Experience:

• Worked as a consultant for the Hawaii Sustainable Agriculture Renewable Energy Project

• Project manager for ITC Water Management Inc.

• Served as cultivation and irrigation superintendent for the Hamakua Sugar Co.

• Served as orchard superintendent for Kilauea Agronomics

• Past member of the Governor's Council of Neighbor Islands Advisors for East Hawaii

• Past member of the Community Development Plan Steering Committee for the Hamakua District

• Past chair of the Hawaii County Environmental Management Commission

• Past member of the Hilo-Hamakua Community Development Corporation Board

• Member and founding president of the Ookala Community Association

Scott Enright earned his bachelor's degree in psychology and philosophy from the University of Hawaii at Hilo.

Feasibility Assessment

During and after my time at the Hawaii Department of Agriculture, I have reviewed many compatible agricultural plans for solar projects and hold that the Kaawanui plan is unique.

Time and time again, water is the limiting factor when considering the compatibility of agricultural activities in and around a solar project. Solar installations are often considered for agriculture land when water resources are limited or non-existent as an alternative land use given the water constraint. With this project, through negotiations with land manager Gay & Robinson, AES was able to secure an annual allotment of water at a fixed per gallon rate to pass through to the agriculture partner at any time during operation of the solar project.

Also unique to this project is that the compatible agricultural partner is the generational owner of the land. The Robinsons manage over 55,000 acres of land on Kaua‘i and maintain traditional practices alongside modern ventures like cattle ranching and crop production for ethanol. Their commitment to stewardship and adaptability has preserved traditional land use while supporting Hawaii’s evolving economic needs, making the Robinson family a cornerstone of generational knowledge and sustainability on Kaua‘i. The new Kaawanui solar project will continue to perpetuate the Robinson family’s commitment to local agriculture.

Further in terms of uniqueness, Kaawanui’s sheep operations will have a unique advantage. Sheep grazing is a time-tested compatible agricultural activity with solar projects because it provides a sustainable and cost-effective solution for vegetation management while mitigating wildfire risk and improving soil health.

However, the bottleneck that other solar projects have incurred with their sheep operations is in the back end of the business in the slaughter end marketing. Kaawanui has a distinct advantage in that the Robinson’s currently operate a slaughterhouse and have marketing agreements in place.

In my opinion, these three advantages, available ag water, a knowledgeable ag partner, and strong marketing capabilities give this plan a great chance for success.



Scott Enright

Exhibit K

Example Emergency Response Plan

AES Clean Energy
O&M Emergency Response & Communication Plan





AES Clean Energy

AES Waikoloa Solar, LLC

68-2400 Waikoloa Road Waikoloa, Hawaii 96738

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1. Introduction

1.1 Purpose

The following emergency response procedures are provided so that all AES Waikoloa Solar personnel understand the practices that are to be followed to be prepared for and to provide immediate and effective response to emergencies that might arise at the facility. Because the safety of employees, contractors and individuals in our communities is of primary concern, the AES Waikoloa Solar Emergency Response Coordinator and each member of the AES Waikoloa Solar staff are committed to providing a safe, healthy work environment and are responsible for ensuring implementation of these procedures.

Life safety shall be the highest priority during any event.

1.2 Limitations

This plan does not imply, nor should readers infer, that its implementation will guarantee that a perfect response will be practical or possible. No plan can shield individuals from all events.

Responders will attempt to coordinate the plan and response according to all applicable laws and standards.

Response to emergencies, events or disasters shall only be undertaken to the level of the responders' training, Personal Protective Equipment (PPE), and resources available.

There may be little to no warning during specific events to implement operational procedures.

The success or failure of all emergency plans depends upon effective training, continual (*e.g.*, annual) review of this response plan, and execution of the response.

Sites and operators shall comply with applicable codes, standards, and other requirements as apply in their locality, even if those codes, standards, and requirements contradict this plan.

Successful implementation of this plan depends on timely identification of capabilities, available resources at the time of the incident and a thorough information exchange between responding organizations and the facility or transporter.

1.3 Facility Description

AES Waikoloa Solar is located near Waikoloa Village, Hawaii County, HI at 68-2400 Waikoloa Road. The site is comprised of 42.25 MW_{DC} of photovoltaic solar generation and 40.5 MW_{DC} (162 MWh) of NMC lithium-ion stationary battery storage contained in 26 enclosures distributed across the ~215-acre project site. The primary entrance is located near milepost MP 7.5 on Waikoloa Road.

Appendix 1 provides a map of the facility. Notification information for plant and external support organizations (police, fire department, medical facilities, etc.) that may be called to respond to emergency situations at AES Waikoloa Solar is included in Appendix 4. Support personnel are available intermittently on the site within the hours 8 AM to 5 PM Monday through Friday. The Site Manager or their delegated substitute is available via cellular phone in case of an emergency.

1.4 Plan Review and Revision

A review of this emergency response plan shall be conducted and documented at a minimum on an annual basis. The plan shall also be reviewed and amended whenever there is a change in facility design, construction, operation, or maintenance that affects emergency response planning. When outside resources are changed or modified the plan shall be reviewed and updated to reflect the changes that may affect this plan.

2. Emergency Response Management

2.1 Overall Organization

Overall responsibility for the Emergency Response Plan (ERP) lies with the AES Waikoloa Solar Emergency Response Coordinator. The Emergency Response Coordinator or their designee is responsible for program implementation, including designating evacuation routes and employee assembly points, coordinating severe weather activities, communicating emergency response procedures to site personnel, contracting with emergency response organizations, and contractor coordination.

2.2 Roles and Responsibilities

Specific management personnel will assume leadership roles for emergency responses. The Emergency Response Coordinator, Site Manager, and/or Lead Technicians will assist in the implementation of this plan by knowing and communicating evacuation routes to workers during emergency evacuation and reporting the status of the evacuation to the Fire Department. The Emergency Response Coordinator is responsible for seeing that this plan is implemented and will appoint an adequate number of personnel to enforce the plan, assure everyone is familiar with this plan and act as a liaison with the local Fire Department(s).

All facility personnel have a responsibility to immediately report emergency situations to the Lead Technician on duty or local emergency responder personnel when appropriate. There shall be no delay in reporting emergency events that require the local emergency responders. The Lead Technician will then notify the Emergency Response Coordinator and other key personnel of the situation using the AES Waikoloa Solar Emergency Notification Telephone List (refer to Appendix 4). Where a Lead Technician is not assigned, facility personnel will refer to the Emergency Notification Telephone list to inform key personnel. Titles and roles are summarized in Appendix 3.

The Emergency Response Coordinator (or designee) shall be responsible for initiating a 'phone tree' for informing relevant operations and administrative contacts in AES, including the Regional Manager to initiate corporate awareness and public communications activities in accordance with company structure and policies.

A subject matter expert (SME) shall be contactable at all times by telephone. This person and a designated secondary SME contact should be readily available to first responders in the case of emergency situations. The SME shall be versed in the battery's failure modes and hazards. A working knowledge of incident command systems will allow the SME to integrate into the emergency response operations when needed. If this is not practical, a toll-free phone number should be available such that first responders may call at any time, and be given operational data on the system, including its current state of health, system alarm notifications, and advice on how to proceed during an emergency event.

2.3 Preparation and Planning for Emergencies

2.3.1 Pre-planning for emergencies is a crucial element of this plan. The following steps have been taken in planning for emergency situations at the site:

- Fire department and other first responders have received a copy of this plan and have participated in an on-site familiarization meeting.
- All emergency responder access points to the facility shall be identified.
- An emergency response information notice board shall be maintained at the AES O&M Shed and contain key contacts for emergencies, a list of personnel certified in First Aid/CPR, and other notices as outlined in this document or as deemed appropriate by the Emergency Response Coordinator. Provision shall be made for non-English speaking workers on site.
- All road exits are established and posted on the emergency information notice board.
- Evacuation route diagrams have been documented and posted on the emergency information notice board.
- All buildings and property surrounded by fencing will be marked by signage that identifies specific hazards (such as the NFPA diamond, and all applicable Danger, Caution, Warning signal words).
- Site personnel receive instruction to keep exits from the site or O&M Shed clear and to maintain ready access to fire extinguishers by not blocking them with furniture, or any other means.
- Safe approach distances are established for equipment's different failure modes, personnel are trained in these distances, and such information is communicated in writing to first responders during drills and other emergency response informational meetings.
- Safety Data Sheets (SDS) provided by manufacturers shall, where relevant, be provided to first responders. In some cases, manufacturers

or suppliers will provide Material Safety Data Sheets (MSDS) instead of SDS where relevant.

2.3.2 Emergency Routes

An AES Waikoloa Solar evacuation sheet shall be posted and orally communicated to site personnel. These procedures shall be discussed at periodic safety meetings in addition to being covered during new employee orientation. Personnel are to know at least two exits whenever possible and be familiar with the evacuation routes posted in the location indicated on the site map (Appendix 1).

Depending upon the degree of emergency, weather and/or site conditions, roadways as designated on the site map (Appendix 1) will be used for routes of evacuation. In the event of an evacuation, all personnel will meet at the designated muster point for further information. If the primary muster point is inaccessible or hazardous, personnel shall gather at the secondary muster point and inform the emergency coordinator (if not present) by radio or telephone. The emergency response coordinator shall inform personnel of a diversion to the secondary muster point by such means as are available, to include radio. If personnel are unable to make it to the designated muster points, they should seek shelter wherever possible and contact their supervisor for further instructions. Accountability of personnel shall be of the upmost importance and be conducted in a timely manner. Responder access points shall be kept unobstructed at all times so first responders will not be hindered in their operations when responding to emergencies within the site.

2.4 Communications

Timely and efficient communications are essential to deal with an emergency response situation. The Emergency Response Coordinator is the central point of contact for all involved in an emergency response, including for first responders and Subject Matter Experts (SMEs). The following processes shall be observed during emergency communications:

- Employees using radios/phones shall yield to individuals who are the most directly involved in an emergency response activity, i.e., emergency response takes priority over all other communication on company network.
- Emergency transmissions should be clearly announced using signal words such as ‘urgent’ or ‘mayday.’ These signal words give priority to the radio transmitter to proceed with their message.
- If emergency radio/phone communications are interrupted or unclear, employees shall proceed to the muster point located south of the main access drive gate and identified in Appendix 1.
- All hand-held radios/phones should be recharged daily with back-up batteries ready for use.

- Radios shall be inspected daily for functionality and a radio check shall be transmitted to confirm that both the transmission and receiving functions work. If a radio is not working properly then the employee shall notify the lead technician and make arrangements for some other form of communication while working. Radios that are not working properly shall be placed out of service and labeled appropriately so they will not be used by another employee.
- Provision shall be made for non-English speaking workers on site.

2.5 Operator Safety & Equipment

2.5.1 General recommendations for operator safety

- Inspect equipment daily for unsafe conditions.
- Keep hands away from exposed electrical connections.
- Keep hands away from hot surfaces.
- Observe all high voltage warnings.
- Any outstanding observations shall be reported to their supervisor immediately and documented.

2.5.2 Personal Protective Equipment

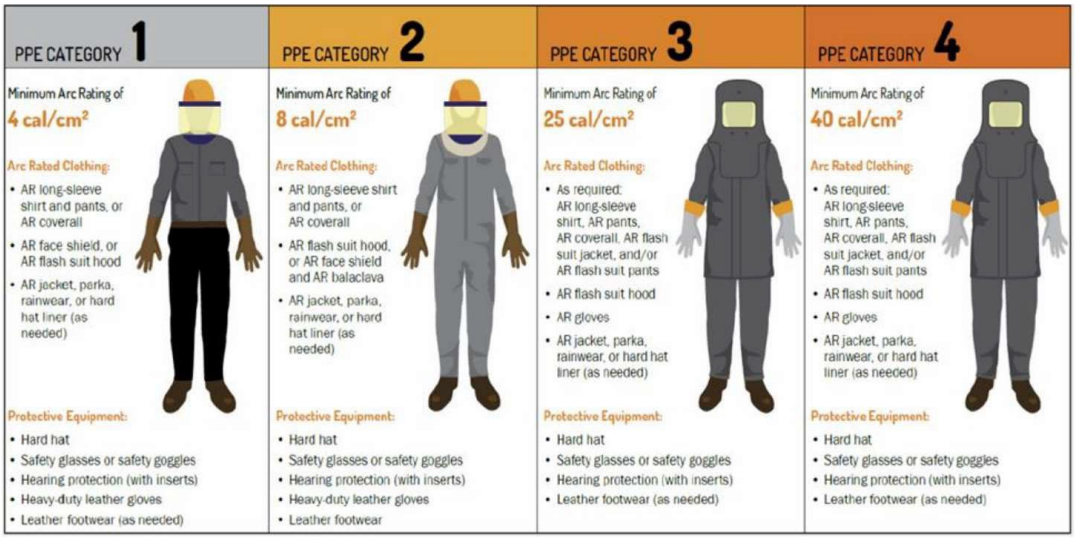
The operation or maintenance of specific equipment may have different safety requirements. There are different levels of PPE that must be checked and maintained. All personnel who wear levels of protection above and beyond their normal everyday attire must be trained in that PPE. All training of PPE shall be conducted by a competent person and documented. Always be aware of individual equipment operational requirements and hazards as well as out of service dates. For example,

- Safety glasses with side shields (no dark glasses are permitted except those approved for welding or cutting)
- Face shields for cutting & grinding
- Approved safety toe shoes
- Approved hearing protection
- Approved hardhat
- Approved gloves
- Long sleeve shirt
- Long pants

All PPE is required to be worn at all times for the working being conducted. Any PPE that is compromised or no longer considered viable for protection shall be discarded and replaced. Any PPE that comes in contact with hazardous material shall be properly decontaminated and inspected for functionality before being returned to service.

If no risk of fire or explosion is present, AR category 2 protective clothing to protect against arc flash and shock shall be worn. Jewelry such as necklaces shall be removed to avoid contact with any electrical hazard.

Categories of ARC resistance (AR) PPE



2.6 Safety Training

2.6.1 General training requirements

Initial training for all site personnel with respect to the contents of this ERP shall be undertaken upon the start of employment or substantial changes in duties. Refresher training of the ERP to site personnel shall be conducted at least annually. Documentation of ERP training is to be maintained in site files.

A variety of emergency response drills (such as fire, tornado, bomb threat, etc. as relevant to the site) are to be held by AES at minimum on an annual basis and shall be documented. At least on an annual basis, the Hawai'i Fire Department and other emergency response personnel shall be requested to participate and assist with critique of evacuation drills. Table-top exercises are encouraged to familiarize relevant response personnel with procedures for different types of emergencies that could be encountered at the site.

The site Emergency Response Coordinator and Lead Technicians are trained in their specific duties upon being assigned these roles or beginning their employment. All building occupants have been instructed on what actions to take in case of an emergency through their copies of procedures and training, as needed.

Operator personnel should receive supplier / manufacturer approved training on the specific characteristics of the energy storage system. Applicable common standards (*e.g.* on electrical safety) should be taken into account.

All personnel who wear levels of protection above and beyond their normal everyday attire must be trained in that PPE. All PPE training shall be conducted by a competent person and documented.

All hazardous materials incident emergency responders and workers will be

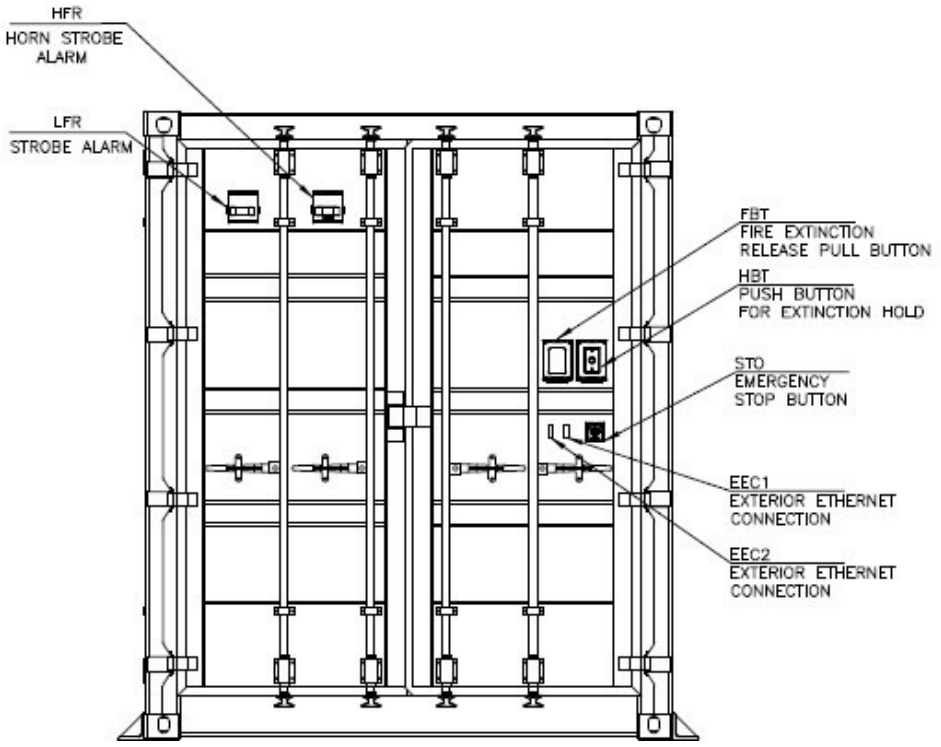
provided training which meets federal and state standards. Such training will be commensurate with AES policies.

Initial and refresher training regarding warning systems and alarms shall be conducted at least annually. Training will be documented.

2.7 Warning Systems and Alarms

Audible and visual (e.g., flashing lights) alarm systems should be established that reflect specific on-site hazard analyses. Personnel should be trained on the significance of different alarms and the corresponding actions as outlined elsewhere in this Plan. Descriptions of each alarm and corresponding actions should be clearly posted on an emergency information notice board (location marked on map in Appendix 1).

The BESS enclosures come equipped with a horn and strobe alarm, as well as a visual "agent release" alarm, that is shown in the picture below.



Warning systems and alarms should be tested at least every six months or more frequently per manufacturer specifications or code requirements. Tests shall be documented. All site personnel, as well as those offsite who are likely to hear or see an alarm, should be made aware of tests so as not to cause undue concern.

3. Emergency Response

3.1 Analyze, Plan, Implement, Evaluate

The phases of emergency response may be categorized under the 'APIE' scheme for handling an emergency: Analyze, Plan, Implement, Evaluate.

- **Analyze:** Analyzing the response is the phase in which the notification takes place to emergency responders.
- **Plan:** Planning the response is the phase in which the proper resources and equipment are called to the emergency scene and a plan is developed to mitigate the emergency.
- **Implement:** Once a plan is developed and the proper resources and equipment are there, then the Emergency Response Coordinator will make the determination to implement the plan.
- **Evaluate:** Once the plan is implemented, it shall be evaluated for safety and effectiveness. If the plan is not safe or effective, then the process should start over again with **Analyze, Plan, Implement, and Evaluate.**

Only personnel who are properly trained in accordance with 29 CFR Part 1910.120(q)(6) may respond to hazardous chemical releases.

No employee is required or permitted to place himself or herself in harm's way in order to facilitate extinguishment, evacuation, or rescue. All rescue operations will be performed by trained professionals upon their arrival. Rescue operations will only be conducted after a risk-reward analysis is done and proper PPE is used to protect against any adverse hazards that may be encountered.

Incidents where local fire department personnel are involved will be managed under a system established by the fire department, called 'Incident Command System.' This establishes a primary incident commander and a liaison to or for the Emergency Response Coordinator.

3.1.1 Analyze

Without entering an immediate hazard area, the employee who first discovers an emergency should identify the following:

- Is there a fire, spill, explosion, or other incident happening?
- Does medical assistance appear to be needed?
- Who/what is at risk: people, the environment, or property?
- What are the weather and terrain conditions and risks?

The employee will also isolate the area to keep people away from the scene until trained responders arrive, as long as it is safe to do so. An employee who has not received training in emergency response should take no actions beyond notification, isolation of the area, and personal safety precautions. Any efforts made to rescue persons, protect property, or protect the environment must be weighed against the possibility of becoming part of the problem. Attempts to rescue others shall only be attempted with proper PPE, proper training, and in a manner that does not create significant risk to rescuer or others. Persons at the scene must not contact spilled material or inhale fumes, smoke, or vapors.

3.1.2 Plan

After all life hazards are no longer a threat, a plan of operation shall be devised for remediation of the event. The plan shall be communicated to all responders and safety of all responders shall be paramount. A staging area, if needed, shall be identified for extra personnel and equipment that may be needed to accomplish the plan's objectives. All responders that will enter the hot zone (affected area) must be made aware of any decontaminated area upon their exit of the hot zone. Trained responders will be called to the scene by the O&M Manager and/or Lead Technicians to begin the process of hazard assessment and to establish objectives and priorities. The hot zone shall be identified, and all non-essential personnel shall not be permitted to enter this area without proper training and permission of the Emergency Response Coordinator.

3.1.3 Implement

The initial response phase starts with notification, which activates the emergency response system. Anyone who observes or receives information regarding an emergency at AES Waikoloa Solar should immediately notify available personnel using the AES Waikoloa Solar radio network or their issued cell phones. The Emergency Response Coordinator and/or Lead Technician will then ensure 911 is notified. At AES Waikoloa Solar, employees are notified of emergencies by cell phone/radio and word of mouth from the Emergency Response Coordinator and/or Lead Technicians. Appendix 4 provides a list of emergency notification information for AES Waikoloa Solar personnel.

If an event has the potential to impact the local community, AES Waikoloa Solar will contact local fire/police to make community notifications. The contact list in Appendix 4 also provides notification information for the Company Public Affairs team who will provide guidance for instances involving media. The Emergency Response Coordinator and/or Lead Technicians will coordinate any media efforts through the AES Waikoloa Solar Asset Manager and Company Legal Department.

The incident command post will be set up in a location free of contaminants and located upwind uphill and upstream. The Emergency Response Coordinator or designee shall remain at the incident command post to serve as a liaison to the Incident Commander designated by emergency responders. Trained responders may enter a 'hot zone' only when wearing appropriate protective equipment. Personnel entering the hot zone shall be briefed on the plan before entering. All communication devices shall be tested prior to entry into the hot zone. A

decontamination corridor shall be established prior to entry into the hot zone. There shall be accountability taken of all personnel entering and leaving the hot zone. A back up team that has the same PPE shall be at the ready in the event of the entry team needs quick assistance. A decontamination team shall be ready for personnel after exiting the location (warm zone). There shall be a doffing station that is set up immediately at the end of the decontamination section that will allow the responders a safe place to remove their PPE. Only trained responders are authorized to risk exposure to chemicals for purposes of containing or stopping the material release.

The Emergency Response Coordinator or a designee will be responsible for notifying the appropriate regulatory agencies and, if necessary, the Emergency Response Contractor or mutual aid groups. Appendix 4 includes a list of emergency contacts and agencies that may be notified in the event of an emergency. The incident will be documented and kept on file.

3.1.4 Evaluate

During the implementation phase of the emergency, response, action and progress shall be analyzed by the Emergency Response Coordinator constantly. If the plan seems to be ineffective or unsafe the responders shall be removed from the hot zone and the plan shall be revised. The new plan shall be implemented, and that revised plan shall be analyzed for safety effectiveness again.

3.2 Evacuation Procedures

When notified to evacuate, site personnel shall do so in a calm and orderly fashion, keeping the following instructions in mind:

- Walk, don't run. Help others who need assistance as long as doing so does not put you at greater risk.
- Stay upwind, upstream, and uphill whenever possible.
- Watch for other traffic and equipment on access roads and roadways.
- Be aware of ice/snow and loose gravel conditions.
- Drive safely.

Site personnel shall go to the primary designated muster area as identified in Appendix 1 and immediately contact their supervisor for further instructions.

During evacuation, the Emergency Response Coordinator and/or Lead Technicians should ensure that every person on his/her crew has been notified and that evacuation routes are clear. Any person with a disability (mobility, hearing, sight, etc.) who requires assistance to evacuate is responsible for pre-arranging with someone in their immediate work area to assist them in the event of an emergency. Anyone knowing of a person with a disability or injury who was not able to evacuate will report this fact immediately to their supervisor. This information shall be communicated to emergency responders immediately upon their arrival if the disabled person has not been evacuated.

Once an evacuation is complete, the Emergency Response Coordinator or Lead Technician should account for all personnel. This accountability information shall be communicated to the emergency responders immediately upon their arrival. When a person is unaccounted for, the following information shall be communicated to the emergency responders:

- Name of the individual
- Disabled or not disabled
- Work location
- Last known location

3.3 Post Emergency Reporting Procedures

Following any emergency described in this plan, and in compliance with facility permits and other County and/or State requirements, an incident report will be prepared by the Emergency Response Coordinator and transmitted to the appropriate individuals and agencies after review by the Company Regional Manager.

The Emergency Response Coordinator shall compile all documentation and perform a post-emergency investigation. Immediate performance of this activity will aid in determining the exact circumstances and cause of the incident. Issues to be determined include:

- Causes of the incident.
- Effectiveness of the emergency response plan.
- Need for amendments to the response plan.
- Need for additional training programs.

The fire department will make the final determination regarding when the scene is safe to release the site to staff. In some circumstances the scene may need to be safeguarded for investigators to examine the event failures. If the event was caused by a criminal act, the O&M manager shall be guided by law enforcement for direction.

If the facility is not able to reopen due to the event, the O&M Manager will make a determination regarding continuity of operations for the facility in consultation with the Company Regional Manager.

4. Fire Incidents

All personnel working at AES Waikoloa Solar are to be trained and should know how to prevent and respond to a fire emergency. All on-site personnel shall:

- Complete an on-site training program identifying the fire risks at AES Waikoloa Solar.
- Understand the protocol and follow emergency procedures should an event occur.
- Review and report potential fire hazards to the Emergency Response Coordinator.

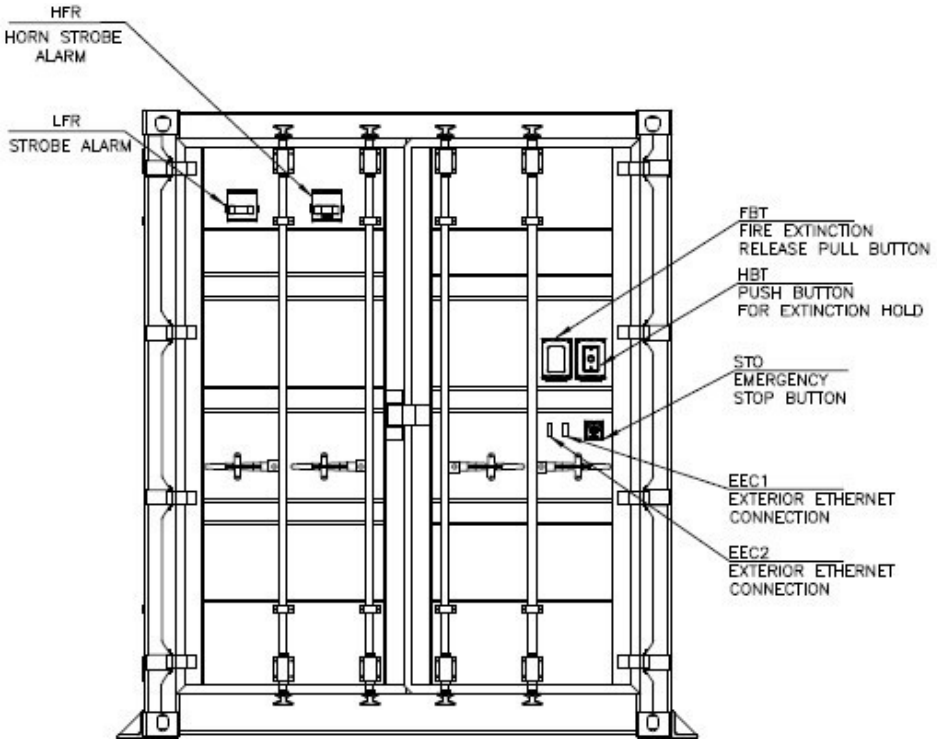
No employee is required or permitted to place himself or herself in harm's way in order to facilitate extinguishment, evacuation, or rescue. All rescue operations will be performed by trained professionals upon their arrival.

4.1 Conditions Associated with Energy Storage Systems

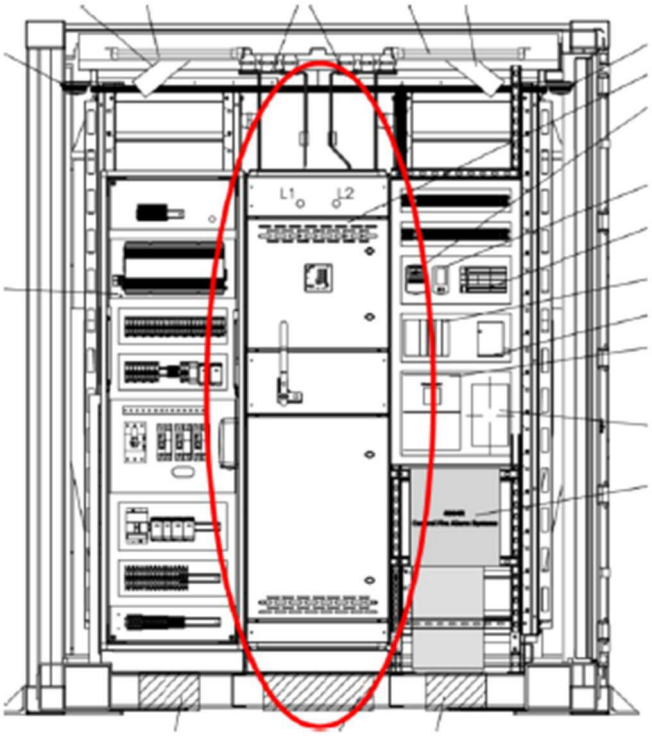
4.1.1 Unique Challenges

Energy storage systems present a unique challenge for fire fighters. Unlike a typical electrical or gas utility, an energy storage system does not have a single point of disconnect. Whereas there are disconnects that will de-energize select parts of the system, batteries will remain energized.

The E-Stop location is located on the exterior of the enclosure as shown in figure below.



The DC disconnect switch is located inside the enclosure, shown in the figure below. It connects the battery modules BCU (Battery Control unit) to the PCS (Power Conversion System) aka the inverter. It should be noted that the switch is a no-load switch and should not be operated under load.



The following hazards may be encountered when fighting fires in energy storage systems:

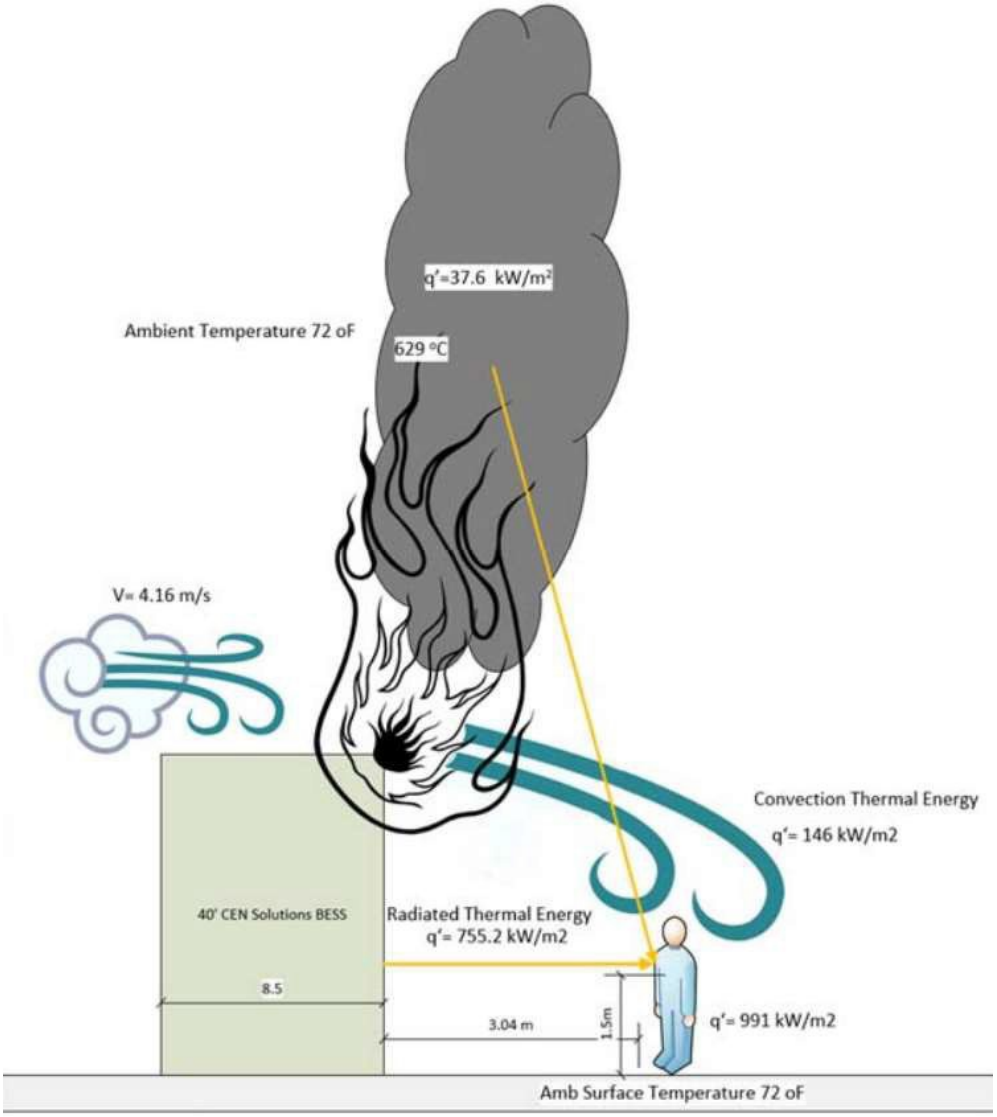
- Shock or arcing hazard due to the presence of water during suppression activities.
- Related electrical enclosures may not resist water intrusion from the high-pressure stream of a fire hose.
- Batteries damaged in the fire may not resist water intrusion.
- Damaged conductors may not resist water intrusion.
- Shock hazard due to direct contact with energized components.
- No means of complete electrical disconnect.
- Chemical spills.
- Toxic gases.
- Thermal runaway and explosions.

4.1.2 Hazard – Radiated Thermal Energy

The Hiller team has conducted a series of analysis to quantify the thermal energy hazards associated with a worst-case fire scenario. A portion of this analysis is provided to characterize and summarize the thermal energies associated with a potential fire event.

The figure and table below present the radiated heat flux as a function of distance from a fully engaged energy storage system. Table 2 presents the physiological effects of thermal radiation and the time of exposure to extreme pain and 2nd degree burns.

Maximum Theoretical Radiated Heat Flux at 10' (3.04m)



Theoretical Momentary Heat Flux as a Function of Distance

Distance	Momentary Maximum Theoretical Heat Flux (kW/m^2)
10'	**939**
20'	**589**
30'	**348**
40'	**235**
50'	**170**
60'	**127**
70'	**98**
80'	**77**
90'	**62**
100'	**51**

Physiological Effects of Thermal Radiation

Time for Physiological Effects (on bare skin) to Occur Following Exposure to Specific Thermal Radiation Levels		
Radiation Intensity (kW/m2)	**Time for Severe Pain (seconds)**	**Time for 2nd Degree Burn (seconds)**
1	115	663
2	45	187
3	27	92
4	18	57
5	13	40
6	11	30
8	7	20
10	5	14
12	4	11

4.1.3 Hazard - Toxic Gas Release

It is well documented that Lithium-ion battery fires generate intense heat and considerable amounts of gas and smoke. Although the emission of toxic gases can be a larger threat than the heat, the knowledge of such emissions is very limited for large grid-connected energy storage systems. The following list provides flammable and toxic gases that may be present during a thermal event of the battery system.

Gases	Chemical Formula	Gas Type
Acetylene	C2H2	Hydrocarbons
Ethylene	C2H4	Hydrocarbons
Ethane	C2H6	Hydrocarbons
Methane	CH4	Hydrocarbons
Methanol	CH3OH	Hydrocarbons
Formaldehyde	CH2O	Hydrocarbons (Aldehydes)
Hydrogen Bromide	HBr	Hydrogen Halides
Hydrogen Chloride	HCl	Hydrogen Halides
Hydrogen Fluoride	HF	Hydrogen Halides
Hydrogen Sulfide	H2S	Sulfur Containing
Carbon Dioxide	CO2	Carbon Containing
Carbon Monoxide	CO	Carbon Containing
Ammonia	NH3	Nitrogen Containing
Hydrogen Cyanide	HCN	Nitrogen Containing
Hydrogen	H2	-
Sulfur Dioxide	SO2	Sulfur Containing

4.1.4 Hazard – Failure of Control Systems

Another issue can be failure of protection and control systems. For example, in a theoretical fire event, the main control system can lead failure of the Battery Management System resulting in overcharging and an inability to monitor the operating environment, such as temperature, current, and voltage. Caution is recommended when approaching a damaged BESS when the condition of the Energy Management System or Battery Management System is unknown.

4.1.5 Hazard – Sensitivity of Li-ion Batteries to Mechanical Damage & Electrical Transients

Contrary to existing conventional battery technology, Li-ion batteries are very sensitive to mechanical damage and electrical surges. This type of damage can result in internal battery short circuits which lead to internal battery hearing, battery explosions and fires. The loss of an individual battery can rapidly cascade to surrounding batteries, resulting in larger scale fire.

4.1.6 Hazard – Electrical (General)

As an electrical energy storage system, the BESS has inherent electrical risks. Only qualified personnel who are working under an approved work authorization package shall have access to exposed electrical conductors. For First Responders, training and education of a response to energized electrical equipment is required. Some of the known hazards associated with electrical energy storage systems include:

- Overcharge
- Short Circuit
- Overcharge Protection
- Imbalanced Charging
- Temperature
- Dielectric Withstand
- Grouping Continuity
- Failure of Cooling/Thermal Stability System
- Mechanical Damage

4.1.7 Hazard – Battery Compartment Electrical Energy

The BESS is an integrated system consisting of power converter equipment (PCE) that is electrically connected to each containerized BESS. The PCE controls the conversion to, or from, AC Current and DC Current. The AC side of the PCE can be easily electrically isolated following approved Lock-and-Tag procedures. Similarly, the DC side can also be isolated from the Battery Enclosure itself on a defined location/isolation switch.

Caution is required as there may be electrical energy within a BESS when the system has been compromised by an incident or fire. Isolation and switching shall only be performed by a trained and competent individual.

4.1.8 Hazard – Battery Compartment Stored/Stranded Energy

Under normal operating conditions, with the enclosure doors closed, the BESS does not pose electrical hazards. The system design incorporates safeguards to help ensure that high voltages are contained, and the enclosure is rendered touch safe.

Each 40’ BESS container at Waikoloa has the potential to store over 6,000 kWh of energy. While the electrical energy may be electrically isolated at various points in the system, the stored energy within each battery module cannot be made safe.

Therefore, there will always be an Arc Flash Thermal Energy Risk and Shock Risk of varying proportions since the batteries will always have residual voltage and current potential.

Anyone working on the battery enclosure and encroaching within the Arc Flash Boundary (AFB) is required to wear PPE to meet the incident energy levels as indicated on the Arc Flash label posted on the enclosure.

Fire responders have their own PPE and shall be made aware, by the person who called them, that they are dealing with Li-ion batteries. First responders shall be made aware through training and upon arrival on scene of incident that full firefighter turnout PPE as well as SCBA is advisable.

4.1.9 Hazard – Environmental

The fire suppression system is an aerosol type that acts like a gaseous system which floods the fire area it is designed to protect and according to the manufacturer SDS it, poses no risk to the environment.

Should the aerosol system not extinguish the fire, and another type of

suppression or extinguishing system be used, e.g. water, then a potential hazard to life and the environment would be created when interaction takes place with the failed batteries, which could produce potentially hazardous chemicals. The primary hazard would be the hydrogen fluoride created. A self-contained breathing apparatus shall be worn at all times along with full personal protective equipment. Efforts should be taken to dike or dam storm drains, water ways or other flow paths of water.

4.1.10 Fire and Water

Due to the hazards described above, care and consideration should be applied when considering fire suppression by means of water inundation within energy storage systems. But because water as an extinguishing agent is commonplace, the appropriate use of water should be assessed, *i.e.* whether water reacts with the chemistries present or whether it is not an appropriate extinguisher class. The local fire department should be informed of appropriate fire suppression methods for the energy storage system type as identified by the equipment manufacturer.

If unconventional fire extinguishers are required, local first responders should be alerted and trained on their use, including a familiarization drill. The appropriate and most suitable extinguisher should be recommended based on the specific needs of the site in accordance with guidance from the manufacturer. This may include water in some cases, and in all scenarios its use should not be discouraged.

All fire extinguishing equipment, whether automatic or manual, shall be regularly inspected for functionality as per manufacturers' guidance.

4.2 Response to a Fire Incident

In the event of an incipient stage (beginning, small) fire, employees should notify adjacent individuals of this situation and exit the area. Only employees trained in the use of fire extinguishers or other manual fire suppression systems should attempt to use an extinguisher or system. **Employees are not expected or authorized to respond to fires beyond the incipient stage (*i.e.*, fires that are beyond the beginning stage and which cannot be extinguished using a hand-held, portable fire extinguisher).** The fire department should be immediately notified by dialing 911 when any type of unintended fire has taken place. Site management shall also be immediately notified of any emergency.

4.2.1 Safety Perimeter

- A safety perimeter of 100' shall be maintained between individuals and the BESS enclosure exhibiting fire conditions. Do not allow personnel other than firefighters in proper PPE to enter the safety perimeter. (The safety perimeter may extend beyond the boundary of the fenced area. Stay upwind out of smoke and off-gassing). Any personnel within this area shall be in full PPE and SCBA. Staging of personnel and equipment shall be on the angles of the BESS enclosure, to stay out of the potential blast radius of any doors or potential

projectiles.

4.2.2 Action Plan for Responding to a BESS Fire

Step	Action	Checked
1.	If a fire is detected, the strobes on the battery enclosures will flash and the alarm will be triggered (in case of smoke or fire).	

2.	Follow the site emergency response plan.
	• Contact control room operator.
	• Call first responders.
	• Contact the O&M Manager (if present) and Emergency Response Coordinator (if not the O&M Manager).
	• Evacuate & Muster effected Personnel.
	  ○ Note the direction of the wind.
	  ▪ No one should stand down wind of the BESS system. (Note: Hazardous fumes may be flowing not only fire and smoke)
	• A safety perimeter as described above in Section 4.2.1 of should be kept from point of fire/smoke incident.
	• When moving from safety boundary toward the engaged BESS the following PPE need to be worn (container doors are closed and prior to opening the doors)
	  ○ SCBA
	  ○ Bunker Gear	

3.	Designate one person to check the following conditions. Two-man rule should be implemented when responding:
	• Has anyone been injured because of the fire?
	  ○ If yes, follow First Aid protocol until First Emergency Responders arrive.
	  ○ If yes, when First Emergency Responders arrive follow their direction.
	• Is nearby Equipment at risk from the fire?
	  ○ If so, take note, alert Site Manager and FF.	

4.	Stop energy flow to all BESS systems by entering “0” MW firming target on the BESS HMI.	

5.	• FD Arrives on site
	• FD access BESS Fire Panel (either in mimic panel or control house)
	• FD determines which container has activated FSS
	• Is there Visible Fire?
	  ○ If **YES** (system has not suppressed fire)
	  ▪ Proceed to firefighting plan (below)
	  ○ If **NO** (system has suppressed fire)
	  ▪ Assume buildup of hazardous flammable gases
	  ▪ UPS power will be on, AUX will be off
	  ▪ Do not approach container or open doors (observe for minimum 3 hrs.)
	  ▪ Thermal camera external scan impacted container, (noted by horn/strobe) or use gas samples/probes
	  ▪ Visit HMI screens to get the temperature details
	  • Heat buildup - **YES**
	  ○ Assume fire
	  ○ Commence firefighting plan below	

	• Heat buildup - **NO**
	  ○ Actuate manual emergency ventilation (EV) system located on side of BESS
	  ○ FSS agent will be purged
	  ○ Observe for at least (3) hrs for temperature change
	  ○ Use portable gas detection at ventilation exhaust
	  ○ If no change in temp or gas detected
	  ▪ Open Container for inspection. Ensure to approach the container from 45-degree angle of any door.
	• Firefighting plan
	  ○ E-Stop BESS (All power is interrupted to the containers) Note: battery racks may still have stranded energy.
	  ○ Confirm energization status of the BESS switchgear.
	  ○ Spray container visible signs of fire
	  ○ Spray adjacent containers for evaporative cooling
	  ○ Continue firefighting until signs of fire are over
	  ○ Observe for at minimum 3 hrs
	  ○ Use portable gas detector to determine presence of gas in the container exterior to container
	  ▪ If gas is detected, continue firefighting, do not open doors
	  ○ Open container for inspection, when gas is below LEL
	  ○ Open container doors at 45-degree angle	

6.	All personnel entering in or around the Safety Perimeter during the emergency don appropriate SCBA due to potential large volumes of hazardous fumes being released.	
7.	Where possible isolate any electrical supplies to equipment threatened by fire.	

4.2.3 Fire Internal to Battery Container

- Call 911 and report the following:
  - Site name: AES Waikoloa Solar
  - The address of the main entrance: 68-2400 Waikoloa Road near mile post MP 7.5 on Waikoloa Road or nearest site access point
  - Injuries, if any, and need for ambulance
- Make sure the immediate area of the fire is clear of personnel.
- Account for all employees, contractors, and visitors who were working in the area of the fire. If any personnel are unaccounted for from the immediate fire area, a communication shall be made through out the facility in attempt to locate the person(s) missing. If the person(s) is equipped with a facility radio then an emergency transmission shall be communicated in attempt to locate the person(s).
- Contact the O&M Manager (if present) and Emergency Response Coordinator (if not the O&M Manager) immediately.
- Contact the Operations Center and Manager (if present).
- Evacuate the area immediately if the fire warning alarm sounds or fire warning lights illuminate.

- Remove any obstructions (vehicles, material, etc.) that might impede response to the scene.
- Proceed to the designated muster point for head count.
- If onsite, the designated Emergency Response Coordinator will do a head count and relay any information/instructions.
- If you encounter heavy smoke, stay low and breathe through a handkerchief or other fabric.
- If there is a second means of egress that is clear of smoke, that egress path will be used and a radio transmission or other type of communication shall be made stating that the clear egress point for other personnel to use for escape is the second means of egress.
- Assist anyone having trouble leaving the area so long as doing so does not put the assistor at additional risk.
- The fire suppression system is designed to work in a contained environment. **DO NOT** open the doors until it has been determined that the agent has been fully released and a pre-determined amount of time has passed to ensure no hazards are present, and with approval of emergency personnel and Subject Matter Expert.
- **DO NOT** put anyone in harm's way to save the battery equipment in the container.
- Once the Fire Department arrives, provide them with the following -
    - All applicable SDS documents
    - Assistance isolating equipment electrically
    - This emergency response plan
    - A liaison to remain with the fire department Incident Commander as needed
- Do not leave the designated muster point until advised to do so. If risk (*e.g.* smoke) requires evacuation of the muster point, the secondary muster point (designated on the map in Appendix 1) will be used and that fact announced via radio and alarms as available.
- The O&M manager and/or Emergency Response Coordinator (if not the O&M manager) will issue an 'all clear' only when the fire department informs them that it is safe to do so and the site (or portions of it) can be reoccupied or normal working conditions can be resumed again.
- The energy storage system is not to be accessed until the O&M Manager or designated Emergency Response Coordinator and the emergency responders give authorization.

In the event of a fire incident, the designated operations personnel responsible for the safe shutdown of the plant will open switchgear to ensure the grid side of the plant is de-energized and isolate the batteries as best able to (i.e. verify the AC and DC breakers are open in the inverter). The Fire Department needs to understand that some of the equipment (batteries) will remain energized no matter what actions are taken, and the recommended option is containment. Batteries remain energized even if all the contactors, breakers, and switches have been opened.

4.2.4 After a Fire

Hazards after a fire should be identified at the time of installation such that recommendations for personal protective equipment (PPE) are available for clean-up crews and hazardous materials (HAZMAT) teams. This may include respirators to protect personnel from toxic gas that continues to be generated

from hot cells. Firewater retention and cleanup measures may be required by local regulations. Once first responders have turned the site back to AES, the Subject Matter Expert, in coordination with the Emergency Response Coordinator, shall direct on-site personnel on procedures for securing the site for safety and pending any investigation.

In addition to the gas generation risk, cells that remain hot also pose a delayed ignition risk, whereby heat in the cell may transfer to undamaged adjacent cells or remaining active material and reignite the fire. As such, fire-damaged equipment must remain monitored for 4 hrs (minimum) when in consultation with AES and the SME.

Care should be taken to ensure that damaged batteries containing energy have been safety de-energized in accordance with disposal procedures, if possible, before handling and disposal. If unable to completely de-energize batteries involved in a fire, care should be taken with handling or dismantling battery systems involved in fires as they may still contain hazardous energy levels.

4.3 Site Maintenance and Housekeeping

- Fire extinguishers shall be inspected monthly as per NFPA 10.
- Fire extinguishers shall not be obstructed and should be in conspicuous locations with appropriate signage as per NFPA 10.
- Combustible material shall not be stored in mechanical rooms, electrical equipment rooms, or energy storage system enclosures.
- Outside dumpsters shall be kept at least five (5) feet away from combustible materials and the lids should be kept closed.
- Materials or equipment storage is not allowed in electrical equipment rooms, or near electrical panels.
- Electrical panel openings must be covered.
- Power strips must be plugged directly into an outlet and not daisy-chained and should be for temporary use only.
- Extension cords and flexible cords should not be substituted for permanent ones.

5. Chemical Release

5.1 Hazardous Materials

An inventory of hazardous materials shall be maintained in the AES O&M Shed and provided in advance to first responders, including fire and ambulance services. Materials typically on site include:

- Transformer oils
- Lithium-ion batteries
- Lead acid batteries

In the event of a breach of energy storage system containment, the Safety Data Sheet for the Lithium-ion battery may be found in Appendix 10.

Only personnel who are properly trained in accordance with 29 CFR Part 1910.120(q)(6) may respond to hazardous chemical releases.

The BESS site perimeter should not be entered during a fire or off-gassing event unless there is an imminent threat to life safety, at which time only properly trained and equipped public safety personnel may enter. This entry shall be with full firefighter protective gear to include self-contained breathing apparatus (SCBA). Entry in this situation shall be at the sole discretion of the officer in charge (OIC).

Chemicals consumed during a thermal runaway event will produce copious amounts of smoke. However, if water is used in extinguishing flames, these gases can become acids which may cause skin irritation.

5.2 Spill Response Procedures

An emergency spill kit is maintained at each PCS pad and company vehicles.

This kit includes, at a minimum:

- Absorbent socks, pads, or pillows
- Disposal bags and ties
- Safety glasses
- Rubber gloves
- Appropriate neutralization medium for liquid present
- Hazardous labels
- Bag of Life-Dri absorbent or equivalent
- Shovel
- Broom

A hard copy of the site-specific Spill Prevention and Response Plan is located at the O&M Shed onsite and available digitally at the following link:

- https://aesde.box.com/s/qkjfdc8cdwdyxmjacjydbvah58sdybdw

A formal notification process shall be initiated when a hazardous material spill or potential spill is first observed. Immediate actions are necessary. The first individual who discovers a spill (spill observer) will be responsible for initiating notification and response procedures. Only employees that are properly trained in accordance with 29 CFR Part 1910.120(q)(6) may respond to hazardous chemical releases. AES is responsible for providing spill recognition and response training for personnel. At least one trained employee shall be on duty at all times.

The first person to witness the spill shall follow these procedures:

1. Make an assessment of the incident as observed.
2. If the incident can be safely controlled, take steps to do so (e.g., turn off source of spill).
3. Notify the Emergency Response Coordinator and provide as much information as possible.

The Emergency Response Coordinator shall follow these procedures in the event of a spill:

1. Notify Supervisors.
2. Make sure all personnel are removed from the spill area.
3. Take immediate actions to minimize any threat to public safety (verify the spill area has been cordoned off).
4. Secure the source of the spill, if safely possible to do so.
5. Maintain close observation of the spill.

Cleanup may range from very simple removal of minor spills to installation of skimmers around large spills or between sensitive areas and spills for longer, prolonged cleanups. Cleanups shall be conducted as per OSHA regulations (part 1910). Cleanups can be on pavement or on soil surfaces. On-site personnel shall be trained in the proper use of the cleanup materials. The Emergency Response Contractor or other contracted – and appropriately certified – waste management company may provide cleanup and remediation services. It is strongly recommended that all contractors determine a disposal site in advance of a spill incident.

5.3 Reporting Major Spills

After initial spill response has begun, notification and reporting to agency personnel shall occur. According to Hawaii Administrative Rules (HAR) Chapter 11-451, releases of reportable quantities of oil in the State of Hawaii must be reported to the Hazard Evaluation and Emergency Response (HEER) office. Reportable quantities and contact information can be found in Appendix 4. The following procedures should be followed when reporting major spills:

- Never include information that has not been verified.
- Never speculate as to the cause of the incident or make any acknowledgment of liability.
- Do not delay reporting because of incomplete information.

- Notify persons/agencies and document notification and the content of the message.
- For spills of federal reportable quantities, in conformance with the requirements in 40 CFR parts 110,119, and 302, the Emergency Response Coordinator shall notify the National Response Center at (800) 424-8802.

Other agencies which may need to be consulted include, but are not limited to, the Hawai'i fire department, County of Hawaii, Department of Environmental Management, Public Works Departments, state police, Waimea Police Department, State Department of Toxic Substances, OSHA, Hawaii Department of Health, Hazardous Evaluation and Emergency Response Office, and (if relevant) Hawaii Department of Health, Clean Water Branch.

6. Medical Emergency

6.1 Medical Emergency Response Procedures

If an employee is injured, or an accident has occurred on site and first aid is not enough treatment for the emergency, 911 must be called. The call to 911 can be made by phone by any available site personnel. The caller must state to the dispatch that they are at the "AES Waikoloa Solar" project site. A second notification will be made to the O&M Shed, to inform others of the situation.

AES Waikoloa Solar employees certified in first aid/cardiopulmonary resuscitation (CPR) may administer aid if they have completed training. Regularly-present employees with first aid/CPR training are identified on the emergency information notice board and employees shall be aware of who on staff is so certified. At all times when the site is staffed, at least one first aid certified member of staff shall be present. The location of first aid kits and automated external defibrillators (AEDs), if present, shall be identified by appropriate signage and indicated on the map in Appendix 1.

All employees shall designate a personal emergency contact, which shall be kept on file.

6.1.1 Serious Injury

The following procedures apply for serious medical injuries such as loss of consciousness, heart attack, bone fractures, neck trauma, or severe burns.

1. If life threatening, call 911.
2. Notify Operations and/or Safety Managers.
3. Provide name, exact location, number of injured persons, and brief description of incident.
4. On-site personnel shall meet EMS responders at site entrance and direct them to location of incident.
5. Do not leave or move the injured unless directed to by Safety Managers or EMS responders.
6. Administer first aid if necessary.

7. The site manager shall inform the employee's personal emergency contact.
8. Document incident and keep on file.

6.1.2 Attending an Incident

When attending an incident, the following procedures apply:

1. Clear a path to the injured person for Operations and/or Safety Managers and assign personnel to assist with signaling EMS responders to the location of the incident.
2. Identify location of Project Site entrance nearest to the incident and notify EMS responders.
3. Operations and/or Safety Managers shall meet EMS responders at site entrance.
4. Direct and accompany EMS responders to location of incident.
5. Follow all directions of EMS responders.
6. Contact management personnel and/or subcontractors.
7. Document incident and keep on file.

6.1.3 Medical Facilities

The nearest medical facility to the project site is:

North Hawai'I Community Hospital

67-1125 Mamalahoa Hwy

Waimea, HI 96743

(808) 885-4444

Directions from site entrance:

1. Head East on Waikoloa Road (4.1 mi)
2. Turn Left onto HI-190/Hawaii Belt Rd (11.3 mi)
3. Hospital will be on the right (427 ft)

6.2 Non-Emergency Safety Incident

6.2.1 Notification of Minor Incidents

In the event a safety incident occurs where emergency response is not required (first aid treatment, near miss, etc.) work is to be stopped immediately and reported to the Emergency Response Coordinator and/or Lead Technician. Risk will be reassessed, adequate controls implemented, and the situation made safe before resuming the task. The event will be documented and kept on file.

6.2.2 Heat Illness

When the temperature exceeds 95 degrees Fahrenheit (35 degrees Celsius), or is expected to be so during the course of a shift or work project, the O&M Manger will hold short staff meetings to review the weather report; reinforce heat illness prevention with all workers; and provide reminders to drink water frequently, to be on the lookout for signs and symptoms of heat illness, and inform them that shade can be made available upon request.

Employees shall have free access to potable drinking water provided and located as close as practicable to the areas where employees are working. Where drinking water is not plumbed or otherwise continuously supplied, it shall be provided in sufficient quantity at the beginning of the work shift to provide one quart per employee per hour for drinking for the entire shift. Employers may begin the shift with smaller quantities of water if they have effective procedures for replenishment during the shift as needed to allow employees to drink one quart or more per hour. The frequent drinking of water shall be encouraged.

7. Security Incidents

7.1 Bomb Threat

7.1.1 The purpose of this plan is to give direction to all site personnel in the event AES Waikoloa Solar is a target of an actual or threatened bomb assault/attack.

Anyone receiving a bomb threat shall:

- Treat the caller with courtesy and respect. Complete the Bomb Threat Report (Appendix 6). Use this sheet as a reference while talking with the caller making the threat.
- Attempt to obtain as much information as possible. See the “Bomb Threat Checklist” (Appendix 7).
- Immediately notify the AES Waikoloa Solar Emergency Coordinator by phone. Stop all radio transmissions from this point on until cleared by the Emergency Coordinator or other competent authority. Radio transmissions can activate electronic detonating or timing devices.

The Emergency Response Coordinator will immediately notify 911. The Emergency Response Coordinator shall:

- Evaluate the threat and determine the appropriate course of action to take.
- Notify law enforcement and/or ambulance.
- Evacuate the facility as necessary.
- Coordinate evacuation of any part of the surrounding community with local authorities as needed.
- Coordinate search of the site with proper authorities.

7.1.2 If any suspicious item(s) are found, they are not to be touched. Barrier tape will be used to mark the area where the suspicious item(s) are by extending a continuous line of tape beginning immediately in front of the suspicious item(s) and extending to just outside the room exit. This will help guide local authorities to the suspicious item.

The Emergency Response Coordinator will ensure that the "All Clear" message is communicated once the threat has passed or is no longer present.

7.2 Chemical/Biological Agent Threat

The procedures described previously for a bomb threat should be used for a chemical or biological agent threat. Refer to Appendix 8 for a copy of the phone report when receiving such a threat and Appendix 9 for a checklist.

Any person that is exhibiting signs and symptoms from a chemical or biological agent should be isolated from other workers and be prepared for transport by EMS.

7.3 Sabotage or Vandalism

Anyone detecting any act or threat of any act of sabotage or vandalism will immediately notify the Emergency Response Coordinator. The Emergency Response Coordinator will evaluate the situation and decide what actions to take. The following options should be considered and/or implemented:

- Notification of 911.
- Corrective action as required, providing that no person will risk injury.
- Evacuation of the facility.

7.4 Active Shooter

In an active shooter situation, employees should:

1. Quickly determine what actions to take to protect life: options include run, hide, and fight (described in the DHS' Ready.gov site). Use best judgment based on the specific circumstances of the incident. Getting away from the shooter(s) is the top priority. Call 911 when in a safe location and warn/prevent individuals from entering an area where an active shooter may be if possible.
2. When encountering responding police, remain calm and follow any and all instructions from the officers. Officers may shout commands and push individuals to the ground for his/her safety as well as their own. When law enforcement personnel arrive at the scene, personnel should be aware of the following:
    - Follow all official instructions from police;
    - Remain calm, think, and resist the urge to panic;
    - Immediately raise hands and spread fingers;
    - Keep hands visible at all times;
    - Put down any items;
    - Avoid making sudden or quick movements toward officers;
    - Do not point, scream, or yell;
    - Do not ask for help from the officers when evacuating;
    - Proceed in the direction as advised by the officers; and

- Provide all relevant information to police.

8. Adverse weather conditions/Natural Disasters

8.1 Flooding and Flash Flood

Flash flooding is a result of heavy localized rainfall such as that from slow moving, intense thunderstorms. Flash floods often result from small creeks and streams overflowing during heavy rainfall. These floods often become raging torrents of water which rip through riverbeds or canyons, sweeping everything with them. Flash flooding can occur within 30-minutes to six hours of a heavy rain event. In hilly terrain, flash floods can strike with little or no advance warning. Distant rain may be channeled into gullies and ravines causing flash flooding in minutes. In the event of a flash flood, the following procedures shall apply:

- During periods of thunderstorms, always remain alert to heavy rains in your immediate area or upstream from your location. It does not have to be raining at your location for flash flooding to occur.
- Do not drive through flooded areas. Even if it looks shallow enough to cross.
- Do not cross flowing streams on foot where water is above your ankles.
- Be especially cautious at night. It is harder to recognize water danger then.
- Do not attempt to outrace a flood on foot. If you see or hear it coming, move to higher ground immediately.
- Be familiar with the land features where you work. It may be in a low area, near a drainage ditch, or small stream.
- Stay tuned to weather forecasts and updates for the latest statements, watches, and warnings concerning heavy rain and flash flooding in the Project Area.
- Waiting 15 to 30 minutes, or until high water recedes, is a simple safety measure.

8.2 Tornado

Upon the issuance of a tornado warning, O&M personnel will evacuate the site and report to the pre-designated shelter area, to be determined prior to O&M personnel arrival. In the event O&M personnel are outside and unable to evacuate to the shelter, the following procedures will be followed:

- Lie flat in a nearby ditch or depression, covering the head with the hands. Be aware of the potential for flooding.
- O&M personnel are safest in a low, flat location and will be instructed to not get under an overpass or bridge.
- O&M personnel will be instructed to never try to outrun a tornado in congested areas in a vehicle. It is safest to leave the vehicle for safe shelter.
- O&M Personnel are instructed to beware of flying debris.

Following tornado or high wind events, the site facility will be evaluated by O&M personnel for damage. All repairs will be performed under standard operational procedures.

8.3 Lightning Storm

In the event a lightning storm is within 10 – 30 miles and approaching the Site, the following procedures shall apply.

- Notify Operations and/or Safety Manager, and all on-site employees.
- Stop work safely and head to staging and laydown yards in vehicles.
- Remain at staging and laydown yards, get update on weather conditions.
- If storm/lighting is still approaching the Project Site, get in and stay in company or personal vehicles that have rubber tires only.
- If safe enough to do so, take cover in on-site designated shelters.
- Once storm passes, remain in cars/trucks for at least 30 minutes depending on passing storm severity, and wait for an "OK" from the O&M Manager or Emergency Response Coordinator in charge of monitoring the storm.

8.4 Hurricane Preparedness Plan

Hurricane season officially begins June 1st and extends through November 30th. National Weather Center is AES Waikoloa Solar's source of hurricane information. All pre-season preparation shall be completed by June 1st each year. The following is an explanation of the notifications from the Weather Center:

- **Advisory:** Hurricanes and storm information is disseminated to the public every six hours.
- **Special Advisory:** Hurricanes and storm information is disseminated when there is significant chance in storm-related weather conditions.
- **Gale Warning:** Sustained winds of 39 - 54 mph and strong wave action are expected.
- **Storm Warning:** Sustained winds of 55 - 73 mph and strong wave action are expected.
- **Hurricane Watch:** A Hurricane may threaten and could affect AES Waikoloa Solar in the next 48 hrs. AES Asset Operations should remain informed of the situation and be prepared to take rapid action in case of a Hurricane Warning.
- **Hurricane Warning:** A hurricane is expected to strike within 24 hours or less, with sustained winds of 74 mph or more and dangerously high water and waves. All preparations should be complete and set in place.

Tropical Disturbance Categories

Category	Wind Speed	Ocean Surge
Tropical Depression	Up to 38 mph	----------
Tropical Storm	39-73 mph	----------
Hurricane Category 1	74-95 mph	4-5 feet
Hurricane Category 2	96-110 mph	6-8
Hurricane Category 3	111-130 mph	9-12

Severe Weather Plan

This plan is a guide for the preparation and communications in advance of and during severe weather affecting the site. This includes administrative and operational

preventive measures which will be in effect in different areas of the site. Guides in this procedure must be coordinated with local utilities and system operators as appropriate. If there is notification that a storm or hurricane may affect AES Waikoloa Solar, the various stages of the plan will be implemented.

Severe Weather Procedures

Stage 1: Pre-season (before June 1st)

1. Prepare a list of possible suppliers.
2. Verify availability of all supplies/material necessary for personal, equipment, and property protection.
3. Keep the site free of loose material and site drainage system in good condition.
4. Verify that all hurricane supplies and emergency handling equipment are safely stored.
5. Establish at least two means of communication for voice communications with other AES personnel and to obtain information regarding the emergency and plant status.

Stage 2: 48-36 hours before landfall

1. The responsible AES personnel will review the nature of the emergency and the status of preparedness of each area following the checklists in this procedure.
2. Site contractors, where appropriate, will be notified of the event and advised to remove equipment or vehicles before the final alert stage.

Stage 3: 36-24 hours before landfall

1. The responsible AES personnel will review the nature of the emergency and the status of preparedness of each area following the checklist in this procedure.
2. Verify with AES O&M Manager that all equipment on site is secure, and all

enclosures are secured and locked, if/when appropriate.

Stage 4: Final Alert (24-0 hours before landfall)

3. Coordinate with the local utility and system operator all procedures to follow.
4. Where single axis trackers are used, plan to manually stow the trackers in their respective safe, wind-stow positions prior to windspeeds reaching the auto-wind-stow trigger and confirm that all trackers have properly stowed in their respective safe positions.

Stage 5: During the storm/hurricane

5. Responsible AES personnel and O&M Subcontractor will be kept informed about the status of the atmospheric disturbance by radio bulletins.
6. Maintenance activities will be stopped. Avoid unsafe operations that may cause personal injury or equipment damage.
7. Maintain contact with the local utility and system operator during emergency as required.
8. If necessary, AES will request the assistance of local Emergency Management Agency, Municipal Fire Dept. and/or Municipal Police.

Stage 6: After the hurricane

1. Visually inspect the surrounding area for damages. Be careful of any loose or falling material. Inspect for leaks or any hazardous material release.
2. Verify facility conditions and equipment in general.
3. Proceed to make and inventory of all damages and generate appropriate work orders. If damage is significant notify AES Operations Director of a potential insurance claim.
4. Replace any emergency equipment/supply that may have been used, in preparation for future use.
5. All off-site personnel will contact the appropriate AES Emergency Coordinator information regarding status of emergency.
6. Return to work will be coordinated at the earliest possible convenience according to an evaluation of the facility's ability to be safely accessed and the facility's needs following the storm.
7. For facility's in construction, as appropriate, be sure to refer to the Storm Water Pollution Prevention Plan (SWPPP) for any required action.

Severe Weather Contingency Plan Check List

1. Secure mechanical equipment on a safe ground and closer to the O&M Shed area.
2. Secure tools and lubricants in a weather-protected, dry area.
3. Verify the PV field and roads are free of debris and components that may be susceptible to hurricane force winds.

8.5 Seismic Event

Earthquakes may strike with little to no advance warning. As such, when an earthquake does occur, it is important to stay as safe as possible. Be aware that some earthquakes are actually fore-shocks and a larger earthquake may subsequently occur. Also, be aware that many earthquakes are accompanied by aftershocks after the main event has occurred. If an earthquake occurs minimize your movements to a few steps to a nearby safe place and if you are indoors stay there until the shaking has stopped and you are sure exiting is safe.

The following actions should be followed for personnel indoors:

- Drop to the ground and take cover by getting under a sturdy piece of furniture and hold on until the shaking stops. If there isn't a desk or sturdy piece of furniture near you, cover your face and head with your arms and crouch in an inside corner of the building.
- Stay away from glass, windows, outside doors and walls, and anything that could fall such as lighting fixtures or furniture.
- Use a doorway for shelter only if it is in close proximity to you and if you know it is a strongly supported load-bearing doorway.
- Stay inside until the shaking stops and it is safe to go outside.

The following actions should be followed for personnel outdoors:

- If you are already outdoors stay there.
- Move away from buildings, structures, light poles, and utility wires.

Once in the open stay there until the shaking stops to prevent being hit by falling debris.

Following seismic events, the site facility will be evaluated by O&M personnel for damage. All repairs will be performed under standard operational procedures.

8.6 Wildfire Threat

The Projects is designed and constructed in a manner that the access roads throughout the site will serve as fire breaks to limit the potential spread of a fire event within the site. Good housekeeping procedures will be followed to remove extraneous flammable materials. The site will be largely free of combustible vegetation with only a ground cover of maintained vegetation adjacent and beneath the solar tracker.

Flying embers from off-site fire may inundate the Project area during fire events. Ignition of the ground cover could result in a fast moving, but lower intensity fire that burn in a patchy manner on the site beneath. The vegetation on the Gen-tie line right-of-way will be cleared around poles and access roads, where not prohibited by environmental constraints. While this type of fire would be relatively short-duration as vegetative fuels are consumed rapidly, surrounding wildfires could be a sustained source of heat and or flames.

In the event of a vegetation fire under or near the modules, BESS or inverters:

- Field personnel shall immediately call "911" and ROCC and report the fire to EHS and Team Leaders.
- For small, isolated fires, the field personnel will safely attempt to shut down inverters.

- For large, and fast-moving fires the following actions will be taken by ROCC to minimize further safety concerns for personnel and equipment.
    - Contact Fire Department for dispatch, if field personnel are unable to do so
    - Assist with any isolation of equipment (i.e., open site breaker)
    - If generation is impacted, contact Hawai'i Electric Light (HELCO)
    - Notify other teams within Company such as the safety, insurance, stakeholders and communication team etc.
    - Complete post fire notification to the transmission and distribution team
    - Restore the unit using the appropriate restoration procedure or switching orders.
- No employee shall fight a fire beyond the incipient stage and the arrival of professional fire suppression personnel.
- Stay upwind and crosswind of the fire while evacuating the area

9. Cybersecurity

Cyber security testing should be an integral part of the energy storage system lifecycle; systems should be secure by design. Once in operation, ensure continuous secure operation by monitoring, risk assessment and patching.

A process should be created and put in place to ensure continuous hardening of the energy storage system. The principle of hardening is making sure that the attack surface to site and equipment is limited by:

- Only necessary network service ports should be open, others should be closed.
- Only necessary software should be installed on the device, other software should be removed.
- Development environments and source code should not be installed on production devices.
- Remote access protocols that use plain text communication should not be used.
- Software that stores passwords unencrypted should not be used.

Please review and become familiar with the latest revision of "AES Global Cybersecurity Policy" and "AES OT Security Standard."

Acronyms

AC	Alternating Current
AED	Automated External Defibrillator
CAMEO	Computer-Aided Management of Emergency Operations
CHEMTREC	Chemical Shipping Regulation & Incident Support
CFR	Code of Federal Regulations
CPR	Cardiopulmonary Resuscitation
DC	Direct Current
DHS	Department of Homeland Security
EMS	Emergency Medical Services
ERP	Emergency Response Plan
FDC	Fire Department Connection
HAZMAT	Hazardous Materials
ICS	Incident Command System
MSDS	Material Safety Data Sheets
NESC	National Electric Safety Code
NFPA	National Fire Protection Association
NRC	National Response Center (U.S. EPA)
NWS	National Weather Service
OSHA	Occupational Safety and Health Administration
O&M	Operations and Maintenance
PPE	Personal Protective Equipment
SDS	Safety Data Sheets
SERC	State Emergency Response Commission
SME	Subject Matter Expert

Extreme Heat

Prevention: Follow prevention procedures in AES-STD-OHS30 - Heat and Cold Stress Prevention and 30 - AES CE OPS EHSS (Heat Stress Prevention) Clean Rev. 0

Preparation: Ambient outdoor temperatures can exceed 100°F. Such temperatures pose a serious threat to the employees' health. Work should be scheduled for cooler parts of the day in warmer months. Work

pace should be moderate, with
frequent breaks. Ice, water, and air-conditioned areas are available to all workers. All workers are trained to recognize the signs of heat illnesses and respond to them appropriately. Training is conducted at hire, and periodically throughout the year. An ice machine produces and stores ice at the O&M and is available to all AES personnel and contractors. Bottled water is also available at the O&M for all workers, and stock is maintained by site lead. Workers are also instructed to:

- Drink plenty of fluids
- Eat “light” foods, avoiding sugars
- Wear a hat
- Keep shirts on
- Take breaks/rest periods in a cool environment air-conditioned vehicle

Response: If an extreme heat event occurs, work may be stopped if it is deemed unsafe or unhealthful. Workers are
expected to stop work anytime symptoms of heat illness present in the field. Workers should watch for signs of heat illness including heat cramps, heat exhaustion (cool, moist skin with goose bumps when in the heat, heavy sweating, faintness, dizziness, fatigue, weak, rapid pulse, low blood pressure upon standing, muscle cramps, nausea, headache), and heat stroke (high body temperature, alteration in mood or behavior, hot, dry skin, flushing, nausea, vomiting, headache, rapid heart rate, rapid breathing, loss of consciousness).

- In the event of heat cramps:
    - Move to a cooler location, and rest or cool down
    - Drink clear juice or an electrolyte containing drink
    - Practice gentle range-of-motion stretching and gentle massage of the affected muscle group(s)
    - Rest from strenuous activity for several hours or more after cramps subside
- In the event of heat exhaustions:
    - Rest in a cool place (shaded, ventilated area, or air-conditioned building/vehicle)
    - Drink cool fluids, such as water or electrolyte drinks
    - Loosen clothing
    - Utilize cooling measures (fans, wet compresses, ice packs, etc.)
    - Seek medical attention if symptoms do not improve within an hour.
- In the event of heat stroke:
    - Activate EMS ***IMMEDIATELY***
    - Move victim to cool environment and loosen clothing
    - Actively cool victim with any means available (fans, douse with water, immerse in water, place ice packs in groin and under arms, etc.)
    - Monitor pulse and respirations, be prepared to perform CPR if necessary
    - Heat stroke requires professional medical treatment every time

Severe Thunderstorms

Prevention: None.

Preparation: Severe thunderstorms include heavy rain, hail, lightning, and tornadoes. Lightning is the greatest danger during a severe thunderstorm. Emergency supplies are located at the O&M. Back-up generators are installed at the O&M and substations to allow for continued site communication in the event of a power loss. Storms are tracked and monitored using INDJI.

Response: Workers are notified of inclement weather or storms via text messages sent by INDJI. In the event of a severe thunderstorm, site personnel must:

1. Remain indoors

2. Stay away from open doors or windows, metal pipes or electrical appliances
3. Immediately climb down from all turbines, towers, or poles
4. Lower all heavy equipment booms, retract outriggers, and exit man baskets
5. Watch for flash flooding

All personnel will prepare to leave the field when lightning is in the 50-mile watch zone and will leave the field in the event lightning enters the 30-mile warning zone. If a site-wide evacuation is necessary, the Team Leaders or designated person will call all workers to one of the muster points, account for all personnel, and ensure they are able to leave site safely, or shelter in place.

Earthquakes

Prevention: None

Preparation: Ensure emergency response supplies are stocked and accessible, including first aid supplies, flashlights, water, and communication equipment.

Response:

1. **Stay in the building**. Many injuries occur while people run through the building to the outside. It is possible to be hit by flying objects, falling plaster or other debris.
2. Assist any handicapped person and find a safe place for them.
3. **Drop, cover and hold.** Try to take cover under a table or other sturdy furniture. Kneel, sit or stay close to the floor. Hold onto furniture legs for balance. Be prepared to move with your cover and face away from windows. Doorways may not be the safest location for protection. If you are outside, stay outside. Go to a clear area away from buildings, trees and power lines

Field Response:

1. Move to an open area away from power lines and poles
2. Get low to the ground and balance yourself. The ground may move violently for several minutes

Immediately AFTER the earthquake:

1. Be prepared for aftershocks. Although usually less intense than the main quake, they can cause further damage
2. Remain at your designated rendezvous location until you have answered to a roll call by a manager**.** **Do not** leave the premises until accounted for and given permission to do so by a manager. Valuable time could be wasted searching for personnel that have not followed correct procedures. You may be directed to return to the AES office location.
3. Only members of management can declare the state of emergency over and give permission to leave the designated rendezvous location or the AES shelter area
4. Gas leaks might be present. Do not use lanterns, torches, lighted cigarettes or open flames
5. If fire is caused by the earthquake, implement the fire procedures

Material Spills

Prevention: All AES workers are trained in spill prevention, control, and countermeasures (SPCC), and all site personnel will operate withing the parameters of the program for each respective site. The programs are available at:
SiteDocs2023>Resources>-SPCC

Preparation:

Material spills can be classified into two distinct categories: ***incidental releases*** and ***emergency releases***.

Incidental Releases

- Incidental releases are small, isolated releases of chemicals, such as cleaning solvents, which do not present or have the potential to cause injuries or require evacuation other than from the immediate release area. Incidental spills can be cleaned up by personnel who have received proper training under the AES global standard and have the proper safety equipment. Incidental releases do not require the response of emergency personnel and/or local fire department.

Emergency Releases

- Emergency releases are incidents that involve large quantities of chemicals and/or have the potential to cause injuries. A release that requires the response of an outside vendor, emergency personnel and/or local fire department is an emergency release.

Safety Data Sheets (SDS) for all chemicals used at O&M can be obtained in SiteDocs>Resources>SDS

Response:

If a spill or leak occurs in conjunction with a fire, workers must **IMMEDIATELY** evacuate the area and notify the fire
department. First responders **MUST** be informed of the chemicals released in the area, and provided with SDS sheets if requested

Employee Procedures for Material Spills:

1. Do not come-in contact the chemical
2. If the spill or vapors may cause an immediate threat to human life or health, evacuate the area IMMEDIATELY
3. If spill isn't immediately hazardous to life or health, unnecessary personnel should leave the immediate area.
4. Visitors, contractors and handicapped personnel in the area may need help exiting.
5. Anyone who is contaminated by the spill should avoid spreading the contamination
6. Seal-off area to prevent contamination of others. If the product is known, obtain and consult the SDS, and follow the guidelines found therein
7. Initiate washing-off and first aid for anyone who has been contaminated by the spill
8. Report the incident to the EHS Regional manager and/or Team Leader. Have the following information available:
    - Type of incident.
    - Injuries
    - Name and quantity of the material, if known
    - Possible hazards to persons or the environment
9. Containment and clean-up will be conducted by trained personnel following the applicable guidelines as shown in the section of this document entitled "Material Spill – Field
10. When the area is secured the person who discovered the spill should notify EHS and their supervisor. Important information that needs to be conveyed to the EHS Manager:
    - Exact location of the spill
    - Volume of material released
    - Rate of release
    - Direction of spill movement
    - Product involved

Personal Protective Equipment (PPE): For most small spills, personal protective equipment may be limited to chemical resistant gloves, protective eyewear and an apron. (Consult the SDS for handling instructions.)

Control the Spill: Stop the flow of material releasing, if possible, e.g., close valves, tighten hose

connections, plugging a hole or breach, or righting a tipped container.

Contain the Spill: Where “control the spill” refers to stopping the release at the source, “containing the spill” refers to stopping the movement of the spilled material once it has been released. Spill containment may include such things as using dirt dikes for ground related spills or temporarily sealing any openings in the bedplate for nacelle related spills.
Absorbent pads and/or absorbent media such as “Bio sweep” or equivalent compounds can be used

Clean Up: We use two basic means for cleaning up a spill. The material may be recovered and absorbed. Once the spill is cleaned up, the debris generated during this operation needs to be disposed of properly. Also, any contaminated equipment (including personal protective equipment) and personnel must be decontaminated

Recovery

Interior / Exterior Cleanup (WATER): The recovery of water generated from interior/exterior tower cleanup requires appropriate equipment, such as a special vacuum unit (e.g., bilge pump).
Exterior Cleanup (SOIL): Cleanup of contaminated soil may include the use of a shovel and or backhoe. All soil with visible traces of contamination must be removed and placed in DOT approved drums.

Absorption

- Absorption of a spill requires the use of a material that will not react with the spill but will soak it up; collecting it into a form that may be safely handled. The standard issue rags are used for interior spills.

Containers.

- All materials recovered from a spill must be placed in DOT approved containment drums. Each container must be labeled before use

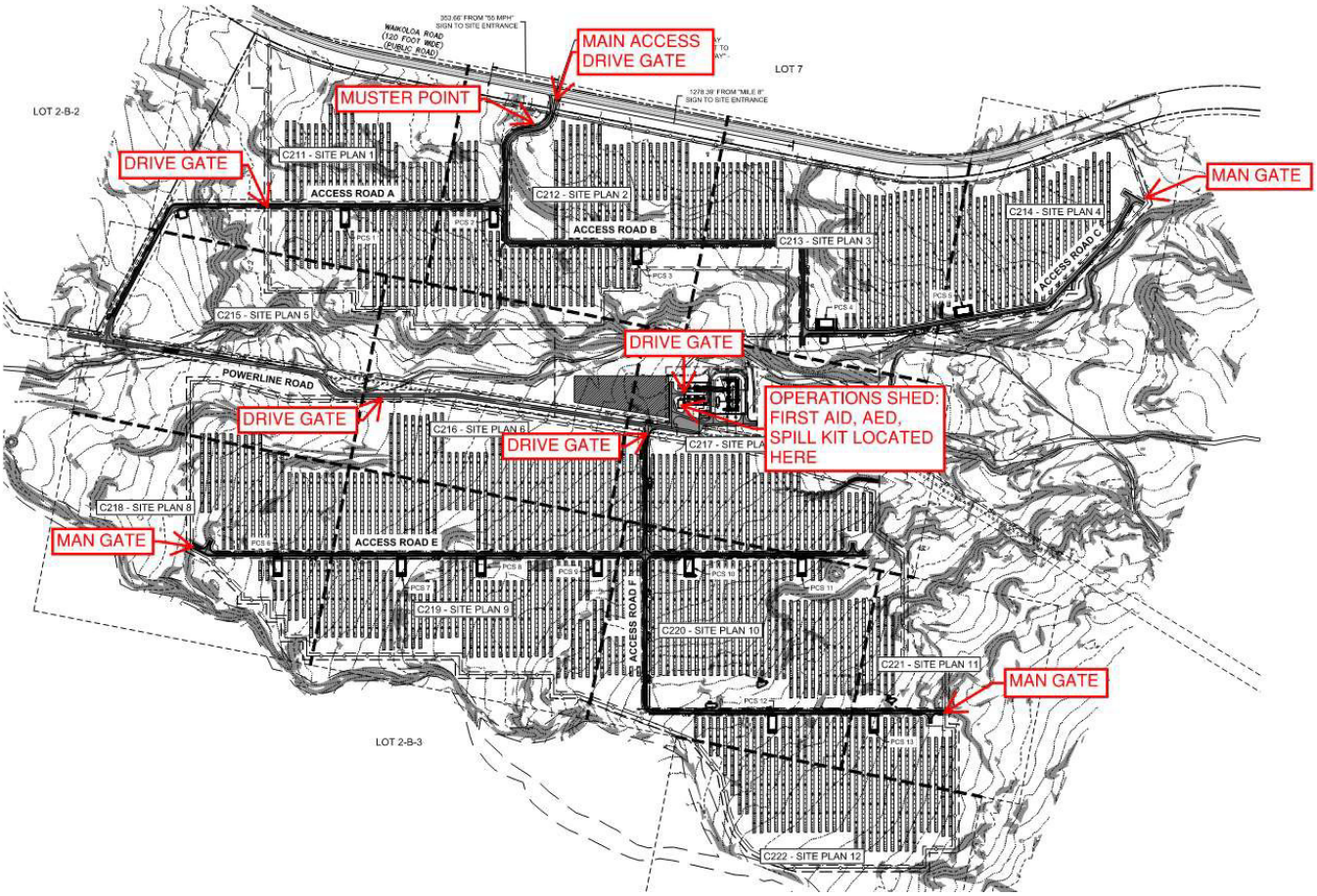
Decontamination.

- The equipment and personnel decontamination are typically very easy. The following is a simplified overview of decontamination procedures. The actual steps taken should be appropriate for the materials/substances being handled during the spill cleanup. SDS’s give specific recommendations on decontamination.
- PPE (e.g., gloves) utilized during clean up, must be properly disposed of. Gloves should be inverted so that contamination is “contained” inside the glove. Tools may also be washed in a mild soap and water solution.
- If an employee meets a hazardous or potentially hazardous substance, the affected area should be washed, using plenty of water and a mild soap (for skin).

Reporting: The requirements of the appropriate SPCC (Spill Prevention Control & Countermeasure) plan must be followed.
Hazardous Waste Transportation: Certified waste transporters must be used when transporting waste to a disposal/collection site. AES uses DOT approved hazardous material contractors. All transported materials are documented via hazardous material manifest and if applicable reported to the appropriate regulatory agencies.

Appendices

Appendix 1: Map of Site



Appendix 2: Intentionally Blank

Appendix 3: Referenced Titles and Roles

Note that some of these responsibilities may be combined within the duties of single individuals.

Company Regional Manager: A Company Regional Manager is an individual not directly responsible for the day-to-day operation of the site, nor for the immediate response during or immediately after an emergency, but who does bear responsibility for post-event assessment and broader planning, recovery, and learning from experience. The Regional Manager would typically bear the responsibility for ensuring incident records are maintained. Such a manager should also ensure a safety-based culture pervades across sites and ensure that O&M Managers are ensuring that training for safety is at the core of operations.

Emergency Response Contractor: An Emergency Response Contractor is an outside organization or individual who is contracted to undertake certain aspects of emergency response (e.g. spill management) but is not otherwise responsible for the strategic coordination of a response, nor is part of typical operation of a site. Care should be taken to ensure such contractors understand the broader picture of site safety and are aware of broader emergency response protocols (such as, but not limited to, the breadth of topics covered in this Plan).

Emergency Response Coordinator: The Emergency Response Coordinator takes control of the emergency and any resources necessary until the emergency has been eliminated and the necessary cleanup and/or restoration are complete. This person shall lead the incident reporting. The emergency response coordinator is typically the O&M Manager; in her/his absence, the Lead Technician or other designated person shall assume this role. All personnel on site shall know who the Emergency Response Coordinator on duty is during their time on site. Remote operators shall likewise know who the Emergency Response Coordinator is for any given shift.

The Emergency Coordinator or a designee will be responsible for notifying the appropriate regulatory agencies and, if necessary, the Emergency Response Contractor or mutual aid groups. Appendix 4 includes a list of emergency contacts and agencies that may be notified in the event of an emergency. The incident will be documented and kept on file.

The Emergency Response Coordinator will direct the following activities during an emergency:

- Ensure the safety of all personnel.
- Evaluate if operations in the affected area should be shut down.
- Take precautions to prevent or limit the spread of fire or explosions.
- Isolate affected area and provide direction for radio announcements.
- Determine the source/cause of the emergency and evaluate the primary and secondary hazards to allow a full-scale, safe response.
- Ensure that appropriate internal and external notifications are made.
- Coordinate outside assistance from public or private organizations.
- Implement other appropriate response provisions as necessary.

The Emergency Response Coordinator should be accredited in accordance with NFPA 70/70E and the National Electric Safety Code (NESC). If s/he is not, someone who is (e.g. the O&M Manager) must be present in emergencies to interface with electrical equipment above 50 volts.

Incident Commander: The on-scene ranking officer, representing the agency with incident jurisdiction. The Incident Commander authorizes incident objectives and strategies that collectively delineate a course of action.[1] The Fire Department designates an Incident Commander as the primary incident manager; it should not be used by civilian organizations that are operating at an incident with emergency responders.

O&M Manager: The Operations and Maintenance Manager is the individual responsible for the normal operation and upkeep of the energy storage system on a day to day basis. This includes standard operating conditions and routine scheduled or responsive maintenance activities.

Lead Technician: A Lead Technician is an on- or off-site individual responsible for the operation of a site from a performance and technical perspective. Such responsibilities may lie with the O&M Manger or with a remote operator.

Site Manager: A Site Manager supervises the personnel for a site. The Site Manager is ultimately responsible for implementation of the company's written procedures and practices.

Subject Matter Expert (SME): An individual and designated secondary contact with detailed working knowledge of the energy storage system and incident command systems. The SME should have ready access to information on state of the system, status and meaning of alarms, etc. The SME's contact information must be available to the Emergency Response Coordinator and first responders, as well as others via information on the emergency information notice board.

[1] Federal Highway Administration. *Glossary*. https://ops.fhwa.dot.gov/publications/ics_guide/glossary.htm

Appendix 4: Emergency Contacts

TITLE	INDIVIDUAL	TELEPHONE NUMBER
Remote Operations Control Center (ROCC)	24HR Operator On Duty	[redacted]
Emergency Coordinator	[redacted]	[redacted]
Subject Matter Expert	[redacted]	[redacted]
Team Lead	[redacted]	[redacted]
Company Regional Manager	[redacted]	[redacted]
Company Asset Manager	[redacted]	[redacted]

Emergency Services & Contactors	Telephone Number
OFFSITE EMERGENCY ASSISTANCE Fire/Police/Ambulance State Police Hospital: North Hawaii Community Hospital 67-1125 Mamalahoa Hwy, Waimea, HI 96743	 911 911 808-885-4444
AGENCY NOTIFICATIONS National Response Center HEER Office as the administrative contact for HSERC Local Emergency Planning Committee (LEPC): Hawaii County	 800-424-8802 Reportable quantities https://health.hawaii.gov/heer/reporting/how-to-report-a-release-spill/ Phone Numbers (808) 586-4249 (7:45am – 4:30pm Monday to Friday) or (808) 236-8200 (after hours which includes weekends, holidays and after 4:30 weekdays) Timeline for reporting Verbal (Immediately) Written Online Report (within 30 days) https://eha-cloud.doh.hawaii.gov/epermit/app/#/formversion/075c31bd-38c2-48a7-a2ec-30b0d879ade4 Gerald Kosaki, LEPC Chair Hawaii County LEPC 277 Kapualani Street Hilo, Hawaii 96720 Phone:(808) 936-8181 gkosaki@hawaii.rr.com
ADDITIONAL ASSISTANCE Police Department (non-emergency) State Poison and Drug Center U.S. Pipeline & Hazardous Material Safety Administration help line	 808-887-3080 808-999-9999 1-800-467-4922 infocntr@dot.gov

Appendix 5: Incident Report Form

HAZARDOUS MATERIALS INCIDENT REPORT

INITIAL CONTACT INFORMATION

(Check one): _____REPORTED/ACTUAL INCIDENT _DRILL/EXERCISE

1. Date/Time of Notification: _____Report received by: _____
2. Reported by (name & phone number or radio call signs): _____
   _____
3. Company/agency and position (if applicable): _____
4. Incident address/descriptive location: _____
   _____
   _____
5. Agencies at the scene: _____
   _____
6. Known damage/casualties (do not provide names over unsecured communications): _____
   _____
   _____

CHEMICAL INFORMATION

7. Nature of emergency: (check all that apply)
   ____Leak ____Explosion ____Spill ____Fire ____Derailment ____Other

   Description: _____
   _____
   _____
   _____
8. Name of material(s) released/placard number(s):_____
9. Release of materials:
   _____Has ended _____Is continuing. Estimated release rate & duration:_____
10. Estimated amount of material which has been released:_____
11. Estimated amount of material which may be released: _____

12. Media into which the release occurred: _____air _____ground _____ water
13. Plume characteristics:
    a. Direction (Compass direction of plume):_____c. Color: _____
    b. Height of plume: _____d. Odor:_____
14. Characteristics of material (color, smell, liquid, gaseous, solid, etc) _____
15. Present status of material (solid, liquid, and gas):_____
16. Apparently responsible party or parties: _____

Note: THIS INCIDENT REPORT IS ONLY AN EXAMPLE. IT CONTAINS SOME OF THE INFORMATION REQUIRED TO REPORT AN INCIDENT TO THE SERC. Go to www.ecy.wa.gov/epcra to obtain a reporting form for businesses to submit to the SERC. This form can be used at an incident, if applicable.

ENVIRONMENTAL CONDITIONS

17. Current weather conditions at incident site:
    Wind From:_____Wind Speed (mph):_____Temperature (F): _____
    Humidity (%): _____Precipitation: _____Visibility: _____
18. Forecast:_____
19. Terrain conditions:_____

HAZARD INFORMATION

(From ERP, MSDS, CHEMTREC, or facility)

20. Potential hazards:_____
21. Potential health effects:_____
22. Safety recommendations:_____
23. Recommended evacuation distance: _____

IMPACT DATA

24. Estimated areas/ populations at risk:_____

25. Special facilities at risk: _____

26. Other facilities with HAZMAT in area of incident: _____

PROTECTIVE ACTION DECISIONS

27. Tools used for formulating protective actions
    _____a. Recommendations by facility operator/responsible party
    _____b. *Emergency Response Plan*
    _____c. Material Safety Data Sheet
    _____d. Recommendations by CHEMTREC
    _____e. Results of incident modeling (CAMEO or similar software)
    _____f. Other: _____

28. Protective action recommendations:
    _____Evacuation ____Shelter-In-Place ____Combination ____No Action

    _____Other _____

    Time Actions Implemented

    _____

    _____

    _____

29. Evacuation Routes Recommended: _____

EXTERNAL NOTIFICATIONS

30. Notification made to:
    _____National Response Center (Federal Spill Reporting) 1-800-424-8802
    _____CHEMTREC (Hazardous Materials Information) 1-800-424-9300
    _____State Emergency Response Commission
    _____SERC written follow-up forms

31. Other Information: _____

Source: Washington State Emergency Response Commission. Local Emergency Planning Committee (LEPC) Hazardous Materials Emergency Response Plan TEMPLATE. September 2011. http://www.ecy.wa.gov/epcra

Appendix 6: Bomb Threat Report

*** * * KEEP CALLER ON THE LINE AS LONG AS POSSIBLE! * * ***

Exact words of caller:

_____

_____

Questions to ask the caller:

1. When is the bomb going to explode? _____
2. Where is the bomb right now? _____
3. What kind of bomb is it? _____
4. What does the bomb look like? _____
5. Why did you set the bomb? _____
6. Where are you calling from? _____
7. What is your name? _____

Try to determine the following

IDENTITY: • male • female • adult • juvenile (age? _____)

VOICE: • loud • high-pitched • deep • raspy • pleasant • disguised • broken Other: _____

ACCENT: • local • not local • foreign • regional _____

RACE: • Caucasian • Black • Hispanic • Asian • Other: _____

SPEECH: • educated • average • illiterate • obscene

Other: _____

MANNER: • calm • angry • rational • irrational • coherent • incoherent • deliberate • self-righteous • laughing • intoxicated

BACKGROUND NOISES:

office machines factory machines bedlam trains quiet

Appendix 7: Bomb Threat Checklist

Mail Threat:
_____1. Handle documents as little as possible to preserve fingerprints. _____2. Hand deliver immediately to O&M Manager.
Phone Threat:
_____1. Complete Bomb Threat Form. _____2. Deliver completed form to O&M Manager. _____3. Notify Supervisor immediately.
O&M Manager:
_____1. Gather all information regarding threat. _____2. Decide upon course of action. _____3. Coordinate searches with proper authorities.
Suspicious Objects:
_____1. DO NOT TOUCH OR ATTEMPT TO MOVE! _____2. Notify Police—911.
Evacuation:
_____1. Announce over public address system, give location where to assemble. Do not use the radio. _____2. Enlist volunteers to remain and shut down site.
Re-entry:
_____1. Determined based on: _____a. “All-clear” given by bomb disposal unit. _____b. O&M Manager’s judgment that danger is passed. _____2. Full report prepared.

Appendix 8: Chemical/Biological Agent Threat Report

*****KEEP CALLER ON THE LINE AS LONG AS POSSIBLE*****

Exact words of caller:

_____

_____

Questions to ask the caller:

1. What chemical or biological agent is it? _____
2. When is the agent going to be released? _____
   (date) (time)
3. Where is it right now? _____
   (Building) (Floor) (Room)
4. Who put it there? _____
5. What does it look like? _____
6. What will cause it to spread? _____
7. What will trigger it? _____
8. Where did you get the agent? _____
9. Why are you doing this? _____
10. What is your name? _____
11. What is your telephone number and address? _____

Try to determine the following

IDENTITY: • male • female • adult • juvenile (age? _____)

VOICE: • loud • high-pitched • deep • raspy • pleasant

• disguised • broken • Other: _____

ACCENT: • local • not local • foreign • regional: _____

RACE: • Caucasian • Black • Hispanic • Asian

Other: _____

SPEECH: educated average illiterate obscene

Other: _____

MANNER: • calm • angry • rational • irrational • coherent

• incoherent • deliberate • self-righteous • laughing • intoxicated

BACKGROUND NOISES:

• office machines • factory machines • bedlam • trains • quiet

• voices • mixed sounds • airplanes • music • traffic

• party Other: _____

If the voice is familiar to you, who did it sound like? _____

Additional Information: _____

_____

Date[redacted] a.m./p.m. Received by: ___

Appendix 9: Chemical/Biological Agent Threat Checklist

Mail Threat:
_____1. Handle documents as little as possible to preserve fingerprints. _____2. Hand-deliver immediately to O&M Manager.
Telephone Threat:
_____1. Complete the Chemical/Biological Threat Report form. _____2. Deliver completed form to O&M Manager immediately.
O&M Manager:
_____1. Gather all information regarding threat. _____2. Decide upon course of action.
Searches:
_____1. Comprehensive—To be conducted by trained law enforcement personnel only.
Suspicious Objects:
_____1. Do not touch or attempt to move. _____2. Notify police.
Evacuation:
_____1. Make a site-wide announcement and give location where to assemble. **_____2. Enlist volunteers to remain and shut down site.**
Re-entry:
_____1. Determined based on: **_____a. "All-Clear" given by competent authority.** **_____b. O&M Manager's judgment that danger has passed.** **_____2. Full report prepared.**

Record of Revisions

Change #	Date of Change	Substance of Change	Entered By
V0.0	06-13-2023	Final Draft	[redacted]
V1.0	09-20-2024	Final	[redacted]
V2.0	09-27-2024	Included Section 8.6, Vegetation Fire	[redacted]

Exhibit L

Kaawanui Decommissioning Plan

DECOMMISSIONING PLAN

Kaawanui Solar Project

Kaawanui Solar, LLC

November 2025

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1. INTRODUCTION

Kaawanui Solar, LLC, a subsidiary of AES Clean Energy Development, LLC (AES), plans to complete decommissioning of the Kaawanui Solar project (Project) and restoration of the Project site at the end of the Project's operational life. The Project consists of a solar photovoltaic (PV) energy generation system and battery energy storage system (BESS), AES Hawai'i Substation, and other ancillary facilities. The Project site, located in Makaweli on the island of Kaua'i, is on land owned by the Robinson Family Partners (Landowner) and managed by Gay & Robinson, Inc. (G&R). It is within the boundaries of the State of Hawai'i's agricultural land use designation and the County of Kaua'i's Comprehensive Zoning Ordinance agricultural and open districts. This decommissioning plan (Plan) describes the general measures and procedures to be developed and implemented to decommission the Project, including the removal of all Project-related equipment and materials and the restoration of the property to substantially the same physical condition as existed prior to Project construction at the conclusion of operations.

1.1 Decommissioning Requirements

Decommissioning will occur after operations conclude. This Plan outlines a typical program for decommissioning and restoration work at the end of the Project life cycle that satisfies Hawai'i state law requiring decommissioning for solar energy facilities as "Permissible uses within the agricultural districts" per Hawai'i Revised Statutes (HRS) Chapter 205-4.5(a)(21), which requires:

"(B) Proof of financial security to decommission the facility is provided to the satisfaction of the appropriate county planning commission prior to date of commencement of commercial generation; and

(C) Solar energy facilities shall be decommissioned at the owner's expense according to the following requirements:

(i) Removal of all equipment related to the solar energy facility within twelve months of the conclusion of operation or useful life; and

(ii) Restoration of the disturbed earth to substantially the same physical condition as existed prior to the development of the solar energy facility."

Prior to commencing decommissioning activities, AES will verify with the local, state, or federal agencies any additional requirements related to then-current applicable laws and standards and submit a revised decommissioning plan if required.

1.2 Project Description

The Project will be constructed on approximately 225 acres of land and is located mauka of Kaumuali'i Highway and Pākalā Village (Figure 1). The Project site consists of portions of Tax Map Keys (4) 1-7-006:006 and 010 (owned by Robinson Family Partners). The Project site consists of undeveloped land that has been intermittently grazed since the end of the sugar plantation days.



Figure 1. Project Vicinity Map

The Project is a solar energy facility that includes a 43-megawatt (MW) ground-mounted solar PV system coupled with a 172 MW-hour (MWh) BESS, underground and overhead electrical lines, a AES Hawai'i Substation, and Kaua'i Island Utility Cooperative (KIUC) owned interconnection facilities. The Project is targeting Commercial Operations in 2028. AES will construct the interconnection facilities, including Kaawanui Substation, as part of the Project; however, the ownership of these facilities will be transferred to KIUC following construction of the solar energy facility. Therefore, the proposed KIUC-owned facilities are not part of this Plan.

The major design features of the Project are outlined below (subject to change as design is finalized):

- 545-Watt (nominal) output, bifacial PV modules
- Single-axis tracker racking system, including steel posts and frames to support the modules
- Eleven (11) inverters on Power Conversion Station (PCS) pads, along with eleven (11) medium voltage step-up transformers.
- Twenty-two (22) lithium-ion battery units, each comprised of two 40-foot storage containers housing the individual battery modules set on 9-module racks, auxiliary equipment, auxiliary transformers, chillers, and associated data collection equipment for metering and monitoring. all located in the BESS yard adjacent to the AES Hawai'i Substation.
- Medium-voltage underground electrical collector line
- On-site 35,000 square foot (0.8 acres) AES Hawai'i Substation with two (2) generation step-up (GSU) transformers, circuit breakers, transformers, a prefabricated control enclosure, and other equipment.
- Internal access routes of compacted gravel bed up to 16 feet wide with compacted 4-foot-wide shoulders for a total of up to 20 feet wide.
- Storage container on a concrete pad
- Perimeter fencing and gates

2. FACILITY DECOMMISSIONING

2.1 Overview

The Project will operate under a Power Purchase Agreement upon commencement of commercial energy generation. The PPA term with KIUC is 25 years. Within 12 months of the operation's conclusion, the Project will be decommissioned, and the equipment and materials will be removed. All the planned decommissioning activities will commence after the Project site has been de-energized and secured.

2.2 General Environmental Practice Standards

During decommissioning activities, all applicable laws and regulations will be adhered to, and the current environmental standards in effect at the time of facility decommissioning will be implemented as required. Many activities during the Project decommissioning phase will be comparable to the construction phase, including the use of heavy equipment on-site and preparation of staging areas, as well as implementation of best management practices such as fugitive dust control measures, earthwork-related soil erosion and sediment controls, stormwater runoff pollution prevention, and stabilization of disturbed areas around all removed project infrastructure.

2.3 Pre-Decommissioning Planning

Decommissioning and restoration activities will be performed in accordance with all applicable regulatory requirements in place at the time of decommissioning, in accordance with the Project's permits and approvals (as applicable), and obligations in the easement agreement with the Landowner. Prior to execution of the decommissioning activities and given that regulatory requirements could change over the operational life of the Project, the applicable permitting and approval requirements will be reviewed with the appropriate local and state governmental agencies to ensure then-current regulatory compliance. AES will coordinate and provide advance notification to local and state governmental agencies, the Landowner, and KIUC prior to the initiation of decommissioning activities.

2.4 Disassembly

Decommissioning will involve the removal of all equipment and materials associated with the Project site and returning the Project site to substantially the same physical condition as existed prior to the development of the solar energy facility (Figure 2). The Project decommissioning work will be conducted in accordance with then-current industry standards, with all equipment and materials treated according to the highest and best use.



Figure 2-1 Preconstruction Photo 1



Figure 2-2 Preconstruction Photo 2



Figure 2-3 Preconstruction Photo 3

Decommissioning would commence once the Project has been fully de-energized and isolated from all external electrical connections, in coordination with KIUC. Consistent with the measures described for the construction and operation of the Project, BMPs would be implemented and maintained throughout the decommissioning phase as needed to avoid and minimize potential impacts to the surrounding environment, particularly those related to dust, erosion, and stormwater runoff.

Once the site has been adequately prepared, decommissioning will include the dismantling and removal of the following components: (1) solar PV modules and racking system, including steel posts, (2) PCS including inverters and transformers, and other auxiliary equipment, (3) AES Hawai'i Substation and related components including communication, operations, and security equipment, (4) BESS, including battery units and battery modules (5) electrical wiring and connections, (6) fencing and gates. Other Project components, such as mobile storage containers and a mobile operations trailer, will be removed from the Project site.

Decommissioning of electrical components may include, where necessary, obtaining required regulatory permits or approvals and following applicable safety procedures before de-energizing, isolating, and disconnecting the electrical equipment and wiring/cabling. Decommissioning of electrical equipment and wiring/cabling will be in accordance with applicable local, state, and federal regulations and then-current environmental standards.

Where applicable, foundations would also be removed to at least 36 inches below grade, and piles would be fully extracted.

Additional details for decommissioned Project components can be found in Section 2.5.

2.4.1. Solar PV Modules and Racking Systems

Once the site is mobilized, disassembly of the solar PV modules will begin immediately and proceed sequentially. These activities entail disconnecting and removing modules and PV harness wiring from the racking system. PV module disassembly includes labor to remove modules and PV wiring from the support system, equipment and tools needed to support module removal, labor and materials to secure modules for shipping, and loading the components onto transport trucks. All the solar PV modules will remain fully intact and packaged for transport. The connecting cables and combiner boxes will also be disconnected and removed from the Project site.

The metal racking systems supporting the solar PV modules will be unbolted and disassembled by contractor workers using standard hand tools, possibly assisted by a small portable crane. AES assumes the decommissioning of the racking system would start four to five weeks after PV module removal has commenced. Disassembly of a racking system entails removing all hardware in reverse order from installation. All above-ground racking support structures will be fully disassembled prior to loading onto transport trucks.

The solar PV modules and racking systems will be supported by below-ground steel piles. AES assumes full removal of pile foundations will start five to six weeks after the commencement of racking system disassembly. H-Beam piles installed on-site can be removed by vibration or the yank-and-pull method. All piles below ground will be removed entirely, and, where practical, the metal will be salvaged.

2.4.2. Collection System

A medium-voltage, underground collection system runs through the Project, collecting power generated at the modules and PCS pads and aggregating it down to the AES Hawai'i collector substation. The collection system will be fully decommissioned at the end of the Project's operational life; all cabling will be removed and trenches restored.

The collection system cabling is comprised of DC conductor affixed to the messenger system, underground DC cables, buried AC three-phase cables, copper grounding cable, and fiber cable. Decommissioning the underground collection system includes excavating buried conductors. Once removed, the material will be cut into manageable sections for removal off-site. All excavated material will be returned to the trenches and covered with topsoil post-excavation.

2.4.3. Power Conversion Stations

There are PCS distributed throughout the PV arrays. Adjacent to the PCS will be pole-mounted monitoring/alarm systems and meteorological monitoring stations. The following key steps are required for PCS decommissioning, with all components appropriately prepared and removed for disposal, salvage, recycling, or re-use:

- Disconnect transformers; transformer oil will be pumped out into a separate industry-approved disposal container and sealed to prevent any spillage during storage and/or transportation.
- Remove PCS inverters, transformers, and auxiliary equipment
- Remove concrete foundation pads and/or pile supports as previously noted herein
- Remove adjacent monitoring poles and meteorological measurement stations

A crane will be needed to assist with the transport and loading of decommissioned equipment onto trailer trucks to remove from the site.

2.4.4. Battery Energy Storage Systems

The BESS containers will all be located in the BESS yard adjacent to the AES Hawai'i Substation. Each BESS container will comprise containerized modules including lithium-ion battery modules, environmental control systems, fire prevention/thermal propagation suppression systems, and other components such as lighting and audio/visual alarms. The following key steps are required for BESS decommissioning, with all components appropriately prepared and removed for disposal, salvage, recycling, or re-use:

- Disconnect BESS from PCS equipment, inverters, transformers, and auxiliary power
- Remove battery racks, battery modules, as well as other non-secured components. BESS containers will be removed and remaining components disassembled.
- Remove concrete foundation pads and/or pile supports as previously noted herein

A crane will be needed to assist with the transport loading of decommissioned equipment onto trailer trucks to remove from site.

2.4.5. AES Hawai'i Substation

The Project includes a collector substation designed with typical equipment seen in North American solar PV project substations, GSU transformers and other substation transformers, bus bars, relay

switches, circuit breakers, air disconnect switches, capacitor banks, reactor banks, dead-end structures, and a control building. All equipment, support structures, and concrete foundations will be removed. The following steps are required for the AES Hawai'i Substation decommissioning, with all components appropriately prepared and removed for disposal, salvage, recycling, or re-use:

- Disconnect and remove medium voltage switchgear
- Disconnect and remove sectionalizing equipment and voltage-transformers
- Disconnect GSU transformers; transformer oil will be pumped out into a separate industry approved disposal container and sealed to prevent any spillage during storage and/or transportation
- Disconnect and remove all electrical monitoring sensors and communications equipment in the control building.
- Disassemble the control building, break up and remove foundations
- Remove GSU transformers
- Remove equipment foundation pads and pile supports for remaining equipment
- Remove the grounding grid, fencing materials, cables, and conduits
- Remove the aggregate surfaces

A crane will be needed to assist with the disassembly and transport loading of decommissioned equipment onto trailer trucks to remove from site.

2.4.6. Fences and Gates

The Project infrastructure is secured by a chain-link fence. Prior to the initiation of decommissioning and restoration activities, AES will coordinate with the Project landowner on the extent to which the fencing and gates within the Project site will be removed. All fencing and gates which the landowner does not want to remain will be removed with the assistance of an excavator, including posts, concrete pole foundations, or other related components. Fencing and gate posts will be dismantled and removed for disposal, salvage, recycling, or re-use in parallel to or after other facility decommissioning work (i.e., removal of PV module, racking, PCS, BESS, or substation equipment and materials).

2.5 Removal

Removal of the Project refers to the transportation of Project equipment and construction materials from the Project site to the appropriate landfill, aggregate rework facility, scrap yard, or recycling facility. Proper disposal of construction/demolition debris is crucial to ensure safety, prevent pollution, avoid burdening Kaua'i's limited landfill capacity, and comply with local regulations. Many construction/demolition waste materials can be recycled or reused, thereby conserving resources and reducing the need for landfills.

During decommissioning, the generated waste material will be reused or recycled to the extent feasible and as required by local, state, and federal regulations and then-current environmental standards. The Project decommissioning contractor will also be responsible for ensuring that materials requiring special disposal are managed in accordance with the regulations in effect at the time of disposal. Although hazardous waste is not anticipated on the Project site, any debris containing hazardous materials that require specialized handling and disposal procedures will be managed in accordance with applicable laws and regulations and then-current environmental standards.

It is AES's commitment that no major Project equipment, like PV modules or batteries, will be disposed of in Hawai'i's landfills. Equipment would be refurbished, salvaged, recycled, or repurposed locally for community benefit to the extent feasible and in accordance with applicable laws and regulations. If necessary and as required, components that cannot be reused, salvaged, recycled, or repurposed will be disposed of off-island at solid waste facilities or landfills in accordance with applicable laws and regulations.

During decommissioning, temporary staging of decommissioned Project components may be necessary; however, all components will be removed from the Project site by the end of the decommissioning period, not to exceed twelve months from the last day of Project operation.

3. SITE RESTORATION

3.1 Overview

Following Project decommissioning and removal of all Project equipment and construction materials related to the Project, site restoration will be conducted such that the physical conditions of the Project site are returned to substantially the same condition as existed prior to construction of the Project, per the permit and regulatory approval conditions set forth for the Project and in conformance with the obligations in the site control agreement with the Project landowner. The Project site will be stabilized to minimize the potential for erosion and runoff from the decommissioning of the Project.

3.2 Site Restoration

The site restoration activities include: (1) restoration of interior access routes and staging areas; and (2) soil and vegetation restoration, and erosion control measures.

3.2.1. Interior Access Routes and Staging Areas Restoration

Interior access routes and staging areas will remain until all equipment and materials related to the Project have been removed. Prior to the initiation of decommissioning and restoration work, AES will coordinate with the Project landowner and easement holders (if applicable) to determine if any interior access routes should be removed or should remain for future use. Interior access routes not identified to remain will be removed.

The decommissioning of then-existing interior access routes and on-site staging areas and restoring the disturbed areas will involve the removal of the gravel or other aggregate materials and filling the voids with on-site surface materials. The fill material will be graded to follow the contours of the Project site. The removed gravel or other aggregate materials will be taken to a recycling facility (or materials processed within an on-site recycling area) where the materials can be processed for salvage value or potential reuse.

3.2.2. Soil and Vegetation Restoration, and Erosion Control

Soil restoration may include localized grading and replacement of topsoil to match surrounding/pre-existing elevations, and disking to aerate the soil. Vegetation restoration may also include revegetation and reseeding of disturbed areas, as needed.

For Project decommissioning site restoration work, AES will develop and implement site-specific soil erosion and sediment control plan and/or stormwater pollution prevention plan in accordance with applicable laws and regulations and then-current environmental standards. These site-specific plans will address the installation, maintenance, and inspection of soil erosion, runoff, and sedimentation control measures on the Project sites.

4. SCHEDULE AND FINANCIAL RESPONSIBILITY

Prior to the expiration of the PPA and end of operations, AES will notify the State of Hawai'i Land Use Commission, the County of Kaua'i Department of Public Works, and the State of Hawai'i Public Utilities Commission in writing of the proposed date of discontinued operations of the Project and provide plans for initiation of the facility decommissioning and site restoration work once available.

The Project will be decommissioned at AES's sole expense in accordance with state law. Evidence of financial security to fund the decommissioning costs will be provided to the Kaua'i Planning Commission prior to the commencement of commercial generation. The amount of financial security will cover the cost of decommissioning minus salvage value. The financial security will remain in place for the duration of the Project life cycle.

5. ENVIRONMENTAL, HEALTH, AND SAFETY MEASURES

AES and/or Project decommissioning contractor will prepare and implement an environmental, health, and safety (EHS) plan prior to initiation of the decommissioning and site restoration work at the Project site. AES will review and assess the contractor's compliance with and achievement of the EHS performance requirements.

During operations, the Project will be governed by an Environmental Compliance Plan (ECP), an Emergency Response Plan (ERP), and a Health, Safety, and Security Plan. These project-specific environmental, health, and safety plans will remain active during Project decommissioning and site restoration and will be updated as needed. The EHS plan will outline practical avoidance/control measures or best practices to ensure that the decommissioning and restoration activities do not cause harm to the environment and people.

6. CONCLUSION

While it is difficult to predict what the evolution of the renewable energy industry will look like at the time of decommissioning, AES is committed to responsibly decommissioning the Project at the end of operations. AES will follow all applicable laws and regulations and then-current environmental standards to fully decommission the Project and restore the land to an equivalent or improved condition, as close to the existing condition of the Project area prior to the initiation of construction.

Exhibit M

Natural Resource Assessment

AECOS No. 1868B

Natural resources assessment for the proposed Kaawanui Solar project in Makaweli, Kauaʻi



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October 30, 2025

Natural resources assessment for the proposed Kaawanui Solar project in Makaweli, Kauaʻi

October 30, 2025 *AECOS* No. 1868B

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Executive Summary

Kaawanui Solar is a proposed 43 MW photo-voltaic array paired with 4 hours of battery storage capacity (172 MWh Battery Energy Storage System [BESS]) to be located on Gay & Robinson, Inc. land in Makaweli on the southwest side of Kaua'i. This report presents results of a survey by *AECOS* Inc. of the approximately 269-ac Preliminary Project Study Area comprising mostly fenced agricultural pens and pastures.

The survey included an assessment of all water features (irrigation ditches, streams, and gulches) present in regard to federal and state statutes covering jurisdiction. Only 'A'akukui Stream was determined to be jurisdictional under federal statutes. However, this stream lies adjacent to but not on the subject property. All other features surveyed are classified as non-jurisdictional. Confirmation of our assessment by the U.S. Army Corps of Engineers may be required.

The survey also included an inventory of flora and fauna extant in the Preliminary Project Study Area. Most of the area is pasture-land dominated by grasses. A total of 97 different species of plants—including 6 indigenous and 3 early Polynesian species—were identified. None of the plants observed is listed as threatened or endangered under state or federal statutes.

A total of 25 species of birds were recorded in the avian survey, of which one (Hawaiian duck) is a listed species under federal and state of Hawai'i endangered species statutes. Two other species (Black-crowned Night Heron and Pacific Golden-Plover) are native but not endangered or threatened. No suitable nesting habitats exist in the Preliminary Project Study Area for any endemic waterbirds, so the proposed project will not impact listed waterbird species

All other vertebrates observed are non-native. However, it is possible that the endangered Hawaiian hoary bat (*Lasiurus semotus*) uses resources in the area. Adverse impacts to Hawaiian hoary bat can be avoided or minimized by not clearing woody vegetation taller than 4.6 m (15 ft) between June 1 and September 15, the bat pupping season, and by avoiding the use of barbed wire for project fencing.

Introduction

Kaawanui Solar is a proposed 43 MW photo-voltaic array paired with 4 hours of battery storage capacity (172 MWh Battery Energy Storage System [BESS]) to be located on land managed by Gay & Robinson, Inc. in Makaweli on Kaua'i (the "Project"). *AECOS,* Inc. was contracted by Group 70 International, Inc. on behalf of AES Hawai'i to perform a terrestrial and aquatic biological assessment and jurisdictional waters determination within the "Preliminary Project Study Area" (Figures 1 and 2). This report details findings of our surveys.

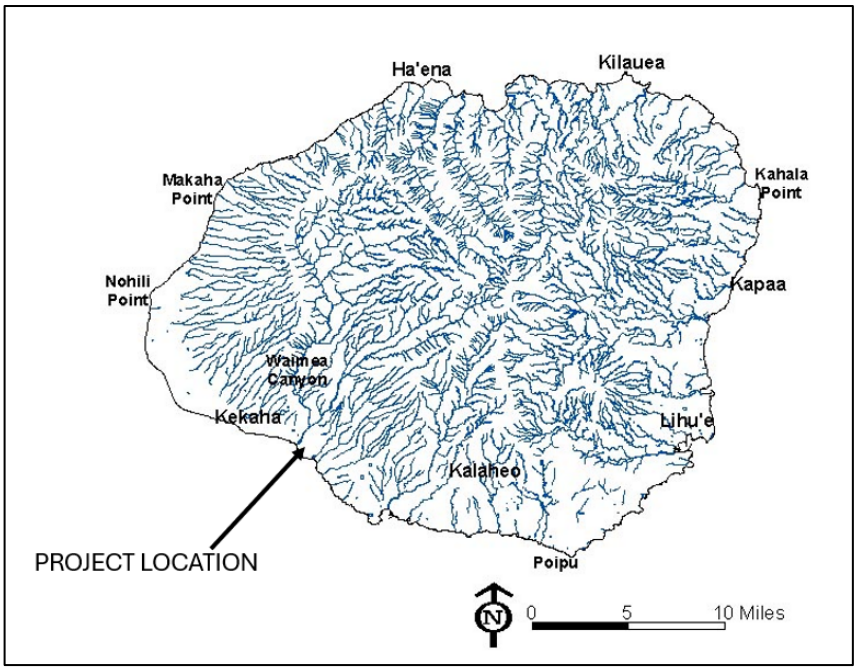

Figure 1. Project location on the Island of Kaua'i.

Site Description

The Preliminary Project Study Area is an approximately 269-ac (109-ha) property located *mauka* of Kaumali'i Highway and comprising mostly fenced agricultural pens and pastures.

The U.S. Fish and Wildlife Service (USFWS), National Wetlands Inventory (NWI) is a nationwide geospatial dataset of wetlands and other surface hydrology features (USFWS, nd-a). The NWI (Figure 3) shows two water features in the Preliminary Project Study Area: a reach of Ka'awanui Gulch labeled as a palustrine wetland (PFO3C), and a remnant irrigation ditch labeled as an upper perennial feature with no connection to the ocean (R3RBH).



Figure 2. Map of the "survey area" (Preliminary Project Study Area) off Kaumali'i Highway in Makaweli, Kaua'i.

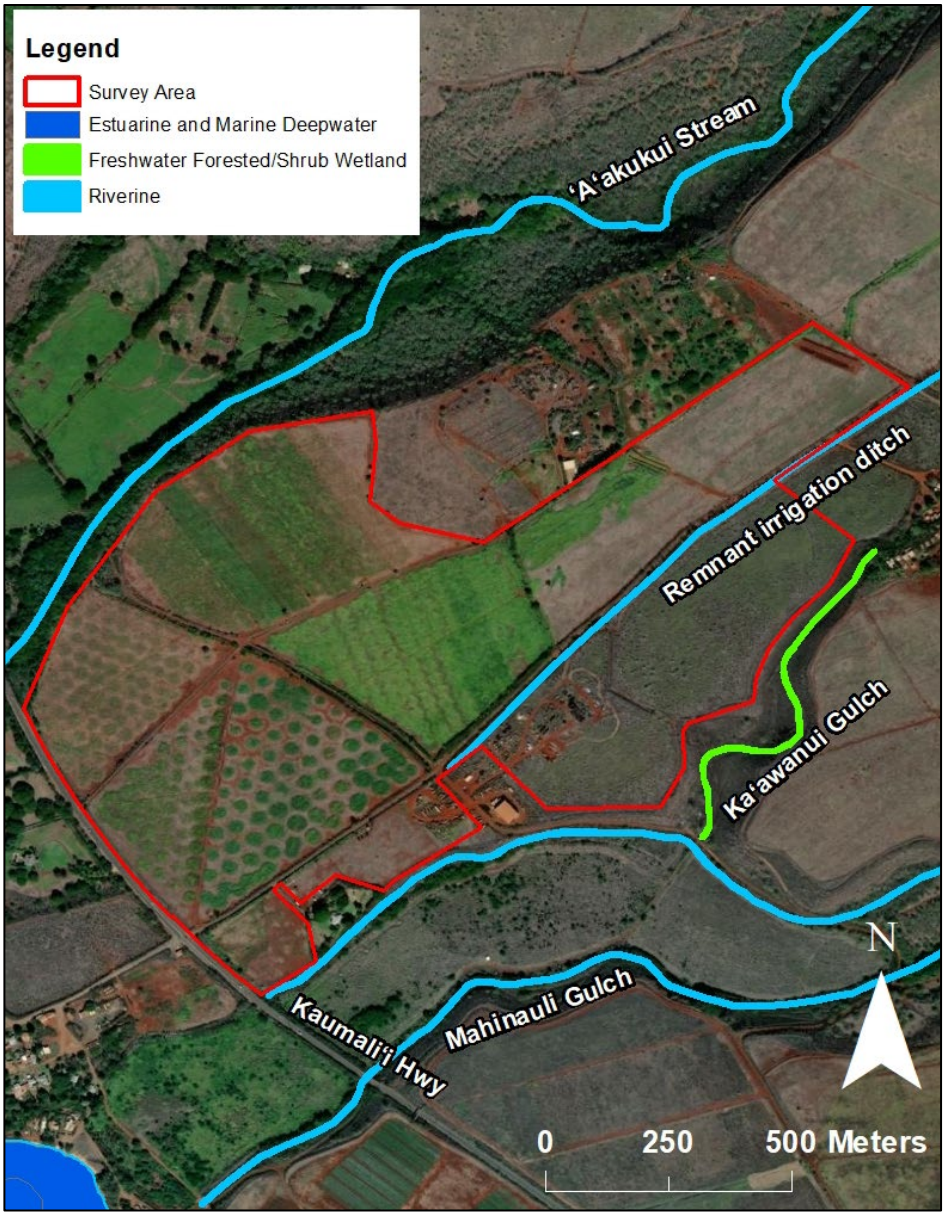

Figure 3. Water features depicted in the National Wetlands Inventory (USFWS, nd-a).

Federal Jurisdictional Waters

Waters of the U.S. (also called "jurisdictional waters") are surface waters that come under federal jurisdiction as authorized by the Clean Water Act (CWA) and the Rivers and Harbors Act (RHA). Authority over these waters is granted to various federal agencies, including the U.S. Environmental Protection Agency (USEPA), with the U.S. Army Corps of Engineers (USACE) having permit authority

for some actions that impact jurisdictional waters. Jurisdictional waters include all tidal waters and a subset of streams, lakes, reservoirs, and wetlands.

Revised Definition of Waters of the US – On March 20, 2023, the final "Revised Definition of 'Waters of the United States'" ("2023 rule") took effect (USACE and USEPA, 2023a). Jurisdictional waters identified in the rule include:

- tidal waters, also known as traditionally navigable waters (TNWs) [(a)(1)(i)][1]
- impoundments of jurisdictional waters [(a)(2)];
- tributaries of TNWs that have relatively permanent water (RPW) [(a)(3)(i)] or tributaries of TNWs that have a significant effect on the chemical, physical, or biological integrity of a TNW [(a)(3)(ii)];
- wetlands adjacent to TNWs [(a)(4)(i)] or wetlands adjacent to and with a continuous surface connection to RPW tributaries [(a)(4)(ii)], or wetlands adjacent to tributaries, provided the wetlands significantly affect the chemical, physical, or biological integrity of a TNW [(a)(4)(iii)];
- other waters not identified above that have RPW and a surface connection to a TNW or RPW tributary [(a)(5)(i)] or other waters not identified above that significantly affect the chemical, physical, or biological integrity of a TNW [(a)(5)(i)].

Non-jurisdictional waters identified in the rule include:

- waste treatment systems, including treatment ponds or lagoons, designed to meet the requirements of the CWA [(b)(1)];
- ditches excavated wholly in and draining only dry land that do not carry RPW [(b)(3)]; and artificial lakes or ponds created by excavating or diking dry land to collect and retain water and are used exclusively for irrigation [(b)(5)].

Although a definition of a tributary is not included in the rule, "tributary" for the purposes of this rule includes rivers, streams, lakes, ponds, and impoundments, regardless of their flow regime, that flow directly or indirectly through another water or waters to a traditional navigable water, the territorial seas, or an interstate water. Waters through which a tributary may flow indirectly include, for example, impoundments, wetlands, lakes, ponds, and streams. A tributary may flow through several downstream waters, including a non-jurisdictional tributary or non-jurisdictional features, such as [an excluded ditch], excluded waste treatment system, and jurisdictional waters that are not tributaries, such as an adjacent wetland" (USACE and USEPA, 2023a; pg. 3080).

US Supreme Court Ruling – On May 25, 2023, a Supreme Court of the US (SCOTUS) ruling, *Sackett v. Environmental Protection Agency* (SCOTUS, 2023),

[1] Numbers and letters given in brackets are from the final rule (USACE and USEPA, 2023a). Waterbody types are referred to by these designations.

ejected the *significant nexus* standard, effectively eliminating jurisdiction over (a)(3)(ii), (a)(4)(iii), and (a)(5)(ii) waters as listed above; revised the "adjacent wetlands" definition; and eliminated jurisdiction over intrastate wetlands.

Revised Definition of Waters of the US; Conforming Rule – On September 8, 2023, the agencies published a conforming rule for the Revised Definition of 'Waters of the United States' ("Conforming Rule; USACE and USEPA, 2023b) to comply with the SCOTUS opinion. According to the Conforming Rule, (a)(3)(ii), (a)(4)(iii), and (a)(5)(ii) waters are no longer jurisdictional and the only jurisdictional wetlands, including intrastate wetlands, are ones that are adjacent (meaning they have a continuous surface connection) to bodies that qualify as WOTUS in their own right.

The extent of federal jurisdiction for tributaries is drawn at the Ordinary High Water Mark ("OHWM"). OHWM is defined as "…that line on the shore established by the fluctuations of water and indicated by physical characteristics such as a clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas" (USACE and USEPA, 2023b).

Wetlands are defined as those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar features characterized by wet ground (USACE, 1987; USACE and USEPA, 2023a).

Hawaiʻi State Waters

Unlike many other states, Hawaiʻi does not have an independent permitting program for state waters that are not regulated as waters of the U.S. Due to recently frequent changes in the definition of waters of the U.S. (e.g., the Clean Water Rule of 2015, the Navigable Waters Protection Rule of 2018, the Revised Definition of Waters of the U.S. of March 2023, the U.S. Supreme Court decision of May 2023, and the conforming rule of 2023), Hawaiʻi State agencies have begun to evaluate whether certain waterbodies are state waters, independent of whether they are waters of the U.S.

State waters fall under jurisdiction authorized under Hawaiʻi Revised Statutes (HRS), State Water Code (HRS § 174C-3, 2021), and Water Pollution Chapter (HRS § 342D-1, 2022). The State Water Code defines a "stream" as "…any river, creek, slough, or natural watercourse in which water usually flows in a defined bed or channel. It is not essential that the flowing [*sic*] be uniform or

uninterrupted. The fact that some parts of the bed or channel have been dredged or improved does not prevent the watercourse from being a stream." A "watercourse… means a stream or any canal, ditch, or other artificial watercourse in which water usually flows in a defined bed or channel. It is not essential that the flowing [*sic*] be uniform or uninterrupted." State waters are defined in the Water Pollution Chapter as "all waters, fresh, brackish, or salt, around and within the State, including, but not limited to, coastal waters, streams, rivers, drainage ditches, ponds, reservoirs, canals, ground waters, and lakes; provided that drainage ditches, ponds, and reservoirs required as part of a water pollution control system are excluded."

Methods

Jurisdictional Waters

AECOS conducted the jurisdictional determination of the aquatic features in the Preliminary Project Study Area on March 4 through March 6, 2025. As applicable to the Preliminary Project Study Area, federal jurisdictional waters (waters of the U.S. or WOTUS) would include: (1) tributaries with relatively permanent water and a surface water connection to tidal waters, and (2) waters adjacent to jurisdictional tributaries, including wetlands, impoundments, and similar waters. To identify state waters, we looked for evidence of a stream bed in channels, standing bodies of water, wetlands, and flowing water in irrigation ditches.

Botanical Survey

AECOS biologists Susan Burr, Kamryn Yoneshige, and Victor Unnone conducted the botanical survey on the Preliminary Project Study Area on March 4, 5, and 6, 2025. Plant species were identified as they were encountered during pedestrian transects that covered the survey area. Notes on the abundance of species were made in order to provide quantitative estimates. Species names follow *Manual of the Flowering Plants of Hawaiʻi* (Wagner et al., 1990; Wagner & Herbst, 1999) for native and naturalized flowering plants, *Hawaiʻi's Ferns and Fern Allies* (Palmer, 2003) and *Taxonomic and Nomenclatural Updates to the Fern and Lycophyte Flora of the Hawaiian Islands* (Ranker et al., 2019) for ferns, and *A Tropical Garden Flora* (Staples & Herbst, 2005) for ornamental and agricultural plants. More recent name changes for naturalized flowering plants mostly follow Imada (2019).

Terrestrial Vertebrates Survey

Avian Biota

An avian survey was conducted by Reginald David on the mornings of March 5 and 6, 2025. Ten avian point-count stations were established approximately equidistant from each other across the Preliminary Project Study Area. A single eight-minute count was conducted at each of the count stations. Birds were identified by visual observations aided by Leica 10 X 42 binoculars, and by listening for vocalizations. Weather conditions were ideal with unlimited visibility, no precipitation, and winds between 1 and 10 miles-per-hour. The avian phylogenetic order and nomenclature used in this report follows the AOU Check-List of North and Middle American Birds 2024 (Chesser et al, 2024).

Terrestrial Mammals

AECOS biologists recorded all mammals encountered during the survey on March 4, 5, and 6, 2025. Indicators of mammalian presence, such as tracks, scat, and other sign were noted. Mammalian phylogenetic order and nomenclature follow *Mammal Species of the World* (Wilson & Reeder, 2005) and Pinzari et al. (2020) for Hawaiian hoary bat.

Results

Jurisdictional Waters Determination

Table 1 provides a list with status of aquatic features we examined in and near the Preliminary Project Study Area.

Table 1. List of aquatic features evaluated in and near the Preliminary Project Study Area at Makaweli.

Feature Name	NWI Classification	NHD Classification	Approximate Length within Project Site (m)	Federal Jurisdictional Status
'A'akukui Stream	R3RBH Perennial stream	Perennial stream	Outside of Project site	**Jurisdictional**
Active Irrigation Ditch	---	---	1900	Not jurisdictional
Remnant Irrigation Ditch	R4SBCx Excavated intermittent channel	Canal Ditch	800	Not jurisdictional
Ka'awanui Gulch	PFO3C & R4SBCx Forested wetland & Excavated intermittent channel	---	200	Not jurisdictional

Background Conditions

The nearest active National Oceanographic and Atmospheric Administration–National Weather Service (NOAA–NWS) rain gage—Waimea Heights (WHGH1)—recorded a total of 119 mm (4.67 in) of rainfall in the three months preceding our field visit in March 2025 (NOAA-NWS, 2025). Total rainfall in that three-month period (December 2024 through February 2025) was 49% of the moving 30-year average rainfall for that gage: 242 mm (9.51 in).

Active Irrigation Ditch

During the survey, an active irrigation ditch not depicted on the NWI was mapped (Figure 4). The ditch runs through the Preliminary Project Study Area (Figure 5), crosses 'A'akukui Stream on a modified road bridge (Figure 6), and terminates in

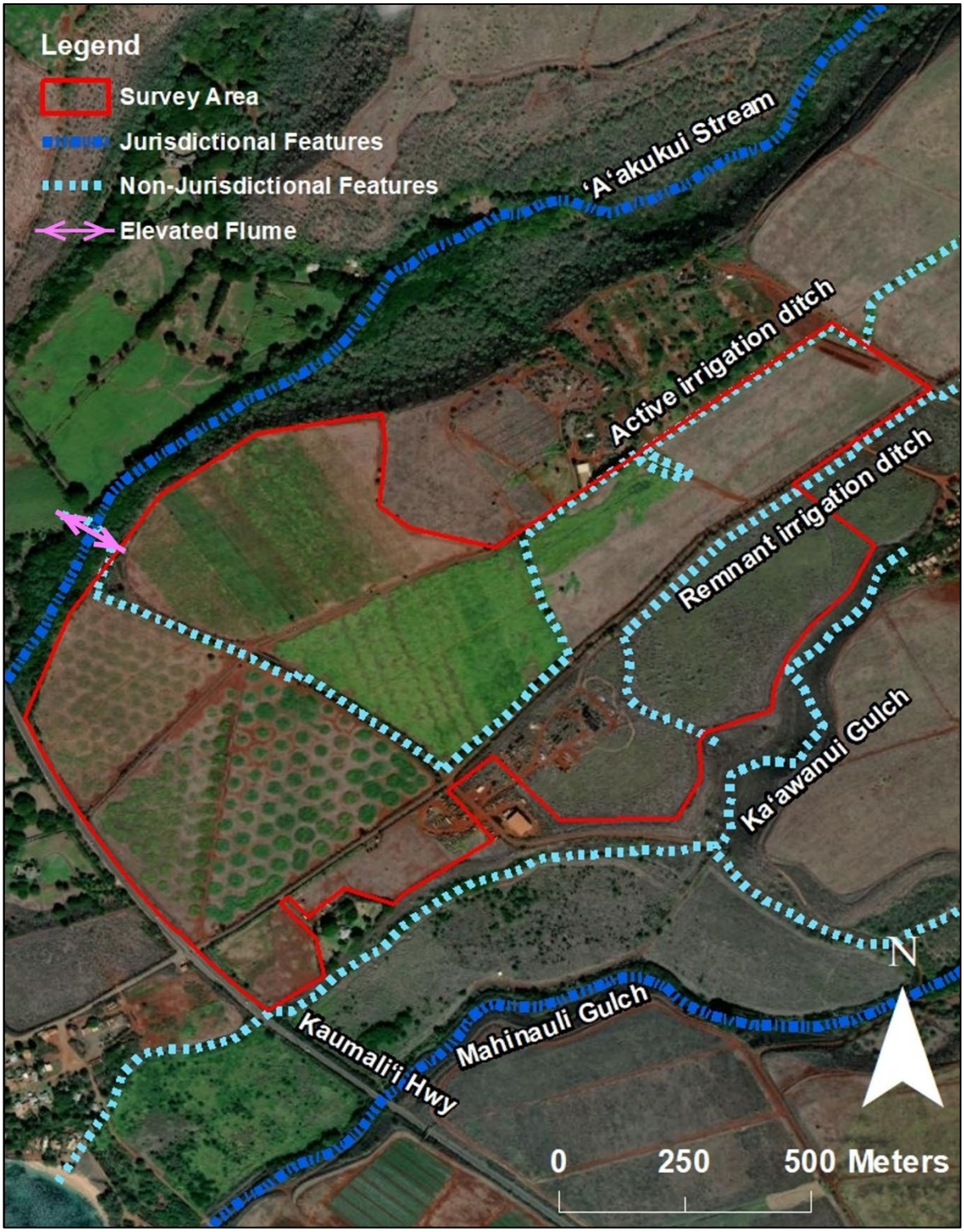

Figure 4. Water features and their jurisdictional status in the Preliminary Project Study Area.



Figure 5. The active irrigation ditch carries water across the Preliminary Project Study Area.



Figure 6. The active irrigation ditch crosses 'A'akukui Stream, flowing across a road bridge to discharge in a field beyond.

an open field west of the Preliminary Project Study Area. The active irrigation ditch does not have a surface connection to the Pacific Ocean or any other Waters of the US. Thus, the active irrigation ditch is not jurisdictional by the Conforming Rule.

Remnant Irrigation Ditch

The remnant irrigation ditch is classified in the NWI as an intermittent stream with no surface connection to the Pacific Ocean. Our survey indicated the remnant irrigation ditch does not have RPW (Figure 7), appears unused in recent time, and the ditch shows no indication of a perennial segment either upstream or downstream of our survey area, in addition to a lack of a surface water connection to the Pacific Ocean. This disqualifies the remnant irrigation ditch from federal jurisdiction; ephemeral as defined (USACE & USEPA, 2023a).



Figure 7. The remnant irrigation ditch does not contain water.

Kaʻawanui Gulch

Kaʻawanui Gulch is indicated in the NWI as a perennial stream and includes a palustrine wetland extension or tributary feature that is partially within the eastern boundary of the Preliminary Project Study Area. Our survey indicates

Kaʻawanui Gulch and the palustrine wetland extension do not have RPW, but it does have a connection to the ocean. This feature is better classified as an ephemeral stream that connects to the Pacific Ocean. Being ephemeral disqualifies Kaʻawanui Gulch from federal jurisdiction (ephemeral by the USACE and USEPA, 2023a definition).

Vegetation

The vegetation in the Preliminary Project Study Area is dominated by guinea grass (*Megathrysus maximus*) and other herbaceous plants. *Koa haole* (*Leucaena leucocephala*) trees line the margins of the agricultural pens (Figure 8). Cultivated *kalo* (*Colocasia esculenta*) is present in the northern portion of the Preliminary Project Study Area, between the active and remnant irrigation ditches (Figure 9).



Figure 8. View of the Preliminary Project Study Area: Guinea grass field with *koa haole* shrub-line in the distance.

Flora

A botanical listing (flora) with relative abundances for all plant taxa encountered in the survey is presented in Table 2. Entries are arranged alphabetically under family names and include scientific name, common name used in Hawai'i, status (i.e., native or non-native; see key at end of table), and a relative abundance value. "Status" reflects the state-wide distribution of the species.



Figure 9. Cultivated *kalo* planted in the northern part of the Preliminary Project Study Area.

A total of 97 plant taxa were recorded during the survey, including one species of fern and 96 flowering plants (angiosperms). Native taxa comprise 6 indigenous species, representing 6% of the total number of species recorded. Another 3 species (3%) are regarded as Early Polynesian introductions (so-called "canoe plants"). The remaining 91% of the plant species are recent introductions to the Hawaiian Islands that have become naturalized (i.e., grow natural in the wild). For disturbed lowlands on Kaua'i, 6% native and 9% combined native and Early Polynesian are fairly typical.

Table 2. Listing of plants observed in the preliminary Project Study Area at Makaweli.

Species listed by family	Common Name	Abundance	Status
PTERIDOPHYTES – FERNS & FERN ALLIES			
PTERIDACEAE			
Pityrogramma calomelanos (L.) Link	silver fern	--	Nat
FLOWERING PLANTS – MONOCOTS			
ARACEAE			
Colocasia esculenta (L.) Schott	*kalo*	C	**Pol**
ARECACEAE			
Cocos nucifera L.	*niu*, coconut	O	**Pol**
Phoenix hybrid	date palm	R	Nat
CYPERACEAE			
Cyperus involucratus Rottb.	umbrella sedge	U	Nat
Cyperus meyenianus Kunth	Meyen's flatsedge	O	Nat
Cyperus polystachyos Rottb.	---	R	**Ind**
Kylinga brevifolia Rottb.	kyllinga; *kili'o'opu*	U	Nat
POACEAE			
Bothriochloa pertusa (L.) A. Camus	pitted beardgrass	U	Nat
Cenchrus ciliaris L.	buffelgrass	O	Nat
Chloris barbata (L.) Sw.	swollen fingergrass	U	Nat
Coix lachrymal-jobi L.	Job's tears	C	Nat
Cynodon dactylon (L.) Pers.	Bermuda grass	O	Nat
Digitaria insularis (L.) Mez ex Ekman	sourgrass	O	Nat
Eleusine indica (L.) Gaertn.	wiregrass	U	Nat
Echinochloa colona (L.) Link	jungle-rice	R	Nat
Echinochloa crus-galli (L.) P. Beauv.	barnyard grass	O	Nat
Eragrostis pectinacea (Michx.) Nees	Carolina lovegrass	C	Nat
Megathrysus maximus (Jacq.) B.K. Simon & W.L. Jacobs	Guinea grass	AA	Nat
Melinis repens (Willd.) Zizka	Natal redtop	O	Nat
Paspalum conjugatum Bergius	Hilo grass	R	Nat
Urochloa mutica (Forssk.) T.Q. Nguyen	California grass	R	Nat
ACANTHACEAE			
Thunbergia fragrans Roxb.	sweet clock-vine	O	Nat

Table 2 (continued).

Species listed by family	Common Name	Abundance	Status
FLOWERING PLANTS - EUDICOTS			
AMARANTHACEAE			
Amaranthus spinosus L.	spiny amaranth	O	Nat
Alternanthera pungens Kunth	khaki weed	O	Nat
Amaranthus palmeri L.	pigweed	C	Nat
ANACARDIACEAE			
Mangifera indica L.	mango	R	Nat
ASCLEPIADACEAE			
Asclepias physocarpa (E. Mey.) Schlechter	balloon plant	U	Nat
ASTERACEAE			
Ageratum conyzoides L.	*maile hohono*	O	Nat
Crassocephalum crepidioides (Benth.) S. Moore	---	R	Nat
Cyanthillium cinereum (L.) H. Rob.	little ironweed	U	Nat
Emilia fosbergii Nicolson	Flora's paintbrush	O	Nat
Pluchea carolinensis (Jacq.) G. Don	sourbush	C	Nat
Sonchus oleraceus L.	sow thistle	O	Nat
Synedrella nodiflora (L.) Gaertn.	nodeweed	U	Nat
Tridax procumbens L.	coat buttons	C	Nat
Ageratum conyzoides L.	---	O	
Verbesina encelloides (Cav.) Benth. & Hook.	golden crown-beard	C	Nat
Conyza bonariensis (L.) Cronq.	hairy horseweed	O	Nat
BIGNONIACEAE			
Spathodea campanulata P. Beauv.	African tulip tree	R	Nat
BUDDLEIACEAE			
Buddleia asiatica Lour.	dog tail	U	Nat
CARICACEAE			
Carica papaya L.	papaya, *mīkana*	U	Nat
CASUARINACEAE			
Casuarina equisetifolia L.	common ironwood	C	Nat
CHENOPODIACEAE			
Chenopodium ambrosioides L.	Mexican tea	O	Nat
Chenopodium album L.	Lamb's quarters	U	Nat

Table 2 (continued).

Species listed by family	Common Name	Abundance	Status
CONVOLVULACEAE			
Ipomoea obscura (L.) Ker-Gawl	---	O	Nat
Ipomoea triloba (L.)	little bell	O	Nat
Merremia aegyptia (L.) Urb.	hairy merremia	O	Nat
Merremia tuberosa (L.) Rendle	wood rose	U	Nat
CUCURBITACEAE			
Momordica charantia L.	wild bitter melon	O	Nat
EUPHORBIACEAE			
Aleurites moluccana (L.) Wild.	*kukui*	R	**Pol**
Euphorbia hypericifolia L.	graceful spurge	U	Nat
Ricinus communis L.	castor bean	C	Nat
Euphorbia cyathophora J. A. Murray	wild poinsettia	R	Nat
Euphorbia hirta L.	garden spurge	O	Nat
Phyllanthus debilis Klein ex Willd.	*niruri*	U	Nat
FABACEAE			
Albizia saman F. Muell.	monkeypod	R	Nat
Canavalia cathartica Thouars	maunaloa	U	Nat
Chamaecrista nictitans (L.) Moench	partridge pea	O	Nat
Crotalaria pallida Aiton	smooth rattlepod	C	Nat
Desmanthus pernambucanus (L.) Thellung	virgate mimosa	O	Nat
Indigofera spicata Forssk.	creeping indigo	O	Nat
Indigofera suffruticosa Mill.	indigo	U	Nat
Leucaena leucocephala (Lam.) deWit	*koa haole*	A	Nat
Macroptilium lathyroides (L.) Urb.	wild bean, cow pea	R	Nat
Macroptilium atropurpureum (DC.) Urb.	---	U	Nat
Lablab purpureus (L.) Sweet	hyacinth bean	R	Nat
Mimosa pudica L. var. unijuga (Duchass. & Walp.) Griseb.	sensitive plant	C	Nat
Neonotonia wightii (Wight & Arnott) Lackey	glycine vine	C	Nat
Pithecellobium dulce (Roxb.) Benth.	*'opiuma*	A	Nat

Table 2 (continued).

Species listed by family	Common Name	Abundance	Status
FABACEAE (cont.)			
Prosopis pallida (Humb. & Bonpl. ex Willd.) Kunth	*kiawe*	U	Nat
Senna occidentallis (L.) Link	coffee senna	U	Nat
LAMIACEAE			
Leonotis nepetifolia (L.) R. Br.	lion's ear	O	Nat
Mesophaerum pectinatum (L.) Kuntze	comb hyptis	A	Nat
Ocimum gratissimum L.	wild basil	U	Nat
LYTHRACEAE			
Cuphea carthagenensis (Jacq.) Macbr.	tarweed	U	Nat
MALVACEAE			
Sida ciliaris L.	---	C	Nat
Abutilon grandifolium (Wild.) Sweet	hairy abutilon	O	Nat
Abutilon incanum (Link) Sweet	hoary abutilon, *ma'o*	O	**Ind**
Malva parviflora L.	cheese weed	O	Nat
Malvastrum coromandelianum (L.) Garcke	false mallow	O	Nat
Sida acuta N. L. Burm.	---	O	Nat
Sida fallax Walp.	*'ilima*	U	**Ind**
Sida rhombifolia L.	---	C	Nat
Waltheria indica L.	*'uhaloa*	C	**Ind**
MORACEAE			
Ficus microcarpa M. Roem.	Chinese banyan	R	Nat
MYRTACEAE			
Syzygium cumini (L.) Skeels	Java plum	C	Nat
ONAGRACEAE			
Ludwigia octovalvis (Jacq.) Raven	primrose willow	C	Nat
PHYTOLACCACEAE			
Rivina humilis L.	coral berry	R	Nat
PLANTAGINACEAE			
Plantago major L.	broad-leaved plantain	R	Nat
PORTULACACEAE			
Portulaca oleracea L.	pig weed	U	Nat
PROTEACEAE			
Grevillea robusta	silk oak	U	Nat
SAPINDACEAE			
Dodonaea viscosa Jacq.	*'a'ali'i*	R	**Ind**

Table 2 (continued).

Species listed by family	Common Name	Abundance	Status
SOLANACEAE			
Solanum lycopersicum var. *cerasiforme* (Duval) Spooner, G.J. Anderson, & R.K, Jansen	cherry tomato	R	Nat
Solanum americanum Mill.	*pōpolo*	R	**Ind**
Solanum seaforthianum Andr.	---	U	Nat
VERBENACEAE			
Stachytarpheta cayennensis (Rich.) Vahl	---	U	Nat
Lantana camara L.	lantana	R	Nat

Legend to Table 2.

STATUS = distributional status for the Hawaiian Islands:
- **Ind** - indigenous; native to Hawai'i, but not unique to the Hawaiian Islands.
- **Pol** – Polynesian introduction before 1778.
- Nat - naturalized, exotic, plant introduced to the Hawaiian Islands since the arrival of the Cook Expedition in 1778, and well-established outside of cultivation.

ABUNDANCE = occurrence ratings for plants identified in the survey:

R – Rare	seen in only one or perhaps two or three times.
U - Uncommon	seen at most in several locations.
O - Occasional	seen with some regularity.
C - Common	observed numerous times during the survey.
A – Abundant	found in large numbers; may be locally dominant.
AA – Very abundant	abundant and dominant; defining vegetation type.

Avian Fauna

A total of 296 individual birds of 25 species representing 15 separate families were recorded during the survey and are listed in Table 3. No additional species were detected as incidental observation while transiting between count stations. Of the 25 species observed, only the Hawaiian Duck or *koloa* (*Anas wyvilliana*), is listed as endangered under federal and state of Hawai'i endangered species statutes (HDLNR 1998, 2015; USFWS; nd-b). Black-crowned Night Heron (*Nycticorax nycticorax hoactli*), an indigenous resident, and Pacific Golden-Plover (*Pluvialis fulva*) an indigenous migrant, were also recorded. Eight of the species are protected under the federal Migratory Bird Treaty Act (USFWS, 2022, 2023).

Table 3. Avian species detected within the Preliminary Project Study Area.

Common Name	ORDER FAMILY *Species*	Status	RA
	ANSERIFORMES		
	ANATIDAE - Ducks, Geese & Swans		
	ANATINAE - Ducks		
Hawaiian Duck †	*Anas wyvilliana*	**EE**	0.20
	GALLIFORMES		
	PHASIANIDAE - Pheasants & Partridges		
	PHASIANINAE - Pheasants & Allies		
Ring-necked Pheasant	*Phasianus colchicus*	A	0.70
Gray Francolin	*Ortygornis pondicerianus*	A	0.10
Black Francolin	*Francolinus francolinus*	A	0.20
Red Junglefowl	*Gallus gallus*	A	2.00
Erckel's Spurfowl	*Pternistis erckelii*	A	1.80
	COLUMBIFORMES		
	COLUMBIDAE - Pigeons & Doves		
Rock Pigeon	*Columba livia*	A	0.10
Spotted Dove	*Streptopelia chinensis*	A	0.40
Zebra Dove	*Geopelia striata*	A	1.80
	CHARADRIIFORMES		
	CHARADRIIDAE - Golden-Plovers, Lapwings & Plovers		
	PLUVIALINAE - Golden-Plovers		
Pacific Golden-Plover †	*Pluvialis fulva*	IM	0.10
	PELECANIFORMES		
	ARDEIDAE - Herons, Bitterns & Allies		
Black-crowned Night Heron †	*Nycticorax nycticorax hoactli*	IR	0.10
Western Cattle-Egret †	*Ardea ibis*	A	1.40
	PSITTACULIFORMES		
	PSITTACULIDAE - Lories, Lovebirds, and Indomalayan and Papua-Australasian Parrots		
	PSITTACULINEAE - Indomalayan and Papua-Australsian Parrots		
Rose-ringed Parakeet	*Psittacula krameri*	A	6.10
	PASSERIFORMES		
	ZOSTEROPIDAE - White-eyes		
Warbling White-eye	*Zosterops japonicus*	A	1.80
	MIMIDAE - Mockingbirds & Thrashers		
Northern Mockingbird †	*Mimus polyglottos*	A	0.20
	STURNIDAE - Starlings		
Common Myna	*Acridotheres tristis*		3.70

Table 3 (continued).

Common Name	ORDER FAMILY *Species*	Status	RA
	ESTRILDIDAE - Estrildid Finches		
African Silverbill	*Euodice cantans*	A	0.20
Scaly-breasted Munia	*Lonchura punctulata*	A	0.70
Chestnut Munia	*Lonchura atricapilla*	A	0.80
Common Waxbill	*Estrilda astrild*	A	3.20
	PASSERIDAE - Old World Sparrows		
House Sparrow	*Passer domesticus*	A	1.10
	FRINGILLIDAE - Fringilline and Carduline Finches & Allies		
	CARDUELINAE - Carduline Finches and Hawaiian Honeycreepers		
House Finch †	*Haemorhous mexicanus*	A	0.50
	ICTERIDAE - Blackbirds		
Western Meadowlark †	*Sturnella neglecta*	A	0.10
	CARDINALIDAE - Cardinals & Allies		
Northern Cardinal †	*Cardinalis cardinalis*	A	0.60
	THRAUPIDAE - Tanagers		
	THRAUPINAE - Core Tanagers		
Red-crested Cardinal	*Paroaria coronata*	A	1.80

† Listed as protected under the federal Migratory Bird Treaty Act (MBTA)of 1918 as amended (USFWS, 2022, 2023).

Legend to Table 3.

Status = distributional status for the Hawaiian Islands:
- **EE =** Endangered endemic species protected under both federal and State of Hawaii endangered species statutes**.**
- A = Alien; naturalized, introduced to the Hawaiian Islands by humans.
- IR = Indigenous resident species, native to the islands but found elsewhere naturally; breeds in Hawaii.
- IM = Indigenous migratory species, native to the islands but found elsewhere naturally; non-breeder in Hawaii.

RA = Relative Abundance. Total species count divided by number of count stations (10).

The avian diversity and densities observed during the survey are consistent with the environment present on the site and current usage at this elevation range on the island of Kaua'i. Four species; Rose-ringed Parakeet (*Psittacula krameria*), Common Myna (*Acridotheris tristis*), Common Waxbill (*Estrilda astrild*), and Red Junglefowl(*Gallus gallus*) accounted for 51% of the total number of birds recorded during station counts. Rose-ringed Parakeet was the most common species recorded, accounting for 21% of the total birds counted.

Terrestrial Mammals

Six terrestrial mammalian species were detected during the Preliminary Project Study. Horse (*Equus caballus*), domestic cow (*Bos taurus*), and water buffalo (*Bubalis bubalis*) were seen throughout the area in pastures. Feral pig (*Sus scrofa*) was also seen across the site. Domestic dog (*Canis lupus familiaris*) and sign of domestic cat (*Felis catus*) were observed.

Discussion and Recommendations

Recommendations are partly based on USFWS Animal Avoidance and Minimization Measures (USFWS-PIFWO, 2023) and Recommended Standard Best Management Practices (USFWS-PIFWO, 2022). Implementation of the recommendations (provided below as bulleted items) by the project contractor will minimize impacts to protected species to the maximum extent practicable.

Jurisdictional Waters Determination

No waters within the Preliminary Project Study Area are WOTUS: the active irrigation ditch is disqualified by the Conforming Rule, and the remnant irrigation ditch and Ka'awanui Gulch were determined to be ephemeral waters under the USACE and USEPA (USACE & USEPA, 2023b) definition. Federal jurisdiction is solely determined by the USACE and is based upon the USACE accepting our findings. Acceptance may require a field visit by a USACE representative from the Regulatory Branch to confirm our delineation. Our delineation is not official until an acceptance letter from the USACE is received by the applicant. At this time, stand-alone jurisdictional determination requests (i.e., not associated with a permit application) may have extended timelines of one year or longer (USACE-AD & HD, 2024).

To protect water quality during construction:

- Use silt containment devices and stop work during flooding conditions.
- Do not stockpile construction-related materials in or in close proximity to aquatic habitats and protect stockpiles from erosion.
- Do not fuel vehicles and equipment near aquatic features.
- Protect exposed soil from erosion.

Botanical Resources

The vegetation of the Preliminary Project Study Area is mostly highly disturbed pastureland. No plants proposed or listed as threatened or endangered species

as set forth in the Endangered Species Act of 1973 as amended (16 U.S.C. 1531-1543; USFWS, n.d.-a; HDLNR, 1998) were seen in the survey. For plants, state listing follows the federal listing.

Avian Resources

Three of the avian species recorded are native species. The *koloa* (Hawaiian Duck) is an endemic species listed as endangered under both federal and State of Hawaiʻi endangered species statutes (HDLNR 1998, 2015; USFWS; nd-b). The Black-crowned Night Heron is a common resident species found close to just about any water feature in Hawaiʻi; and Pacific Golden-Plover is an indigenous migratory species that spends the fall and winter months in the Hawaiian Islands, returning to the high Arctic to nest about the end of April every year. The remaining 22 species recorded are all alien to the Hawaiian Islands.

We did not record any seabirds during the surveys, but at least two listed seabird species—Hawaiian Petrel (*Pterodroma sandwichensis*) and Newell's Shearwater (*Puffinus newelli*)—overfly the Preliminary Project Study Area during the breeding season which extends from roughly late April through the middle of December (David, 2025; SOS unpublished data, 2024).

Waterbirds

No suitable nesting habitat exists in the Preliminary Project Study Area for any of the extant endemic waterbirds (including the *koloa*). It is not expected that the proposed project will deleteriously impact any listed waterbird species.

Seabirds

Listed night-flying seabirds in Hawaiʻi include Hawaiian Petrel, Newell's Shearwater, and Band-rumped Storm-Petrel (*Hydrobates castro*). On the Island of Kauaʻi these three species nest in upland mountainous habitat. In the summer and fall, night-flying seabirds (especially fledglings) transiting to the sea from inland locations can become disoriented by exterior lighting. When disoriented, seabirds may collide with man-made structures or the ground. If not killed outright, dazed or injured birds are targets of opportunity for feral mammals (Podolsky et al., 1998; Ainley et al., 2001; Day et al., 2003). The primary cause of mortality in these species is predation by alien mammalian species at the nesting colonies (USFWS, 1983; Ainley et al., 2001). Collision with man-made structures is considered second most as a significant cause of mortality of these seabirds in Hawaiʻi. No suitable nesting habitat for seabird species occurs in the Preliminary Project Study Area or nearby.

- The project can minimize or avoid risks to protected night-flying seabirds by not conducting night-time construction and ensure that all installed outdoor lighting is fully shielded (night sky compliant; HDLNR, 2015),

Terrestrial Mammalian Resources

Hawaiian Hoary Bat

It is possible that the endangered Hawaiian hoary bat (*Lasiurus semotus*) uses resources in the area. This bat species is solitary and rare but has a widespread distribution in Hawai'i. The Hawaiian hoary bat uses multiple roosts within a home territory (Bonaccorso, et al. 2015), so the disturbance associated with removal of any particular tree would be minimal. An exception might be during the pupping season if a female bat carrying pups, or an unattended pup, is in a tree being felled, these individuals could be unable to flee.

- Potential adverse impacts to Hawaiian hoary bat can be avoided or minimized by not clearing woody vegetation taller than 4.6 m (15 ft) between June 1 and September 15, the bat pupping season, and by avoiding the use of barbed wire for fencing.

Other Resources of Potential Concern

Critical Habitat

The Preliminary Project Study Area is not within nor near federally delineated Critical Habitat (USFWS, n.d.-a). No equivalent designation exists under state law.

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Exhibit N

Permit Applications and Checklists

Exhibit N1

Checklist of State Special Permit Application Requirements

Checklist of State Special Permit Application Requirements

Checklist of State Special Permit Application Requirements	
Requirements	**Section of Application**
Pre-Application Procedures	
1) Pre-Application Meeting with the Kaua'i Department of Planning ("KDP")	Section 7.2
2) Environmental Assessment or Environmental Impact Assessment, if required	Section 13
Application Requirements	
1) Completed Zoning Permit Application	Exhibit N2
2) A nonrefundable filing and processing fee of one hundred dollars ($150)	Submitted separately
3) Project Description/Petition	
a) Specify the use desired;	Section 3.2
b) State concisely the nature of the applicant's interest in the subject matter;	Section 3.10
c) Reasons for seeking the special permit;	Section 5.1
e) If applicable and appropriate, any facts, views, arguments.	Section 8
4) A statement addressing Hawaiian customary and traditional rights under Article XII, Section 7 of the Hawai'i State Constitution	Section 14
5) A statement shall be submitted which addresses why existing properties that are properly designated or zoned are not suitable for the Project	Section 2.1
6) A statement of the reasons for the granting of the Special Permit citing how the Project would promote the effectiveness and objectives of Chapter 205, HRS and why the proposal is an unusual and reasonable use of the land.	Section 8
7) The applicant shall also address the guidelines set forth in Section 13-6 of the County of Kaua'i, Planning Commission Rules and Regulations.	Section 8.3
a) Such use shall not be contrary to the objectives sought to be accomplished by Chapters 205 and 205A, HRS, and the rules of the Land Use Commission;	Section 8
b) The desired use would not adversely affect surrounding property;	Section 8
c) The use would not unreasonably burden public agencies to provide roads and streets, sewers, water, drainage, school improvements, and police and fire protection;	Section 8

Checklist of State Special Permit Application Requirements	
Requirements	**Section of Application**
d) Unusual conditions, trends, and needs have arisen since the district boundaries and rules were established;	Section 8
e) The land upon which the Project is sought is unsuited for the uses permitted within the district; and	Section 8
f) Would promote the effectiveness and objectives of Chapter 205, HRS, as amended.	Section 8
8) Scaled Drawings	
a) Site/Plot Plan of the project area with reference points (property lines, roadways, shoreline, etc.)	Exhibit E
b) Location Map	Exhibit C1
c) Building/Floor Plans (all existing and Projects and/or structures shown thereon, floor plans and elevations of the proposed structures)	Exhibit E
9) Photos (labeled and keyed to a general site map)	Exhibit D

Exhibit N2

Kaua‘i Department of Planning Standard Zoning Permit Application

DEPARTMENT OF PLANNING

STANDARD ZONING PERMIT APPLICATION

One (1) original; If providing plans, five (5) sets, including original, required.
Fees vary based on permits required and range from $30 to over $1000.
Proof of 100% fee ownership rights or authorized agent must be attached.

DEPARTMENT USE ONLY				
Zoning				Intake By:
Use				
Variance				Intake Date:
SMA				
PDU				Acceptance Date/By:
TOTAL FEE:				
Additional Fees:				
Receipt Number				
Building Permit No.				
Associated Permits (e.g. SSD)				

Check One: ☐ Paper Plans ☑ Electronic Plans

This application shall be filled out by all seeking Zoning, Use, Variance, SMA Use or PDU permits pursuant to the Kauai County Code, Hawai'i Revised Statutes Chapter 205A and all relevant rules and regulations of the Planning Commission and Department. Supplemental information may be attached to form. SMA applications may also require additional SMA assessment forms.

Permitting fees may be made via cash or check. All checks shall be made out to: **"Director of Finance"**

Complete Information Below			
Tax Map Key Number	(4) 1-7-006: 006 (por.) and 010 (por.)	Condominium Number	
Applicant Name(s)	Kaawanui Solar, LLC		
Property Address	Makaweli, Kaua'i, Hawai'i		
Mailing Address	1003 Bishop St., Suite 2288, HON., HI 96813		
Parcel Area	269 acres	Contact Phone	808-650-9037
Zoning Designation	Agriculture and Open	Contact Email (if applicable)	megan.kane@aes.com

Applicant Declarations (incorrect responses may slow your permit review)

Please place an "X" under Yes or No under the following:

		YES	NO	Staff Verification
1	Is this property located in the Special Management Area (SMA)?		x	
2	Is this property part of a Condominium Property Regime (CPR)?		x	
3	Is this property within 500 feet of the shoreline?		x	
4	Is this property within the Agriculture Zoning District?	x		
5	Is there a structure on the property that is 50 years old or older?		x	
6	Do you have an Additional Dwelling Unit Certificate?		x	
7	Is this a permit for an after-the-fact construction or activity?		x	
8	I hold at least a 100% property interest in the property.		x	
9	Are you an agent for the property owner?	x		
10	Has a similar application been previously denied?		x	
11	Is this an application for an agriculture structure under 200 square feet		x	
12	Are there known burials on the site?		x	
13	Are you using water not provided by a domestic water system?		x	
14	Does existing grade under building footprint change by 2' or more in any direction?			
15	The proposed residential unit is a Multi-Family Dwelling Unit?		x	
16	Is this a conversion of a legally existing single-family dwelling unit into a multi-family two dwelling unit?		X	
17	Is this structure a guest house?		x	
18	Does guest house contain a kitchen?		x	

1. What is the proposed construction and/or intended use of the structure or parcel (may attach additional info)? Development and operation of the Kaawanui Solar Project, a 43-MW solar energy facility to produce renewable energy for use by KIUC.
2. If this is not the first dwelling unit on the subject property identified on this application, please state how many dwelling units presently exist: 0

Submittal Checklist

Please **INITIAL** under "Yes" or not applicable "N/A" regarding each of the statements:

		YES	NA	Staff Verification
1	All plot plans I have submitted are drawn to scale.	x		
2	I have ensured all TMK numbers are visible on all plan sheets.	x		
3	Any plans I have submitted clearly show all structures and setback dimensions.	X		
4	My plans provide lot coverage calculations	x		
5	I have ensured kitchens are marked with the 8' radii required by the Planning Department's Administrative Rules.		X	
6	Because this application involves a CPR, the plot plan shows all existing structures.		X	
7	Building plate does not exceed 20 feet from the finished grade at entry.	x		

Acknowledgements - Please **INITIAL** next to each of the statements:

I UNDERSTAND:	Initial Here
Additional fees and/or the submittal of other application forms may be necessary to complete this application for acceptance and processing.	NM
Tender of fees by the County does not imply acceptance of this application.	NM
Errors in self-declaration or missing or incomplete information will delay acceptance and processing of your application.	NM
Any purposeful misrepresentations in this application may result in delay, denial, permit revocation, violations, fines and even criminal prosecution.	NM

The owner and/or authorized representative is hereby made aware that the construction, work, use or activity approved in this permit shall be subject to inspection by Planning Department personnel. The applicant is advised that inspection may occur prior to or during construction and use to ascertain the activity is conducted in compliance with the law. Further, I am a duly authorized agent or have 100% ownership rights.

WARNING: if you are a property owner of a Unit within a Condominium Property Regime (CPR), you are obligated to acknowledge and understand your rights and duties under the documents governing your CPR. The Kaua'i County Planning Department (Department) has no duty or obligation to enforce CPR documents. By submitting this application [or, authorization form], you hereby indemnify and hold harmless the Department from any and all liability arising from disputes or actions resulting from the interpretation or enforcement of your CPR documents.

OWNER/AGENT SIGNATURE: nm Digitally signed by nick.molinari Date: 2025.12.30 20:45:39 -05'00' DATE: 12/30/2025

FOR PLANNING DEPARTMENT USE ONLY (THIS CONSTITUTES PERMIT IF FILLED OUT BY DEPT.):

APPROVED ☐ DENIED ☐ BY: _____ DATE: _____

DIRECTOR'S CONDITIONS OF APPROVAL (staff to **initial** next to applicable conditions):

This permit shall expire if no building is issued within one (1) year after the approval date and/or if construction does not start within one (1) year of building permit issuance.	
Director's standard conditions for non-residential agricultural structures (attach)	
Should any archaeological or historic resources be discovered during ground disturbing/construction work, all work in the area of the find shall immediately cease and the Applicant shall contact the State Department of Land and Natural Resources, Historic Preservation Division and the Planning Department to determine mitigation measures.	
Additional Conditions (State):	

Exhibit N3

County of Kaua‘i General Application Requirements

PLANNING DEPARTMENT
COUNTY OF KAUA'I

GENERAL SUBMITTAL REQUIREMENTS

The following is a list of General Application requirements for Class III and IV Zoning Permits, Use Permits, Project Development Use Permits, Variance Permits, Special Permits, and Special Management Area Permits (SMA). In preparing Applications for permit applications or petitions, please provide an exhibit and/or page reference for the application submittal, information, and documents requested. Zoning Permit Application Forms, Special Management Assessment Forms, and Special Treatment District Checklist are also available at the Planning Department, 4444 Rice Street, Suite A473, Līhu'e, Hawai'i 96766.

Pre-permit application consultation with the Planning Department and various County and State Agencies are recommended.

Instructions for Petitions for General Plan Amendments, State Land Use District Boundary Amendments (15 acres or less) and Zoning Amendments, are also available at the Planning Department.

An original plus one copy of the following items shall be submitted for review by the Planning Department for suitability for processing based on the attached checklist. Upon deeming the application suitable for agency review, the Planning Department will contact the applicant to request the additional number of application packets needed to complete the land use application for processing. The applicant shall provide 12 copies of the final application form and supporting information to complete the application for processing in accordance with Section 8-3.1(f) of the Kauai County Code, 1987, as amended.

Application shall be deemed complete when the above requirements have been satisfied and the following have been received:

1. Twelve (12) copies of the *FINAL* application.
2. Non-refundable filing fee payable to the COUNTY OF KAUAI, DIRECTOR OF FINANCE.
3. The filing fees are as follows:
   - State Land Use District Boundary Amendment = $150.00
   - General Plan Amendment = $600.00
   - Zoning Amendment = $300.00
   - Special Permit = $150.00
   - Use Permit, Project Development Use Permit, Variance Permit = $300.00
   - Class III Zoning Permit = $200.00
   - Class IV Zoning Permit = $800.00
   - Special Management Area Use Permit = $1,776.46
   - Special Management Area Minor Permit = $150.00
   - Shoreline Setback Variance Permit = $300.00
4. Digital copy (.PDF preferred) of entire transmittal including documents & exhibits.

☐ Incomplete _____

_____

☐ Application Deemed Complete as all information has been submitted and necessary fees have been paid.

By: _____ Date: _____

DEPARTMENT OF PLANNING
KAʻĀINA HULL, DIRECTOR
JODI A. HIGUCHI SAYEGUSA, DEPUTY DIRECTOR

DEREK S.K. KAWAKAMI, MAYOR
REIKO MATSUYAMA, MANAGING DIRECTOR

GENERAL CLASS III & IV ZONING REQUIREMENTS CHECKLIST	
Project Name: Kaawanui Solar	TMK: (4) 1-7-006: 006 and 010 (por.)
Applicant(s): Kaawanui Solar, LLC	Permit Nos.

REQUIRED INFORMATION

	APPLICANT & PROPERTY INFORMATION	Exhibit and/or Page Number	Staff Comments
1	Zoning Permit Application Form or Petition for Amendments. The Application Form or Petition shall be completed and provide the required information pertaining to the property, such as: Tax Map Key number(s), State Land Use District Designation (SLUD), General Plan Designation, and County Zoning Designation.	Exhibit N2	
2	Documents that verify ownership of the property under the subject application(s), or that the Applicant is the Authorized Agent o the property owner(s).	Exhibit A2	
3	If the Applicant is not the owner(s) of the subject parcel, then a notarized written authorization for the application by the owner shall be included. Said authorization shall include the owner's name, mailing addresses, contact information (i.e. phone number, cell number, email address)	Exhibit A2	
4	Agent's name, mailing address, and contact information (i.e. phone number, cell number, email address)	Exhibit A1	

	GRAPHIC & SCHEMATIC REQUIREMENTS	Exhibit and/or Page Number	Staff Comments
5	Location Map identifying the project site, adjacent roadway, and identifying landmarks.	Exhibit C1	
6	Schematic Site Development Plan of Plot Plans drawn to scale that identify the following:		
	○ Property lines and easements with its dimensions, total land or parcel area calculations;	Exhibit E	
	○ County and SLUD Zoning and General Plan Designation areas of the property and applicable densities;	Exhibits C4, C5, C6	
	○ Flood Zone(s) and required elevations;	Exhibit C26	
	○ Location, size, and dimensions of all existing and proposed buildings, structures, improvements and uses;	Exhibit E	
	○ Building setback distances to property lines, between buildings, right-of-ways, and parking lots;	Exhibit E	
	○ Proposed Lot Coverage calculations and areas;	Exhibit E	
	○ Topographic information showing existing features, conditions and drainage patterns, and proposed grading & finished grade elevations, and drainage patterns;	Exhibit E	
	○ Location of environmentally sensitive areas, habitat and botanical features which include, but are not limited to, wetlands, streams, rock outcroppings, endangered plants and animals, and exceptional trees;	Exhibit C20	
	○ Existing and proposed landscaping which depicts open spaces, plantings and trees;	Exhibit H	
	○ Existing and proposed roadways, and accesses to the project site; and	Exhibits C12 and E	
	○ Certified Shoreline, shoreline setback lines, stream and other setback lines.	N/A	

7	Conceptual Building Plans (drawn to scale):		
	○ All existing and/or proposed building elevations with finished material called out. Exterior Elevations shall identify the existing and finished grade;	Exhibit E	
	○ Building heights, maximum wall plate height, cross sections that are drawn to scale and clearly define the architectural character of the development; and	Exhibit E	
	○ Floor plans of all buildings and typical unit types for multi-family projects;	N/A	

WRITTEN REQUIREMENTS		**Exhibit and/or Page Number**	**Staff Comments**
8	A Report or Statement addressing the following:		
	○ Description of the proposed project and proposed uses, operations and management of the proposed use which includes, but is not limited to, proposed employee housing plan, hours of operation;	Section 3	
	○ Summary of Permits (i.e. Use Permit, Variance Permit, Special Permit, Class IV Zoning etc.) or Land Use Amendments requested, and the application section of the Kaua'i County Code or regulation citing the specific standards and criteria for granting of the permit or amendment being requested;	Sections 5, 8, 10, 11	
	○ Policies and Objectives of the General Plan; the provisions of the Community Development Plan applicable to the application (including design standards and application requirements); the provisions of the applicable zoning district; and an analysis of the extent to which the application, if granted, conforms to these provisions of the applicable district; and an analysis of the extent to which the application, if granted, conforms to these policies, objectives and provisions;	Sections 9, 10, 11, 12	
	○ Detailed land use history of the parcel, which includes but is not limited to, former and existing State and County land use designations, violations and uses;	Sections 2 and 3.1	
	○ Status reports of all Zoning Amendment ordinance conditions, existing Land Use Permit conditions, and Subdivision Application conditions pertaining to the project site;	Section 2	
	○ Analysis of the secondary impacts of the proposed use on the surrounding area, which includes but is not limited to, increases in property value, population, housing, community services and facility needs, secondary jobs and employment generated, and compatibility with the surrounding uses;	Sections 6 and 11.1.1	
	○ Water source, supply and distribution system analysis, which includes but is not limited to, methods of irrigation that exists on the parcel and proposed for the application, location and use of groundwater and non-potable water sources;	Section 6.6.1	
	○ Sewage Disposal Analysis – A description of a proposed method of sewage disposal;	Section 6.6.3	
	○ Solid Waste Disposal Analysis – A description of a proposed method of solid waste disposal, including methods for recycling, reclamation and waste stream diversion; and	Section 6.6.4	
	○ Description of environmentally sensitive areas, habitat and botanical features, which includes but is not limited to, wetlands streams, rock outcroppings, endangered plants and animals, and exceptional trees.	Sections 4.6, 4.8, 6.1	
	○ **Ka Pa'akai Assessment** – A detailed description that address a three-part analytical framework to assist the State and Counties in fulfilling their constitutional obligation to preserve and protect traditional and customary practices (TCP) exercised by Native Hawaiians, to the extent feasible. The analytical framework was established by the Hawaii Supreme Court and developed to assist with balancing both the rights of Native Hawaiians to exercise their TCPs, and the private landowners. It should provide information for the department staff to apply the Ka Pa'akai 3-step analytical framework as set forth below: ▪ Identify whether any valued cultural, historical, or natural resources are present within the project area, and identify the extent to which Native Hawaiian TCP rights are exercised ▪ Determine the extent to which the identified resources and rights will be affected or impaired by the proposed project. ▪ Specify any feasible action, if any, to be taken to reasonably protect Native Hawaiian rights if they are found to exist, either currently or possibly in the past. (Please refer to the Planning Department Worksheet for Ka Pa'akai Assessment for details)	Section 14.2	

9	A completed evaluation form or written comments from the County Housing Division relative to the County's housing requirements, pursuant to Ordinance No. 860.	N/A	

ADDITIONAL INFORMATION (SUBJECT TO DIRECTOR'S DETERMINATION)

	APPLICANT & PROPERTY INFORMATION	**Exhibit and/or Page Number**	**Staff Comments**
10	Title Report necessary for the project site. Title Insurance will be mandatory for all affected Kuleana parcel(s).	Exhibit A2	

	GRAPHIC & SCHEMATIC REQUIREMENTS	**Exhibit and/or Page Number**	**Staff Comments**
11	Schematic Site Development Plans of Plot Plans drawn to scale, which identify the following:		
	○ Location of existing or required access to shoreline or traditional site either on property or adjacent to; and	N/A	
	○ Certified Shoreline, shoreline setback lines, stream and other setback lines.	N/A	
12	Three (3) dimensional drawings of models, which clearly indicates the relation of the proposed development to other uses and structure within the surrounding area, and show the development in the context of significant viewplanes.	Exhibit E	
13	Dated photographs of the project site, existing structures, and the surrounding area.	Exhibit D	

	WRITTEN REQUIREMENTS	**Exhibit and/or Page Number**	**Staff Comments**
14	Additional information to the included in the required report:		
	○ Preliminary archaeological and historical data;	Section 6.2	
	○ A preservation/mitigation plan;	Section 6.2	
	○ Traffic Impact analysis showing level of service with and without the project, when required by the State Department of Transportation OR County Department of Public Works;	Section 6.10, Exhibit T	
	○ A Transportation Master Plan, which includes vehicle, pedestrian and other forms of circulation to adjacent services and destinations;	Section 6.10, Exhibit T	
	○ For parcel located in SLUD Agricultural or County Agriculture zoning district, an assessment of the impact which the proposed use may have on agricultural use of the parcel, which includes but is not limited to, feasibility analysis of potential agricultural uses suited for the project site;	Section 3.6 and Exhibit J	
	○ A Water Master Plan, which aligns to the goals of the 2020 Water Plan for Kaua'i;	Section 6.6.1	
	○ A baseline study and preservation/mitigation plan for environmentally sensitive areas and endangered species habitat;	Section 6.1, Exhibit M	
	○ A summary of all meetings held between the Applicant and any community or residential group that may be impacted by the Applicant's proposal, the issues raised at these meetings, and any proposed mitigation measures by the Applicant to deal with the raised concerns;	Section 7, Exhibit W	
	○ For properties adjacent to the shoreline or containing traditional access or sites requiring access – A Preservation/Mitigation Plan detailing how access will be allowed and managed;	N/A	
	○ For projects near the shoreline, riparian areas or wetlands, or those involving intensive landscaping or turf management, such as golf courses – Identification and assessment of chemicals and fertilizers used, including but not limited to, detailing effects upon surface, underground and marine water resources and neighboring properties and surrounding flora & fauna. If applicable, provide a mitigation plan and maintenance program and schedule;	N/A	
	○ For properties listed on the Kaua'i Historic and Non-Historic Resource Inventory – An inventory and description of historic features on the property;	N/A	
	○ Proposed Employee Housing Plan; and	N/A	

	○ Description of sustainable strategies incorporated into project, including but not limited to, strategies to reduce water and energy and material consumption, promote alternative forms of transportation, reduce wastewater and storm runoff, waste stream diversion and encourage the preservation of function ecosystem, i.e. LEEDS, Los Impact Design, Green Building principles, recycling, composting, BMP's, etc..	Section 3.10	

ADDITIONAL PERMITS		**Exhibit and/or Page Number**	**Staff Comments**
15	For projects located within the Special Treatment District – The Applicant shall comply with necessary requirements of Section 8-11.5 of the KCC, and provide information noted in the Special Treatment District Checklist.	N/A	
16	For projects located within the Special Management Area (SMA) – The Applicant shall complete & submit an SMA Assessment application of the proposed development.	N/A	
17	For properties located within 500 feet of the shoreline – The Applicant shall comply with the requirements of Section 8-27 of the KCC, entitled "Shoreline Setback and Coastal Protection," and provide the necessary information contained in the Shoreline Setback checklist.	N/A	
18	If applicable, the petition requirements and content for a Special Permit, pursuant to Chapter 13 of the Rules of Practice and Procedures of the Planning Commission, and Chapter 205 of the Hawai'i Revised Statutes (HRS).	Exhibit N2, Section 13	
19	A Finding of No Significant Impact (FONSI) or Final Environmental Impact Statement (EIS), when required by Chapter 343 of the Hawai'i Revised Statutes (HRS).	N/A	

Exhibit O

Literature Review and Field Inspection

Draft

Archaeological Literature Review and Field Inspection for the Kaawanui Solar Project, Makaweli Ahupua‘a, Waimea District, Kaua‘i TMKs: (4) 1-7-006:006 por. and 010 por.

Prepared for
G70

Prepared by
Olivier M. Bautista, B.A.,
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and
Hallett H. Hammatt, Ph.D.

Cultural Surveys Hawai‘i, Inc.
Kailua, Hawai‘i
(Job Code: MAKAWELI 11)

April 2025

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Management Summary

Reference	Archaeological Literature Review and Field Inspection for the Kaawanui Solar Project, Makaweli Ahupua‘a, Waimea District, Kaua‘i, TMKs: (4) 1-7-006:006 por. and 010 por. (Bautista et al. 2025)
Date	April 2025
Project Number(s)	Cultural Surveys Hawai‘i, Inc. (CSH) Job Code: MAKAWELI 11
Investigation Permit Number	CSH completed the fieldwork component of this study under archaeological fieldwork permit number 25-04, issued by the Hawai‘i State Historic Preservation Division (SHPD) per Hawai‘i Administrative Rules (HAR) §13-13-282.
Agencies	State Historic Preservation Division/Department of Land and Natural Resources (SHPD)
Land Jurisdiction	Private
Project Proponent	Private; Kaawanui Solar, LLC
Planning Consultant Contact	Tracy Camuso Principal G70 111 South King Street, Suite 170 Honolulu, HI 96813 Office: (808) 523-5866 Fax: (808) 523-5874 Email: tracyc@g70.design
Project Location	The Preliminary Project Study Area is in Makaweli Ahupua‘a off the southwestern coast of the island of Kaua‘i. It is bounded on the southwest by Kaumuali‘i Highway, on the southeast by the Ka‘awanui Gulch, on the northwest by Kekupua Valley, and on the northeast by agricultural parcels. The village of Pākalā lies approximately 0.2 miles to the southwest. The Preliminary Project Study Area is depicted on a portion of the 1996 Hanapepe U.S. Geological Survey (USGS) 7.5-minute topographic quadrangle (Figure 1), tax map plat (Figure 2), and 2022 aerial photo (Figure 3).
Project Description	Kaawanui Solar, LLC is proposing the 43 MWac Ka‘awanui Solar project located along Kaumuali‘i Highway in Makaweli on Kaua‘i. The project is targeting commercial operations by 30 June 2028. The major equipment will consist of PV solar modules, trackers, PCSs, BESS containers, and GSUs. The 43 MW collection will be routed to a proposed 57/69 kV project substation and related interconnection and ancillary facilities, the “Ka‘awanui Substation”.

Project Acreage	The Project will be sited within an approximate 268.4-acre (108.6-hectare) Preliminary Project Study Area. The Project Area, which houses the Project infrastructure, will be a smaller subset of the Preliminary Study Area.
Historic Preservation Regulatory Context	The proposed project would be subject to Hawai‘i State historic preservation review legislation governing private projects (Hawai‘i Revised Statutes [HRS] §6E-42 and HAR §13-284).
Document Purpose	This investigation was conducted—through historical, cultural, and archaeological background research and a field inspection of the Preliminary Project Study Area—to determine the likelihood that archaeological historic properties may be affected by the project. This document is intended to facilitate the project's planning and support the project's historic preservation review compliance. This investigation does not fulfill the requirements of an archaeological inventory survey (AIS) investigation, per HAR §13-276. This information may also be used to support consultation with the SHPD regarding the project's necessary historic preservation review steps pursuant to HAR §13-284.
Fieldwork Effort	Fieldwork was accomplished on 22 and 23 January 2025 by CSH Project Director Missy Kamai, B.A., and Archaeologist Samantha Purdy, B.A., under the general supervision of Principal Investigator Hallett H. Hammatt, Ph.D. This work required approximately 4 person-days to complete.
Results Summary	Background research and the field inspection revealed that the Preliminary Project Study Area has been extensively modified by operations related to historic sugar cultivation and subsequent agricultural activities. Numerous historic-era features associated with transportation and sugarcane agriculture were identified, including portions of plantation roads and the Old Government Road, rock walls, ditch systems, a railroad remnant, and a water tank. No pre-Contact archaeological features were observed.
Recommendations	The results of this literature review and field inspection (LRFI) indicate a low potential of encountering surface or subsurface pre-Contact archaeological features within the Preliminary Project Study Area, given the nature and extent of prior land alteration. CSH strongly recommends consultation with SHPD to obtain a determination regarding the need for an AIS for the proposed project. Additional documentation will likely be required for the historic features encountered during the field inspection.

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Section 1 Introduction

1.1 Project Background

At the request of G70, Cultural Surveys Hawai‘i, Inc. (CSH) has prepared this literature review and field inspection (LRFI) for the Kaawanui Solar Project, Makaweli Ahupua‘a, Waimea District, Kaua‘i, TMKs: (4) 1-7-006:010 por. and 006 por. The Preliminary Project Study Area is located off the southwestern coast of Kaua‘i near the village of Pākalā. It is depicted on a portion of the 1996 Hanapepe U.S. Geological Survey (USGS) 7.5-minute topographic quadrangle (Figure 1), tax map plat (Figure 2), and 2022 aerial photo (Figure 3).

Kaawanui Solar, LLC is proposing the 43 MWac Ka‘awanui Solar project located along Kaumuali‘i Highway in Makaweli on Kaua‘i. The project is targeting commercial operations by 30 June 2028. The major equipment will consist of PV solar modules, trackers, PCSs, BESS containers, and GSUs. The 43 MW collection will be routed to a proposed 57/69 kV project substation and related interconnection and ancillary facilities, the “Ka‘awanui Substation”.

The LRFI study area is the entire approximate 268.4-acre Preliminary Project Study Area. The Project Area, which houses the Project infrastructure, will be a smaller subset of the Preliminary Study Area.

1.2 Document Purpose and Historic Preservation Regulatory Context

The proposed project would be subject to Hawai‘i State historic preservation review legislation governing private projects (Hawai‘i Revised Statutes [HRS] §6E-42 and Hawai‘i Administrative Rules [HAR] §13-284).

This investigation was conducted—through historical, cultural, and archaeological background research and a field inspection of the Preliminary Project Study Area —to determine the likelihood that archaeological historic properties may be affected by the project. This document is intended to facilitate the project’s planning and support the project’s historic preservation review compliance. This investigation does not fulfill the requirements of an archaeological inventory survey (AIS) investigation, per HAR §13-276.

This information may also be used to support consultation with the State Historic Preservation Division (SHPD) regarding the project’s necessary historic preservation review steps pursuant to HRS §6E-42 and HAR §13-284.

1.3 Environmental Setting

1.3.1 Natural Environment

The 268.4-acre Preliminary Project Study Area is in the *ahupua‘a* (traditional land division) of Makaweli off the western coast of Kaua‘i. The *ahupua‘a* of Makaweli comprises approximately 21,844 acres, bounded on the west by Waimea Ahupua‘a and on the east by Hanapēpē Ahupua‘a. Its *mauka* (upslope) edge runs along the Waimea-Hanalei District border including Mt. Wai‘ale‘ale and part of the Alaka‘i Swamp. A large portion of upper Makaweli Ahupua‘a lies in the Nā Pali–Kona Forest Reserve. The Preliminary Project Study Area is situated in the more *makai* (seaward) portion of Makaweli, within gently sloping lands situated between Kekupua Valley to the north

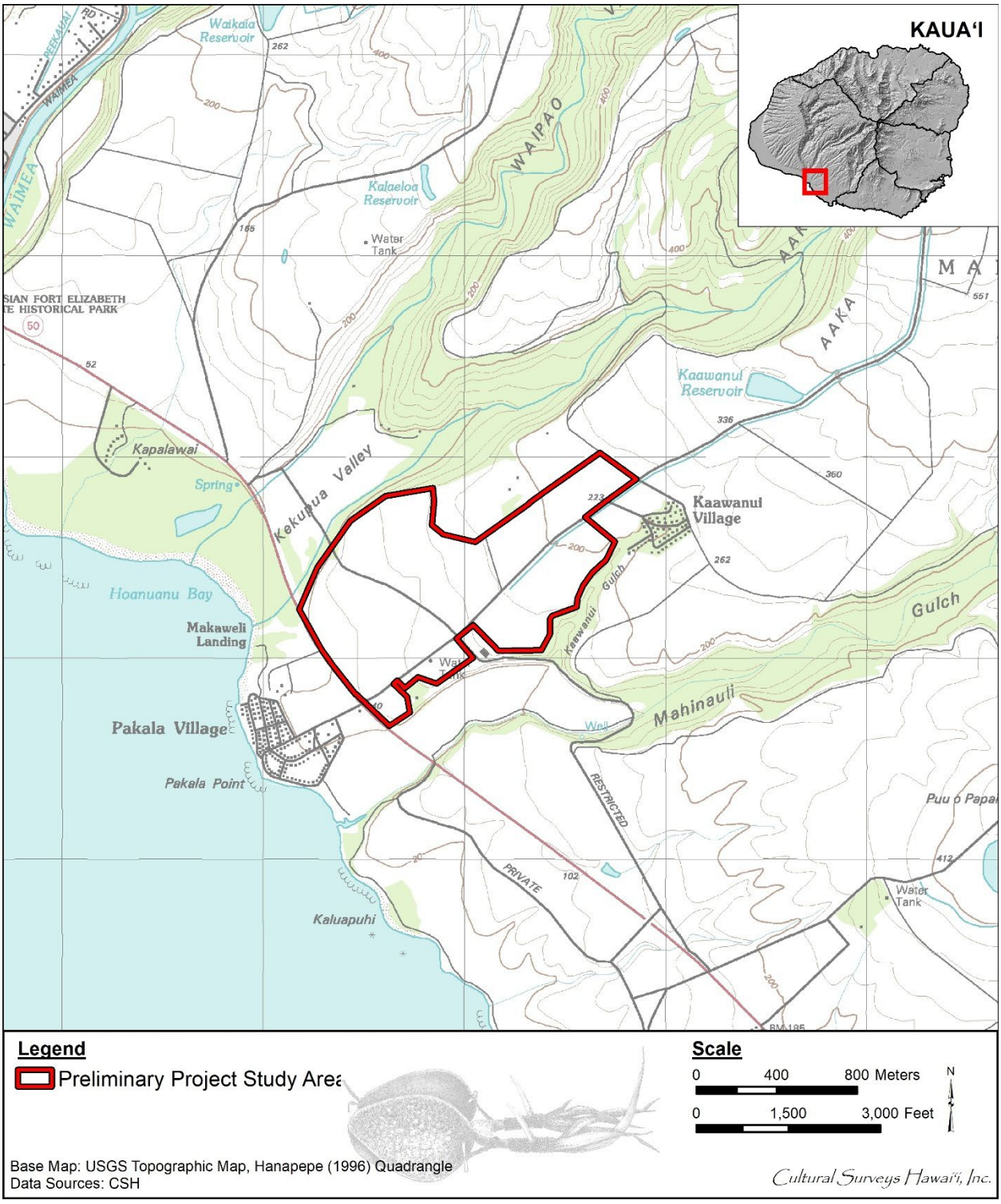

Figure 1. Portion of the 1996 Hanapepe USGS 7.5-minute topographic quadrangle showing the location of the Preliminary Project Study Area

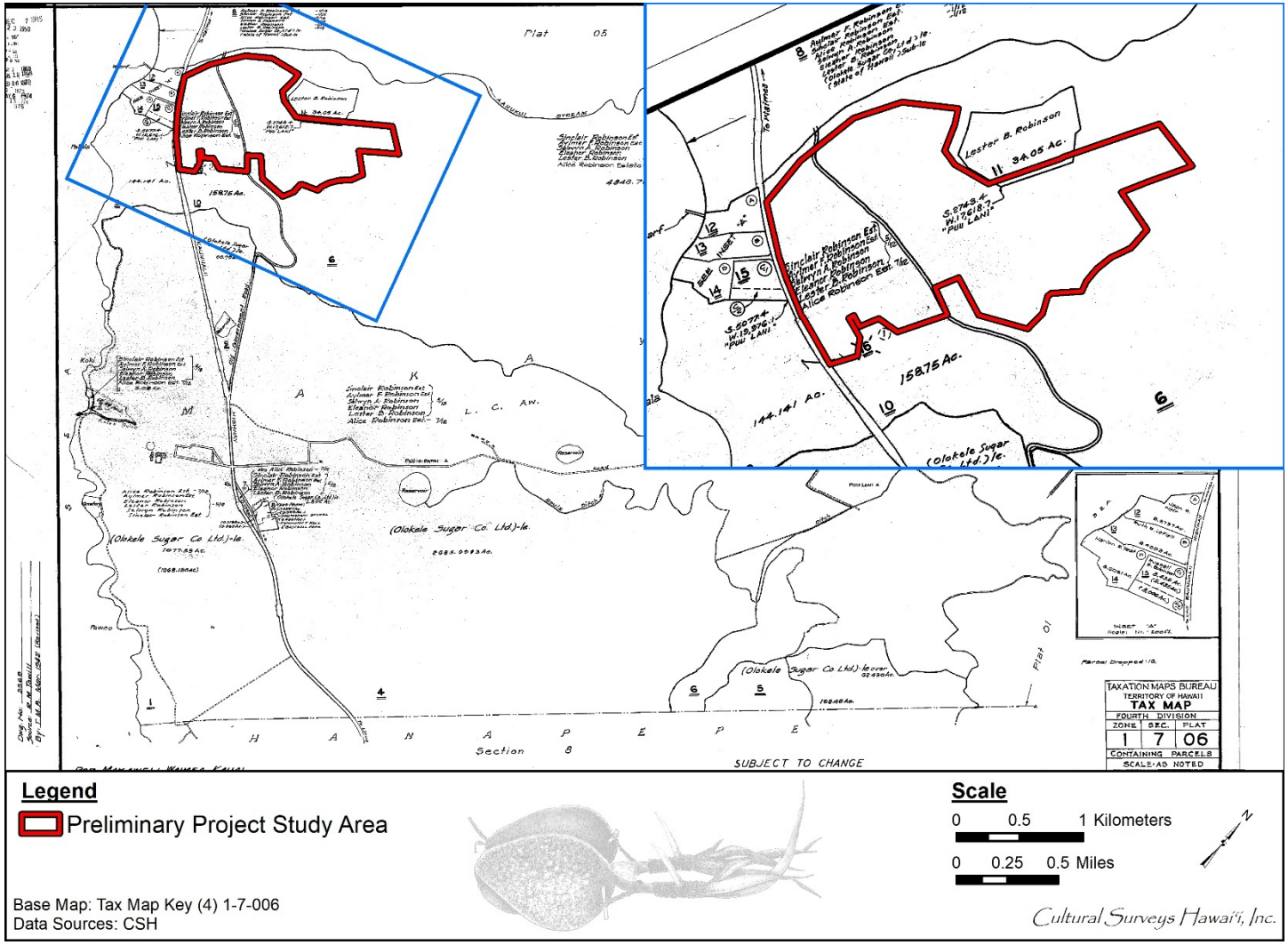

Figure 2. Tax Map Key (TMK) (4) 1-7-006 showing the Preliminary Project Study Area in portions of parcels 006 and 010 (Hawai‘i TMK Service 2025)

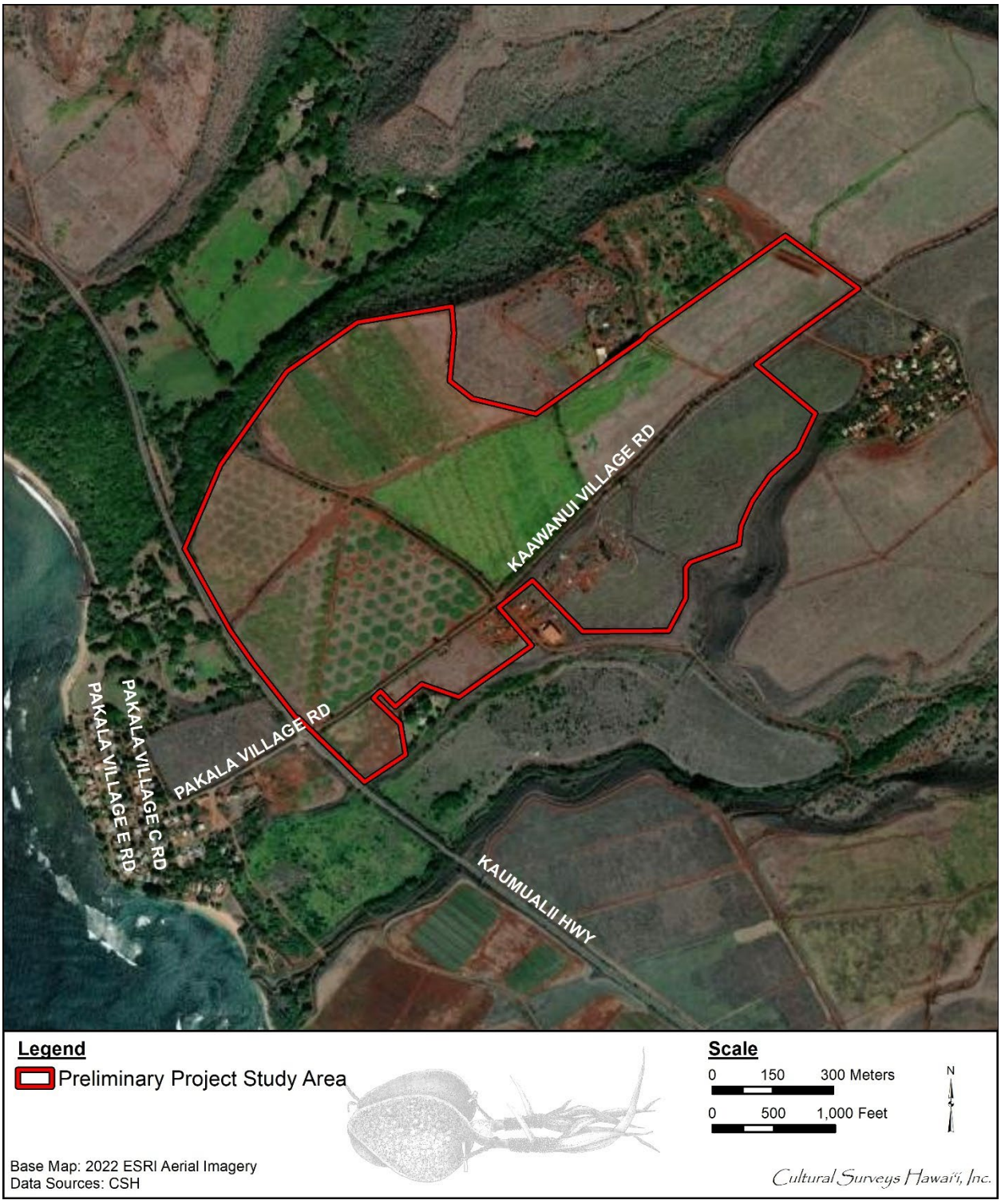

Figure 3. Aerial photograph of the Preliminary Project Study Area (ESRI 2022)

and Ka‘awanui Gulch to the south.

The Preliminary Project Study Area is located on the drier leeward coast of Kaua‘i, where it receives an average of 20 inches in annual rainfall (Giambelluca et al. 1986). The Preliminary Project Study Area has a variety of vegetative habitats including open grassy areas and heavy *kiawe* (*Neltuma pallida*) forest. The vegetative zones are described in the *Manual of Flowering Plants of Hawai‘i, Volume I*, as “Coastal Dry Forest - Kiawe (Prosopis) Forest, subtype inland kiawe forest” which “often has an open woodland aspect. It occurs in low, warm areas, especially in dry situations near the coasts on all of the main islands, primarily below 300m in elevation. This community is usually very species-poor and consists almost exclusively of species introduced since the 19th century” (Wagner et al. 1990:62).

According to the U.S. Department of Agriculture (USDA) Soil Survey Geographic (SSURGO) database (2001) and soil survey data gathered by Foote et al. (1972), the Preliminary Project Study Area primarily consists of Makaweli series soils—specifically Makaweli silty clay loam, 0 to 6% slopes (MgB); Makaweli stony silty clay loam, 6 to 12% slopes (MhB); and Makaweli stony silty clay loam, 6 to 12% slopes (MhC) (Figure 4). Makaweli soils are described as follows:

> […] well-drained soils on uplands on the island of Kauai. These soils developed in material weathered from basic igneous rock. They are gently sloping to steep. Elevations range from nearly sea level to 500 feet. The annual rainfall amounts to 20 to 35 inches. Three-fourths of it occurs from October through March. The mean annual soil temperature is 74° F…
>
> These soils are used for irrigated sugarcane, pasture, and homesites. The natural vegetation consists of kiawe, lantana, fingergrass, klu, koa haole, and piligrass. [Foote et al. 1972:90]

A few small pockets of Nonopahu clay, 2 to 10% slopes (NnC) are present throughout the Preliminary Project Study Area (see Figure 4). Nonopahu soils are described as:

> […] moderately well drained soils on uplands on the island of Kauai. These soils developed in material weathered from basic igneous rock relatively high in olivine. They are gently sloping to moderately sloping. Elevations range from nearly sea level to 800 feet. The annual rainfall amounts to 23 to 40 inches. The mean annual soil temperature is 74° F…
>
> These soils are used for irrigated sugarcane and pasture. The natural vegetation consists of koa haole, klu, and feather fingergrass. [Foote et al. 1972:100]

A small area of Dune land (DL) (see Figure 4) is along the *makai* boundary of the Preliminary Project Study Area. This miscellaneous land type:

> […] consists of hills and ridges of sand-size particles drifted and piled by wind. The hills and ridges are actively shifting or are so recently fixed or stabilized that no soil horizons have developed. The sand is dominantly from coral and seashells. This miscellaneous land type occurs in coastal areas on the islands of Maui and Kauai. Elevations range from nearly sea level to 150 feet. The annual rainfall amounts to 15 to 90 inches. [Foote et al. 1972:29]

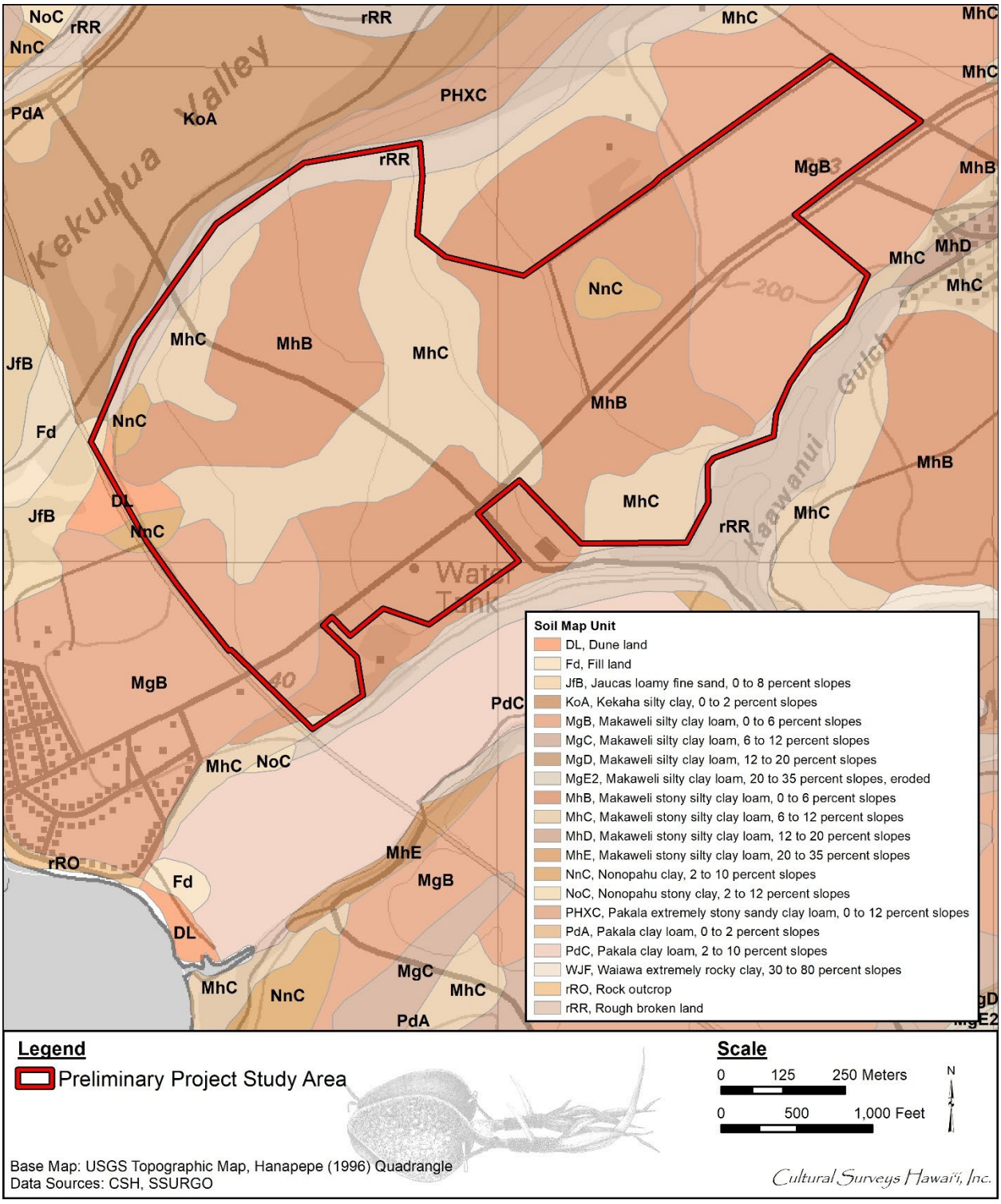

Figure 4. Overlay of *Soil Survey of the Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii* (Foote et al. 1972), indicating soil types within and surrounding the Preliminary Project Study Area (USDA SSURGO 2001)

Areas of Rough broken land (rRR) are found along the northern and southern boundaries of the Preliminary Project Study Area, correlating with the edges of Kekupua Valley and Ka‘awanui Gulch, respectively (see Figure 4). This miscellaneous land type is characterized as “very steep land broken by numerous intermittent drainage channels […] It occurs in gulches and on mountainsides on all the Islands except Oahu” (Foote et al. 1972:119). This land type is generally used for watershed and wildlife habitat but is also used in some places for pasture and woodland.

1.3.2 Built Environment

The 268.4-acre Preliminary Project Study Area is situated in lands used for sugarcane agriculture for over 100 years. It is bounded on the southwest by Kaumuali‘i Highway and on the northeast by agricultural parcels. Plantation settlements Pākalā Village and Ka‘awanui Village are situated nearby to both the *makai* and *mauka* ends of the Preliminary Project Study Area, respectively. Overhead electrical transmission lines are located along Ka‘awanui Village Road.

Plantation-era infrastructure is found throughout the Preliminary Project Study Area and includes a network of unpaved and paved plantation roads, culverts, ditches, stone walls and water storage. Remnants of plantation-era machinery are scattered about the landscape, particularly in the central eastern portion of the Preliminary Project Study Area. A section of the Old Government Road, which predated the plantation in this area, bisects the *makai* portion of the Preliminary Project Study Area.

Since the demise of the sugarcane industry the Preliminary Project Study Area has been used for various other agricultural endeavors and ranching. Most of the Preliminary Project Study Area currently comprises fallow agricultural fields and modern fenced pens used for grazing cattle and water buffalo, which have been sectioned into named “pens” (Figure 5). A taro patch surrounded by an electrified fence is present in the northern tip of the Preliminary Project Study Area.

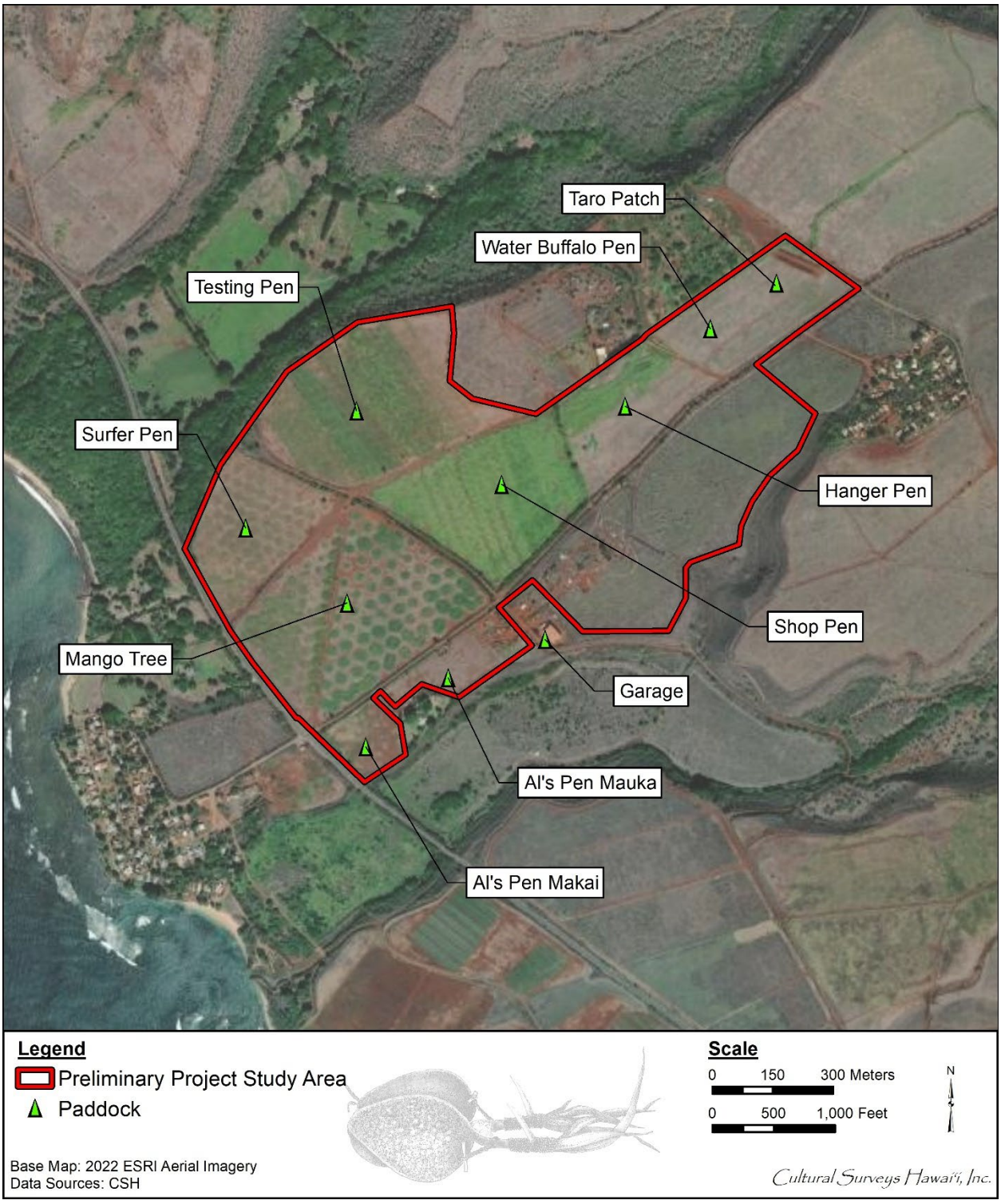

Figure 5. Aerial photograph (ESRI 2022) showing the various named modern pens utilized in modern agricultural activities throughout the Preliminary Project Study Area after sugar plantation closure

Section 2 Methods

2.1 Field Methods

CSH completed the fieldwork component of this study under archaeological fieldwork permit number 25-04, issued by the SHPD pursuant to HAR §13-13-282. Fieldwork was conducted on 22 and 23 January 2025 by CSH Project Director Missy Kamai, B.A., and Archaeologist Samantha Purdy, B.A., under the general supervision of Principal Investigator Hallett H. Hammatt, Ph.D. This work required approximately 4 person-days to complete.

2.2 Research Methods

Background research included a review of previous archaeological studies on file at the SHPD; review of documents at Hamilton Library of the University of Hawai‘i, the Hawai‘i State Archives, the Mission Houses Museum Library, the Hawai‘i Public Library, and the Bishop Museum Archives; study of historic photographs at the Hawai‘i State Archives and the Bishop Museum Archives; and study of historic maps at the Survey Office of the Department of Land and Natural Resources. Historic maps and photographs from the CSH library were also consulted. In addition, Māhele records were examined from the Waihona ‘Aina database (Waihona ‘Aina 2025) and historic newspaper articles from Newspapers.com (2021) were reviewed.

This research provided the environmental, cultural, historic, and archaeological background for the Preliminary Project Study Area.

Section 3 Background Research

In ancient times, Kaua‘i was divided into five traditional *moku* (districts): Halele‘a, Ko‘olau, Puna, Kona, and Nā Pali. However, after the battle of Wahiawa in 1824, the land of Kaua‘i was redistributed and district boundaries changed. The new district names became Hanalei, Kawaihau, Līhu‘e, Kōloa, and Waimea; the Waimea District consisted of Waimea, Makaweli, and Hanapēpē.

3.1 *Wahi Pana* (Place Names, Sacred Places, and Landscapes)

A Hawaiian *wahi pana* is also referred to as a place name. “In Hawaiian culture, if a particular spot is given a name, it is because an event occurred there which has meaning for the people of that time” (McGuire and Hammatt 2000:17). *Wahi pana* were passed on through the oral tradition, preserving the unique significance of each place. *Wahi pana* can refer to natural geographic locations, such as streams, peaks, rock formations, ridges, and offshore islands and reefs, or they can refer to Hawaiian divisions, such as *ahupua‘a, ‘ili*, *mo‘o,* and man-made structures, such as fishponds, reservoirs, *kula* (pasture), and *kauhale* (house compound). Hawaiians named all sorts of objects, places, and points of interest; named features in the vicinity of the current Preliminary Project Study Area are shown on Imlay’s 1891 map of Gay and Robinson lands (Figure 6).

3.2 Traditional and Historical Background

3.2.1 Pre-Contact Period

Immediately west of Makaweli Ahupua‘a (where the Preliminary Project Study Area is located) is the *ahupua‘a* of Waimea, the largest *ahupua‘a* on the island of Kaua‘i. Early accounts from this *ahupua‘a* indicate a coastal settlement pattern. Cultural layers and burials have been recorded along the shore, which is a typical pattern throughout the Hawaiian Islands. In addition to coastal settlements, the fertile Waimea River Valley had the resources to support a substantial population, evidenced by early agricultural settlements. For example, Hammatt and Ida (1993) identified a prehistoric cultural layer (State Inventory of Historic Places [SIHP] # 50-30-05-04012) in present-day Waimea Town, and the layer was charcoal carbon dated to AD 910-1275. In contrast, there has not been as much modern development within the *ahupua‘a* of Makaweli and little previous archaeology has been done, but interpretations of pre-Contact land use within Makaweli can be extrapolated from Waimea. Coastal occupation and river valley settlement patterns would have mirrored those in Waimea only on a smaller scale.

Clearly Kaua‘i in general and the Waimea District in particular were largely isolated from the political intrigues and strife that marked much of late pre-Contact Hawai‘i. Studies of Kaua‘i’s political history (Fornander 1969; Hommon 1976) indicate 18 out of 24 transfers of political rule were cases of orderly succession. Prior to Cook’s arrival, there may have been only two military conflicts in the history of Kaua‘i, a raid by a Big Island chief, ca. 1460, and a dynastic struggle between the cousins Kawelo‘aikanaka and Kawelo-a-Maihunali‘i (who was aided by O‘ahu forces), ca. 1680.

To some extent, Cook’s arrival coincided with an increase in Hawaiian political and military aggression. In 1779 there were the “Goat Wars” with Ni‘ihau. In 1791, Kaua‘i forces were involved in fighting at O‘ahu (death of the Kaua‘i chief Ka‘eokiilani) and in the “Red-Mouth Gun” fighting against Kamehameha I at Hamakua, Hawai‘i. In 1796, Keawe, the son of Kamakahelei

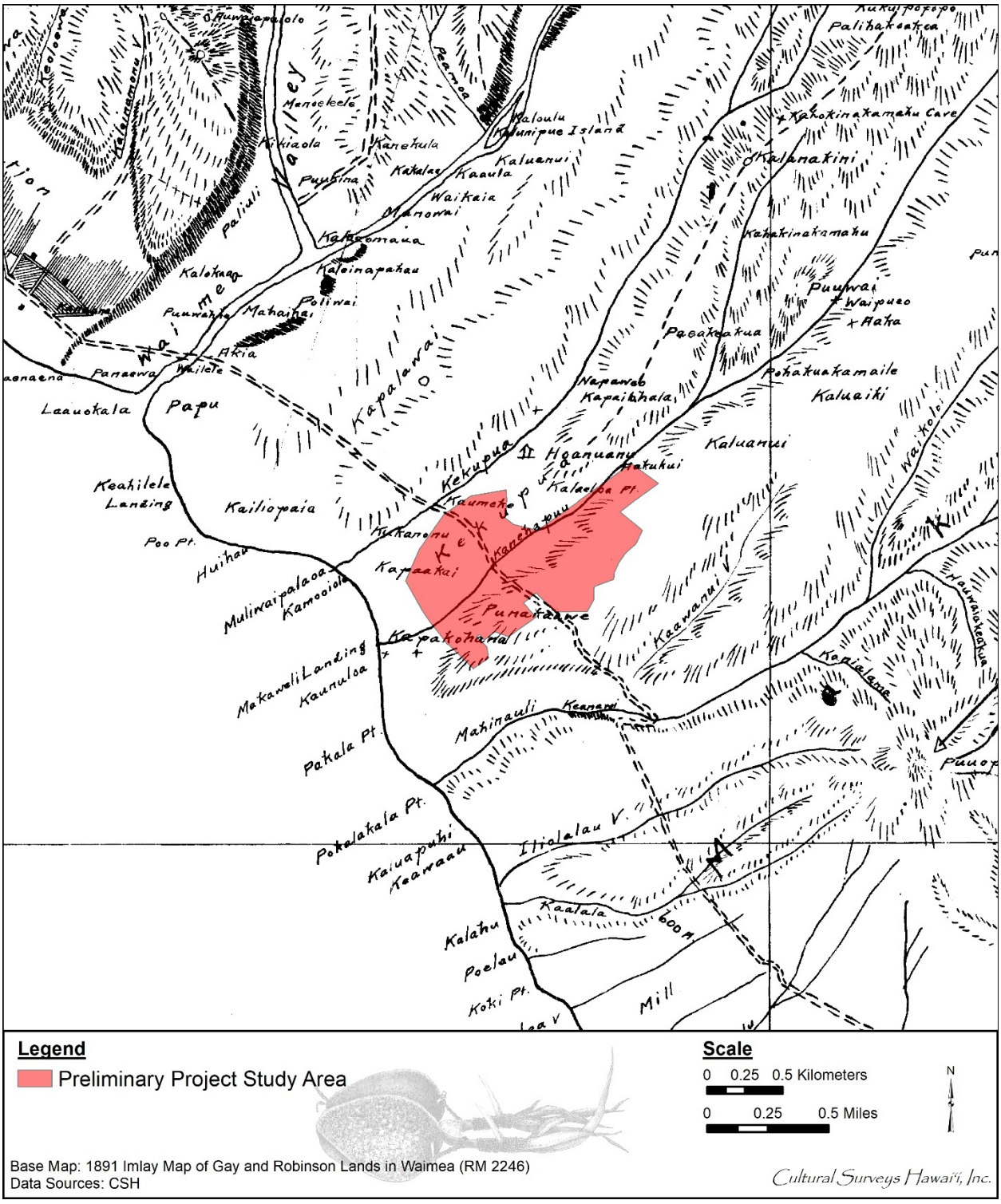

Figure 6. Portion of 1891 Imlay map of Gay and Robinson lands (RM 2246) showing place names in and around the Preliminary Project Study Area

and Kiha, led a revolt against Kaumuali‘i from which Keawe emerged as *ali‘i nui* (head chief) (Kuykendall 1968:48, 51). From 1796 to 1804 a state of war existed with Kamehameha I which was rekindled in the Kaua‘i rebellion of 1824.

From Captain Cook’s landing, western impact exacerbated native political tensions. Cook’s lieutenants, George Vancouver, George Dixon, and Nathan Portlock, returned to Waimea repeatedly and established it as a major port and entrepôt. While Waimea may have always been a royal center for the *ali‘i* (chiefly class) of Kaua‘i, this position was greatly reinforced after Western Contact.

3.2.2 Early Historic Period (1778–Late 1800s)

Written accounts of Hawai‘i began when Captain James Cook anchored a mile off shore at Waimea Bay on the southwest side of Kaua‘i on 20 January 1778. The squadron consisted of two ships, the *Resolution* and the *Discovery*. Cook went ashore to investigate the availability of water and the temperament of the people to see if they were friendly and if a trade for supplies could be negotiated:

> The very instant I leaped ashore, they all fell flat on their faces, and remained in that humble posture till I made signs to them to rise. They then brought a great many small pigs and gave us without regarding whether they got any thing [sic] in return or no [sic] indeed the most of them were present[ed] to me with plantain trees, in a ceremonious way as is usual on such like occasions, and I ratified these marks of friendship by presenting them with such things as I had with me. [Beaglehole, 1974: 269]

It is most likely that during much of the early historic period, Native Hawaiians in the Waimea Ahupua‘a, specifically those nearest to Waimea River, had close association with the people on the east side of the river. Cook notes the following:

> [I] took a walk up the Valley, accompanied by Dr. Anderson and Mr. Webber; conducted by one of the Natives […] Our road lay in the plantations, which were chiefly of Tara [taro], and sunk a little below the common level so as to contain the water necessary to nourish the roots. As we ranged down the coast from the East in the Ships, we observed at every Village one or more elevated objects, like Pyramids and we had seen one in this valley that we were desireous [*sic*] of going to see. Our guide understood us, but as this was on the other side of the river, he conducted us to one on the same side we were upon; it proved to be in a Morai which in many respects was like those of Otaheite. [Cook 1821]

This “Morai” on the west side of the river is thought to be Keaalii Heiau. The *heiau* (pre-Christian place of worship) “on the other side of the river” was probably Mahaihai Heiau, whose location is noted on a map by Francis Gay (Bennett, 1931:104, 111, see Figure 6).

A few early historic documents describe areas possibly located in Makaweli, but these are intertwined with early histories of Waimea and Hanapēpē Ahupua‘a. The history of Georg Schaffer on Kaua‘i is one such history that ties Makaweli with Waimea and Hanapēpē and involves the sandalwood trade and establishment of Russian forts and trading posts.

3.2.2.1 Russia’s Arrival

After Cook’s death at Kealakekua on 14 February 1779, Charles Clerke took charge and headed for Waimea once again. After provisioning at Waimea and Ni‘ihau, he sailed for Kamchatka in Russia and finally anchored at Petropavlovsk. Clerke was dying of tuberculosis and, anticipating that he might never reach England, he entrusted Captain Cook’s journal, maps, and reports with the Russian governor, Major Behm, who was returning to St. Petersburg. Behm was to pass the documents on to the British ambassador who would in turn hand them over to the proper authorities in London. These events led to the Russians being the first to learn about Cook’s discovery of the Hawaiian Islands before the rest of Europe and the world (Joesting 1984:41). This set the stage for Russian involvement in the Hawaiian Islands.

The Russians recognized the importance of Hawai‘i for provisioning their ships along the fur trade route between the Northwest and China. In 1815, a Russian-owned ship full of furs hit a reef and sank off Waimea Bay, Kaua‘i. The crew abandoned ship and was left stranded on Kaua‘i for two and a half months. Meanwhile, Kaumuali‘i, paramount chief of Kaua‘i, retrieved the ship’s goods (furs included) and kept them, despite the Russians’ objections. Georg Schaffer was sent to Hawai‘i under Russian orders to retrieve the goods as diplomatically as possible. It has been debated whether Schaffer was following orders or whether he acted on his own behalf when he raised the Russian flag on Kaua‘i. An agreement was reached when Kaumuali‘i asked for protection in exchange for a Russian monopoly of the sandalwood trade. Kaumuali‘i agreed to provide 500 men as an army to conquer the other islands and Schaffer was to provide the ships, ammunition, and weapons. An important part of the agreement was that Schaffer would oversee all construction of future forts and trading posts. The Russian fort at Waimea was built by the Russian-American Company in 1816 under the direction of Schaffer. Kamehameha I, hearing of Schaffer’s plans and feeling intimidated by the threat of Russian invasion, sent a message to Kaumuali‘i asking that Schaffer be deported. By June 1817, Schaffer and his men were forced to leave Kaua‘i (Mills 1996:30–37).

3.2.2.2 The Kaua‘i Rebellion of 1824

In 1824, Kaumuali‘i became very ill. Gathered around him were his sisters, his wife Ka‘ahumanu, his daughter Kapo, and the prime minister of the Kingdom, Kalanimōkū. When Kalanimōkū asked him how the lands were to be redistributed after his death, Kaumuali‘i answered, “let the lands be as they are; those chiefs who have lands to hold them, those who have not to have none” (Kamakau 1992:265).

Kalanimōkū decided to disregard Kaumuali‘i’s wish that the land not be redistributed. All Kaua‘i lands were seized. Some of the Kaua‘i chiefs, dissatisfied with the redistribution of the lands, rebelled and stormed the Russian Fort where Kahalai‘a had been left in charge. News of the rebellion reached Honolulu and companies of soldiers were sent to Kaua‘i as backup. In the end, the rebel chiefs were defeated and Kalanimōkū redistributed the lands. It was at this time that Kaua‘i and the rest of the islands were turned over to the child king, Kauikeaouli Kamehameha III (Liholiho Kamehameha II’s younger brother), and Kaikio‘ewa was appointed the new governor (Kamakau 1992:265–269). Kaikio‘ewa was an old warrior chief who was the guardian (*kahu*) of Kauikeaouli.

> […] Sometime before Kahalai‘a left the fort, the *‘ili* of Kaho‘omano in the *ahupua‘a* of Makaweli was given by Ka‘ahumanu to Kahalai‘a for the use of

> soldiers stationed at the fort. This land belonged with the fort since the days of Kaumuali‘i and continued to be used by soldiers, or ‘*koa*’ into the early 1850s. [Mills 1996:198–199]

3.2.2.3 The Māhele and the Kuleana Act

Following the death of Kaumuali‘i, there was a great rebellion and a vying for political power among the Hawai‘i and Maui island chiefs and the Kaua‘i chiefs. It was at this time that the Kamehameha family won control of Kaua‘i. The Kaua‘i chiefs were punished for their rebellion and were excluded from the *kālai‘āina* (distribution of lands) when the lands were redistributed.

At the end of the 1824 rebellion, as Hawaiian historian Samuel Kamakau, notes, “The lands held by chiefs of Hawai‘i were tabu; Waimea and Makaweli were held by Ka-‘ilinaoa and Ka‘u‘uku-ali‘i […]” (Kamakau 1992:268).

Following the death of Kamehameha I, Ka‘ahumanu, his favorite wife, inherited his lands. When Ka‘ahumanu died in 1832, her heir was Elizabeth Kahō‘anokū Kīna‘u, daughter of Kamehameha I and Kaheiheimālie (Ka‘ahumanu’s sister). Kīna‘u inherited Ka‘ahumanu’s *‘āina* (lands) as well as the position of *Kuhina Nui* (Premier). In 1827, Kīna‘u married Mataio Kekūanaō‘a and bore five children. The first two sons died young. But the other three children would continue the Kamehameha legacy: Alexander Liholiho would eventually reign as Kamehameha IV and Lota Kapuāiwa would reign as Kamehameha V. Kīna‘u died in 1839 only four months after her daughter, Victoria Kamāmalu Ka‘ahumanu, was born. Since Kīna‘u’s death was sudden and she did not leave a *kauoha* (command), it was decided by the *Ali‘i Nui* that Victoria Kamāmalu would inherit her lands and her position of *Kuhina Nui*. Kamāmalu’s guardians were John ‘Ī‘ī and her father, Mataio Kekūanaō‘a (Kame‘eleihiwa, 1992:120–124).

Following the enactment of a series of new laws from the mid-1840s to mid-1850s, Kamehameha III divided the land into four categories: Crown Lands reserved for himself and the royal house; Government Lands for the government; Konohiki Lands claimed by *ali‘i* and their *konohiki* (supervisors); and *kuleana*, small plots claimed by the *maka‘āinana* (commoners) (Chinen 1958:8–15). These claims are described in Land Commission Award (LCA) testimony from the claimant and witnesses. A Royal Patent (RP), which quitclaimed the government’s interest in the land, was issued on most Land Commission Awards (Chinen 1958:14). In some cases, more than one RP number was issued for an LCA, especially in cases where there were several widely separated *‘āpana* (lots), such as an award with agricultural land in one *ahupua‘a* and a house lot in another.

Ali‘i were required to pay a commutation fee to the government for their confirmed Konohiki Land titles; this payment could be in cash or in the return of land to the government or crown. Many *ali‘i* elected to return substantial portions of their awarded lands to avoid the one-third commutation cash fee. The Kuleana Act of 1850 allowed *maka‘āinana*, in principle, to own land parcels where they were currently and actively cultivating and/or residing. In 1851, certain Government Lands became available for purchase in lots of 1 to 50 acres in fee simple; this new category of land ownership became known as Royal Patent Grants or Land Grants.

At the time of the Mahele in 1848, Victoria Kamāmalu held seven *‘āina* on the island of Kaua‘i. Five of these *‘āina* were relinquished to the *Mo‘i* (King) and she retained two *‘āina* for herself, including the *ahupua‘a* of Makaweli (LCA 7713). Since Kamāmalu was only 7 years old in 1848,

her guardians, Mataio Kekuanaō‘a and Ioane ‘Ī‘ī, acted on her behalf. In 1857, Kekuanaō‘a and ‘Ī‘ī agreed to a *Palapala Ho‘olimalima Kula* (lease for *kula* lands) to a *hui* (group) of people from Makaweli and Waimea. The group consisted of 120 people who all signed the lease. The lease reads as follows:

> *Eia nā mea i koe ma kēia ho‘olimalima ‘ana o ka loko nui i Kekupua a me nā loko li‘ili‘i, ‘o ka i‘a ho‘omalu, ‘o ka lā‘au kapu o nā kumu ‘alani i Waikae, ‘o nā lo‘i Pō‘alima a me nā kumu nui o Mahaihai a me Kekupua, ‘o nā kuleana o nā kānaka a me ka Pāpūkapu, ka wahie inā he mea kū‘ai koe no ia ma kēia ho‘olimalima ‘ana.*
>
> Translation: Here are the things exempt from this lease. The large pond in Kekupua and the small ponds, the protected [by taboo] fish, the sanctioned wood of the orange trees at Waikae, the Po‘alima taro fields and the large trees of Mahaihai and Kekupua, the kuleana of the people and the reserved fort, the firewood, if it is for sale, is exempted by this lease.

The above exemptions are obviously a carry-over of the ancient *kapu* system. The lease indicates the kinds of items that were *kapu*. Traditionally, large ponds were often reserved for the *ali‘i*. The lease also indicates that even though the *kapu* system was done away with in 1819, certain provisions were still being observed by the *ali‘i* and their people as late as 1857.

A sizable population was present in Makaweli during this period. Māhele records indicate 117 *kuleana* claims comprising 119 *‘āpana* were filed in Makaweli during the Māhele. These *‘āpana* were within the *‘ili* of Hakioa, Kaho‘omano, Kakalae, Kaloulu, Kapalawai, Koleakalo Manawai, Pu‘ulima, Wai‘awa‘awa, and Waikaia all located along the Waimea River, the Makaweli River, or a major western tributary of the Makaweli River (Figure 7). No *kuleana* claims are indicated within the Preliminary Project Study Area, or the majority of Makaweli to the east of the Waimea-Makaweli-Mokuone river basin.

The fort, at the mouth of the Waimea River on the Makaweli side, had seen action in the Rebellion of 1824, when O‘ahu forces put down the uprising against the Kamehameha dynasty. The *koa* or soldiers at the fort were given *lo‘i* (irrigated taro terrace) lands nearby the fort so they could help raise their own food. Twenty-two of the Makaweli claims are for fort soldiers, who generally claimed a single *lo‘i* or *mo‘o*. Most fort soldiers were given land in the *‘ili* of Kaho‘omano, with some others in Hakioa; both of these *‘ili* are located quite close to the fort (Esh et al. 2008).

Within the 119 claimed *‘āpana* in Makaweli, 223 *lo‘i* or *mo‘o* (which presumably included *lo‘i*) are enumerated. The majority of these *lo‘i ‘āpana* are in Hakioa (28), Kaho‘omano (26), and Kakalae (23). Thus the vast majority of *lo‘i* claims were in seaward portions of the Waimea and Makaweli rivers. There are claims for 31 house lots. Presumably, some or all of the 22 soldiers awarded *lo‘i* were still garrisoned at the fort; the house lots tend to be in *‘ili* closer to the shore, and some along the rivers.

The Māhele land documents suggest a pattern of the extensive exploitation of the Waimea-Makaweli-Mokuone river basin. The *ahupua‘a* of Makaweli is bounded by the Waimea River on the western side at the shore. The Waimea River is fed by the Makaweli River tributary a short distance up the river, and the Makaweli River, in turn, is fed by other streams such as the Mokuone Stream. At the time of the Māhele, people were settled along these river basins. Waimea, at this

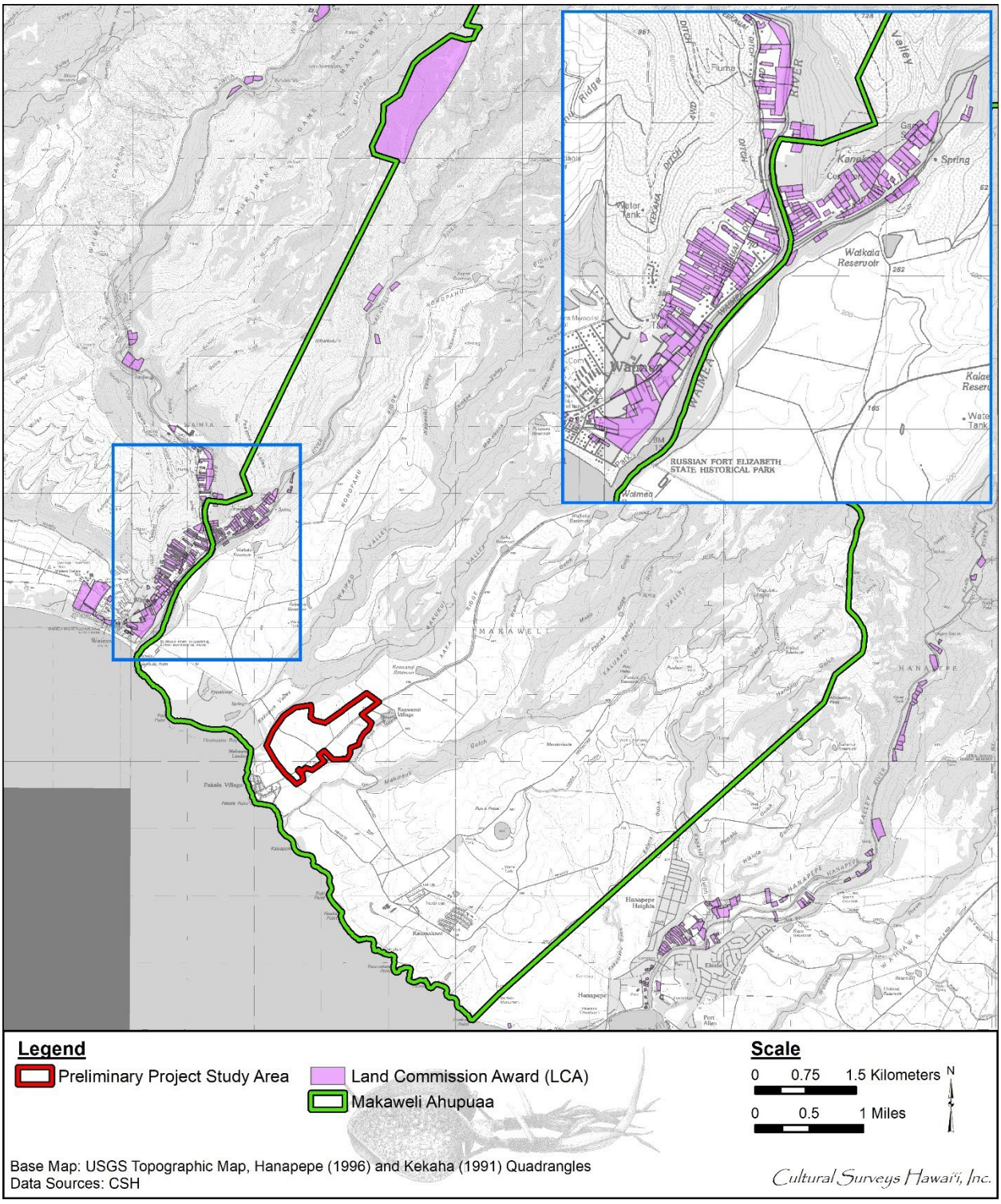

Figure 7. Portion of the 1996 Hanapepe USGS 7.5-minute topographic showing the LCAs nearest to the Preliminary Project Study Area in Makaweli Ahupua‘a

same time, had the greatest population on the island of Kaua‘i; Makaweli’s land use is closely linked to Waimea, with some claimants living in one place and farming in the other or vice versa. There is a slight preference for a house lot in Waimea, but several have house lots in both *ahupua‘a*. Visiting ships were probably supplied with food from both districts when they stopped at Waimea Bay.

A major problem in reconstructing Māhele-era settlement patterns is that tax maps and other readily available historic maps do not show *‘ili* areas for claims or awards in Huakaule, Kahalai, Kahana, Kahola, Kaikolu, Kalā‘au‘ōkala, Kamaka‘eli‘eli, Kamo‘ouli (Kamo‘oali‘i), Kaneli, Kaohuilihau, Kapuemanu, Kaunuloa, Kiele, Kohiana, Kukuihoehoe, Kula‘amokualuli, Kumuiki, Mahaihai (Mahaemae), Manini, Mokuone, Nonopahu, Ololokalau, Olokele, Palaloa, Piliamo‘o, Poleiwale, Uhilau, Waikui or Wailele. It is difficult to understand the entire *ahupua‘a* settlement pattern when so many of the geographic areas of settlement are unknown. Perhaps these *‘ili* were all along the westernmost margin of Makaweli as is the case with the geographically identifiable *‘ili*, but for all we know they may have been widely spread out over Makaweli Ahupua‘a.

Thus, while the Māhele provides a very detailed record of the western end of Makaweli, which was extensively cultivated along the Waimea-Makaweli-Mokuone river valleys, little is known about the eastern and central part of the *ahupua‘a.* Records indicate the *ali‘i* used the Kekupua Fishpond and the Kapalawai area north of Pākalā Village, and there were a few salt ponds along the shore. From our knowledge of Waimea and Hanapēpē, it is likely the land just *mauka* of the shore provided *pili* grass for housing, and that there were possibly even wetland terraces in other valleys to the west of the Makaweli River.

3.2.2.4 Ranching

In 1793, Captain Vancouver gave Kamehameha a gift of a longhorn bull and a heifer, which were pastured on the island of Hawai‘i. A ten-year sanction was put on the cattle to ensure their survival and growth. These strange looking animals were called *pua‘a bipi* (pig-beef) because of their strange stare. Kamakau (1992:164) notes, “this was the beginning of the wild herds of Waimea and Mauna Kea.” By the 1820s, the unchecked cattle population had used up its grazing lands and was attacking the farmlands. In 1832, Kamehameha III recruited Spanish vaqueros to teach Hawaiians how to ride horses and rope cattle (Ronck 1984:57).

In 1803, Richard Cleveland brought the first horses to Kaua‘i. Kamehameha did not see much use in them since they were not used for food like cattle were (Ronck 1984:57).

In 1831, ranching was introduced to Kaua‘i when Richard Charlton, the British consul, leased some land in the Hanalei district. He started with a herd of about 100 head of cattle. Other ranchers followed suit and in 1848 the practice of registering brands to distinguish ownership of cattle was started on Kaua‘i. Kaumuali‘i’s favorite wife, Deborah Kapule, kept a large herd along the Wailua River (Ronck 1984:57).

Articles in Hawaiian language newspapers of the time indicate “wild cattle” were still a problem on all the islands even in the late 1800s. In 1874, G.K. Maka from Waiolama, Hilo writes a letter asking for support of a bill of complaint to the Legislature:

> In these days in which we are living here, we are surrounded by cattle and live together [...] Therefore, you people who are so fond of your lands that you hold them back, do not lease them. We are living in trouble. O my fellow representatives,

> from Hawai‘i to Kaua‘i [...] Perhaps now our king will agree, just as he promised to here in Hilo, to let you fence in your patches and homes and if cattle enter take the (creature) to the Pound. Here is a good idea, let the lease holder put up the fences [...] [*Nūpepa Kūoko‘a* 13 June 1874]

By 1899, “wild cattle” as well as goats had become a big problem on Kaua‘i. Notes from Henry Pratt Judd of a hunting trip to Makaweli indicate that over a two-day period, 180 goats and 11 cattle were shot (Judd 1899).

3.2.2.5 Sugar

In 1835, Ladd and Company started the first successful sugar plantation in Hawai‘i at Kōloa, Kaua‘i. William Ladd, William Hooper, and Peter Brinsmade took out a 50-year lease on 980 acres of land at Kōloa from Kamehameha III. As other sugar plantations were organized, more labor was needed to work the fields. Plantation owners began recruiting laborers from outside the Hawaiian Islands. The Chinese were the first to arrive in 1852, followed by the Japanese in 1868 and Portuguese workers in 1878.

The Hawaiian Sugar Company (a.k.a. Makaweli Plantation) was founded at Makaweli Ahupua‘a shortly after the signing of the Reciprocity Treaty of 1876 by representatives of the Scottish Mirlees, Watson & Yaryan Company. Samuel T. Alexander and Henry P. Baldwin took over the plantation, incorporating it in 1889 (Condé and Best 1973:134). A large mill was established in present-day Kaumakani Town and approximately a dozen camps for sugar workers were scattered amongst the fields (Figure 8 and Figure 9).

3.2.2.6 The Sinclair-Robinson-Gay Family

The Sinclairs arrived in Honolulu in 1863 and immediately began looking for large tracts of land to purchase. Disappointed with what they saw, the family decided to head for California in search of better prospects. King Kamehameha IV, hearing of their plans to leave, offered them the island of Ni‘ihau. Unusually heavy rainfall was recorded for 1861–1863, and Ni‘ihau was exceptionally lush and green when the two Sinclair brothers, Francis and James, did a site inspection of the island. Excited at their discovery, they hoped to re-establish the cattle and sheep business they had left behind in New Zealand. The two brothers accepted the King’s offer and purchased the island of Ni‘ihau for $10,000 in gold. There they raised Merino sheep and Shorthorn cattle from the continental United States, Australia, and New Zealand.

In 1865, Eliza Sinclair purchased the *ahupua‘a* of Makaweli (21,844 acres) from Victoria Kamāmalu Ka‘ahumanu for $15,000. A new home built in the cool uplands at about 1,800 feet (ft) elevation became known as the “Makaweli house” and sometime in the early 1870s the Sinclair family moved from Ni‘ihau to settle there (Dorrance and Morgan 2000:32–33).

The Kapalawai house was built by Aubrey Robinson for his wife Alice Gay Robinson; Figure 10 indicates the house was located northwest of the Preliminary Project Study Area. The exact date of construction is not known, but the house was probably built around the mid-1890s. The original house plans do not show a date, but the Robinsons have a photo of the house with the date 1897 written on the back (19 May 1999, pers. comm. with Ed Rice), thus making the house at least 103 years old. The Kapalawai house was designated as SIHP # 50-30-9-00764 Feature A.

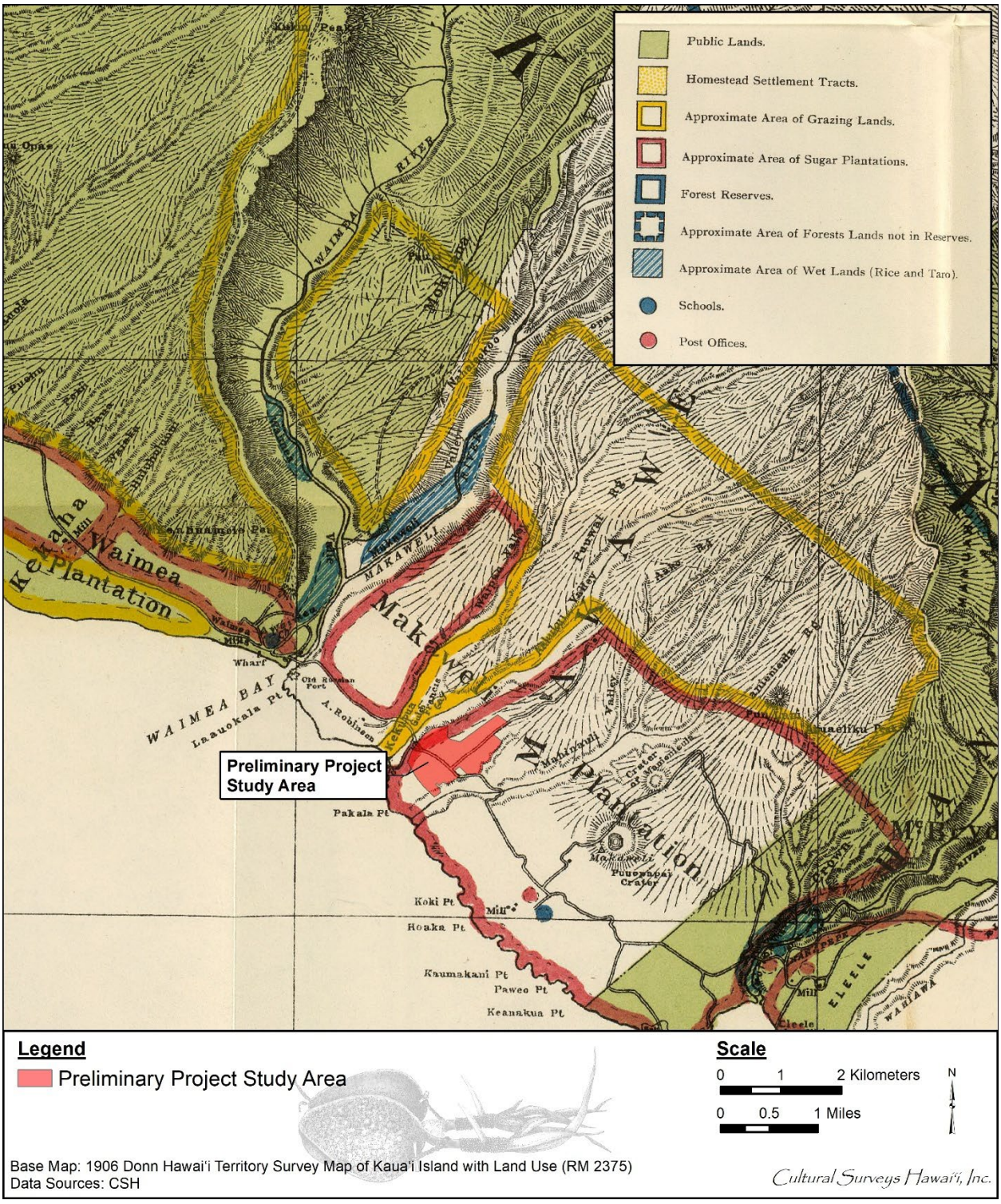

Figure 8. Portion of 1906 Donn map of Kaua‘i, showing the Preliminary Project Study Area within the bounds of the Makaweli Plantation

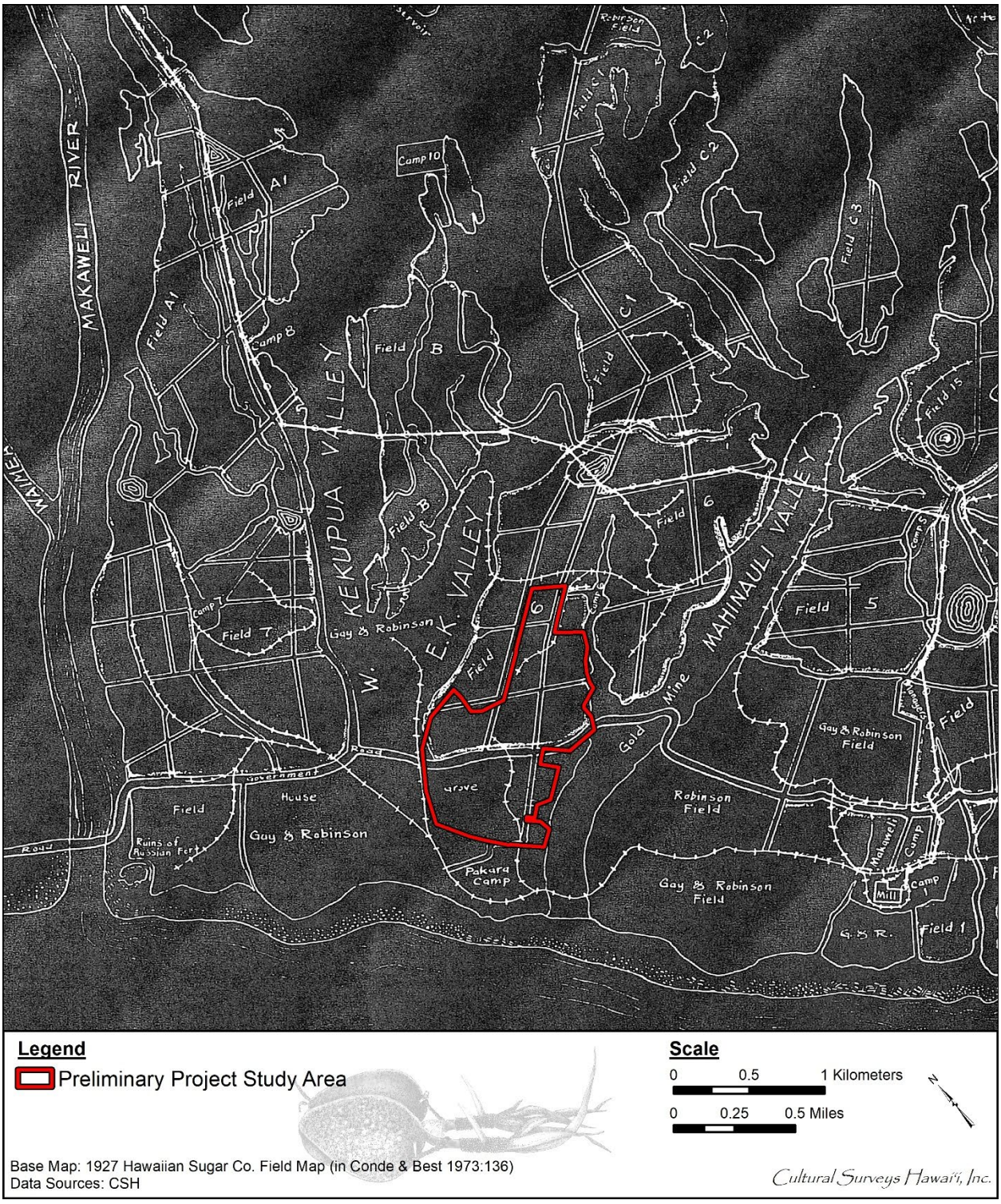

Figure 9. 1927 Hawaiian Sugar field map (Condé and Best 1973:136) showing the Preliminary Project Study Area in relation to plantation features such as planting fields, camps, cane roads, and rail lines

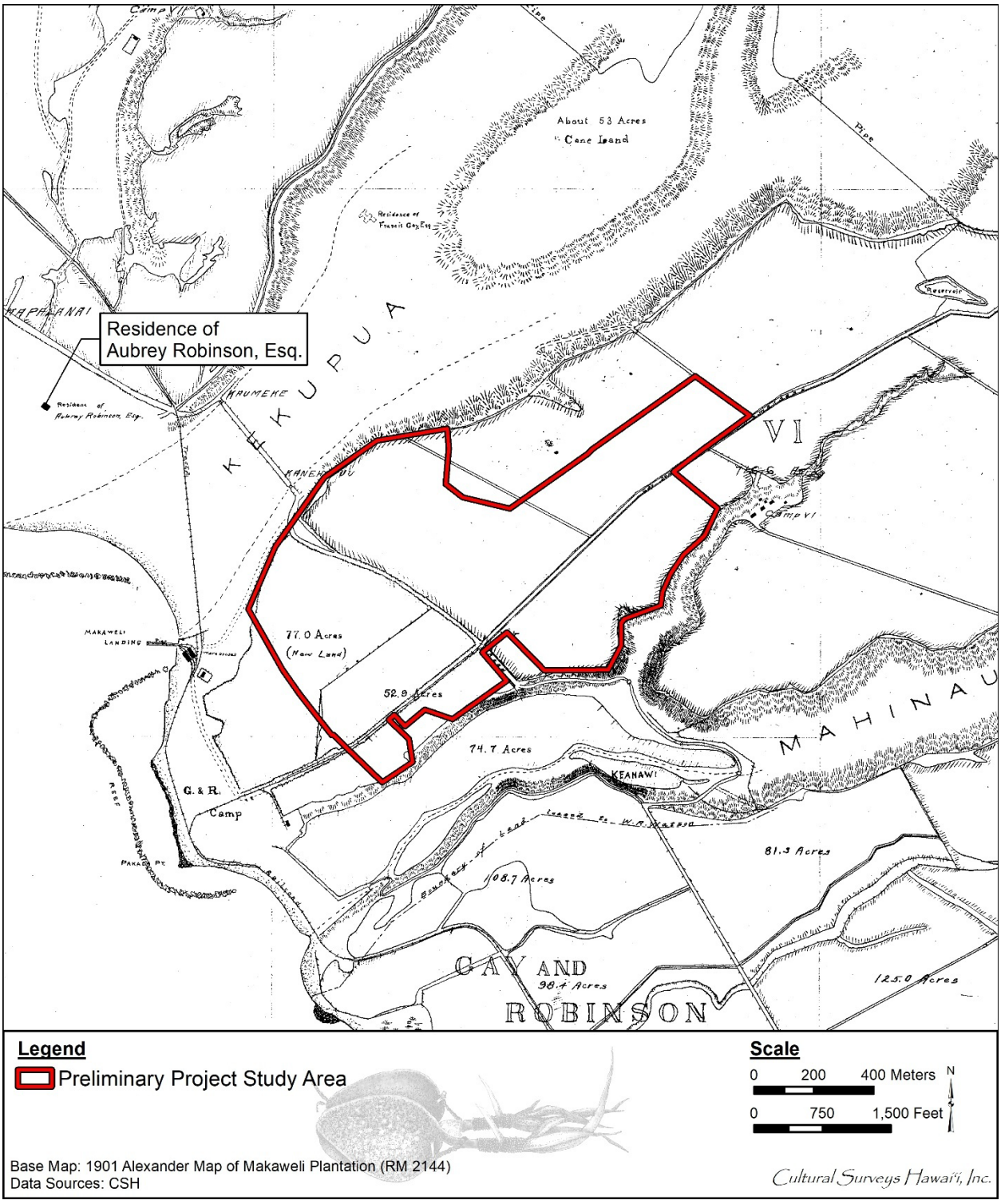

Figure 10. Portion of the 1901 Alexander map of Makaweli Plantation (RM 2144) showing the location of Aubrey Robinson’s northwest of the Preliminary Project Study Area

In 1889, Francis Gay and Aubrey Robinson formed the family partnership known as Gay & Robinson (G&R). Through this partnership, the various family businesses, such as Makaweli Ranch and Makaweli Plantation, were managed. By the early 1880s the Robinsons became involved in the sugar business, not only planting their own crops but also leasing large tracts of land to Hawaiian Sugar Company (Wilcox 1996:86). The Robinsons were always looking for new and creative ways to utilize their land. For many years, they raised bees for honey and experimented with other agricultural crops.

3.2.3 1900s - Present

Makaweli Plantation was one of the most successful and profitable plantations in Hawai‘i, due in large part to improvements in irrigation at the start of the twentieth century (Wilcox 1996:89). The Hawaiian Sugar Company was one of the first plantations to construct family housing for its workers with amenities such as a plantation store (Dorrance and Morgan 2000:33). It established 11 or 12 small camps scattered among their fields in Makaweli Ahupua‘a around the turn of the century. The town of Kaumakani grew up from the settlements around the sugar mill known as “Makaweli Camp” and “Camp 1.” Ka‘awanui Village grew up from “Camp 6,” and Pākalā Village grew up from “Pakala Camp”; these settlements are depicted in relation to the Preliminary Project Study Area on Figure 9 and Figure 11.

The Territorial Government in the 1930s constructed a new Belt Road system on Kaua‘i (MKE Associates, LLC/Fung Associates, Inc.). The portion of the new Belt Road through southwestern Kaua‘i is Kaumuali‘i Highway (Route 50), which replaced the Old Government Road as the main transportation route through the area. Kaumuali‘i Highway is visible in relation to the Preliminary Project Study Area, villages, and plantation infrastructure such as cane roads and water features in Figure 12. Notably, the portion of the Old Government Road within the Preliminary Project Study Area is labeled “Private Road” in Figure 12, indicating it became subsumed into the plantation holdings.

Hawaiian Sugar Company was dissolved in 1940 due to disputes over new leasing agreements. Olokele Sugar Company was formed under the new management of C. Brewer & Company and operated on the former Hawaii Sugar Company plantation lands (Wilcox 1996:89). A 1970s aerial photo shows the Preliminary Project Study Area under continued cultivation (Figure 13). C. Brewer & Company sold Olokele Sugar Company to Gay & Robinson as its lease was nearing expiration in 1994. The plantation and mill continued to operate under the name Gay & Robinson until it was closed in the first decade of the twenty-first century.

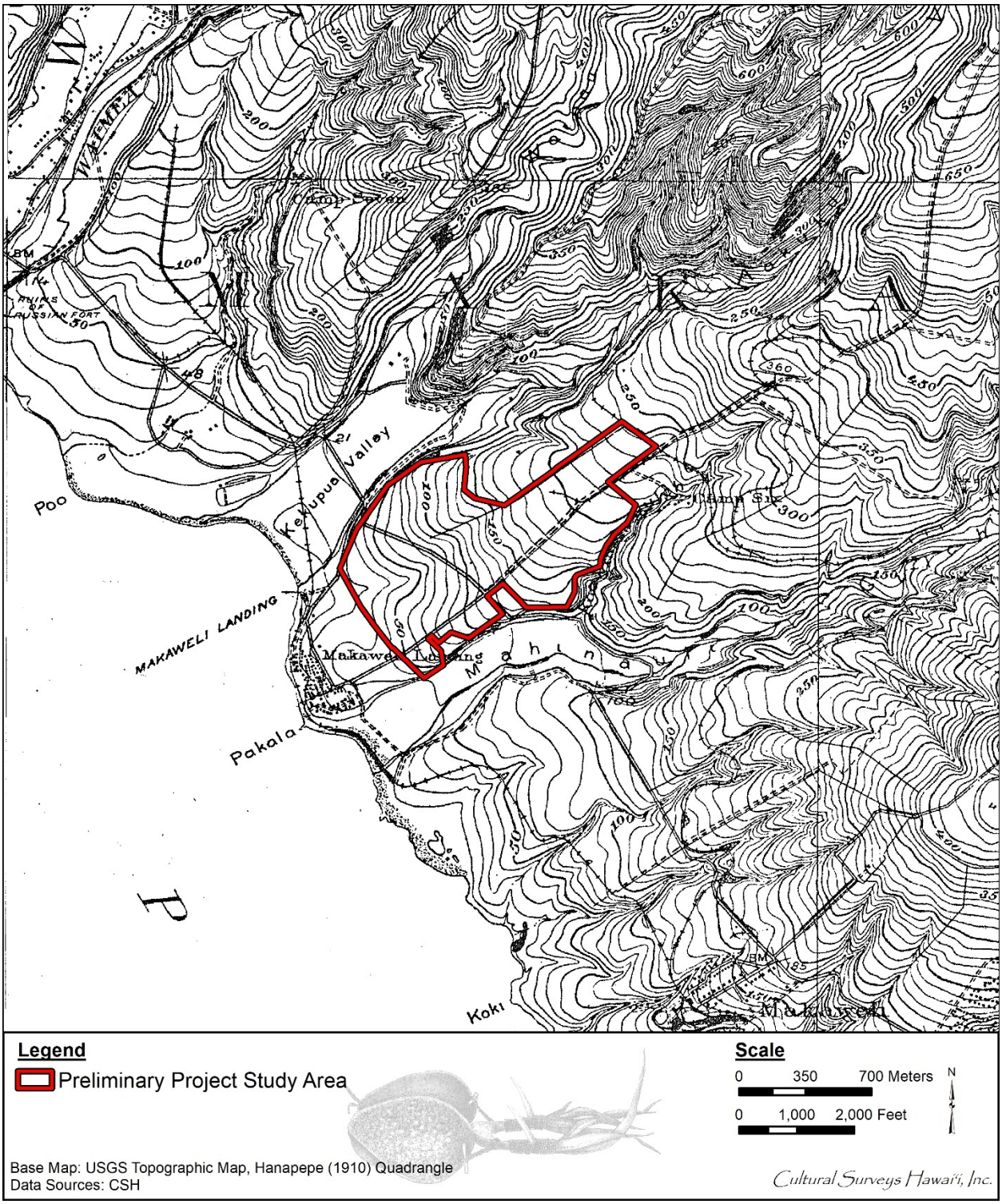

Figure 11. Portion of the 1910 Hanapepe USGS topographic quadrangle showing the Preliminary Project Study Area

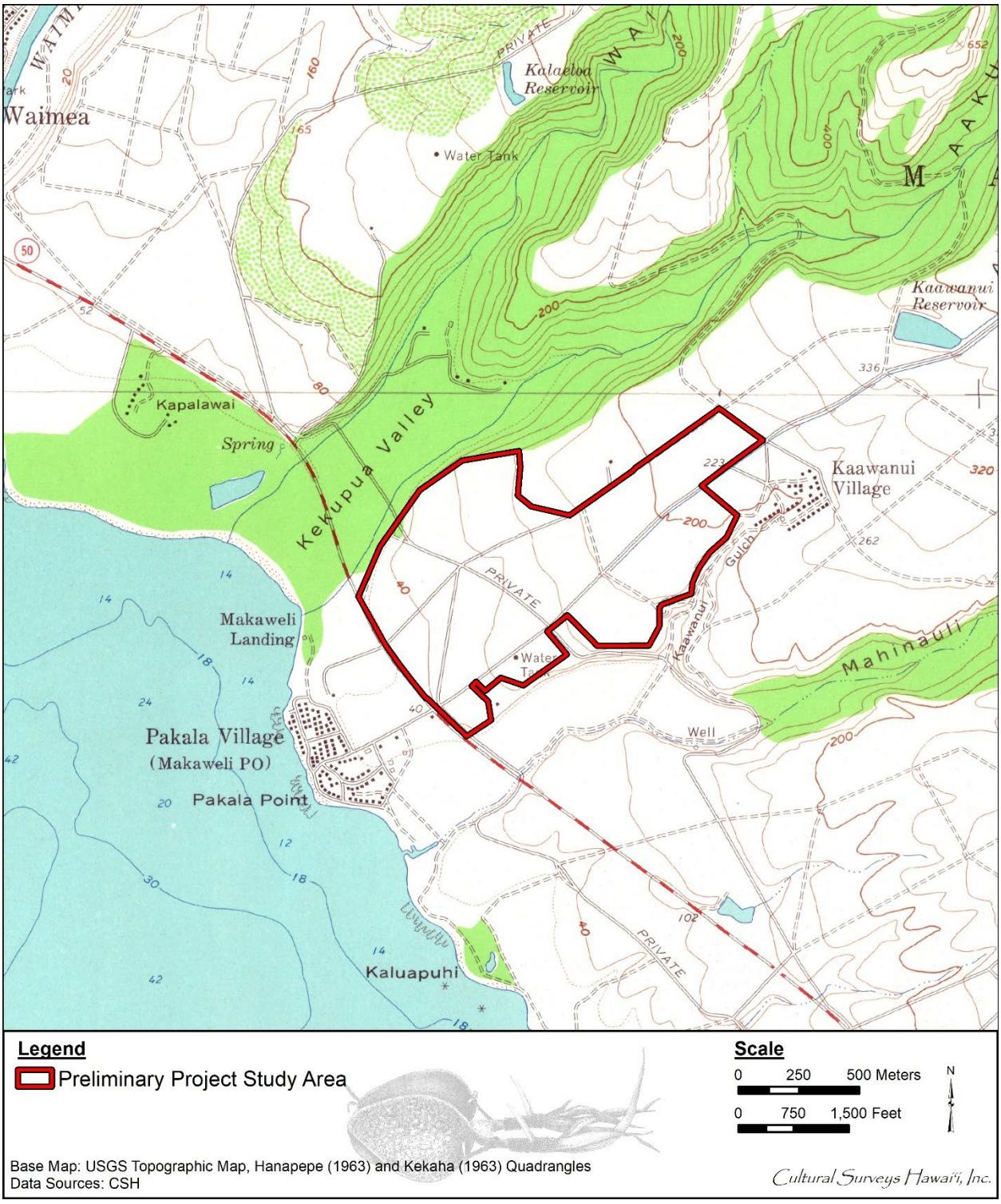

Figure 12. Portion of the 1963 Hanapepe USGS topographic quadrangle showing the Preliminary Project Study Area

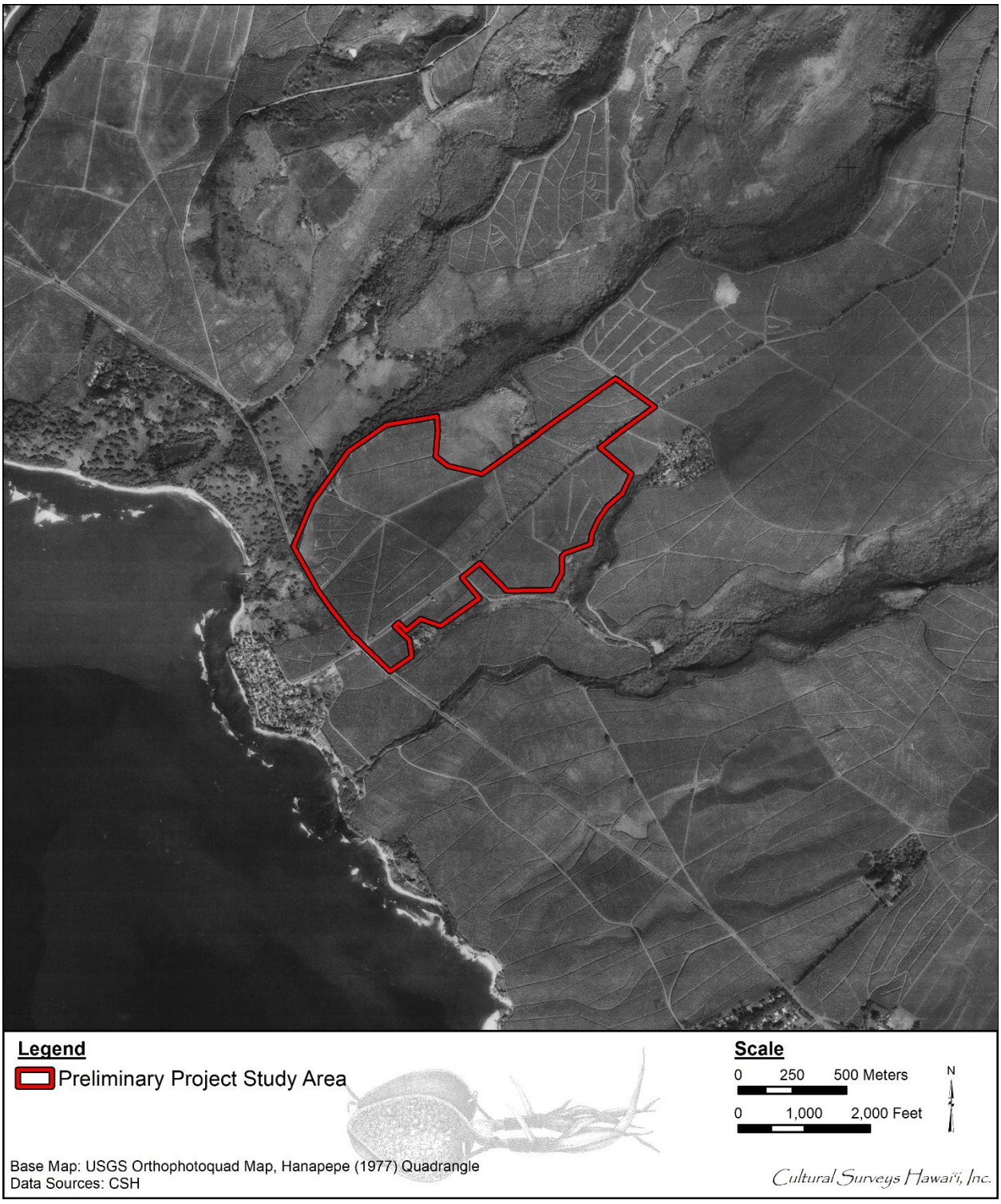

Figure 13. Portion of the 1977 USGS Hanapepe orthophotoquad map showing the Preliminary Project Study Area

3.1 Previous Archaeological Research

Seven prior archaeological studies have been conducted within 1.5 km of the current Preliminary Project Study Area; none of these overlap with the Preliminary Project Study Area. These seven prior studies are depicted in relation to the current Preliminary Project Study Area in Figure 14 and summarized in Table 1.

Archaeological sites previously documented within 2.5 km of the Preliminary Project Study Area are located in Figure 15 and listed in Table 2. These include Māha‘iha‘i Heiau and ‘A‘akukui Heiau, both documented in upland Makaweli during early surveys by Thrum (1907) and Bennett (1931); human burials at the coast (SIHP #s 50-30-09-00792 Feature B and -06011); Pe‘ekaua‘i (Menehune) Ditch (SIHP # -00026) along the Waimea River; Kekupua fishpond (SIHP # 50-30-09-00765); and historic-era sites associated with the Robinson family and/or sugar plantation land use (SIHP #s 50-30-09-00762, -00763, -00764, -00766, and -02269).

3.1.1 SHPD Inadvertent Finding near Manhinauli Gulch – McMahon 1993

In 1993, SHPD archaeologist Nancy McMahon assessed the inadvertent discovery of a coastal burial, southwest of the current Preliminary Project Study Area (McMahon 1993; see Figure 14). SIHP # 50-30-09-06011 is located just south of the inlet of Mahinauli Gulch, and just north of the Robinson Landing barge harbor (see Figure 15). The discovery exposed a cultural deposit including midden and basalt debitage. It was unclear whether the burial was traditional Hawaiian or historic.

3.1.2 Kapalawai – Zulick et al. 2000; McDermott and Hammatt 2001

CSH conducted an AIS with subsurface testing for the 170-acre Kapalawai Resort project located immediately west of the current Preliminary Project Study Area (Zulick et al. 2000; see Figure 14). Six historic properties were identified: SIHP # 50-30-09-00762, a series of rock walls (Features A through E), a terrace (Feature F), and an iron pot (Feature G); SIHP # -00763, an oval-shaped stone platform; SIHP # -00764, a housing complex of 14 historic buildings (Feature A, the main house; Feature B, the guest house; Feature C, offices; Feature D, the carriage house; Feature E, the tack room; Feature F, the greenhouse; Features G through N, employee cottages); SIHP # -00765, Kekupua Fishpond; SIHP # -00766, a Portuguese brick oven; and SIHP # -00792, a cultural deposit (Feature A) which includes a human burial (Feature B) (see Figure 15).

The subsurface testing program included 23 backhoe trenches throughout the project area; nine hand-excavated test units, eight being related to SIHP # -00763, and one excavated along the shoreline; and seven random coring samples within Kekupua Fishpond (SIHP # -00765) (Zulick et al. 2000:9). Charcoal from the core sample at Kekupua Pond was radiocarbon dated to AD 895-1225, and two charcoal samples from SIHP # -00792 range from the fifteenth century to the twentieth century (sample 139725 [CSH ID# Kapal0a]) yielded a calendar age range of AD 1400 to 2000. Sample 139726 (CSH ID# Kapal0b) yielded a calendar age range of AD 1480 to 1960 (Zulick et al. 2000:171).

CSH subsequently conducted an addendum to the 2000 AIS (McDermott and Hammatt 2001; see Figure 14) that recorded two new features of SIHP # -00762: Feature H is a pump house and related pipeline and out-flow basin, and Feature I is a subsurface culvert.

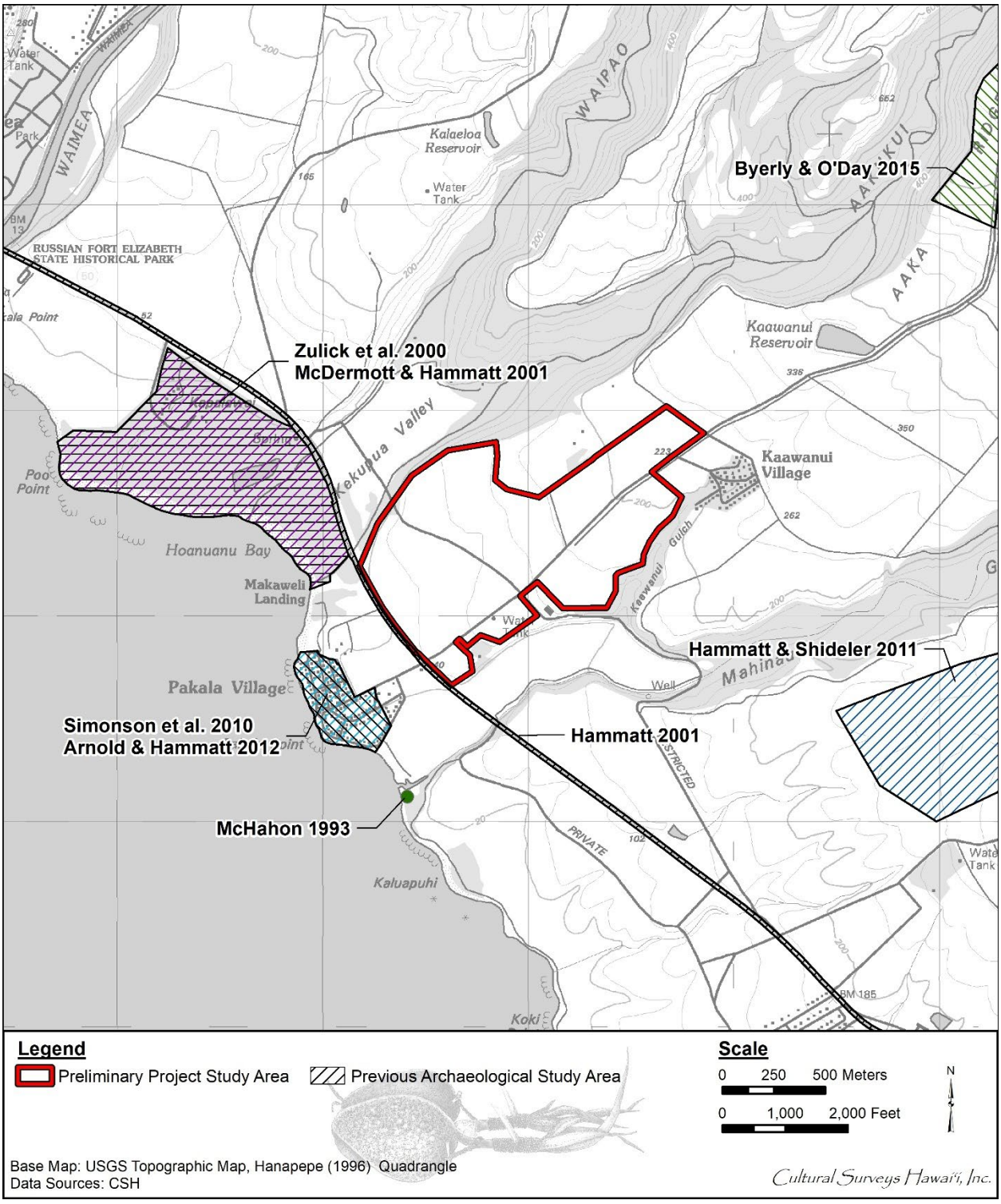

Figure 14. Portion of the 1996 Hanapepe and 1991 Kekaha USGS 7.5-minute topographic quadrangles showing previous archaeological studies located within 1.5 km of the current Preliminary Project Study Area

Table 1. Previous archaeological studies within 1.5 km of the current Preliminary Project Study Area

Reference	Type of Study	Location	Results
McMahon 1993	Inadvertent burial discovery and disinterment	Near Mahinauli gulch east of Pākalā Village	SIHP # 50-30-09-06011, human burial discovered and disinterred
Zulick et al. 2000	Archaeological inventory survey with subsurface testing	Kapalawai	Documented six newly identified historic properties: SIHP #s 50-30-09-00762, walls, terrace, and iron pot; -00763, platform; -00764, house complex; -00765, Kekupua fishpond; -00766, historic structure; and -00792, cultural deposit and human burial
Hammatt 2001	Archaeological inventory survey (recorded as an archaeological assessment)	Approx. 51-mile road corridor between Kekaha and Moloa‘a	Concluded portion of corridor adjacent to current Preliminary Project Study Area has low potential for subsurface archaeological features
McDermott and Hammatt 2001	Addendum archaeological inventory survey	Kapalawai	Identified and documented two new features of SIHP # 50-30-09-00762 (pump house with related pipeline and outflow basin, and subsurface culvert)
Simonson et al. 2010	Archaeological inventory survey (recorded as an archaeological assessment)	Pākalā Village	No historic properties documented
Hammatt and Shideler 2011	Archaeological literature review	Eight potential landfill locations including Pu‘u o Pāpa‘i in Makaweli	Research indicated no known historic properties and low potential for undocumented historic properties within Pu‘u o Pāpa‘i (Makaweli) project area, based on its distance from coast and prior land disturbance
Arnold and Hammatt 2012	Archaeological monitoring	Pākalā Village	No historic properties documented
Byerly and O’Day 2015	Archaeological inventory survey	50-acre agricultural parcel in Makaweli, TMK: (4) 1-7-006:006	Documented SIHP # 50-30-09-02269, historic irrigation ditch system

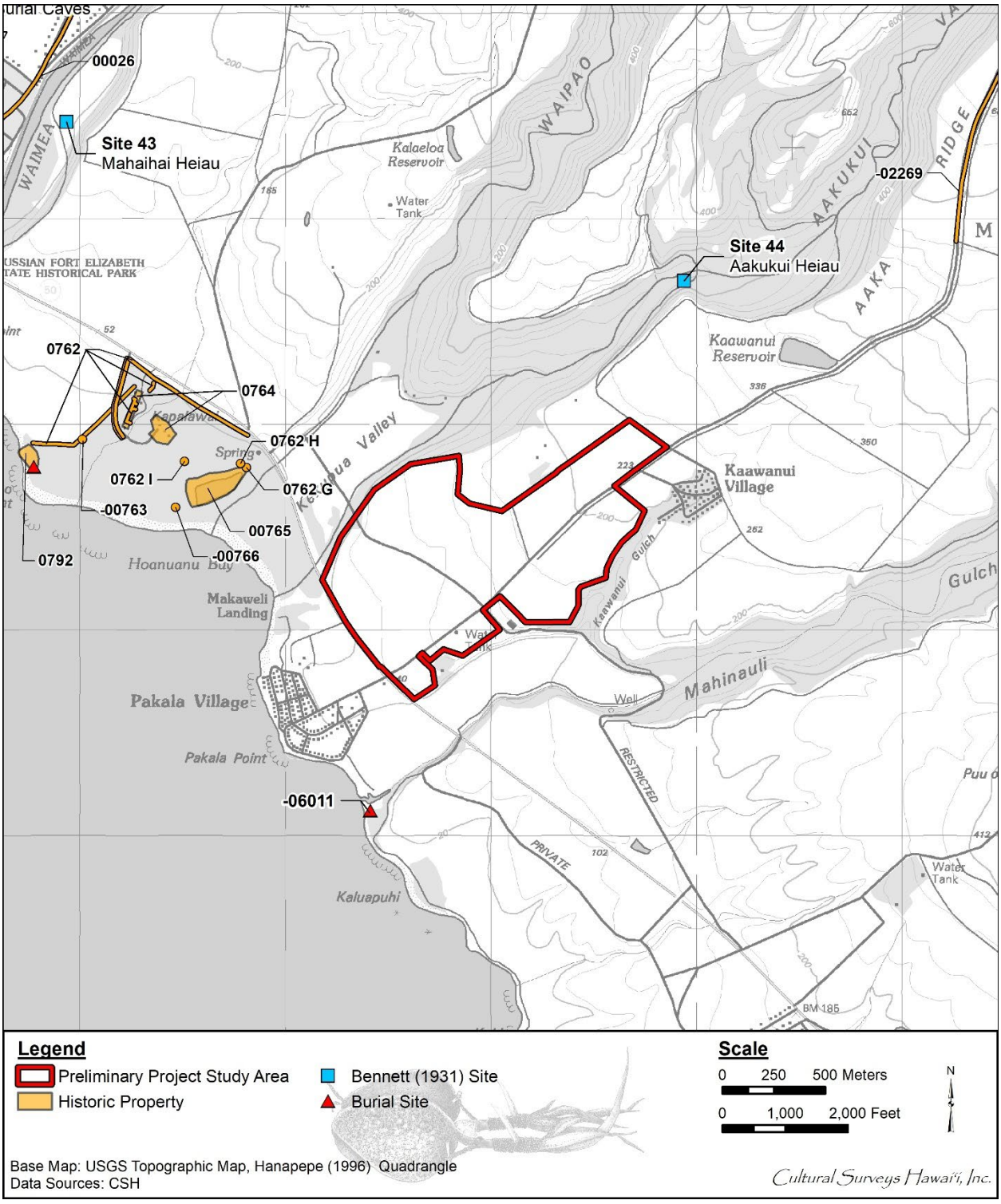

Figure 15. Portion of the 1996 Hanapepe USGS 7.5-minute topographic quadrangle showing archaeological sites previously documented within 2.5 km of the Preliminary Project Study Area

Table 2. Previously documented archaeological sites within 2.5 km of the Preliminary Project Study Area

SIHP # 50-30-09-*****	Site Type	Reference
Site 43	Māha‘iha‘i Heiau	Thrum 1907; Bennett 1931
Site 44	‘A‘akukui Heiau	Thrum 1907; Bennett 1931
-00026 (Site 26)	Pe‘ekaua‘i (Menehune) Ditch, also known as Kīkīaola	Vancouver 1789; 1918 Thrum and Evans map (RM 2686); Menzies 1920; Bennett 1931; Damon 1931; 1910 USGS topo map; 1963 USGS topo map; Joerger and Streck 1979; Hawai‘i Register 1974; National Register 1984; 1996 USGS topo map; Kamai and Hammatt 2015; Tomonari-Tuggle and Duarte 2017; Tomonari-Tuggle and Stephens 2017
-00762	Robinson-era complex including rock walls, terrace, iron pot, pump house and related structure, and a subsurface culvert	Zulick et al. 2000; McDermott and Hammatt 2001
-00763	Platform/possible plantation clearing mound	Zulick et al. 2000
-00764	Robinson Homestead complex	Zulick et al. 2000
-00765	Kekupua fishpond	Zulick et al. 2000
-00766	Portuguese oven	Zulick et al. 2000
-00792A	Pre-Contact cultural layer	Zulick et al. 2000
-00792B	Human burial	Zulick et al. 2000
-02269	Historic sugar plantation irrigation ditch system	Byerly and O’Day 2015
-06011	Human burial	McMahon 1993

An archaeological monitoring plan (Hammatt and Shideler 2006a), preservation plan (Hammatt and Shideler 2006b), and burial treatment plan (Hammatt and Shideler 2006c) were later prepared for the project.

3.1.1 Highway Corridor – Hammatt 2001

In 2001, CSH conducted an archaeological inventory survey (lack of finds recorded as an archaeological assessment) for an approximately 82-km (51-mile) road corridor for a proposed fiberoptic cable project between Kekaha and Moloa‘a (Hammatt 2001). The corridor included a portion of Kaumuali‘i Highway immediately west of the current Preliminary Project Study Area (see Figure 14). The objective of the survey was to identify areas within the corridor having potential for subsurface historic properties including human burials and cultural deposits (Hammatt 2001:1). The project corridor was evaluated based on previous studies including soil surveys, tax and historic maps, LCA documents and locations, previous archaeological studies, and field inspections as appropriate. The results were synthesized to produce a scale representing four levels of potential for yielding subsurface archaeological resources: low, moderate, high, and very high (Hammatt 2001:12). Section 3 of the corridor, which extended from the eastern end of the Waimea River Bridge past the current Preliminary Project Study Area to the sand deposit in the vicinity of Makaweli Landing, was evaluated as having a low potential for yielding subsurface historic properties (Hammatt 2001:16–17).

3.1.2 Pakala Village Wastewater Treatment – Simonson et al. 2010; Arnold and Hammatt 2012

CSH conducted an AIS with subsurface testing for a wastewater project in Pākalā Village located southwest of the Preliminary Project Study Area (Simonson et al. 2010; see Figure 14). No historic properties were documented, and therefore the AIS was termed an archaeological assessment pursuant to HAR §13-284-5(A). Despite these findings, archaeological monitoring was recommended for the project based on the potential for encountering human skeletal remains within the natural Jaucas sand sediments underlying agricultural fill and alluvial material in a portion of the project area.

Archaeological monitoring of the project was subsequently conducted by CSH (Arnold and Hammatt 2012; see Figure 14). No cultural materials were identified.

3.1.3 Kaua‘i Landfill – Hammatt and Shideler 2011

CSH in 2011 prepared an archaeological literature review of eight potential locations for a new municipal solid waste landfill (Hammatt and Shideler 2011). One of the eight proposed locations was at Pu‘u o Pāpa‘i in Makaweli, located southeast of the current Preliminary Project Study Area (see Figure 14). Research indicated no known historic properties were present within the Pu‘u o Pāpa‘i project area. Although no prior archaeological survey has been done at that location, it was assessed as having a low probability of containing “highly significant” historic properties based on its distance from the coast and prior agricultural disturbance.

3.1.4 Byerly and O’Day 2015

Garcia and Associates in 2015 completed an AIS of 50 acres located northeast of the current Preliminary Project Study Area (Byerly and O’Day 2025; see Figure 14). One historic property was documented and designated as SIHP # 50-30-09-02269 (see Figure 15). The site is a historic

irrigation ditch system comprising six features including a linear earthen ditch with culverts and concrete floodgates. Other modern agricultural features related to the former sugarcane plantation were also observed, including irrigation features dating from the 1980s to 2010.

3.2 **Background Summary**

Very little written information is available about the pre-Contact period of Native Hawaiians within Makaweli Ahupua‘a. It is most likely that during much of the pre-Contact period, Native Hawaiians in the Waimea Ahupua‘a, specifically along the west side of Waimea River, had close association with the people on the east side of the river in the Makaweli Ahupua‘a.

Based on the Māhele claims, the land use pattern at Makaweli was very strongly focused on the seaward portion of the *ahupua‘a* along the Waimea-Makaweli-Mokuone river valleys. The general absence of historic accounts, *kuleana* land claims, or archaeological studies from the eastern and central parts of Makaweli Ahupua‘a should not be used to attest to a low population in the remainder of Makaweli Ahupua‘a though it may have been more dispersed. This population would have been supported by the presence of at least two other perennial streams to the east extending to the ocean and an assortment of other intermittent streams and gulches throughout Makaweli. With the significant Hawaiian population decline post-Contact, the continued economic growth of Waimea Bay as a major trade center, creation of a Waimea mission station, and development of a fortification at Waimea, people would have been drawn in from the surrounding country.

In the late nineteenth to early twentieth century the settlement pattern in Makaweli Ahupua‘a shifted from subsistence agricultural along the riverbanks and coastline to commercial agricultural development relating to the sugar industry. A series of “camps/villages” were established throughout the *ahupua‘a* to support a new influx of people working at the plantations.

Section 4 Results of Fieldwork

Fieldwork was accomplished on 22–23 January 2025 by CSH Project Director Missy Kamai, B.A., and CSH Archaeologist Samantha Purdy, B.A., under the general supervision of Principal Investigator Hallett H. Hammatt, Ph.D. This work required approximately 4 person-days to complete. The focus of the field inspection was to examine the Preliminary Project Study Area for points of interest identified during background research and establish the potential for historic properties throughout the Preliminary Project Study Area. Any archaeological or architectural features encountered during the inspection were documented with Trimble GPS, photos, and brief written notes.

Ground visibility was excellent throughout most of the Preliminary Project Study Area, which consists mainly of open agricultural plots sectioned into fenced pens (see Figure 5, Figure 16 and Figure 17). Some of these pens are being actively watered using sprinklers to decrease wildfire risk and support pasturage (see Figure 17 and Figure 18). The agricultural fields are generally fallow or used to graze ungulates like water buffalo and cattle (Figure 19 and Figure 20). The only food crop being grown is a small plot of taro in the Buffalo Pen in the *mauka* portion of the Preliminary Project Study Area (see Figure 5 and Figure 21). Two-track dirt roads provide access within the pens. Large clearing mounds were observed in two corners of Mango Pen (Figure 22).

The eastern portion of the Preliminary Project Study Area located between Ka‘awanui Village and the base yard is not currently being grazed or used for agriculture, and this area has become overgrown (Figure 23). The base yard area is located east of Ka‘awanui Road at the Old Government Road intersection; portions of the base yard within the Preliminary Project Study Area bounds contain an abundance of abandoned plantation-related machinery including large cane hauler vehicles (Figure 24 and Figure 25). The portion of the base yard containing the garage structure is outside the Preliminary Project Study Area limits.

The Preliminary Project Study Area lands are accessible from a network of existing roadways, including sections of the Old Government Road and former plantation roads, which utilize culverts where they pass over ditches. Historic maps illustrate how the network of roads has changed over time (see Figure 6 and Figure 9 through Figure 13). Other plantation-related infrastructure was identified within the Preliminary Project Study Area, including rock walls, ditches, a water tank, and a remnant railroad track. No pre-Contact features were encountered, likely due to over a century of land alteration for plantation land use.

The various historic features documented during the field inspection are illustrated in Figure 26 and summarized in Table 3. These features can be categorized under five primary types: roads, walls, ditch systems, railroad, and water storage. Further discussion of these results is provided in Section 4.1.



Figure 16. Photo overlooking a fallow field within the Preliminary Project Study Area; view to southwest



Figure 17. Photo overlooking an irrigated field within the Preliminary Project Study Area; view to northeast



Figure 18. Photo showing sprinkler irrigation in a field within the Preliminary Project Study Area; view to west



Figure 19. Photo of water buffalo grazing within a fenced pen in the Preliminary Project Study Area; view to northeast



Figure 20. Photo of cattle grazing within a fenced pen in the Preliminary Project Study Area; view to north



Figure 21. Photo overlooking the taro patch in the northern portion of the Preliminary Project Study Area; view to southeast



Figure 22. Photo of boulder clearing mound located in the northern corner of the Mango Tree Pen; view to southwest



Figure 23. Photo of an overgrown field east of Ka‘awanui Road; view to west



Figure 24. Photo of abandoned machinery in the base yard area; view to northeast



Figure 25. Photo of abandoned sugarcane haulers in the base yard area; view to northwest

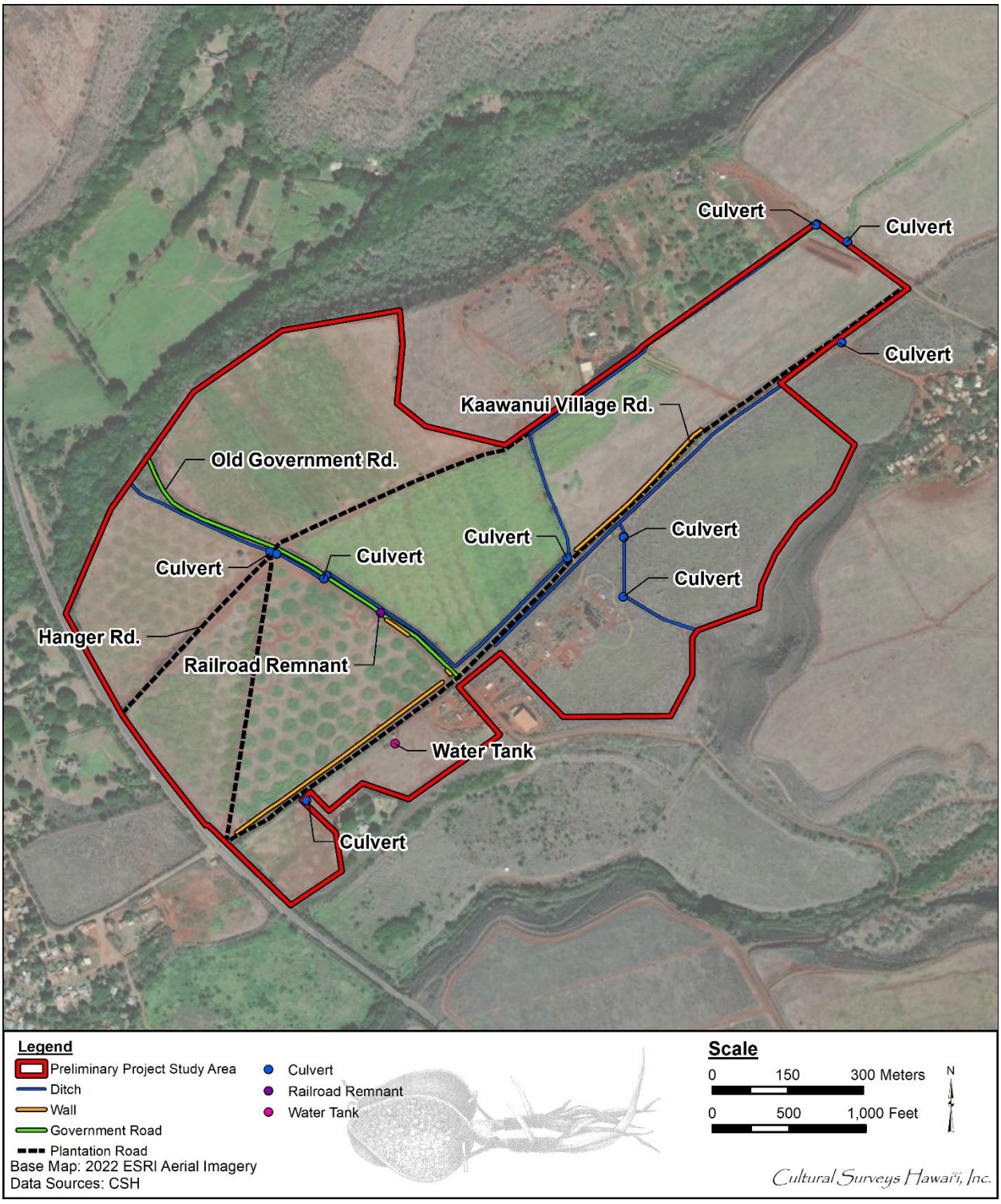

Figure 26. Aerial photograph (ESRI 2022) showing the locations of historic features observed during the field inspection

Table 3. Historic features identified within the Preliminary Project Study Area

Type	Feature	Function	Relative date	Present Condition
Roads	Old Government Road	Transportation	Pre-plantation (1800s)	Functioning/in-use; portion in Preliminary Project Study Area now privately owned
	Ka‘awanui Village Road	Transportation for plantation activities	Early plantation (pre-1901)	Functioning/in-use
	Hanger Road	Cane road used for transportation for plantation activities	Plantation (early to 1900s)	Functioning/in-use
	Cane Road	Cane road used for transportation for plantation activities	Plantation (1963-1977)	Functioning/in-use
Walls	Stacked rock walls along Ka‘awanui Village Road	Boundary	Unknown; likely early plantation era (late 1800s to early 1900s)	Extant segments range from good to poor/disturbed condition; lower segment is in generally better condition
	Stacked rock walls along Old Government Road	Boundary	Unknown	Extant segments are in fair to poor condition
Ditch Systems	Ditch system northwest of Ka‘awanui Road	Open ditch with culverts and sluice gates	Likely early plantation era (late 1800s to early 1900s)	Portions currently in use for irrigation needs; sluice gates are remnant and non-functioning
	Ditch system southeast of Ka‘awanui Road	Open ditch with culverts and some areas of stacked sides	Likely early plantation era (late 1800s to early 1900s)	Appears inactive/abandoned; no water present in ditch during field inspection
Railroad	Railroad remnant	Sugarcane transportation	Early plantation (pre-1901)	Isolated track remnant embedded within Old Government Road
Water Storage	Water tank	Plantation water storage and use	Plantation (pre-1963)	Used for current irrigation needs; includes associated pipelines

4.1 Historic Features in the Preliminary Project Study Area

4.1.1 Roads

4.1.1.1 Old Government Road

An 820-m-long section of the Old Government Road bisects the Preliminary Project Study Area northwest-southeast (see Figure 26 and Figure 27). This cross-*ahupua‘a* route was constructed during the 1800s prior to the plantation and is depicted on the 1891 map of Gay and Robinson Lands (see Figure 6). It continues beyond the Preliminary Project Study Area limits in both directions. The portion of this roadway within the Preliminary Project Study Area is now privately owned and is used for agricultural activities. The pavement along this section of the road has not been maintained and has deteriorated in many places.

4.1.1.2 Ka‘awanui Village Road

The *makai* section of Ka‘awanui Village Road runs through the eastern portion of the Preliminary Project Study Area (see Figure 26). This road begins at Kaumuali‘i Highway and continues upslope (which is to the northeast direction in this area) for several kilometers. The section of Ka‘awanui Village Road within the Preliminary Project Study Area is 1.75 km long. The road is characterized by an approximately 6-m-wide asphalt-paved surface with dirt shoulders (Figure 28). Several spurs extend east from this road for private driveways, base yards, and the entrance to Camp Six (Ka‘awanui Village). Ka‘awanui Road intersects with the Old Government Road within the Preliminary Project Study Area, approximately 575 m *mauka* of Kaumuali‘i Highway. Ka‘awanui Village Road was constructed in the early years of the plantation and can be seen on maps as early as 1901 (see Figure 10). This road is still being actively used for private residence and agricultural activities.

4.1.1.3 Hanger Road

Hanger Road bisects the Preliminary Project Study Area east to west (see Figure 26). It begins at Kaumuali‘i Highway and continues upslope a distance of approximately 1 km. Hanger Road intersects with the Old Government Road approximately 437 m north of Kaumuali‘i Highway. It is 2.8 m wide with asphalt paving and dirt shoulders (Figure 29). The portion of the road upslope of Old Government Road appears on a 1927 map (see Figure 9); the 1963 USGS topographic map (see Figure 12) also includes the lower section between Kaumuali‘i Highway and Old Government Road, indicating it was extended sometime between those dates. The road was likely built to access and haul sugarcane from the plantation fields and continues to be used for agricultural activities.

4.1.1.4 Cane Road

An unnamed cane road is present within the Mango Tree Pen in the *makai* portion of the Preliminary Project Study Area (see Figure 26). This roadway diagonally bisects the pen north-south. It extends a distance of 580 m between the Hanger Road/Old Government Road intersection and the Kaumuali‘i Highway/Ka‘awanui Road intersection. It is characterized as a single lane dirt roadway (Figure 30). This road is not shown on the 1963 topographic map (see Figure 12) but does appear on the 1977 aerial photo, indicating it was created sometime during those dates. The road was likely built to access and haul sugarcane from the fields within the Mango Tree Pen and continues to be used for agricultural activities.



Figure 27. Photo overlooking the Old Government Road from the Hanger Road intersection; view to west



Figure 28. Photo overlooking a section of Ka‘awanui Village Road within the poroject area (note the overhead transmission line along road shoulder); view to northeast



Figure 29. Photo overlooking the lower portion of Hanger Road within the Preliminary Project Study Area; view to southwest



Figure 30. Photo overlooking the dirt cane road within the Mango Tree Pen; view to north

4.1.2 Walls

4.1.2.1 Stacked Rock Walls along Ka‘awanui Village Road

Two stacked rock wall segments are present along the western edge of Ka‘awanui Village Road (see Figure 26). It is unclear whether these walls were constructed contemporaneously. The walls are constructed of stacked basalt cobbles and boulders. The *makai* wall segment runs between Ka‘awanui Village Road and the Mango Tree Pen. This segment, which is 508.5 m long, is in generally good condition (Figure 31). It measures 1.0–1.8 m wide with heights of 1.0–1.8 m and up to 8 courses of stacking, with some areas of collapse. Further upslope, a 230-m wall segment is present between Ka‘awanui Village Road and the Shop Pen. This *mauka* segment is similar in construction to the lower segment, though it tends to be shorter in height and exhibits more disturbance (Figure 32). Portions of the *mauka* wall have become heavily overgrown. These walls were likely constructed in the early plantation era (late 1800s to early 1900s), whenever the fields along lower Ka‘awanui Village Road began to be utilized.

4.1.2.2 Stacked Rock Wall along Old Government Road

Two stacked rock wall segments are present along the southern edge of the Old Government Road (see Figure 26). These wall segments may have been part of a continuous wall that has been heavily disturbed. The eastern segment is situated near the Ka‘awanui Village Road intersection and the eastern corner of the Mango Tree Pen. This segment measures 9.6 m long, with some areas of collapse and vegetation overgrowth (Figure 33 and Figure 34). The western segment is 52.8 m long and exhibits significant collapse and possible disturbance, and portions are heavily overgrown. Generally, these wall segments consist of basalt cobbles stacked 3–4 courses high, with heights of 1.0–1.2 m and widths of 0.8–1.1 m. The date of construction for these walls is unknown. It is possible they were constructed along Old Government Road prior to the plantation; alternatively, they may date to the early plantation era (late 1800s to early 1900s), whenever the fields along this portion of the road began to be utilized.

4.1.3 Ditch Systems

The Preliminary Project Study Area contains two earthen ditch systems originating from the upslope Ka‘awanui Reservoir (see Figure 26). One of these systems, located west of Ka‘awanui Road, is in active use. The other system, located east of Ka‘awanui Road, appears inactive/abandoned.

The active ditch system is currently being used to irrigate some fields within the Preliminary Project Study Area. The portion of this active system within the Preliminary Project Study Area is 2.12 km in overall length. It enters the Preliminary Project Study Area in the northern corner of the Water Buffalo Pen (Figure 35), then extends downslope along the western edge of the Preliminary Project Study Area. The ditch crosses between the Hanger Pen and Shop Pen to the western side of Ka‘awanui Road, and then extends between the road and the eastern edge of the Shop Pen to the Old Government Road intersection, where it turns to the northwest along the Old Government Road (Figure 36). The ditch passes through culverts where it crosses under the Old Government Road and Hanger Road. The portion of the ditch nearest to Kekupua Valley deviates *makai* away from the Old Government Road.



Figure 31. Photo overlooking a portion of the *makai* rock wall segment along Ka‘awanui Village Road; view to northwest



Figure 32. Photo overlooking a portion of the *mauka* rock wall segment along Ka‘awanui Village Road; view to west



Figure 33. Photo of stacked rock wall segment located along Old Government Road near the Ka‘awanui Village Road intersection; view to west



Figure 34. Photo overlooking an overgrown section of a stacked rock wall segment located along Old Government Road; view to west



Figure 35. Photo overlooking the portion of the active irrigation ditch where it crosses into the Preliminary Project Study Area within Water Buffalo Pen; view to north



Figure 36. Photo overlooking a portion of the active irrigation ditch near the Old Government Road; view to west

The inactive ditch system enters the Preliminary Project Study Area along the eastern side of Ka‘awanui Road and appears to terminate in the vicinity of the base yard; it may have once fed the water tank located downslope via pipeline. This inactive system (Figure 37), which comprises a collective length of 1.3 km, includes several runoff ditches leading toward Ka‘awanui Gulch to the southeast, including a major offshoot located just upslope of the base yard area that is visible on aerial imagery (see Figure 13). Rock stacking is present intermittently along the eastern side of the portion of this ditch along Ka‘awanui Road (Figure 38). No water was observed within this system and portions are heavily overgrown.

Ten culverts were observed within the Preliminary Project Study Area, generally where the ditches cross beneath roadways (see Figure 26). The culvert outlets utilize various construction elements, including dry stacked rock headwalls, cement mortared rock headwalls with sluice gates, and steel culvert pipes (Figure 39 through Figure 42). The sluice gates are generally remnant and no longer functioning. Culverts located in the *mauka* portion of the property generally have a more elaborately built outlet structure, including an area for a gate, and appear to be older than some of the culverts found in the more *makai* areas near Hanger Road.

4.1.4 Railroad

A single isolated remnant of the former plantation railroad was identified in the lower portion of the Preliminary Project Study Area (see Figure 26). This remnant comprises a short section of railroad track embedded within the Old Government Road travel way. The track remnant comprises two parallel rails measuring 1.9 m long (Figure 43). The railroad track in this portion of the Preliminary Project Study Area appears on the 1901 map of Makaweli Plantation (see Figure 10) and the 1927 Hawaiian Sugar Company Field Map (see Figure 9), indicating this remnant likely dates to the early plantation era.

4.1.5 Water Storage

A galvanized steel water tank is located on the eastern side of Ka‘awanui Road, approximately 400 m upslope of Kaumuali‘i Highway (see Figure 26 and Figure 44). The water tank is enclosed within a chain link security fence. An associated 1-ft metal pipe carries water out of the tank facility for plantation use. A series of other pipes and valves, concrete blocks, and other equipment are also present within the tank enclosure. This water tank appears on the 1963 topographic map (see Figure 12), indicating it is more than 50 years old.



Figure 37. Photo overlooking a portion of the abandoned irrigation ditch east of Ka‘awanui Village Road; view to northeast



Figure 38. Photo of an area of rock stacking along the abandoned irrigation ditch east of Ka‘awanui Village Road; view to north



Figure 39. Photo showing a section of cement-mortared rock channel lining at a culvert in the Water Buffalo Pen; view to north



Figure 40. Photo of a typical ditch and culvert along the main ditch system; view to east



Figure 41. Photo of a typical culvert along the main ditch system; view to north



Figure 42. Photo of a typical culvert along the inactive ditch system; view to northeast



Figure 43. Photo of the railroad remnant located along the Old Government Road; view to southwest



Figure 44. Photo of the fenced water tank located along the eastern side of Ka‘awanui Village Road; view to south

Section 5 Summary and Recommendations

Fieldwork for this LRFI was accomplished on 22–23 January 2025 by CSH Project Director Missy Kamai, B.A., and Archaeologist Samantha Purdy, B.A., under the general supervision of Principal Investigator Hallett H. Hammatt, Ph.D. This work required approximately 4 person-days to complete.

Background research and the field inspection revealed that the Preliminary Project Study Area has been extensively modified by operations related to historic sugar cultivation and subsequent agricultural activities. Numerous historic-era features associated with transportation and sugarcane agriculture were identified, including portions of plantation roads and the Old Government Road, rock walls, ditch systems, a railroad remnant, and a water tank. No pre-Contact archaeological features were observed.

The results of this LRFI indicate a low potential of encountering surface or subsurface pre-Contact archaeological features within the Preliminary Project Study Area, given the nature and extent of prior land alteration.

CSH strongly recommends consultation with SHPD to obtain a determination regarding the need for an AIS for the proposed project. Additional documentation will likely be required for the historic features encountered during the field inspection.

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Exhibit P

Archaeological Inventory Survey

Draft

Archaeological Inventory Survey Report for the Kaawanui Solar Project, Makaweli Ahupua‘a, Waimea District, Kaua‘i TMKs: (4) 1-7-006:006 por. and 010 por.

Prepared for
Kaawanui Solar, LLC

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Management Summary

Reference	Archaeological Literature Review and Field Inspection for the Kaawanui Solar Project, Makaweli Ahupua‘a, Waimea District, Kaua‘i, TMKs: (4) 1-7-006:006 por. and 010 por. (Bautista et al. 2025)
Date	September 2025
Project Number(s)	• Hawai‘i Cultural Resource Information System (HICRIS) Project No.: 2025PR00506 • Cultural Surveys Hawai‘i, Inc. (CSH) Job Code: MAKAWELI 14
Investigation Permit Number	CSH completed the fieldwork component of this study under archaeological fieldwork permit number 25-04, issued by the Hawai‘i State Historic Preservation Division (SHPD) per Hawai‘i Administrative Rules (HAR) §13-13-282.
Agencies	State Historic Preservation Division/Department of Land and Natural Resources (SHPD)
Land Jurisdiction	Private
Project Proponent	Private; Kaawanui Solar, LLC, a subsidiary of AES Clean Energy Development, LLC (AES Hawai‘i)
Project Location	The Preliminary Project Study Area (“study area”) is in Makaweli Ahupua‘a off the southwestern coast of the island of Kaua‘i. It is bounded on the southwest by Kaumuali‘i Highway, on the southeast by the Ka‘awanui Gulch, on the northwest by Kekupua Valley, and on the northeast by agricultural parcels. The village of Pākalā lies approximately 0.2 miles to the southwest. The Study area is depicted on a portion of the 2024 Hanapepe U.S. Geological Survey (USGS) 7.5-minute topographic quadrangle (Figure 1), tax map plat (Figure 2), and 2022 aerial photo (Figure 3).
Project Description	Kaawanui Solar, LLC is proposing the 43 MWac Kaawanui Solar project located along Kaumuali‘i Highway in Makaweli on Kaua‘i. The project is targeting commercial operations by 30 June 2028. The major equipment will consist of PV solar modules, trackers, PCSs, BESS containers, and GSUs. The 43 MW collection will be routed to a proposed 57/69 kV project substation and related interconnection and ancillary facilities, the “Kaawanui Substation”.
Project Acreage	The Project will be sited within an approximate 268.4-acre (108.6-hectare) Preliminary Project Study Area. The Project Area, which houses the Project infrastructure, will be a smaller subset of the Preliminary Project Study Area.
Historic Preservation Regulatory Context	This AIS investigation fulfills the requirements of HAR §13-276 and was conducted to identify, document, and assess significance of any

	historic properties. This document is intended to support the proposed project's historic preservation review under Hawai‘i Revised Statutes (HRS) §6E-42 and HAR §13-284. It is also intended to support any project-related historic preservation consultation with stakeholders such as state and county agencies and interested Native Hawaiian Organizations (NHOs) and community groups. An archaeological literature review and field inspection (LFRI) (Bautista et al. 2025) was previously conducted for this project to support planning efforts and historic preservation review compliance. The field inspection identified numerous historic-era features associated with transportation and sugarcane agriculture, including portions of plantation roads and the Old Government Road, rock walls, ditch systems, a railroad remnant, and a water tank. No pre-Contact archaeological features were observed. CSH recommended consultation with SHPD to obtain a determination regarding the need for an AIS for the proposed project, noting that additional documentation would likely be required for the historic features encountered during the field inspection. Subsequently, CSH conducted proactive archaeological observation/monitoring of the Project's geotechnical survey and prepared a report summarizing the results of this fieldwork (Wilkinson and Hammatt 2025; Appendix A). The project was initiated in HICRIS on 25 April 2025 and assigned as Project Number 2025PR00506. The LRFI report (Bautista et al. 2025) and geotechnical survey monitoring report (Wilkinson and Hammatt 2025) were enclosed in the project submittal. At the request of the project proponent, CSH has prepared this AIS to document and assess the historic features located within the study area.
Results of Consultation	During the AIS CSH sought to identify and consult with knowledgeable individuals or organizations to obtain information about the historical land use within the study area. This effort involved outreach via telephone and email to James Robinson of Gay & Robinson in August 2025. Mr. Robinson responded via email on 4 August 2025, providing information about the ditch system and one of the roadways in the study area.
Fieldwork Effort	Fieldwork was accomplished on 14–16 July 2025 by CSH Archaeologists Samantha Purdy, B.A., and Genevieve Glennon, B.A., under the general supervision of Principal Investigator Hallett H. Hammatt, Ph.D. This work required approximately 6 person-days to complete.

Historic Properties Identified and Historic Property Significance	One previously documented historic property and five newly documented historic properties were identified as a result of this AIS: • SIHP # 50-30-09-02269 is a historic plantation ditch system. A portion of the ditch system located upslope of the current study area was previously documented and assessed by Byerly and O'Day (2015:22) as significant under Criterion d for "its information related to historic sugarcane production in upland Kaua‘i." The results of the current AIS support this prior assessment for SIHP # -02269. • SIHP # 50-30-09-CSH-3 is the historic Old Government Road. The segment of this roadway within the study area is assessed as significant under Criterion d for the information it has provided about historic transportation within the study area. • SIHP # 50-30-09-CSH-4 is the historic Ka‘awanui Village Road. The segment of this roadway within the study area is under Criterion d for the information it has provided about historic plantation-related transportation within the study area. • SIHP # 50-30-09-CSH-5 is a historic plantation road. The segment of this roadway within the study area is assessed as significant under Criterion d for the information it has provided about historic plantation-related transportation within the study area. • SIHP # 50-30-09-CSH-6 is a railroad track remnant of indeterminate age. It is assessed as significant under Criterion d for the information it has provided about plantation-related activity within the study area. • SIHP # 50-30-09-CSH-7 is a historic water tank facility. It is assessed as significant under Criterion d for the information it has provided about historic plantation-related water use within the study area.
Effect Recommendation	In accordance with HAR §13-284-7, the project effect is "effect, with agreed upon mitigation commitments." The six historic properties documented in the study area are assessed as significant under Criterion d of the State of Hawai‘i significance criteria. Documentation of these historic properties in this AIS has included historical research, GPS data collection, photographs, plan view maps, representative profiles and cross section maps, written descriptions, and consultation with a knowledgeable party. This AIS has adequately documented the location, extent, function, age, and construction methods of the six historic properties in the study area, mitigating project-related impacts pursuant to HAR §13-284-8.

Mitigation Recommendations	No further archaeological work, including archaeological monitoring, is recommended. However, if subsurface features or deposits are encountered at any time during construction, construction activities shall cease in the area of the find and SHPD shall be contacted immediately. All project-related development shall be within the limits of the study area.

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Section 1 Introduction

1.1 Project Background

At the request of Kaawanui Solar LLC, a subsidiary of AES Hawai‘i, Cultural Surveys Hawai‘i, Inc. (CSH) has prepared this archaeological inventory survey (AIS) report for the Kaawanui Solar Project, Makaweli Ahupua‘a, Waimea District, Kaua‘i, TMKs: (4) 1-7-006:010 por. and 006 por. The Preliminary Project Study Area (“study area”) is located off the southwestern coast of Kaua‘i near the village of Pākalā. It is depicted on a portion of the 2024 Hanapepe U.S. Geological Survey (USGS) 7.5-minute topographic quadrangle (Figure 1), tax map plat (Figure 2), and 2022 aerial photo (Figure 3).

Kaawanui Solar, LLC is proposing the 43 MWac Kaawanui Solar project located along Kaumuali‘i Highway in Makaweli on Kaua‘i. The project is targeting commercial operations by 30 June 2028. The major equipment will consist of PV solar modules, trackers, PCSs, BESS containers, and GSUs. The 43 MW collection will be routed to a proposed 57/69 kV project substation and related interconnection and ancillary facilities, the “Kaawanui Substation”.

The AIS study area is the entire approximately 268.4-acre (108.6-hectare) Preliminary Project Study Area. The Project Area, which houses the Project infrastructure, will be a smaller subset of the Preliminary Project Study Area.

1.2 Document Purpose and Historic Preservation Regulatory Context

This AIS investigation fulfills the requirements of HAR §13-276 and was conducted to identify, document, and assess significance of any historic properties. This document is intended to support the proposed project’s historic preservation review under Hawai‘i Revised Statutes (HRS) §6E-42 and HAR §13-284. It is also intended to support any project-related historic preservation consultation with stakeholders such as state and county agencies and interested Native Hawaiian Organizations (NHOs) and community groups.

An archaeological literature review and field inspection (LFRI) (Bautista et al. 2025) was previously conducted for this project to support planning efforts and historic preservation review compliance. The field inspection identified numerous historic-era features associated with transportation and sugarcane agriculture, including portions of plantation roads and the Old Government Road, rock walls, ditch systems, a railroad remnant, and a water tank. No pre-Contact archaeological features were observed. CSH recommended consultation with SHPD to obtain a determination regarding the need for an AIS for the proposed project, noting that additional documentation would likely be required for the historic features encountered during the inspection.

Subsequently, CSH conducted proactive archaeological observation/monitoring of the Project’s geotechnical survey and prepared a report summarizing the results of this fieldwork (Wilkinson and Hammatt 2025; Appendix A).

The project was initiated in HICRIS on 25 April 2025 and assigned as Project Number 2025PR00506. The LRFI report (Bautista et al. 2025) and geotechnical survey monitoring report (Wilkinson and Hammatt 2025) were enclosed in the project submittal. At the request of the project proponent, CSH has prepared this AIS to document and assess the historic features located within the study area.

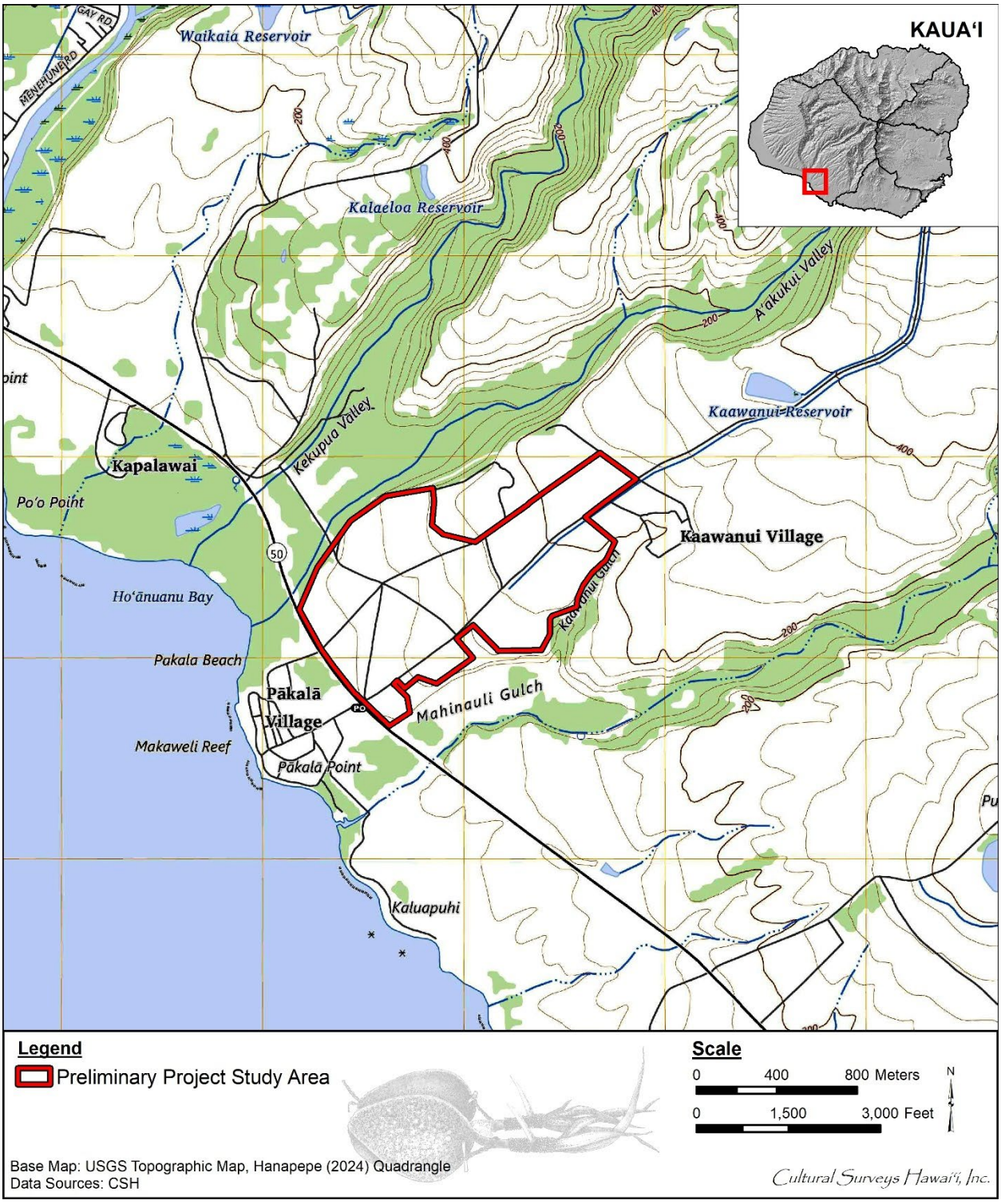

Figure 1. Portion of the 2024 Hanapepe USGS 7.5-minute topographic quadrangle showing the location of the study area

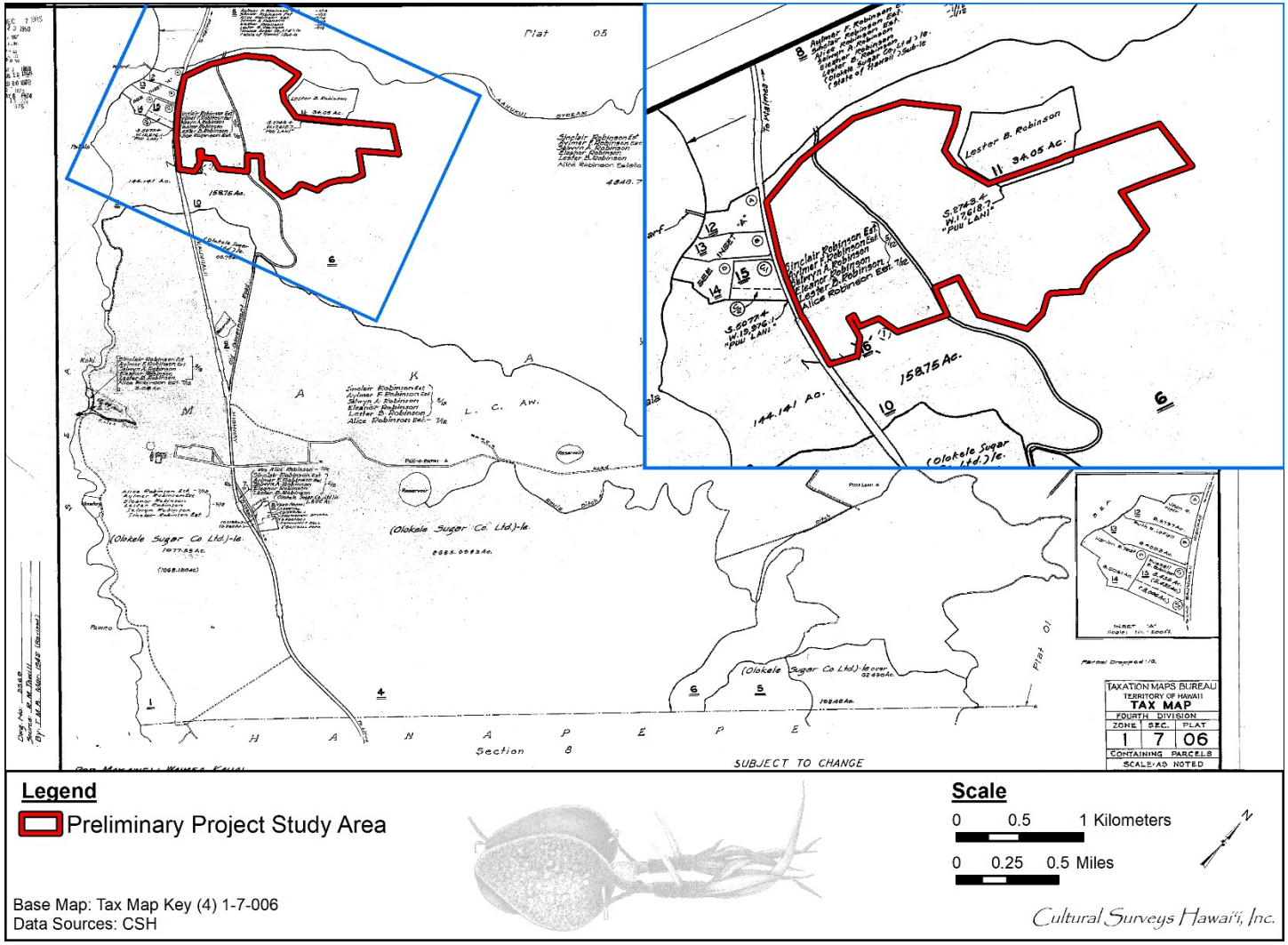

Figure 2. Tax Map Key (TMK) (4) 1-7-006 showing the study area in portions of parcels 006 and 010 (Hawai‘i TMK Service 2025)

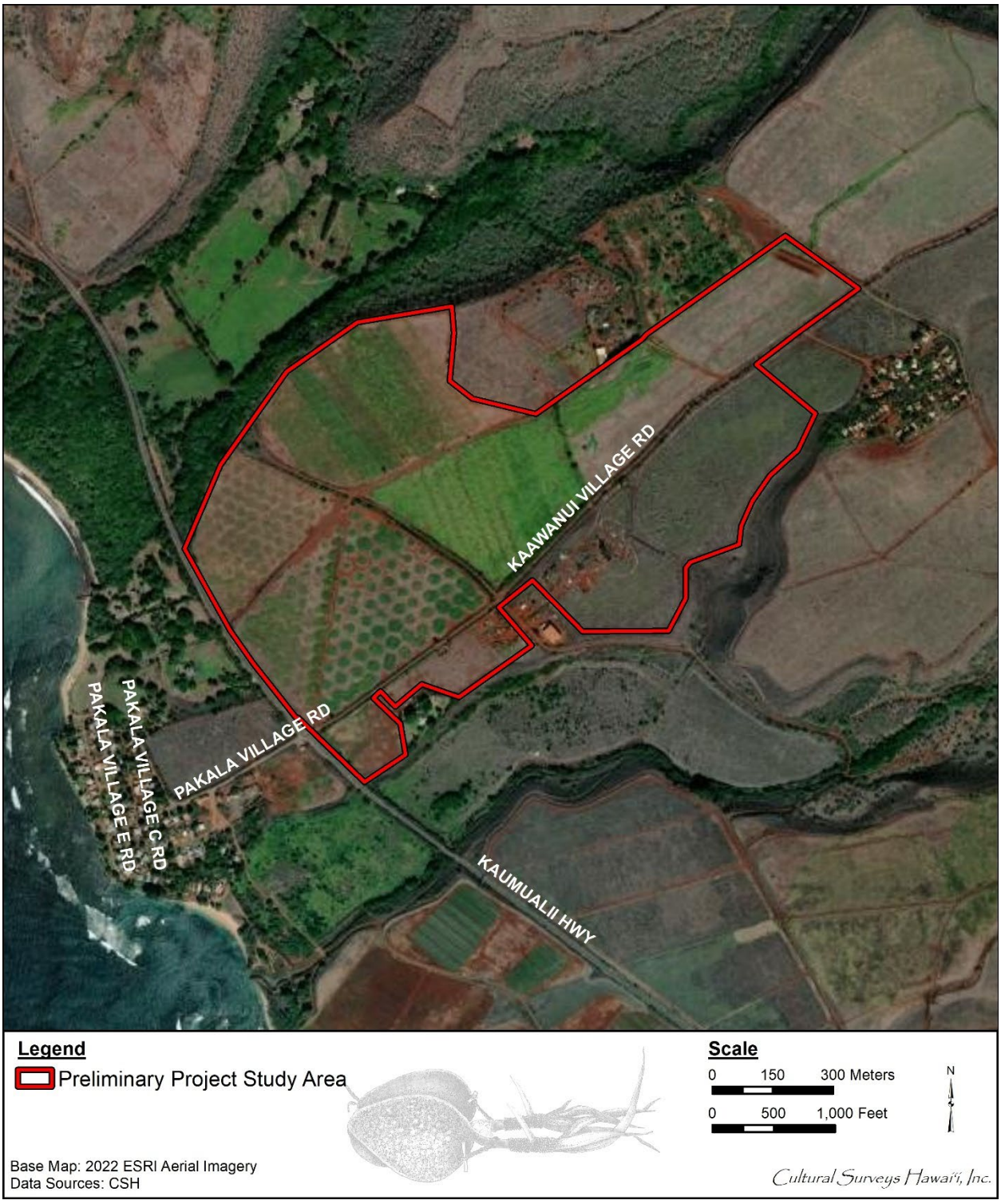

Figure 3. Aerial photograph of the study area (ESRI 2022)

1.3 **Environmental Setting**

1.3.1 Natural Environment

The 268.4-acre study area is in the *ahupua‘a* (traditional land division) of Makaweli off the western coast of Kaua‘i. The *ahupua‘a* of Makaweli comprises approximately 21,844 acres, bounded on the west by Waimea Ahupua‘a and on the east by Hanapēpē Ahupua‘a. Its *mauka* (upslope) edge runs along the Waimea-Hanalei District border including Mt. Wai‘ale‘ale and part of the Alaka‘i Swamp. A large portion of upper Makaweli Ahupua‘a lies in the Nā Pali–Kona Forest Reserve. The study area is situated in the more *makai* (seaward) portion of Makaweli, within gently sloping lands situated between the ‘A‘akukui and Kekupua Valleys to the north and Ka‘awanui Gulch to the south.

The study area is located on the drier leeward coast of Kaua‘i, where it and receives an average of 20 inches in annual rainfall (Giambelluca et al. 1986). The study area, situated at elevations ranging from approximately 12–70 m (40–230 ft) above mean sea level (amsl), has a variety of vegetative habitats including open grassy areas and heavy *kiawe* (*Neltuma pallida*) forest. The vegetative zones are described in the *Manual of Flowering Plants of Hawai‘i, Volume I*, as “Coastal Dry Forest - Kiawe (Prosopis) Forest, subtype inland kiawe forest” which “often has an open woodland aspect. It occurs in low, warm areas, especially in dry situations near the coasts on all of the main islands, primarily below 300 m in elevation. This community is usually very species-poor and consists almost exclusively of species introduced since the 19th century” (Wagner et al. 1990:62).

According to the U.S. Department of Agriculture (USDA) Soil Survey Geographic (SSURGO) database (2001) and soil survey data gathered by Foote et al. (1972), the study area primarily consists of Makaweli series soils—specifically Makaweli silty clay loam, 0 to 6% slopes (MgB); Makaweli stony silty clay loam, 6 to 12% slopes (MhB); and Makaweli stony silty clay loam, 6 to 12% slopes (MhC) (Figure 4). Makaweli soils are described as follows:

> […] well-drained soils on uplands on the island of Kauai. These soils developed in material weathered from basic igneous rock. They are gently sloping to steep. Elevations range from nearly sea level to 500 feet. The annual rainfall amounts to 20 to 35 inches. Three-fourths of it occurs from October through March. The mean annual soil temperature is 74° F…
>
> These soils are used for irrigated sugarcane, pasture, and homesites. The natural vegetation consists of kiawe, lantana, fingergrass, klu, koa haole, and piligrass. [Foote et al. 1972:90]

A few small pockets of Nonopahu clay, 2 to 10% slopes (NnC) are present throughout the study area (see Figure 4). Nonopahu soils are described as:

> […] moderately well drained soils on uplands on the island of Kauai. These soils developed in material weathered from basic igneous rock relatively high in olivine. They are gently sloping to moderately sloping. Elevations range from nearly sea level to 800 feet. The annual rainfall amounts to 23 to 40 inches. The mean annual soil temperature is 74° F…

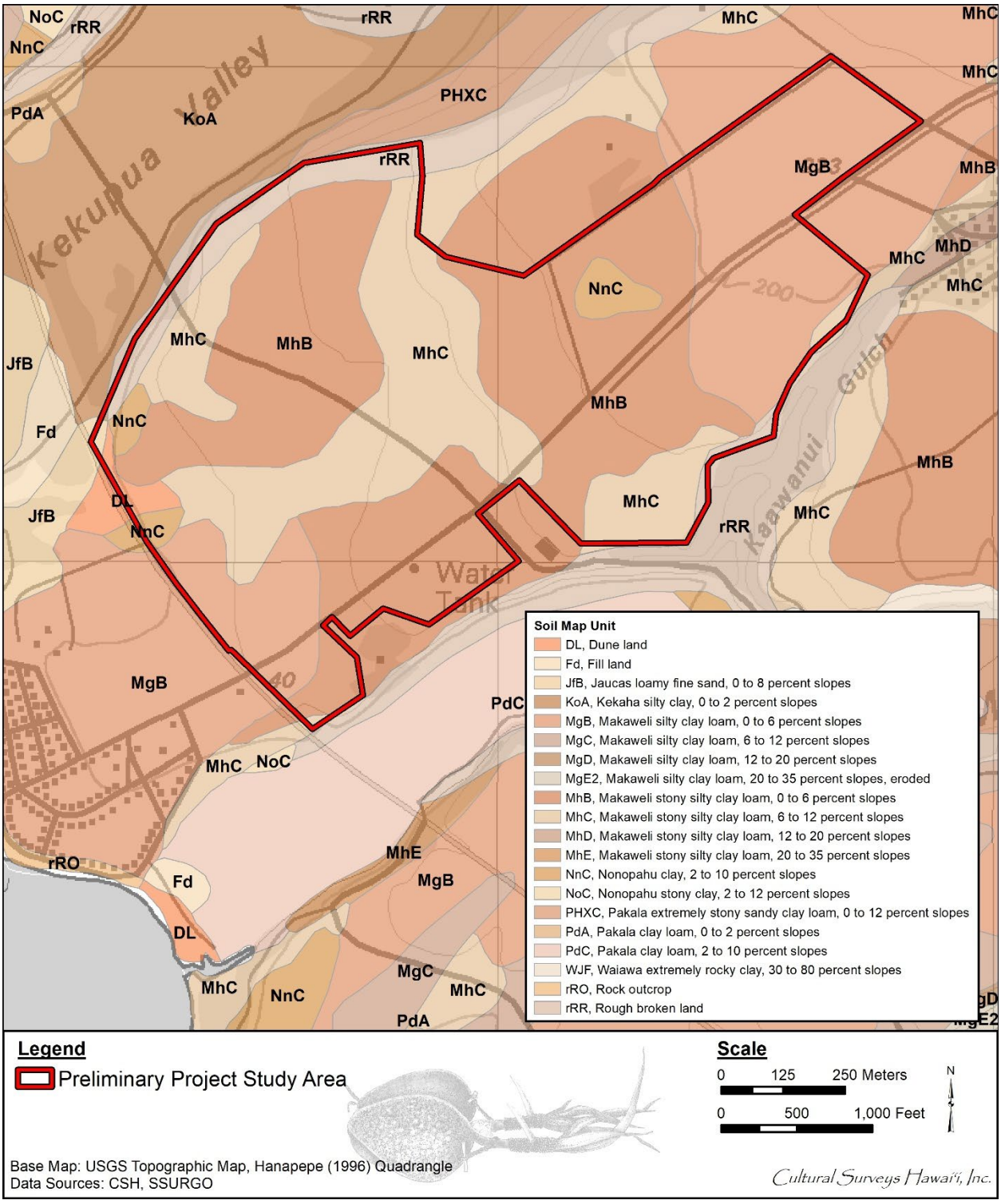

Figure 4. Overlay of *Soil Survey of the Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii* (Foote et al. 1972), indicating soil types within and surrounding the study area (USDA SSURGO 2001)

> These soils are used for irrigated sugarcane and pasture. The natural vegetation consists of koa haole, klu, and feather fingergrass. [Foote et al. 1972:100]

A small area of Dune land (DL) (see Figure 4) is along the *makai* boundary of the study area. This miscellaneous land type:

> […] consists of hills and ridges of sand-size particles drifted and piled by wind. The hills and ridges are actively shifting or are so recently fixed or stabilized that no soil horizons have developed. The sand is dominantly from coral and seashells. This miscellaneous land type occurs in coastal areas on the islands of Maui and Kauai. Elevations range from nearly sea level to 150 feet. The annual rainfall amounts to 15 to 90 inches. [Foote et al. 1972:29]

Areas of Rough broken land (rRR) are found along the northern and southern boundaries of the study area, correlating with the edges of Kekupua Valley and Ka‘awanui Gulch, respectively (see Figure 4). This miscellaneous land type is characterized as “very steep land broken by numerous intermittent drainage channels […] It occurs in gulches and on mountainsides on all the Islands except Oahu” (Foote et al. 1972:119). This land type is generally used for watershed and wildlife habitat but is also used in some places for pasture and woodland.

1.3.2 Built Environment

The 268.4-acre study area is situated in lands used for sugarcane agriculture for over 100 years. It is bounded on the southwest by Kaumuali‘i Highway and on the northeast by agricultural parcels. Plantation settlements Pākalā Village and Ka‘awanui Village are situated nearby to both the *makai* and *mauka* ends of the study area, respectively. Overhead electrical transmission lines are located along Ka‘awanui Village Road and the northwestern boundary of the study area.

Plantation-era infrastructure is found throughout the study area and includes a network of roadways, stone walls, and water infrastructure including irrigation ditches and a water tank. Remnants of plantation-era machinery are scattered about the landscape, particularly in the central eastern portion of the study area. A section of the Old Government Road, which predated the plantation in this area, bisects the *makai* portion of the study area.

Since the demise of the sugarcane industry the study area has been used for various other agricultural endeavors and ranching. Most of the study area currently comprises fallow agricultural fields and modern fenced pens used for grazing cattle and water buffalo, which have been sectioned into named “pens” (Figure 5). These pens contain unimproved access roads and buried irrigation lines used to operate modern sprinkler systems. A taro patch surrounded by an electrified fence is present in the northern tip of the study area.

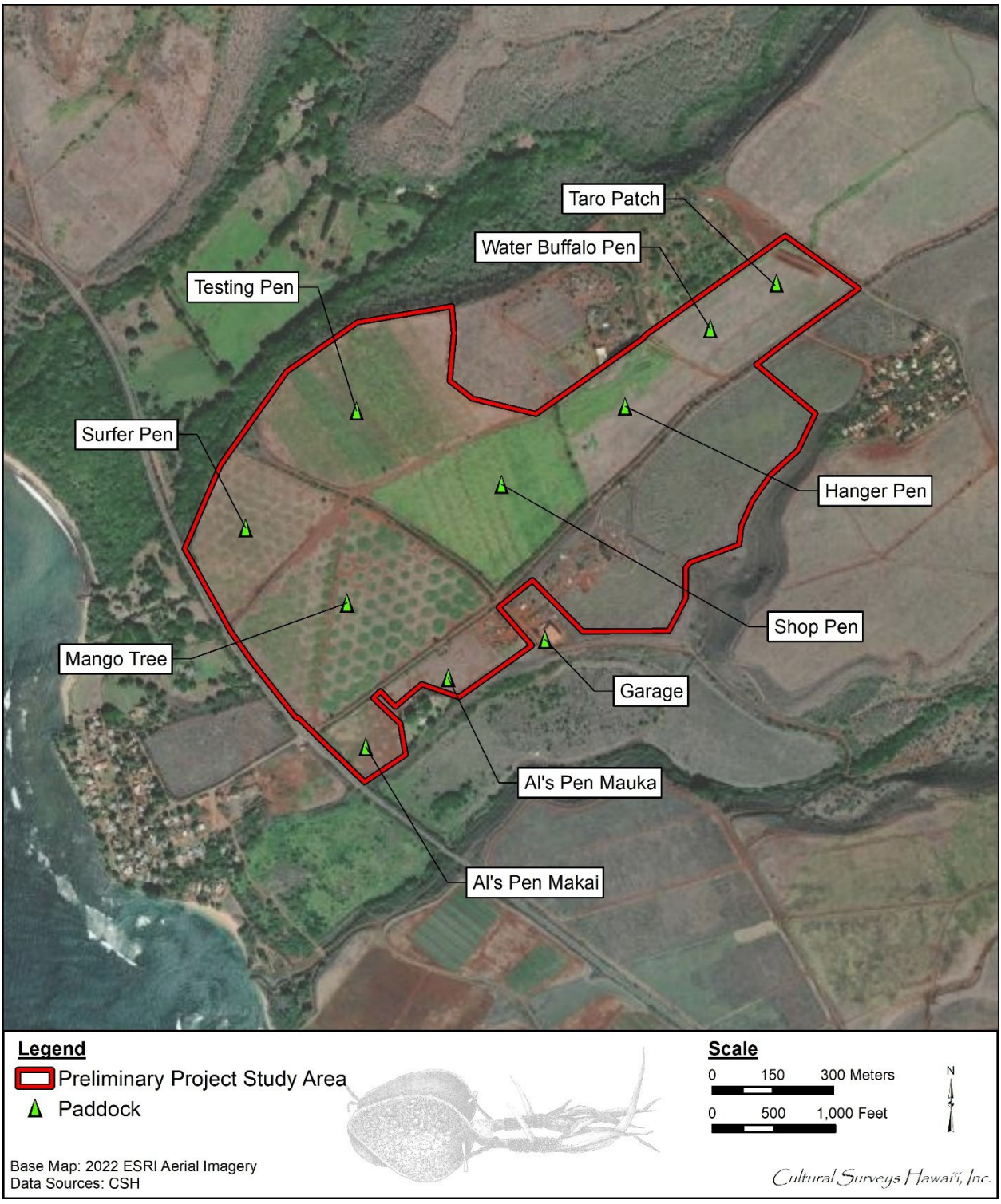

Figure 5. Aerial photograph (ESRI 2022) showing the various named modern pens utilized in modern agricultural activities throughout the study area after sugar plantation closure

Section 2 Methods

2.1 Field Methods

CSH completed the fieldwork component of this AIS under archaeological fieldwork permit number 25-04, issued by the SHPD pursuant to HAR §13-13-282. Fieldwork was conducted on 14–16 July 2025 by CSH Archaeologists Samantha Purdy, B.A., and Genevieve Glennon, B.A., under the general supervision of Principal Investigator Hallett H. Hammatt, Ph.D. This work required approximately 6 person-days to complete.

A pedestrian inspection of the study area was undertaken for the purpose of historic property identification and documentation. The pedestrian survey was accomplished through systematic sweeps spaced 10–25 m apart dependent on ground visibility, which is generally very good in the study area, and provided 100% coverage of the study area.

Where a historic property was encountered, the determination of its boundary was based on factors including apparent age, architectural style, and the spatial and functional interrelationships of both natural and man-made features.

At each historic property archaeologists recorded site and feature locations using a Trimble Geo 7X unit (sub-meter accuracy), took digital photographs, and prepared a written description. Scaled plan view maps were prepared for select features located along the State Inventory of Historic Places [SIHP] # 50-30-09-02269 ditches, SIHP # 50-30-09-CSH-6 railroad remnant, and SIHP # 50-30-09-CSH-7 water tank. Several representative scaled cross-section and profile drawings were also completed at SIHP # -02269. Plan maps were not prepared for linear sites/features including the SIHP # -02269 ditch channels or roadways and associated walls (SIHP #s 50-30-09-CSH-3, 50-30-09-CSH-4, and 50-30-09-CSH-5). The overall routes of these linear sites/features were mapped using the Trimble and plotted on aerial imagery, and representative scaled profile drawings were completed at the wall features along the roadways. Modern features such as buried irrigation lines and bulldozer push piles were noted and photographed.

No subsurface testing was conducted during the AIS fieldwork. The test pits excavated during the Project’s geotechnical survey, as documented by CSH (Wilkinson and Hammatt 2025; see Appendix A) provided a good sampling of subsurface conditions throughout the study area. The test pit work consisted of the mechanical excavation of fourteen trenches (TP-1 through TP-14) using a Takeuchi TB 260 excavator. The trenches measured approximately 3 m (10 ft) long by 50 cm (1.6 ft) wide and were excavated to bedrock. Depths were variable, ranging from 80–275 cm below surface (cmbs). A stratigraphic profile of each test pit excavation was drawn and photographed. The observed sediments were described using standard USDA soil description observations/terminology. Soil sediment descriptions included Munsell color; texture; consistence; structure; plasticity; cementation; origin of sediments; descriptions of any inclusions, such as cultural material and/or roots; lower boundary distinctness and topography; and other general observations. No stratigraphic anomalies, potential cultural deposits, subsurface features, or cultural deposits were exposed during excavation for test pits. Additionally, test excavations within the context of a historic property were not needed to support evaluations of site age and/or function.

GPS field data was post-processed, yielding horizontal accuracy between 0.1 and 0.5 m. GPS location information was converted into GIS shape files using Trimble's Pathfinder Office software, version 2.80, and graphically displayed using ESRI's ArcGIS 10.3. CSH utilizes the NAD 83 HARN datum and UTM Zone 5N coordinate system.

2.2 **Laboratory Methods**

No materials were collected during AIS fieldwork, so no laboratory analysis was necessary.

2.3 **Research Methods**

Background research included a review of previous archaeological studies on file at the SHPD; review of documents at Hamilton Library of the University of Hawai‘i, the Hawai‘i State Archives, the Mission Houses Museum Library, the Hawai‘i Public Library, and the Bishop Museum Archives; study of historic photographs at the Hawai‘i State Archives and the Bishop Museum Archives; and study of historic maps at the Survey Office of the Department of Land and Natural Resources. Historic maps and photographs from the CSH library were also consulted. In addition, Māhele records were examined from the Waihona ‘Aina database (Waihona ‘Aina 2025) and historic newspaper articles from Newspapers.com (2021) were reviewed.

This research provided the environmental, cultural, historic, and archaeological background for the study area.

2.4 **Consultation Methods**

A cultural impact assessment (CIA) is being prepared for the Kaawanui Solar Project in accordance with Office of Environmental Quality Control (OEQC) guidelines, and will involve consultation with community members, agencies, and Native Hawaiian Organizations (NHOs).

Consultation outreach has been conducted for this AIS to gather additional information about historical land use in the study area. The consultation involved outreach via phone and email to James Robinson of Gay & Robinson.

2.5 **Disposition of Materials**

No materials (e.g., artifacts or samples) were collected during the AIS. All data generated during the AIS are stored at the CSH offices.

Section 3 Background Research

In ancient times, Kaua‘i was divided into five traditional *moku* (districts): Halele‘a, Ko‘olau, Puna, Kona, and Nā Pali. However, after the battle of Wahiawa in 1824, the land of Kaua‘i was redistributed and district boundaries changed. The new district names became Hanalei, Kawaihau, Līhu‘e, Kōloa, and Waimea; the Waimea District consisted of Waimea, Makaweli, and Hanapēpē.

3.1 *Wahi Pana* (Place Names, Sacred Places, and Landscapes)

A Hawaiian *wahi pana* is also referred to as a place name. “In Hawaiian culture, if a particular spot is given a name, it is because an event occurred there which has meaning for the people of that time” (McGuire and Hammatt 2000:17). *Wahi pana* were passed on through the oral tradition, preserving the unique significance of each place. *Wahi pana* can refer to natural geographic locations, such as streams, peaks, rock formations, ridges, and offshore islands and reefs, or they can refer to Hawaiian divisions, such as *ahupua‘a, ‘ili*, *mo‘o,* and man-made structures, such as fishponds, reservoirs, *kula* (pasture), and *kauhale* (house compound). Hawaiians named all sorts of objects, places, and points of interest; named features in the vicinity of the current study area are shown on Imlay’s 1891 map of Gay & Robinson lands (Figure 6).

3.2 Traditional and Historical Background

3.2.1 Pre-Contact Period

Immediately west of Makaweli Ahupua‘a (where the study area is located) is the *ahupua‘a* of Waimea, the largest *ahupua‘a* on the island of Kaua‘i. Early accounts from this *ahupua‘a* indicate a coastal settlement pattern. Cultural layers and burials have been recorded along the shore, which is a typical pattern throughout the Hawaiian Islands. In addition to coastal settlements, the fertile Waimea River Valley had the resources to support a substantial population, evidenced by early agricultural settlements. For example, Hammatt and Ida (1993) identified a prehistoric cultural layer (SIHP # 50-30-05-04012) in present-day Waimea Town, and the layer was charcoal carbon dated to AD 910-1275. In contrast, there has not been as much modern development within the *ahupua‘a* of Makaweli and little previous archaeology has been done, but interpretations of pre-Contact land use within Makaweli can be extrapolated from Waimea. Coastal occupation and river valley settlement patterns would have mirrored those in Waimea only on a smaller scale.

Clearly Kaua‘i in general and the Waimea District in particular were largely isolated from the political intrigues and strife that marked much of late pre-Contact Hawai‘i. Studies of Kaua‘i’s political history (Fornander 1969; Hommon 1976) indicate 18 out of 24 transfers of political rule were cases of orderly succession. Prior to Cook’s arrival, there may have been only two military conflicts in the history of Kaua‘i, a raid by a Big Island chief, ca. 1460, and a dynastic struggle between the cousins Kawelo‘aikanaka and Kawelo-a-Maihunali‘i (who was aided by O‘ahu forces), ca. 1680.

To some extent, Cook’s arrival coincided with an increase in Hawaiian political and military aggression. In 1779 there were the “Goat Wars” with Ni‘ihau. In 1791, Kaua‘i forces were involved in fighting at O‘ahu (death of the Kaua‘i chief Ka‘eokiilani) and in the “Red-Mouth Gun” fighting against Kamehameha I at Hamakua, Hawai‘i. In 1796, Keawe, the son of Kamakahelei

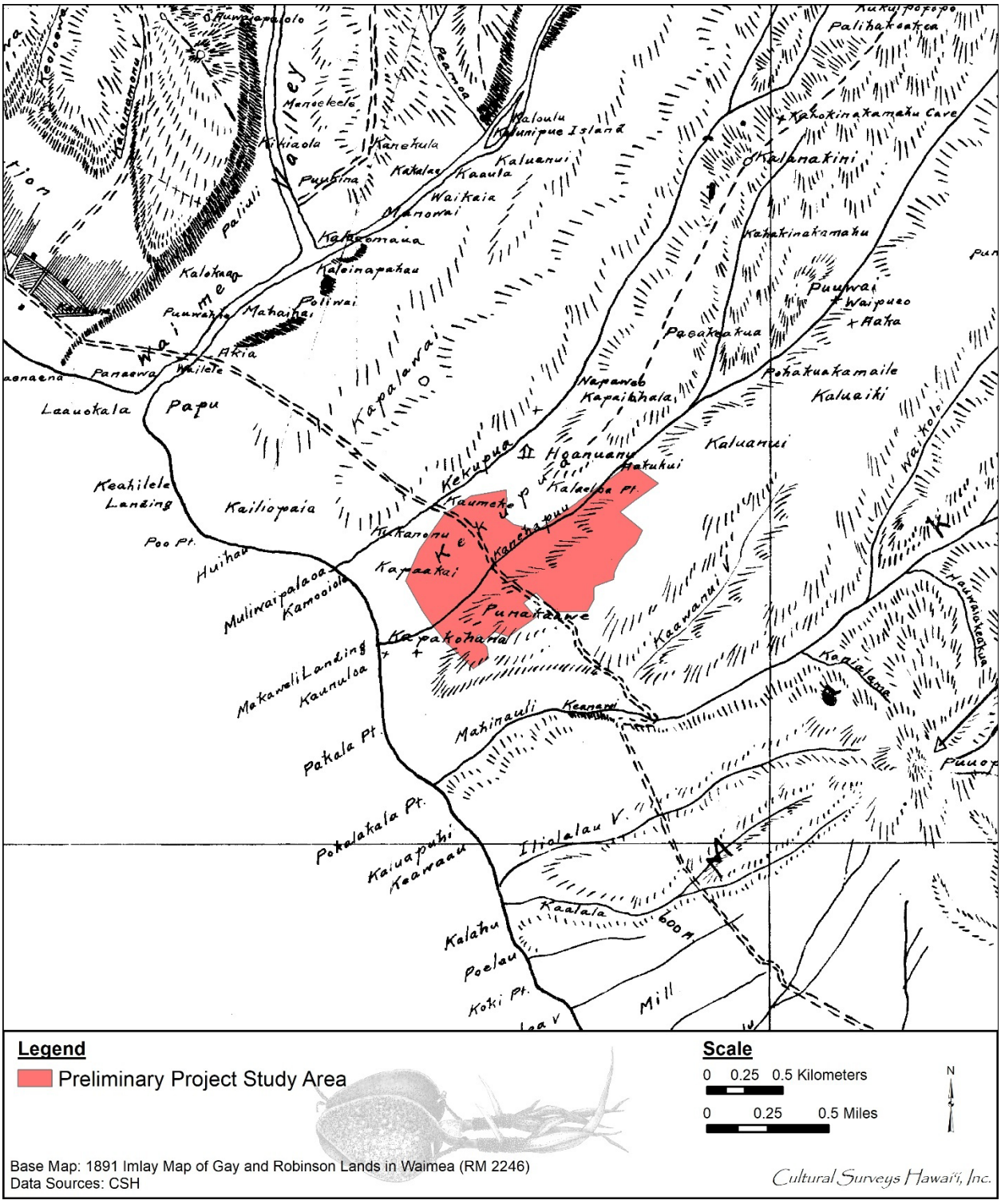

Figure 6. Portion of 1891 Imlay map of Gay and Robinson lands (RM 2246) showing place names in and around the study area

and Kiha, led a revolt against Kaumuali‘i from which Keawe emerged as *ali‘i nui* (head chief) (Kuykendall 1968:48, 51). From 1796 to 1804 a state of war existed with Kamehameha I which was rekindled in the Kaua‘i rebellion of 1824.

From Captain Cook’s landing, western impact exacerbated native political tensions. Cook’s lieutenants, George Vancouver, George Dixon, and Nathan Portlock, returned to Waimea repeatedly and established it as a major port and entrepôt. While Waimea may have always been a royal center for the *ali‘i* (chiefly class) of Kaua‘i, this position was greatly reinforced after Western Contact.

3.2.2 Early Historic Period (1778–Late 1800s)

Written accounts of Hawai‘i began when Captain James Cook anchored a mile offshore at Waimea Bay on the southwest side of Kaua‘i on 20 January 1778. The squadron consisted of two ships, the *Resolution* and the *Discovery*. Cook went ashore to investigate the availability of water and the temperament of the people to see if they were friendly and if a trade for supplies could be negotiated:

> The very instant I leaped ashore, they all fell flat on their faces, and remained in that humble posture till I made signs to them to rise. They then brought a great many small pigs and gave us without regarding whether they got any thing [sic] in return or no [sic] indeed the most of them were present[ed] to me with plantain trees, in a ceremonious way as is usual on such like occasions, and I ratified these marks of friendship by presenting them with such things as I had with me. [Beaglehole 1974:269]

It is most likely that during much of the early historic period, Native Hawaiians in the Waimea Ahupua‘a, specifically those nearest to Waimea River, had close association with the people on the east side of the river. Cook notes the following:

> [I] took a walk up the Valley, accompanied by Dr. Anderson and Mr. Webber; conducted by one of the Natives […] Our road lay in the plantations, which were chiefly of Tara [taro], and sunk a little below the common level so as to contain the water necessary to nourish the roots. As we ranged down the coast from the East in the Ships, we observed at every Village one or more elevated objects, like Pyramids and we had seen one in this valley that we were desireous [*sic*] of going to see. Our guide understood us, but as this was on the other side of the river, he conducted us to one on the same side we were upon; it proved to be in a Morai which in many respects was like those of Otaheite. [Cook 1821]

This “Morai” on the west side of the river is thought to be Keaalii Heiau. The *heiau* (pre-Christian place of worship) “on the other side of the river” was probably Mahaihai Heiau, whose location is noted on a map by Francis Gay (Bennett 1931:104, 111, see Figure 6).

A few early historic documents describe areas possibly located in Makaweli, but these are intertwined with early histories of Waimea and Hanapēpē Ahupua‘a. The history of Georg Schaffer on Kaua‘i is one such history that ties Makaweli with Waimea and Hanapēpē and involves the sandalwood trade and establishment of Russian forts and trading posts.

3.2.2.1 Russia’s Arrival

After Cook’s death at Kealakekua on 14 February 1779, Charles Clerke took charge and headed for Waimea once again. After provisioning at Waimea and Ni‘ihau, he sailed for Kamchatka in Russia and finally anchored at Petropavlovsk. Clerke was dying of tuberculosis and, anticipating that he might never reach England, he entrusted Captain Cook’s journal, maps, and reports with the Russian governor, Major Behm, who was returning to St. Petersburg. Behm was to pass the documents on to the British ambassador who would in turn hand them over to the proper authorities in London. These events led to the Russians being the first to learn about Cook’s discovery of the Hawaiian Islands before the rest of Europe and the world (Joesting 1984:41). This set the stage for Russian involvement in the Hawaiian Islands.

The Russians recognized the importance of Hawai‘i for provisioning their ships along the fur trade route between the Northwest and China. In 1815, a Russian-owned ship full of furs hit a reef and sank off Waimea Bay, Kaua‘i. The crew abandoned ship and was left stranded on Kaua‘i for two and a half months. Meanwhile, Kaumuali‘i, paramount chief of Kaua‘i, retrieved the ship’s goods (furs included) and kept them, despite the Russians’ objections. Georg Schaffer was sent to Hawai‘i under Russian orders to retrieve the goods as diplomatically as possible. It has been debated whether Schaffer was following orders or whether he acted on his own behalf when he raised the Russian flag on Kaua‘i. An agreement was reached when Kaumuali‘i asked for protection in exchange for a Russian monopoly of the sandalwood trade. Kaumuali‘i agreed to provide 500 men as an army to conquer the other islands and Schaffer was to provide the ships, ammunition, and weapons. An important part of the agreement was that Schaffer would oversee all construction of future forts and trading posts. The Russian fort at Waimea was built by the Russian-American Company in 1816 under the direction of Schaffer. Kamehameha I, hearing of Schaffer’s plans and feeling intimidated by the threat of Russian invasion, sent a message to Kaumuali‘i asking that Schaffer be deported. By June 1817, Schaffer and his men were forced to leave Kaua‘i (Mills 1996:30–37).

3.2.2.2 The Kaua‘i Rebellion of 1824

In 1824, Kaumuali‘i became very ill. Gathered around him were his sisters, his wife Ka‘ahumanu, his daughter Kapo, and the prime minister of the Kingdom, Kalanimōkū. When Kalanimōkū asked him how the lands were to be redistributed after his death, Kaumuali‘i answered, “let the lands be as they are; those chiefs who have lands to hold them, those who have not to have none” (Kamakau 1992:265).

Kalanimōkū decided to disregard Kaumuali‘i’s wish that the land not be redistributed. All Kaua‘i lands were seized. Some of the Kaua‘i chiefs, dissatisfied with the redistribution of the lands, rebelled and stormed the Russian Fort where Kahalai‘a had been left in charge. News of the rebellion reached Honolulu and companies of soldiers were sent to Kaua‘i as backup. In the end, the rebel chiefs were defeated and Kalanimōkū redistributed the lands. It was at this time that Kaua‘i and the rest of the islands were turned over to the child king, Kauikeaouli Kamehameha III (Liholiho Kamehameha II’s younger brother), and Kaikio‘ewa was appointed the new governor (Kamakau 1992:265–269). Kaikio‘ewa was an old warrior chief who was the guardian (*kahu*) of Kauikeaouli.

> […] Sometime before Kahalai‘a left the fort, the *‘ili* of Kaho‘omano in the *ahupua‘a* of Makaweli was given by Ka‘ahumanu to Kahalai‘a for the use of

> soldiers stationed at the fort. This land belonged with the fort since the days of Kaumuali‘i and continued to be used by soldiers, or ‘*koa*’ into the early 1850s. [Mills 1996:198–199]

3.2.2.3 The Māhele and the Kuleana Act

Following the death of Kaumuali‘i, there was a great rebellion and a vying for political power among the Hawai‘i and Maui island chiefs and the Kaua‘i chiefs. It was at this time that the Kamehameha family won control of Kaua‘i. The Kaua‘i chiefs were punished for their rebellion and were excluded from the *kālai‘āina* (distribution of lands) when the lands were redistributed.

At the end of the 1824 rebellion, as Hawaiian historian Samuel Kamakau, notes, “The lands held by chiefs of Hawai‘i were tabu; Waimea and Makaweli were held by Ka-‘ilinaoa and Ka‘u‘uku-ali‘i […]” (Kamakau 1992:268).

Following the death of Kamehameha I, Ka‘ahumanu, his favorite wife, inherited his lands. When Ka‘ahumanu died in 1832, her heir was Elizabeth Kahō‘anokū Kīna‘u, daughter of Kamehameha I and Kaheiheimālie (Ka‘ahumanu’s sister). Kīna‘u inherited Ka‘ahumanu’s *‘āina* (lands) as well as the position of *Kuhina Nui* (Premier). In 1827, Kīna‘u married Mataio Kekūanaō‘a and bore five children. The first two sons died young. But the other three children would continue the Kamehameha legacy: Alexander Liholiho would eventually reign as Kamehameha IV and Lota Kapuāiwa would reign as Kamehameha V. Kīna‘u died in 1839 only four months after her daughter, Victoria Kamāmalu Ka‘ahumanu, was born. Since Kīna‘u’s death was sudden and she did not leave a *kauoha* (command), it was decided by the *Ali‘i Nui* that Victoria Kamāmalu would inherit her lands and her position of *Kuhina Nui*. Kamāmalu’s guardians were John ‘Ī‘ī and her father, Mataio Kekūanaō‘a (Kame‘eleihiwa 1992:120–124).

Following the enactment of a series of new laws from the mid-1840s to mid-1850s, Kamehameha III divided the land into four categories: Crown Lands reserved for himself and the royal house; Government Lands for the government; Konohiki Lands claimed by *ali‘i* and their *konohiki* (supervisors); and *kuleana*, small plots claimed by the *maka‘āinana* (commoners) (Chinen 1958:8–15). These claims are described in Land Commission Award (LCA) testimony from the claimant and witnesses. A Royal Patent (RP), which quitclaimed the government’s interest in the land, was issued on most Land Commission Awards (Chinen 1958:14). In some cases, more than one RP number was issued for an LCA, especially in cases where there were several widely separated *‘āpana* (lots), such as an award with agricultural land in one *ahupua‘a* and a house lot in another.

Ali‘i were required to pay a commutation fee to the government for their confirmed Konohiki Land titles; this payment could be in cash or in the return of land to the government or crown. Many *ali‘i* elected to return substantial portions of their awarded lands to avoid the one-third commutation cash fee. The Kuleana Act of 1850 allowed *maka‘āinana*, in principle, to own land parcels where they were currently and actively cultivating and/or residing. In 1851, certain Government Lands became available for purchase in lots of 1 to 50 acres in fee simple; this new category of land ownership became known as Royal Patent Grants or Land Grants.

At the time of the Mahele in 1848, Victoria Kamāmalu held seven *‘āina* on the island of Kaua‘i. Five of these *‘āina* were relinquished to the *Mo‘i* (King) and she retained two *‘āina* for herself, including the *ahupua‘a* of Makaweli (LCA 7713). Since Kamāmalu was only 7 years old in 1848,

her guardians, Mataio Kekuanaō‘a and Ioane ‘Ī‘ī, acted on her behalf. In 1857, Kekuanaō‘a and ‘Ī‘ī agreed to a *Palapala Ho‘olimalima Kula* (lease for *kula* lands) to a *hui* (group) of people from Makaweli and Waimea. The group consisted of 120 people who all signed the lease. The lease reads as follows:

> *Eia nā mea i koe ma kēia ho‘olimalima ‘ana o ka loko nui i Kekupua a me nā loko li‘ili‘i, ‘o ka i‘a ho‘omalu, ‘o ka lā‘au kapu o nā kumu ‘alani i Waikae, ‘o nā lo‘i Pō‘alima a me nā kumu nui o Mahaihai a me Kekupua, ‘o nā kuleana o nā kānaka a me ka Pāpūkapu, ka wahie inā he mea kū‘ai koe no ia ma kēia ho‘olimalima ‘ana.*
>
> Translation: Here are the things exempt from this lease. The large pond in Kekupua and the small ponds, the protected [by taboo] fish, the sanctioned wood of the orange trees at Waikae, the Po‘alima taro fields and the large trees of Mahaihai and Kekupua, the kuleana of the people and the reserved fort, the firewood, if it is for sale, is exempted by this lease.

The above exemptions are obviously a carry-over of the ancient *kapu* system. The lease indicates the kinds of items that were *kapu*. Traditionally, large ponds were often reserved for the *ali‘i*. The lease also indicates that even though the *kapu* system was done away with in 1819, certain provisions were still being observed by the *ali‘i* and their people as late as 1857.

A sizable population was present in Makaweli during this period. Māhele records indicate 117 *kuleana* claims comprising 119 *‘āpana* were filed in Makaweli during the Māhele. These *‘āpana* were within the *‘ili* of Hakioa, Kaho‘omano, Kakalae, Kaloulu, Kapalawai, Koleakalo Manawai, Pu‘ulima, Wai‘awa‘awa, and Waikaia all located along the Waimea River, the Makaweli River, or a major western tributary of the Makaweli River (Figure 7). No *kuleana* claims are indicated within the study area, or the majority of Makaweli to the east of the Waimea-Makaweli-Mokuone river basin.

The fort, at the mouth of the Waimea River on the Makaweli side, had seen action in the Rebellion of 1824, when O‘ahu forces put down the uprising against the Kamehameha dynasty. The *koa* or soldiers at the fort were given *lo‘i* (irrigated taro terrace) lands nearby the fort so they could help raise their own food. Twenty-two of the Makaweli claims are for fort soldiers, who generally claimed a single *lo‘i* or *mo‘o*. Most fort soldiers were given land in the *‘ili* of Kaho‘omano, with some others in Hakioa; both of these *‘ili* are located quite close to the fort (Esh et al. 2008).

Within the 119 claimed *‘āpana* in Makaweli, 223 *lo‘i* or *mo‘o* (which presumably included *lo‘i*) are enumerated. The majority of these *lo‘i ‘āpana* are in Hakioa (28), Kaho‘omano (26), and Kakalae (23). Thus the vast majority of *lo‘i* claims were in seaward portions of the Waimea and Makaweli rivers. There are claims for 31 house lots. Presumably, some or all of the 22 soldiers awarded *lo‘i* were still garrisoned at the fort; the house lots tend to be in *‘ili* closer to the shore, and some along the rivers. Some awards from this area include testimony identifying the Alanui Aupuni (Government Road) as a landmark, indicating the presence of an established cross-*ahupua‘a* travel route by this timeframe.

The Māhele land documents suggest a pattern of the extensive usage of the Waimea-Makaweli-Mokuone river basin. The *ahupua‘a* of Makaweli is bounded by the Waimea River on the western side at the shore. The Waimea River is fed by the Makaweli River tributary a short distance up the

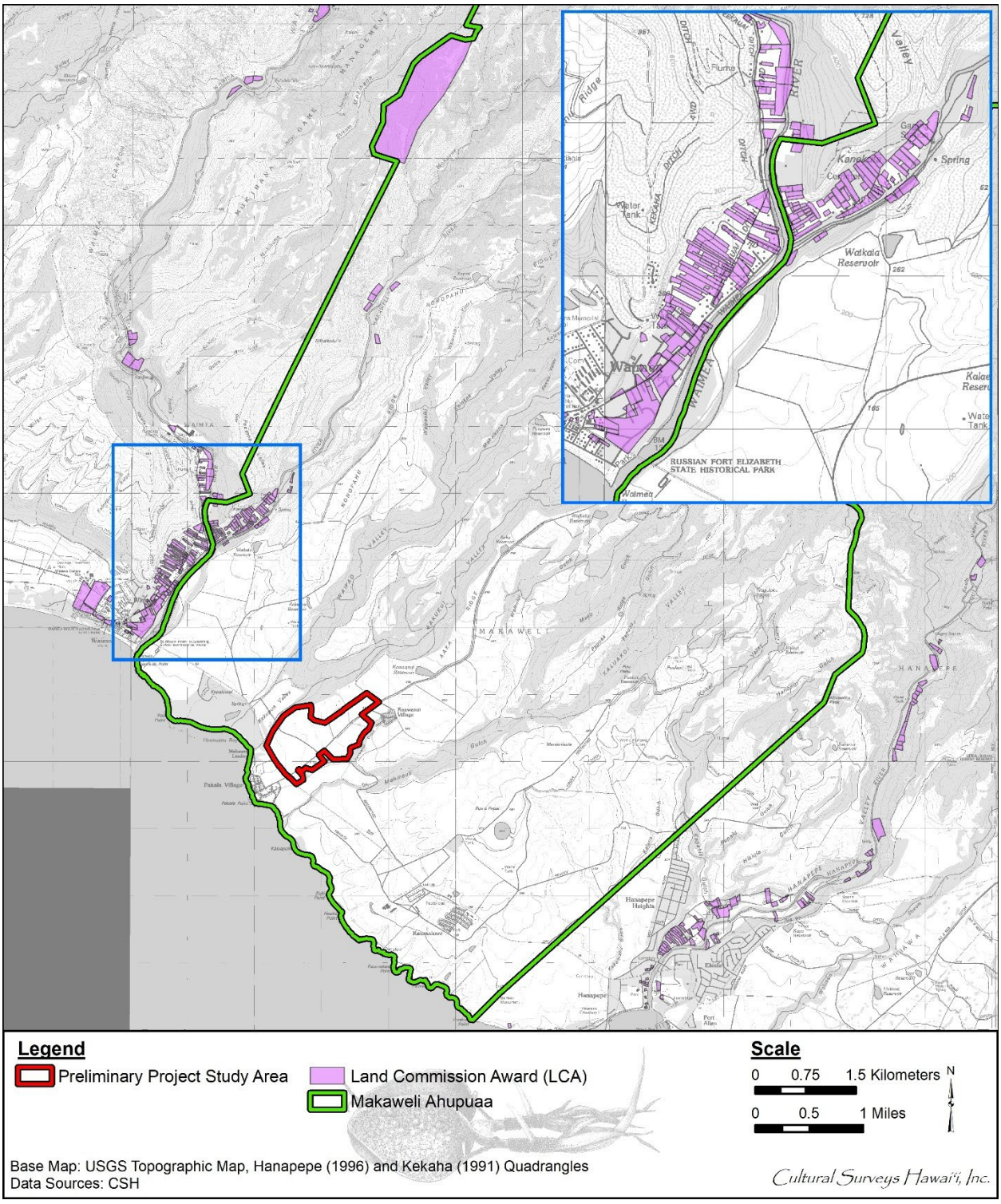

Figure 7. Portion of the 1996 Hanapepe USGS 7.5-minute topographic showing the LCAs nearest to the Study area in Makaweli Ahupua‘a

river, and the Makaweli River, in turn, is fed by other streams such as the Mokuone Stream. At the time of the Māhele, people were settled along these river basins. Waimea, at this same time, had the greatest population on the island of Kaua‘i; Makaweli's land use is closely linked to Waimea, with some claimants living in one place and farming in the other or vice versa. There is a slight preference for a house lot in Waimea, but several have house lots in both *ahupua‘a*. Visiting ships were probably supplied with food from both districts when they stopped at Waimea Bay.

A major problem in reconstructing Māhele-era settlement patterns is that tax maps and other readily available historic maps do not show *‘ili* areas for claims or awards in Huakaule, Kahalai, Kahana, Kahola, Kaikolu, Kalā‘au‘ōkala, Kamaka‘eli‘eli, Kamo‘ouli (Kamo‘oali‘i), Kaneli, Kaohuilihau, Kapuemanu, Kaunuloa, Kiele, Kohiana, Kukuihoehoe, Kula‘amokualuli, Kumuiki, Mahaihai (Mahaemae), Manini, Mokuone, Nonopahu, Ololokalau, Olokele, Palaloa, Piliamo‘o, Poleiwale, Uhilau, Waikui or Wailele. It is difficult to understand the entire *ahupua‘a* settlement pattern when so many of the geographic areas of settlement are unknown. Perhaps these *‘ili* were all along the westernmost margin of Makaweli as is the case with the geographically identifiable *‘ili*, but for all we know they may have been widely spread out over Makaweli Ahupua‘a.

Thus, while the Māhele provides a very detailed record of the western end of Makaweli, which was extensively cultivated along the Waimea-Makaweli-Mokuone river valleys, little is known about the eastern and central part of the *ahupua‘a.* Records indicate the *ali‘i* used the Kekupua Fishpond and the Kapalawai area north of Pākalā Village, and there were a few salt ponds along the shore. From our knowledge of Waimea and Hanapēpē, it is likely the land just *mauka* of the shore provided *pili* grass for housing, and that there were possibly even wetland terraces in other valleys to the west of the Makaweli River.

3.2.2.4 Ranching

In 1793, Captain Vancouver gave Kamehameha a gift of a longhorn bull and a heifer, which were pastured on the island of Hawai‘i. A ten-year sanction was put on the cattle to ensure their survival and growth. These strange looking animals were called *pua‘a bipi* (pig-beef) because of their strange stare. Kamakau (1992:164) notes, "this was the beginning of the wild herds of Waimea and Mauna Kea." By the 1820s, the unchecked cattle population had used up its grazing lands and was attacking the farmlands. In 1832, Kamehameha III recruited Spanish vaqueros to teach Hawaiians how to ride horses and rope cattle (Ronck 1984:57).

In 1803, Richard Cleveland brought the first horses to Kaua‘i. Kamehameha did not see much use in them since they were not used for food like cattle were (Ronck 1984:57).

In 1831, ranching was introduced to Kaua‘i when Richard Charlton, the British consul, leased some land in the Hanalei district. He started with a herd of about 100 head of cattle. Other ranchers followed suit and in 1848 the practice of registering brands to distinguish ownership of cattle was started on Kaua‘i. Kaumuali‘i's favorite wife, Deborah Kapule, kept a large herd along the Wailua River (Ronck 1984:57).

Articles in Hawaiian language newspapers of the time indicate "wild cattle" were still a problem on all the islands even in the late 1800s. In 1874, G.K. Maka from Waiolama, Hilo writes a letter asking for support of a bill of complaint to the Legislature:

> In these days in which we are living here, we are surrounded by cattle and live together [...] Therefore, you people who are so fond of your lands that you hold

> them back, do not lease them. We are living in trouble. O my fellow representatives, from Hawai‘i to Kaua‘i [...] Perhaps now our king will agree, just as he promised to here in Hilo, to let you fence in your patches and homes and if cattle enter take the (creature) to the Pound. Here is a good idea, let the lease holder put up the fences [...] [*Nūpepa Kūoko‘a* 13 June 1874]

By 1899, “wild cattle” as well as goats had become a big problem on Kaua‘i. Notes from Henry Pratt Judd of a hunting trip to Makaweli indicate that over a two-day period, 180 goats and 11 cattle were shot (Judd 1899).

3.2.2.5 Sugar

In 1835, Ladd and Company started the first successful sugar plantation in Hawai‘i at Kōloa, Kaua‘i. William Ladd, William Hooper, and Peter Brinsmade took out a 50-year lease on 980 acres of land at Kōloa from Kamehameha III. As other sugar plantations were organized, more labor was needed to work the fields. Plantation owners began recruiting laborers from outside the Hawaiian Islands. The Chinese were the first to arrive in 1852, followed by the Japanese in 1868 and Portuguese workers in 1878.

The Hawaiian Sugar Company (a.k.a. Makaweli Plantation) was founded at Makaweli Ahupua‘a shortly after the signing of the Reciprocity Treaty of 1876 by representatives of the Scottish Mirlees, Watson & Yaryan Company. Samuel T. Alexander and Henry P. Baldwin took over the plantation, incorporating it in 1889 (Condé and Best 1973:134). A large mill was established in present-day Kaumakani Town (Figure 8), as well as workers’ camps. Construction of the Hanapēpē Ditch (circa 1891) facilitated irrigation of 3,000 acres of cane in the western portion of the plantation (Wilcox 1996:87–88), and development of a 30-inch gauge railroad was undertaken to transport cane from the fields to the mill (Condé and Best 1973:136).

3.2.2.6 The Sinclair-Robinson-Gay Family

The Sinclairs arrived in Honolulu in 1863 and immediately began looking for large tracts of land to purchase. Disappointed with what they saw, the family decided to head for California in search of better prospects. King Kamehameha IV, hearing of their plans to leave, offered them the island of Ni‘ihau. Unusually heavy rainfall was recorded for 1861–1863, and Ni‘ihau was exceptionally lush and green when the two Sinclair brothers, Francis and James, did a site inspection of the island. Excited at their discovery, they hoped to re-establish the cattle and sheep business they had left behind in New Zealand. The two brothers accepted the King’s offer and purchased the island of Ni‘ihau for $10,000 in gold. There they raised Merino sheep and Shorthorn cattle from the continental United States, Australia, and New Zealand.

In 1865, Eliza Sinclair purchased the *ahupua‘a* of Makaweli (21,844 acres) from Victoria Kamāmalu Ka‘ahumanu for $15,000. A new home built in the cool uplands at about 1,800 feet (ft) elevation became known as the “Makaweli house” and sometime in the early 1870s the Sinclair family moved from Ni‘ihau to settle there (Dorrance and Morgan 2000:32–33).

The Kapalawai house was built by Aubrey Robinson for his wife Alice Gay Robinson; Figure 9 indicates the house was located northwest of the study area. The exact date of construction is not known, but the house was probably built around the mid-1890s. The original house plans do not show a date, but the Robinsons have a photo of the house with the date 1897 written on the back (19 May 1999, pers. comm. with Ed Rice), thus making the house over 120 years old. The

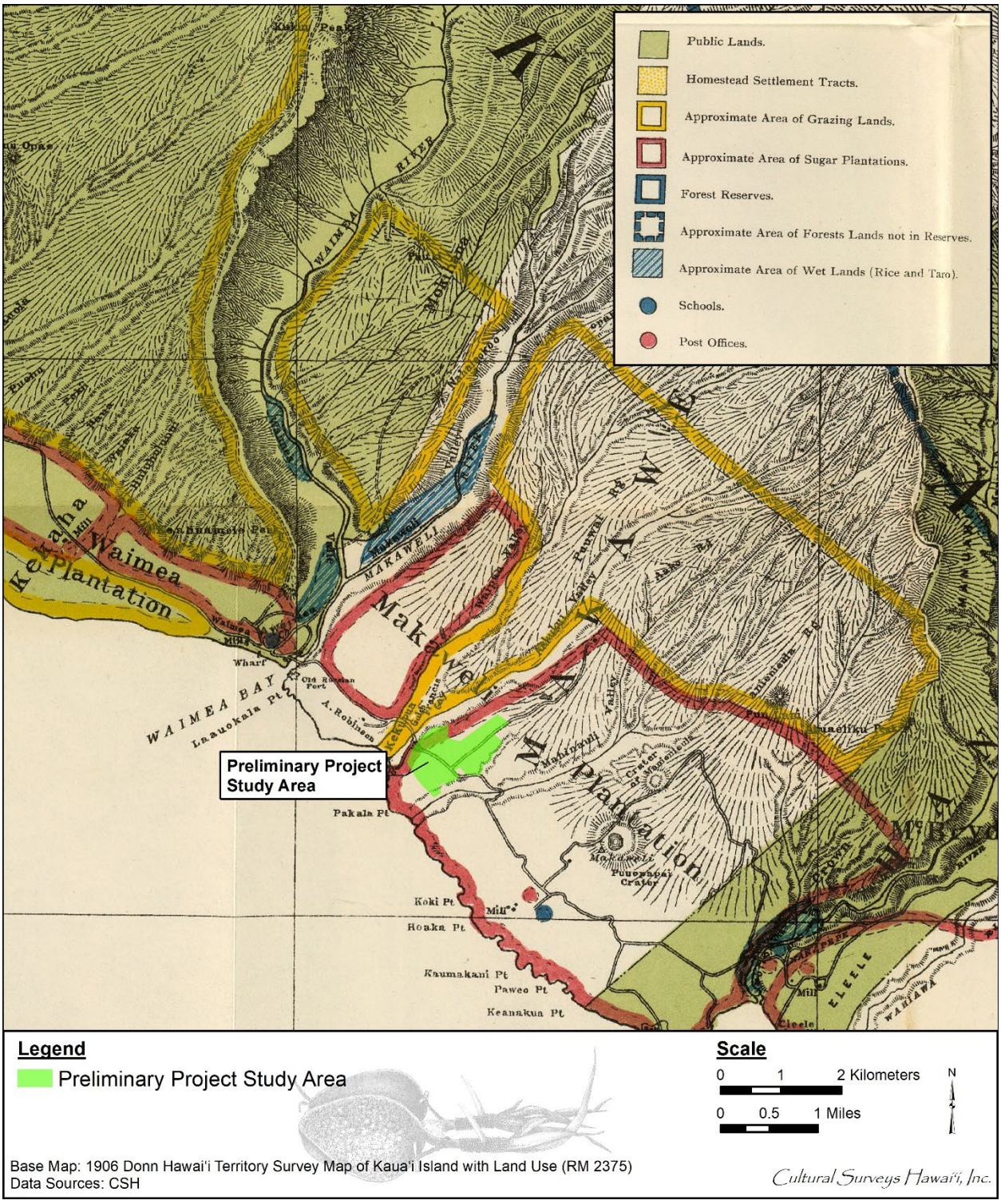

Figure 8. Portion of 1906 Donn map of Kaua‘i, showing the study area within the bounds of the Makaweli Plantation, and the mill, school, and post office to the south in the vicinity of present-day Kaumakani Town

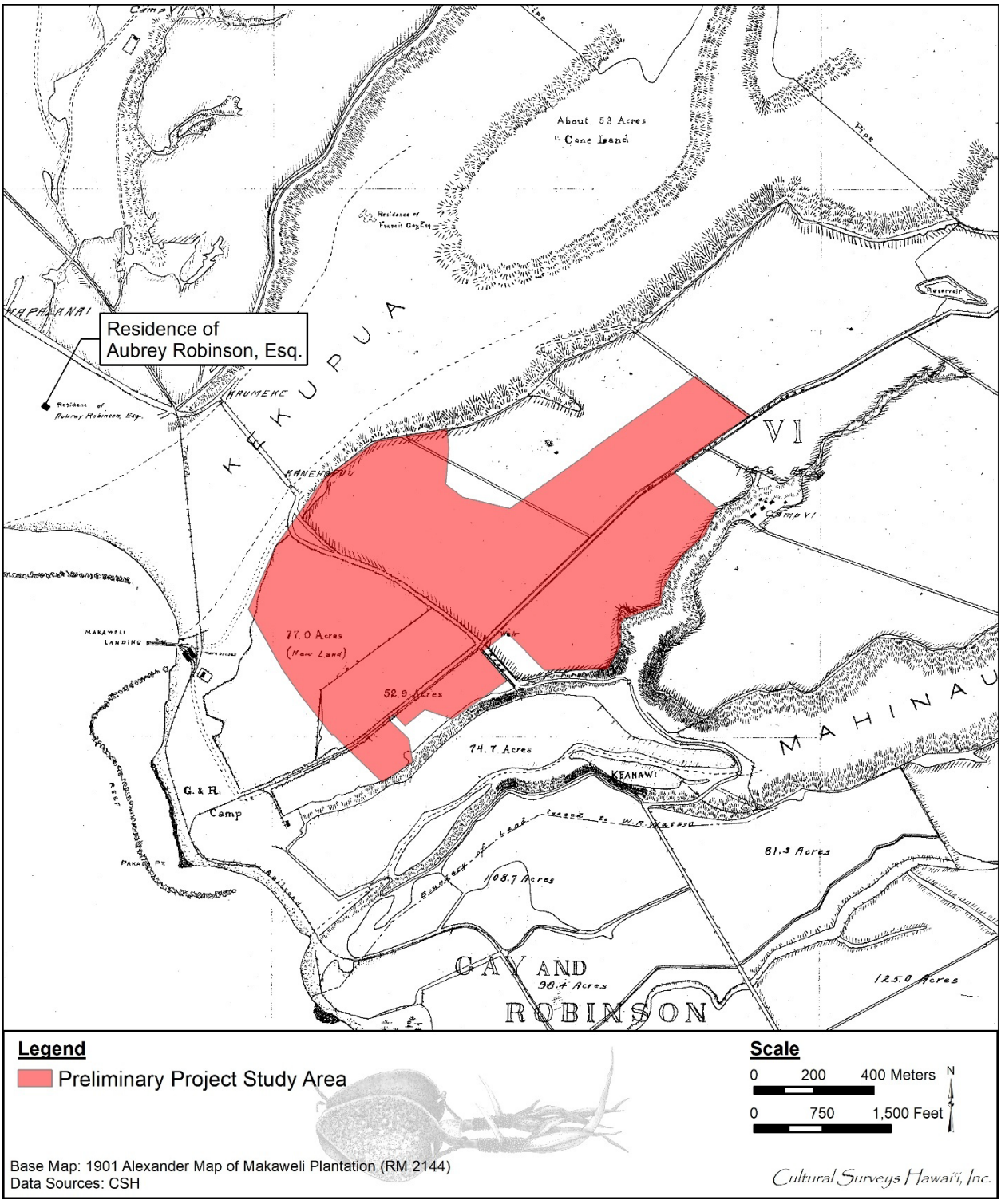

Figure 9. Portion of the 1901 Alexander map of Makaweli Plantation (RM 2144) showing the location of Aubrey Robinson’s northwest of the study area and a reservoir located upslope

Kapalawai house was designated as SIHP # 50-30-9-00764 Feature A.

In 1889, Francis Gay and Aubrey Robinson formed the family partnership known as Gay & Robinson (G&R). This partnership managed various family businesses such as Makaweli Ranch and Makaweli Plantation. By the early 1880s the Robinsons became involved in the sugar business, not only planting their own crops but also leasing large tracts of land to Hawaiian Sugar Company (Wilcox 1996:86), while continuing to engage in other agricultural pursuits like beekeeping.

3.2.3 1900s - Present

Makaweli Plantation was one of the most successful and profitable plantations in Hawai‘i, due in large part to improvements in irrigation at the start of the twentieth century (Wilcox 1996:89). In 1904 the Olokele Ditch was completed, delivering water at 1,075 ft to the eastern portion of the plantation. According to Wilcox (1996:89), “With the completion of the Olokele Ditch, the Hawaiian Sugar Company had one of the best gravity supplies in the islands.” Improvements in the vicinity of the study area appear on maps from the early 1900s; Figure 9, Figure 10, and Figure 11 depict a new reservoir located at 360 ft elevation (at the locale of the current Ka‘awanui Reservoir), and Figure 10 shows two ditches extending downslope from this reservoir into the study area. The full extent of Olokele Ditch is shown in Figure 12.

The Hawaiian Sugar Company was one of the first plantations to construct family housing for its workers with amenities such as a plantation store (Dorrance and Morgan 2000:33). It established 11 or 12 small camps scattered among their fields in Makaweli Ahupua‘a around the turn of the century. The town of Kaumakani grew up from the settlements around the sugar mill known as “Makaweli Camp” and “Camp 1.” Ka‘awanui Village grew up from “Camp 6,” and Pākalā Village grew up from “Pakala Camp”; these settlements are depicted in relation to the study area on Figure 10 and Figure 11. The railroad was expanded to accommodate transportation of cane throughout the growing plantation; by 1927 spurs were constructed to fields located within the bounds of the study area, including one spur crossing the government road, and another located further upslope (see Figure 11).

The Alanui Aupuni (Government Road) extending through the study area likely underwent improvements such as widening and paving during the early 1900s by the newly established County of Kaua‘i (MASON 2025:19). In the 1930s a new Belt Road system was constructed on Kaua‘i (MKE Associates, LLC/Fung Associates, Inc.). The portion of the new Belt Road through southwestern Kaua‘i is Kaumuali‘i Highway (Route 50), which replaced the Old Government Road as the main transportation route through the area. Kaumuali‘i Highway is visible in relation to the study area, villages, and plantation infrastructure such as cane roads and water/irrigation features in Figure 13. Notably, the portion of the Old Government Road within the study area is labeled “Private Road” in Figure 13, indicating it became subsumed into the plantation holdings.

Hawaiian Sugar Company was dissolved in 1940 due to disputes over new leasing agreements. Olokele Sugar Company was formed under the new management of C. Brewer & Company and operated on the former Hawaii Sugar Company plantation lands (Wilcox 1996:89). In 1941, the plantation railroad ceased operation (Condé and Best 1973:135). Aerial images from the 1960s and 1970s aerial photo shows the study area under continued cultivation (Figure 14 and Figure 15). C. Brewer & Company sold Olokele Sugar Company to Gay & Robinson as its lease was nearing expiration in 1994. The plantation and mill continued to operate under the name Gay & Robinson until it was closed in 2010.

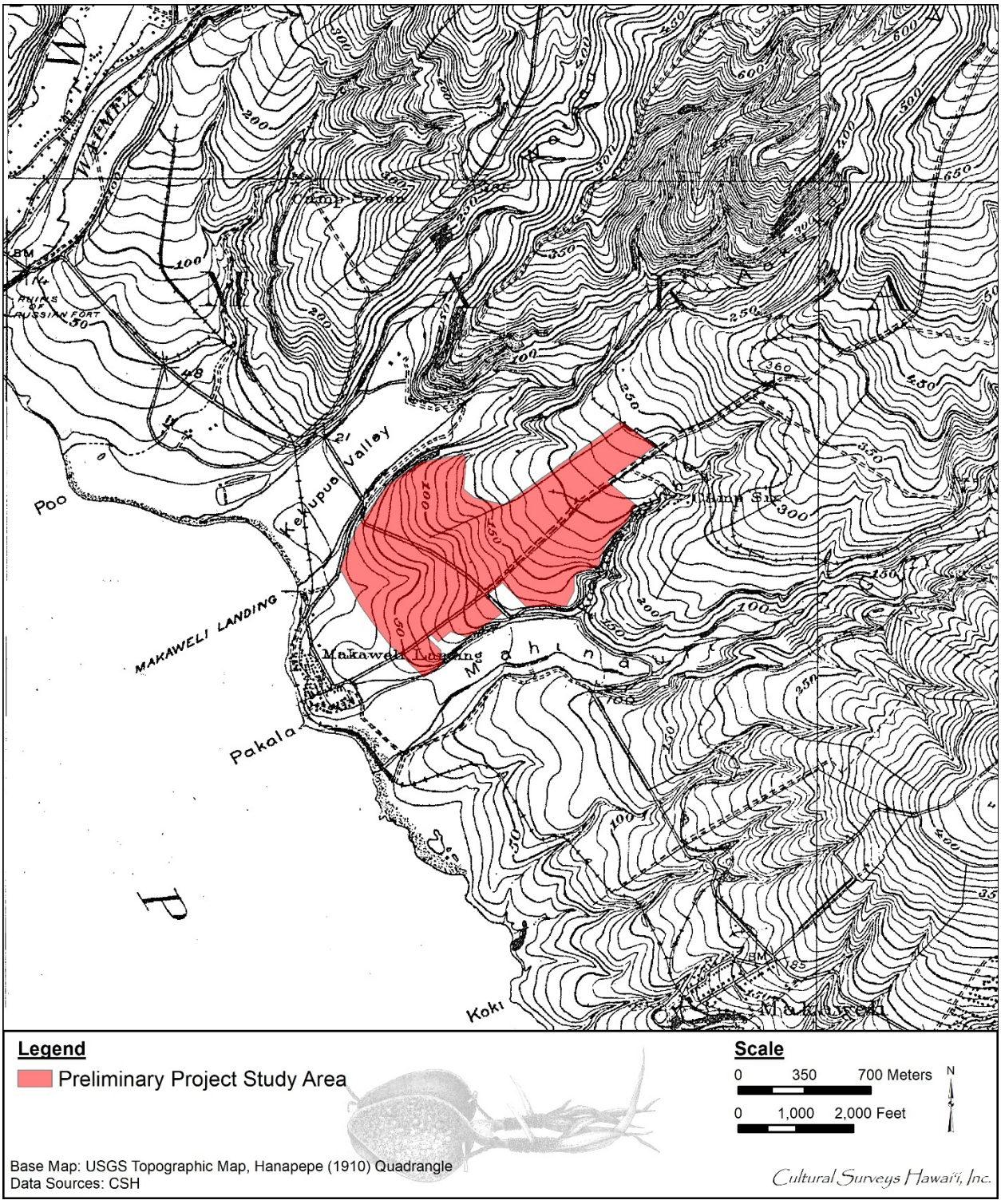

Figure 10. Portion of the 1910 Hanapepe USGS topographic quadrangle showing the study area

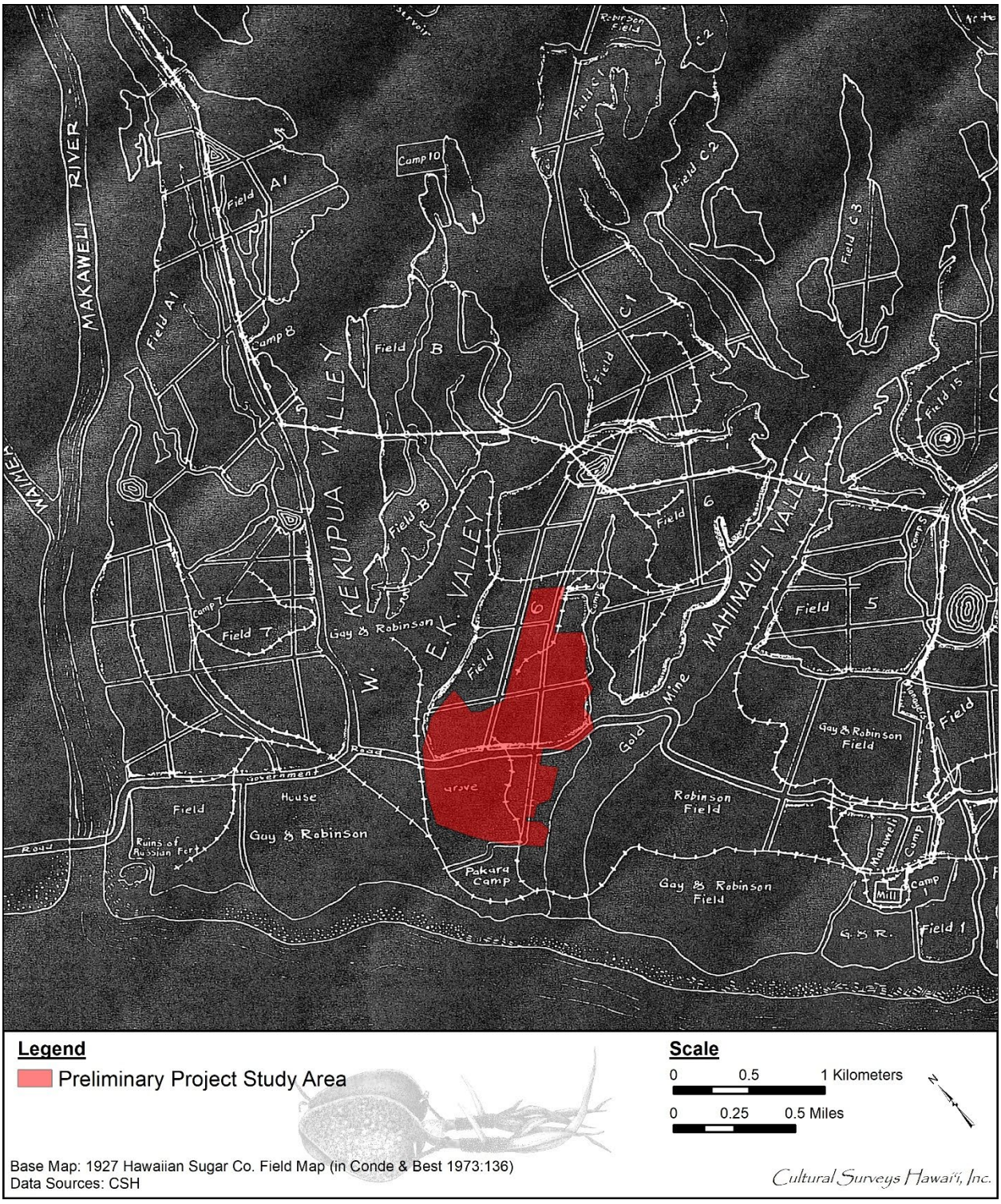

Figure 11. 1927 Hawaiian Sugar field map (Condé and Best 1973:136) showing the study area in relation to plantation features such as planting fields, camps, reservoirs, cane roads, and rail lines, including spurs extending through the study area

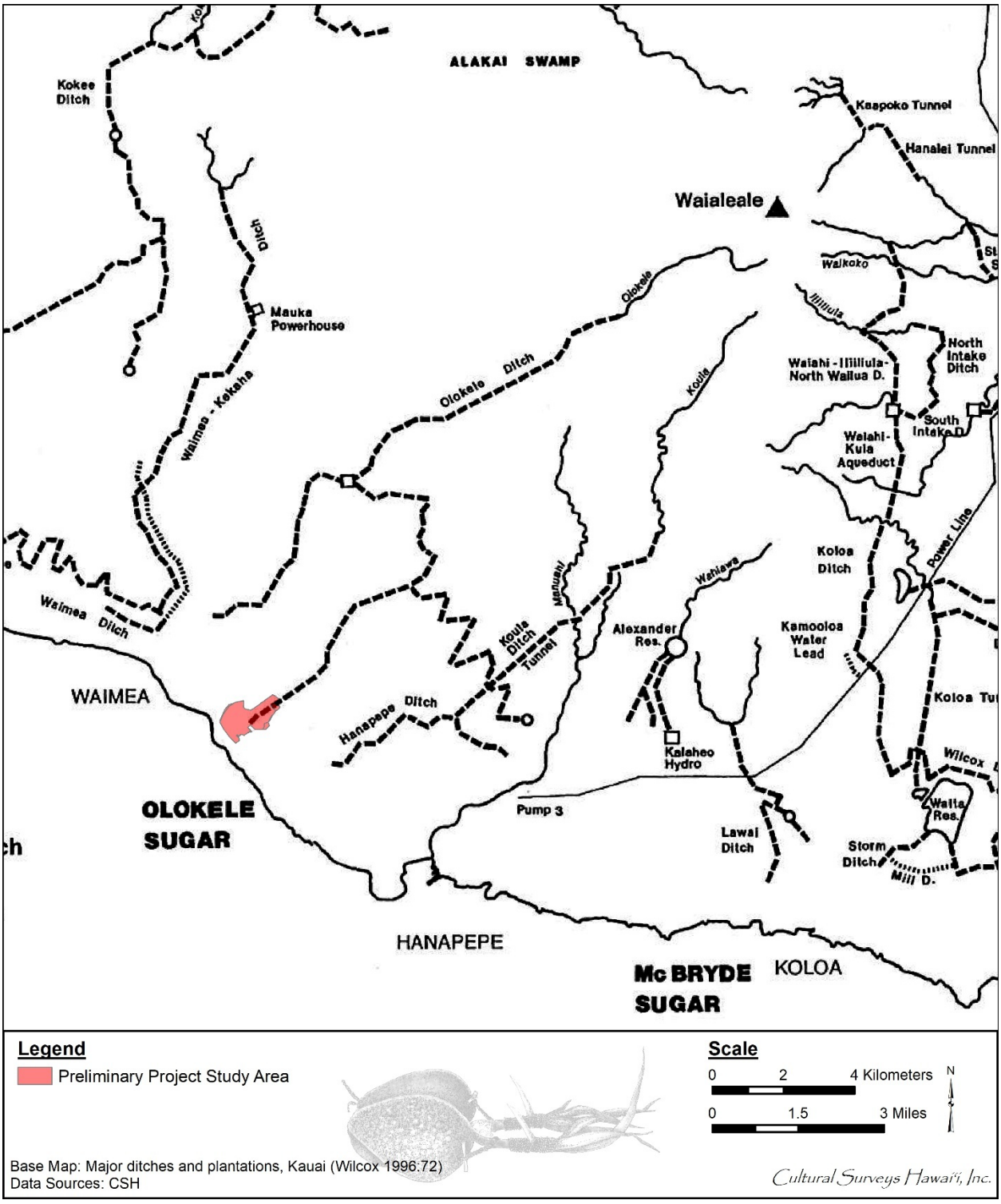

Figure 12. Adaptation of a map from Wilcox (1996:72) showing plantation ditches in southwestern Kaau‘i, include a portion of the Olokele Ditch extending into the study area

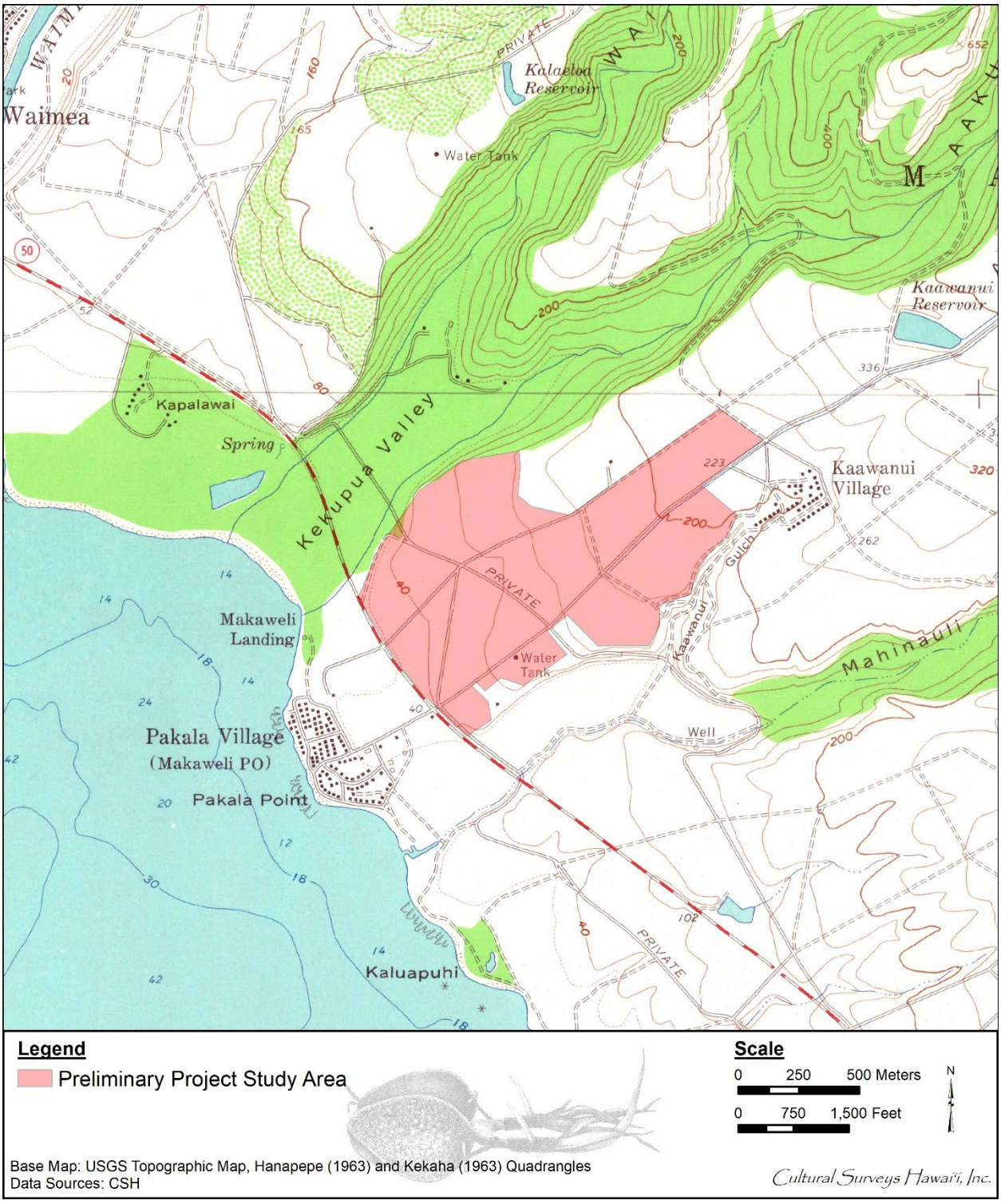

Figure 13. Portion of the 1963 Hanapepe USGS topographic quadrangle showing the study area

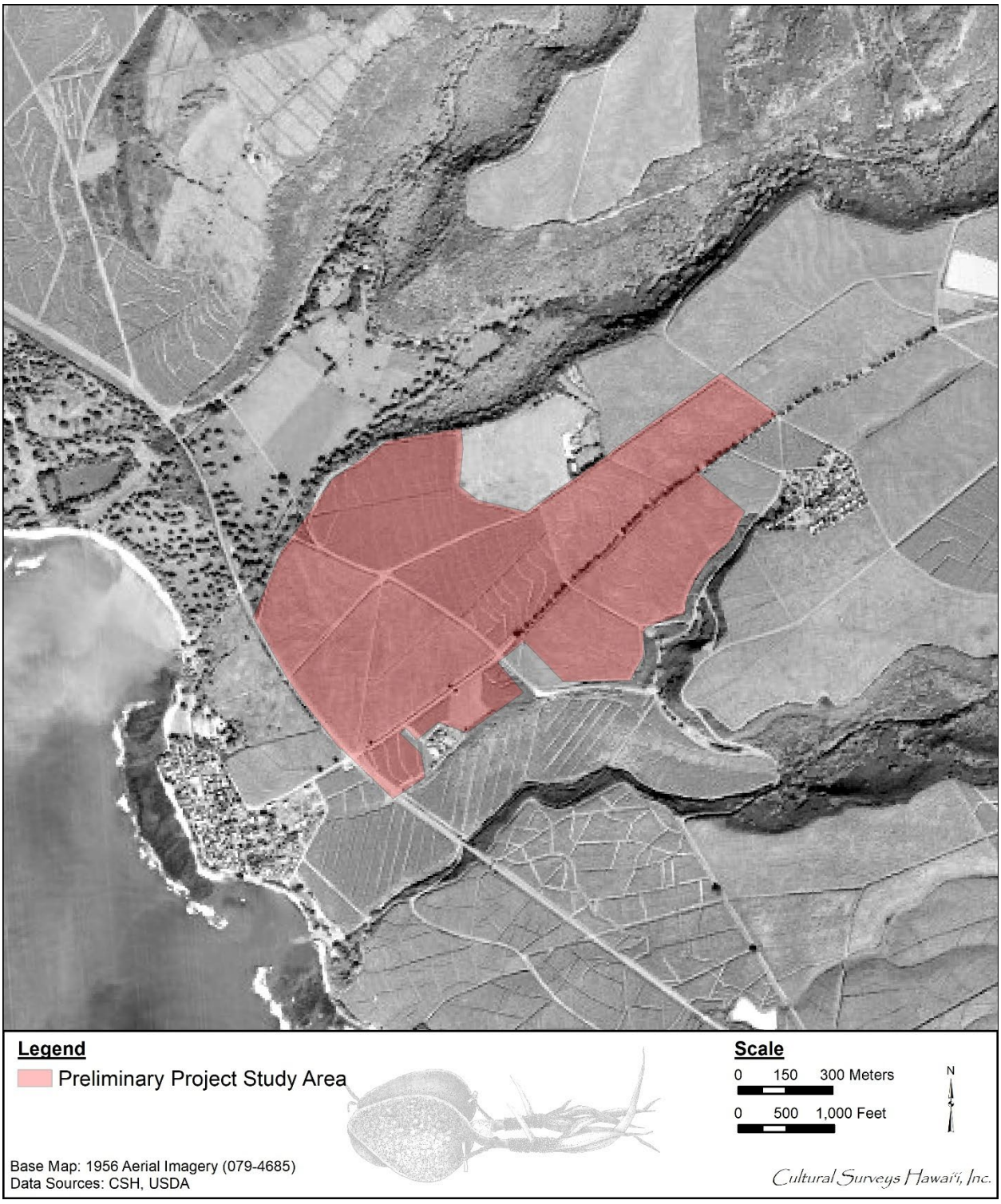

Figure 14. Portion of a 1965 USDA aerial image showing the study area

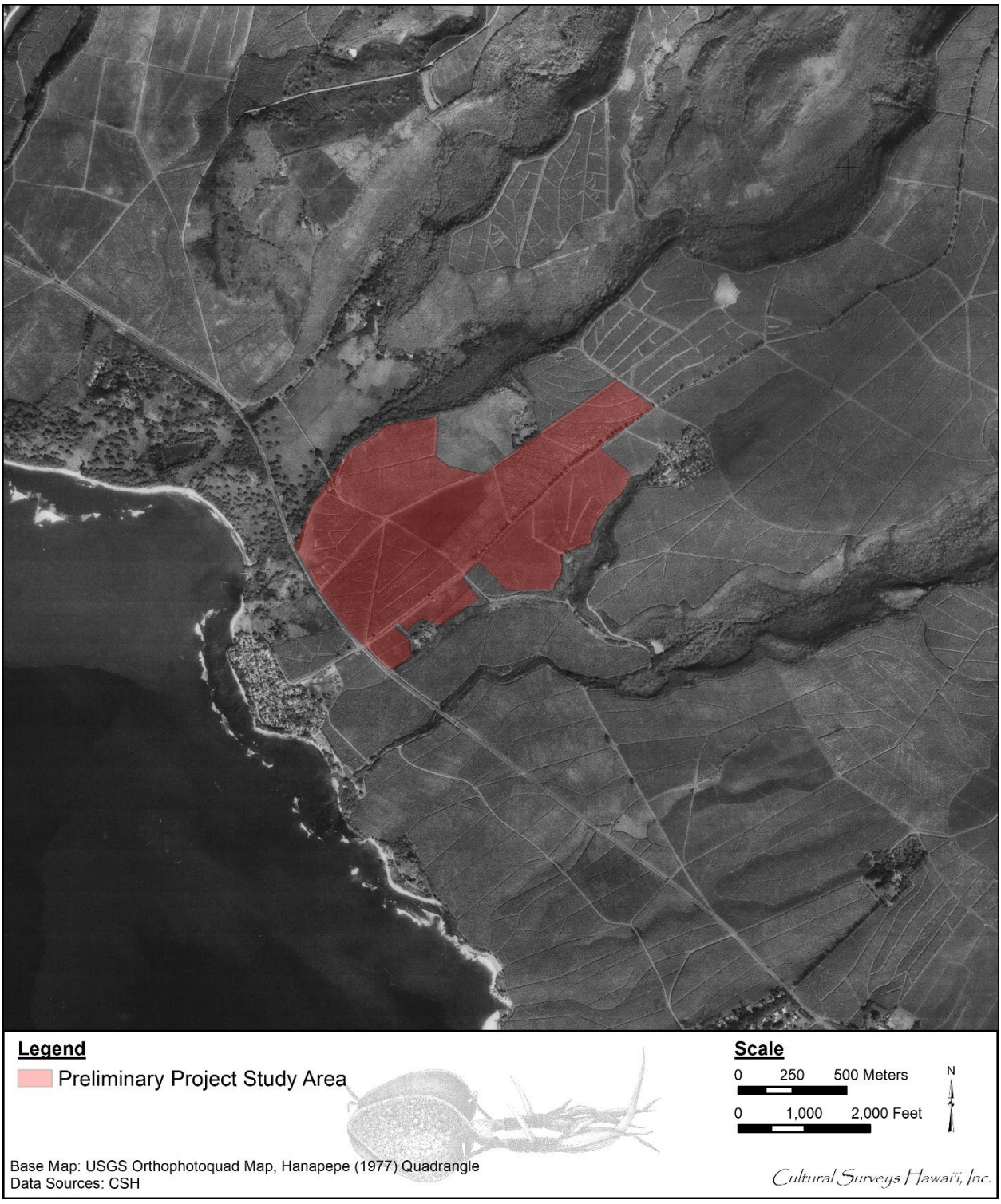

Figure 15. Portion of the 1977 USGS Hanapepe orthophotoquad map showing the study area

3.3 Previous Archaeological Research

Eight prior archaeological studies have been conducted within 1.5 km of the current study area; none of these overlap with the study area. These eight prior studies are depicted in relation to the current Study area in Figure 16 and summarized in Table 1.

Archaeological sites previously documented within 2.5 km of the study area are located in Figure 17 and listed in Table 2. These include Māha‘iha‘i Heiau and ‘A‘akukui Heiau, both documented in upland Makaweli during early surveys by Thrum (1907) and Bennett (1931); human burials at the coast (SIHP #s 50-30-09-00792 Feature B and 50-30-09-06011); Pe‘ekaua‘i (Menehune) Ditch (SIHP # 50-30-09-00026) along the Waimea River; Kekupua fishpond (SIHP # 50-30-09-00765); and historic-era sites associated with the Robinson family and/or sugar plantation land use (SIHP #s 50-30-09-00762, 50-30-09-00763, 50-30-09-00764, 50-30-09-00766, and 50-30-09-02269).

3.3.1 SHPD Inadvertent Finding near Manhinauli Gulch – McMahon 1993

In 1993, SHPD archaeologist Nancy McMahon assessed the inadvertent discovery of a coastal burial, southwest of the current study area (McMahon 1993; see Figure 16). SIHP # 50-30-09-06011 is located just south of the inlet of Mahinauli Gulch, and just north of the Robinson Landing barge harbor (see Figure 17). The discovery exposed a cultural deposit including midden and basalt debitage. It was unclear whether the burial was traditional Hawaiian or historic.

3.3.2 Kapalawai – Zulick et al. 2000; McDermott and Hammatt 2001

CSH conducted an AIS with subsurface testing for the 170-acre Kapalawai Resort project located immediately west of the current study area (Zulick et al. 2000; see Figure 16). Six historic properties were identified: SIHP # -00762, a series of rock walls (Features A through E), a terrace (Feature F), and an iron pot (Feature G); SIHP # -00763, an oval-shaped stone platform; SIHP # -00764, a housing complex of 14 historic buildings (Feature A, the main house; Feature B, the guest house; Feature C, offices; Feature D, the carriage house; Feature E, the tack room; Feature F, the greenhouse; Features G through N, employee cottages); SIHP # -00765, Kekupua Fishpond; SIHP # -00766, a Portuguese brick oven; and SIHP # -00792, a cultural deposit (Feature A) which includes a human burial (Feature B) (see Figure 17).

The subsurface testing program included 23 backhoe trenches throughout the project area; nine hand-excavated test units, eight being related to SIHP # -00763, and one excavated along the shoreline; and seven random coring samples within Kekupua Fishpond (SIHP # -00765) (Zulick et al. 2000:9). Charcoal from the core sample at Kekupua Pond was radiocarbon dated to AD 895-1225, and two charcoal samples from SIHP # -00792 range from the fifteenth century to the twentieth century (sample 139725 [CSH ID# Kapal0a]) yielded a calendar age range of AD 1400 to 2000. Sample 139726 (CSH ID# Kapal0b) yielded a calendar age range of AD 1480 to 1960 (Zulick et al. 2000:171).

CSH subsequently conducted an addendum to the 2000 AIS (McDermott and Hammatt 2001; see Figure 16) that recorded two new features of SIHP # -00762: Feature H is a pump house and related pipeline and out-flow basin, and Feature I is a subsurface culvert.

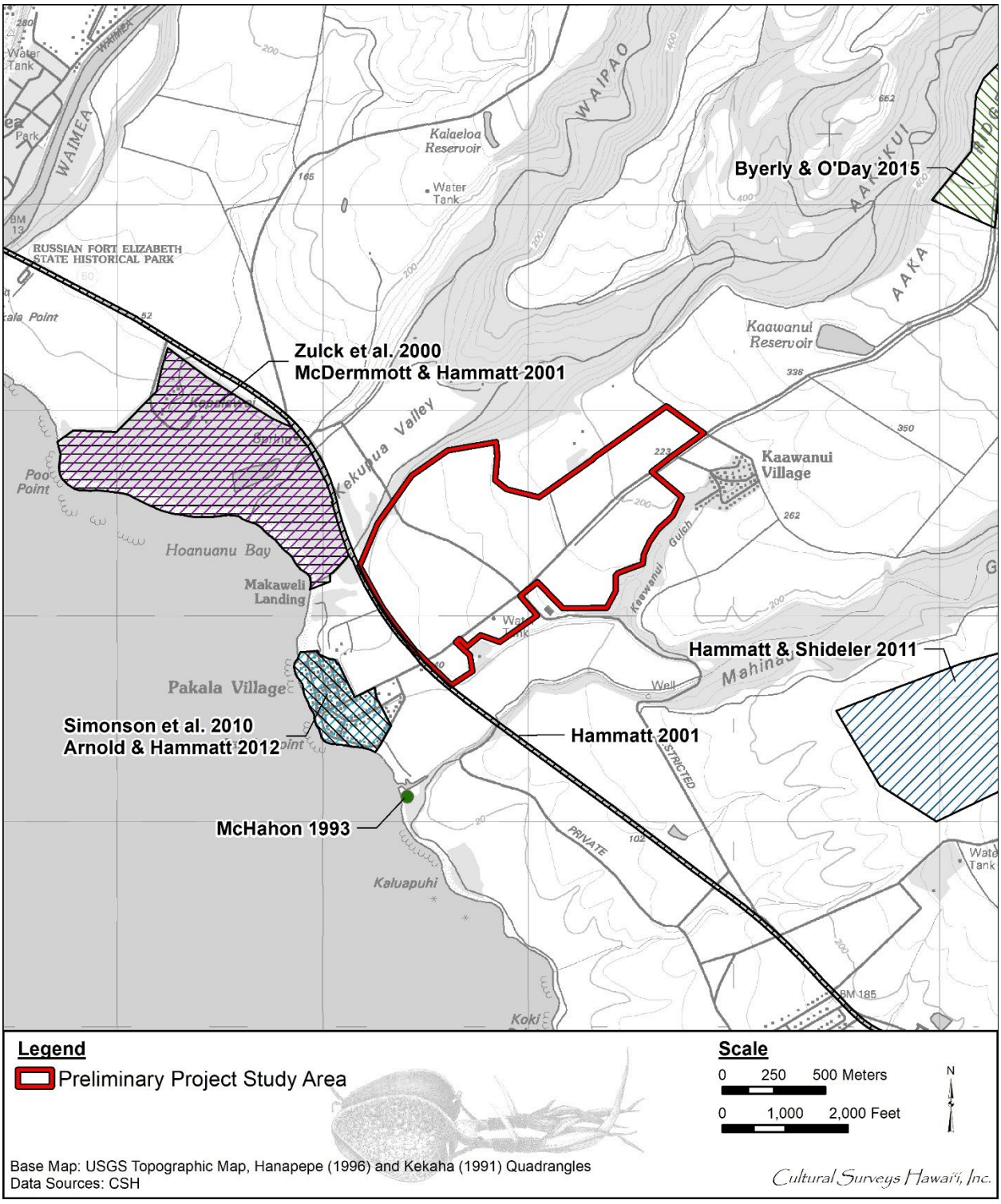

Figure 16. Portion of the 1996 Hanapepe and 1991 Kekaha USGS 7.5-minute topographic quadrangles showing previous archaeological studies located within 1.5 km of the current study area

Table 1. Previous archaeological studies within 1.5 km of the current study area

Reference	Type of Study	Location	Results
McMahon 1993	Inadvertent burial discovery and disinterment	Near Mahinauli gulch east of Pākalā Village	SIHP # 50-30-09-06011, human burial discovered and disinterred
Zulick et al. 2000	Archaeological inventory survey with subsurface testing	Kapalawai	Documented six newly identified historic properties: SIHP #s 50-30-09-00762, walls, terrace, and iron pot; -00763, platform; -00764, house complex; -00765, Kekupua fishpond; -00766, historic structure; and -00792, cultural deposit and human burial
Hammatt 2001	Archaeological inventory survey (recorded as an archaeological assessment)	Approx. 51-mile road corridor between Kekaha and Moloa‘a	Concluded portion of corridor adjacent to current Study area has low potential for subsurface archaeological features
McDermott and Hammatt 2001	Addendum archaeological inventory survey	Kapalawai	Identified and documented two new features of SIHP # 50-30-09-00762 (pump house with related pipeline and outflow basin, and subsurface culvert)
Simonson et al. 2010	Archaeological inventory survey (recorded as an archaeological assessment)	Pākalā Village	No historic properties documented
Hammatt and Shideler 2011	Archaeological literature review	Eight potential landfill locations including Pu‘u o Pāpa‘i in Makaweli	Research indicated no known historic properties and low potential for undocumented historic properties within Pu‘u o Pāpa‘i (Makaweli) project area, based on its distance from coast and prior land disturbance
Arnold and Hammatt 2012	Archaeological monitoring	Pākalā Village	No historic properties documented
Byerly and O’Day 2015	Archaeological inventory survey	50-acre agricultural parcel in Makaweli, TMK: (4) 1-7-006:006	Documented SIHP # 50-30-09-02269, historic irrigation ditch system

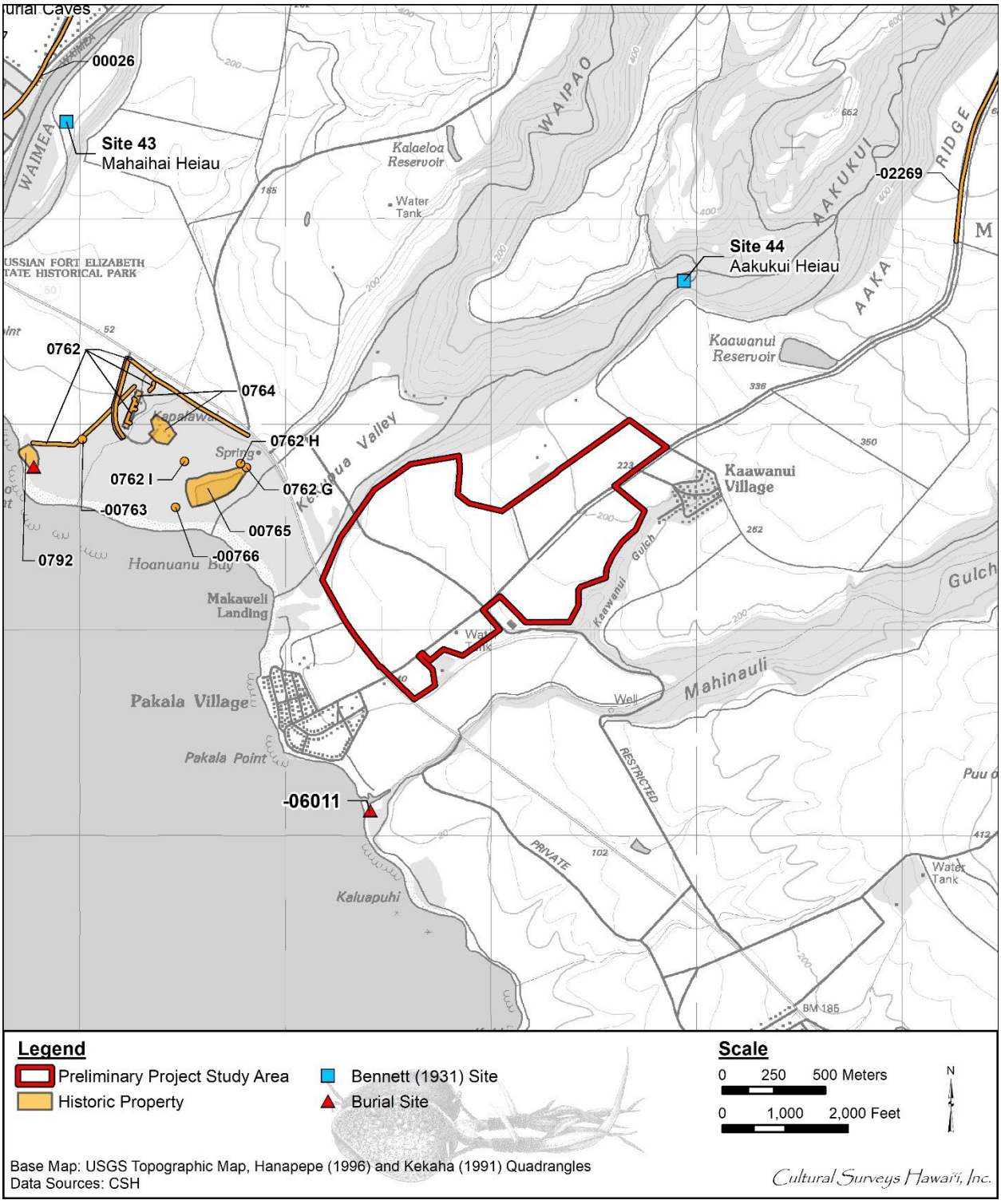

Figure 17. Portion of the 1996 Hanapepe USGS 7.5-minute topographic quadrangle showing archaeological sites previously documented within 2.5 km of the study area

Table 2. Previously documented archaeological sites within 2.5 km of the study area

SIHP # 50-30-09-*****	Site Type	Reference
Site 43	Māha‘iha‘i Heiau	Thrum 1907; Bennett 1931
Site 44	‘A‘akukui Heiau	Thrum 1907; Bennett 1931
-00026 (Site 26)	Pe‘ekaua‘i (Menehune) Ditch, also known as Kīkīaola	Vancouver 1789; 1918 Thrum and Evans map (RM 2686); Menzies 1920; Bennett 1931; Damon 1931; 1910 USGS topo map; 1963 USGS topo map; Joerger and Streck 1979; Hawai‘i Register 1974; National Register 1984; 1996 USGS topo map; Kamai and Hammatt 2015; Tomonari-Tuggle and Duarte 2017; Tomonari-Tuggle and Stephens 2017
-00762	Robinson-era complex including rock walls, terrace, iron pot, pump house and related structure, and a subsurface culvert	Zulick et al. 2000; McDermott and Hammatt 2001
-00763	Platform/possible plantation clearing mound	Zulick et al. 2000
-00764	Robinson Homestead complex	Zulick et al. 2000
-00765	Kekupua fishpond	Zulick et al. 2000
-00766	Portuguese oven	Zulick et al. 2000
-00792A	Pre-Contact cultural layer	Zulick et al. 2000
-00792B	Human burial	Zulick et al. 2000
-02269	Historic sugar plantation irrigation ditch system comprising 6 features (Features 1–6)	Byerly and O’Day 2015
-06011	Human burial	McMahon 1993

An archaeological monitoring plan (Hammatt and Shideler 2006a), preservation plan (Hammatt and Shideler 2006b), and burial treatment plan (Hammatt and Shideler 2006c) were later prepared for the project.

3.3.1 Highway Corridor – Hammatt 2001

In 2001, CSH conducted an archaeological inventory survey (lack of finds recorded as an archaeological assessment) for an approximately 82-km (51-mile) road corridor for a proposed fiberoptic cable project between Kekaha and Moloa‘a (Hammatt 2001). The corridor included a portion of Kaumuali‘i Highway immediately west of the current study area (see Figure 16). The objective of the survey was to identify areas within the corridor having potential for subsurface historic properties including human burials and cultural deposits (Hammatt 2001:1). The project corridor was evaluated based on previous studies including soil surveys, tax and historic maps, LCA documents and locations, previous archaeological studies, and field inspections as appropriate. The results were synthesized to produce a scale representing four levels of potential for yielding subsurface archaeological resources: low, moderate, high, and very high (Hammatt 2001:12). Section 3 of the corridor, which extended from the eastern end of the Waimea River Bridge past the current Study area to the sand deposit in the vicinity of Makaweli Landing, was evaluated as having a low potential for yielding subsurface historic properties (Hammatt 2001:16–17).

3.3.2 Pakala Village Wastewater Treatment – Simonson et al. 2010; Arnold and Hammatt 2012

CSH conducted an AIS with subsurface testing for a wastewater project in Pākalā Village located southwest of the study area (Simonson et al. 2010; see Figure 16). No historic properties were documented, and therefore the AIS was termed an archaeological assessment pursuant to HAR §13-284-5(A). Despite these findings, archaeological monitoring was recommended for the project based on the potential for encountering human skeletal remains within the natural Jaucas sand sediments underlying agricultural fill and alluvial material in a portion of the project area.

Archaeological monitoring of the project was subsequently conducted by CSH (Arnold and Hammatt 2012; see Figure 16). No cultural materials were identified.

3.3.3 Kaua‘i Landfill – Hammatt and Shideler 2011

CSH in 2011 prepared an archaeological literature review of eight potential locations for a new municipal solid waste landfill (Hammatt and Shideler 2011). One of the eight proposed locations was at Pu‘u o Pāpa‘i in Makaweli, located southeast of the current study area (see Figure 16). Research indicated no known historic properties were present within the Pu‘u o Pāpa‘i project area. Although no prior archaeological survey has been done at that location, it was assessed as having a low probability of containing “highly significant” historic properties based on its distance from the coast and prior agricultural disturbance.

3.3.4 Byerly and O’Day 2015

Garcia and Associates in 2015 completed an AIS of 50 acres located northeast of the current study area (Byerly and O’Day 2025; see Figure 16). One historic property was documented and designated as SIHP # -02269 (see Figure 17). The site is a historic irrigation ditch system comprising six features (designated Features 1–6) including a linear earthen ditch (Feature 1) with

culverts (Features 2, 4, and 6) and concrete floodgates (Features 3 and 5). The ditch was described as being actively used and maintained. Byerly and O'Day (2025:22) note "[t]he historic irrigation ditch feeds the reservoir to the south [Ka‘awanui Reservoir] and provides a vital resource to ongoing agricultural operations further down slope." The site was recommended for no further work, on the basis that it contained "very little information potential beyond what has already been gathered," (Byerly and O'Day 2025:22). Other modern agricultural features related to the former sugarcane plantation were also observed, including irrigation features dating from the 1980s to 2010.

3.4 Prior Studies Conducted for the Kaawanui Solar Project

3.4.1 Bautista et al. 2025

In January 2025, CSH conducted an archaeological literature review and field inspection (LRFI) to determine the likelihood that archaeological historic properties may be affected by the project. The LRFI report (Bautista et al. 2025) concluded that the study area has been extensively modified by operations related to historic sugar cultivation and subsequent agricultural activities. Numerous historic-era features associated with transportation and sugarcane agriculture were identified, including portions of plantation roads and the Old Government Road, rock walls, ditch systems, a railroad remnant, and a water tank. No pre-Contact archaeological features were observed. The potential for encountering surface or subsurface pre-Contact archaeological features within the study area was assessed as low, given the nature and extent of prior land alteration. CSH noted additional documentation will likely be required for the historic surface features encountered during the field inspection, and recommended consultation with SHPD regarding the need to conduct an AIS.

3.4.2 Wilkinson and Hammatt 2025

CSH has also provided archaeological observation of the Project's geotechnical survey and prepared a report summarizing the results of this fieldwork (Wilkinson and Hammatt 2025; see Appendix A). The geotechnical survey involved mechanical boring, pull tests, and test pit excavations at select locations throughout the study area to determine subsurface conditions and facilitate soil sampling. Excavation of test pits extended below the plow zone, exposing study area sediments characterized by one or two layers of natural Makaweli series soils overlying basalt bedrock. Makaweli soils are characterized as well-drained silty clay loams developed in material weathered from basic igneous rock; these soils are generally used for irrigated sugarcane, pasture, and homesites (Foote et al. 1972:90). The upper limits of these sediments have generally been disturbed by prior agricultural activity. No cultural layers or materials were observed within any of the excavated areas, and the geotechnical survey did not adversely affect any historic properties.

3.5 Background Summary

Very little written information is available about the pre-Contact period of Native Hawaiians within Makaweli Ahupua‘a. It is most likely that during much of the pre-Contact period, Native Hawaiians in the Waimea Ahupua‘a, specifically along the west side of Waimea River, had close association with the people on the east side of the river in the Makaweli Ahupua‘a.

Based on the Māhele claims, the land use pattern at Makaweli was very strongly focused on the seaward portion of the *ahupua‘a* along the Waimea-Makaweli-Mokuone river valleys. The general absence of historic accounts, *kuleana* land claims, or archaeological studies from the eastern and central parts of Makaweli Ahupua‘a should not be used to attest to a low population in the remainder of Makaweli Ahupua‘a though it may have been more dispersed. This population would have been supported by the presence of at least two other perennial streams to the east extending to the ocean and an assortment of other intermittent streams and gulches throughout Makaweli. With the significant Hawaiian population decline post-Contact, the continued economic growth of Waimea Bay as a major trade center, creation of a Waimea mission station, and development of a fortification at Waimea, people would have been drawn in from the surrounding country.

In the late nineteenth to early twentieth century the settlement pattern in Makaweli Ahupua‘a shifted from subsistence agricultural along the riverbanks and coastline to commercial agricultural development relating to the sugar industry. A series of “camps/villages” were established throughout the *ahupua‘a* to support a new influx of people working at the plantations, as well as irrigation and transportation systems.

Aside from the LRFI (Bautista et al. 2025) and geotechnical survey observation (Wilkinson and Hammatt 2025) conducted for the Kaawanui Solar Project, no previous archaeological studies have been conducted within the study area. The LRFI identified series of historic-era features associated with transportation and sugarcane agriculture, including portions of plantation roads and the Old Government Road, rock walls, ditch systems, a railroad remnant, and a water tank. The ditch systems may be associated with the ditch (SIHP # -02269) documented by Byerly and O’Day (2015) *mauka* of the study area. No subsurface archaeological features were encountered during observation of the project geotechnical survey; excavations extended below the plow zone and exposed natural sediments that have generally been disturbed by prior agricultural activity.

Section 4 Consultation

A CIA is being prepared for the Kaawanui Solar Project in accordance with Office of Environmental Quality Control (OEQC) guidelines, and will involve consultation with community members, agencies, and Native Hawaiian Organizations (NHOs).

Hawai‘i Administrative Rules (HAR) §13-284-6(c) stipulates,

> Prior to submission of significance evaluations for properties other than architectural properties, the agency shall consult with ethnic organizations or members of the ethnic group for whom some of the historic properties may have significance under criterion ‘e’ to seek their views on the significance evaluations. For native Hawaiian properties which may have significance under criterion ‘e’ the Office of Hawaiian Affairs also shall be consulted.

No pre-Contact sites were identified within the study area, and no historic-era sites within the study area are assessed as having significance under Criterion e. However, CSH sought to identify and consult with knowledgeable individuals or organizations to obtain information about the historical land use within the study area. This effort involved outreach via telephone and email to James Robinson of Gay & Robinson in August 2025. Mr. Robinson responded via email on 4 August 2025, providing information about the ditch system in the study area. He also included an annotated 2000 aerial image showing points of interest associated with the ditch system; an adapted version of this image is provided in Figure 18.

Mr. Robinson noted in his email the ditch system is “quite old, created for sugar (early 1900’s)…” He shared that modifications have been made “over the years as farming systems changed”, particularly with the adoption of drip irrigation in the 1970s. Settling ponds were added to help clean the water and infield supply ditches abandoned. Mr. Robinson noted the study area lands are serviced by two supply ditches originating from Ka‘awanui Reservoir located upslope (see Figure 18). According to Mr. Robinson, “[t]he eastern supply ditch has not been used since sugar shutdown and currently only used for stormwater drainage.”

Mr. Robinson shared that SIHP # -CSH-5 has been called “Hanger Road” only for discussion of this project and does not have a formal name. This roadway accesses the Lester Robinson homestead (TMK: [4] 1-7-006:011) which “had a private landing site permitted in the early 80’s to support Niihau.” The homestead is supplied with water piped from an irrigation ditch *makai* of Ka‘awanui Reservoir.

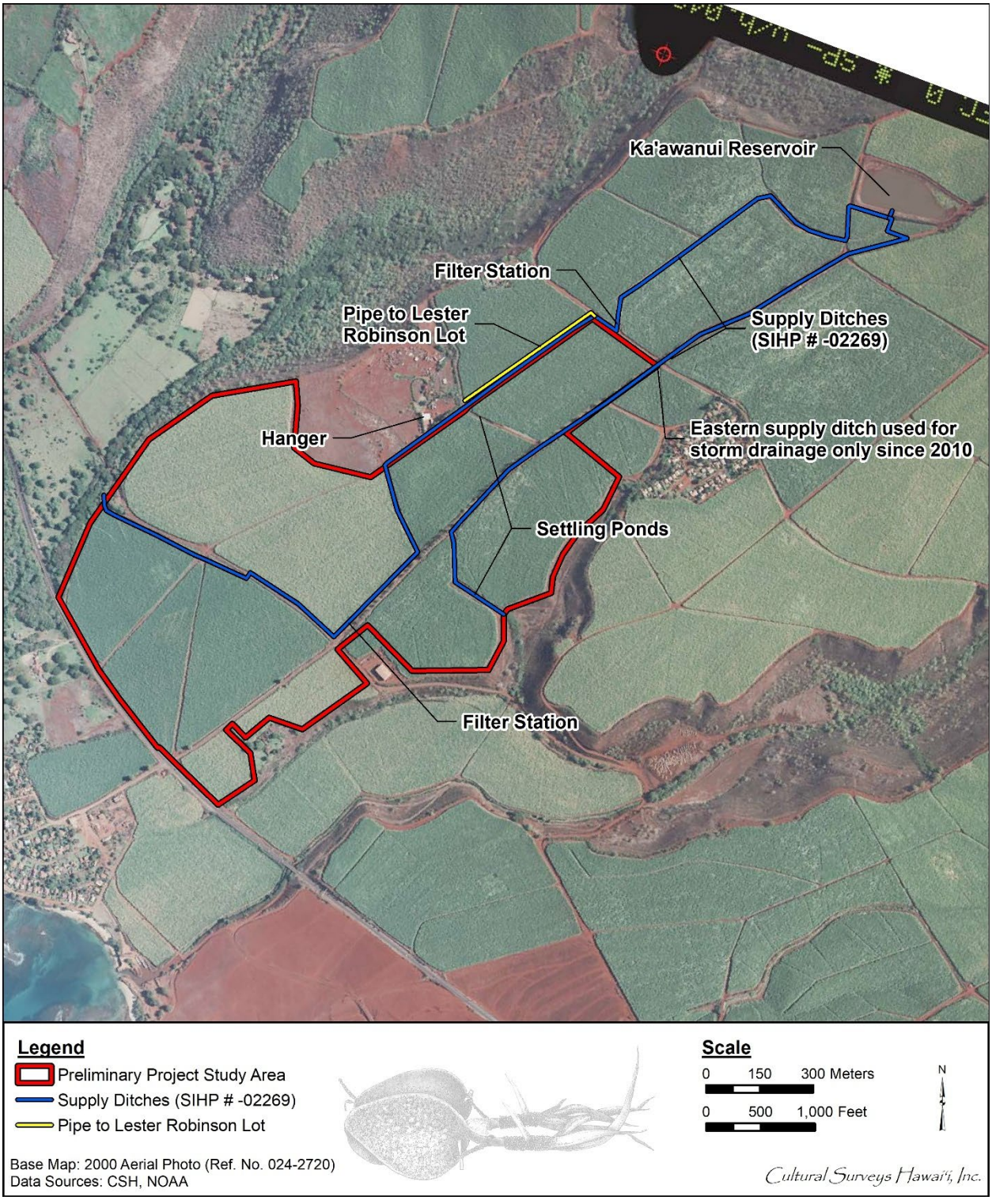

Figure 18. Portion of a 2000 NOAA aerial image showing the points of interest identified by James Robinson associated with the ditch system in the vicinity of the study area

Section 5 Results of Fieldwork

The AIS fieldwork was accomplished in July 2025 and required approximately 6 person-days to complete. The fieldwork included a 100% pedestrian survey of the study area and documentation of historic properties. As noted in Section 2.1, subsurface testing was not conducted during the AIS. The subsurface environment was documented by CSH during the project geotechnical survey; the report of findings for this work is included in Appendix A.

Ground visibility was excellent throughout most of the study area, which consists mainly of open agricultural plots sectioned into fenced pens (see Figure 5, Figure 19 and Figure 20). Two-track dirt roads provide access within the pens (Figure 21 through Figure 23). Some of these pens are being actively watered using sprinkler systems fed by buried irrigation lines to decrease wildfire risk and support pasturage (see Figure 23 and Figure 24). The agricultural fields are generally fallow or used to graze ungulates including horses, goats, and cattle (Figure 25 Figure 26). Fencing used for the pens is typically comprised of modern t-posts and wooden corner posts with hog wire and/or barbed wire, and welded metal gates (Figure 27). Troughs are present in some of the pens (Figure 28). No food crops were being grown at the time of fieldwork; previously during the LRFI a small plot of taro was present in the Water Buffalo Pen in the *mauka* portion of the study area, but this plot appears to be currently inactive though electric fencing is still present (Figure 29). The water buffalo observed during the LRFI in this pen had also been removed and replaced with goats. Large bulldozer clearing mounds and push piles were observed in an area along the Old Government Road in the western portion of the study area and within two corners of Mango Pen (Figure 30 and Figure 31).

The eastern portion of the study area located between Ka‘awanui Village and the base yard is not currently being grazed or used for agriculture, and this area has become overgrown (Figure 32). The plantation base yard area is located east of Ka‘awanui Village Road at the Old Government Road intersection; portions of the base yard within the study area bounds contain an abundance of abandoned plantation-related machinery including large cane hauler vehicles (Figure 33 through Figure 35). A 2000 aerial photo (see Figure 18) indicates this area was actively planted in cane until likely the final years of sugar production and has been used to stage all the old plantation equipment only in recent years. The portion of the base yard containing the garage structure is outside the study area limits. A modern irrigation ditch supplies water for grazing horses in Al’s Pen Makai (Figure 36).

An undocumented segment of one previously identified historic property (SIHP # 50-30-09-02269, historic plantation ditch system) and five newly identified historic properties (SIHP #s 50-30-09-CSH-3, historic Old Government Road; 50-30-09-CSH-4, historic Ka‘awanui Village Road; 50-30-09-CSH-5, historic Hanger Road; 50-30-09-CSH-5, railroad track remnant; and 50-30-09-CSH-6, historic water tank facility) were identified within the study area. These sites are depicted in Figure 37 and summarized in Table 3. Full site descriptions are provided in Section 5.

An architectural Reconnaissance Level Survey (RLS) was also undertaken for the project by MASON (2025) which evaluated several of the features documented in this AIS for architectural significance (Appendix A).



Figure 19. Photo overlooking a field within the Testing Pen; view to north

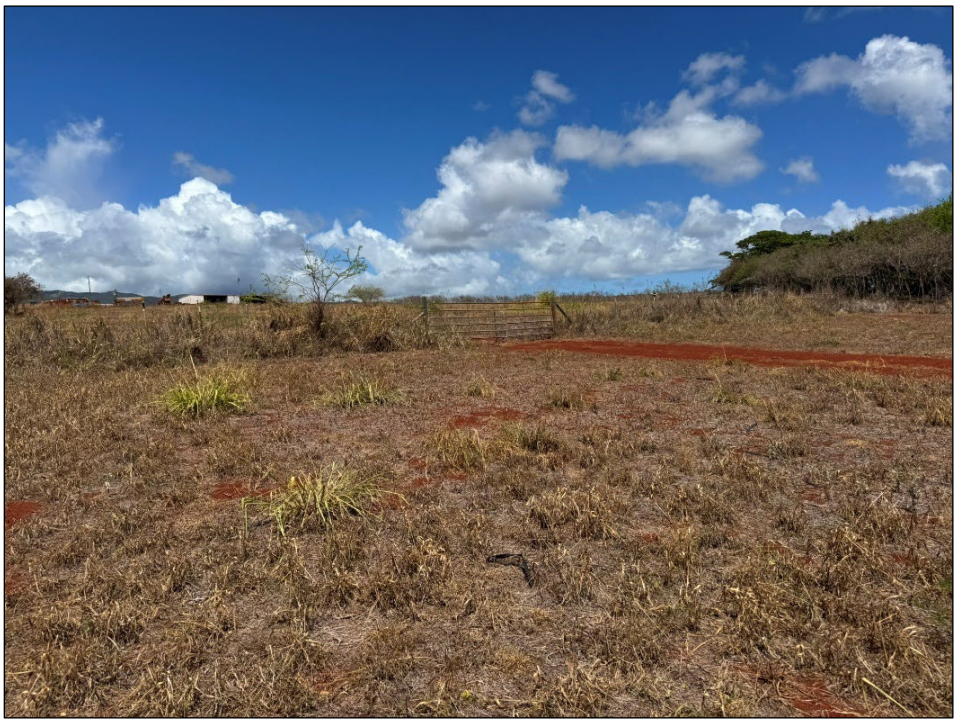

Figure 20. Photo overlooking a portion of Al’s Pen Mauka; view to northeast



Figure 21. Photo overlooking a field road within Testing Pen; view to northeast



Figure 22. Photo overlooking a field road within Mango Pen; view to north



Figure 23. Photo overlooking an irrigated field within Shop Pen; view to southwest



Figure 24. Photo overlooking a buried irrigation line within Testing Pen; view to northeast



Figure 25. Photo showing horses grazing within Mango Pen; view to west



Figure 26. Photo of goats grazing within Water Buffalo Pen; view to northeast



Figure 27. Photo showing a typical modern t-post fence and gate in the study area, view to northeast



Figure 28. Photo showing a modern trough and fencing along the *mauka* boundary of Shop Pen; view to northeast



Figure 29. Photo overlooking the former taro patch area in the northern portion of Water Buffalo Pen; view to east



Figure 30. Photo of a large, modern clearing mound located in the western portion of the study area; view to southeast



Figure 31. Photo showing a boulder clearing mound and dozer pushpiles located in the northern corner of Mango Tree Pen; view to northeast



Figure 32. Photo overlooking an overgrown field east of Ka‘awanui Village Road; view to southeast



Figure 33. Photo showing an abandoned tractor in the western portion of the study area; view to southwest



Figure 34. Photo of abandoned sugarcane haulers in the base yard area; view to north



Figure 35. Photo of abandoned vehicles and equipment in the base yard area; view to northeast



Figure 36. Photo showing a modern irrigation channel in Al’s Pen Makai; view to south

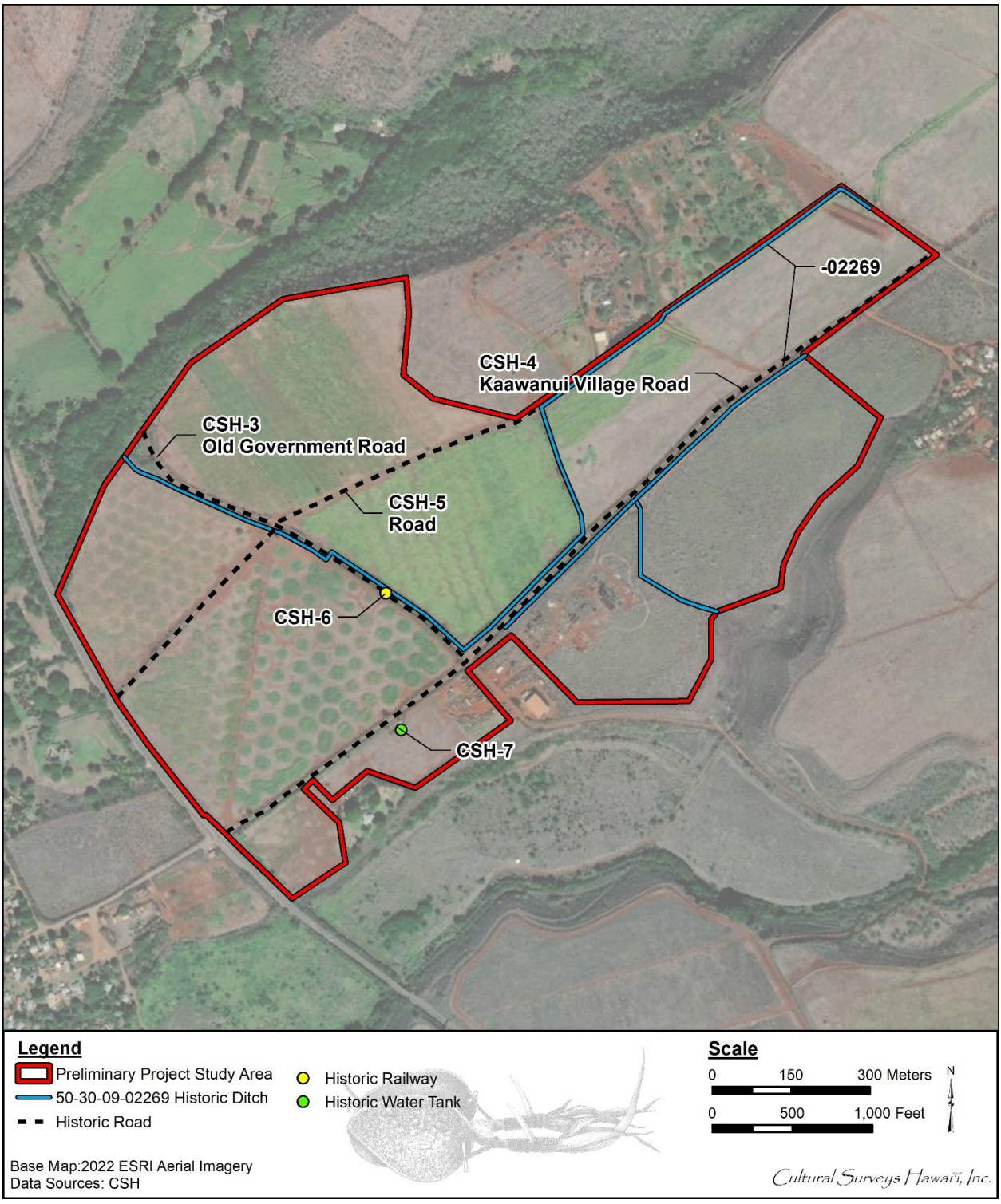

Figure 37. Aerial photograph (ESRI 2022) showing the locations of historic properties documented within the study area

Table 3. Historic properties identified within the study area

SIHP # (50-30-09)	Formal Type	# of Features	Function	Likely Age
-02269	Ditch System/ Complex	2 (with 11 sub-features)	Water control/ agriculture	Historic (early twentieth century with subsequent modifications)
CSH-3	Old Government Road	2	Transportation	Historic (early to mid-nineteenth century with subsequent improvements)
CSH-4	Ka‘awanui Village Road	2	Transportation (plantation)	Historic (late nineteenth to early twentieth century with continued improvements
CSH-5	Road	1	Transportation (plantation)	Historic (early to mid-twentieth century with subsequent improvements)
CSH-6	Railroad track remnant	1	Indeterminate (possible transportation for plantation)	Indeterminate
CSH-7	Water tank facility	1	Water storage/ agriculture	Historic (mid-twentieth century with continued improvements)

Section 6 Historic Property Descriptions

6.1 SIHP # 50-30-09-02269

FORMAL TYPE:	Plantation Ditch System/Complex
FUNCTION:	Water control/agriculture
NUMBER OF FEATURES:	2, with 11 sub-features
AGE:	Historic (early twentieth century with subsequent modifications)
TAX MAP KEY:	(4) 1-7-006:006 and 010 (portions in study area)
LAND JURISDICTION:	Private
PREVIOUS DOCUMENTATION:	None for portions within current study area; Byerly and O’Day (2015) documented a portion of overall system located 1.6 km upslope

SIHP # 50-30-09-02269 is a plantation ditch system extending throughout former sugar plantation lands in Makaweli Ahupua‘a. A portion of this ditch system previously documented 1.6 km upslope of the current study area by Byerly and O’Day (2015) was designated SIHP # -02269 Features 1–6 (see Section 3.3.4). Two distinct sections of the system are located within the current study area, both fed from the Ka‘awanui Reservoir located approximately 0.7 km (0.4 miles) upslope of the study area (see Figure 18 and Figure 38). These two sections are designated as SIHP # -02269 Feature CSH-1 and Feature CSH-2. Feature CSH-1, described in Section 6.1.1, is in the eastern portion of the study area, extending *makai* along Ka‘awanui Village Road; and Feature CSH-2, described in Section 6.1.2, extends throughout the pens in the western portion of the study area (see Figure 38). Because the previously and currently documented portions are within the same overall ditch system, the existing SIHP # -02269 site designation is utilized for the elements documented within the current study area.

SIHP # -02269 Features CSH-1 and CSH-2 are irrigation ditches constructed to supply water to Makaweli Plantation sugarcane fields formerly located in and around the study area. According to James Robinson (personal communication) portions of these ditches may have been constructed in the early 1900s. Mr. Robinson shared that the ditch system has been modified and updated over time, with the most notable modification being the adoption of drip irrigation in the mid-1970s. Settling ponds were incorporated along the ditches to help clean the water, and infield supply ditches were abandoned.

6.1.1 SIHP # 02269 Feature CSH-1

Feature CSH-1 is a supply ditch extending from its source at Ka‘awanui Reservoir upslope of the study area downward along the eastern side of Ka‘awanui Village Road (see Figure 18, Figure 37, and Figure 38). A branch of this ditch diverges at a point between Ka‘awanui Village and the baseyard, with the main ditch continuing downslope to terminate near the baseyard, and a diversion ditch extending to the south/southeast terminating at Ka‘awanui Gulch (see Figure 38).

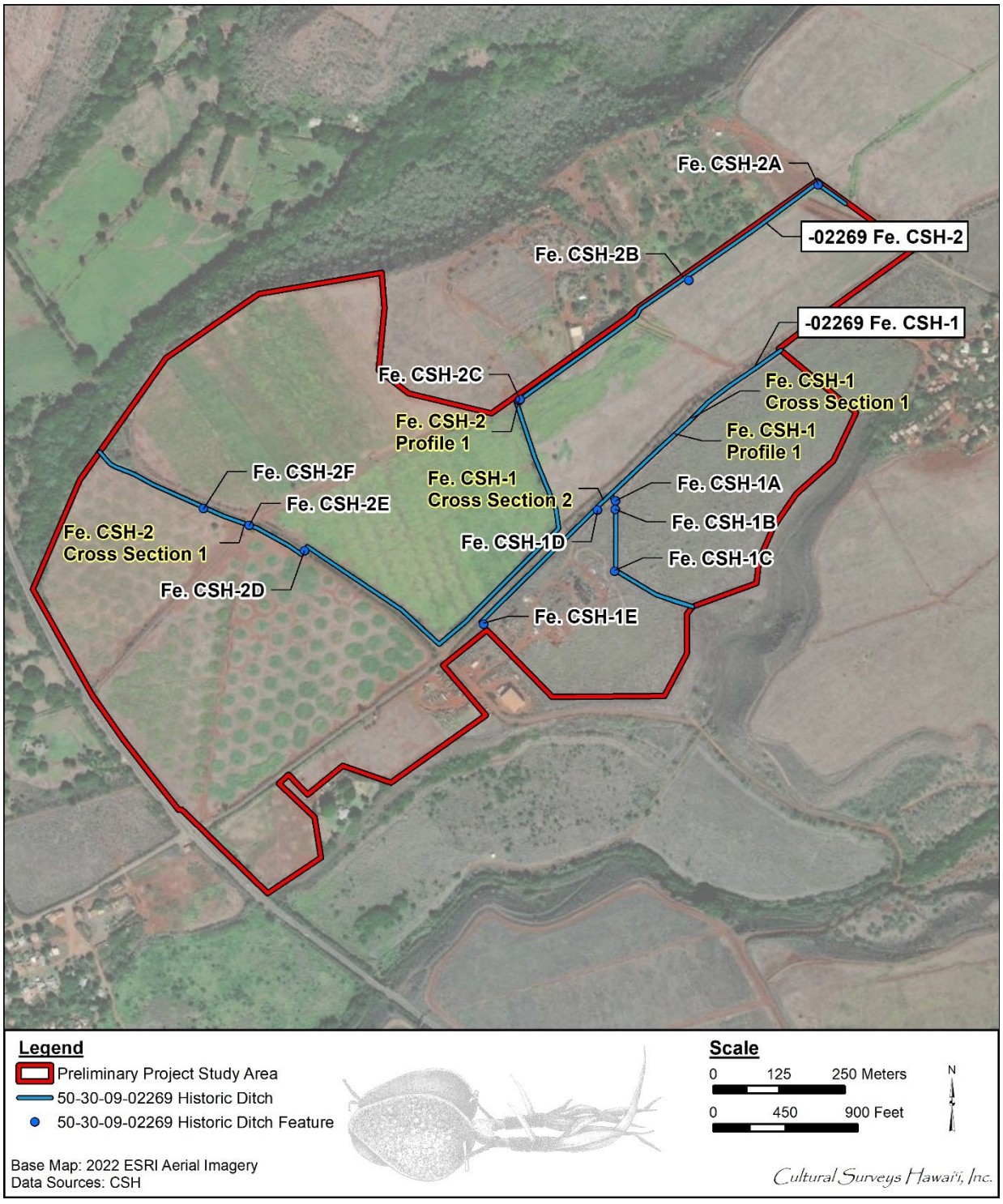

Figure 38. Aerial photograph (ESRI 2022) showing the portion of the SIHP # -02269 ditch system/complex within the study area and the locations of representative cross sections and profiles

The Feature CSH-1 main ditch is characterized as an earthen ditch channel with a compacted soil floor measuring 1–2 m in width. The ditch was dry at the time of survey; water flow within it would be downslope to the southwest. The ditch is mostly overgrown with vegetation consisting of guinea grass and invasive weeds and trees. The main ditch segment extending entirely along Ka‘awanui Village Road utilizes a stone retaining wall along its western side. The retaining wall consists of dry stacked basalt cobbles and small boulders and boulder slabs that are tightly to loosely stacked on top of the soil channel embankment. This dry stacked construction style was uniform along the entire length of the main ditch, although there was some variation in height, which ranges from 1–2.5 m above the interior channel floor. Intermittent sections of collapse are present along the length of the main ditch. The eastern wall of the main ditch consists of a significantly lower soil berm embankment and does not exhibit any rock stacking; this eastern ditch wall measures 30–50 cm in height. Representative documentation of the main ditch included cross-section drawings and photos at two locations along the ditch (see Figure 38 and Figure 39 through Figure 42), and profile documentation at one location (see Figure 38, Figure 43 and Figure 44). Two concrete water control/diversion structures are situated along the main ditch (Features CSH-1D and CSH-1E) downslope of the junction with the diversion ditch (see Figure 38).

The Feature CSH-1 diversion ditch branches to the south from the main ditch 0.6 km downslope of the *mauka* study area boundary on the eastern side of Ka‘awanui Village Road. This diversion extends approximately 115 m south from the junction, then turns to the southeast and extends 150 m to the edge of Ka‘awanui Gulch (see Figure 38). The junction of the main and secondary ditches (Feature CSH-1A) has rock and mortar retaining walls and evidence of two sluice gates that would have controlled the water flow into this diversion. The diversion ditch channel then extends beneath an access road via a concrete culvert (Feature CSH-1B) and travels south for approximately 118 m before passing beneath a soil berm via a second concrete culvert (Feature CSH-1C). The channel between the Feature CSH-1B and Feature CSH-1C culverts is uniform in width (2 m) and the soil banks are uniform in height (50–60 cm) (Figure 45). At Feature CSH-1C, the diversion ditch channel makes a turn to the southeast and becomes significantly wider (c. 4–5 m) with wall heights of up to 4 m (see Figure 38 and Figure 46). This wider portion of the diversion serves as a settling basin (James Robinson, personal communication) and extends for approximately 90 m before narrowing and ultimately terminating at the gulch edge. Excluding the portion of the diversion ditch at Feature CSH-1A, the walls of the diversion ditch are comprised of soil and do not utilize any rock retaining features.

Feature CSH-1 has not been used for irrigation since the sugar plantation ceased operation; it is currently only used for stormwater drainage. The main, *mauka-makai* portion of the eastern ditch along Ka‘awanui Village Road appears on maps dating back to at least 1910 (see Figure 10), though later additions are evident (i.e. Features CSH-1D and E). The diversion extending to the southeast does not appear on a 1965 aerial image, but is visible on a 1977 orthophoto, providing a relative construction date (see Figure 14 and Figure 15).

Feature CSH-1A comprises a diversion feature located at the junction of the main ditch channel and diversion ditch extending to the south and southeast (see Figure 38). This diversion system was designed to redirect water flow from the main ditch channel south into the intersecting ditch branch. Four retaining wall segments are present along the eastern and western diversion



Figure 39. Photo showing a representative cross section (Cross Section 1) along SIHP # -02269 Feature CSH-1 ditch; view to southwest

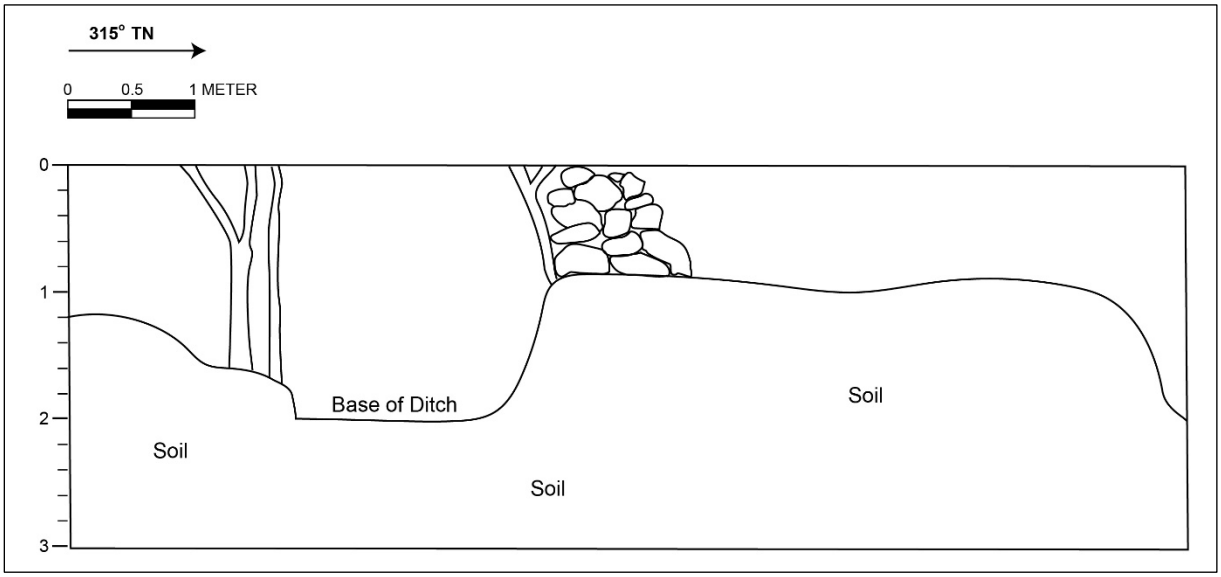

Figure 40. Cross Section 1 at SIHP # -02269 Feature CSH-1 ditch



Figure 41. Photo showing a representative cross section (Cross Section 2) along SIHP # -02269 Feature CSH-1 ditch; view to west

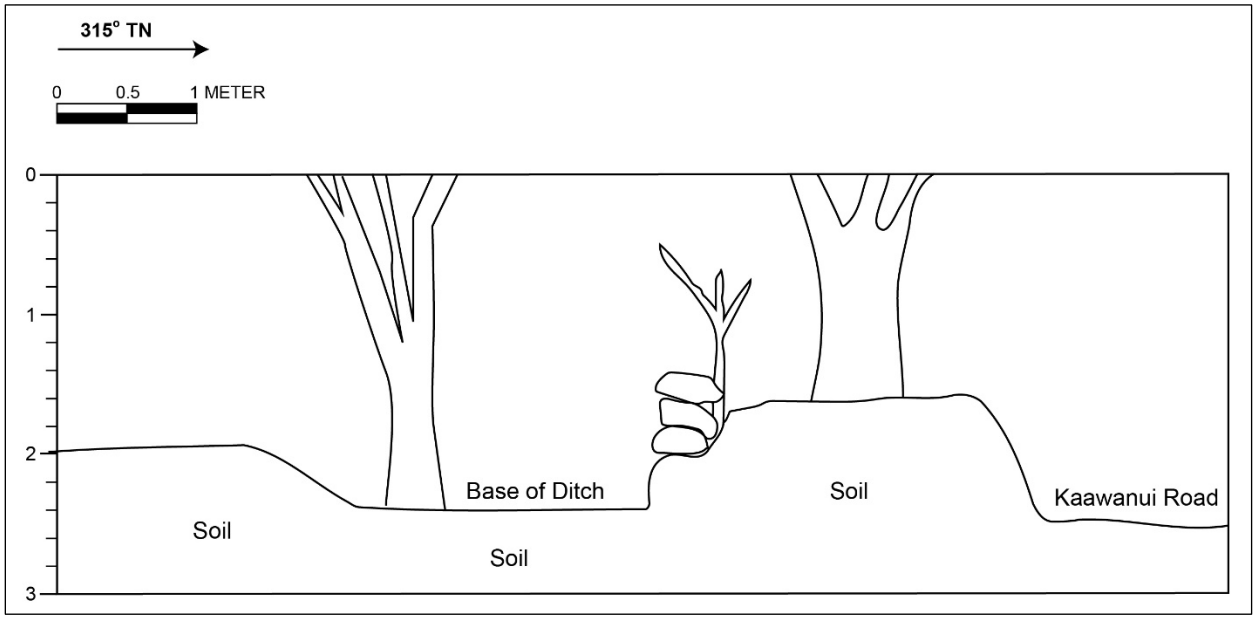

Figure 42. Cross Section 2 at SIHP # -02269 Feature CSH-1 ditch



Figure 43. Photo showing a representative profile (Profile 1) of SIHP # -02269 Feature CSH-1 retaining wall; view to northwest

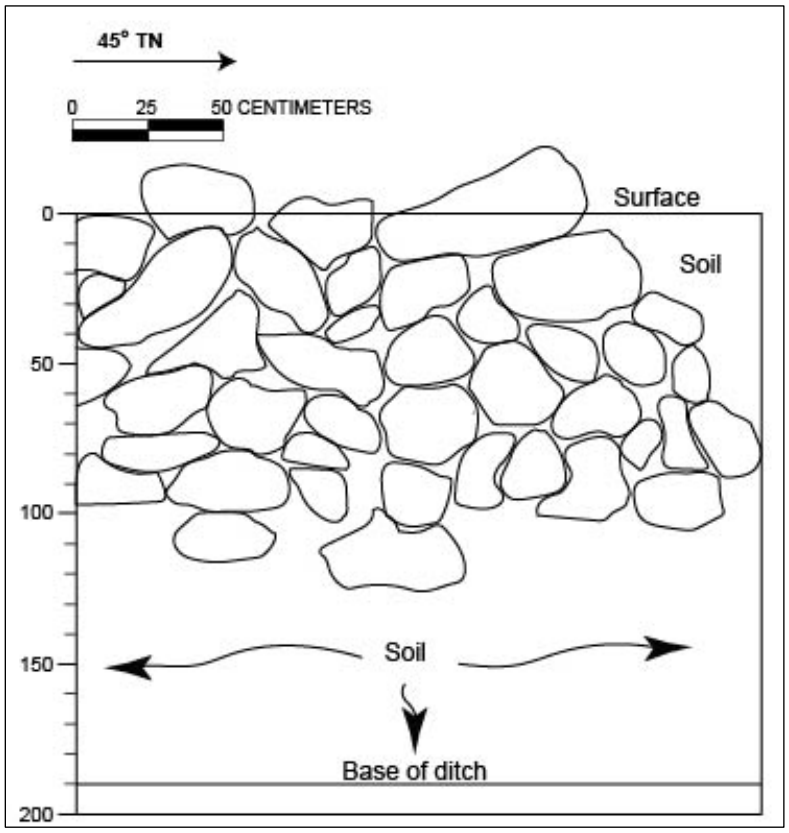

Figure 44. Profile 1 at SIHP # -02269 Feature CSH-1 retaining wall



Figure 45. Photo showing a section of the SIHP # -02269 Feature CSH-1 diversion ditch between CSH-1B and CSH-1C culverts; view to south



Figure 46. Photo overlooking the settling basin located along the SIHP # -02269 Feature CSH-1 diversion ditch; scale is 2 m; view to east

ditch embankments in this area, creating a defined channel extending roughly north to south (Figure 47 through Figure 49). Overall, the feature measures approximately 7.2 m in length (north to south). The ditch channel in this area measures approximately 0.9 to 2.0 m in width and consists of a compacted soil floor with evidence of accumulated sediment and vegetation. The four sections of mortared rock retaining walls are situated in key areas, with some sections exhibiting concrete surfacing or patching. These retaining walls measure between 50 to 80 centimeters in interior height, with the exterior edges of the walls level with the adjacent ground surface. The widths of the walls vary from 40–50 cm. The sections of ditch walls between the mortared wall segments consist of soil. Both the northern and southern ends of the feature have been reinforced with concrete and exhibit guide slots for a pull/sluice gate formed into the concrete retaining walls. A 2x4 lumber post and collapsed and weathered pieces of lumber, possibly representing the remnants of a former control gate or fence, are located near the junction of the main ditch and its divergence. Feature A operated as a regulated sluice or control point for distributing water from the main channel to the eastern portion of the study area; based on a comparison of historic aerial images (see Figure 14 and Figure 15) it appears to have been constructed sometime between 1965–1977. Feature CSH-1A is in overall fair condition.

Feature CSH-1B is a circular concrete culvert located along the diversion ditch approximately 35 m south of the junction with the main ditch (see Figure 38). The culvert conveys water southward beneath a dirt access road leading to the base yard. The culvert extends approximately 6 m beneath the roadway. The concrete culvert pipe is approximately 25 cm in diameter. Both its northern and southern openings are partially buried beneath accumulated soil and debris. At the northern inlet the culvert is partially exposed and reinforced with a thin layer of mortar and rock around its edges. Two large, collapsed basalt cobbles located near the opening likely served as capstones or structural reinforcement. The northern culvert opening measures 35 cm high and 60 meters wide. At the southern outlet the culvert is bordered by a dry-stacked cobble and slab retaining wall measuring approximately 60 cm high and 100 cm wide (Figure 50). Two large basalt slabs positioned at the outlet likely helped stabilize the overlying roadway. Feature CSH-1B is in fair condition.

Feature CSH-1C is a circular concrete culvert located along the diversion ditch approximately 118 m south of CSH-1B (see Figure 38). The culvert conveys water beneath an approximately 4-m-wide soil berm that is overgrown with *koa haole*. It exits at a settling basin that is oriented northwest/southeast. The concrete culvert pipe measures 50 cm in diameter. The northern inlet is framed by earthen embankments reinforced with stacked mortared basalt cobbles that create a narrow channel in front of the opening (Figure 51). The northern opening measures 70 cm high and 100 cm wide. The southern culvert outlet is partially obscured by a deep layer of accumulated debris and soil, and the earthen berm is significantly more eroded on this side. Unlike the northern side of the culvert, no mortared retaining wall is visible, though a few cobbles appear to be dry stacked along the culvert edges, and the upper lip of the culvert is fractured. This southern side of the culvert appears significantly more eroded and collapsed. Feature CSH-1C is in overall poor condition; although the culvert is intact it is degraded and partially obscured by sediment.

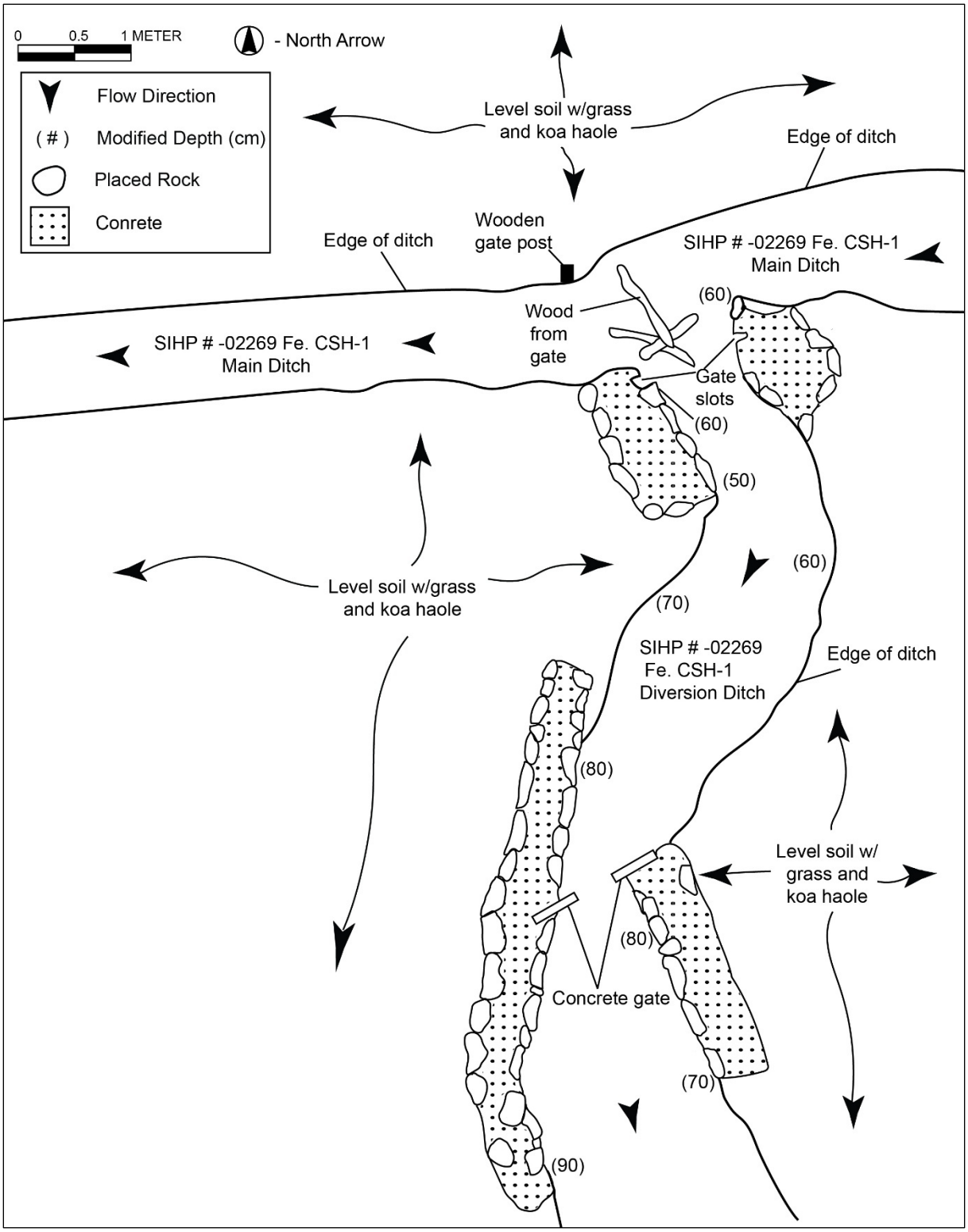

Figure 47. Plan view of SIHP # -02269 Feature CSH-1A ditch diversion



Figure 48. Photo overlooking the northern end of SIHP # -02269 Feature CSH-1A ditch diversion; view to southwest



Figure 49. Photo overlooking the southern end of SIHP # -02269 Feature CSH-1A ditch diversion; view to northwest



Figure 50. Photo showing the SIHP # -02269 Feature CSH-1B culvert outlet; view to north



Figure 51. Photo showing the SIHP # -02269 Feature CSH-1C culvert inlet; view to south

Feature CSH-1D is a water control structure situated along the western side of the Feature CSH-1 main ditch 38.5 m southwest of Feature CSH-1A (see Figure 38 and Figure 52 through Figure 54). The structure consists of a rectangular concrete basin formed by vertical concrete walls, and adjoining rock wall forming a retaining wall along the ditch channel.

The concrete basin feature measures 6.5 m long (northeast to southwest) and 2.4 m wide, with uniform interior and exterior wall heights of 75 cm except for along the exterior western and northern sides, where the retaining walls are level with the surrounding ground surface. The concrete basin is partitioned by a crosswise divider constructed of two cast-in-place concrete piers and a 2x4 wooden beam that spans the width of the structure and is anchored into the side walls. This may represent the remnants of a wooden superstructure, although the lack of other wooden material makes this difficult to determine. Guide rails for three wood-framed sluice gates are embedded into the concrete pillars and the edges of the concrete walls along this partition. The central sluice gate remains in situ within the guide rails, and remnants of a second sluice gate have collapsed within the feature. An approximately 35-cm pipe/valve is located within the concrete wall in the western corner of the basin. A fourth sluice gate is located at the southern corner of the concrete feature and is positioned perpendicular to the main interior flow. It is set within the guide rails of the concrete walls and opens towards the adjacent ditch. Its placement suggests that it was used to control water levels or sediment flow within the chamber. The sluice gates are uniform in construction and consist of a wooden frame fitted with a fine gauge metal mesh screen. They measure 70 cm long and 60 cm wide. A single brown glass Anheuser-Busch bottle was observed within the central portion of the concrete basin. The embossed logo near the neck of the bottle, depicting an eagle with an “A” suggests that the bottle was likely manufactured between the 1940s and 1960s. The bottle was not collected.

A mortared basalt rock retaining wall extends southwest from the concrete basin and terminates at a concrete pier situated along the ditch channel. The retaining wall measures 3 m long and up to 1 m wide, with a maximum height of 95 cm. A second pier is present on the opposite side of the ditch in this location, and guide slots formed within the piers indicate a sluice gate would have once been installed across the ditch channel in this location. The concrete pier on the eastern edge of the ditch measures 1 m long by 0.5 m wide. A segment of dry stacked rock retaining wall extends northeast from the eastern pier a distance of approximately 2.5 m along the ditch edge.

Overall, Feature CSH-1D is in fair condition. MASON (2025:38) identifies this feature as a check and turnout, which would have functioned to filter and transition water from the ditch system into an underground pipe. The robust concrete construction indicates likely mid-twentieth century utility related to management of the ditch system.

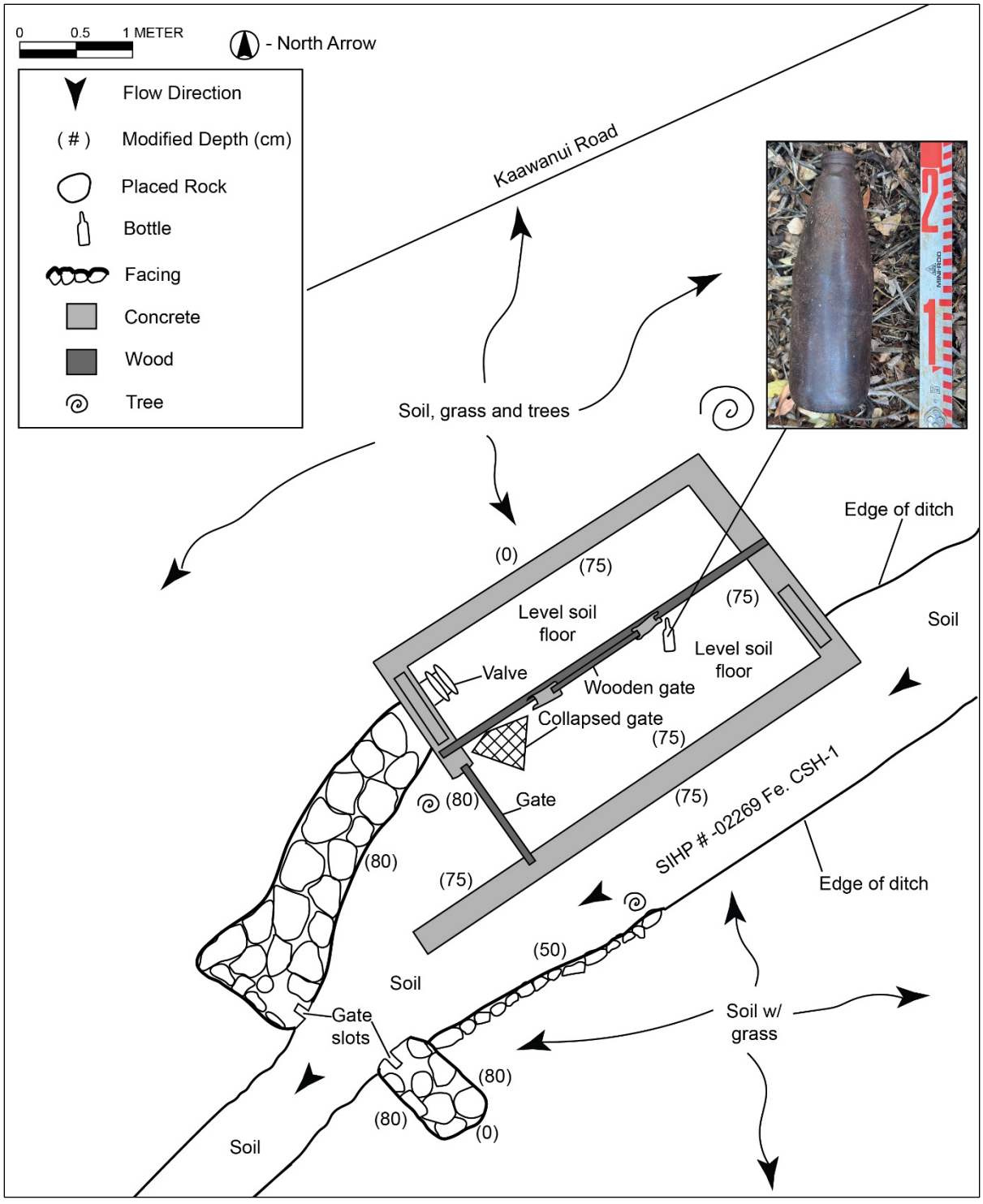

Figure 52. Plan view of SIHP # -02269 Feature CSH-1D water control structure



Figure 53. Photo overlooking SIHP # -02269 Feature CSH-1D water control structure; view to northeast



Figure 54. Photo overlooking SIHP # -02269 Feature CSH-1D water control structure; view to northwest

Feature CSH-1E consists of a water control structure situated along the western side of the Feature CSH-1 main ditch 307 m southwest of Feature CSH-1D near the terminus of main ditch in the base yard vicinity (see Figure 38 and Figure 55 through Figure 57). Overall, the feature measures 7.5 meters in length and 5 meters in width with heights reaching nearly 1 m. The structure consists of two contiguous, cast-in-place rectangular concrete basins. The southern basin is oriented along a northwest-southeast axis, and the northern basin is set on an opposing axis at the western end of the other basin, forming an L-shape. The basins are constructed of vertically poured concrete walls with squared corners, which are uniform in height. The two basins share a central partition wall, indicating they were constructed contemporaneously or as part of a phased but integrated system. The walls of the feature exhibit uniform thickness (15 cm) and show evidence of formwork impressions and overall surface weathering, typical of mid-twentieth century construction. Interior features include remnants of metal pipe hardware, likely associated with hydraulic control functions. The interior floor of the basins consists of compacted soil which has accumulated debris and vegetation over time. At the northeastern end of the feature, evidence of a former sluice gate is indicated by guide slots in the concrete visible on both the exterior wall of the feature and the corresponding side of the ditch. The gate mechanism was likely used to regulate the flow of water into the ditch and basins. The northern basin contains a valve box, and a wooden post is screwed into its western sidewall.

Multiple inscriptions are present on the exposed concrete surfaces of both adjoining basins. The surface of the northernmost wall bears the inscriptions “7-3-46” and “July 3 1946”, as well as somewhat unintelligible script that appears to be a name (possibly “D.E. Lione”). Along the western wall of the southern basin the date “July-5-1946” as well as “Pakala Camp” and the name “Kabu” and other intelligible script are present. These inscriptions suggest the feature (including both basins) was originally constructed in 1946. It appears the feature underwent modifications and resurfacing of the concrete walls at various stages in time. This is evidenced by an exposed section of the concrete surface along the northeastern wall of the northern basin, where an earlier inscription that appears to read “Independence [Day] July 4, 46” is partially visible beneath the eroded resurfaced concrete layer. A separate, more recent inscription of “7.31.67” is located along the surface of the eastern wall of the northern basin, reflecting later improvements/concrete resurfacing. It also indicates that the feature was in use for at least two decades.

Collapsed concrete elements are present immediately east of the feature, overlapping the edge of the ditch channel; the function of these remnants is unclear, but they may may have formed gate supports or supported hydraulic control infrastructure associated with the feature.

Overall, Feature CSH-1E is in poor to fair condition. MASON (2025:41–42) identifies this feature as a settling box which would have functioned to capture and still water from the ditch, allowing sediment to settle within the box, and deliver clean water back into the ditch. The robust concrete construction and dated inscriptions indicate mid-twentieth century utility related to management of the ditch system.

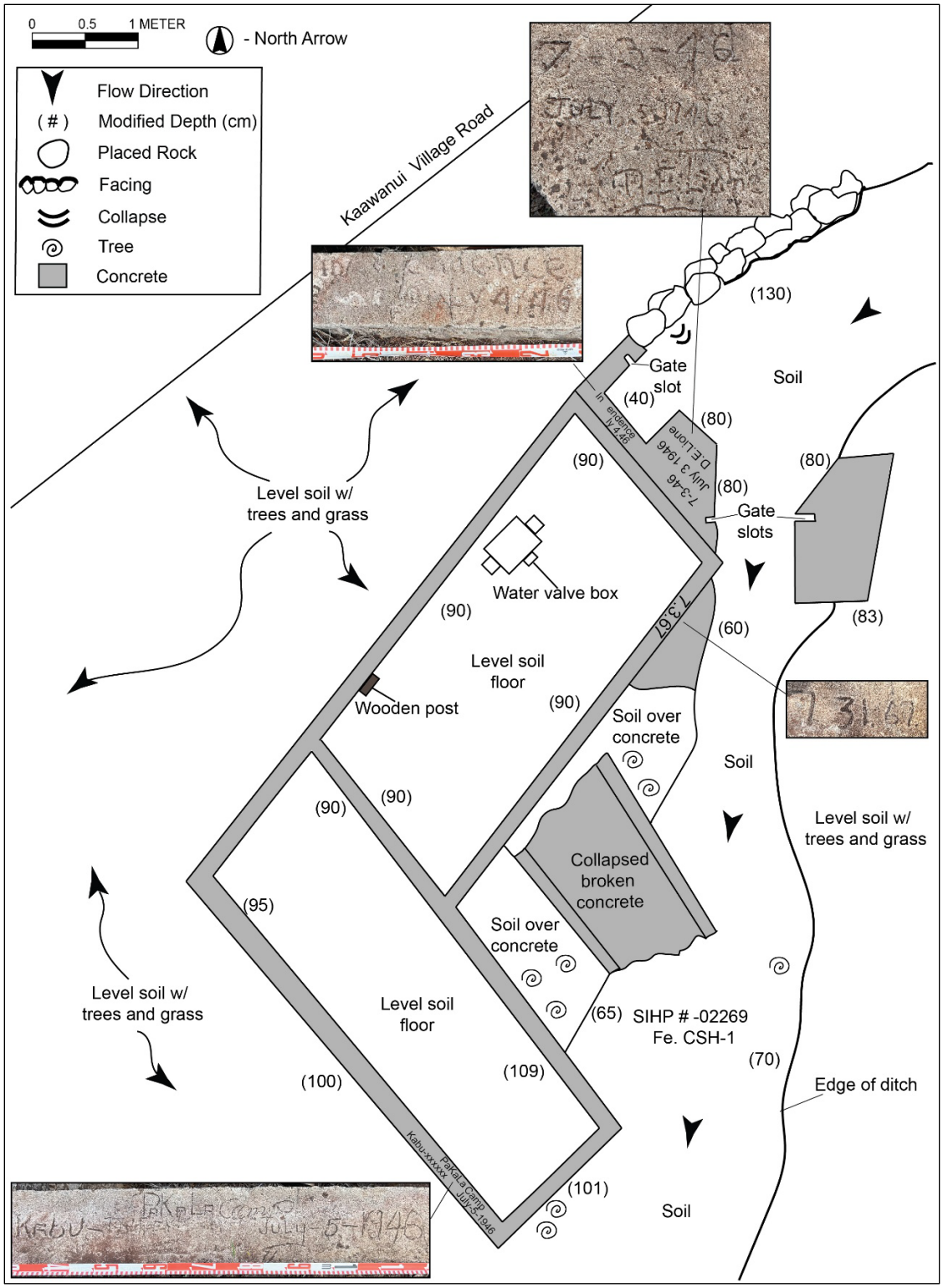

Figure 55. Plan view of SIHP # -02269 Feature CSH-1E water control structure



Figure 56. Photo overlooking SIHP # -02269 Feature CSH-1E water control structure; view to southwest



Figure 57. Photo overlooking SIHP # -02269 Feature CSH-1E water control structure; view to northwest

6.1.2 SIHP # 02269 Feature CSH-2

Feature CSH-2 is a supply ditch extending from its source at Ka‘awanui Reservoir downslope through the western and central portions of the study area, which remain in active agricultural use (see Figure 18 and Figure 38). The ditch enters the study area near the center of Water Buffalo Pen (Figure 58) and extends along the northern study area boundary to the northwest corner of the pen. From this point the ditch flows through a culvert (Feature CSH-2A) and turns to the southwest, travelling downslope along the western side of Water Buffalo Pen and the study area (Figure 59). It flows into an overflow area at the corner of Water Buffalo and Hanger Pens, then continues downslope along the western side of Hanger Pen. At the western corners of Hanger and Shop Pens the ditch flows through another culvert (Feature CSH-2C) and is diverted to the east, where it runs along the *mauka* edge of Shop Pen towards Ka‘awanui Village Road. The ditch turns southwest 2.5 m east of Ka‘awanui Village Road and continues for a distance of 315 m along the *makai* edge of Shop Pen to a culvert (Feature CSH-2D) that conveys the flow beneath the Old Government Road into Mango Pen. From this point the ditch continues northwest, passing through another culvert (Feature CSH-2E) below Hanger Road and into Surfer Pen. It continues in a northwest direction toward ‘A‘akukui Stream beyond the study area (see Figure 38).

The Feature CSH-2 main ditch is characterized as an earthen ditch channel measuring 1–4 m in width. The ditch was flowing with water during the time of survey. Feature CSH-2 generally does not utilize rock retaining walls like the wall found at Feature CSH-1; apart from the retaining walls at the culverts, only two short, isolated wall segments were observed along the western ditch (Features CSH-2B and F; see Figure 38). A representative cross section (Feature CSH-2 Cross Section 1) was documented near Feature CSH-2E (see Figure 38, Figure 60, and Figure 61).

Feature CSH-2A is a culvert located in the northern corner of the study area at the top of Water Buffalo Pen (see Figure 38 and Figure 62). The culvert utilizes a 16-inch metal pipe. The inflow is supported with dry stacked large boulders and measures 1.3 m and 50–70 cm high; some of the rocks have collapsed into the ditch channel. The culvert travels 10.5 m northwest underground to the outflow, where the channel turns in a southwestern direction (Figure 63). The outflow headwall is constructed using mortared basalt cobbles. Mortared rock retaining walls extend along either side of the channel from the headwall. The southeastern channel wall is constructed of at least four courses of mortared basalt cobbles and measures 2 m long by up to 10 cm wide with a maximum height of 90 cm. The northwestern retaining wall, which also utilizes at least four courses of stacking, measures 2.8 m long by up to 45 cm wide with heights between 60–70 cm (Figure 64). This wall terminates at a concrete pier of similar height, formed with a groove that would have once held a sluice gate. The pier on the opposite channel wall is no longer present. Feature CSH-2A is in overall fair condition.

Feature CSH-2B is an isolated section of retaining wall located along the northwestern side of the SIHP # -02269 Feature CSH-2 ditch channel on the northwestern boundary of the Water Buffalo Pen, approximately 300 m *makai* of Feature CSH-2A (see Figure 38 and Figure 65 through Figure 67). The wall is constructed with several courses of dry stacked basalt slab and boulders, with signs of erosion along the upper courses. It measures 2.8 m long by 40 cm wide with heights up to 65 cm inside the channel. The wall is situated at a point where the channel narrows, indicating it was likely intended to facilitate constriction of the channel. It is in overall fair condition.



Figure 58. Photo showing the entry point of the SIHP # -02269 Feature CSH-2 ditch into the study area, at the *mauka* end of Water Buffalo Pen; view to north



Figure 59. Photo showing a utility pole set along the edge of the SIHP # -02269 Feature CSH-2 ditch on the northwestern edge of Water Buffalo Pen; view to southwest



Figure 60. Photo showing a representative cross section (Cross Section 1) along SIHP # -02269 Feature CSH-2 ditch; view to west

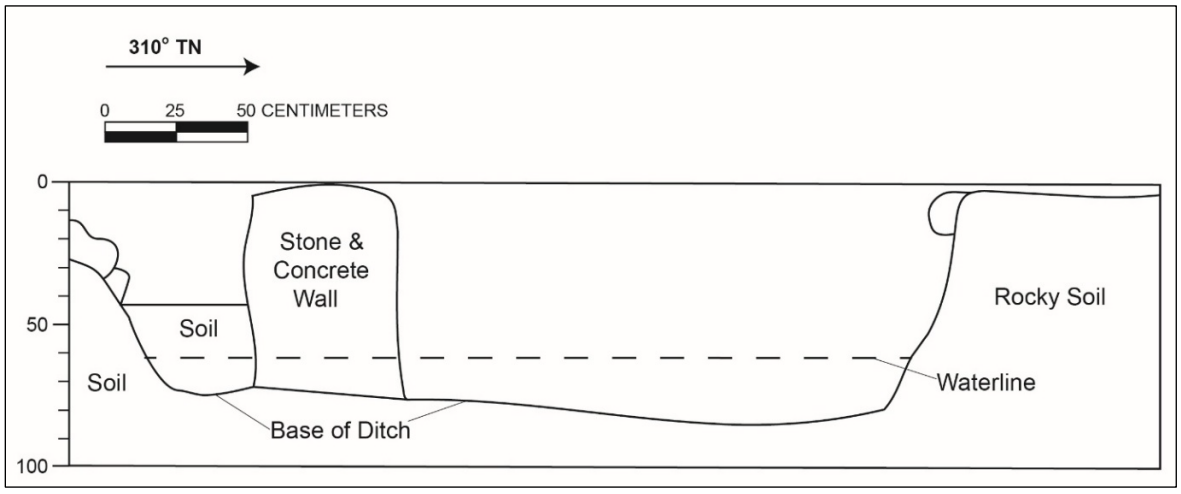

Figure 61. Cross Section 1 at SIHP # -02269 Feature CSH-2 ditch

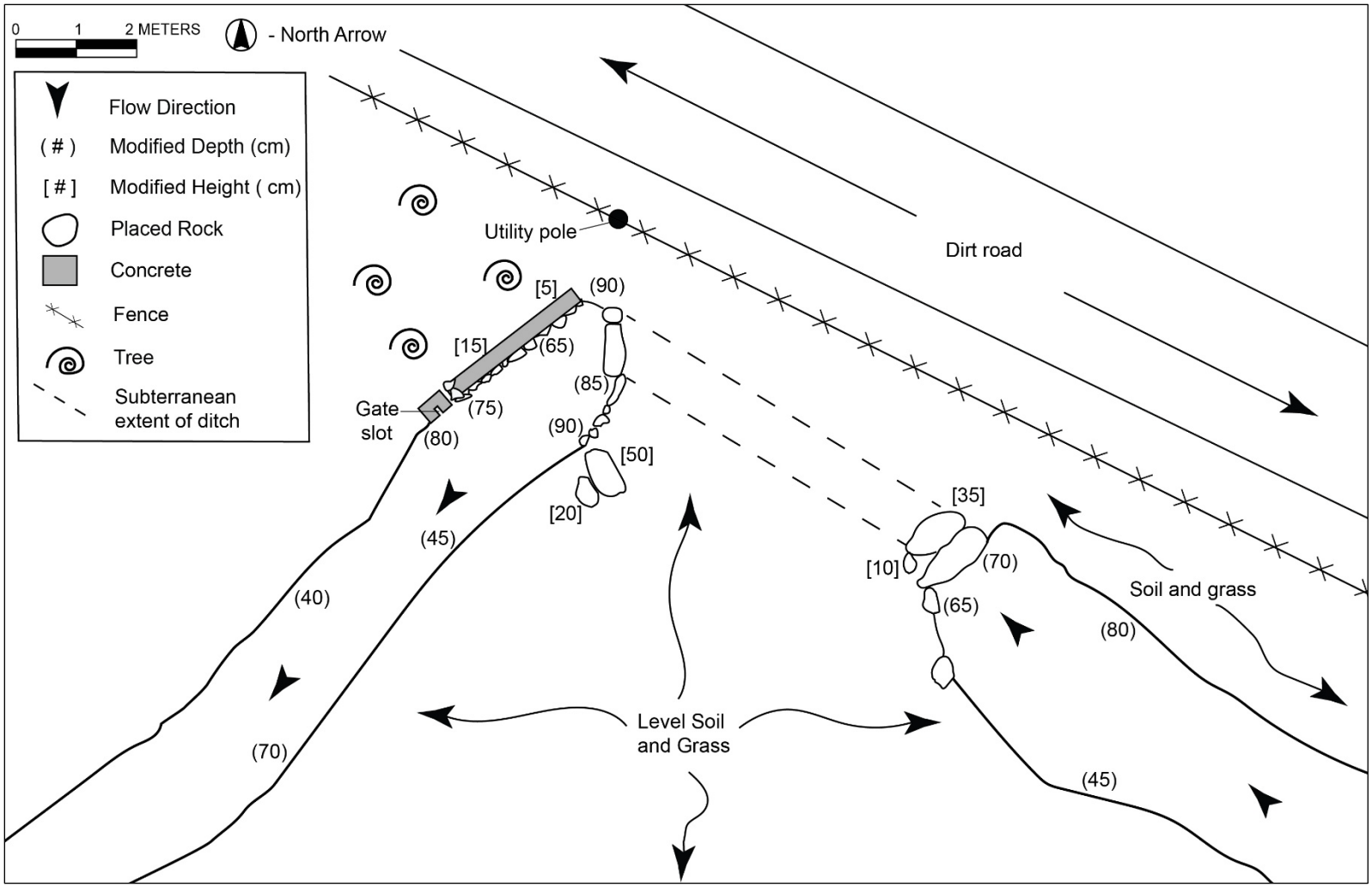

Figure 62. Plan view of SIHP # -02269 Feature CSH-2A culvert



Figure 63. Photo showing the change in direction of the SIHP # -02269 Feature CSH-2 ditch at the CSH-2A culvert; view to southeast



Figure 64. Photo showing the mortared rock retaining wall and concrete sluice gate at SIHP # -02269 Feature CSH-2A culvert outlet; view to northwest

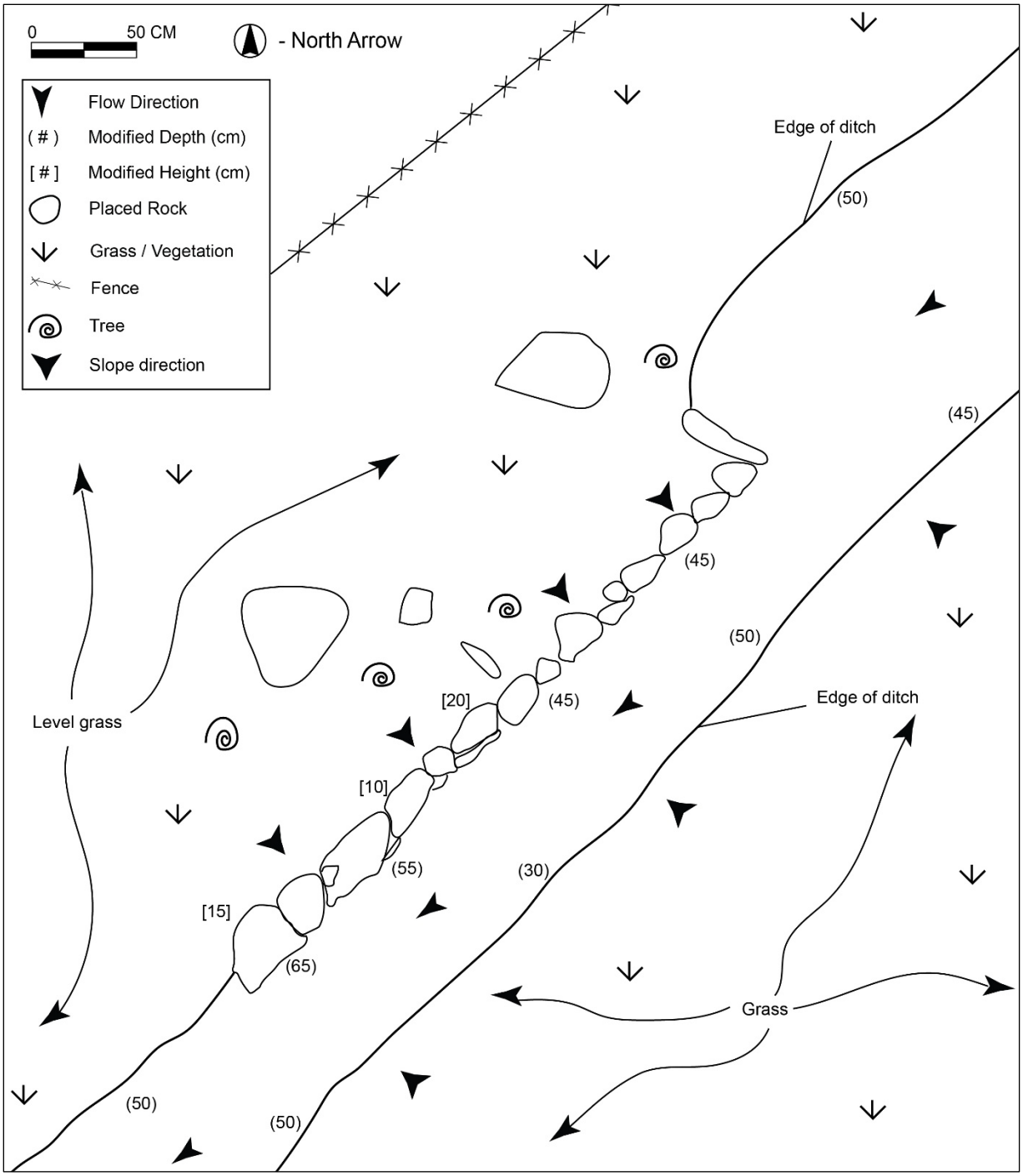

Figure 65. Plan view of SIHP # -02269 Feature CSH-2B retaining wall



Figure 66. Photo showing the SIHP # -02269 Feature CSH-2B retaining wall; view to northwest



Figure 67. Photo showing constriction of the SIHP # -02269 Feature CSH-2 ditch channel at the CSH-B retaining wall location; view to north

Feature CSH-2C is a culvert straddling the Hanger Pen and Shop Pen boundary along the northwestern edge of the study area, east of SIHP # -CSH-5 (Hanger Road) and approximately 394 m southwest of Feature CSH-2B (see Figure 38). This portion of the ditch is filled with tall grass and sediment but remains functional. The culvert utilizes a 16-inch metal pipe that extends an overall distance of 9.5 m below an unnamed cane road to an outflow, where the ditch channel turns in a southeastern direction. The inlet measures approximately 46 cm wide with a maximum height of 55 cm and is obscured in dense grass. The outlet is constructed of at least four courses of stacked rock and concrete forming an elbow that serves to alter the channel direction (Figure 68 and Figure 69). A piece of sheet metal is located across from the culvert outlet, potentially representing a gate blocking flow from continuing along the original channel route in this location; however, no signs of a ditch continuing *makai* were observed. Overall, the constructed outlet measures 3.5 m long by 2.5 m wide. Figure 70 provides a profile view of the northwestern side of the outlet, where the culvert pipe opens into the channel. Feature CSH-2C is in overall fair condition.

Feature CSH-2D is a culvert passing from Shop Pen under Old Government Road (SIHP # -CSH-3) and into top of Mango Pen in the western portion of the study area (see Figure 38). The culvert utilizes a 16-inch metal pipe that extends an overall distance of 9 m below the road. The inlet is located 1.1 m northeast of the SIHP # -CSH-3 travel way and obscured in dense grass. It is surrounded by loose rocks with soil and grass and measures 60 cm wide and 70 cm high. The culvert pipe exhibits damage at the outlet, which is overlain with boulders and compacted soil (Figure 71). The outlet headwall measures 2.5 m wide and up to 1.7 m high. Feature CSH-2D is in overall fair condition.

Feature CSH-2E is a culvert running from Mango Pen under the SIHP # -CSH-5 road into Surfer Pen in the western portion of the project area, approximately 116 m northwest of Feature CSH-2D (see Figure 38). The culvert utilizes a 16-inch metal pipe. The inlet is located approximately 8 m south of Old Government Road (SIHP # -CSH-3). Its headwall is constructed with mortared basalt cobbles overlain with boulders and soil, and measures 1.2 m long and 85 cm high. The outlet is located 14.5 m to the northwest, approximately 2.5 m south of Old Government Road (SIHP # -CSH-3). The outlet headwall is constructed with stacked basalt cobbles and boulders and remnants of mortar surrounding the pipe, and measures 1.6 m long and up to 1.2 m high (Figure 72). A stacked stone retaining wall extends from the headwall along the northern channel edge; this wall measures 2.5 m long and up to 1 m high. It is in overall fair condition. A chunk of stone and concrete wall is present in the ditch channel approximately 2.5 m downstream of the outlet (location of Feature CSH-2 Cross Section 1; see Figure 60 and Figure 61). This wall segment appears isolated, and its source and function are unknown.

Feature CSH-2F is an isolated section of retaining wall located along the southwestern side of the SIHP # -02269 Feature CSH-2 ditch channel on the northeastern boundary of the Surfer Pen, approximately 85 m northwest of Feature CSH-2E (see Figure 38 and Figure 73). The retaining wall is constructed of mortared subangular cobbles and boulders capped with concrete. It measures approximately 3 m long by 80 cm wide with a height of up to 70 cm high. It is in fair condition.

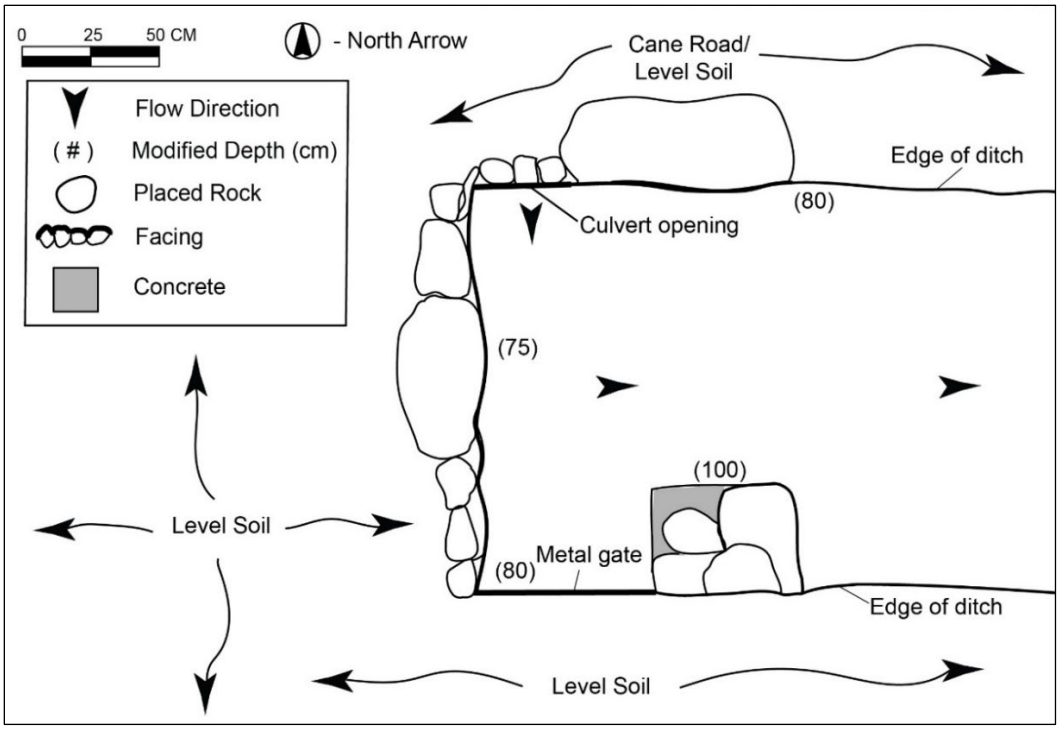

Figure 68. Plan view of SIHP # -02269 Feature CSH-2C culvert outlet add grass



Figure 69. Photo of the SIHP # -02269 Feature CSH-2C culvert outlet; view to northeast

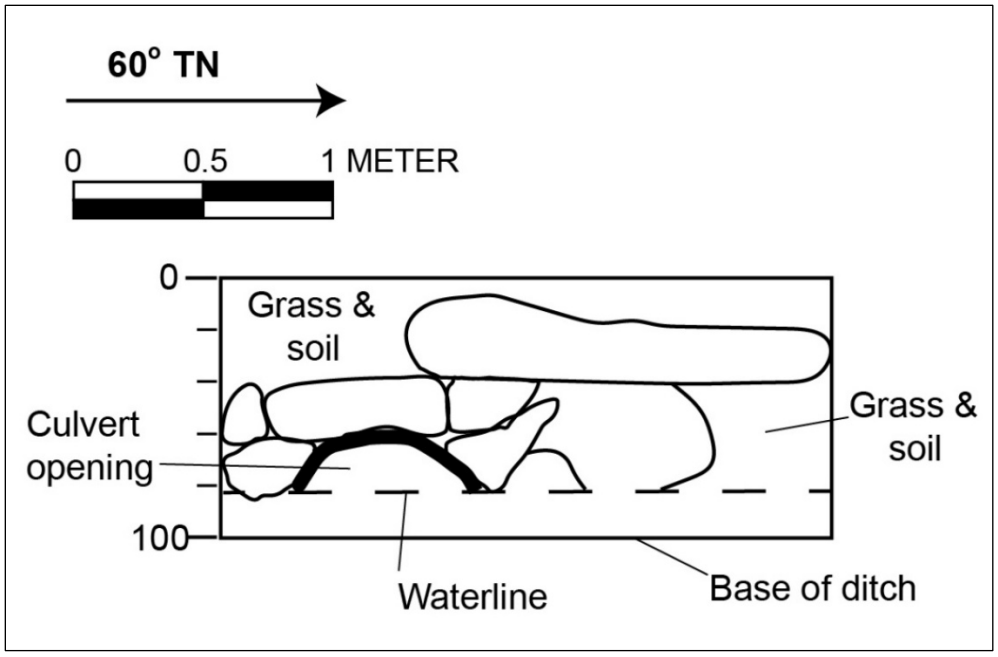

Figure 70. Profile 1 at SIHP # -02269 Feature CSH-2C culvert outlet



Figure 71. Photo of the SIHP # -02269 Feature CSH-2D culvert outlet; view to northeast



Figure 72. Photo overlooking the SIHP # -02269 Feature CSH-2E culvert outlet; view to southeast



Figure 73. Photo of the SIHP # -02269 Feature CSH-2F retaining wall; view to north

Feature CSH-2, the western supply ditch, remains active within the study area. This ditch also first appears on the 1910 map (see Figure 10), extending downslope from Ka‘awanui Reservoir along the western side of the road, then turning west below the 250-ft elevation contour, and then turning southwest to head *makai* most of the way to the Old Government Road. Subsequently, as planting fields were rearranged and new cane roads established, a diversion was created at the Feature CSH-2C culvert location, with a new channel running southeast toward Ka‘awanui Village Road, then down to and along Old Government Road to the northwest. It is unknown when the original channel extending *makai* from the Feature CSH-2C vicinity was abandoned; it appears to have been filled in as no signs of this section are visible in the vicinity of Hanger Road.

The site is in poor to good condition. While the earthen ditch channels themselves are in generally good, operable condition, the component features show variable signs of maintenance and/or degradation. A single portable artifact was observed throughout the site (beer bottle noted at Feature CSH-1A).

Despite areas of erosion and deterioration, the portions of SIHP # -02269 within the study area retain integrity of location, design, materials, workmanship, and feeling. Integrity of setting and association are only partially retained due to changes to surroundings following closure of the sugar plantation. A portion of the ditch system located upslope of the current study area was previously documented and assessed by Byerly and O’Day (2015:22) as significant under Criterion d for “its information related to historic sugarcane production in upland Kaua‘i.” The results of the current AIS support this prior assessment for SIHP # -02269.

6.2 SIHP # 50-30-09-CSH-3

FORMAL TYPE:	Old Government Road
FUNCTION:	Transportation
NUMBER OF FEATURES:	2
AGE:	Historic (early to mid-nineteenth century with subsequent improvements)
TAX MAP KEY:	(4) 1-7-006:999 (segment in study area)
LAND JURISDICTION:	Private (segment in study area)
PREVIOUS DOCUMENTATION:	None

SIHP # -50-30-09-CSH-3 is a segment of the Old Government Road (or Alanui Aupuni), a historic cross-*ahupua‘a* roadway located on the western side of Kaua‘i. This roadway bisects the study area along the boundary between TMK parcels 006 and 010 (see Figure 37 and Figure 74) and continues beyond the study area to the northwest and southeast. The segment in the study area is accessed from privately owned roadways SIHP #s -CSH-4 (Ka‘awanui Village Road) and CSH-5. It is bounded upslope by Testing Pen and Shop Pen and downslope by Surfer Pen and Mango Tree Pen. A portion of the SIHP # -02269 Feature CSH-2 ditch runs immediately adjacent (within 2–3 m) to Old Government Road, crossing under the road in the vicinity of SIHP # -02269 Feature CSH-2D (see Figure 37 and Figure 38). SIHP # -CSH-3 comprises two features: Feature A is the constructed roadway itself, and Feature B is a linear wall extending along a portion of the road in the study area (see Figure 74).

SIHP # -CSH-3 Feature A is the travel way of the Old Government Road. It extends a total distance of 775 m in the study area, between its intersection with Ka‘awanui Village Road to the southeast and the edge of ‘A‘akukui Valley to the northwest (see Figure 74, Figure 75, and Figure 76). The road utilizes asphalt pavement over a gravel base, with grassy dirt shoulders, with widths of 2.5–3.5 m The pavement surface is not maintained and has eroded away to dirt in many areas. Erosion along an intact portion of the road reveals several layers of roadway material including asphalt pavement, gravel, basalt cobbles, and soils (Figure 77), likely deposited over time as the road was in active public use. While the surfacing materials have been impacted by erosion, the road remains passable and functional.

SIHP # -CSH-3 Feature B is a dry stacked rock that runs parallel to Old Government Road along the *makai* side (see Figure 74). The wall is located 1.5–2.5m south/southwest of the Feature A roadway and portions have become overgrown with grass. It extends a total distance of 320 m between the Ka‘awanui Village Road intersection and the vicinity of the SIHP # -02269 Feature CSH-2D culvert. The southeastern portion of the wall has been heavily disturbed, though an approximately 10-m-long segment remains intact adjacent to the Ka‘awanui Village Road intersection (see Figure 74 and Figure 78). The feature is constructed with 3–5 courses of subangular basalt cobbles and small boulders. It ranges in width from 0.6–1.6 m, with heights of 0.8–1.3m. A representative profile (Profile 1) was documented along an intact segment of the wall (see Figure 74, Figure 79 and Figure 80).

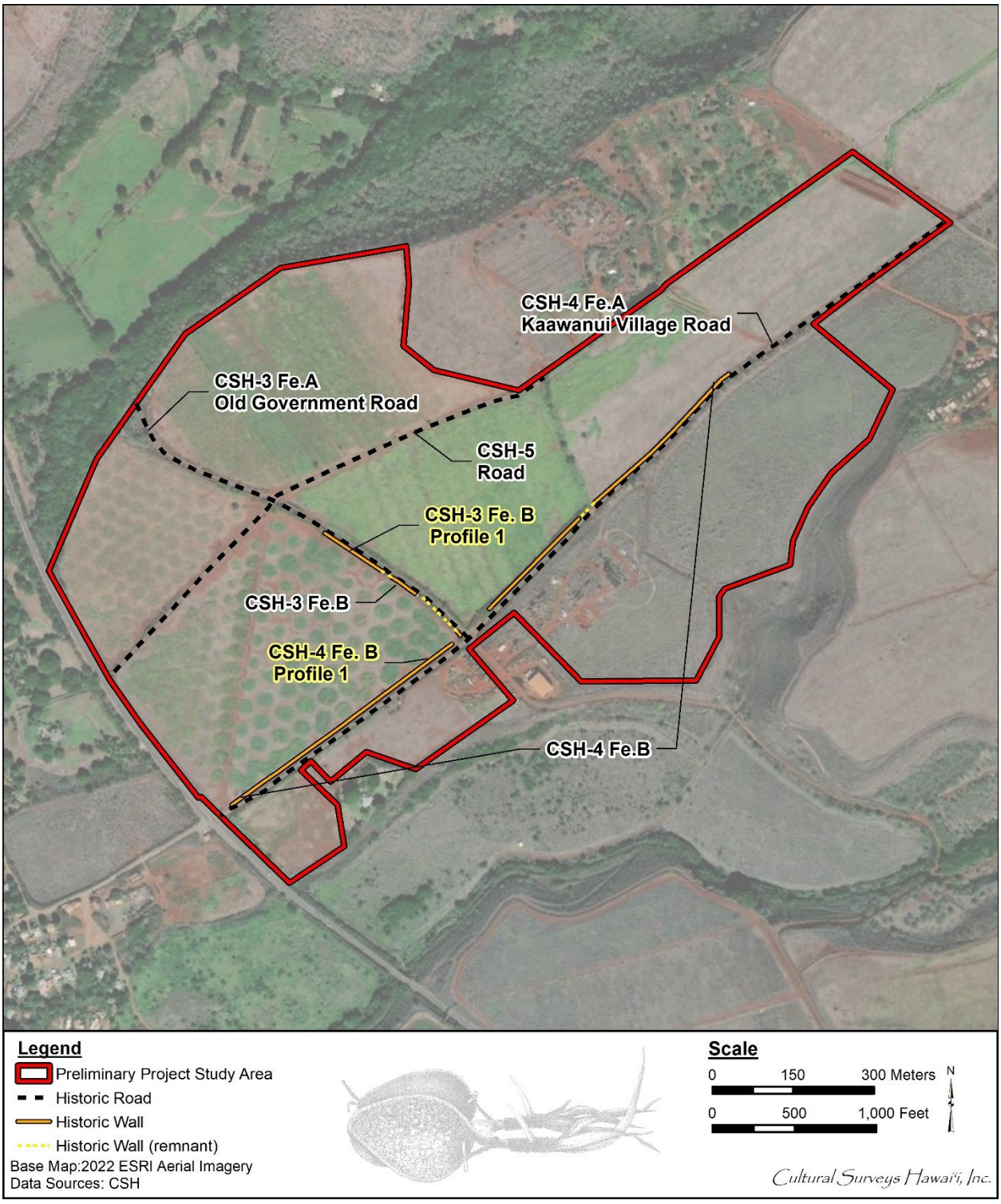

Figure 74. Aerial photograph (ESRI 2022) showing the locations of historic roads and associated wall features documented within the study area



Figure 75. Photo overlooking SIHP # -CSH-3, Old Government Road, from intersection with Ka‘awanui Village Road; view to northwest



Figure 76. Photo overlooking a section of SIHP # -CSH-3 Feature A road; view to west



Figure 77. Photo showing profile of an exposed portion of the SIHP # -CSH-3 Feature A road bed; view to northeast



Figure 78. Photo overlooking an intact section of SIHP # -CSH-3 Feature B wall near Ka‘awanui Village Road intersection; view to west



Figure 79. Photo of Profile 1 at SIHP # -CSH-3 Feature B wall; view to northeast

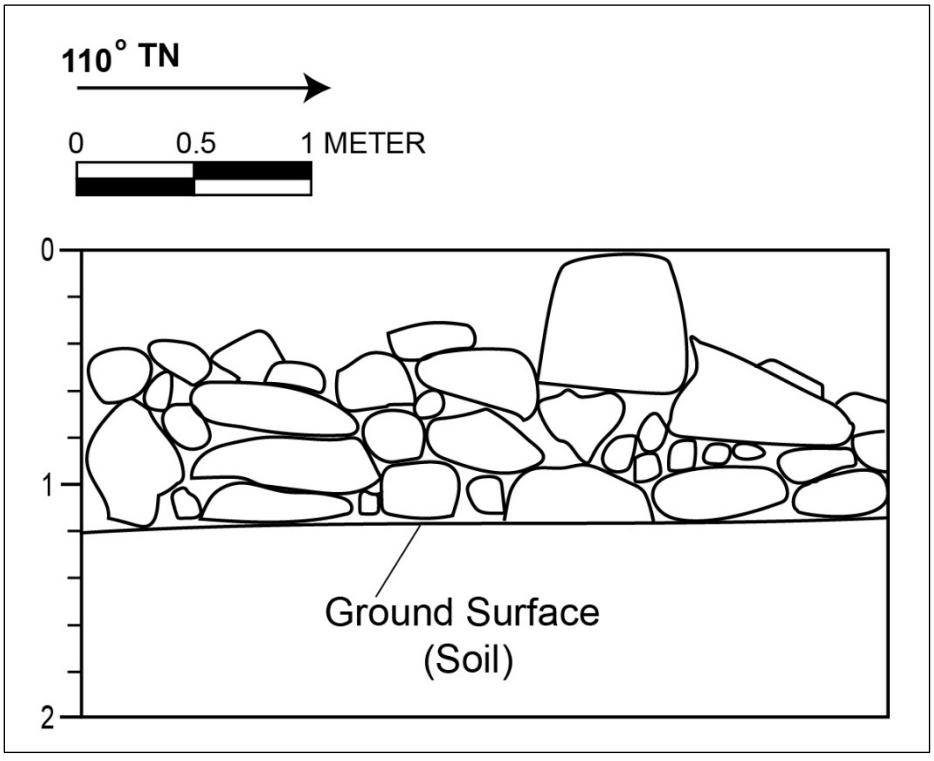

Figure 80. Profile 1 at SIHP # -CSH-3 Feature B wall

Māhele records from the Waimea area dating to the late 1840s note the presence of the Alanui Aupuni or Government Road (see Section 3.2.2.3), and maps from the turn of the century depict the portion of this roadway in the study area (see Figure 6, Figure 8, and Figure 9). The RLS report (MASON 2025:19) notes “By ca. 1910, the Government Road was enhanced with improvements (widening, paving, and some straightening of curves) by the County of Kaua‘i that made it part of the Kaua‘i Belt Road in the Makaweli area.” This revised alignment is presumably illustrated in maps from 1910 and 1927 (see Figure 10 and Figure 11) which indicate continued use of the roadway as the primary transportation route in southwest Kaua‘i. After construction of the new Belt Road (Kaumuali‘i Highway/Route 50) downslope of the study area in the 1930s, this section of the Old Government Road was subsumed by Makaweli Plantation, becoming a private road (see Section 3.2.3 and Figure 13).

The construction date of the Feature B wall is unknown but based on its construction and materials it is assessed as historic (50 years or greater in age). It is possible the wall was constructed along Old Government Road prior to the establishment of Makaweli Plantation; alternatively, it may date to the early plantation era (late 1800s to early 1900s), whenever the fields along this portion of the road began to be utilized. It is of similar construction to the wall located along Ka‘awanui Village Road (SIHP # -CSH-4 Feature B), suggesting these walls may be of relatively contemporaneous construction.

The segment of SIHP # -CSH-3 within the study area is in poor to fair condition. It retains integrity of location. Integrity of design, material, and workmanship, feeling, and association are only partially retained due to degradation and replacement of the historic roadway material and collapse of the associated wall in some areas. Integrity of setting is only partially retained due to changes to surroundings following closure of the sugar plantation and replacement of this roadway as a public thoroughfare by the new Belt Road (Kaumuali‘i Highway). This segment of Old Government Road does not exhibit any notable or distinctive features. It is assessed as significant under Criterion d for the information it has yielded about historic transportation within the study area.

6.3 SIHP # 50-30-09-CSH-4

FORMAL TYPE:	Ka‘awanui Village Road
FUNCTION:	Transportation (plantation)
NUMBER OF FEATURES:	2
AGE:	Historic (late nineteenth to early twentieth century with continued improvements)
TAX MAP KEY:	(4) 1-7-006:006, 010 (segment in study area)
LAND JURISDICTION:	Private
PREVIOUS DOCUMENTATION:	None

SIHP # -50-30-09-CSH-4 is a segment of Ka‘awanui Village Road, a historic road built to access Camp Six (Ka‘awanui Village) and other upland areas of Makaweli Plantation. This *mauka-makai* roadway bisects the study area (see Figure 37 and Figure 74), beginning at Kaumuali‘i Highway and extending upslope to Ka‘awanui Village and beyond. This road is bounded to the west by Mango Tree Pen, Shop Pen, Hanger Pen, and Water Buffalo Pen; and to the east by Al’s Pen Mauka and Makai, the plantation baseyard, fallow fields, and Ka‘awanui Village. It intersects with the Old Government Road (SIHP # -CSH-3) within the study area, approximately 575 m *mauka* of the highway. A portion of the SIHP # -02269 Feature CSH-2 ditch runs along the western side of the road at Shop Pen (see Figure 37). The site comprises two features: Feature A is the constructed roadway itself, and Feature B is a linear wall extending along a portion of the road in the study area (see Figure 74).

SIHP # -CSH-4 Feature A is the travel way of Ka‘āwanui Village Road. It extends a total distance of 1.75 km (1.1 miles) in the study area, between its intersection with Kaumuali‘i Highway and Ka‘awanui Village (see Figure 74). The road is characterized by an asphalt paved surface with dirt shoulders, with widths of 4–6 m (Figure 81 and Figure 82). The pavement surface exhibits signs of repeated patching and has eroded away to dirt in some places. While the surfacing materials have been impacted by erosion, the road remains passable and functional.

SIHP # -CSH-3 Feature B is a dry stacked rock that runs parallel to Ka‘awanui Village Road along the western side (see Figure 74, Figure 83, and Figure 84). The wall is located 1.0–2.5 m west of the Feature A roadway and portions have become overgrown with grass. It consists of two main segments: the first segment extends the full length of the road between the highway and the Old Government Road intersection; the second segment begins 55 m *mauka* of Old Government Road, just above a filter station for the SIHP # -02269 Feature CSH-2 ditch, and extends an overall distance of 625 m. A portion of the wall near the Shop and Hanger Pen boundary has been heavily disturbed (see Figure 74). The feature is constructed with 3–5 courses of subangular basalt cobbles and small boulders. It ranges in width from 0.6–1.6 m, with heights of 0.6–2.2 m. A representative profile (Profile 1) was documented along an intact segment of the wall (Figure 85 and Figure 86).

Ka‘awanui Village Road was constructed in the early years of the plantation and can be seen on maps as early as 1901 (see Figure 9). This road is still being actively used for private residence



Figure 81. Photo overlooking the lower portion of SIHP # -CSH-4 Ka‘awanui Road from the Kaumuali‘i Highway; view to northeast



Figure 82. Photo overlooking a portion of SIHP # -CSH-4 Ka‘awanui Road; view to southwest



Figure 83. Photo overlooking the Feature B wall running along the lower portion of SIHP # -CSH-4 Ka‘awanui Road; view to north



Figure 84. Photo overlooking the Feature B wall running along the central portion of SIHP # -CSH-4 Ka‘awanui Road; view to southwest



Figure 85. Photo of Profile 1 at SIHP # -CSH-4 Feature B wall; view to northwest

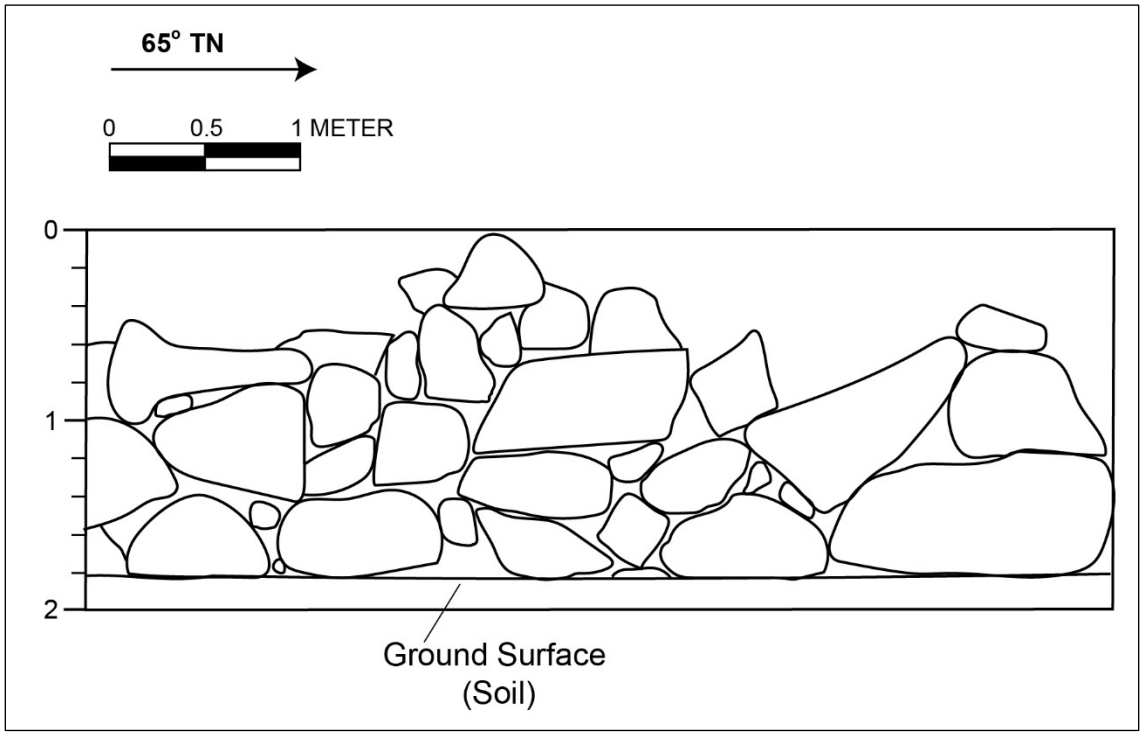

Figure 86. Profile 1 at SIHP # -CSH-4 Feature B wall

and agricultural activities. The construction date of the Feature B wall is unknown but based on its construction and materials it is assessed as historic (50 years or greater in age). It is of similar construction to the wall located along Old Government Road (SIHP # -CSH-3 Feature B), suggesting these walls may be of relatively contemporaneous construction.

The segment of SIHP # -CSH-4 within the study area is in fair condition. It retains integrity of location. Integrity of design, material, and workmanship, feeling, and association are only partially retained due to degradation and replacement of the historic roadway material and collapse of the associated wall in some areas. Integrity of setting is only partially retained due to changes to surroundings following closure of the sugar plantation. The site is assessed as significant under Criterion d for the information it has yielded about historic plantation-related transportation within the study area.

6.4 **SIHP # 50-30-09-CSH-5**

FORMAL TYPE:	Road
FUNCTION:	Transportation (plantation)
NUMBER OF FEATURES:	1
AGE:	Historic (early to mid-twentieth century with subsequent improvements)
TAX MAP KEY:	(4) 1-7-006:006, 010 (segment in study area)
LAND JURISDICTION:	Private
PREVIOUS DOCUMENTATION:	None

SIHP # -50-30-09-CSH-5 is a segment of a plantation roadway informally called “Hanger Road” for the project. This *mauka-makai* roadway bisects the western portion of the study area (see Figure 37 and Figure 74). It begins at Kaumuali‘i Highway and continues northeast beyond the study area limits, accessing the Lester Robinson homestead at TMK parcel 011. It is bounded to the north/northwest by Testing Pen and Surfer Pen, and to the south/southeast by Shop Pen and Mango Tree Pen. Hanger Road intersects with the Old Government Road (SIHP # -CSH-3) approximately 440 m upslope of Kaumuali‘i Highway. Unlike SIHP # -CSH-3 and -CSH-4, no rock walls are present along this road.

SIHP # -CSH-5 extends a total distance of 1.1 km (0.7 miles) in the study area. The road is characterized by an asphalt paved surface with dirt shoulders, measuring approximately 2.8 m wide (Figure 87 and Figure 88). The pavement surface exhibits signs of repeated patching and has eroded away to dirt in many places. While the surfacing materials have been impacted by erosion, the road remains passable and functional.

SIHP # -CSH-5 appears to have been constructed over two phases. The upper portion of the roadway above Old Government Road appears on the 1927 map of Makaweli Plantation (see Figure 11), but not the lower section. The roadway was likely extended below Old Government Road following construction of the new Belt Road (Kaumuali‘i Highway) in the 1930s. This lower portion of Hanger Road is visible on the 1963 USGS topographic map (see Figure 13). The road continues to be used for agricultural activities and access to parcel 011, where a “private landing site [was] permitted in the early 80’s to support Niihau,” (James Robinson, personal communication).

The segment of SIHP # -CSH-5 within the study area is in poor to fair condition. It retains integrity of location. Integrity of design, material, and workmanship, feeling, and association are only partially retained due to degradation and replacement of the historic roadway material. Integrity of setting is only partially retained due to changes to surroundings following closure of the sugar plantation. The site is assessed as significant under Criterion d for the information it has yielded about historic plantation-related transportation within the study area.



Figure 87. Photo overlooking the entrance to SIHP # -CSH-5 road from Kaumuali‘i Highway; view to the northeast



Figure 88. Photo overlooking a section of SIHP # -CSH-5 road in the study area; view to southwest

6.5 SIHP # 50-30-09-CSH-6

FORMAL TYPE:	Railroad track remnant
FUNCTION:	Indeterminate (possible transportation for plantation)
NUMBER OF FEATURES:	1
AGE:	Indeterminate
TAX MAP KEY:	(4) 1-7-006:999 (Old Government Road ROW)
LAND JURISDICTION:	Private
PREVIOUS DOCUMENTATION:	None

SIHP # -CSH-6 is an isolated remnant of railroad track located along a section of Old Government Road (SIHP # -CSH-3) in the central portion of the study area (see Figure 37). The remnant consists of two sections of parallel rails embedded in the road surface. The adjacent roadway shoulder is overgrown with grasses and *koa haole*. The SIHP # -CSH-3 Feature B wall is located approximately 4 m south and west, and the SIHP # -02269 Feature CSH-2 ditch channel is approximately 3 m northeast.

The SIHP # -CSH-6 remnant extends in a southwest/northeast orientation across the *makai* portion of Old Government Road (Figure 89 through Figure 91). The two iron rails are set parallel with a spacing of 60 cm (approximately 24 in), indicating a narrow gauge that is not the standard 30-in narrow gauge typically seen on Kaua‘i (MASON 2025:45). The western rail measures 1.9 m long and the eastern rail is 1.8 m long. Both measure 3.5–5.0 cm wide with a thickness of 5.0 cm. The rails are embedded into the Old Government Road surface and rise approximately 1–2 cm above the road surface. A gap is present in the portion of the SIHP # -CSH-3 Feature B wall near the remnant, but this gap is somewhat offset from the orientation of the rails, so any potential association between the two features is unclear. No further evidence of the railroad was observed in the vicinity.

The location and alignment of SIHP # -CSH-6 is consistent with the railroad shown on the historic 1927 map (see Figure 11), which at face value suggests this remnant may date to the early plantation era. However, the isolated nature of this remnant within the Old Government Road is curious, as are some of its other characteristics. In the RLS report MASON (2025:45–46) lists several reasons why this site is unlikely to be an in-situ remnant of the plantation railroad, including the odd spacing of the rails, the position of the rails relative to the roadway surface, the absence of ballast or ties, and the relatively short (cut) lengths of the rail sections. The rails may have been set in place at a much later (modern) date when the road was paved, but the function or purpose is unknown.

SIHP # -CSH-6 is in poor, deteriorated condition. The site retains integrity of location, design, and materials. Because the age and function of the site are unknown, integrity of setting, feeling, and association cannot be evaluated. This historic property is assessed as having significance under Criterion d for the information it has yielded about plantation-related activity within the study area.

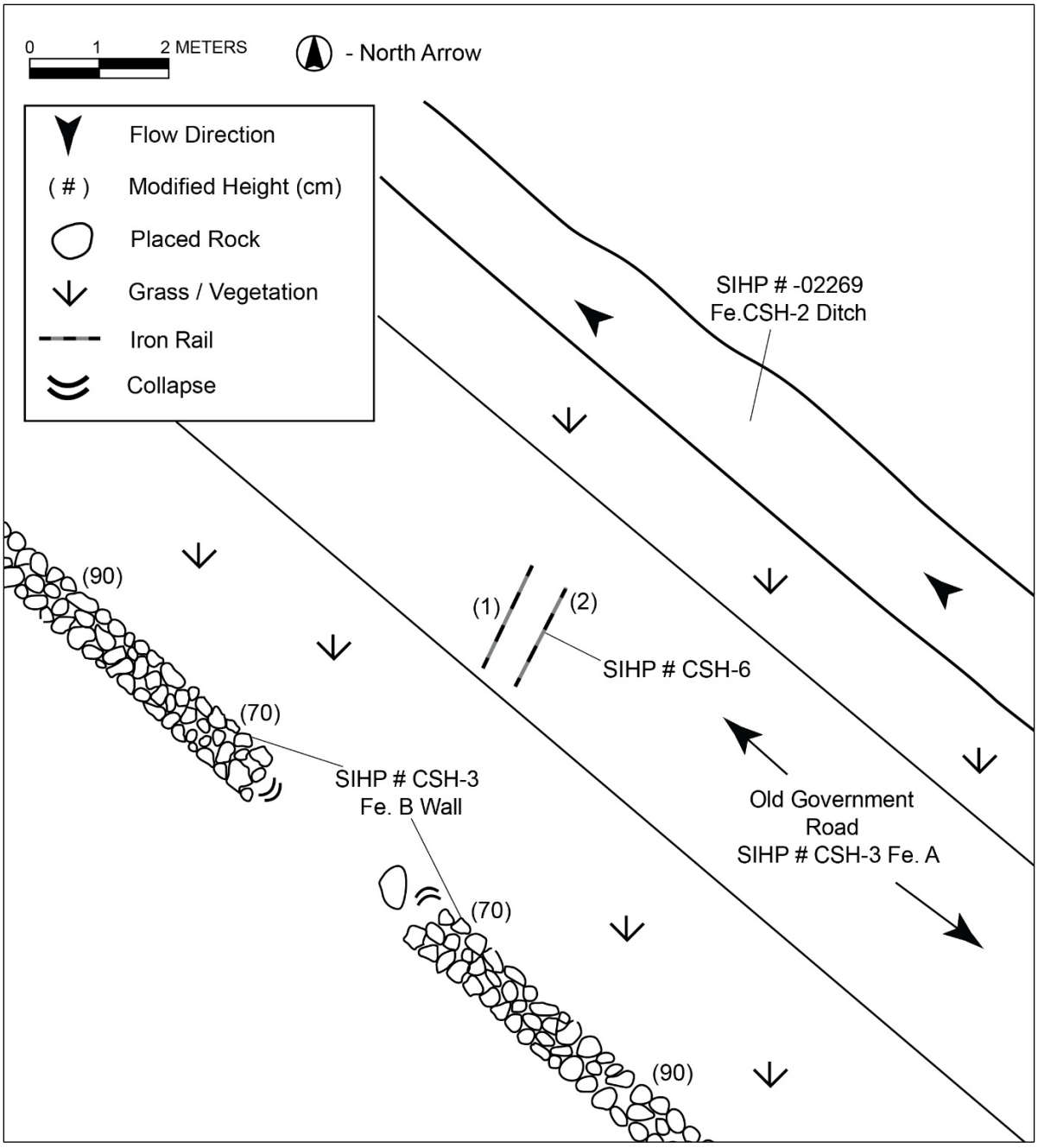

Figure 89. Plan view of SIHP # -CSH-6 railroad remnant



Figure 90. Photo overlooking SIHP # -CSH-6 railroad remnant located along Old Government Road; view to southwest



Figure 91. Photo of SIHP # -CSH-6 railroad remnant located along Old Government Road; view to northwest

6.6 SIHP # 50-30-09-CSH-7

FORMAL TYPE:	Water tank facility
FUNCTION:	Water storage/agriculture
NUMBER OF FEATURES:	1
AGE:	Historic (mid-twentieth century with continued improvements)
TAX MAP KEY:	(4) 1-7-006:010
LAND JURISDICTION:	Private
PREVIOUS DOCUMENTATION:	None

SIHP # -CSH-7 is water storage facility located along the lower portion of Ka‘awanui Village Road (SIHP # -CSH-4) in the vicinity of Al’s Pen Mauka in the southern portion of the study area (see Figure 37, Figure 92, and Figure 93). The site is completely enclosed by a 10-foot (3-m) high chain-link fence, accessed by two gates situated on opposite sides of the enclosure. The area surrounding the site contains dry grass with scattered trees.

The fenced area contains a modern 35,000-gallon water tank and various components such as valves, gauges and piping (Figure 94). This modern tank is functional and used to supply water to areas downslope via PVC pipeline. It replaces a historic tank depicted on the 1963 USGS topographic map. Adjacent to the modern tank is a series of eight linear concrete blocks of variable length, set parallel with a spacing of 75 cm and forming a circular pattern. The concrete blocks range in length from approximately 5–8 m, with heights of 70 cm. The blocks area tapered, with widths of 40-60 cm. The entire feature measures 10 m long northwest/southeast by 7.5 m wide northeast/southwest, and may have served as the foundation for the original tank.

SIHP # -CSH-7 is a water storage facility comprising both modern and historic elements. The exact age of the concrete feature that may have supported the former water tank is unknown, but likely dates to the mid-twentieth century; a water tank was present at this location by 1963, but it is not depicted on older maps from the early twentieth century (e.g. Figure 11, Figure 10). The modern tank and associated pipeline infrastructure are in active use.

SIHP # -CSH-7 is in remnant to good, operable condition. While the historic water tank has been replaced, portions of the original facility (e.g., concrete foundation) remain. The site retains integrity of location. Integrity of setting, design, material, workmanship, feeling, and association are only partially retained due to replacement of the historic material and changes to surroundings following closure of the sugar plantation. The site is assessed as significant under Criterion d for the information it has yielded about historic plantation-related water use within the study area.



Figure 92. Photo showing SIHP # -CSH-7 water tank facility located along Ka‘awanui Village Road; view to northeast



Figure 93. Photo of SIHP # -CSH-7 water tank; view to east

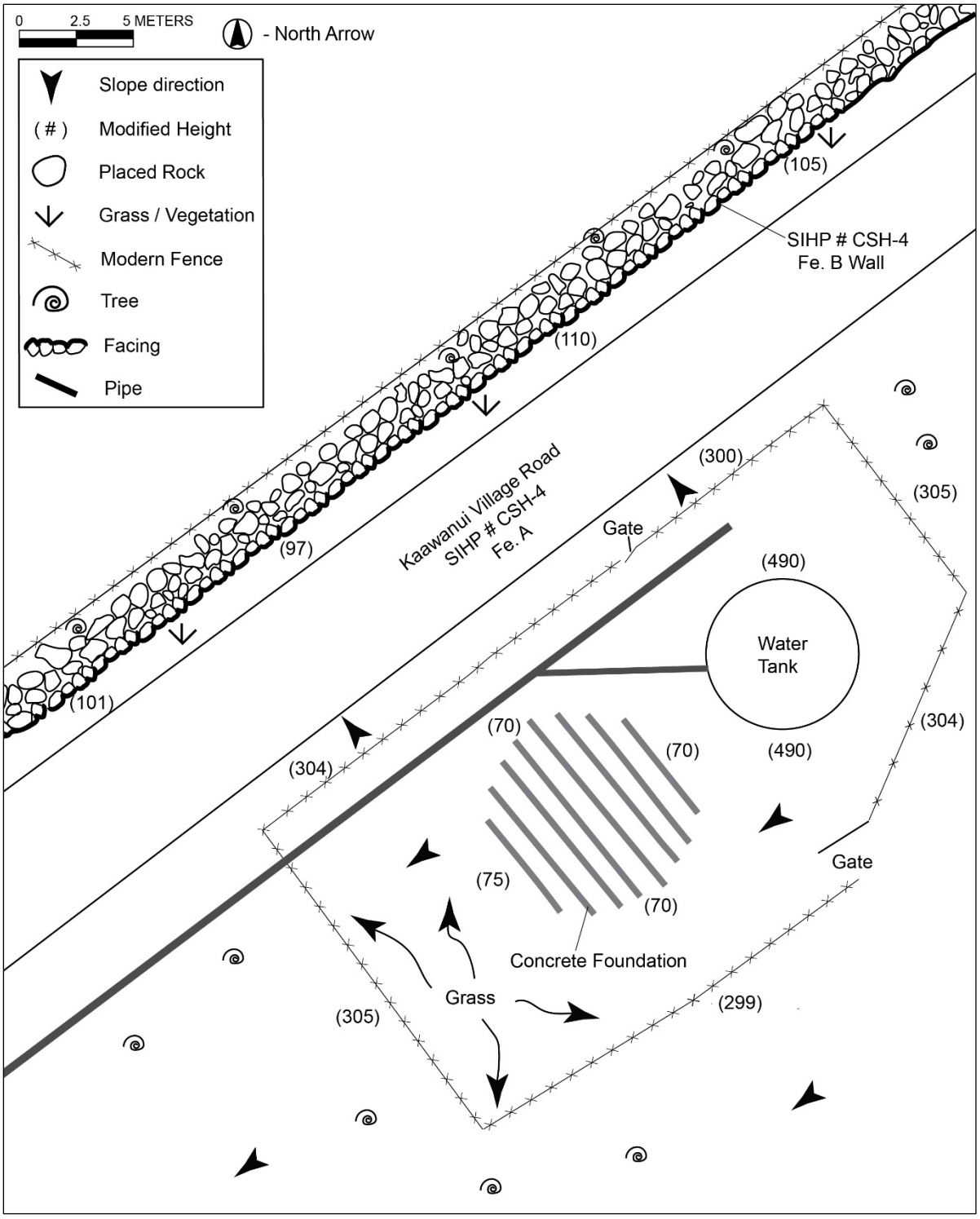

Figure 94. Plan view of SIHP # - CSH-7 water tank facility

Section 7 Summary and Interpretation

7.1 Summary

On behalf of Kaawanui Solar, LLC, a subsidiary of AES Hawai‘i, CSH has undertaken this AIS for the Kaawanui Solar Project, Makaweli Ahupua‘a, Waimea District, Kaua‘i, TMKs: (4) 1-7-006:010 por. and 006 por. The AIS fieldwork involved a 100% coverage pedestrian survey of the study area with GPS data collection and site documentation. The fieldwork was conducted on 14–16 July 2025 by CSH Archaeologists Samantha Purdy, B.A., and Genevieve Glennon, B.A., under the general supervision of Principal Investigator Hallett H. Hammatt, Ph.D. This work required approximately 6 person-days to complete.

Six historic properties were documented in the study area. These sites include a newly recorded portion of a previously documented historic ditch system (SIHP # 50-30-09-02269), and five newly identified historic properties associated with historic transportation and plantation land use (SIHP #s 50-30-09-CSH-3, Old Government Road; 50-30-09-CSH-4, Ka‘awanui Village Road, 50-30-09-CSH-5, plantation road; 50-30-09-CSH-6, railroad track remnant; and 50-30-09-CSH-7, water tank facility). All these historic properties (except for the railroad remnant) exhibit evidence of continued modification or improvement over time, highlighting the long duration of agricultural land use and associated access within the study area. No pre-Contact features were encountered.

While the AIS investigation did not include subsurface testing, observation of the project geotechnical survey provided a good sampling of subsurface conditions throughout the study area (Wilkinson and Hammatt 2025; see Appendix A). The geotechnical survey included but was not limited to mechanical excavation of fourteen trenches that extended below the plow zone, exposing sediments characterized by one or two layers of natural Makaweli series soils overlying basalt bedrock. The upper limits of these sediments have generally been disturbed by prior agricultural activity. No stratigraphic anomalies, potential cultural deposits, subsurface features, or cultural deposits were exposed during excavation for test pits. These findings indicate a low potential of encountering subsurface pre-Contact archaeological features within the study area, given the nature and extent of prior land alteration.

An effort was made to consult with knowledgeable individuals about the history of the study area. Consultation with James Robinson of Gay & Robinson provided insight about some of the historic features identified during the AIS, particularly the SIHP # -02269 ditch system.

7.2 Interpretation

The findings of this AIS are consistent with the known history of land use. Background research provided little specific evidence of pre-Contact land use within and surrounding the study area but suggests settlement patterns within Makaweli would have been similar (albeit on a smaller scale) to those in nearby Waimea, where occupation was concentrated along the coast and river valleys. Subsequently, the study area was part of the Makaweli Sugar plantation and used to plant cane for over a century, from the late nineteenth century to the early 2000s. This intensive historic and ongoing agricultural land use likely impacted any pre-Contact features once present on the ground surface or within the plow zone throughout the study area.

Section 8 Significance Assessments

Under HRS §6E, for a historic property to be significant under HAR §13-284-6 (applicable to private projects), the historic property should possess integrity of location, design, setting, materials, workmanship, feeling, and/or association, and meet one or more of the following significance criteria:

a Be associated with events that have made an important contribution to the broad patterns of our history;

b Be associated with the lives of persons important in our past;

c Embody the distinctive characteristics of a type, period, or method of construction, represent the work of a master, or possess high artistic value;

d Have yielded, or is likely to yield, information important for research on prehistory or history; or

e Have an important value to the native Hawaiian people or to another ethnic group of the state due to associations with cultural practices once carried out, or still carried out, at the property or due to associations with traditional beliefs, events or oral accounts—these associations being important to the group's history and cultural identity.

SIHP # 50-30-09-02269 is a historic plantation ditch system. The portions of the site within the current study area are in poor to good condition. While the earthen ditch channels themselves are in generally good, operable condition, the component features show variable signs of maintenance and/or degradation. Despite some areas of erosion and deterioration along the portions of the site within the study area, the site retains integrity of location, design, materials, workmanship, and feeling. Integrity of setting and association are only partially retained due to changes to surroundings following closure of the sugar plantation. A portion of the ditch system located upslope of the current study area was previously documented and assessed by Byerly and O'Day (2015:22) as significant under Criterion d for "its information related to historic sugarcane production in upland Kaua‘i." The results of the current AIS support this prior assessment for SIHP # -02269.

SIHP # 50-30-09-CSH-3 is the historic Old Government Road. The segment of this road within the study area is in poor to fair condition. It retains integrity of location. Integrity of design, material, and workmanship, feeling, and association are only partially retained due to degradation of the historic roadway material and collapse of the associated wall in some areas. Integrity of setting is only partially retained due to changes to surroundings following closure of the sugar plantation and replacement of this roadway as a public thoroughfare by the new Belt Road (Kaumuali‘i Highway). This segment of Old Government Road does not exhibit any notable or distinctive features. It is assessed as significant under Criterion d for the information it has yielded about historic transportation within the study area.

SIHP # 50-30-09-CSH-4 is the historic Ka‘awanui Village Road. The segment of this roadway within the study area is in fair condition. It retains integrity of location. Integrity of design,

material, and workmanship, feeling, and association are only partially retained due to degradation and replacement of the historic roadway material and collapse of the associated wall in some areas. Integrity of setting is only partially retained due to changes to surroundings following closure of the sugar plantation. The site is assessed as significant under Criterion d for the information it has yielded about historic plantation-related transportation within the study area.

SIHP # 50-30-09-CSH-5 is a historic plantation road. The segment of this roadway within the study area is in poor to fair condition. It retains integrity of location. Integrity of design, material, and workmanship, feeling, and association are only partially retained due to degradation and replacement of the historic roadway material. Integrity of setting is only partially retained due to changes to surroundings following closure of the sugar plantation. The site is assessed as significant under Criterion d for the information it has yielded about historic plantation-related transportation within the study area.

SIHP # 50-30-09-CSH-6 is a railroad track remnant of indeterminate age. It is in poor, deteriorated condition. The site retains integrity of location, design, and materials. Because the age and function of the site are unknown, integrity of setting, feeling, and association cannot be evaluated. The site is assessed as having significance under Criterion d for the information it has yielded about plantation-related activity within the study area.

SIHP # 50-30-09-CSH-7 is a historic water tank facility. It is in remnant to good, operable condition. While the historic water tank has been replaced, portions of the original facility (e.g., concrete foundation) remain. The site retains integrity of location. Integrity of setting, design, material, workmanship, feeling, and association are only partially retained due to replacement of the historic material and changes to surroundings following closure of the sugar plantation. The site is assessed as significant under Criterion d for the information it has yielded about historic plantation-related water use within the study area.

Section 9 Project Effect and Mitigation Recommendations

9.1 Project Effect

In accordance with HAR §13-284-7, the project effect is “effect, with agreed upon mitigation commitments.” The six historic properties documented in the study area are assessed as significant under Criterion d of the State of Hawai‘i significance criteria. Documentation of these historic properties in this AIS has included historical research, GPS data collection, photographs, plan view maps, representative profiles and cross section maps, written descriptions, and consultation with a knowledgeable party. This AIS has adequately documented the location, extent, function, age, and construction methods of the six historic properties in the study area, mitigating project-related impacts pursuant to HAR §13-284-8.

9.2 Mitigation Recommendations

No further archaeological work, including archaeological monitoring, is recommended. However, if subsurface features or deposits are encountered at any time during construction, construction activities shall cease in the area of the find and SHPD shall be contacted immediately. All project-related development shall be within the limits of the study area.

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Appendix A Letter Report: *Results of Archaeological Oversight for a Geotechnical Survey for the Ka‘awanui Solar + Storage Project* (Wilkinson and Hammatt 2025)

CULTURAL SURVEYS HAWAI‘I

ARCHAEOLOGICAL , CULTURAL, AND HISTORICAL DOCUMENTATION SERVICES — SINCE 1982

17 April 2025

Tracy Camuso
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Office: (808) 523-5866
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CSH Job Code: MAKAWELI 12

Subject: Results of Archaeological Oversight for a Geotechnical Survey for the Ka‘awanui Solar + Storage Project, Makaweli Ahupua‘a, Waimea District, Kaua‘i, TMK(s): portions (4) 1-7-006:006 por. and 010 por.

Aloha Tracy Camuso,

At the request of G70, Cultural Surveys Hawai‘i, Inc. (CSH) conducted archaeological oversight for a geotechnical survey associated with the Ka‘awanui Solar + Storage Project, Makaweli Ahupua‘a, Waimea District, Kaua‘i, TMK(s): (4) 1-7-006: 006 por. and 010 por. CSH personnel conducted fieldwork on 3–5 February 2025 under the general supervision of Hallett H. Hammatt (principal investigator).

The geotechnical survey involved mechanical boring, pull testing, and excavation of test pits at select locations within the approximately 286-acre (115.74-hectare) Ka‘awanui Solar Preliminary Project Study Area to determine subsurface conditions and facilitate soil sampling. The results of the geotechnical survey will inform project planning and design. The Preliminary Project Study Area is depicted on a portion of the 1996 Hanapepe U.S. Geological Survey (USGS) 7.5-minute topographic quadrangle (Figure 1) and tax map plat (Figure 2).

Historic preservation review has not yet been initiated for the Ka‘awanui Solar Project. Due to the presence of historic features in the Preliminary Project Study Area, G70 on behalf of Kaawanui Solar, LLC contacted CSH to request proactive oversight (monitoring) of all ground disturbing work associated with the geotechnical survey.

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Date: 17 April 2025

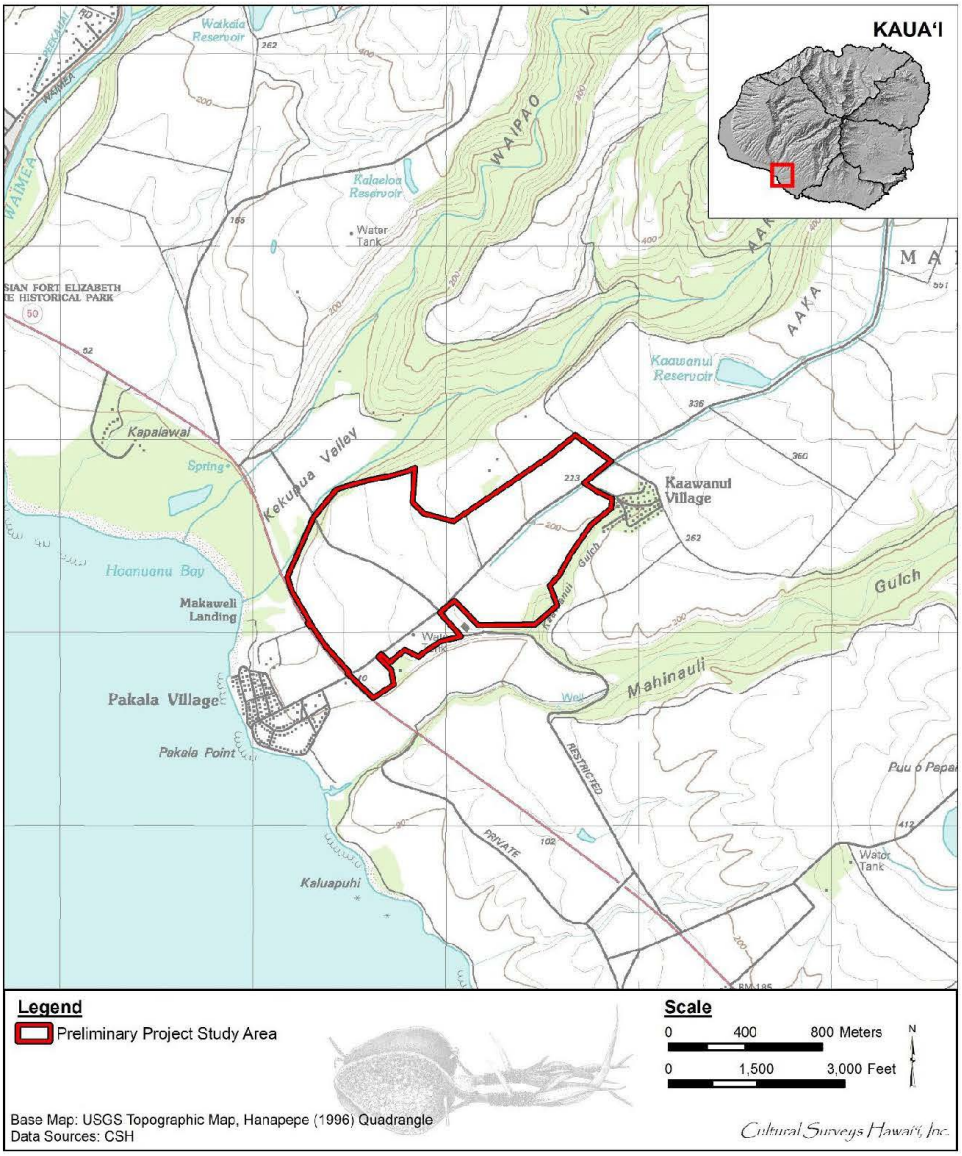

Figure 1. Portion of the 1996 Hanapepe U.S. Geological Survey (USGS) topographic quadrangle showing the location of the Preliminary Project Study Area

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Date: 17 April 2025

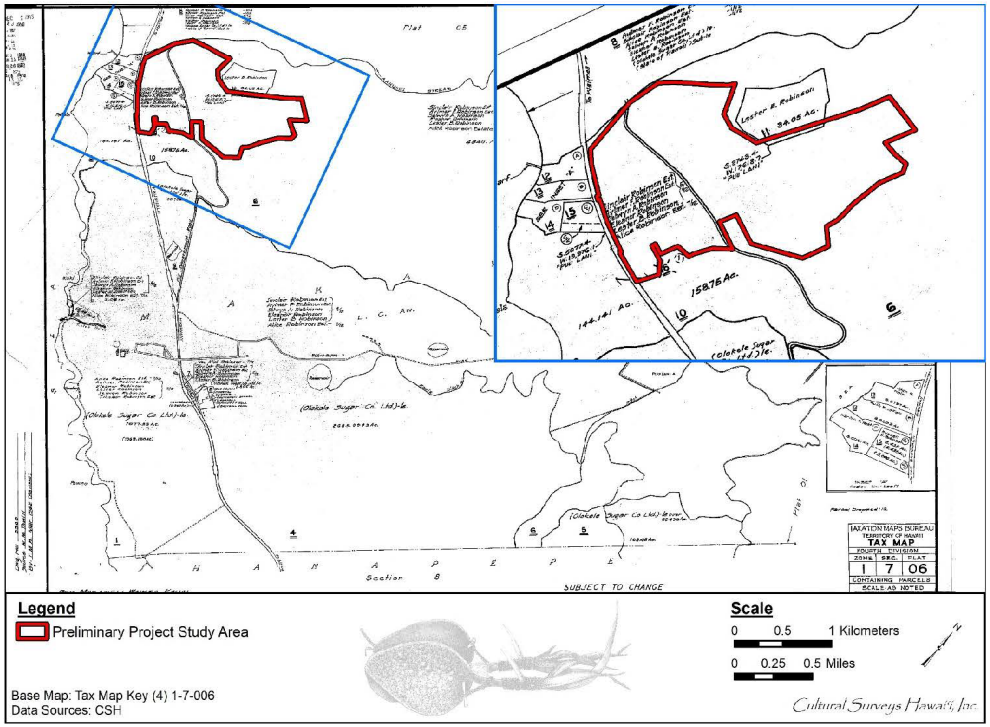

Figure 2. Tax Map Key (TMK) (4) 1-7-006 showing the Preliminary Project Study Area in portions of parcels 006 and 010 (Hawai‘i TMK Service 2025)

This letter provides documentation regarding the results of the archaeological oversight of the geotechnical survey, and concludes no adverse impacts occurred to historic properties from these activities.

Previously Documented Historic Properties

CSH has undertaken an archaeological literature review and field inspection (LRFI) for the AES Ka‘awanui Solar + Storage Project (Bautista et al. 2025). Background research and a field inspection conducted on 22–23 January 2025 revealed that the Preliminary Project Study Area has been extensively modified by operations related to historic sugar cultivation and subsequent agricultural activities. Numerous historic-era features associated with transportation and sugarcane agriculture were identified within the Preliminary Project Study Area, including portions of plantation roads and the Old Government Road, rock walls, ditch systems, a railroad remnant, and a water tank. These historic features are depicted in a 2022 aerial photo (Figure 3). No pre-Contact archaeological features were identified within the Preliminary Project Study Area.

Given the nature and extent of prior land alteration and results of the field inspection, Bautista et al. (2025) assessed a low potential of encountering surface or subsurface pre-Contact archaeological features within the Preliminary Project Study Area. Consultation with the State Historic Preservation Division (SHPD) was strongly recommended to obtain a determination regarding the need for an AIS for the proposed project. Additional documentation will likely be required for the historic features encountered during the field inspection.

Results of Fieldwork

Archaeological oversight (monitoring) for the geotechnical survey was conducted on 3–5 February 2025 by CSH archaeologist Samantha Purdy, B.A., under the general supervision of Principal Investigator Hallett H. Hammatt, Ph.D. This work involved observation and stratigraphic documentation of the test pit excavations. Boring for core samples and pull testing were not directly monitored; the geotechnical contractor was instructed to halt this work upon any findings of cultural materials and report to the project team. Twenty-five bores and 28 pull tests were conducted throughout the Preliminary Project Study Area (Figure 4). Upon completion of these activities the contractor relayed to the CSH monitor that no cultural materials were identified.

To mitigate any possible damage to historic sites in the vicinity, the on-site archaeologist adhered to the following methods:

- All potential historic properties were treated as significant and avoided during activities associated with the geotechnical survey. The on-site archaeologist investigated potential historic properties within or in the near vicinity of work areas as shown on maps based on previous documentation for locational accuracy.
- Before the start of work, the on-site archaeologist gave a cultural sensitivity orientation to geotechnical survey contractors, to raise awareness and explain the sensitivity of working around areas of historic and cultural significance.
- The on-site archaeologist observed the geotechnical investigation process and inspected the area of the geotechnical test pit for any potential historic properties before, during, and after the work was performed to ensure potential historic properties were not damaged.

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Date: 17 April 2025

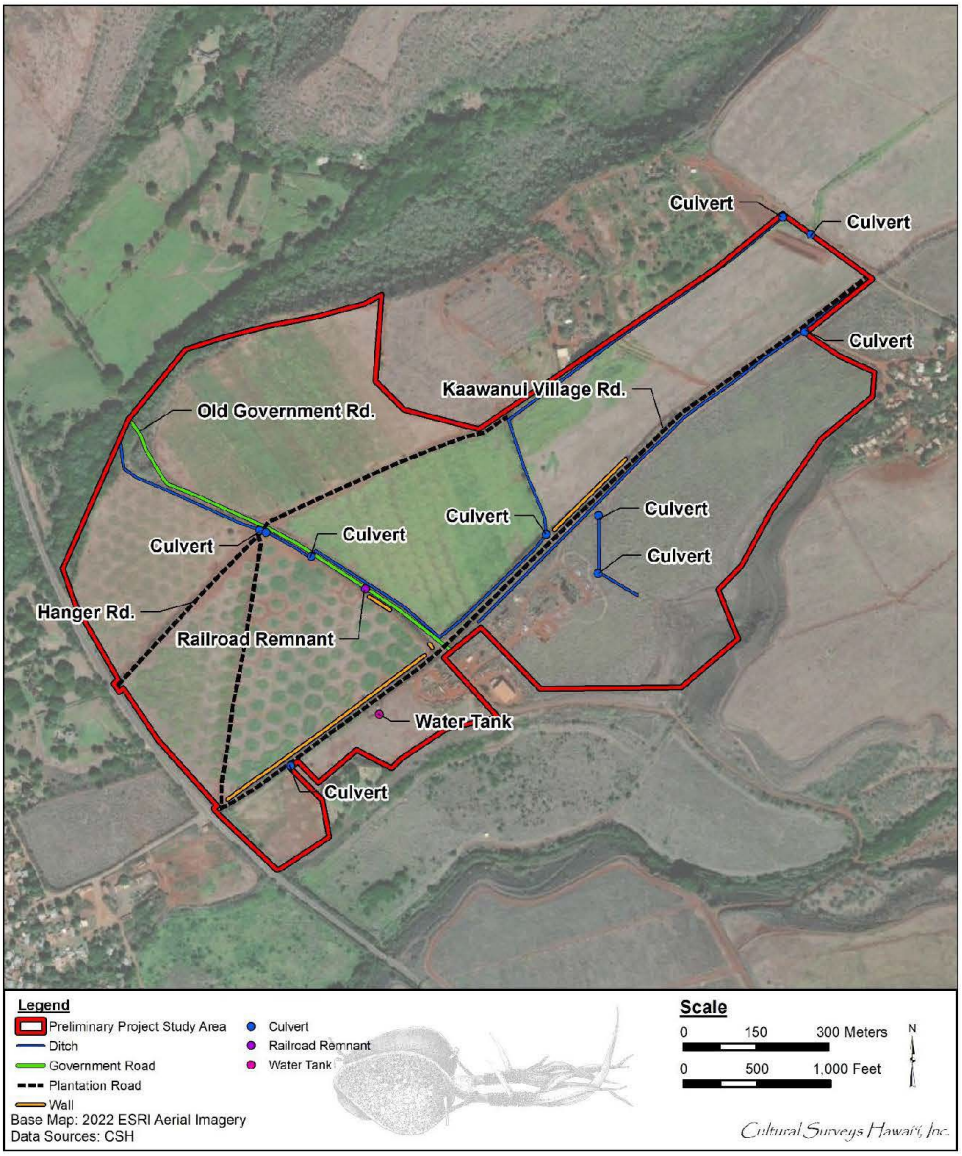

Figure 3. Aerial photo (ESRI 2022) from Bautista et al. (2025:39) showing the locations of historic features observed during the field inspection

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Date: 17 April 2025

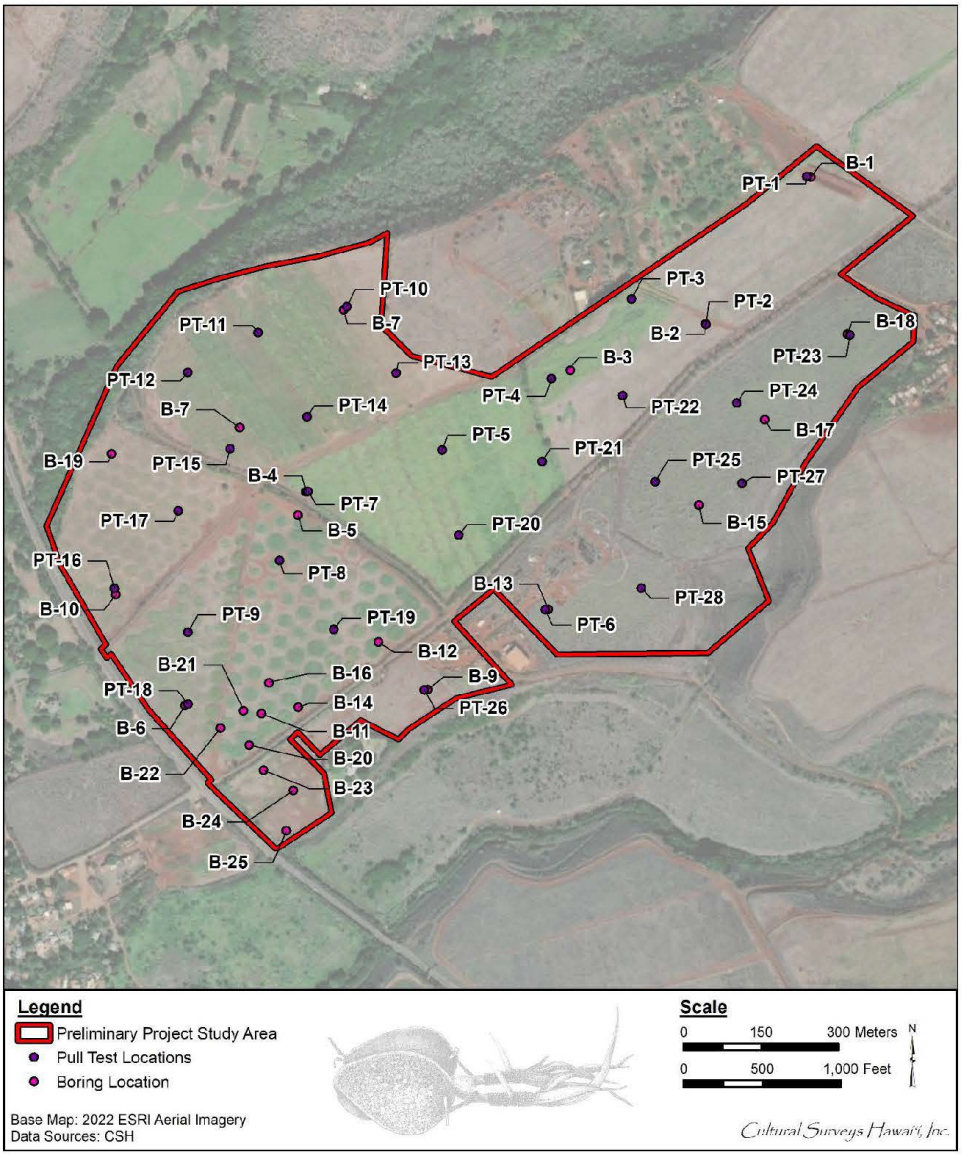


Figure 4. Aerial photo (ESRI 2022) showing the locations of bores and pull tests conducted during the geotechnical survey

Background research indicated the Preliminary Project Study Area was subjected to extensive sugar cultivation in the past. Remnants of plantation infrastructure were identified during the Bautista et al. (2025) LRFI (see Figure 3). Portions of the historic (but still active) roadways in the Preliminary Project Study Area —including Old Government Road, Ka‘awanui Road, and Hanger Road—were used for access during the geotechnical survey, but use of these transportation routes for access did not adversely impact them. All the other historic features documented by Bautista et al. (2025) in the Preliminary Project Study Area were avoided during the geotechnical survey. Figure 5 depicts the locations of the historic features in relation to the completed geotechnical test pits. Furthermore, no newly identified archaeological sites were found.

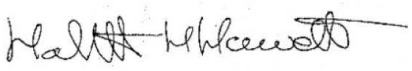
The test pit work consisted of the mechanical excavation of fourteen trenches (TP-1 through TP-14) using a Takeuchi TB 260 excavator (Figure 5 through Figure 10). Initially 15 test pits were proposed, but TP-5 was eliminated due to accessibility concerns. The trenches measured approximately 3 m (10 ft) long by 50 cm (1.6 ft) wide and were excavated to bedrock. Depths were variable, ranging from 80–275 cm below surface (cmbs). All extracted materials were inspected for cultural materials or unusual sediments; no cultural layers or materials were observed within any of the excavated areas. Documentation of the 14 test pits included photographs, drawings, and stratigraphic descriptions of profiles at each trench (Figure 12 through Figure 39; Table 1 through Table 14).

Excavation of test pits extended below the plow zone, exposing Preliminary Project Study Area sediments characterized by one or two layers of natural Makaweli series soils overlying basalt bedrock. Makaweli soils are characterized as well-drained silty clay loams developed in material weathered from basic igneous rock; these soils are generally used for irrigated sugarcane, pasture, and homesites (Foote et al. 1972:90). The upper limits of these sediments have generally been disturbed by prior agricultural activity.

Recommendations

No subsurface archaeological features or deposits were encountered during the geotechnical survey boring and test pit excavations within TMKs: (3) 6-2-002:006 and 010. No evidence of traditional Hawaiian land use was documented during this subsurface survey or the Bautista et al. (2025) LRFI, which identified only historic-era surface features. Background research indicates this portion of Makaweli was *kula* (plains) or forested lands, and the Land Commission Awards in Makaweli are focused in the wet river valley areas away from the Preliminary Project Study Area. CSH recommends continued avoidance and protection of the surface historic-era properties until consultation can be undertaken with SHPD regarding historic preservation requirements for the Ka‘awanui Solar Project, or any other ground disturbing projects.

Sincerely,



Hallett H. Hammatt, Ph.D., Principal Investigator
Cultural Surveys Hawai‘i, Inc.

This report was prepared with assistance from CSH Project Director Sarah Wilkinson, B.A.

Subj: Archaeological Oversight for the Ka‘awanui Solar + Storage Project **Page 8**

Date: 17 April 2025

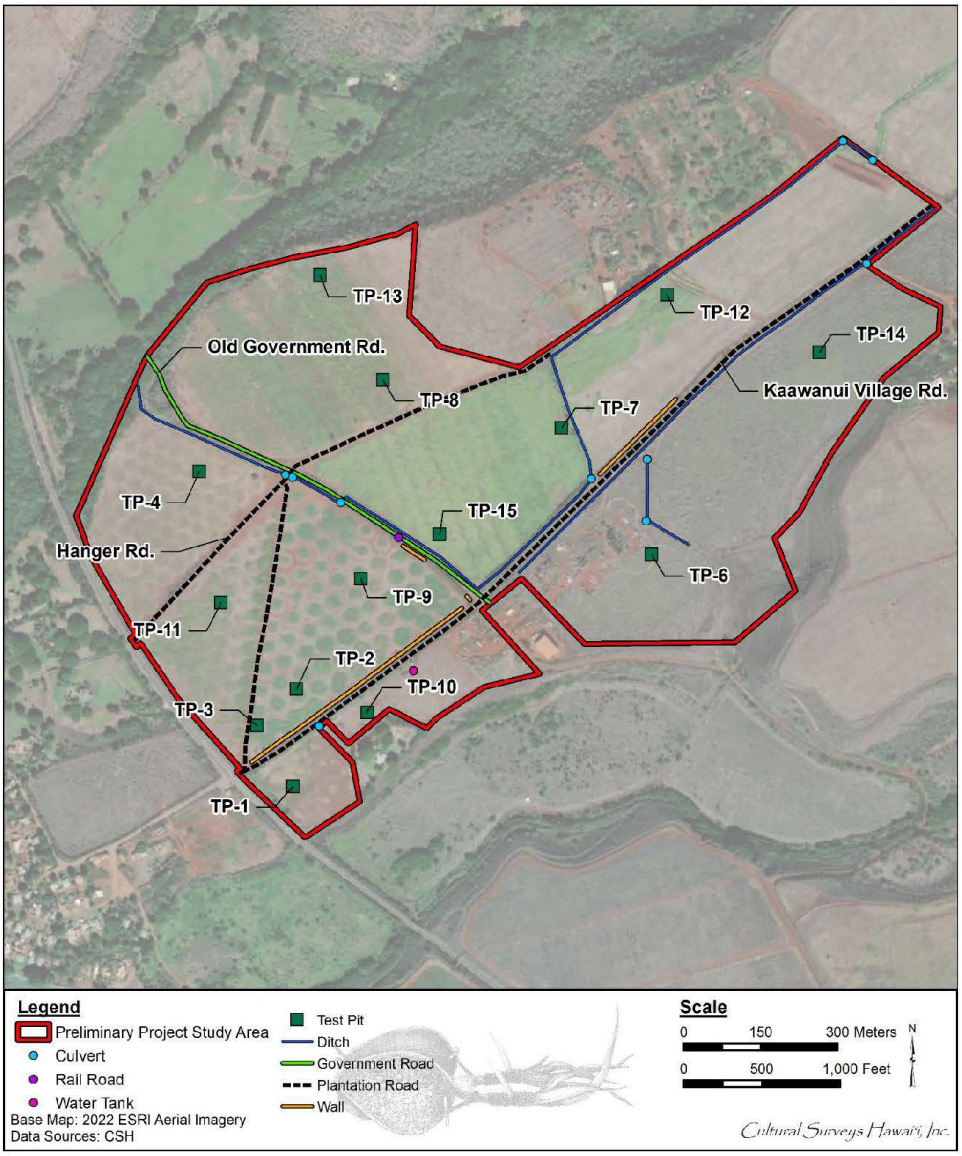


Figure 5. Aerial photo (ESRI 2022) showing the locations of geotechnical test pits in relation to historic features identified by Bautista et al. (2025)



Figure 6. Photo showing a mini excavator trenching Test Pit 2 (TP-2); view to northeast



Figure 7. Photo showing a mini excavator trenching Test Pit 6 (TP-6); view to southeast



Figure 8. Photo showing a mini excavator trenching Test Pit 9 (TP-9); view to west



Figure 9. Photo showing a mini excavator trenching Test Pit 12 (TP-12); view to northeast



Figure 10. Photo showing a mini excavator trenching Test Pit 14 (TP-14); view to north



Figure 11. Photo showing a mini excavator trenching Test Pit 15 (TP-15); view to north

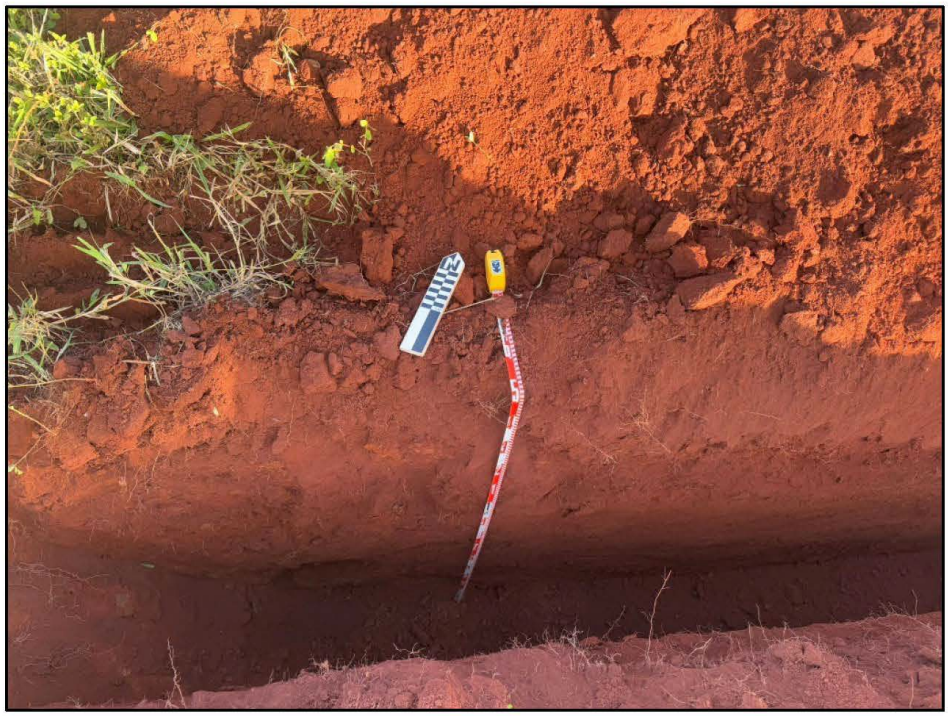


Figure 12. Photo of Profile 1 located along the northern sidewall of Test Pit 1 (TP-1); view to north

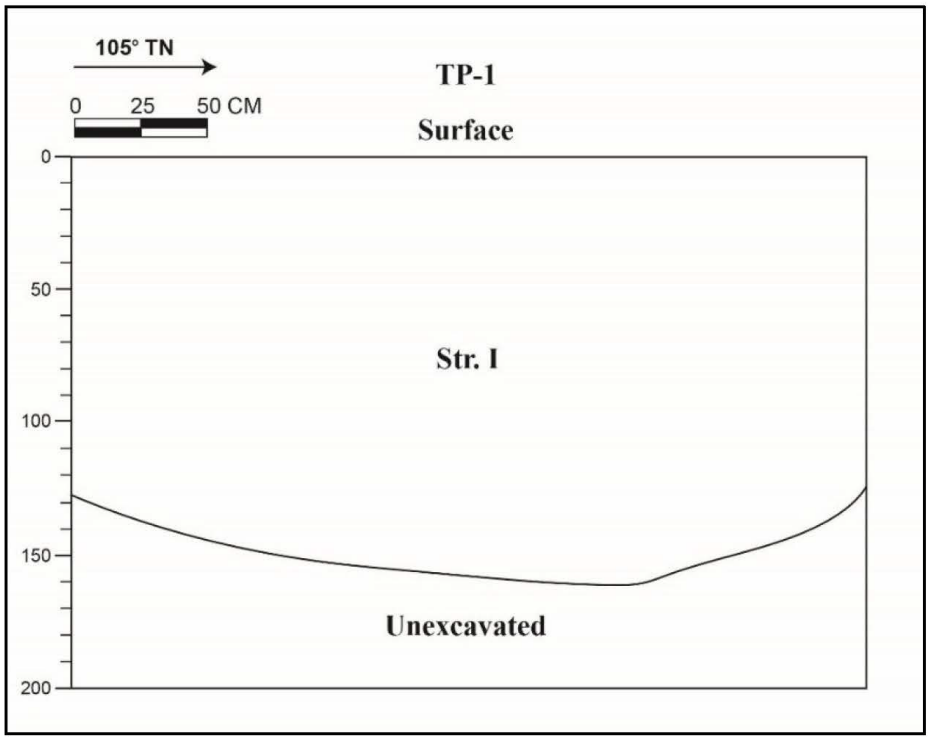


Figure 13. Drawing of Profile 1 located along the northern sidewall of Test Pit 1 (TP-1)

Table 1. Profile 1 stratigraphic description

Stratum	Depth (cmbs)	Description of Sediment
I	0–155 (base of excavation [BOE])	10R 3/3 (dusky red); silty clay loam; weak, fine, granular structure; dry, loose consistence; weak cementation; slightly plastic; terrigenous sediment origin; lower boundary terminating at bedrock; many fine roots; no cultural material present

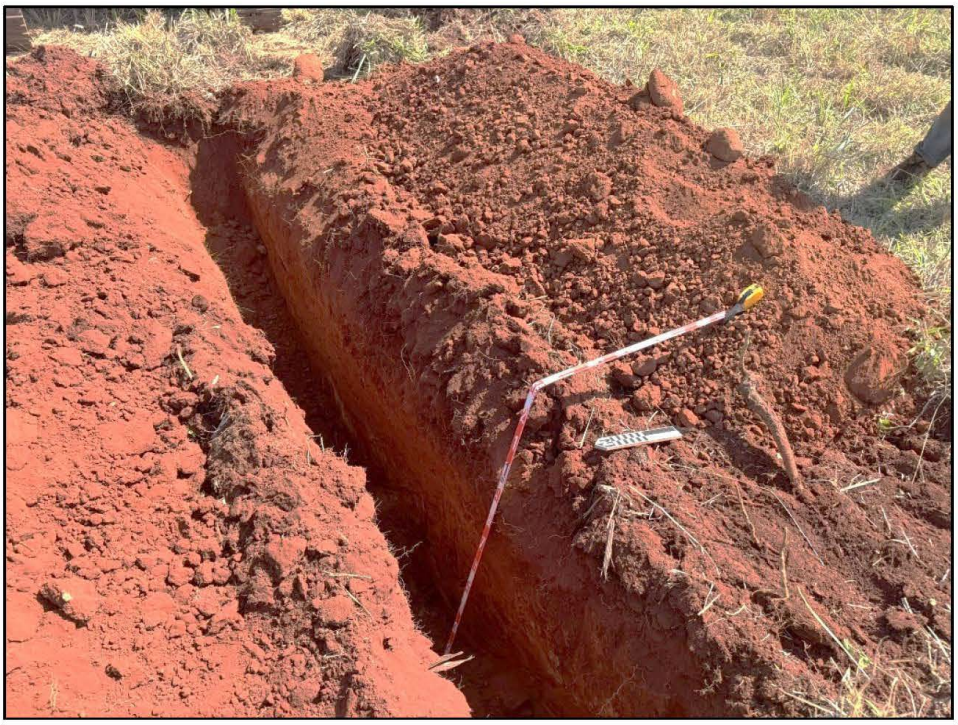


Figure 14. Photo of Profile 2 located along the southern sidewall of Test Pit 2 (TP-2); view to east

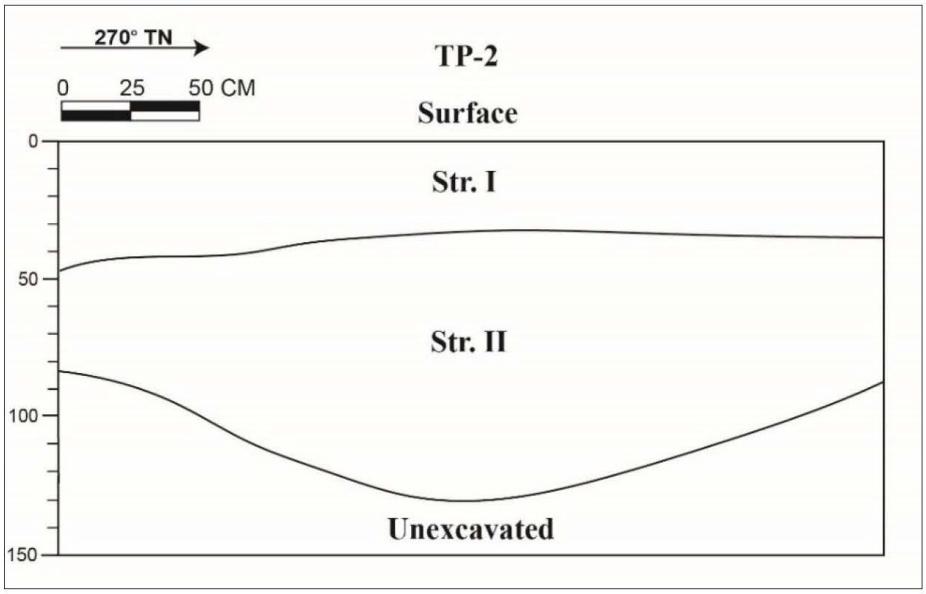


Figure 15. Drawing of Profile 2 located along the southern sidewall of Test Pit 2 (TP-2)

Table 2. Profile 2 stratigraphic description

Stratum	Depth (cmbs)	Description of Sediment
I	0–45	10R 3/3 (dusky red); silty clay loam; weak, fine, granular structure; dry, loose consistence; weak cementation; slightly plastic; terrigenous sediment origin; diffuse, smooth lower boundary; many fine roots; no cultural material present
II	40–130 (BOE)	10R 3/6 (dark red); silty clay loam; weak, fine, granular structure; dry, loose consistence; weak cementation; slightly plastic; terrigenous sediment origin; lower boundary terminating at bedrock; no roots observed; no cultural material present

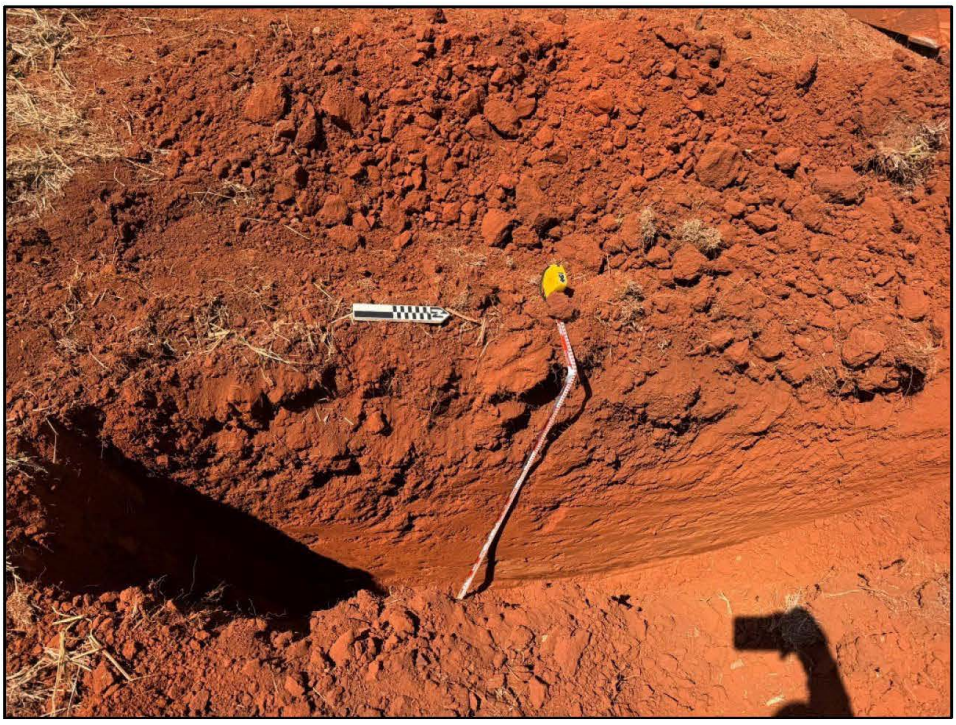


Figure 16. Photo of Profile 3 (TP-3) located along the western sidewall of Test Pit 3 (TP-3); view to west

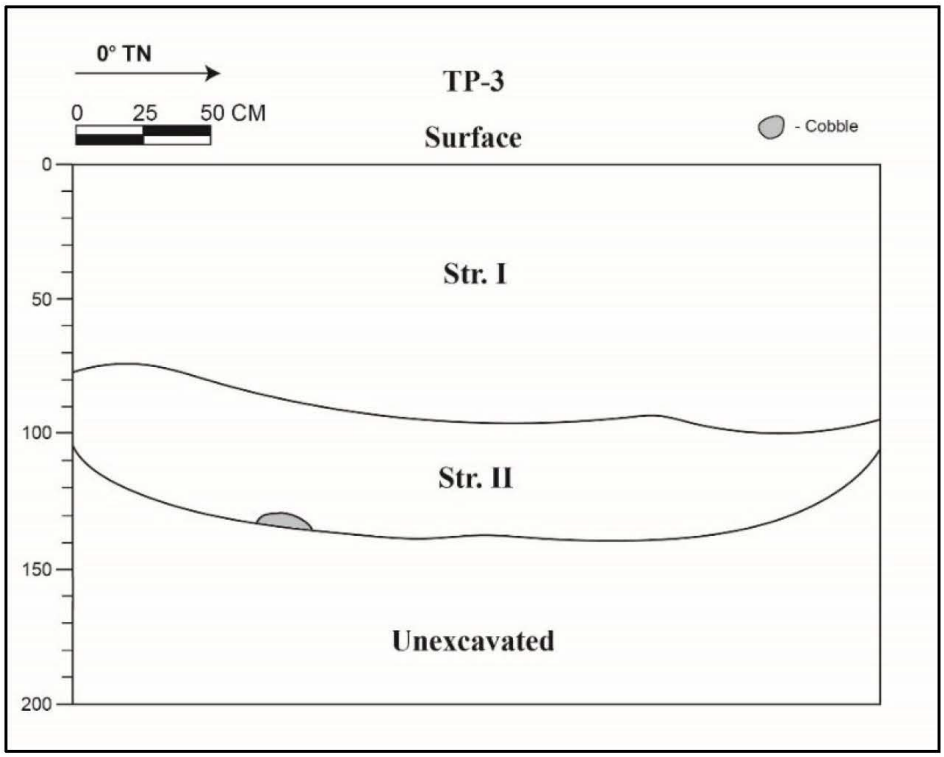


Figure 17. Drawing of Profile 3 located along the western sidewall of Test Pit 3 (TP-3)

Table 3. Profile 3 stratigraphic description

Stratum	Depth (cmbs)	Description of Sediment
I	0–90	10R 3/3 (dusky red); silty clay loam; weak, fine, granular structure; dry, loose consistence; weak cementation; slightly plastic; terrigenous sediment origin; diffuse, smooth lower boundary; many fine roots; no cultural material present
II	75–135 (BOE)	10R 3/6 (dark red); silty clay loam; weak, fine, granular structure; dry, loose consistence; weak cementation; slightly plastic; terrigenous sediment origin; lower boundary terminating at bedrock; no roots observed; one large cobble present at lower boundary; no cultural material present



Figure 18. Photo of Profile 4 located along the southern sidewall of Test Pit 4 (TP-4); view to west

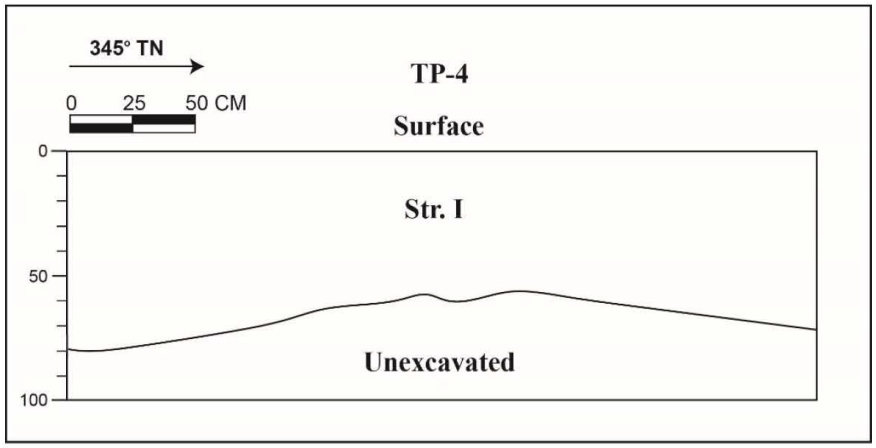


Figure 19. Drawing of Profile 4 located along the southern sidewall of Test Pit 4 (TP-4)

Table 4. Profile 4 stratigraphic description

Stratum	Depth (cmbs)	Description of Sediment
I	0–80 (BOE)	10R 3/3 (dusky red); silty clay loam; weak, fine, granular structure; dry, loose consistence; weak cementation; slightly plastic; terrigenous sediment origin; lower boundary terminating at bedrock; many fine roots; no cultural material present



Figure 20. Photo of Profile 6 located along the northern sidewall of Test Pit 6 (TP-6); view to northwest

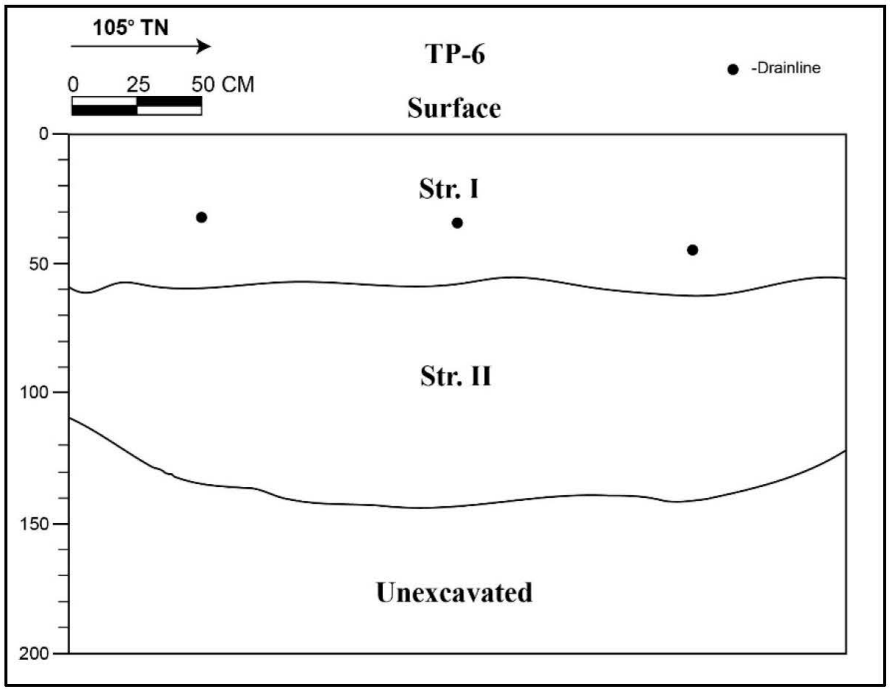


Figure 21. Drawing of Profile 6 located along the northern sidewall of Test Pit 6 (TP-6)

Table 5. Profile 6 stratigraphic description

Stratum	Depth (cmbs)	Description of Sediment
I	0–60	10R 3/3 (dusky red); silty clay loam; weak, fine, granular structure; dry, loose consistence; weak cementation; slightly plastic; terrigenous sediment origin; diffuse, smooth lower boundary; many fine roots; series of modern drain lines present between 30–40 cmbs
II	60–145 (BOE)	10R 4/4 (weak red); silty clay loam; weak, fine, granular structure; dry, loose consistence; weak cementation; slightly plastic; terrigenous sediment origin; lower boundary terminating at bedrock; no roots observed; no cultural material present



Figure 22. Photo of Profile 7 located along the southwestern sidewall of Test Pit 7 (TP-7); view to southwest

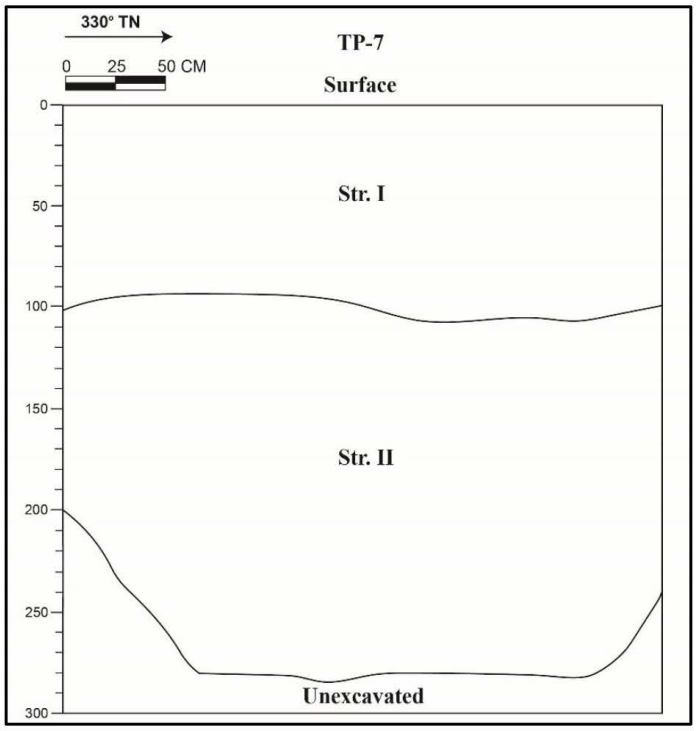


Figure 23. Drawing of Profile 7 located along the southwestern sidewall of Test Pit 7 (TP-7)

Table 6. Profile 7 stratigraphic description

Stratum	Depth (cmbs)	Description of Sediment
I	0–105	10R 3/3 (dusky red); silty clay loam; weak, fine, granular structure; dry, loose consistence; weak cementation; slightly plastic; terrigenous sediment origin; diffuse, smooth lower boundary; many fine roots; no cultural material present
II	100–275 (BOE)	10R 3/6 (dark red); silty clay loam; weak, fine, granular structure; dry, loose consistence; weak cementation; slightly plastic; terrigenous sediment origin; lower boundary terminating at bedrock; no roots observed; no cultural material present



Figure 24. Photo of Profile 8 located along the northeastern sidewall of Test Pit 8 (TP-8); view to northeast

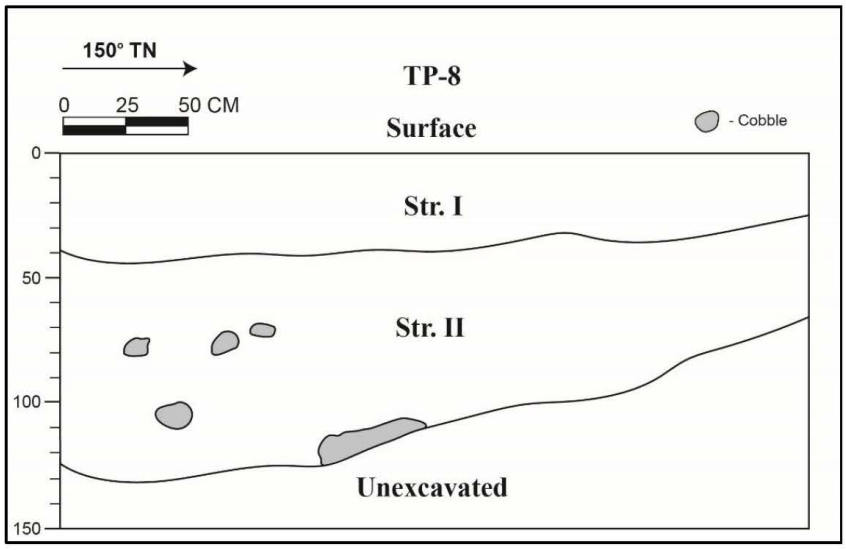


Figure 25. Drawing of Profile 8 located along the northeastern sidewall of Test Pit 8 (TP-8)

Table 7. Profile 8 stratigraphic description

Stratum	Depth (cmbs)	Description of Sediment
I	0–40	10R 3/3 (dusky red); silty clay loam; weak, fine, granular structure; dry, loose consistence; weak cementation; slightly plastic; terrigenous sediment origin; diffuse, smooth lower boundary; many fine roots; no cultural material present
II	30–130 (BOE)	10R 3/6 (dark red); silty clay loam; weak, fine, granular structure; dry, loose consistence; weak cementation; slightly plastic; terrigenous sediment origin; lower boundary terminating at bedrock; no roots observed; includes <10% basalt cobbles; no cultural material present



Figure 26. Photo of Profile 9 located along the southern sidewall of Test Pit 9 (TP-9); view to south

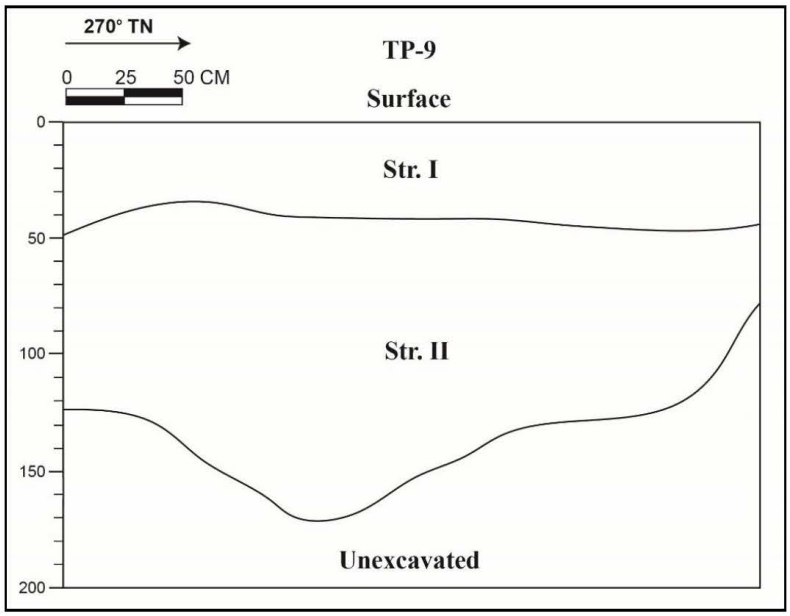


Figure 27. Drawing of Profile 9 located along the southern sidewall of Test Pit 9 (TP-9)

Table 8. Profile 9 sediment description

Stratum	Depth (cmbs)	Description of Sediment
I	0–48	10R 3/3 (dusky red); silty clay loam; weak, fine, granular structure; dry, loose consistence; weak cementation; slightly plastic; terrigenous sediment origin; diffuse, smooth lower boundary; many fine roots; no cultural material present
II	35–170 (BOE)	10R 3/6 (dark red); silty clay loam; weak, fine, granular structure; dry, loose consistence; weak cementation; slightly plastic; terrigenous sediment origin; lower boundary terminating at bedrock; no roots observed; no cultural material present



Figure 28. Photo of Profile 10 located along the northwestern sidewall of Test Pit 10 (TP-10); view to northwest

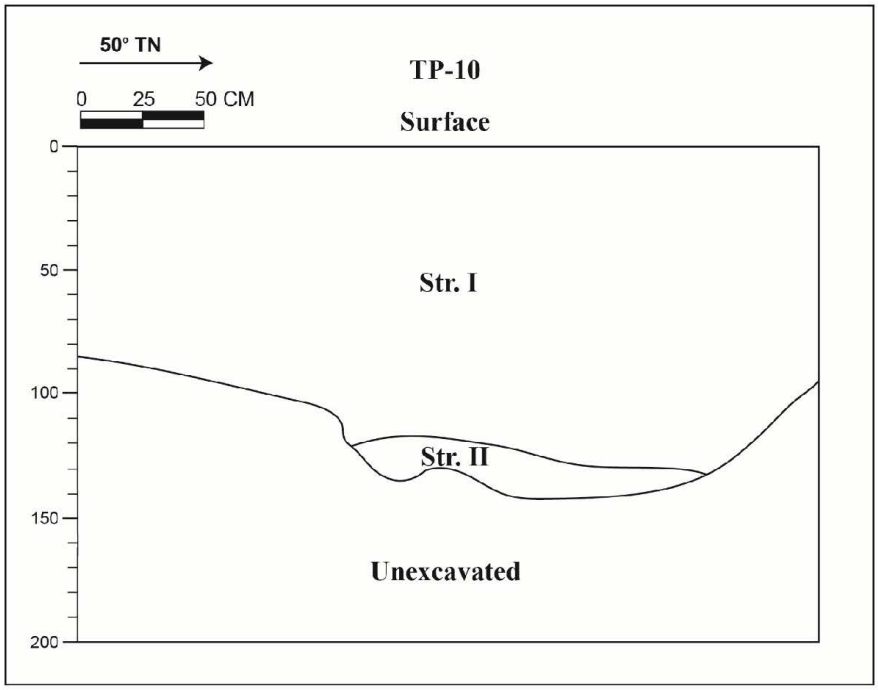


Figure 29. Drawing of Profile 10 located along the northwestern sidewall of Test Pit 10 (TP-10)

Table 9. Profile 10 sediment description

Stratum	Depth (cmbs)	Description of Sediment
I	0–115	10R 3/3 (dusky red); silty clay loam; weak, fine, granular structure; dry, loose consistence; weak cementation; slightly plastic; terrigenous sediment origin; diffuse, smooth lower boundary at Stratum II; many fine roots; no cultural material present
II	110–140 (BOE)	10R 3/6 (dark red); silty clay loam; weak, fine, granular structure; dry, loose consistence; weak cementation; slightly plastic; terrigenous sediment origin; lower boundary terminating at bedrock; no roots observed; no cultural material present



Figure 30. Photo of Profile 11 located along the northern sidewall of Test Pit 11 (TP-11); view to northeast

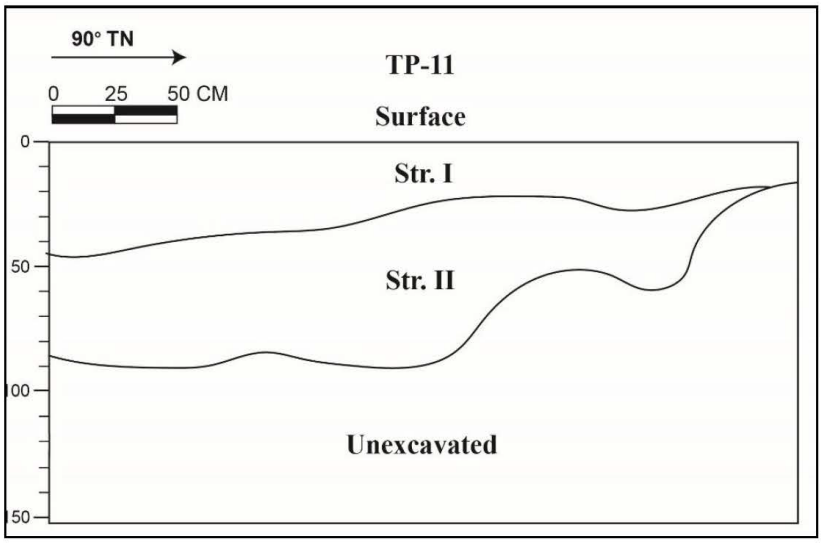


Figure 31. Drawing of Profile 11 located along the northern sidewall of Test Pit 11 (TP-11)

Table 10. Profile 11 sediment description

Stratum	Depth (cmbs)	Description of Sediment
I	0–45	10R 3/3 (dusky red); silty clay loam; weak, fine, granular structure; dry, loose consistence; weak cementation; slightly plastic; terrigenous sediment origin; diffuse, smooth lower boundary; many fine roots; no cultural material present
II	30–90 (BOE)	10R 3/6 (dark red); silty clay loam; weak, fine, granular structure; dry, loose consistence; weak cementation; slightly plastic; terrigenous sediment origin; lower boundary terminating at bedrock; no roots observed; no cultural material present



Figure 32. Photo of Profile 12 located along the northeastern sidewall of Test Pit 12 (TP-12); view to northeast

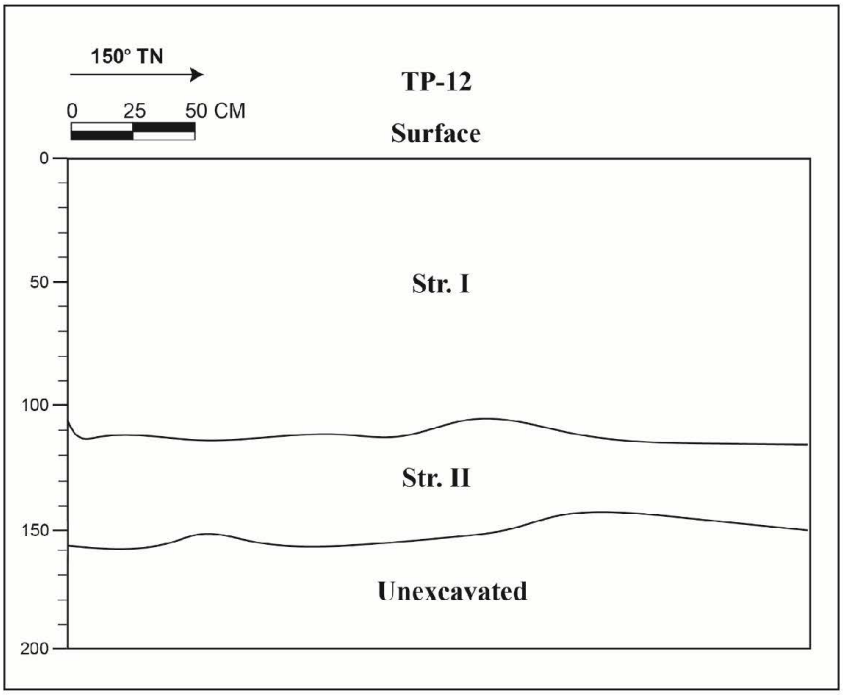


Figure 33. Drawing of Profile 12 located along the northeastern sidewall of Test Pit 12 (TP-12)

Table 11. Profile 12 sediment description

Stratum	Depth (cmbs)	Description of Sediment
I	0–115	10R 3/3 (dusky red); silty clay loam; weak, fine, granular structure; dry, loose consistence; weak cementation; slightly plastic; terrigenous sediment origin; diffuse, smooth lower boundary; many fine roots; no cultural material present
II	110–140 (BOE)	10R 4/6 (dark red); silty clay loam; weak, fine, granular structure; dry, loose consistence; weak cementation; slightly plastic; terrigenous sediment origin; lower boundary terminating at bedrock; no roots observed; no cultural material present

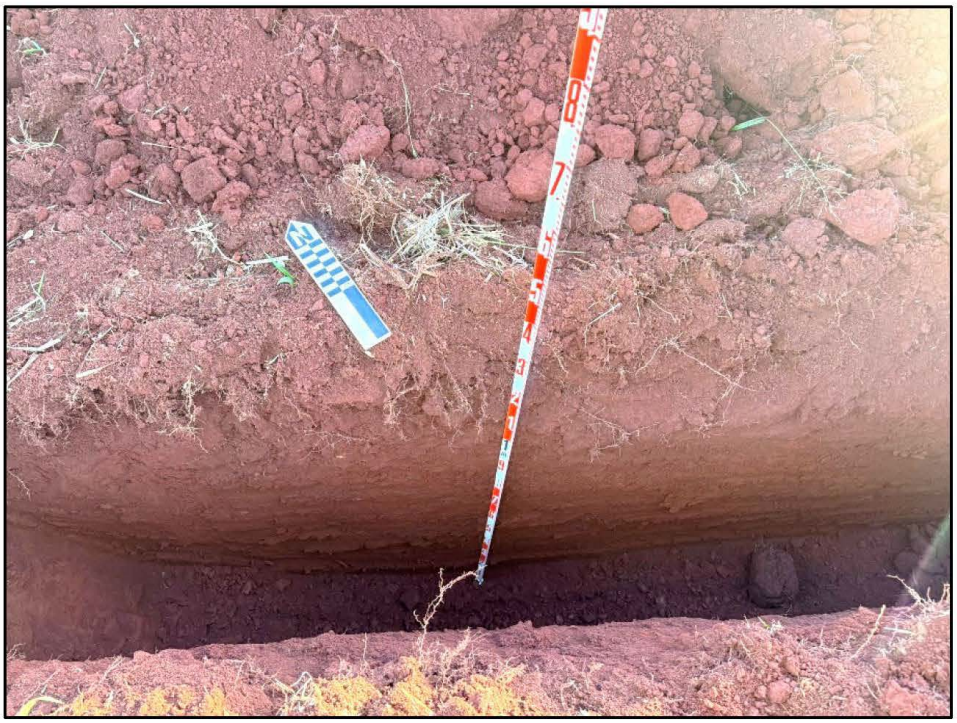


Figure 34. Photo of Profile 13 located along the northeastern sidewall of Test Pit 13 (TP-13); view to northeast

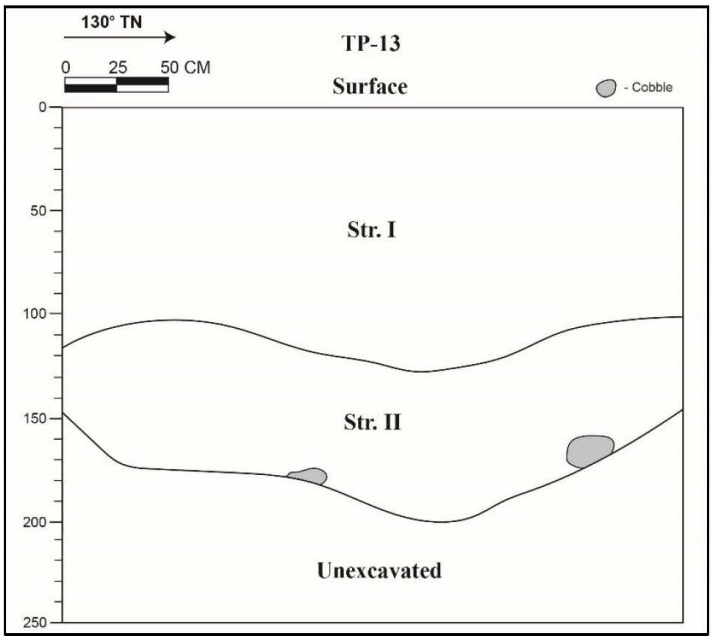


Figure 35. Drawing of Profile 13 located along the northeastern sidewall of Test Pit 13 (TP-13)

Table 12. Profile 13 sediment description

Stratum	Depth (cmbs)	Description of Sediment
I	0–110	10R 3/3 (dusky red); silty clay loam; weak, fine, granular structure; dry, loose consistence; weak cementation; slightly plastic; terrigenous sediment origin; diffuse, smooth lower boundary; many fine roots; no cultural material present
II	150–200 (BOE)	10R 3/6 (dark red); silty clay loam; weak, fine, granular structure; dry, loose consistence; weak cementation; slightly plastic; terrigenous sediment origin; lower boundary terminating at bedrock; no roots observed; includes <10% basalt cobbles; no cultural material present



Figure 36. Photo of Profile 14 located along the eastern sidewall of Test Pit 14 (TP-14); view to east

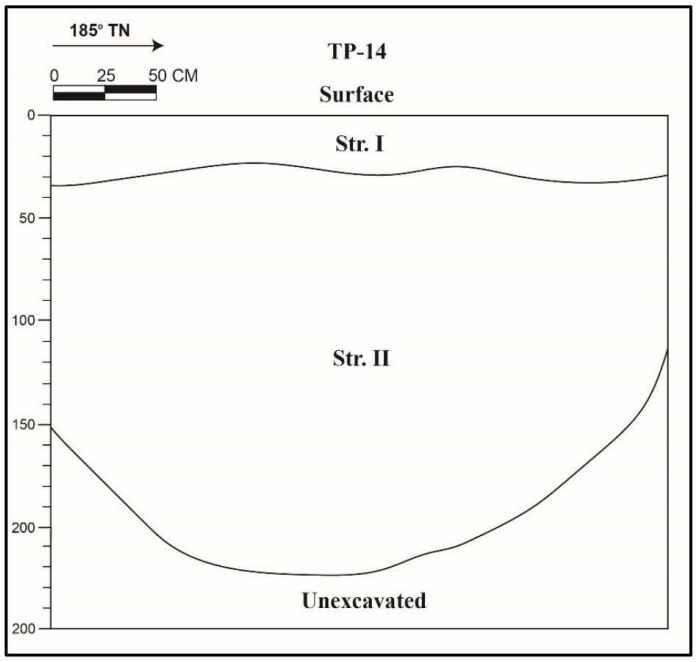


Figure 37. Drawing of Profile 14 located along the northeastern sidewall of Test Pit 14 (TP-14)

Table 13. Profile 14 sediment description

Stratum	Depth (cmbs)	Description of Sediment
I	0–35	10R 3/3 (dusky red); silty clay loam; weak, fine, granular structure; dry, loose consistence; weak cementation; slightly plastic; terrigenous sediment origin; diffuse, smooth lower boundary; many fine roots; no cultural material present
II	30–220 (BOE)	10R 3/6 (dark red); silty clay loam; weak, fine, granular structure; dry, loose consistence; weak cementation; slightly plastic; terrigenous sediment origin; lower boundary terminating at bedrock; no roots observed; no cultural material present

Date: 17 April 2025

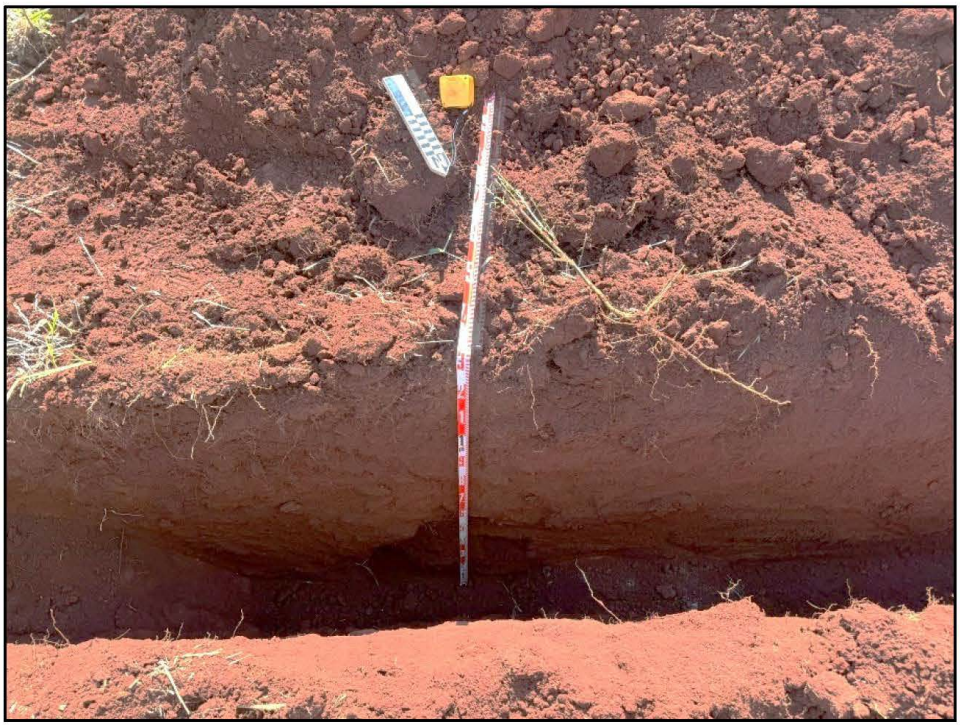


Figure 38. Photo of Profile 15 located along the southwestern sidewall of Test Pit 15 (TP-15); view to southwest

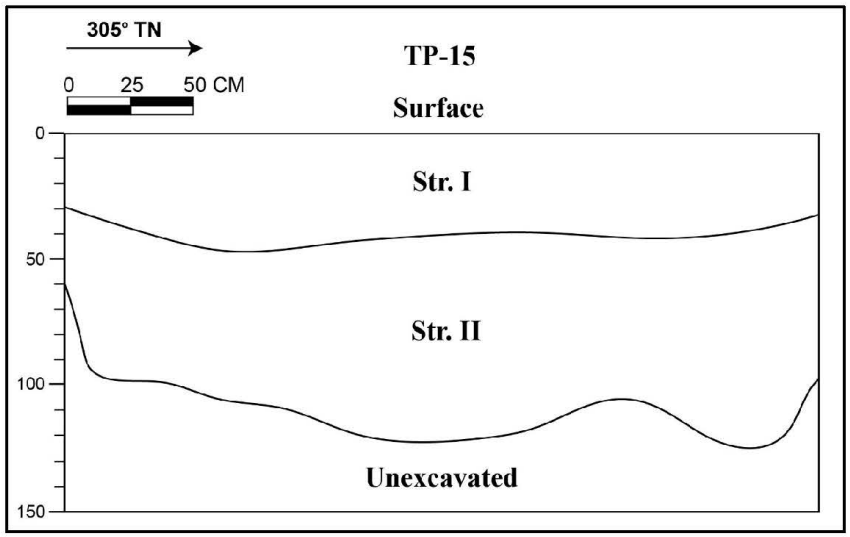


Figure 39. Drawing of Profile 15 located along the northeastern sidewall of Test Pit 15 (TP-15)

Table 14. Profile 15 sediment description

Stratum	Depth (cmbs)	Description of Sediment
I	0–40	10R 3/3 (dusky red); silty clay loam; weak, fine, granular structure; dry, loose consistence; weak cementation; slightly plastic; terrigenous sediment origin; diffuse, smooth lower boundary; many fine roots; no cultural material present
II	30–120 (BOE)	10R 3/6 (dark red); silty clay loam; weak, fine, granular structure; dry, loose consistence; weak cementation; slightly plastic; terrigenous sediment origin; lower boundary terminating at bedrock; no roots observed; no cultural material present

Date: 17 April 2025

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Esri, Inc.
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Hawai‘i Tax Map Key (TMK) Service
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USGS (U.S. Geological Survey)
1996 Hanapepe USGS 7.5-minute topographic quadrangle. USGS Information Services, Denver, Colorado.

Appendix B SHPD Correspondence

Appendix C DRAFT Architectural Reconnaissance Level Survey Report (MASON 2025)

DRAFT Reconnaissance Level Survey, Kaawanui Solar Project, Makaweli Ahupua‘a, Waimea District, Kaua‘i

TMK: [4] 1-7-006: 006 por. and 010 por.

Prepared by MASON under contract to
Cultural Surveys Hawai'i, Inc.

HICRIS Project No. 2025PR00506

September 2025



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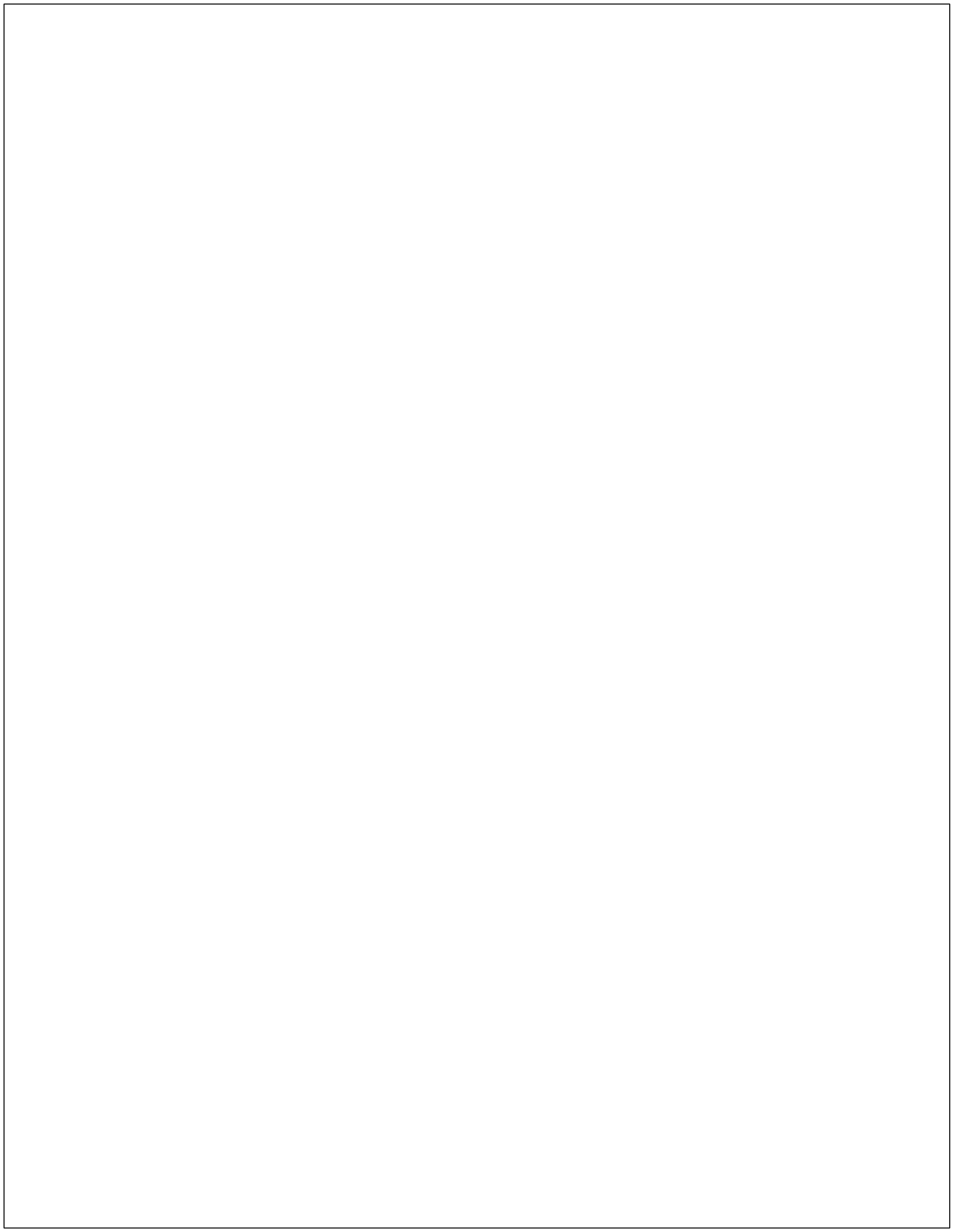


Introduction

Mason Architects, Inc. (MASON) was hired by Cultural Surveys Hawaii, Inc. (CSH) to develop a Reconnaissance Level Survey (RLS) for the Kaawanui Solar Project, Makaweli Ahupua'a, Waimea District, Kaua'i. An Archaeological Literature Review and Field Inspection (LRFI) was completed in April 2025 by CSH.[1,2] It identified the fourteen architectural resources that are studied in this RLS. These consist of six culverts, one board adjusted irrigation gate, one irrigation check and turnout, one irrigation settling box, three roadways, one remnant short section of railroad track, and one water tank. MASON surveyed these fourteen structures and evaluated them for historical significance. The HICRIS number assigned to this project is 2025PR00506.

Identification of Historic Properties (per SB No. 15, At 293)

On July 3, 2025, S.B. No. 15, Act 293, revised the definition of "Historic property." The new definition is: "'Historic property' means any building, structure, object, district, area, or site, including heiau and underwater site, that is over fifty years old and meets the criteria for being entered into the Hawai'i register of historic places." This definition differs from the prior definition, which did not include the text "and meets the criteria for being entered into the Hawai'i register of historic places."

The new Hawai'i Revised Statutes (HRS) §6E-2 definition for historic property now aligns more closely with the definition provided in 36 CFR 800.16, as applicable to NHPA Section 106 processes.

In keeping with these definitions, this RLS has identified no historic properties or resources.

Project Objectives

This RLS was prepared in support of a proposed project to install a photo voltaic system and substation on a portion of the Preliminary Project Study Area. See Figure 1. For this project, Kaawanui Solar, LLC is proposing a 43 MW solar photovoltaic (PV) array and 172 MWh containerized lithium-ion Battery Energy Storage System (BESS) consisting of Photo-Voltaic (PV) solar modules, trackers, Power Conversion Systems (PCSs), BESS containers, and Generator Step Up (GSU) transformers. This PV system will be routed to a proposed 57/69 kV project substation and related interconnection and ancillary features (the Kaawanui Substation). The system and substation will be sited on a portion of the 269-acre Preliminary Project Study Area.

This survey is intended to fulfill historic property identification and significance evaluation requirements for Hawai'i Administrative Rules (HAR) Chapter 13-284 related processes that will be undertaken by the State Historic Preservation Division (SHPD) as they review the proposed project.

[1] Oliver M. Bautista, Samantha Purdy, and Hallett H. Hammatt, *Draft Archaeological LRFI for the Kaawanui Solar + Storage Project (Job Code Makaweli 11)*. April 2025.

[2] Note that Cultural Surveys Hawai'i, Inc. is preparing an archaeological report for this project and has supplied MASON with their temporary site names for the resources covered in this RLS. These site names all include "CSH" in the name and are used here and throughout the RLS.

Methodology

MASON staff visited the Preliminary Project Study Area on July 15, 2025, to photograph and record the resources. See the Evaluation of Significance Section and Table 1 for a complete summary. MASON also performed historical research, including review of historical newspaper articles, histories, hydrological reports, context studies, and historic aerial photographs and maps.

MASON evaluated the structures for significance and integrity in keeping with HAR §13-284-6, Criteria "a-d"; MASON did not evaluate the resource for Criterion "e" ("having important value to the native Hawaiian people or other ethnic group"), as MASON is not qualified or scoped to undertake ethnographic studies. MASON also evaluated the structures for significance and integrity in keeping with Hawai'i Register of Historic Places criteria "A-D" of HAR §13-198-8.

Setting

The Preliminary Project Study Area is located in the open, rural land between the Kekupua Valley and the Mahinauli Gulch, mauka[3] of the Kaumuali'i Highway (Route 50) along the southwest coast of Kaua'i. The Preliminary Project Study Area elevation ranges from about 40' above sea level (at the highway) to about 230.' This land was planted in sugar cane from about 1890 to 2009. The Preliminary Project Study Area now consists of open pasturage for cattle and water buffalo, fruit tree orchard groves, and fallow land with grasses, shrubs, and small trees. The Preliminary Project Study Area is crisscrossed by several dirt roadways, many of which are bordered by mature trees.

[3] Hawaiian word that means "in the direction of the mountains."

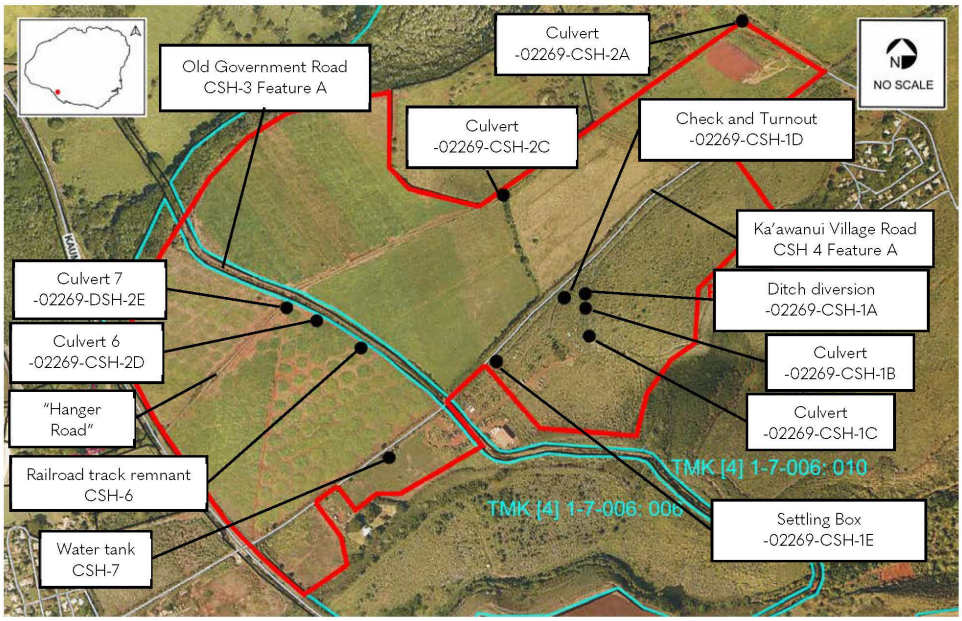


Figure 1. Preliminary Project Study Area for the Kaawanui Solar Project (red outline). The TMK boundaries are shown in cyan and the features surveyed in this RLS are labeled. The feature numbers were assigned by Cultural Surveys Hawai‘i Inc. *Source: Google Earth; Graphic notations; MASON, 2025.*

Historical Overview

"Hawai'i Sugar Co., the dirtiest, dustiest red dirt plantation in Hawai'i." – Jared G. Smith
"Never mind. This is ten-ton dust." – Henry P. Baldwin[4]

Introduction

The Preliminary Project Study Area is part of a 4,848-acre parcel on the west side of Kaua'i that, along with the island of Ni'ihau, Hawaiian King Kamehameha V sold to Eliza McHutchinson Sinclair in 1864 for $10,000. Mrs. Sinclair's grandson, Aubry Robinson (1853-1936) and his cousin Francis Gay (1852-1928), founded the firm of Gay & Robinson (G&R) in 1889 and established a ranch and sugar cane fields on the Kaua'i parcel. Sugar cane was grown in the Preliminary Project Study Area lands from about 1890 to 2009. This was done under a succession of lessees through 1994 and then under G&R until they ceased sugar operations in 2010.

Hawaiian Sugar Co. and Subsequent Tenants

The original lease of G&R land for a proposed sugar plantation was the ca. 1887 lease to William Renny Watson of Glasgow, Scotland, who was in Hawai'i as a representative of the Scottish firm Mirlees, Watson & Yaran Co. that manufactured heavy machinery. The firm had maintained a presence in Hawai'i since the 1875 Treaty of Reciprocity, promoting the sugar industry with the goal of selling equipment to sugar plantations and mills.[5] Watson's thirty-eight-year lease was to be paid in sugar to G&R. Watson proposed building a sugar mill on part of the property. G&R retained a large portion of land to grow their own sugar, which would be milled at Watson's proposed mill. In early March 1888, Watson invited Henry P. Baldwin to join his venture. He had already secured provisional investment commitments from James Campbell and Charles Reed Bishop. Baldwin offered $10,000 to enter the partnership.[6]

Watson returned to Scotland and in 1889 the Alexander and Baldwin families had a summer vacation in Europe. Also in Europe that summer was E. M. Walsh, a former manager of Alexander & Baldwin's (A&B) Paia sugar plantation, who had recently graduated from Harvard Law School. Walsh met with Watson, who related that he wanted Hawaiian interests to take the lead in developing a sugar plantation on his leased G&R land. Watson related this information to Henry Baldwin, and Baldwin and Samuel T. Alexander agreed to take the lead on the new plantation. On October 30, 1889, the Hawaiian Sugar Co. was incorporated in Hawai'i by Watson, Baldwin, Alexander, Walsh, Campbell, Bishop, and George W. McFarlane. Baldwin, Alexander, and Walsh held a majority of the 20,000 shares of stock issued at $100 par to a total of twenty-five subscribers.[7]

Only a few days later, the lease was transferred from Watson to Alexander and Baldwin for a consideration to Watson of $50,000 and the right to appoint two directors. Watson was also assured that all orders for mill, railway, and cultivation equipment would go to John Fowler &

[4] Jesse C. Conde, with Gerald M. Best. *Sugar Trains, Narrow Gauge Rails of Hawai'i*. (Felton CA: Glenwood Publishing). 1973. 134.; William H. Dorrance, and Francis S. Morgan, *Sugar Islands: The 165-year Story of Sugar in Hawai'i*. (Honolulu: Mutual Publishing). 2000. 33.
[5] Conde, *Sugar Trains*. 134.
[6] Arthur L. Dean, *Alexander & Baldwin, Ltd. and the Predecessor Partnerships*. (Honolulu: Alexander & Baldwin). 1950. 31.
[7] Dean, *Alexander & Baldwin*. 32.

Co. of London.[8] George McFarlane was Watson's representative in Hawai'i and executed the agreement. Baldwin also had G&R extend the lease to a fifty-year term. G&R retained 600 acres of land (raised to 700 acres in 1900) to cultivate their sugar cane and tasked Hawaiian Sugar Co. to cultivate and mill it. The Hawaiian Sugar Co. lands reached from the Hanapēpē River in the east to the Waimea River in the west. The fields G&R retained were scattered within this area, with a large concentration along the coastline north and northwest of the mill. G&R also retained some fields in the far mauka reaches of cultivation. In mid-1892 the Hawaiian Sugar Co. mill was under construction at Makaweli about 1½ miles southeast of the Preliminary Project Study Area and Hawaiian Sugar Co. had about 2,200 acres of cane under cultivation. The Hawaiian Sugar Co. mill was the second largest in the Kingdom after Maui's Hawaiian Commercial & Sugar Co. See Figures 2-4.The first Hawaiian Sugar Co. crop was milled in early 1893 and in July of that year, the company's Honolulu agent, W.G Irwin & Co., announced a stock dividend.[9]



Figure 2. Ca. 1895 view of the Hawaiian Sugar Co. mill. *Source: Conde, Sugar Trains.*

Henry Baldwin and Samuel Alexander became the agents for Hawaiian Sugar Co. in 1898 and in 1900 the two partners incorporated their business dealings as Alexander & Baldwin, Ltd. (A&B). The investments of stock subscribers that started the plantation were paid for in installments. The plantation was quite successful and got on a paying basis when only seventy percent of the investments were collected. In mid-1899 stockholders voted to declare the company stock fully paid and shortly after the par value was reduced to $20 and the stock split five shares for one. Although Henry Alexander and Samuel Baldwin were major players in the Hawaiian sugar community, controlling Hawaiian Sugar Co. as well as other major operations, they were chronically short of cash and typically had outstanding debts. The men formed the Makaweli Sugar Co., incorporated in San Francisco, as a parent company of Hawaiian Sugar Co., using Hawaiian Sugar Co. stock as assets. They were able to sell Makaweli stock while keeping enough to control both it and Hawaiian Sugar Co.[10] The Makaweli Sugar Co. was a synthesis of Hawaiian

[8] Research for this report did not discover why Mr. Watson represented Mirlees, Watson & Yaryan Co, in 1887 and then referred equipment purchases to John Fowler & Co.

[9] Dean, *Alexander & Baldwin*. 33.; Jesse C. Conde, with Gerald M. Best. *Sugar Trains, Narrow Gauge Rails of Hawai'i*. (Felton CA: Glenwood Publishing). 1973. 136.

[10] Dean, *Alexander & Baldwin*. 61.; 'A 'Missionary' Trick," *The* [Honolulu] *Independent*. September 4, 1899. 2.

Sugar Co. sugar cane operation, the sugar mill at Makaweli, and the approximately 600 acres of G&R cane. See Figure 3 and Figure 4.

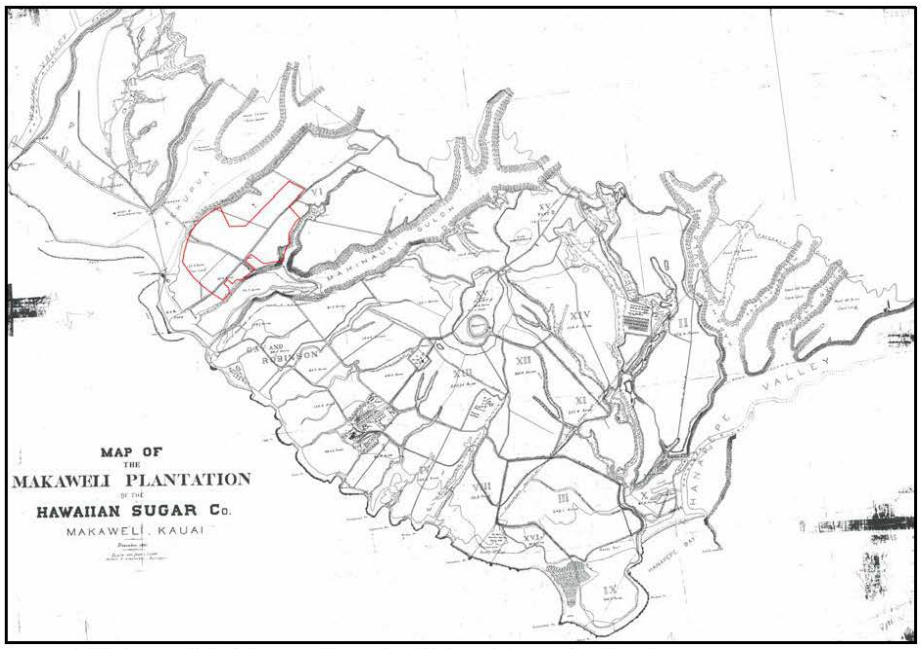


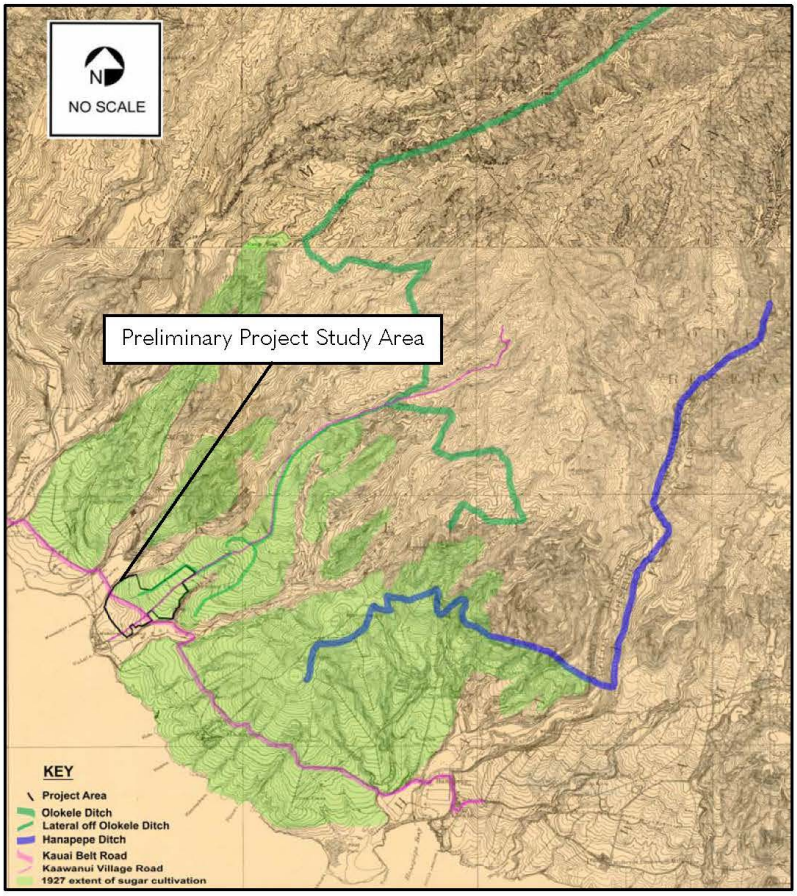
Figure 3. 1901 map of the Hawaiian Sugar Co./Makaweli Sugar Co. North at top. *Source: DAGS, Reg. Map 2144. December 1901.*

The plantation manager of Hawaiian Sugar Co. for twenty-five years during the early 20th century was Henry Baldwin's nephew, Benjamin D. Baldwin (1867-1928). Benjamin was renowned on Kaua'i for his well-received paternal management style that provided for Hawaiian Sugar Co. workers. Under his management, the plantation was one of the first in Hawai'i to construct modern worker family housing with plumbing and electricity, offer medical care to workers, and provide community social and recreation programs for family members. His son, Douglas E. Baldwin (1894-1970) subsequently managed Hawaiian Sugar Co.[11]

By 1910 Hawaiian Sugar Co. had 3,235 acres of cane under cultivation and (as Makaweli Sugar Co.) was also cultivating 674 acres for G&R. See Figure 6. Hawaiian Sugar Co. manager B.D. Baldwin stated that the cane was expected to have excellent yields of high quality juice "higher in sucrose and purity than [he had] ever seen" in the area and would be a "record breaker." Baldwin made a conservative estimate of sugar yield for the 1910 season of 19,667 tons for the Hawaiian Sugar Co. acreage.[12] This conservative estimate of 1910 production by Baldwin belied the actuality of production; Hawaiian Sugar Co. production exploded during 1905-1909 to an

[11] A.B Gilmore, *The Hawai'i Sugar Manual, 1939.* (New Orleans: A.B. Gilmore). 1939. 146. William H. Dorrance, and Francis S. Morgan, *Sugar Islands: The 165-year Story of Sugar in Hawai'i.* (Honolulu: Mutual Publishing). 2000. 33.
[12] "Excellent Showing of Hawaiian Sugar," *Hawaiian Star.* February 26, 1910. 10.

average of over 20,000 tons per year, due to increased acreage for planting and new irrigation sources.[13] To support the shipping of sugar to the U.S. mainland, Hawaiian Sugar Co., in conjunction with Kaua'i Railway Co., built a rail track system, ca. 1910, to the wharf at Port Allen and improved the facilities there, which allowed steamship transports to call at Port Allen. See Figure 8. Both Hawaiian Sugar Co. and adjacent McBryde Sugar Co. used the Port Allen facility.[14] Through the 1930s the Hawaiian Sugar Co. consistently ranked in the top three Kaua'i producers of sugar, vying with Līhu'e Plantation Co. and Kekaha Sugar Co. Hawaiian Sugar Co. production was typically around 20,000 tons through about 1924 and then rose to over 30,000 tons for 1930 to 1938. The maximum production year for Hawaiian Sugar Co. was 1932 when 37,633 tons of sugar were produced.[15]



[13] Dean, *Alexander & Baldwin*. 103.
[14]. Dean, *Alexander & Baldwin*. 104.
[15] *The Hawai'i Sugar Manual*. Various dates.; Hawaiian Sugar Planters Association, *Story of Sugar in Hawai'i*. (Honolulu: HSPA). 1925. 93.; Dean, *Alexander & Baldwin*. 151, 215.

Figure 4. Shading was added to this map to emphasize features described in the text. Note that the extent Hawaiian Sugar Co./Makaweli Sugar Co. cultivation is ca. 1927. *Source: USGS, Hanapēpē Quadrangle. 1910.*

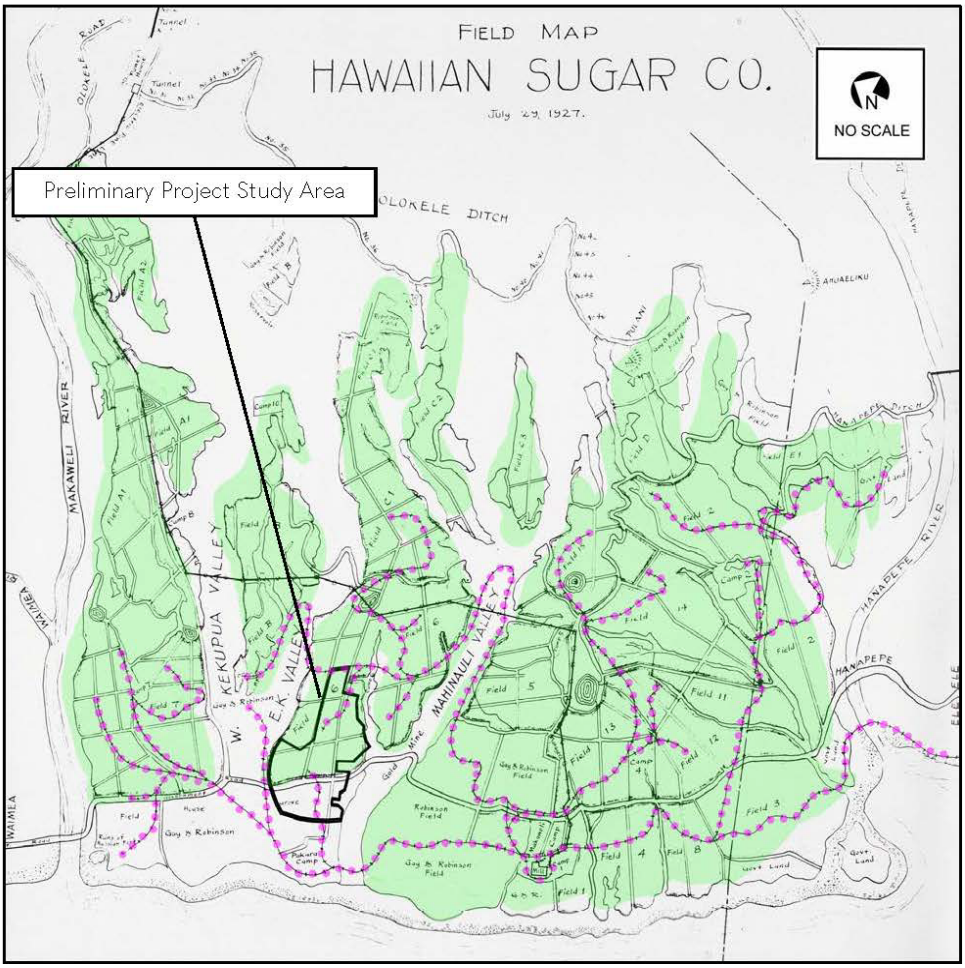


Figure 5. This 1927 map shows the field numbering of Hawaiian Sugar Co. cane fields. Added green shading shows the approximate extent of cane cultivation and the extent of railroad tracks is highlighted in magenta dots. *Source: Conde, Sugar Trains.*

Although Hawaiian Sugar Co.'s success paid a good rent to G&R, consisting of the profits on G&R's retained 700 acres, there were frequent controversies and conflict between the two corporations. This ranged from disagreements over water rights, to uncertainty where lease boundaries lied, to petty conflicts over trespassing animals. Both sides professed a sincere desire for harmony, but it remained elusive, most likely due to a lack of mutual confidence. As Hawaiian Sugar Co.'s fifty-year-lease approached its 1938 end, disagreements over renewal

terms surfaced. A two-year extension was agreed upon that lengthened the lease to December 31, 1940, as the corporations negotiated. G&R wanted more land for its own sugar that Hawaiian Sugar Co. did not want to give up. Each side rejected the other's proposals and in 1940 Hawaiian Sugar Co. began wrapping up the company's affairs in preparation for liquidation. G&R wanted to purchase the mill so they could harvest. Honolulu sugar agent C. Brewer & Co. organized a new plantation in 1940, Olokele Sugar Co., that purchased the mill and took over a new lease on the G&R lands that ran until the year 2000. Olokele Sugar Co. was basically the same plantation as Hawaiian Sugar Co. but with new management and control. Hawaiian Sugar Co. dissolved and vacated its lease on Makaweli lands on July 31, 1940.[16]

Olokele's lease allowed G&R the extra cane land they could not achieve in their negotiations with Hawaiian Sugar Co. After a poor tonnage yield in 1942 as the new Olokele Sugar Co. began operations, its yearly production tonnage hovered near 20,000 tons for the ensuing years. This typically placed Olokele as the fourth largest producer of sugar on Kaua'i, with Līhu'e Plantation co., Kekaha Sugar Co., and McBryde Sugar Co. occupying the top three positions.[17]



Figure 6. Port Allen in 1932, the year of maximum sugar production for Hawaiian Sugar Co. *Source: NARA II, file # 23938159. July 1, 1932.*

[16] Dean, *Alexander & Baldwin*. 152, 218. Dorrance, *Sugar Islands*. 34.
[17] William H. Flanagan, ed., Hawai'i Sugar Manual, 1947-1948. (New Orleans: Gilmore Publishing). 1948. 11.



Figure 7. Aerial view of the Makaweli Hawaiian Sugar Co. mill. *Source: NARA II, File # 23938077. Jan. 10 1933.*



Figure 8. This 1943 aerial view shows a typical cultivated portion of the Olokele Sugar Co. plantation (formerly Hawaiian Sugar Co.). View facing northeast, the mill at Makaweli is seen in the wooded area at lower right center, and a small portion of Mahinauli Valley is seen at the left edge. The two round reservoirs in the background are the terminations of the Hanapēpē Ditch. The Preliminary Project Study Area is out of view to the left. *Source: NARA II, File # 23938129. January 6, 1943.*

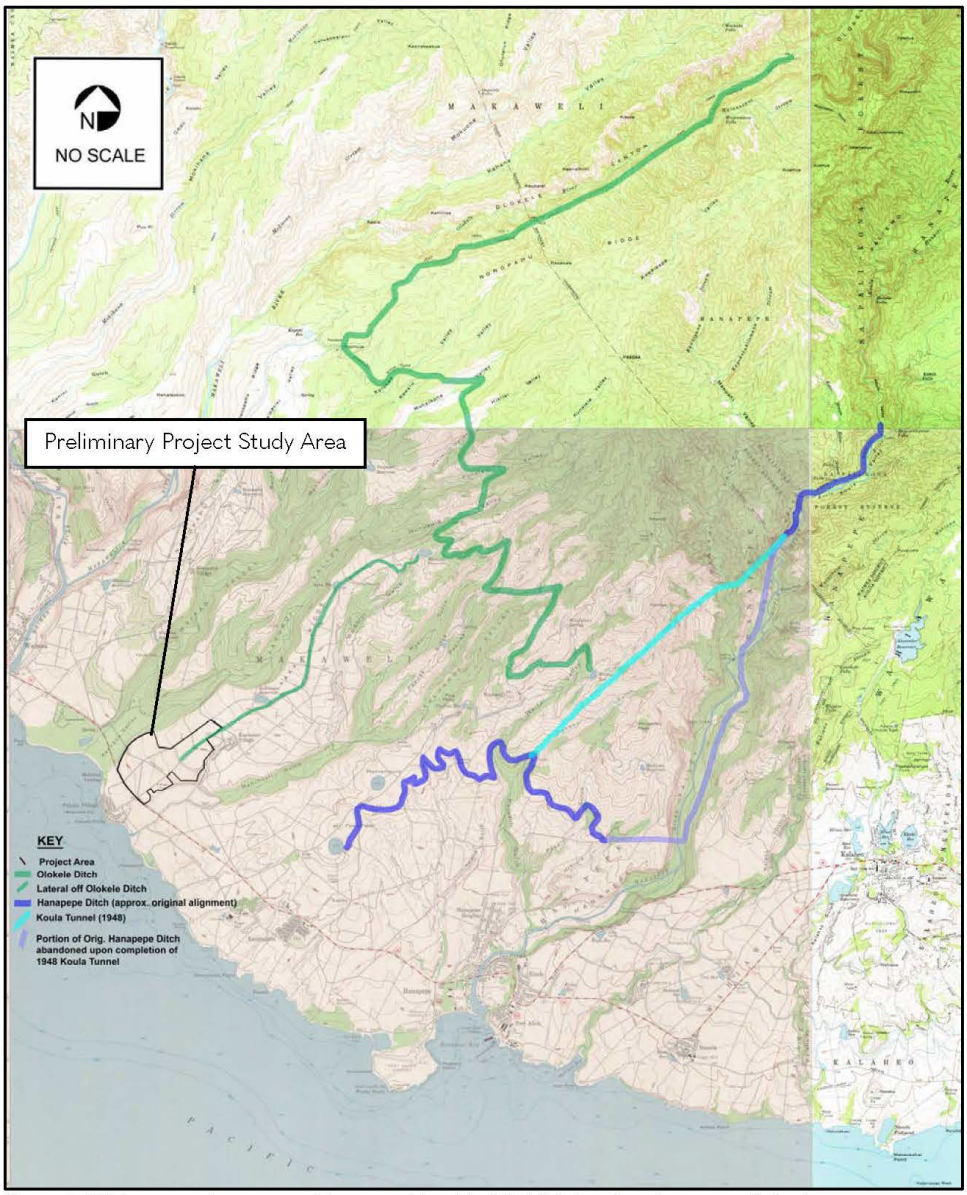


Figure 9. 1963 composite topographic map with added highlighting showing some of the features described in the text. *Source: USGS, Topographic maps. 1963.*

11

In 1972, Olokele Sugar Co. was the first plantation in Hawai'i to use drip irrigation it its sugar cane fields. The increased irrigation efficiency provided by its drip system was a benefit to Olokele's bottom line, but the plantation, like all in Hawai'i, was about to be hit by a cataclysm in sugar pricing. In the mid-1970s, worldwide sugar demand far outstripped supplies and prices skyrocketed. This prompted the U.S. Congress to remove import restrictions and taxes on imported sugar and remove exiting domestic sugar quotas and acreage restrictions. This caused worldwide sugar production to increase and prices to drop dramatically, so low that U.S. producers could not cover the cost of production. Congress implemented price support, but between 1970 and 1980 nine Hawai'i plantations ceased operations. Due to unpredictable world production rates, the price of sugar shot back up and Congress cancelled its legislative support for the industry. This price uncertainty, the resulting whipsawing of government support, and the advent of the U.S. corn sweetener industry put a tremendous strain on Hawaiian sugar producers that many could not weather and more Hawai'i plantations closed in the 1980s.[18]

Olokele Sugar Co., sited on some of the best sugar land in Hawai'i, was able to maintain operations until 1994. That year its agent, C. Brewer & Co., feeling that the future of sugar in Hawai'i was a dim prospect, decided to close the plantation. C.Brewer also cited the impending 2001 expiration of the Olokele lease from landowner G&R.

C. Brewer was reluctant to undertake necessary major improvements in the plantation without some kind of assurance from G&R that they could expect to make a return on those investments with a new 21st century lease.[19] C. Brewer sold the mill at Makaweli and all equipment to the landowner G&R in April 1994. G&R continued to grow cane on 7,500 acres and mill sugar. Olokele's employees were retained by G&R, and since the Olokele workers were unionized, G&R employees also joined the ILWU upon the transition.[20] G&R made a multi-million-dollar investment in new equipment for their sugar plantation and mill. The expanding costs of repairing plantation roadway and irrigation systems were significant. From 2003 to 2006 G&R estimated it incurred between $8m and $12m in losses. The Gay & Robinson Inc. sugar plantation at Makaweli closed in 2010 after processing the harvest from the 2009 crop.[21]

[18] C. Allen Jones and Robert V. Osgood, *From King Cane to the Last Sugar Mill.* (Honolulu: University of Hawai'i Press). 2015. 181-183.; Dorrance, *Sugar Islands*. 35.
[19] Jan TenBruggencate, "Kaua'i plantation buys out rival." *Honolulu Advertiser*. February 19, 1994. C 1.
[20] Dorrance, *Sugar Islands*. 35.
[21] "Ethanol deal ends sugar era on Kaua'i," *Honolulu Advertiser*. September 11, 2008. 1.

Irrigation Ditches at Hawaiian Sugar Co.

Irrigation was of paramount importance to the plantations that raised sugar cane in the Preliminary Project Study Area. Henry P. Baldwin understood that as he negotiated with G&R in 1889 to lease the land that would become the Hawaiian Sugar Co. In 1889, shortly after Hawaiian Sugar Co. was created, construction began on the Hanapēpē Ditch. This ditch's layout and engineering was by Baldwin himself, although he had no formal engineering training. Baldwin had closely participated in the planning and construction of the 1878 Hāmākua Ditch on Maui, which gave him sufficient insight on planning the route for Hanapēpē Ditch. The Hanapēpē Ditch, completed in 1891, collected Hanapēpē River water at an elevation of about 900' and delivered it to the eastern portions of the Hawaiian Sugar Co. plantation, down to about 415' elevation.[22]

Although the Hanapēpē Ditch was a great asset for the eastern portion of Hawaiian Sugar Co.'s fields, Baldwin knew that more water, delivered at high elevations, would unlock the growing potential of the western and farther mauka lands of the lease that could be brought under more intense cultivation. G&R controlled both the water rights, particularly the Olokele River near the west end of the plantation, and the potential upper fields. On December 31, 1900, Hawaiian Sugar Co. received permission from G&R to construct the Olokele Ditch to collect water from the Olokele River at about 1,475' elevation and bring it down to about the 1075' elevation level. See Figure 9 and Figure 5. In this agreement, G&R received the additional 100 acres of sugar land that brought their total acreage in the Hawaiian Sugar Co. plantation to 700 acres. A subsequent agreement with G&R, executed on April 1, 1901, allowed Hawaiian Sugar Co. to lease the land below the elevation of the new Olokele Ditch and above the elevation of the existing (1889) Hanapēpē Ditch, which entered the plantation from the northwest and traversed at about 415' elevation. The effects of the new Olokele Ditch and the expanded acreage under cultivation are evident in the Hawaiian Sugar Co. production figures for 1901-1909. The average ton of sugar produced each year jumped from about 12,000 tons to about 20,000 tons in 1905, the year after the Olokele Ditch was completed.[23]

In planning the Olokele Ditch, Hawaiian Sugar Co. drew up agreements for the land it needed to obtain the water from the river. G&R did not sign several of them, unsure they were authorized to make such agreements. "Not withstanding [sic] the dubious status of the tenure of the land, the Hawaiian Sugar Co. went ahead with its [ditch] development and cultivation."[24] This would become a point of contention between the two that fueled future disagreements.

The Olokele Ditch was engineered by Michael O'Shaughnessy, who later engineered other significant irrigation ditches in Hawai'i (including 1905 Ko'olau Ditch, Maui; 1907 Kohala Ditch, Big Island; and the Upper and Lower Hāmākua Ditches, Big Island, 1907 and 1910, respectively). The ditch was the first in Hawai'i to use long lengths of tunnel to move water through headlands, a departure from the common practice of using open ditches excavated on the contour of the terrain. Construction commenced in 1902. Once complete, it included eight miles of 7' diameter tunnels and five miles of open ditch, and cost about $360,000. The Olokele Ditch had an average flow of 66 million gallons per day (mgd) and since it had relatively little open ditch,

[22] Carol Wilcox, *Sugar Water, Hawai'i's Plantation Ditches*. (Honolulu: University of Hawai'i Press). 1996. 86.
[23] Dean, *Alexander & Baldwin*. 103.
[24] Dean, Alexander & Baldwin. 104.

only required five ditch men for maintenance. This efficiency and volume drove the 1905 increase in Hawaiian Sugar Co. yields.[25]

The Preliminary Project Study Area, in the western portion of the former Hawaiian Sugar Co. plantation's fields, was historically supplied with irrigation water via a lateral ditch from the Olokele Ditch. The Preliminary Project Study Area consists mostly of the ca. 1927 Hawaiian Sugar Co. Field No. 6, which occupied the mauka portion of the Preliminary Project Study Area, mauka of the Old Government Road.[26]

The lateral ditch that supplied Field 6 was about 3 miles long. It extended down Aaka Ridge (which lies between Aakuku Valley and Waikoloi Gulch) from its beginning at the Olokele Ditch in Honuaula Valley. Ca. 1910 this lateral ditch emptied into a small reservoir at about 360' elevation that is in the approximate location of the 1950 Ka'awanui Reservoir, which was a new reservoir built on the site of the earlier one. From this ca. 1910 reservoir, two lateral ditches extended downslope toward the current Preliminary Project Study Area, one lateral on either side of the unpaved mauka extension of Ka'awanui Village Road. Upon reaching the mauka boundary of the Preliminary Project Study Area, the lateral on the east side of the road extended directly downslope along the east side of Ka'awanui Village Road. The west lateral branched off to the northwest at the mauka Preliminary Project Study Area boundary and turned makai at a point that is uphill of the end of present-day "Hanger Road"[27] and almost directly in line with the orientation of that road. The west lateral ditch ran downhill along the alignment of present-day "Hanger Road".[28]

At the time of the field work for this report in July of 2025, the east lateral was abandoned, and the west lateral had flowing water. CSH assigned the following designations for these resources as part of their survey effort for the Kaawanui Solar Project; the east lateral is currently called -02269-CSH-1 and the west lateral is called -02269-CSH-2. The abandoned east lateral and the functioning west lateral have has been assigned Hawai'i State Inventory of Historic Places (SIHP) number 50-30-09-02269.[29] Ditch Check and turnout -02269-CSH-1D, Settling Box -02269-CSH-1E, Ditch Diversion -02269-CSH-1A, Culvert -02269-DSH-1B, and Culvert -02269-CSH-1C in this RLS report are on the alignment of the east lateral. The alignment of the west lateral ditch has been changed over time since 1910 and Culverts -02269-CSH-2A, -02269-CSH-2C, -02269-CSH-2D, and -02269-CSH-2E are on the present-day alignment of the west lateral ditch.

In 1946, Olokele Sugar Co. and C. Brewer contracted for a $500,000 improvement to the 1891 Hanapēpē Ditch. This consisted of a lengthy stretch of two tunnels totaling about 17,000' (3¼ miles), that bypassed a long section of flumes and siphons where the ditch was routed along the Hanapēpē River south of Kālai Stream. After fifty-five years of use, these flumes and siphons were apparently leaking out and wasting a lot of irrigation water, leading to their replacement by the tunnels, which were collectively called Koula Tunnel. Subsequently, the Hanapēpē Ditch was

[25] Wilcox, *Sugar Water*. 89.
[26] Conde, *Sugar Trains*. 136.
[27] CSH provided MASON with an explanation that, "Per James Robinson, this road has informally been referred to as ""Hanger Road"" for discussion of this project, but is technically an unnamed road."
[28] USGS, Hanapēpē Quadrangle topographic map. 1910.
[29] Oliver M. Bautista, Smanatha Purdy, and Hallett H. Hammatt, *Draft Archaeological LRFI for the Kaawanui Solar + Storage Project (Job Code Makaweli 11)*. April 2025.

commonly referred to as the Koula Tunnel Ditch. Construction of the Koula Tunnel was likely accomplished by workers employed by the landowner, G&R. Before the Koula Tunnel was built, the two corporations with rights to Hanapēpē River Water, G&R and McBryde Sugar Co., diverted most all of the river water in a quota allotment that kept both reasonably satisfied. The construction of the tunnel allowed more water to be taken out by G&R and Olokele Sugar Co. and upset this allotment balance, diminishing the water that was available for McBryde's irrigation intakes downstream. McBryde filed suit against G&R. The matter was settled by the Hawai'i Supreme Court's 1973 decision, commonly known as the McBryde Decision, which ruled that normal surplus waters belong to the State of Hawai'i and not to private landowners.[30]

Ca. 1946, while the east lateral was in service, two ditch features were built along its length at about the 170' elevation level and at about the 125' elevation level. The upper feature (-02269-CSH-1D), built of concrete and CRM, appears to have functioned as a check and turnout to divert ditch water into a conduit to feed adjacent fields. This feature has a gate across the ditch to back water up into a receiving basin that then flows into a conduit. The lower feature (-02269-CSH-1E), built of concrete, appears to have functioned as a settling box to allow sand and gravel to settle out of the ditch water. It has a gate across the ditch to back water up into a settling box.

Irrigation water was still routed down the east lateral through the early 1970s. An orthophoto quad map by the USGS dated 1977 shows that by that year a new board adjusted gate (-02269-CSH-1A) was added at about the 180' elevation level that functioned to dump excess water out of the east lateral ditch into the nearby Ka'awanui Gulch.[31] By 2000, an aerial photograph indicates that the west lateral irrigation ditch was re-routed to its present alignment.[32] This consisted of turning it to the south southeast away from "Hanger Road" at a point about 1/3 mile north of "Hanger Road's" intersection with Old Government Road. When the route of the ditch met Ka'awanui Village Road it was routed south along that road to Old Government Road where it turned northwest along that road. The west lateral ditch currently (2025) runs along Old Government Road to cross the Aaukui Stream (out of the Preliminary Project Study Area) on a concrete bridge that has been re-purposed to also serve as a ditch flume.

[30] "Olokele Giving Favorable Report to Stockholders," *Honolulu Star Bulletin*. March 22, 1946. 2.; Wilcox, *Sugar Water*. 86-90.; Jerry Tune, "State Eyes Water Rights." *Honolulu Star Bulletin*. August 15, 1975.
[31] USGS, Hanapēpē Quadrangle, orthophotoquad map. 1977
[32] UH Mānoa, MAGIS Collection, Aerial Photograph # 2720. April 30, 2000.

Hawaiian Sugar Co. Railroad

The Hawaiian Sugar Co. began building its railroad system upon the formation of the company, and by 1891 the plantation had over five miles of track laid and two steam locomotives from the Baldwin Locomotive Works of Philadelphia. Locomotives purchased by the Hawaiian Sugar Co. since 1891 were all 30" gauge.[33] See Figure 10.

HAWAIIAN SUGAR PLANTATION COMPANY
SURPLUS
January 10, 1941

#1 Steam locomotive — 30" gauge weight 21,000 lbs. 4 drivers Purchased 1891	$1,000
#2 Steam locomotive — 30" gauge Weight 38,700 lbs. 4 drivers New boiler and frame 1938	$2,500
#3 Steam locomotive — 30" gauge Weight 38,700 lbs. 4 drivers New boiler 1923 — Purchased 1893	$1,500
#4 Steam locomotive 30" gauge weight 44,000 lbs. 4 drivers New boiler 1928	$2,000
#5 Steam locomotive — 30" gauge Weight 53,300 lbs. 6 drivers Purchased 1912	$3,000
#6 Steam locomotive — 30" gauge Weight 49,300 lbs. 6 drivers	$4,000
Baldwin Whitcomb Diesel Mechanical Drive Locomotive — 30" gauge Weight 20,000 lbs. Purchased June 1938	$3,950

Figure 10. This table shows that Hawaiian Sugar Co. locomotives were all 30" gauge. *Source: Conde, Sugar Trains.*

By 1891 the plantation also had five miles of portable track and about 250 cane cars. By December 1901 the Hawaiian Sugar Co. had a spur of permanent rail track extending into the Preliminary Project Study Area from a main line that ran near the coastline. This spur extended mauka up Ka'awanui Village Road from Pākalā Camp near Makaweli Landing to end just mauka of Old Government Road. Note that Figure 3, a 1901 map, shows a fence line running parallel to the spur about 700' to the northwest. See Figure 11.[34]

Planning for the land that could be cultivated once Olokele Ditch was complete, the company began extending permanent track northwest of the mill. In 1904 over six miles of new track was laid and an additional five miles was underway the following year. These new lines were extended into the lower areas of cultivation; harvested cane from the upper fields was flumed down to points along these tracks and loaded into cane cars for the mill. Ca. 1909 Hawaiian Sugar Co. joined with McBryde Sugar Co. to access Port Allen with rail track and improve the port. In 1912, after the purchase of several more locomotives, the permanent track was extended to some mauka fields and plantation camps, including Camp 5 at about 400' elevation (the mill at

[33] Conde, *Sugar Trains*. 135.
[34] Arthur C. Alexander, "Map of the Makaweli Plantation of the Hawaiian Sugar Co." DAGS Registered Map # 2144. December 1901.

Makaweli was located at about 90′ elevation). By 1920 Hawaiian Sugar Co. railroad was using 30lb rails for both their permanent and portable track. Standard dimensions for this weight of rail track are 3⅛" height and base, and 1 11/16" width of the rail.[35]

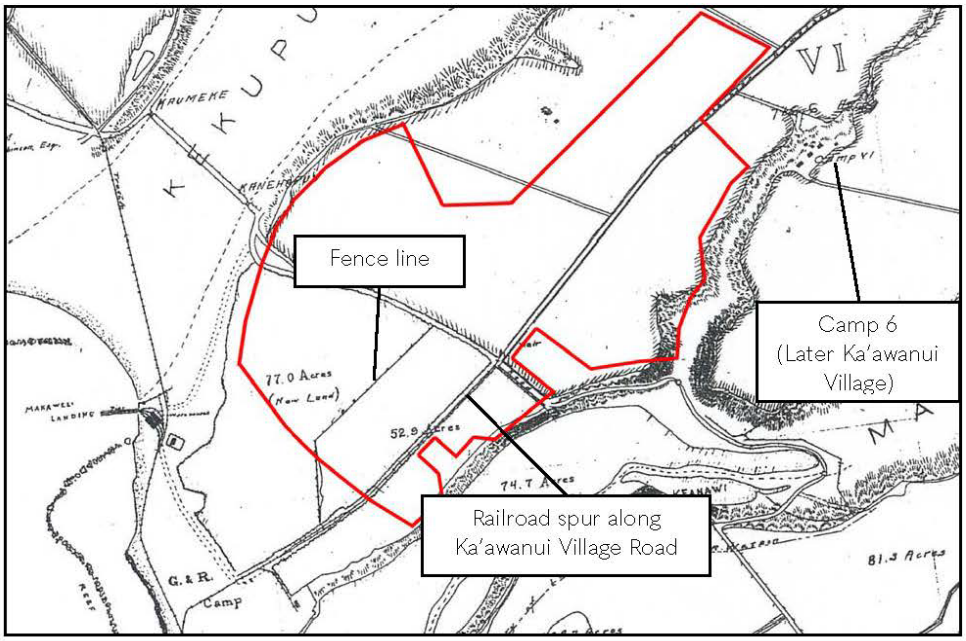


Figure 11. Detail of Figure 3, 1901 field map of the Hawaiian Sugar Co. (Makaweli Sugar Co.) showing rail lines, fences, and housing camps. The Preliminary Project Study Area is highlighted with an added red outline. North at top. *Source: (Alexander) DAGS Registered Map # 2144. December 1901.*

From early on, Hawaiian Sugar Co. experimented with and adopted modern mechanization methods. Ca. 1920, the plantation switched from coal to fuel oil power for their locomotives. In 1924, the plantation experimented with loading cane onto rail cars mechanically, with crane derricks mounted on earthmovers. At the time, other plantations relied on workers to manually load rail cars, carrying harvested cane on their backs up the ramps.[36]

By 1927 Hawaiian Sugar Co. had developed a rail spur that extended mauka from Pākalā Camp and crossed Old Government Road about 750′ northwest of Ka'awanui Village Road.[37] See Figure 5. In 1931 the plantation had about thirty-five miles of permanent track and four- and one-half miles of portable track, six steam locomotives, 600 cane cars, fifteen sugar cars, and thirty-

[35] Conde, *Sugar Trains*. 134.; *ASCE Rail Specifications*, website https://railroadrails.com/knowlege/rail-section-dimensions/ accessed on July 9, 2025
[36] This manual loading of cane was termed "hāpai-ko" by the plantations (hāpai = to lift, ko = sugar cane).
[37] Hawaiian Sugar Co. Field Map Hawaiian Sugar Co. July 29, 1927. In Conde, *Sugar Trains*. 136.

five flatbed cars for hauling portable track. In 1931 some fluming was still being employed to bring cane down from the highest fields. Spent flume water was routed into irrigation ditches.[38]

Olokele Sugar Co. took over the Hawaiian Sugar Co. plantation in 1940.

The next year, just a few months before the December 7th, 1941, Japanese attack on Pearl Harbor, which brought the United States' into World War II, Olokele retired their railroad in favor of truck hauling. They used locomotives for the 1941 harvest season that ended in July. On July 23, 1941, employees gathered around festooned locomotives to celebrate the end of the plantation's railroad. See Figure 12.

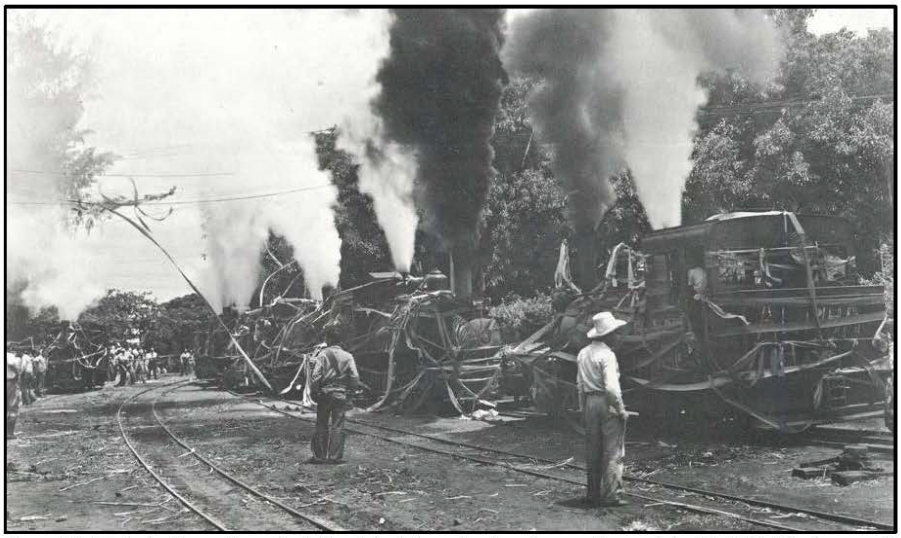


Figure 12. Olokele Sugar Co. plantation's last day of railroad operations, July 23, 1941. The locomotives were decked out in ribbons and steam whistles blasted. *Source: Conde, Sugar Trains.*

After the 1941 harvest, most of the permanent rail tracks were removed.

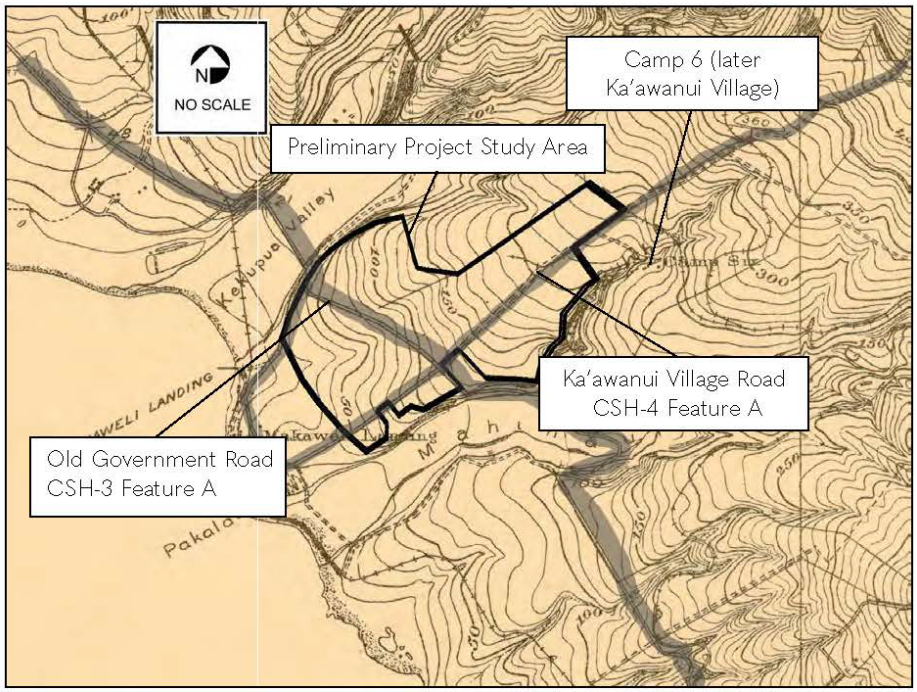
For the 1941-42 season, the plantation used mechanical harvesting and hauled cane to the mill via eleven 7-ton dump trucks.[39] Finished sugar was trucked to the shipping facility at Port Allen under contract with Kaua'i Terminals, Ltd.[40] This was the first time in Hawai'i that a plantation used mechanical can harvesting and truck hauling exclusively. Most other plantations' transition to trucking would take place later, after the end of World War II, in 1946 or 1947.

[38] Conde, *Sugar Trains*. 135.
[39] "Hawaiian Sugar Co. is Experimenting with Cane-Loaders," *Honolulu Star Bulletin*. February 9, 1924. 2.; Clarice B. Taylor, "Olokele To Be First Fully Mechanized Plantation." *Honolulu Star Bulletin*. September 29, 1941. 2.
[40] William H. Flanagan, ed., Hawai'i Sugar Manual, 1947-1948. (New Orleans: Gilmore Publishing). 1948. 218.

Hawaiian Sugar Co. Roadways

The system of roadways in the Preliminary Project Study Area today has its origins with a ca. 1891 wagon road that connected 'Ele'ele with the Waimea Plantation. By December 1901, this section of wagon road was established as the Old Government Road.[41] By ca. 1910, the Old Government Road was enhanced with improvements (widening, paving, and some straightening of curves) by the County of Kaua'i that made it part of the Kaua'i Belt Road in the Makaweli area. Figure 13.

The ca. 1910 roadway retained the name Old Government Road and was also referred to as the Kaua'i Belt Road. The County of Kaua'i was established in 1905, five years after Hawai'i was annexed to the United States. The establishment of county government enabled infrastructure development on the island, including building a belt road to improve access, commerce, and construction for the residents and business owners. The first County Engineer was civil engineer Joseph Moragne (1864-1937), who largely completed the Kaua'i Belt Road by the end of his tenure in 1915.[42]



[41] L.E. Imlay, "Map of Kaua'i Compiled from Government Surveys and Private Surveys of Lands Belonging to Gay and Robinson." DAGS Registered Map 2246. 1891.; Arthur C. Alexander, "Map of the Makaweli Plantation of the Hawaiian Sugar Co." DAGS Registered Map # 2144. December 1901.

[42] Dawn Duensing, Hawai'i's Scenic Roads, Paving the Way for Tourism in the Islands. (Honolulu: University of Hawai'i Press). 2015. 58.

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Figure 13. 1910 topographic map with added highlighting to show roads in the Preliminary Project Study Area. *Source: USGS, Hanapēpē Quadrangle. 1910.*

By 1901 today's Ka'awanui Village Road had also been built. Its name at that time is not known. This road was unpaved where it extended mauka of the Old Government Road, while the section going makai to Pākalā Village and Makaweli Landing was paved.[43] The section mauka of the Old Government Road provided access to Hawaiian Sugar Co. housing area Camp 6, which was called Ka'awanui/Ka'awanui Camp by 1949.[44] From 1910 to at least 1983 today's Ka'awanui Village Road extended a good distance mauka of the Old Government Road, about five and a half miles. This took the road over the Olokele Ditch and terminated at a group of three small buildings at the 1880' elevation level in Kunalele Valley. Today's Ka'awanui Village Road paralleled the lateral ditch that supplied Field 6 for a portion of this mauka section.[45]

By 1927 "Hanger Road" was built and Field 6 was divided into neat rectangles by it and other field roads. In 1927 the Old Government Road marked the makai boundary of Hawaiian Sugar Co. cane fields. Makai of this road the Preliminary Project Study Area is indicated as a "grove" on a historic (1927) map with the settlement of Pākalā at the coastline outside the Preliminary Project Study Area.[46] By 1950 the earlier neat pattern of roads in the Preliminary Project Study Area was changed by re-alignments and road additions, but the Old Government Road, Ka'awanui Village Road, and "Hanger Road" retained their historic alignments, as they do currently.[47] Field roads within the cultivated areas were formed and abandoned as planting and harvest needs shifted. For example, from about 1950 unnamed diagonal field roads crossed the cultivated fields. See Figure 14 and Figure 15.

[43] Arthur C. Alexander, "Map of the Makaweli Plantation of the Hawaiian Sugar Co." DAGS Registered Map # 2144. December 1901.; USGS, "Hanapēpē Quadrangle, topographic map." 1910.
[44] "Kaua'i Filipino Dies Following Stabbing," Honolulu Star-Bulletin. December 24, 1949. 37.
[45] USGS, "Hanapēpē Quadrangle, topographic map." Various dates.
[46] Conde, *Sugar Trains*. 136.
[47] USGS, "Aerial photograph, Flightline GS-MF, Photo K1-75." November 21, 1950.

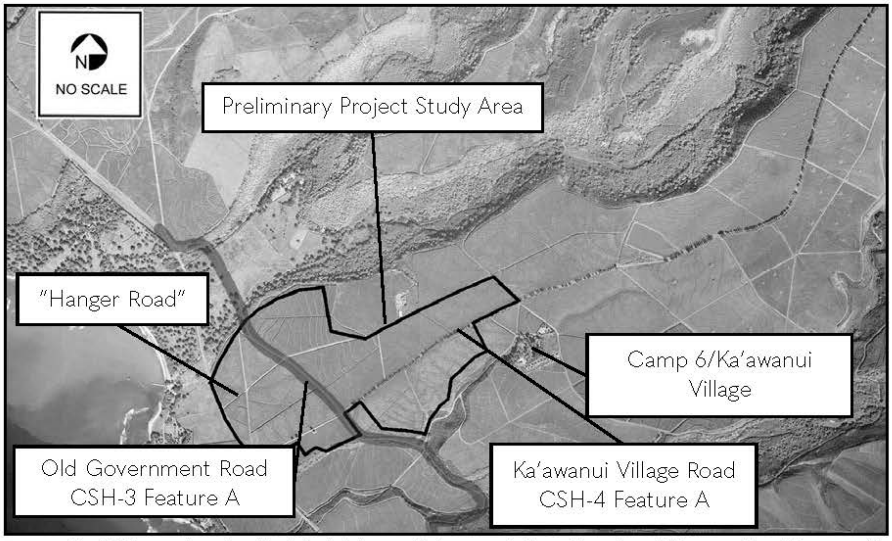

Figure 14. 1950 aerial with added highlighting. Ka'awanui Village Road and "Hanger Road" are visible. *Source: USGS, Flightline GS-MF, Photo K1-75. November 21, 1950.*

The current alignment of Kaumuali'i Highway (Route 50) that defines the makai boundary of the Preliminary Project Study Area was built ca. 1938. This highway bypassed the section of the Old Government Road from near Hawaiian Sugar Co.'s mill at Makaweli to the north rim of Kekupua Valley.[48]

[48] "Waimea Scans New Federal Highway Name," Honolulu Advertiser. August 6, 1938. 7.; USGS, "Hanapēpē Quadrangle, topographic map." 1963.

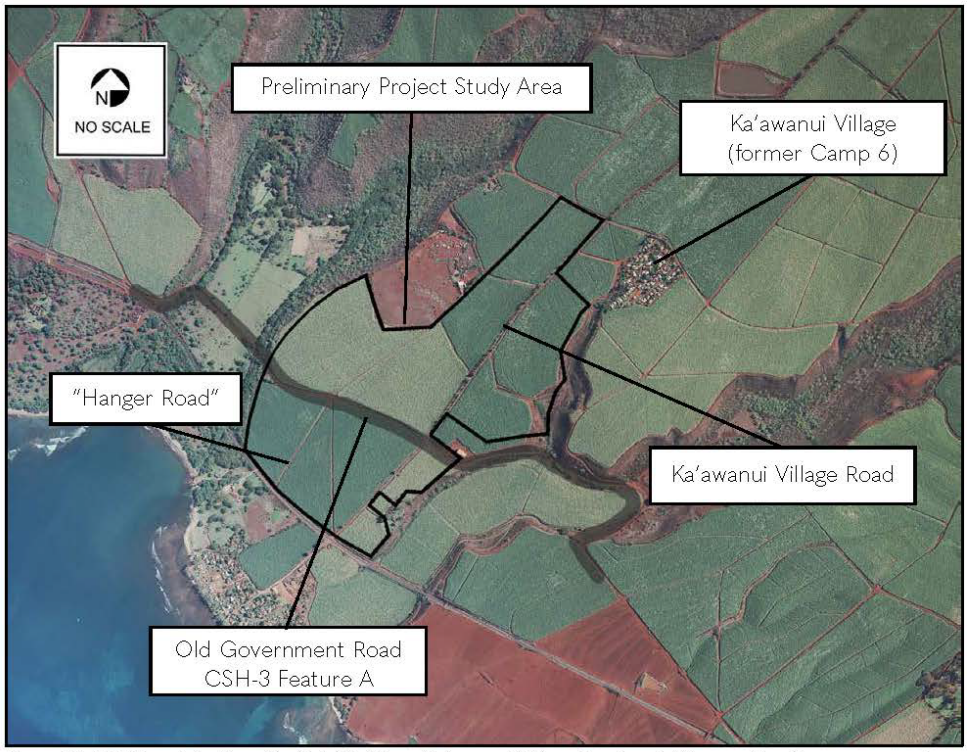

Figure 15. 2000 aerial with added highlighting. Ka'awanui Village Road and "Hanger Road" are apparent. *Source: MAGIS UH Mānoa, #2720. April 30, 2000.*

A separate portion of Kaua'i Belt Road – the North Shore Section - was added to the Hawai'i Register of Historic Places in 2003, and to the National Register of Historic Places (NRHP) in 2004.[49] It was listed with state and local significance in the NRHP Areas of engineering, transportation, social history, commerce under NRHP Criteria A and C. Additional documentation for the nomination prepared in 2021 identified an additional NRHP Area of significance under Criterion A; Conservation, for the substantial preservation efforts that occurred along the road since the 1970s. Assigned SIHP # 50-30-02-02334, the listed portion extends from Princeville to Hā'ena State Park and mostly follows the original ca. 1915 Kaua'i Belt Road alignment. This section of Kaua'i Belt Road is far outside the Preliminary Project Study Area, on the opposite side of the island. Yet it has a shared historic context with the roughly half-mile portion of Old Government Road within the current Preliminary Project Study Area, since it was part of the same planning and development effort undertaken during the 1905-1915 tenure of Kaua'i County Engineer Joseph Moragne. As mentioned above, Moragne was responsible for much of the initial construction of the Kaua'i Belt Road in the early 20th century.

[49] Dawn Duensing, "National Register Nomination Form for Kaua'i Belt Road (North Shore Section), April 8, 2002." Prepared on behalf of the Hanalei Roads Committee. 2002.; Hawai'i State Historic Preservation Division (SHPD), Online Historic Register listing, accessed on May 13, 2024.

However, the nomination notes that "This section of roadway is relatively unaltered and is the most spectacular portion of Kaua'i's belt road system, both in its historic character and scenery. It is the only portion of the Kaua'i Belt Road that retains historic integrity."[50]

[50] Dawn Duensing, National Register Nomination Form for Kaua'i Belt Road (North Shore Section), April 8, 2002. Prepared on behalf of the Hanalei Roads Committee. 6.

Architectural Descriptions

The resources surveyed as part of this study are described on the following pages, with brief alteration histories. The alteration histories are not meant to be a comprehensive list of every change, but a list of the most significant alterations noted. The descriptions are presented in the following section, ordered in groups of similar resource types. Irrigation features are presented first. These are followed by the Railroad Track Remnant and the Water Tank. The grouping of roadways is presented last. This order is also used in the Significance and Integrity section, Table 1. Although this order of the Architectural Descriptions and Significance and Integrity does not follow the chronological flow of the Historic Context, it allows the reader to better compare resources due to their ordering in groups.

Character defining features are only provided if the resource meets Hawai'i Register of Historic Places and HAR §13-284-6 significance and integrity criteria.

The feature numbers used as identifiers for the resources were assigned by Cultural Surveys Hawai'i, Inc. and are used to conform with their 2025 archaeological report.

Culvert -02269-CSH-2A (ca. 1910)



Figure 16. Culvert -02269-CSH-2A inlet. View facing southwest. *Source: MASON, 2025.*

Description

Culvert -02269-CSH-2A directs the flow of the west lateral ditch (SIHP # -02269) through a right angle turn that is accomplished at the outlet portal where the direction of the water flow changes from across the slope to straight downhill. The inlet of Culvert -02269-CSH-2A is concealed by natural stones placed in front of an above the inlet portal. The ditch above the inlet is widened into a slow-moving pool. The construction of the culvert pipe could not be observed during field work and its configuration and materials are not known. The culvert is about 15′ long from inlet to outlet, carrying the lateral ditch under a footpath. The outlet of Culvert -02269-CSH-2A is formed of irregular natural stones, set with cement where stones meet. Cement leaks out in some of the joints. The outlet empties through the left bank of the approximately 3′-wide ditch that extends downslope. The left bank of the ditch - for about 4′ below the outlet - is natural stones set with some concrete. Below this the left bank transitions to earth sides and the approximately 3′-wide ditch flow strongly. The right bank of this ditch opposite the outlet is concrete rubble masonry (CRM), about 2′ high, that extends about 6′, terminating in a single, concrete stanchion for a board adjusted gate. A small stilling wall serves to settle the water flow as it enters the ditch. A low weir is in the ditch at the upstream edge of the concrete stanchion. The opposite stanchion, on the left bank, is missing. Below the extant stanchion the right bank the ditch has earthen sides.

Alterations

- The CRM ditch wall appears to be a historic alteration.

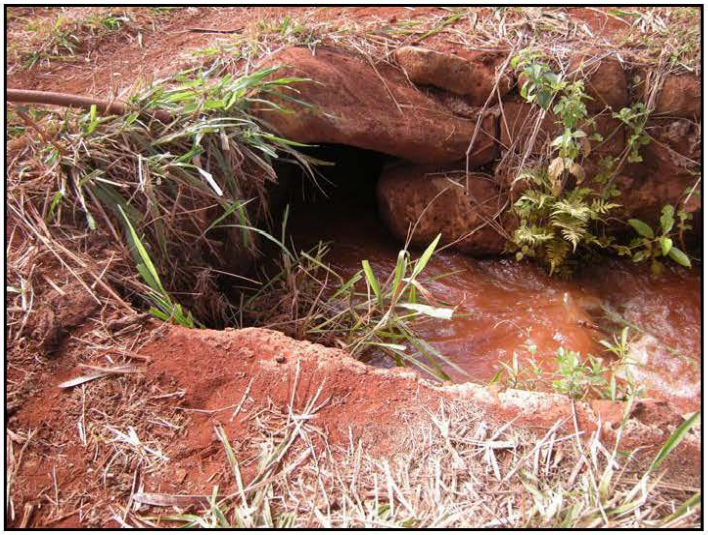

Figure 17. Culvert -02269-CSH-2A outlet. View facing southeast. Note the right angle turn of the water flow *Source: MASON, 2025.*



Figure 18. Culvert -02269-CSH-2A showing the ditch above the inlet in the top center and the outlet and a portion of the ditch below the outlet in the foreground. View facing southeast. *Source: MASON, 2025.*



Figure 19. Culvert -02269-CSH-2A inlet. View facing northwest. *Source: MASON, 2025.*



Figure 20. Culvert -02269-CSH-2A outlet and a section of the ditch. The outlet flow is from the lower right. Note the short section of CRM sidewall of the ditch. The low stilling wall is at the right end of the ditch and at the left end of the ditch the low weir is seen at the base of the concrete stanchion for a board adjusted gate. *Source: MASON, 2025.*



Figure 21. The west lateral ditch below the outlet of Culvert -02269-CSH-2A. View facing northeast.
Source: MASON, 2025.

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Culvert -02269-CSH-2C (ca. 2000)



Figure 22. Culvert -02269-CSH-2C inlet. View facing southwest. *Source: MASON, 2025.*

Description

Culvert -02269-CSH-2C is overgrown with dense vegetation and could not be observed. The west lateral ditch makes a turn to the south southeast, moving away from "Hanger Road," at Culvert -02269-CSH-2C. Both the inlet and outlet were not directly observable. A short section of the ditch below the outlet indicates that the ditch has earthen banks and is likely between 2′ to 4′ wide.

Alterations

- None apparent.



Figure 23. Culvert -02269-CSH-2C outlet. View facing west. *Source: MASON, 2025.*



Figure 24. A portion of the west lateral ditch just below Culvert -02269-CSH-2C outlet. View facing southwest. *Source: MASON, 2025.*

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Ditch Diversion -02269-CSH-1A (ca. 1977)



Figure 25. Ditch Diversion -02269-CSH-1A on the east lateral, view facing southeast. The water flow through this gate was from the inlet at the bottom of this photograph to the outlet of the gate channel at the top. The abandoned east lateral ditch (SIHP # 50-30-09-02269) is seen in the bottom of this photo, extending from left to right. The water flow through this lateral was also left to right. *Source: MASON, 2025.*

Description

Ditch diversion -02269-CSH-1A on the east lateral is an abandoned, concrete board adjusted gate. This gate has concrete stanchions about 2' high that are formed with vertical slots to hold the wood boards that were used to open and close the water flow. In addition to the concrete stanchions, the gate is built with a combination of earthen and CRM sidewalls and has an earthen bottom. The channel of this gate is about 35' in total length and about 2' to 3' wide across the bottom. The route of the gate has two angles that direct the water flow. When this gate was in operation, it dumped excess ditch water from the east lateral ditch into a section of ditch leading to the nearby Ka'awanui Gulch, which lies about 840' to the southeast. The original east lateral ditch that feeds this gate is blocked off with stones and earth just downstream of the gate. The ditch continuing out of the channel outlet of this gate toward Ka'awanui Gulch has natural earth walls and bottom.

Alterations

- Some sections of CRM sidewall were added after the original construction

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Figure 26. Ditch diversion -02269-CSH-1A on the east lateral, view facing northwest. This is the outlet of the channel of the gate. *Source: MASON, 2025.*



Figure 27. A view of a concrete stanchion with vertical slot for adjustment boards. View facing northeast. This is the inlet of the gate, the east lateral ditch is at the left of this photo with the former water flow from top to bottom of the photo. *Source: MASON, 2025.*



Figure 28. A typical earthen side wall in the gate channel. View facing west. *Source: MASON, 2025.*



Figure 29. A section of CRM sidewall of the gate channel that appears to be original construction. View facing northeast. *Source: MASON, 2025.*



Figure 30. A section of CRM sidewall of the gate channel that appears to be built after the original construction. View facing southwest. *Source: MASON, 2025.*

Culvert -02269-CSH-1B (ca. 1977)



Figure 31. Inlet of Culvert -02269-CSH-1B, view facing south. This inlet has a 12″ diameter of cast concrete pipe with a flared (bell) end. *Source: MASON, 2025.*

Description

Culvert -02269-CSH-1B is an abandoned culvert under a dirt road. The culvert is constructed of sections of bell-end, 12″ diameter cast concrete pipe. Overall length of the culvert is about 20′. The culvert outlet is concealed by a stone slab above the opening that is supported on stones.

Alterations

- None apparent.



Figure 32. Overall view of Culvert -02269-CSH-1B with the inlet in the foreground. The outlet is out of view in the background. view facing south. *Source: MASON, 2025.*



Figure 33. Outlet of Culvert -02269-CSH-1B, view facing north. *Source: MASON, 2025.*

Culvert -02269-CSH-1C (ca. 1977)



Figure 34. Inlet of Culvert -0229-CSH-1C, view facing south. *Source: CSH. 2025.*

Description

Culvert -02269-CSH-1C is an abandoned culvert, about 13′ long that is constructed of 20″ diameter cast concrete pipe. The culvert is oriented approximately north-south at a point where the abandoned earthen ditch it carries shifts its flow from southward to the southeast. The culvert inlet has the remains of basalt and cement CRM wingwalls that flare out from the culvert pipe for about 2′ to channelize the inlet flow. The culvert outlet opens into an eroded and sedimented section of the earthen ditch, which extends toward Ka'awanui Gulch.

Alterations

- None apparent.



Figure 35. Outlet of Culvert -0229-CSH-1C, view facing north. *Source: CSH. 2025.*



Figure 36. View of the earthen ditch extending downstream from the outlet of Culvert -0229-CSH-1C, which is in the left foreground. View facing southeast. *Source: CSH. 2025.*

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Check and Turnout -02269-CSH-1D (ca. 1946)



Figure 37. The ditch flowed past this feature in the foreground, from right to left. The longitudinal divider of three screen gates that separates the east chamber from the west chamber can be seen in the center of the turnout. The check gate is out of view to the left (downstream of the turnout). *Source: CSH. 2025.*

Description

Check and Turnout -02269-CSH-1D, is a vertical-walled, concrete constructed turnout alongside the west side of the ditch. It is about 21' long x 8' wide and 2'-6" high. It is divided longitudinally into east and west chambers by three board adjusted gates that operate vertically in slots in the endwalls and in two concrete post set along the centerline. These three gates have the remains of wood-frame, metal mesh vertical sliding trash screens. A fourth vertical operating trash screen is in slots near the downstream end of the east chamber of the turnout. The check gate for the turnout is located about 10' downstream of the turnout. The check gate across the ditch is a vertical operated, board adjusted gate that has concrete slots in CRM sections on both sides of the ditch. The CRM hardens the west side of the ditch wall from the turnout to the check gate. The east side of the ditch at the check gate is a short section of CRM about 36' x 18' in plan. The south end wall of the west chamber of the turnout has a 12" diameter conduit with a control valve that extends underground.

Alterations

- None apparent

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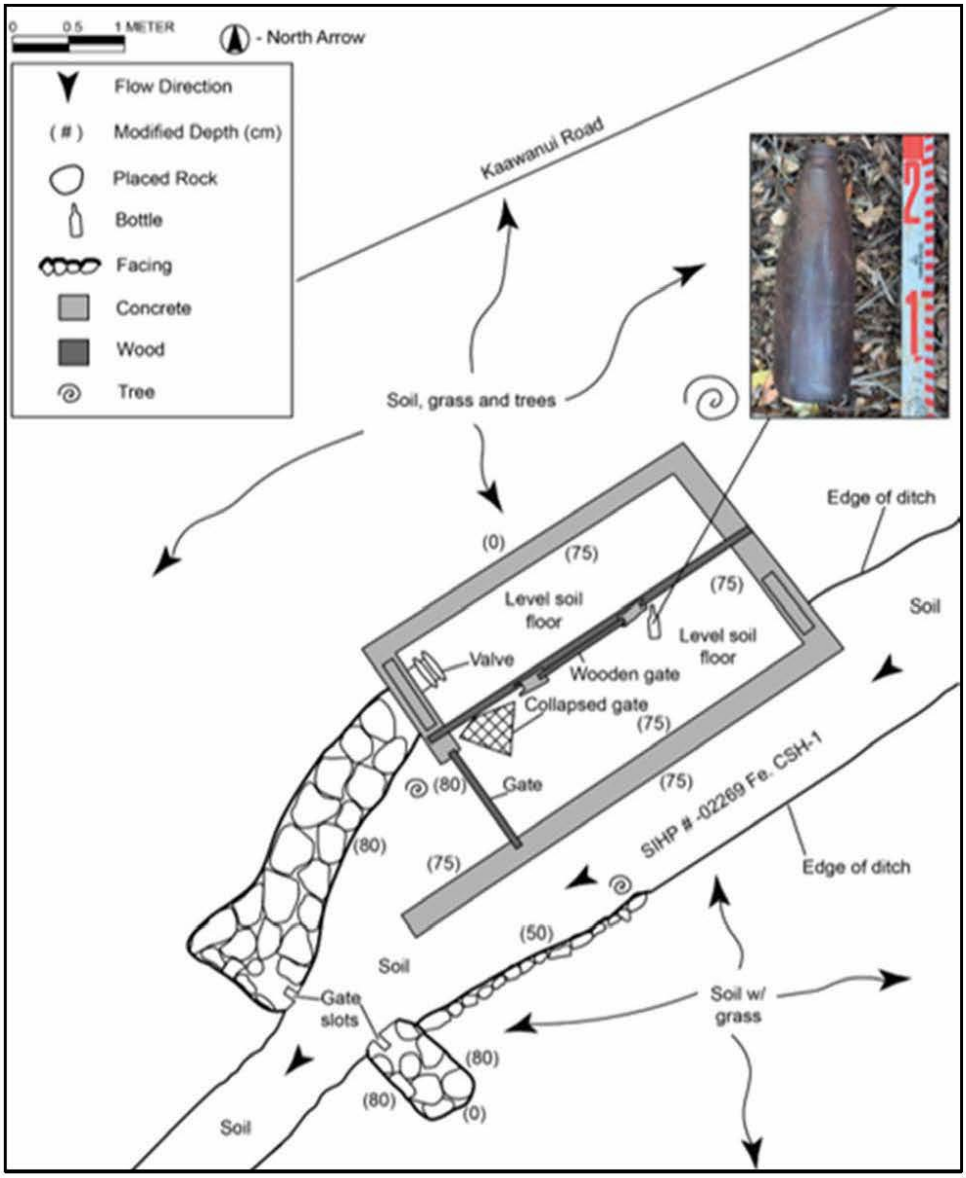

Figure 38. Plan sketch of the Check and Turnout -02269-CSH-1D that was prepared by Cultural Surveys Hawai'i, Ind. *Source: CSH. 2025.*

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Figure 39. Check and Turnout -02269-CSH-1D, view facing northeast. The check gate is in the foreground and the vertical (east) sidewall of the east chamber can be seen in the background. *Source: CSH. 2025.*

Settling Box -02269-CSH-1E (ca. 1946)



Figure 40. Settling Box -02269-CSH-1E, view facing southwest. The ditch extends up the left side of the structure, the vertical slot for the board adjusted gate across the ditch can be seen in the concrete block at center foreground. *Source: CSH. 2025.*

Description

Settling Box -02269-CSH-1E is a vertical-walled, concrete constructed settling box alongside the west side of the ditch. It has an irregular L-shaped plan with overall dimensions of about 24′ long x 17′ wide and 3′high. It is divided into two chambers, each about 16′ x 7′ in plan. The north chamber forms the upright member of the L and the south chamber forms the base of the L. Adjacent to the north end of the north member there are concrete slots on each side of the ditch for a board adjusted gate across the ditch. The east slot is formed in a concrete block about 5′ x 2′ in plan and the west slot is formed in an irregular angular block of concrete that is cast against the walls of the settling box. This gate across the ditch appears to have formerly operated to back up ditch water so that water could enter the chambers of the settling box. This would still the water current enough so that carried sediment would settle out of the water flow and collect on the bottom of the settling box. Ditch water would then flow over the top of the sidewalls, out of the box and back into the ditch. Remains of broken concrete, appearing to be an open top chute to guide the outlet flow over the top of the box, are present between the box and the west side of the ditch.

The top edges of the sidewalls of the settling box have threaded bolts imbedded that protrude several inches above the sidewalls. This suggests that there was a framework of some type

secured to the top edges. The settling box has three inscriptions in the top edges of the sidewalls that indicate a 1946 construction date. An additional 1967 inscription on the east sidewall of the north chamber indicates that repairs or alterations were done there in that year.

Alterations

- Some repair or reconstruction of the east sidewall occurred in 1967

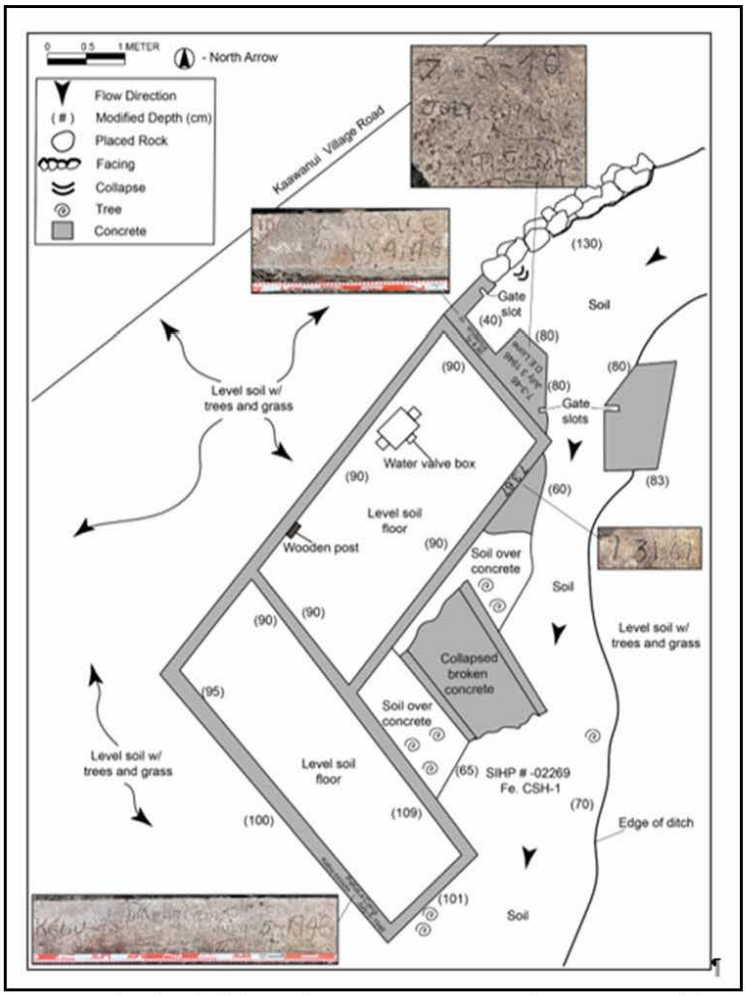

Figure 41. Plan sketch of the Settling Box -02269-CSH-1E that was prepared by Cultural Surveys Hawai'i, Inc. *Source: CSH. 2025.*

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Figure 42. Settling Box -02269-CSH-1E, view facing northwest. *Source: CSH. 2025.*

Culvert -02269-CSH-2D (ca. 2000)



Figure 43. Culvert -02269-CSH-2D outlet. View facing north. *Source: MASON, 2025.*

Description

Culvert -02269-CSH-2D is an 18" diameter iron pipe along the west lateral (SIHP # -02269). The culvert passes under Old Government Road about 350' east of "Hanger Road". The inlet could not be observed due to dense vegetation, so the total length of the culvert is estimated at about 40' to 45'. The culvert outlet empties into a section of lateral ditch that is eroded into a small pool about 8' across. This pool quickly narrows to a typical ditch width of about 3' with earthen sides and bottom.

Alterations

- None apparent



Figure 44. Culvert -02269-CSH-2D inlet. View facing south. *Source: MASON, 2025.*



Figure 45. A view of the pool formed at the Culvert -02269-CSH-2D outlet. View facing north. *Source: MASON, 2025.*



Figure 46. West lateral ditch downstream from Culvert -02269-CSH-2D outlet. View facing northwest.
Source: MASON, 2025.

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Culvert -02269-CSH-2E (ca. 2000)



Figure 47. Culvert -02269-CSH-2E inlet. View facing northwest. *Source: MASON, 2025.*

Description

Culvert -02269-CSH-2E is a 16" diameter iron pipe with its inlet and outlet reinforced by headwalls consisting of concrete with imbedded stones and an overall length of about 60'. However, this culvert has an approximately 4' length of its upper portion broken away, exposing the water that flows through the pipe. This broken area is about 25' from the inlet portal and is amid a dense growth of brush that prevents inspection of the breach, which does not impede or deflect the flow of water through the culvert. It is possible that this culvert is actually two separate culverts with outlet and inlet in the dense brush, but this could not be confirmed in the field.

The west lateral ditch (SIHP # -02269) above the culvert is typically about 5' across and widens to about 9' just above the inlet where the water has pooled. The culvert passes under "Hanger Road" just south of the intersection with Old Government Road. A dirt footpath also passes over the culvert on the east side of "Hanger Road," east of the dense brush. Culvert -02269-CSH-2E outlet empties into a small pool about 9' across. Typical width of the west lateral ditch (SIHP # -02269) below this pool is about 3' with earthen side walls and bottom.

Alterations

- None apparent
- It is possible that Culvert -02269-CSH-2E consists of two separate culverts that are separated by a short distance at the area of dense brush, but this could not be confirmed in the field.



Figure 48. View of the broken section of Culvert -02269-CSH-2E in dense brush. View facing north northeast. *Source: MASON, 2025.*



Figure 49. Detail view of Culvert -02269-CSH-2E inlet. View facing southwest. *Source: MASON, 2025.*

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Figure 50. West lateral ditch above Culvert -02269-CSH-2E inlet. View facing southeast. *Source: MASON, 2025.*



Figure 51. Culvert -02269-CSH-2E outlet. View facing northeast. *Source: MASON, 2025.*



Figure 52. This photo shows the dense stand of vegetation about 25′ from the inlet of Culvert -02269-CSH-2E, which is out of view to the right of this photo. View facing north. The asphalt paving seen on the left is "Hanger Road". The vehicle is parked at the north corner of the intersection of "Hanger Road" and Old Government Road. The west lateral ditch CSH-1 flows into Culvert -02269-CSH-2E from the right and the flow exits the outlet of Culvert -02269-CSH-2E out of view on the left. *Source: MASON, 2025.*



Figure 53. This photo shows a portion of "Hanger Road" at Culvert -02269-CSH-2E. View facing west. "Hanger Road" extends from the right foreground toward the center background. It goes out of sight behind the dense stand of vegetation (left center) that conceals the broken section of Culvert -02269-CSH-2E. The outlet of Culvert -02269-CSH-2E is in the stand of trees at the right background. *Source: MASON, 2025.*



Figure 54. Culvert -02269-CSH-2E outlet showing the downstream end of the small pool formed at the outlet. View facing northeast. *Source: MASON, 2025.*



Figure 55. A view of a typical section of west lateral ditch downstream of Culvert -02269-CSH-2E outlet. View facing northeast. *Source: MASON, 2025.*

Railroad Track Remnant CSH-6 (ca. 1995)



Figure 56. Railroad Track Remnant CSH-6 at the makai edge of Old Government Road. View facing southeast. *Source: MASON, 2025.*

Description

The Railroad Track Remnant CSH-6 is a pair of parallel sections of track, each 6′-2″ long that are imbedded transversely in the pavement of Old Government Road along the makai edge of the roadway about 750′ northwest of Ka'awanui Village Road. The remnant pair is 30 lb.[51] track (3 1/8″ height, 3 1/8″ base width, 1 11/16″ width of top rail) with a measurement of 22 5/8″ gauge (the distance from the inside of one rail to the inside of the other rail). The top of each rail is flush with the asphalt paving of the roadway. Upon the partial excavation of one end of one rail during the fieldwork, no ballast or ties were observable under the track. The track appears to be laid directly on basalt bedrock with a thin cushioning of compacted soil about 1/2″ thick under the track base.

The remnant pair is oriented northeast-southwest and is in the approximate position of a ca. 1927 plantation railroad track that is indicated on a map of the plantation from the same year.[52] However, for several reasons the remnant pair is not evaluated as being an actual historic remnant of Hawaiian Sugar Co. working track:

- The Hawaiian Sugar Co. used 30″ gauge track.
- The actual gauge of the remnant pair (22 5/8″ gauge) is not a gauge that was ever utilized anywhere. The closest railroad gauges (distance from the inside of one rail to the inside of the other rail) that were historically used in Hawai'i are 24″ and 60cm (23.62″). Twenty-four-inch gauge was used on some plantation railroads (Kīlauea Sugar Co. on Kaua'i used 24″ gauge), and 60cm gauge was used at some US Army ammunition magazines at Schofield Barracks, O'ahu.

[51] Railroad track is described in the USA as its weight in pounds per yard. 30 lb. track has a weight of 30 lbs. per yard.
[52] Hawaiian Sugar Co. "Field Map Hawaiian Sugar Co. July 29, 1927. In Conde, *Sugar Trains*. 136.

- The remnant pair is set level with the existing pavement. It is doubtful that any track remining from ca. 1927 would have been laid at a level corresponding to the pavement of a later date.
- The remnant pair is set without any ballast or ties. Permanent railroad tracks are always set in a ballast that can absorb shocks, such as crushed stone. Permanent railroad tracks are always set on ties atop the ballast.
- The pair of rails is only 6′-2″ in length. It is doubtful that the plantation would have cut rails in this configuration when removing the rail system. Rails are typically removed in their original lengths, which was 39′.

The pair was cut to 6′-2″ length from historic 30lb rails and set in the grade when the existing asphalt of the Old Government Road was laid down. This was possibly in 1995 when G&R took possession of the Olokele Sugar Co. plantation; they may have undertaken road paving as part of infrastructure improvements that Olokele was deferring due to the uncertainty of a 2001 renewal of their lease from G&R. The rationale behind the suspected ca. 1995 placement of this track is unknown, but the remnant pair has a spacing measurement of 24″ o.c. (from the center of one rail to the center of the other). This corresponds to 22 5/8″ gauge.

Alterations

- None apparent



Figure 57. Railroad Track Remnant CSH-6 with scale devise showing the track gauge is 22 5/8″. View facing southwest. Note the area at the south end of the northwest track, at upper right in photo, which was excavated during field work to examine for ballast and to measure the track. *Source: MASON, 2025.*



Figure 58. Railroad Track Remnant, the excavated end of the track. View facing northeast. *Source: MASON, 2025.*



Figure 59. Railroad Track Remnant, the excavated end of the track. View facing east. *Source: MASON, 2025.*



Figure 60. Railroad Track Remnant, the excavated end of the track. View facing west. *Source: MASON, 2025.*

Water Tank CSH-7 (ca. 1950)



Figure 61. The Water Tank CSH-7. View facing south. *Source: MASON, 2025.*

Description

The Water Tank CSH-7 is a cylindrical water reservoir that is constructed of corrugated metal on a concrete slab foundation. The tank cylinder is about 15′ in diameter and 13′ high with a conical metal roof that yields a total overall height of about 16′. The tank is in a fenced enclosure with a large-diameter (~12″) flanged iron pipe extending along the northwest side of the enclosure. A piping system within the enclosure on the southwest side of the tank appears to tap into this iron to supply the tank with water via a pipe extending up into the roof.

Alterations

- The corrugated metal siding and conical metal roof appear to be replacements



Figure 62. The Water Tank CSH-7, showing the associated piping on the southwest side. Note the large-diameter iron pipe in the left foreground. View facing east. *Source: MASON, 2025.*

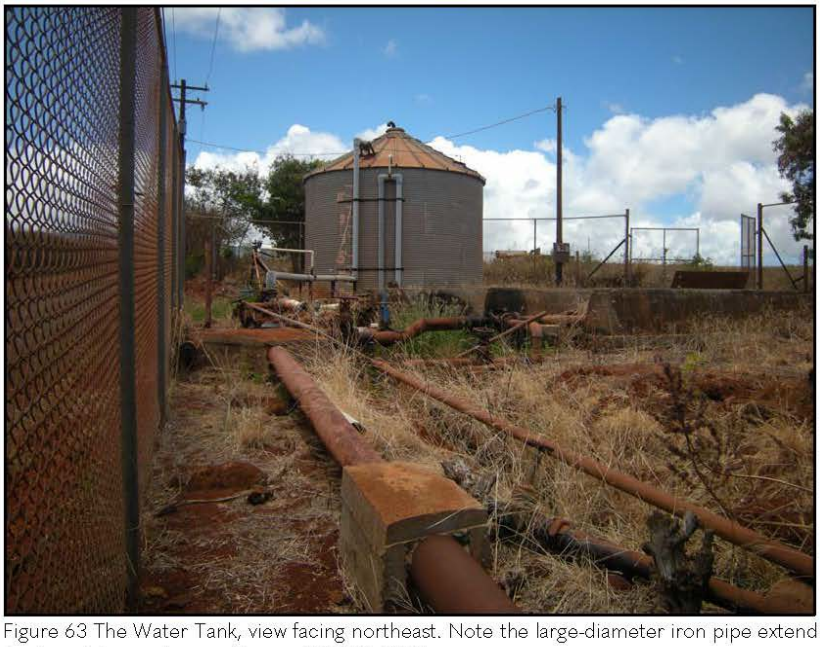

Figure 63 The Water Tank, view facing northeast. Note the large-diameter iron pipe extending along the fencing of the enclosure. *Source: MASON, 2025.*

Ka'awanui Village Road CSH-4 Feature A (ca. 1901)



Figure 64. Ka'awanui Village Road CSH-4 Feature A, looking mauka from near the Kaumuali'i Highway. View facing northeast. *Source: MASON, 2025.*

Description

Ka'awanui Village Road CSH-4 Feature A is a two lane, asphalt paved roadway about 15' wide with minimal shoulders that are typically cut grass. It follows a rather straight route through the Preliminary Project Study Area, extending almost directly upslope from the Kaumualii Highway to a locked gate at the junction of the side road to Ka'awanui Village. Along this length it rises from 40' elevation at Kaumualii Highway to about 235' elevation at the locked gate. The paving of the roadway is crazed and degraded along most of its length with some portions covered with gravel and dust and numerous patched areas. Dry stack stone walls edge the road shoulder in many areas.

Alterations

- Repaved several times since 1901
- Numerous patched areas of paving
- Asphalt paving has degraded to gravel in some areas



Figure 65. Ka‘awanui Village Road, looking makai from near the Water Tank. Kaumuali‘i Highway is in the distance. View facing southwest. *Source: MASON, 2025.*



Figure 66. Ka‘awanui Village Road, looking makai from near the junction with Old Government Road. View facing southwest. *Source: MASON, 2025.*



Figure 67. Ka'awanui Village Road, looking mauka from near the junction with Old Government Road. View facing northeast. *Source: MASON, 2025.*



Figure 68. Ka'awanui Village Road, looking makai from near the top of the road. View facing southwest. *Source: MASON, 2025.*



Figure 69. Ka'awanui Village Road showing a typical section of pavement. View facing east. *Source: MASON, 2025.*

Old Government Road CSH-3 Feature A (ca. 1910)



Figure 70. Old Government Road, a typical section of roadway. View facing northwest from near the junction with "Hanger Road". *Source: MASON, 2025.*

Description

Old Government Road CSH-3 Feature A has sections of old asphalt paving interspersed with areas of gravel and dirt. It is typically about 18′ wide with narrow shoulders of gravel and weeds. The paving at the sections where it is exposed is crazed with numerous patches and broken portions. Although the route through the Preliminary Project Study Area traverses across the highland between the Mahinauli Gulch (toward the southeast) and the Kekupua Valley (toward the northwest) the terrain of the roadway slopes downward toward the Kekupua Valley. The course of the roadway loses about 90′ of elevation along its path through the Preliminary Project Study Area, from about 110′ elevation at its southeast end to about 20′ elevation at its northwest end.

Alterations

- Repaved several times since 1910
- Numerous patched areas of paving
- Asphalt paving has degraded to gravel in some areas



Figure 71. Old Government Road, at its southeastern end where it intersects Ka'awanui Village Road. View facing northwest. *Source: MASON, 2025.*



Figure 72. Old Government Road, near the Railroad Track Remnant, View facing northwest. *Source: MASON, 2025.*



Figure 73. Old Government Road, near its northwest end. View facing southeast. *Source: MASON, 2025.*



Figure 74. Old Government Road, at its northwest end where it leaves the Preliminary Project Study Area and descends into Kekupua Valley. Note the remains of asphalt paving. View facing northwest. *Source: MASON, 2025.*

Unnamed Road ("Hanger Road") CSH-5 (ca. 1927)



Figure 75. "Hanger Road," a typical section of roadway. View facing northeast from near the upper end of the road. *Source: MASON, 2025.*

Description

This road is formally unnamed. CSH provided MASON with an explanation that, "Per James Robinson, this road has informally been referred to as ""Hanger Road"" for discussion of this project, but is technically an unnamed road."[53]

"Hanger Road" CSH-5 is a single lane roadway, typically about 10' wide. The road consists mostly of sections of old asphalt paving with some areas where the paving had degraded to gravel and dirt. The shoulders are typically mown grass and weeds with some sections wider (at up to about 6') than the Old Government and Ka'awanui Village Roads. These wider shoulder areas usually are edged with pasture fencing. "Hanger Road" extends mauka – makai in the Preliminary Project Study Area, from Kaumualii Highway at its lower end (elevation about 20') to a small aircraft Hanger at its upper end (elevation about 180').

Alterations

- Repaved over time
- Numerous patched areas of paving

[53] CSH, Project Correspondence with Dee Ruzicka, August, 2025.



Figure 76. A view of the lower end of "Hanger Road" CSH-5, showing autos travelling on Kaumualii Highway in the background. View facing southwest. *Source: MASON, 2025.*



Figure 77. "Hanger Road," looking mauka from near the bottom of the road. View facing northeast. *Source: MASON, 2025.*

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Figure 78. "Hanger Road" is seen in this photo receding makai in the center background. The cross-road is Old Government Road. View facing southwest. *Source: MASON, 2025.*



Figure 79. "Hanger Road," extending mauka above Old Government Road. View facing northeast. *Source: MASON, 2025.*



Figure 80. "Hanger Road," near its upper end. The grassy pasture at the left in the background is the Shop Pen. View facing southwest. *Source: MASON, 2025.*

Evaluation of Significance and Integrity

Fourteen resources were surveyed and evaluated for this RLS.

Seven of the resources were built ca. 1977 or later. These are less than 50 years in age and thus cannot be considered historic properties:

- Culvert -02269-CSH-2C (ca. 2000)
- Ditch diversion -02269-CSH-1A (ca. 1977)
- Culvert -02269-CSH-1B (ca. 1977)
- Culvert -02269-CSH-1C (ca, 1977)
- Culvert –02269-CSH—2D (ca. 2000)
- Culvert -02269-CSH-2E (ca. 2000)
- Railroad Track Remnant CSH-6 (ca. 1995)

The remaining seven resources are older than 50 years in age and were assessed for significance in keeping with HAR §13-284-6 significance and integrity criteria.

- Culvert -02269-CSH-2A (ca. 1910)
- Check and Turnout -02269-CSH-1D (ca. 1946)
- Settling Box -02269-CSH-1E (ca. 1946)
- Water Tank CSH-7 (ca. 1950)
- Ka'awanui Village Road CSH-4 Feature A (ca. 1901)
- Old Government Road CSH-3 Feature A (ca. 1910)
- "Hanger Road" CSH-5 (ca. 1927)

No resources were evaluated as meeting HAR §13-284-6 significance and integrity criteria. See Table 1, Significance Evaluation and Integrity Assessments for all resources studied.

Property Types

This RLS was undertaken to identify historic resources, which includes the five property classification types (Buildings, Structures, Objects, Sites, and Districts) defined in the National Register Bulletin #15, "How to Apply the National Register Criteria for Evaluation." [54]

To follow is a discussion of these property classification types for the seven resources greater than fifty years of age as identified in the Preliminary Project Study Area. The seven resources less than fifty years of age are not included in this Property Type evaluation.

Buildings

According to the National Register Bulletin "How to Apply the National Register Criteria for Evaluation," a building "is created principally to shelter any form of human activity."

- None of the resources evaluated in the Preliminary Project Study Area meet this definition.

[54] National Park Service, Cultural Resources, *National Register Bulletin #15 How to Apply the National Register Criterion for Evaluation.* (Washington DC: U.S Department of the Interior)1997. 5

Structures
According to the National Register Bulletin "How to Apply the National Register Criteria for Evaluation," "[t]he term "structure" is used to distinguish from buildings those functional constructions made usually for purposes other than creating human shelter."

- All of the seven resources (50 years old or greater) evaluated in the Preliminary Project Study Area meet this definition.
    - Culvert -02269-CSH-2A (ca. 1910)
    - Check and Turnout -02269-CSH-1D (ca. 1946)
    - Settling Box -02269-CSH-1E (ca. 1946)
    - Water Tank CSH-7 (ca. 1950)
    - Ka'awanui Village Road CSH-4 Feature A (ca. 1901)
    - Old Government Road CSH-3 Feature A (ca. 1910)
    - "Hanger Road" CSH-5 (ca. 1927)

Objects
According to the National Register Bulletin "How to Apply the National Register Criteria for Evaluation," the term object is used to distinguish buildings and structures from constructions that are primarily artistic in nature or relatively small in scale and simply constructed. Although it may be movable by nature or design, an object is associated with a specific setting or environment. Small objects not designed for a specific location usually are not eligible. Such works include transportable sculpture, furniture, and other decorative arts that, unlike a fixed outdoor sculpture, do not possess association with a specific place. Objects should be in a setting appropriate to their significant historic use, roles, or character. Objects relocated to a museum are inappropriate for listing in the National Register.

- None of the resources evaluated in the Preliminary Project Study Area meet this definition.

Sites
According to the National Register Bulletin "How to Apply the National Register Criteria for Evaluation," 'sites' are defined as "the location of a significant event, prehistoric or historic occupation or activity, or a building or structure, whether standing, ruined, or vanished, where the location itself possesses historic, cultural or archaeological value regardless of the value of any existing structure."

- None of the resources evaluated in the Preliminary Project Study Area meet this definition.

Districts
According to the National Register Bulletin "How to Apply the National Register Criteria for Evaluation," the definition of a District is: "A district possesses a significant concentration, linkage, or continuity of sites, buildings, structures, or objects united historically or aesthetically by plan or physical development." The Bulletin explains that "the majority of the components that add to the district's historic character, even if they are individually undistinguished, must possess integrity."

- The resources were surveyed and evaluated for significance, both individually and as a collection. Since no historically significant resources were identified within the Preliminary Project Study Area, a historic district is not applicable.

Table 1: Significance Evaluation and Integrity Assessments

Name/Photo	Year Built	Evaluation of Significance (HAR §13-284-6 and Hawai'i Register criteria)	Integrity Assessment (HAR §13-284-6)
Culvert -02269-CSH-2A on West Lateral Ditch 	Ca. 1910	Does not meet requirements. Associated with Hawaiian Sugar Co. irrigation, but as a somewhat isolated and non-distinctive component on a lateral (not primary supply) irrigation ditch, it is evaluated as a non-significant structure that does not readily convey its historic period. Further it has no known association with the lives of important persons, and is not expected to yield information important in history.	Retains integrity of L, D, M, W, F, A. Integrity of S is only partially retained due to changes to surroundings.
Culvert -02269-CSH-2C on West Lateral Ditch 	Ca. 2000	Less than 50 years in age and thus cannot be considered as a historic property.	N/A
Ditch diversion (Board-adjusted gate) -02269-CSH-1A on East Lateral Ditch 	ca. 1977	Less than 50 years in age and thus cannot be considered as a historic property.	N/A
Culvert -02269-CSH-1B 	Ca. 1977	Less than 50 years in age and thus cannot be considered as a historic property.	N/A

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Name/Photo	Year Built	Evaluation of Significance (HAR §13-284-6 and Hawai'i Register criteria)	Integrity Assessment (HAR §13-284-6)
Culvert -02269-CSH-1C 	Ca. 1977	Less than 50 years in age and thus cannot be considered as a historic property.	N/A
Check and Turnout -02269-CSH-1D 	Ca. 1946	Does not meet requirements. Associated with Olokele Sugar Co. irrigation, but as a somewhat isolated component on a lateral (not primary supply) irrigation ditch, it is evaluated as a non-significant structure that does not rise to a level necessary for eligibility. Further it has no known association with the lives of important persons, and is not expected to yield information important in history.	Retains integrity of L, D, M, W, F, A. Integrity of S is only partially retained due to changes to surroundings.
Settling Box -02269-CSH-1E 	Ca. 1946	Does not meet requirements. Associated with Olokele Sugar Co. irrigation, but as a somewhat isolated component on a lateral (not primary supply) irrigation ditch, it is evaluated as a non-significant structure that does not rise to a level necessary for eligibility. Further it has no known association with the lives of important persons, and is not expected to yield information important in history	Retains integrity of L, D, F, A. Integrity of W and M are partially retained due to 1967 repairs. Integrity of S is only partially retained due to changes to surroundings.
Culvert -02269-CSH-2D on West Lateral Ditch 	Ca. 2000	Less than 50 years in age and thus cannot be considered as a historic property.	N/A

Name/Photo	Year Built	Evaluation of Significance (HAR §13-284-6 and Hawai'i Register criteria)	Integrity Assessment (HAR §13-284-6)
Culvert -02269-CSH-2E on West Lateral Ditch 	Ca. 2000	Less than 50 years in age and thus cannot be considered as a historic property.	N/A
Railroad Track Remnant CSH-6 	Ca. 1995	Less than 50 years in age and thus cannot be considered as a historic property.	N/A
Water Tank CSH-7 	Ca. 1950	Does not meet requirements. Possibly associated with Olokele Sugar, but as utilitarian water tank, it is evaluated as a non-significant structure that does not readily convey its historic period. Further it has no known association with the lives of important persons and is not expected to yield information important in history.	Retains integrity of L. Integrity of S, D, M, W, F, A are only partially retained due to changes in the surroundings and replacement of tank wall and roof.
Ka'awanui Village Road CSH-4 Feature A 	Ca. 1901	Does not meet requirements. Although it is associated with the Hawaiian Sugar Co. as a road that provided direct access to plantation worker housing (Camp 6, later Ka'awanui Camp/Village) from the coastline, it is not evaluated as a major or significant resource on its own and does not exhibit any distinctive features or engineering aspects. It is not associated with an important person, nor is it expected to yield information important in history.	Retains integrity of L. Integrity of S is only partially retained due to changes in the surroundings. Integrity of D, M, W, F, A are partially retained due to re-pavement and patching of the asphalt.

Name/Photo	Year Built	Evaluation of Significance (HAR §13-284-6 and Hawai'i Register criteria)	Integrity Assessment (HAR §13-284-6)
Old Government Road CSH-3 Feature A 	Ca. 1910	Does not meet requirements. While this section of road was part of the main route to Līhu'e from the Preliminary Project Study Area locality starting ca. 1910, and is a component of the Old Government Road that became part of the Kaua'i Belt Road System, it represents less than half a mile of the original Kaua'i Belt Road, and does not exhibit any notable or distinctive features or characteristics from that period. It is a relatively mundane and isolated section of the Belt Road and does not readily convey its historic period. (Note: A section of the Kaua'i Belt Road on the North Shore between Princeville and Hā'ena was added to the Hawai'i Register in 2003 under SIHP # 50-30-02-02334, which is notable for its many distinctive historic bridges.)	Retains integrity of L. Integrity of S is only partially retained due to changes in the surroundings. Integrity of D, M, W, F, A are partially retained due to the degraded condition of the paving.
"Hanger Road" CSH-5 	Ca. 1927	Does not meet requirements. Although it was likely built during the Hawaiian Sugar Co. era, it is not evaluated as a major or significant resource on its own, and does not exhibit any distinctive features or engineering aspects. It is not associated with an important person, nor is it expected to yield information important in history.	Retains integrity of L. Integrity of S, D, M, W, F, A are partially retained due to changes in the surroundings and patching of the asphalt

**Integrity assessments provided in the table are abbreviations for the aspects of integrity specified in Hawai'i Administrative Rules Chapter 13-275-6. The seven aspects of integrity are: L = Location, D = Design, S = Setting, M = Materials, W = Workmanship, F = Feeling, and A = Association.*

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Appendices

Appendix A – Significance Criteria: HAR §13-284-6 Evaluation of Significance

The following is an excerpt from HAR §13-284-6:

(a) Once a historic property is identified, then an assessment of significance shall occur. The agency shall make this assessment or delegate this assessment, in writing, to the SHPD. This information shall be submitted in the survey report, if historic properties were found through the survey.

(b) To be significant, a historic property shall possess integrity of location, design, setting, materials, workmanship, feeling, and association and shall meet one or more of the following criterion:

(1) Criterion "a". Be associated with events that have made an important contribution to the broad patterns of our history;

(2) Criterion "b". Be associated with the lives of persons important in our past;

(3) Criterion "c". Embody the distinctive characteristics of a type, period, or method of construction, represent the work of a master, or possess high artistic value;

(4) Criterion "d". Have yielded, or is likely to yield, information important for research on prehistory or history; or

(5) Criterion "e". Have an important value to the native Hawaiian people or to another ethnic group of the state due to associations with cultural practices once carried out, or still carried out, at the property or due to associations with traditional beliefs, events or oral accounts--these associations being important to the group's history and cultural identity.

A group of sites can be collectively argued to be significant under any of the criteria.

Appendix B – HAR §13-284-7 Determining Effects to Significant Historic Properties

The following is an excerpt from HAR §13-284-7:

(a) The effects or impacts of a project on significant properties shall be determined by the agency. Effects include direct as well as indirect impacts. One of the following effect determinations must be established:

> (1) "No historic properties affected". The project will have no effect on significant historic properties; or
>
> (2) "Effect, with proposed mitigation commitments". The project will affect one or more significant historic properties, and the effects will be potentially harmful. However, the agency has proposed mitigation commitments involving one or more forms of mitigation to reasonably and acceptably mitigate the harmful effects.

(b) Effects include, but are not limited to, partial or total destruction or alteration of the historic property, detrimental alteration of the properties' surrounding environment, detrimental visual, spatial, noise or atmospheric impingement, increasing access with the chances of resulting damage, and neglect resulting in deterioration or destruction.

(c) Effect determinations shall be submitted to SHPD for review and approval. The determinations shall include a map showing the location of the project and a general discussion of the project's scope of work, so the nature of possible effects can be understood.

> (1) If the SHPD disagrees with the effect determinations, a letter that specifies the disagreements shall be sent within forty five days of SHPD receipt of the effect determinations. To proceed with the review process, the agency shall correct the problems, consulting with the SHPD as needed to resolve differences, and resubmit the effect determinations.
>
> (2) If the SHPD agrees with the effect determinations, the SHPD shall send a letter of agreement within forty five days of SHPD receipt of the effect determinations.

(d) No historic properties affected determinations for architectural properties shall be expedited when the SHPD agrees with the agency that minor changes to a building or structure will not affect its significant character. Because these changes are typically non-controversial and require prompt processing, the SHPD shall write its concurrence as a "no historic properties affected" determination.

> (1) The SHPD shall post notifications of any such "no historic properties affected" determinations every Friday either at the SHPD office or on the SHPD website. Should the office be closed on any Friday as a result of a holiday or some type of disaster, the information shall be posted on the first following working day.

(2) Interested persons have the opportunity to comment on such determinations within thirty days. At the end of thirty days if objections to the minor changes to the properties are submitted, the SHPD may reconsider its findings under the provisions of section 13-275-11.

(e) When the SHPD agrees that the action will not affect any significant historic properties, this is the SHPD's written concurrence and historic preservation review ends. If the project will have an "effect, with proposed mitigation commitments", then mitigation commitments and detailed mitigation plans shall be developed by the agency and approved by SHPD, as discussed in the following section.

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Appendix C – HAR §13-284-8 Mitigation

The following is an excerpt from HAR §13-284-8:

(a) If a project will have an "effect" (impact) on significant historic properties, then a mitigation commitment proposing the form of mitigation to be undertaken for each significant historic property shall be submitted by the agency to the SHPD for review and approval.

(1) Mitigation can occur in five forms.

(A) Preservation, which may include avoidance and protection (conservation), stabilization, rehabilitation, restoration, reconstruction, interpretation, or appropriate cultural use.

(B) Architectural recordation, which involves the photographic documentation and possibly the measured drawing of a building, structure or object prior to its alteration or destruction.

(C) Archaeological data recovery, which enables the recovery of an adequate and reasonable amount of the significant information from a significant historic property prior to its alteration or destruction. Data recovery may include archaeological mapping, surface collection, excavation, monitoring, laboratory analyses, and interpretive analyses.

(D) Historical data recovery, which involves researching historical source materials to document an adequate and reasonable amount of information about the property when a property will be altered or destroyed.

(E) Ethnographic documentation, which involves interviewing knowledgeable individuals and researching historical source materials to document an adequate and reasonable amount of information about the property when a property will be altered or destroyed.

Appendix D - Hawai'i Register of Historic Places Criteria: HAR §13-198-8

The following is an excerpt from HAR §13-198-8:

Criteria for decisions; considerations. In deciding whether a property should be entered and ordered into the Hawai'i register, the review board shall evaluate whether the property meets or possesses, individually or in combination, the following criteria or characteristics:

(1) The quality of significance in Hawaiian history, architecture, archaeology, and culture, which is present in districts, sites buildings, structures, and objects of State and local importance that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and:

(A) That are associated with events that have made a significant contribution to broad patterns of our American or Hawaiian history;

(B) That are associated with the lives of persons significant in our past;

(C) That embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic value, or that represent a significant and distinguishable entity whose components may lack individual distinction; or

(D) That have yielded, or may be likely to yield, information important in history;

(2) Environmental impact, i.e., whether the preservation of the building, site, structure, district of object significantly enhances the environmental quality of the State;

(3) The social, cultural, educational, and recreational value of the building, site, structure, district, or object, when preserved, presented, or interpreted, contributes significantly to the understanding and enjoyment of the history and culture of Hawai'i, the Pacific area, or the nation. [Eff 6/22/81; am and comp 3/9/89] (Auth: §§6E-5.5,91-2)

Exhibit Q

Reconnaissance Level Survey

DRAFT Reconnaissance Level Survey, Kaawanui Solar Project, Makaweli Ahupua'a, Waimea District, Kaua'i

TMK: [4] 1-7-006: 006 por. and 010 por.

Prepared by MASON under contract to

Cultural Surveys Hawai'i, Inc.

HICRIS Project No. 2025PR00506

September 2025



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Introduction

Mason Architects, Inc. (MASON) was hired by Cultural Surveys Hawaii, Inc. (CSH) to develop a Reconnaissance Level Survey (RLS) for the Kaawanui Solar Project, Makaweli Ahupua'a, Waimea District, Kaua'i. An Archaeological Literature Review and Field Inspection (LRFI) was completed in April 2025 by CSH.[1, 2] It identified the fourteen architectural resources that are studied in this RLS. These consist of six culverts, one board adjusted irrigation gate, one irrigation check and turnout, one irrigation settling box, three roadways, one remnant short section of railroad track, and one water tank. MASON surveyed these fourteen structures and evaluated them for historical significance. The HICRIS number assigned to this project is 2025PR00506.

Identification of Historic Properties (per SB No. 15, At 293)

On July 3, 2025, S.B. No. 15, Act 293, revised the definition of "Historic property." The new definition is: "'Historic property' means any building, structure, object, district, area, or site, including heiau and underwater site, that is over fifty years old and meets the criteria for being entered into the Hawai'i register of historic places." This definition differs from the prior definition, which did not include the text "and meets the criteria for being entered into the Hawai'i register of historic places."

The new Hawai'i Revised Statutes (HRS) §6E-2 definition for historic property now aligns more closely with the definition provided in 36 CFR 800.16, as applicable to NHPA Section 106 processes.

In keeping with these definitions, this RLS has identified no historic properties or resources.

Project Objectives

This RLS was prepared in support of a proposed project to install a photo voltaic system and substation on a portion of the Preliminary Project Study Area. See Figure 1. For this project, Kaawanui Solar, LLC is proposing a 43 MW solar photovoltaic (PV) array and 172 MWh containerized lithium-ion Battery Energy Storage System (BESS) consisting of Photo-Voltaic (PV) solar modules, trackers, Power Conversion Systems (PCSs), BESS containers, and Generator Step Up (GSU) transformers. This PV system will be routed to a proposed 57/69 kV project substation and related interconnection and ancillary features (the Kaawanui Substation). The system and substation will be sited on a portion of the 269-acre Preliminary Project Study Area.

This survey is intended to fulfill historic property identification and significance evaluation requirements for Hawai'i Administrative Rules (HAR) Chapter 13-284 related processes that will be undertaken by the State Historic Preservation Division (SHPD) as they review the proposed project.

[1] Oliver M. Bautista, Samantha Purdy, and Hallett H. Hammatt, *Draft Archaeological LRFI for the Kaawanui Solar + Storage Project (Job Code Makaweli 11)*. April 2025.

[2] Note that Cultural Surveys Hawai'i, Inc. is preparing an archaeological report for this project and has supplied MASON with their temporary site names for the resources covered in this RLS. These site names all include "CSH" in the name and are used here and throughout the RLS.

Methodology

MASON staff visited the Preliminary Project Study Area on July 15, 2025, to photograph and record the resources. See the Evaluation of Significance Section and Table 1 for a complete summary. MASON also performed historical research, including review of historical newspaper articles, histories, hydrological reports, context studies, and historic aerial photographs and maps.

MASON evaluated the structures for significance and integrity in keeping with HAR §13-284-6, Criteria "a-d"; MASON did not evaluate the resource for Criterion "e" ("having important value to the native Hawaiian people or other ethnic group"), as MASON is not qualified or scoped to undertake ethnographic studies. MASON also evaluated the structures for significance and integrity in keeping with Hawai'i Register of Historic Places criteria "A-D" of HAR §13-198-8.

Setting

The Preliminary Project Study Area is located in the open, rural land between the Kekupua Valley and the Mahinauli Gulch, mauka[3] of the Kaumuali'i Highway (Route 50) along the southwest coast of Kaua'i. The Preliminary Project Study Area elevation ranges from about 40' above sea level (at the highway) to about 230.' This land was planted in sugar cane from about 1890 to 2009. The Preliminary Project Study Area now consists of open pasturage for cattle and water buffalo, fruit tree orchard groves, and fallow land with grasses, shrubs, and small trees. The Preliminary Project Study Area is crisscrossed by several dirt roadways, many of which are bordered by mature trees.

[3] Hawaiian word that means "in the direction of the mountains."

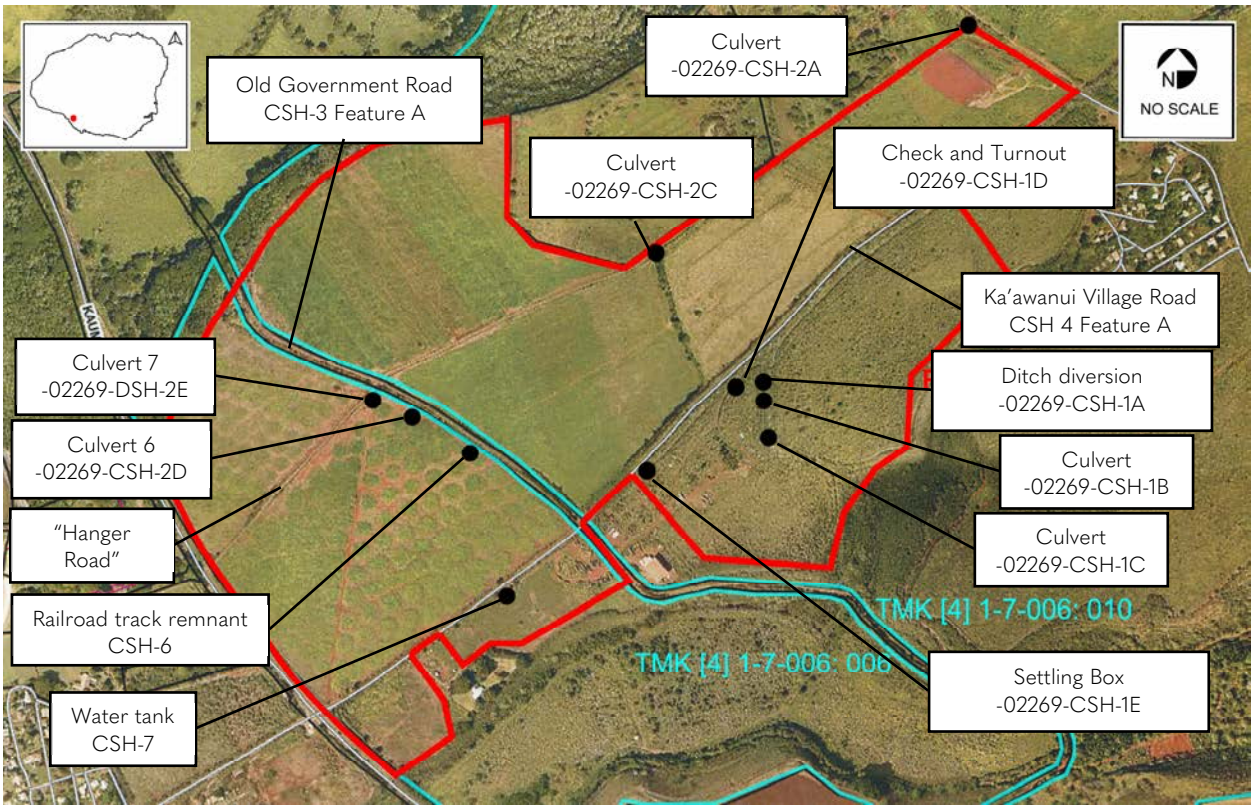

Figure 1. Preliminary Project Study Area for the Kaawanui Solar Project (red outline). The TMK boundaries are shown in cyan and the features surveyed in this RLS are labeled. The feature numbers were assigned by Cultural Surveys Hawai'i Inc. *Source: Google Earth; Graphic notations; MASON, 2025.*

Historical Overview

"Hawai'i Sugar Co., the dirtiest, dustiest red dirt plantation in Hawai'i." – Jared G. Smith
"Never mind. This is ten-ton dust." – Henry P. Baldwin[4]

Introduction

The Preliminary Project Study Area is part of a 4,848-acre parcel on the west side of Kaua'i that, along with the island of Ni'ihau, Hawaiian King Kamehameha V sold to Eliza McHutchinson Sinclair in 1864 for $10,000. Mrs. Sinclair's grandson, Aubry Robinson (1853-1936) and his cousin Francis Gay (1852-1928), founded the firm of Gay & Robinson (G&R) in 1889 and established a ranch and sugar cane fields on the Kaua'i parcel. Sugar cane was grown in the Preliminary Project Study Area lands from about 1890 to 2009. This was done under a succession of lessees through 1994 and then under G&R until they ceased sugar operations in 2010.

Hawaiian Sugar Co. and Subsequent Tenants

The original lease of G&R land for a proposed sugar plantation was the ca. 1887 lease to William Renny Watson of Glasgow, Scotland, who was in Hawai'i as a representative of the Scottish firm Mirlees, Watson & Yaran Co. that manufactured heavy machinery. The firm had maintained a presence in Hawai'i since the 1875 Treaty of Reciprocity, promoting the sugar industry with the goal of selling equipment to sugar plantations and mills.[5] Watson's thirty-eight-year lease was to be paid in sugar to G&R. Watson proposed building a sugar mill on part of the property. G&R retained a large portion of land to grow their own sugar, which would be milled at Watson's proposed mill. In early March 1888, Watson invited Henry P. Baldwin to join his venture. He had already secured provisional investment commitments from James Campbell and Charles Reed Bishop. Baldwin offered $10,000 to enter the partnership.[6]

Watson returned to Scotland and in 1889 the Alexander and Baldwin families had a summer vacation in Europe. Also in Europe that summer was E. M. Walsh, a former manager of Alexander & Baldwin's (A&B) Paia sugar plantation, who had recently graduated from Harvard Law School. Walsh met with Watson, who related that he wanted Hawaiian interests to take the lead in developing a sugar plantation on his leased G&R land. Watson related this information to Henry Baldwin, and Baldwin and Samuel T. Alexander agreed to take the lead on the new plantation. On October 30, 1889, the Hawaiian Sugar Co. was incorporated in Hawai'i by Watson, Baldwin, Alexander, Walsh, Campbell, Bishop, and George W. McFarlane. Baldwin, Alexander, and Walsh held a majority of the 20,000 shares of stock issued at $100 par to a total of twenty-five subscribers.[7]

Only a few days later, the lease was transferred from Watson to Alexander and Baldwin for a consideration to Watson of $50,000 and the right to appoint two directors. Watson was also assured that all orders for mill, railway, and cultivation equipment would go to John Fowler &

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[4] Jesse C. Conde, with Gerald M. Best. *Sugar Trains, Narrow Gauge Rails of Hawai'i*. (Felton CA: Glenwood Publishing). 1973. 134.; William H. Dorrance, and Francis S. Morgan, *Sugar Islands: The 165-year Story of Sugar in Hawai'i*. (Honolulu: Mutual Publishing). 2000. 33.

[5] Conde, *Sugar Trains*. 134.

[6] Arthur L. Dean, *Alexander & Baldwin, Ltd. and the Predecessor Partnerships*. (Honolulu: Alexander & Baldwin). 1950. 31.

[7] Dean, *Alexander & Baldwin*. 32.

Co. of London.[8] George McFarlane was Watson's representative in Hawai'i and executed the agreement. Baldwin also had G&R extend the lease to a fifty-year term. G&R retained 600 acres of land (raised to 700 acres in 1900) to cultivate their sugar cane and tasked Hawaiian Sugar Co. to cultivate and mill it. The Hawaiian Sugar Co. lands reached from the Hanapēpē River in the east to the Waimea River in the west. The fields G&R retained were scattered within this area, with a large concentration along the coastline north and northwest of the mill. G&R also retained some fields in the far mauka reaches of cultivation. In mid-1892 the Hawaiian Sugar Co. mill was under construction at Makaweli about 1½ miles southeast of the Preliminary Project Study Area and Hawaiian Sugar Co. had about 2,200 acres of cane under cultivation. The Hawaiian Sugar Co. mill was the second largest in the Kingdom after Maui's Hawaiian Commercial & Sugar Co. See Figures 2-4.The first Hawaiian Sugar Co. crop was milled in early 1893 and in July of that year, the company's Honolulu agent, W.G Irwin & Co., announced a stock dividend.[9]

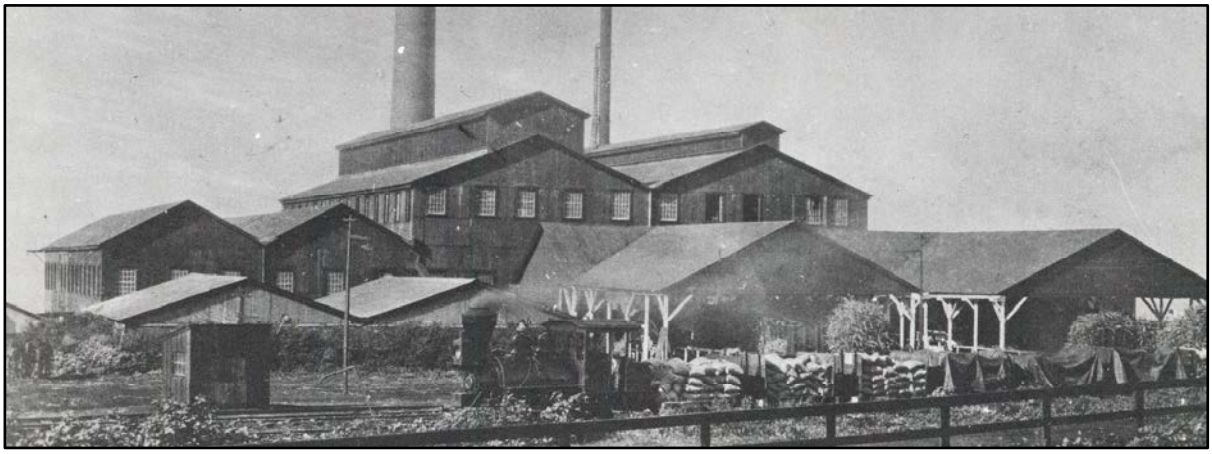


Figure 2. Ca. 1895 view of the Hawaiian Sugar Co. mill. *Source: Conde, Sugar Trains*.

Henry Baldwin and Samuel Alexander became the agents for Hawaiian Sugar Co. in 1898 and in 1900 the two partners incorporated their business dealings as Alexander & Baldwin, Ltd. (A&B). The investments of stock subscribers that started the plantation were paid for in installments. The plantation was quite successful and got on a paying basis when only seventy percent of the investments were collected. In mid-1899 stockholders voted to declare the company stock fully paid and shortly after the par value was reduced to $20 and the stock split five shares for one. Although Henry Alexander and Samuel Baldwin were major players in the Hawaiian sugar community, controlling Hawaiian Sugar Co. as well as other major operations, they were chronically short of cash and typically had outstanding debts. The men formed the Makaweli Sugar Co., incorporated in San Francisco, as a parent company of Hawaiian Sugar Co., using Hawaiian Sugar Co. stock as assets. They were able to sell Makaweli stock while keeping enough to control both it and Hawaiian Sugar Co.[10] The Makaweli Sugar Co. was a synthesis of Hawaiian

[8] Research for this report did not discover why Mr. Watson represented Mirlees, Watson & Yaryan Co, in 1887 and then referred equipment purchases to John Fowler & Co.

[9] Dean, *Alexander & Baldwin*. 33.; Jesse C. Conde, with Gerald M. Best. *Sugar Trains, Narrow Gauge Rails of Hawai'i*. (Felton CA: Glenwood Publishing). 1973. 136.

[10] Dean, *Alexander & Baldwin*. 61.; 'A 'Missionary' Trick," *The* [Honolulu] *Independent*. September 4, 1899. 2.

Sugar Co. sugar cane operation, the sugar mill at Makaweli, and the approximately 600 acres of G&R cane. See Figure 3 and Figure 4.

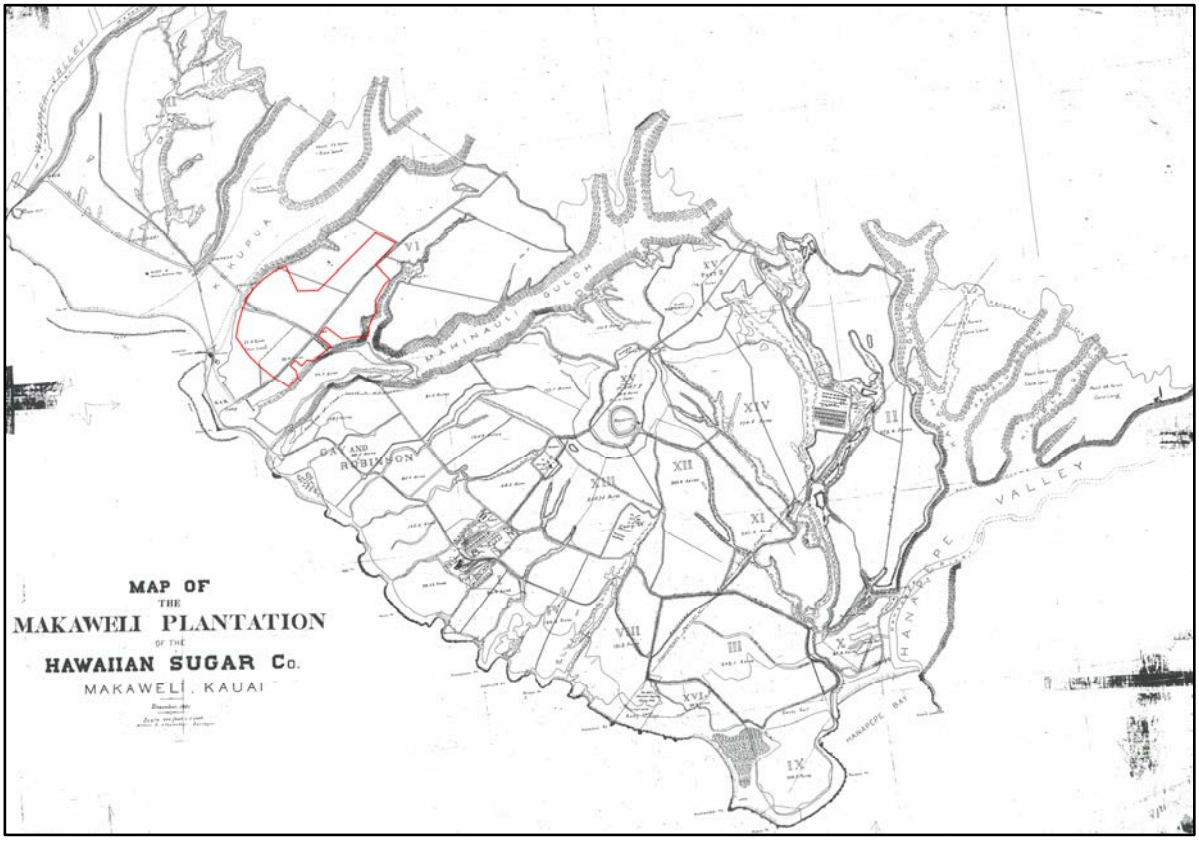


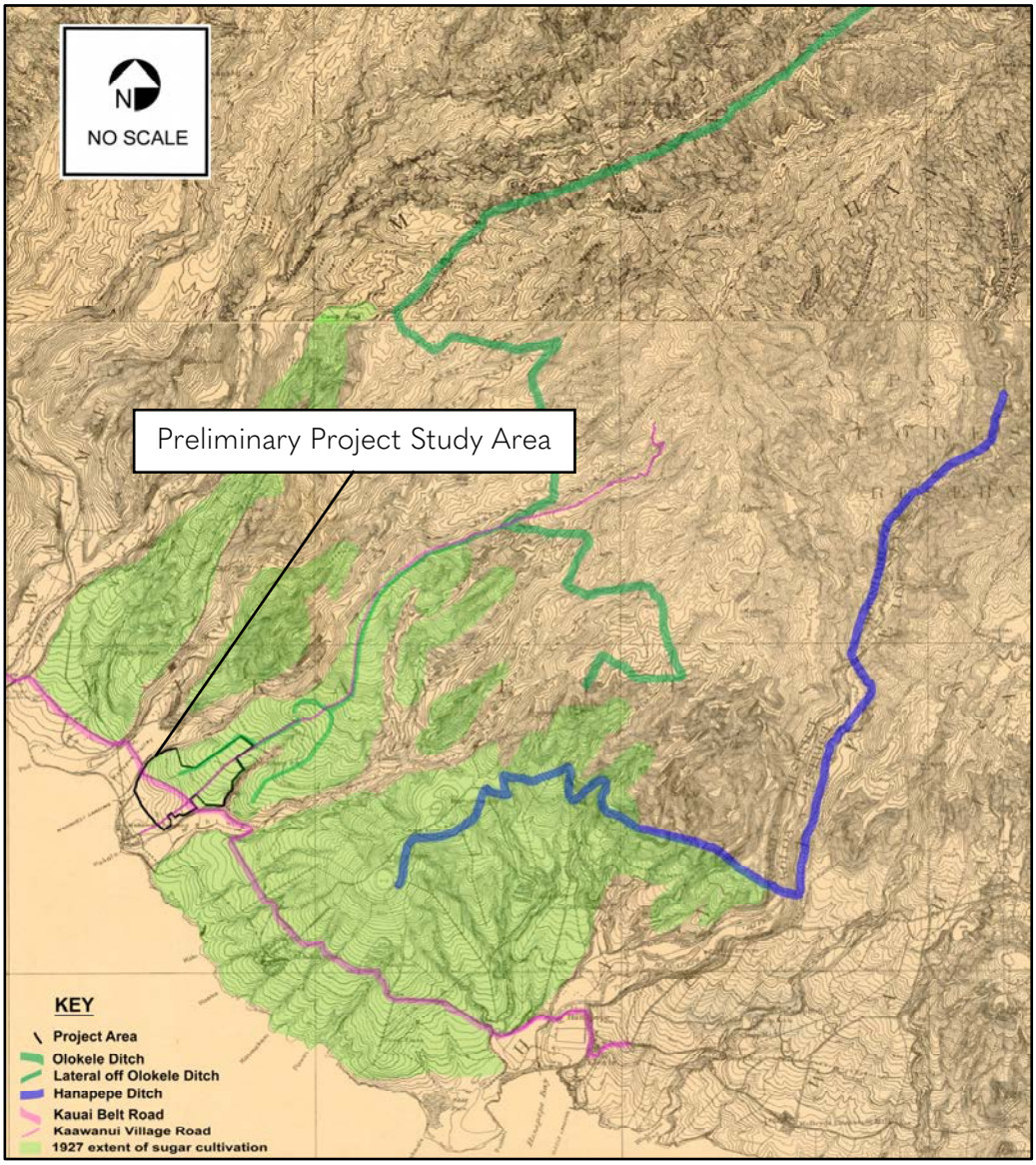
Figure 3. 1901 map of the Hawaiian Sugar Co./Makaweli Sugar Co. North at top. *Source: DAGS, Reg. Map 2144. December 1901.*

The plantation manager of Hawaiian Sugar Co. for twenty-five years during the early 20th century was Henry Baldwin's nephew, Benjamin D. Baldwin (1867-1928). Benjamin was renowned on Kaua'i for his well-received paternal management style that provided for Hawaiian Sugar Co. workers. Under his management, the plantation was one of the first in Hawai'i to construct modern worker family housing with plumbing and electricity, offer medical care to workers, and provide community social and recreation programs for family members. His son, Douglas E. Baldwin (1894-1970) subsequently managed Hawaiian Sugar Co.[11]

By 1910 Hawaiian Sugar Co. had 3,235 acres of cane under cultivation and (as Makaweli Sugar Co.) was also cultivating 674 acres for G&R. See Figure 6. Hawaiian Sugar Co. manager B.D. Baldwin stated that the cane was expected to have excellent yields of high quality juice "higher in sucrose and purity than [he had] ever seen" in the area and would be a "record breaker." Baldwin made a conservative estimate of sugar yield for the 1910 season of 19,667 tons for the Hawaiian Sugar Co. acreage.[12] This conservative estimate of 1910 production by Baldwin belied the actuality of production; Hawaiian Sugar Co. production exploded during 1905-1909 to an

[11] A.B Gilmore, *The Hawai'i Sugar Manual, 1939*. (New Orleans: A.B. Gilmore). 1939. 146. William H. Dorrance, and Francis S. Morgan, *Sugar Islands: The 165-year Story of Sugar in Hawai'i*. (Honolulu: Mutual Publishing). 2000. 33.
[12] "Excellent Showing of Hawaiian Sugar," *Hawaiian Star*. February 26, 1910. 10.

average of over 20,000 tons per year, due to increased acreage for planting and new irrigation sources.[13] To support the shipping of sugar to the U.S. mainland, Hawaiian Sugar Co., in conjunction with Kaua'i Railway Co., built a rail track system, ca. 1910, to the wharf at Port Allen and improved the facilities there, which allowed steamship transports to call at Port Allen. See Figure 8. Both Hawaiian Sugar Co. and adjacent McBryde Sugar Co. used the Port Allen facility.[14] Through the 1930s the Hawaiian Sugar Co. consistently ranked in the top three Kaua'i producers of sugar, vying with Līhu'e Plantation Co. and Kekaha Sugar Co. Hawaiian Sugar Co. production was typically around 20,000 tons through about 1924 and then rose to over 30,000 tons for 1930 to 1938. The maximum production year for Hawaiian Sugar Co. was 1932 when 37,633 tons of sugar were produced.[15]



[13] Dean, *Alexander & Baldwin*. 103.
[14]. Dean, *Alexander & Baldwin*. 104.
[15] *The Hawai'i Sugar Manual*. Various dates.; Hawaiian Sugar Planters Association, *Story of Sugar in Hawai'i.* (Honolulu: HSPA). 1925. 93.; Dean, *Alexander & Baldwin*. 151, 215.

Figure 4. Shading was added to this map to emphasize features described in the text. Note that the extent Hawaiian Sugar Co./Makaweli Sugar Co. cultivation is ca. 1927. *Source: USGS, Hanapēpē Quadrangle. 1910.*

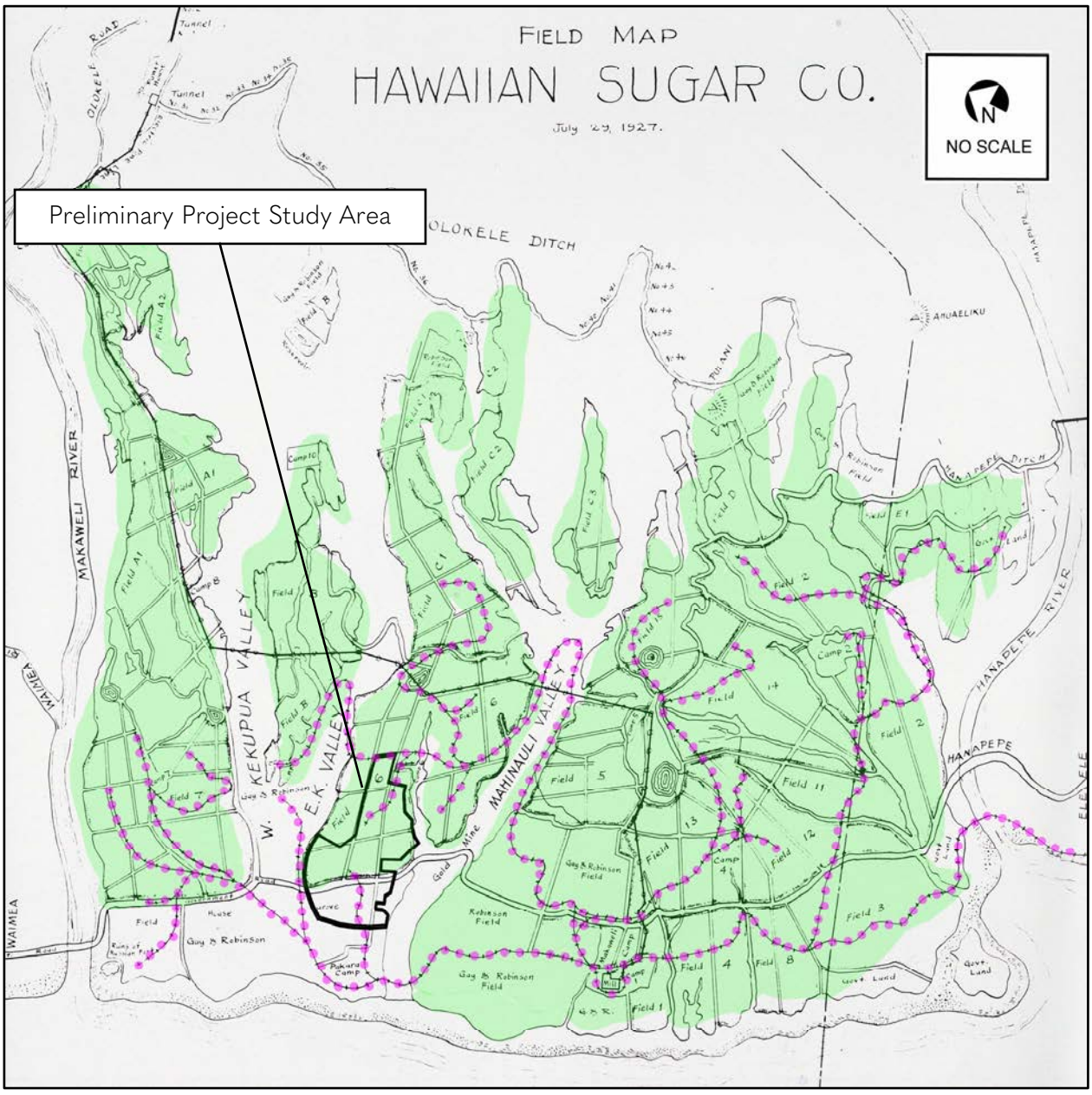


Figure 5. This 1927 map shows the field numbering of Hawaiian Sugar Co. cane fields. Added green shading shows the approximate extent of cane cultivation and the extent of railroad tracks is highlighted in magenta dots. *Source: Conde, Sugar Trains*.

Although Hawaiian Sugar Co.'s success paid a good rent to G&R, consisting of the profits on G&R's retained 700 acres, there were frequent controversies and conflict between the two corporations. This ranged from disagreements over water rights, to uncertainty where lease boundaries lied, to petty conflicts over trespassing animals. Both sides professed a sincere desire for harmony, but it remained elusive, most likely due to a lack of mutual confidence. As Hawaiian Sugar Co.'s fifty-year-lease approached its 1938 end, disagreements over renewal

terms surfaced. A two-year extension was agreed upon that lengthened the lease to December 31, 1940, as the corporations negotiated. G&R wanted more land for its own sugar that Hawaiian Sugar Co. did not want to give up. Each side rejected the other's proposals and in 1940 Hawaiian Sugar Co. began wrapping up the company's affairs in preparation for liquidation. G&R wanted to purchase the mill so they could harvest. Honolulu sugar agent C. Brewer & Co. organized a new plantation in 1940, Olokele Sugar Co., that purchased the mill and took over a new lease on the G&R lands that ran until the year 2000. Olokele Sugar Co. was basically the same plantation as Hawaiian Sugar Co. but with new management and control. Hawaiian Sugar Co. dissolved and vacated its lease on Makaweli lands on July 31, 1940.[16]

Olokele's lease allowed G&R the extra cane land they could not achieve in their negotiations with Hawaiian Sugar Co. After a poor tonnage yield in 1942 as the new Olokele Sugar Co. began operations, its yearly production tonnage hovered near 20,000 tons for the ensuing years. This typically placed Olokele as the fourth largest producer of sugar on Kaua'i, with Līhu'e Plantation co., Kekaha Sugar Co., and McBryde Sugar Co. occupying the top three positions.[17]



Figure 6. Port Allen in 1932, the year of maximum sugar production for Hawaiian Sugar Co. *Source: NARA II, file # 23938159. July 1, 1932.*

[16] Dean, *Alexander & Baldwin*. 152, 218. Dorrance, *Sugar Islands*. 34.
[17] William H. Flanagan, ed., Hawai'i Sugar Manual, 1947-1948. (New Orleans: Gilmore Publishing). 1948. 11.



Figure 7. Aerial view of the Makaweli Hawaiian Sugar Co. mill. *Source: NARA II, File # 23938077. Jan. 10 1933.*



Figure 8. This 1943 aerial view shows a typical cultivated portion of the Olokele Sugar Co. plantation (formerly Hawaiian Sugar Co.). View facing northeast, the mill at Makaweli is seen in the wooded area at lower right center, and a small portion of Mahinauli Valley is seen at the left edge. The two round reservoirs in the background are the terminations of the Hanapēpē Ditch. The Preliminary Project Study Area is out of view to the left. *Source: NARA II, File # 23938129. January 6, 1943.*

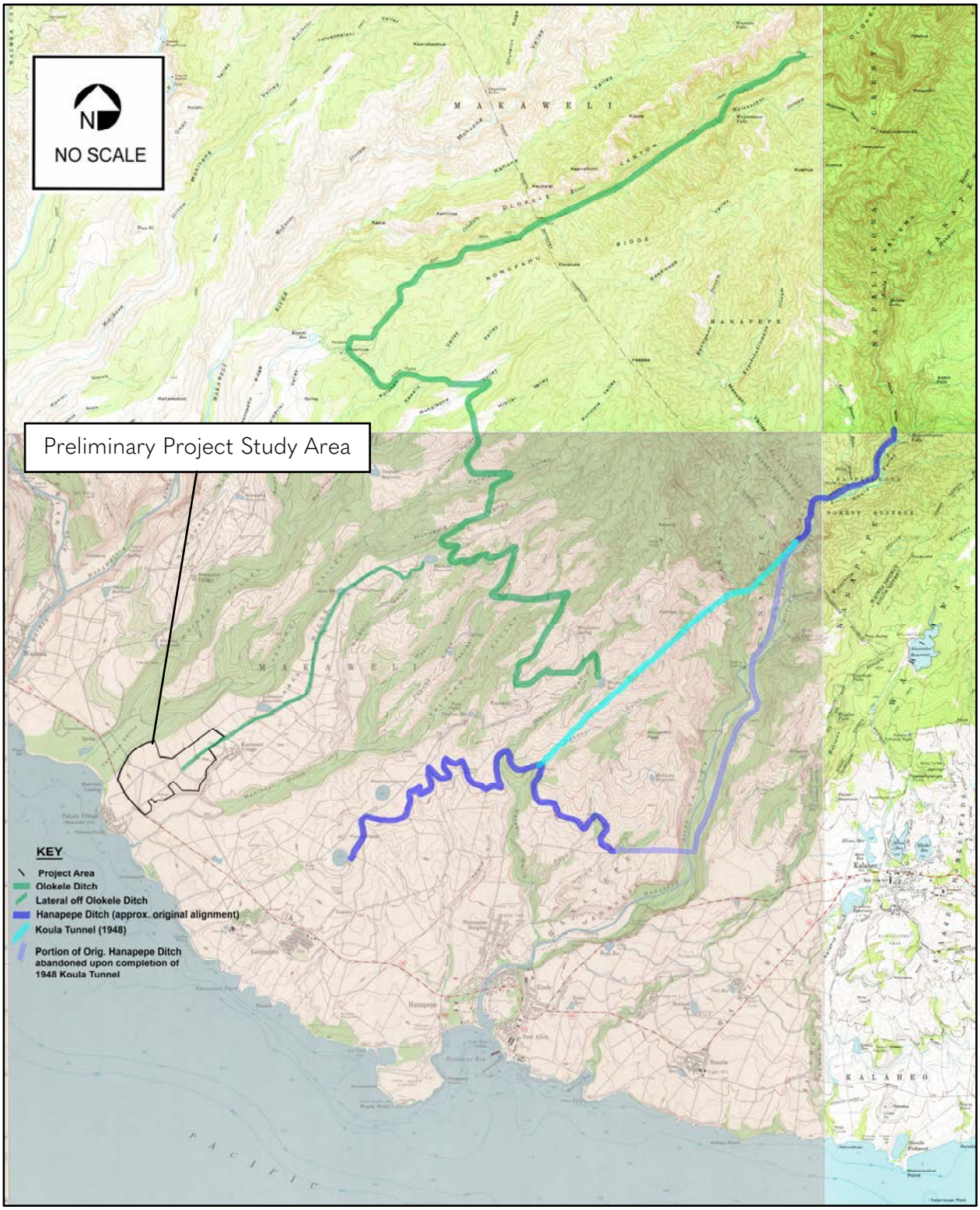


Figure 9. 1963 composite topographic map with added highlighting showing some of the features described in the text. *Source: USGS, Topographic maps. 1963.*

In 1972, Olokele Sugar Co. was the first plantation in Hawai'i to use drip irrigation it its sugar cane fields. The increased irrigation efficiency provided by its drip system was a benefit to Olokele's bottom line, but the plantation, like all in Hawai'i, was about to be hit by a cataclysm in sugar pricing. In the mid-1970s, worldwide sugar demand far outstripped supplies and prices skyrocketed. This prompted the U.S. Congress to remove import restrictions and taxes on imported sugar and remove exiting domestic sugar quotas and acreage restrictions. This caused worldwide sugar production to increase and prices to drop dramatically, so low that U.S. producers could not cover the cost of production. Congress implemented price support, but between 1970 and 1980 nine Hawai'i plantations ceased operations. Due to unpredictable world production rates, the price of sugar shot back up and Congress cancelled its legislative support for the industry. This price uncertainty, the resulting whipsawing of government support, and the advent of the U.S. corn sweetener industry put a tremendous strain on Hawaiian sugar producers that many could not weather and more Hawai'i plantations closed in the 1980s.[18]

Olokele Sugar Co., sited on some of the best sugar land in Hawai'i, was able to maintain operations until 1994. That year its agent, C. Brewer & Co., feeling that the future of sugar in Hawai'i was a dim prospect, decided to close the plantation. C.Brewer also cited the impending 2001 expiration of the Olokele lease from landowner G&R.

C. Brewer was reluctant to undertake necessary major improvements in the plantation without some kind of assurance from G&R that they could expect to make a return on those investments with a new 21st century lease.[19] C. Brewer sold the mill at Makaweli and all equipment to the landowner G&R in April 1994. G&R continued to grow cane on 7,500 acres and mill sugar. Olokele's employees were retained by G&R, and since the Olokele workers were unionized, G&R employees also joined the ILWU upon the transition.[20] G&R made a multi-million-dollar investment in new equipment for their sugar plantation and mill. The expanding costs of repairing plantation roadway and irrigation systems were significant. From 2003 to 2006 G&R estimated it incurred between $8m and $12m in losses. The Gay & Robinson Inc. sugar plantation at Makaweli closed in 2010 after processing the harvest from the 2009 crop.[21]

[18] C. Allen Jones and Robert V. Osgood, *From King Cane to the Last Sugar Mill.* (Honolulu: University of Hawai'i Press). 2015. 181-183.; Dorrance, *Sugar Islands*. 35.

[19] Jan TenBruggencate, "Kaua'i plantation buys out rival." *Honolulu Advertiser*. February 19, 1994. C 1.

[20] Dorrance, *Sugar Islands*. 35.

[21] "Ethanol deal ends sugar era on Kaua'i," *Honolulu Advertiser*. September 11, 2008. 1.

Irrigation Ditches at Hawaiian Sugar Co.

Irrigation was of paramount importance to the plantations that raised sugar cane in the Preliminary Project Study Area. Henry P. Baldwin understood that as he negotiated with G&R in 1889 to lease the land that would become the Hawaiian Sugar Co. In 1889, shortly after Hawaiian Sugar Co. was created, construction began on the Hanapēpē Ditch. This ditch's layout and engineering was by Baldwin himself, although he had no formal engineering training. Baldwin had closely participated in the planning and construction of the 1878 Hāmākua Ditch on Maui, which gave him sufficient insight on planning the route for Hanapēpē Ditch. The Hanapēpē Ditch, completed in 1891, collected Hanapēpē River water at an elevation of about 900' and delivered it to the eastern portions of the Hawaiian Sugar Co. plantation, down to about 415' elevation.[22]

Although the Hanapēpē Ditch was a great asset for the eastern portion of Hawaiian Sugar Co.'s fields, Baldwin knew that more water, delivered at high elevations, would unlock the growing potential of the western and farther mauka lands of the lease that could be brought under more intense cultivation. G&R controlled both the water rights, particularly the Olokele River near the west end of the plantation, and the potential upper fields. On December 31, 1900, Hawaiian Sugar Co. received permission from G&R to construct the Olokele Ditch to collect water from the Olokele River at about 1,475' elevation and bring it down to about the 1075' elevation level. See Figure 9 and Figure 5. In this agreement, G&R received the additional 100 acres of sugar land that brought their total acreage in the Hawaiian Sugar Co. plantation to 700 acres. A subsequent agreement with G&R, executed on April 1, 1901, allowed Hawaiian Sugar Co. to lease the land below the elevation of the new Olokele Ditch and above the elevation of the existing (1889) Hanapēpē Ditch, which entered the plantation from the northwest and traversed at about 415' elevation. The effects of the new Olokele Ditch and the expanded acreage under cultivation are evident in the Hawaiian Sugar Co. production figures for 1901-1909. The average ton of sugar produced each year jumped from about 12,000 tons to about 20,000 tons in 1905, the year after the Olokele Ditch was completed.[23]

In planning the Olokele Ditch, Hawaiian Sugar Co. drew up agreements for the land it needed to obtain the water from the river. G&R did not sign several of them, unsure they were authorized to make such agreements. "Not withstanding [sic] the dubious status of the tenure of the land, the Hawaiian Sugar Co. went ahead with its [ditch] development and cultivation."[24] This would become a point of contention between the two that fueled future disagreements.

The Olokele Ditch was engineered by Michael O'Shaughnessy, who later engineered other significant irrigation ditches in Hawai'i (including 1905 Ko'olau Ditch, Maui; 1907 Kohala Ditch, Big Island; and the Upper and Lower Hāmākua Ditches, Big Island, 1907 and 1910, respectively). The ditch was the first in Hawai'i to use long lengths of tunnel to move water through headlands, a departure from the common practice of using open ditches excavated on the contour of the terrain. Construction commenced in 1902. Once complete, it included eight miles of 7' diameter tunnels and five miles of open ditch, and cost about $360,000. The Olokele Ditch had an average flow of 66 million gallons per day (mgd) and since it had relatively little open ditch,

[22] Carol Wilcox, *Sugar Water, Hawai'i's Plantation Ditches*. (Honolulu: University of Hawai'i Press). 1996. 86.
[23] Dean, *Alexander & Baldwin*. 103.
[24] Dean, Alexander & Baldwin. 104.

only required five ditch men for maintenance. This efficiency and volume drove the 1905 increase in Hawaiian Sugar Co. yields.[25]

The Preliminary Project Study Area, in the western portion of the former Hawaiian Sugar Co. plantation's fields, was historically supplied with irrigation water via a lateral ditch from the Olokele Ditch. The Preliminary Project Study Area consists mostly of the ca. 1927 Hawaiian Sugar Co. Field No. 6, which occupied the mauka portion of the Preliminary Project Study Area, mauka of the Old Government Road.[26]

The lateral ditch that supplied Field 6 was about 3 miles long. It extended down Aaka Ridge (which lies between Aakuku Valley and Waikoloi Gulch) from its beginning at the Olokele Ditch in Honuaula Valley. Ca. 1910 this lateral ditch emptied into a small reservoir at about 360' elevation that is in the approximate location of the 1950 Ka'awanui Reservoir, which was a new reservoir built on the site of the earlier one. From this ca. 1910 reservoir, two lateral ditches extended downslope toward the current Preliminary Project Study Area, one lateral on either side of the unpaved mauka extension of Ka'awanui Village Road. Upon reaching the mauka boundary of the Preliminary Project Study Area, the lateral on the east side of the road extended directly downslope along the east side of Ka'awanui Village Road. The west lateral branched off to the northwest at the mauka Preliminary Project Study Area boundary and turned makai at a point that is uphill of the end of present-day "Hanger Road"[27] and almost directly in line with the orientation of that road. The west lateral ditch ran downhill along the alignment of present-day "Hanger Road".[28]

At the time of the field work for this report in July of 2025, the east lateral was abandoned, and the west lateral had flowing water. CSH assigned the following designations for these resources as part of their survey effort for the Kaawanui Solar Project; the east lateral is currently called -02269-CSH-1 and the west lateral is called -02269-CSH-2. The abandoned east lateral and the functioning west lateral have has been assigned Hawai'i State Inventory of Historic Places (SIHP) number 50-30-09-02269.[29] Ditch Check and turnout -02269-CSH-1D, Settling Box -02269-CSH-1E, Ditch Diversion -02269-CSH-1A, Culvert -02269-DSH-1B, and Culvert -02269-CSH-1C in this RLS report are on the alignment of the east lateral. The alignment of the west lateral ditch has been changed over time since 1910 and Culverts -02269-CSH-2A, -02269-CSH-2C, -02269-CSH-2D, and -02269-CSH-2E are on the present-day alignment of the west lateral ditch.

In 1946, Olokele Sugar Co. and C. Brewer contracted for a $500,000 improvement to the 1891 Hanapēpē Ditch. This consisted of a lengthy stretch of two tunnels totaling about 17,000' (3¼ miles), that bypassed a long section of flumes and siphons where the ditch was routed along the Hanapēpē River south of Kālai Stream. After fifty-five years of use, these flumes and siphons were apparently leaking out and wasting a lot of irrigation water, leading to their replacement by the tunnels, which were collectively called Koula Tunnel. Subsequently, the Hanapēpē Ditch was

[25] Wilcox, *Sugar Water*. 89.
[26] Conde, *Sugar Trains*. 136.
[27] CSH provided MASON with an explanation that, "Per James Robinson, this road has informally been referred to as ""Hanger Road"" for discussion of this project, but is technically an unnamed road."
[28] USGS, Hanapēpē Quadrangle topographic map. 1910.
[29] Oliver M. Bautista, Smanatha Purdy, and Hallett H. Hammatt, *Draft Archaeological LRFI for the Kaawanui Solar + Storage Project (Job Code Makaweli 11)*. April 2025.

commonly referred to as the Koula Tunnel Ditch. Construction of the Koula Tunnel was likely accomplished by workers employed by the landowner, G&R. Before the Koula Tunnel was built, the two corporations with rights to Hanapēpē River Water, G&R and McBryde Sugar Co., diverted most all of the river water in a quota allotment that kept both reasonably satisfied. The construction of the tunnel allowed more water to be taken out by G&R and Olokele Sugar Co. and upset this allotment balance, diminishing the water that was available for McBryde's irrigation intakes downstream. McBryde filed suit against G&R. The matter was settled by the Hawai'i Supreme Court's 1973 decision, commonly known as the McBryde Decision, which ruled that normal surplus waters belong to the State of Hawai'i and not to private landowners.[30]

Ca. 1946, while the east lateral was in service, two ditch features were built along its length at about the 170' elevation level and at about the 125' elevation level. The upper feature (-02269-CSH-1D), built of concrete and CRM, appears to have functioned as a check and turnout to divert ditch water into a conduit to feed adjacent fields. This feature has a gate across the ditch to back water up into a receiving basin that then flows into a conduit. The lower feature (-02269-CSH-1E), built of concrete, appears to have functioned as a settling box to allow sand and gravel to settle out of the ditch water. It has a gate across the ditch to back water up into a settling box.

Irrigation water was still routed down the east lateral through the early 1970s. An orthophoto quad map by the USGS dated 1977 shows that by that year a new board adjusted gate (-02269-CSH-1A) was added at about the 180' elevation level that functioned to dump excess water out of the east lateral ditch into the nearby Ka'awanui Gulch.[31] By 2000, an aerial photograph indicates that the west lateral irrigation ditch was re-routed to its present alignment.[32] This consisted of turning it to the south southeast away from "Hanger Road" at a point about 1/3 mile north of "Hanger Road's" intersection with Old Government Road. When the route of the ditch met Ka'awanui Village Road it was routed south along that road to Old Government Road where it turned northwest along that road. The west lateral ditch currently (2025) runs along Old Government Road to cross the Aaukui Stream (out of the Preliminary Project Study Area) on a concrete bridge that has been re-purposed to also serve as a ditch flume.

[30] "Olokele Giving Favorable Report to Stockholders," *Honolulu Star Bulletin*. March 22, 1946. 2.; Wilcox, *Sugar Water*. 86-90.; Jerry Tune, "State Eyes Water Rights." *Honolulu Star Bulletin*. August 15, 1975.

[31] USGS, Hanapēpē Quadrangle, orthophotoquad map. 1977

[32] UH Mānoa, MAGIS Collection, Aerial Photograph # 2720. April 30, 2000.

Hawaiian Sugar Co. Railroad

The Hawaiian Sugar Co. began building its railroad system upon the formation of the company, and by 1891 the plantation had over five miles of track laid and two steam locomotives from the Baldwin Locomotive Works of Philadelphia. Locomotives purchased by the Hawaiian Sugar Co. since 1891 were all 30" gauge.[33] See Figure 10.

HAWAIIAN SUGAR PLANTATION COMPANY
SURPLUS
January 10, 1941

#1 Steam locomotive — 30" gauge weight 21,000 lbs. 4 drivers Purchased 1891	$1,000
#2 Steam locomotive — 30" gauge Weight 38,700 lbs. 4 drivers New boiler and frame 1938	$2,500
#3 Steam locomotive — 30" gauge Weight 38,700 lbs. 4 drivers New boiler 1923 — Purchased 1893	$1,500
#4 Steam locomotive 30" gauge weight 44,000 lbs. 4 drivers New boiler 1928	$2,000
#5 Steam locomotive — 30" gauge Weight 53,300 lbs. 6 drivers Purchased 1912	$3,000
#6 Steam locomotive — 30" gauge Weight 49,300 lbs. 6 drivers	$4,000
Baldwin Whitcomb Diesel Mechanical Drive Locomotive — 30" gauge Weight 20,000 lbs. Purchased June 1938	$3,950

Figure 10. This table shows that Hawaiian Sugar Co. locomotives were all 30" gauge. *Source: Conde, Sugar Trains.*

By 1891 the plantation also had five miles of portable track and about 250 cane cars. By December 1901 the Hawaiian Sugar Co. had a spur of permanent rail track extending into the Preliminary Project Study Area from a main line that ran near the coastline. This spur extended mauka up Ka'awanui Village Road from Pākalā Camp near Makaweli Landing to end just mauka of Old Government Road. Note that Figure 3, a 1901 map, shows a fence line running parallel to the spur about 700' to the northwest. See Figure 11.[34]

Planning for the land that could be cultivated once Olokele Ditch was complete, the company began extending permanent track northwest of the mill. In 1904 over six miles of new track was laid and an additional five miles was underway the following year. These new lines were extended into the lower areas of cultivation; harvested cane from the upper fields was flumed down to points along these tracks and loaded into cane cars for the mill. Ca. 1909 Hawaiian Sugar Co. joined with McBryde Sugar Co. to access Port Allen with rail track and improve the port. In 1912, after the purchase of several more locomotives, the permanent track was extended to some mauka fields and plantation camps, including Camp 5 at about 400' elevation (the mill at

[33] Conde, *Sugar Trains*. 135.
[34] Arthur C. Alexander, "Map of the Makaweli Plantation of the Hawaiian Sugar Co." DAGS Registered Map # 2144. December 1901.

Makaweli was located at about 90′ elevation). By 1920 Hawaiian Sugar Co. railroad was using 30lb rails for both their permanent and portable track. Standard dimensions for this weight of rail track are 3⅛" height and base, and 1 11/16" width of the rail.[35]

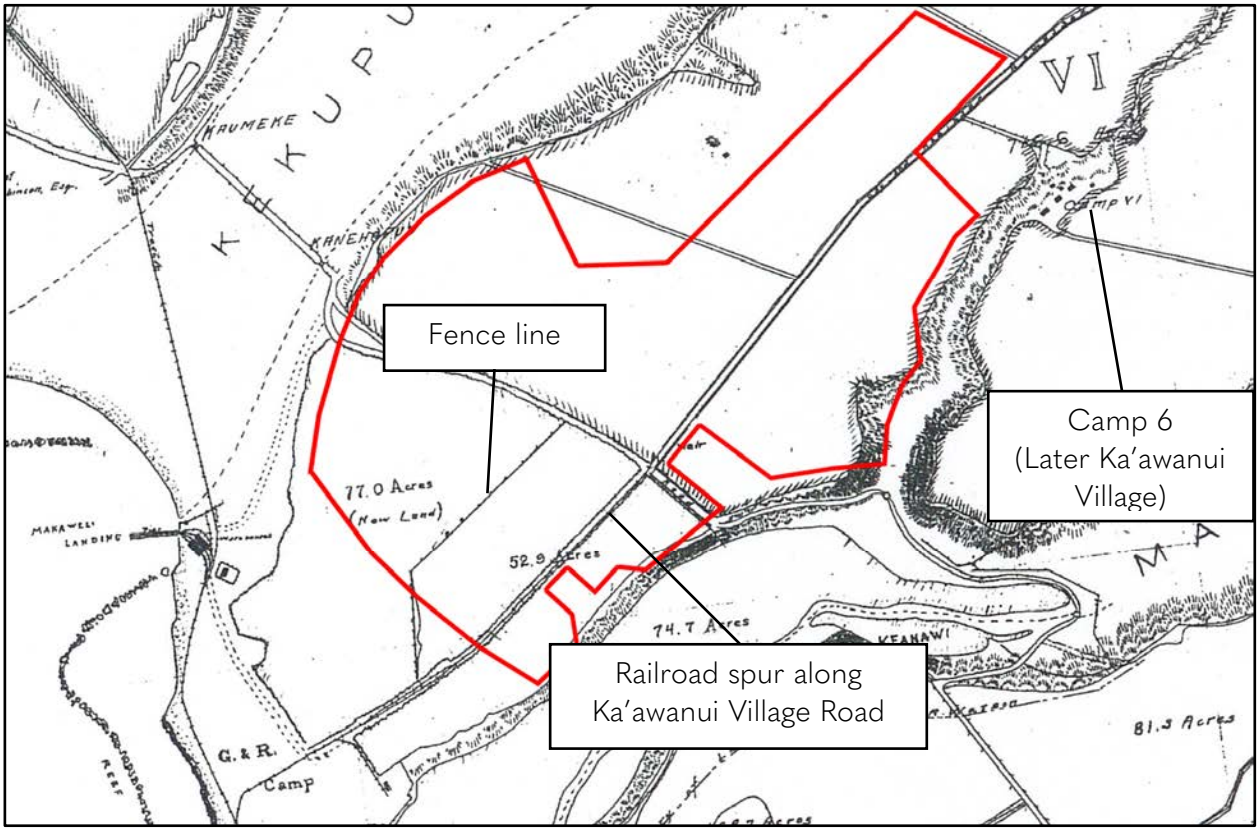


Figure 11. Detail of Figure 3, 1901 field map of the Hawaiian Sugar Co. (Makaweli Sugar Co.) showing rail lines, fences, and housing camps. The Preliminary Project Study Area is highlighted with an added red outline. North at top. *Source: (Alexander) DAGS Registered Map # 2144. December 1901.*

From early on, Hawaiian Sugar Co. experimented with and adopted modern mechanization methods. Ca. 1920, the plantation switched from coal to fuel oil power for their locomotives. In 1924, the plantation experimented with loading cane onto rail cars mechanically, with crane derricks mounted on earthmovers. At the time, other plantations relied on workers to manually load rail cars, carrying harvested cane on their backs up the ramps.[36]

By 1927 Hawaiian Sugar Co. had developed a rail spur that extended mauka from Pākalā Camp and crossed Old Government Road about 750′ northwest of Ka'awanui Village Road.[37] See Figure 5. In 1931 the plantation had about thirty-five miles of permanent track and four- and one-half miles of portable track, six steam locomotives, 600 cane cars, fifteen sugar cars, and thirty-

[35] Conde, *Sugar Trains*. 134.; *ASCE Rail Specifications*, website https://railroadrails.com/knowlege/rail-section-dimensions/ accessed on July 9, 2025

[36] This manual loading of cane was termed "hāpai-ko" by the plantations (hāpai = to lift, ko = sugar cane).

[37] Hawaiian Sugar Co. Field Map Hawaiian Sugar Co. July 29, 1927. In Conde, *Sugar Trains*. 136.

five flatbed cars for hauling portable track. In 1931 some fluming was still being employed to bring cane down from the highest fields. Spent flume water was routed into irrigation ditches.[38]

Olokele Sugar Co. took over the Hawaiian Sugar Co. plantation in 1940.

The next year, just a few months before the December 7th, 1941, Japanese attack on Pearl Harbor, which brought the United States' into World War II, Olokele retired their railroad in favor of truck hauling. They used locomotives for the 1941 harvest season that ended in July. On July 23, 1941, employees gathered around festooned locomotives to celebrate the end of the plantation's railroad. See Figure 12.

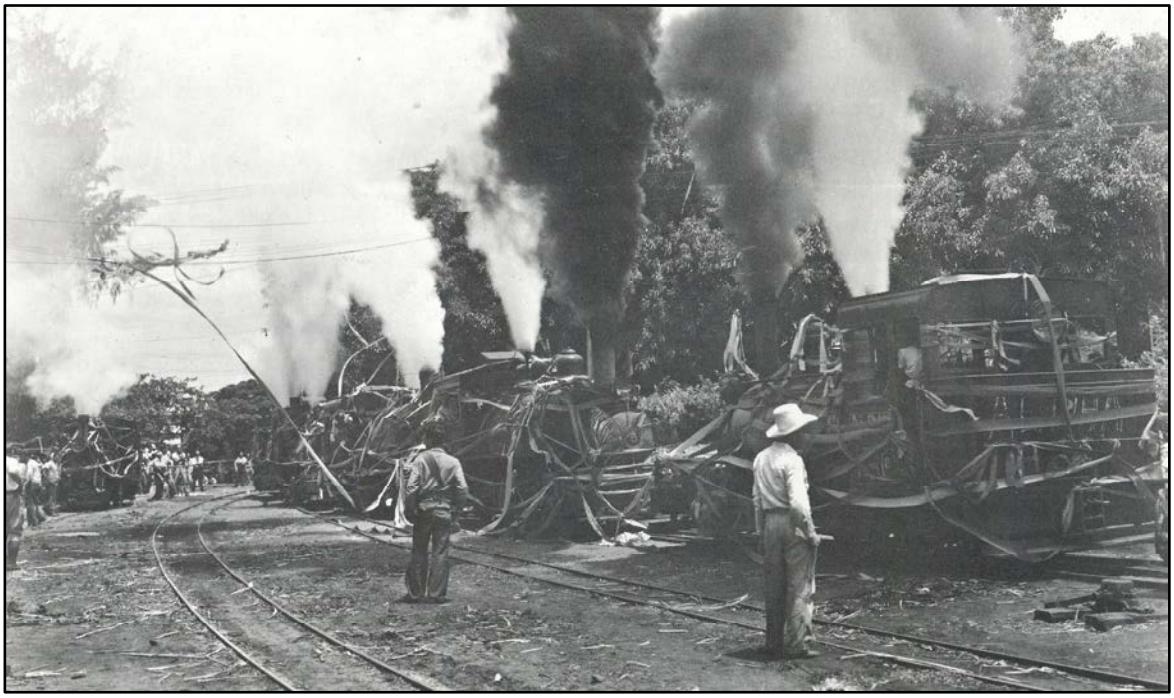


Figure 12. Olokele Sugar Co. plantation's last day of railroad operations, July 23, 1941. The locomotives were decked out in ribbons and steam whistles blasted. *Source: Conde, Sugar Trains.*

After the 1941 harvest, most of the permanent rail tracks were removed.

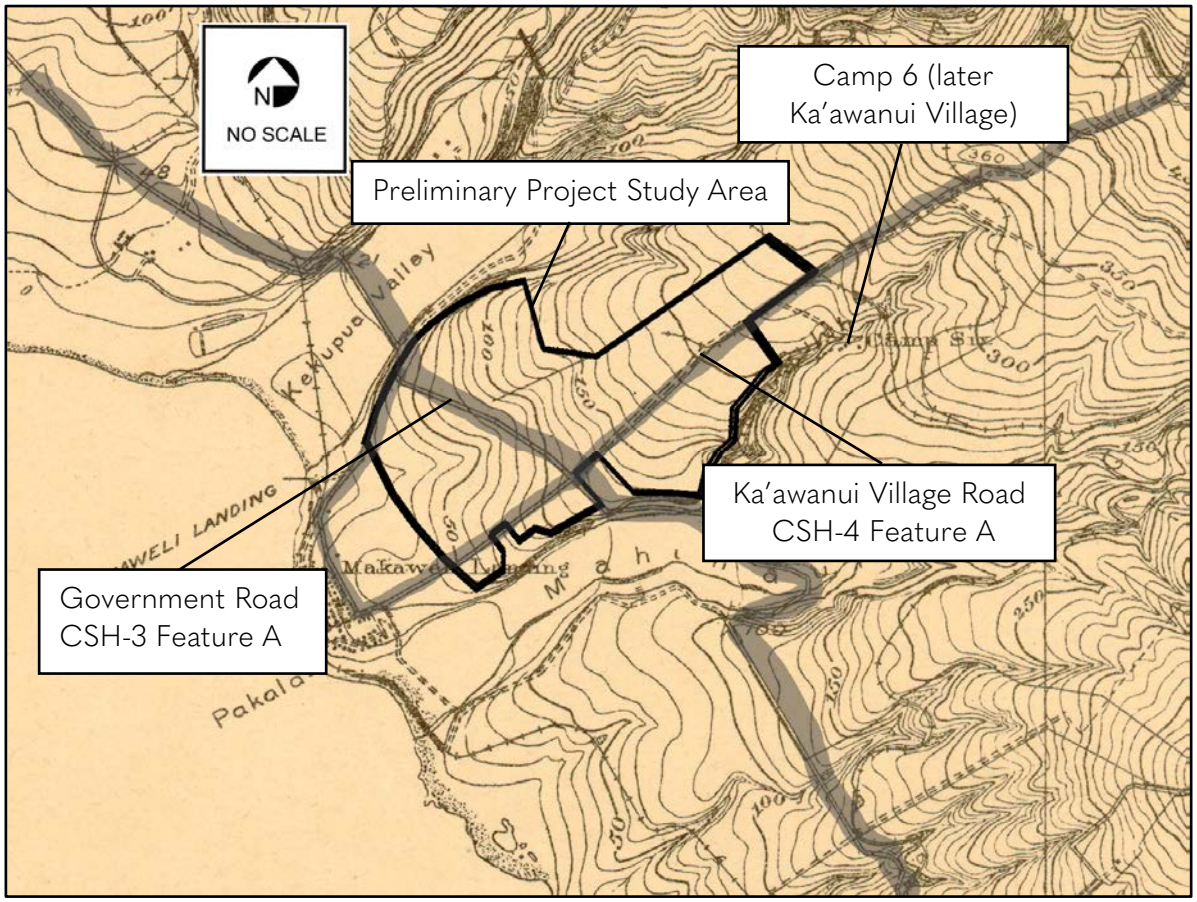
For the 1941-42 season, the plantation used mechanical harvesting and hauled cane to the mill via eleven 7-ton dump trucks.[39] Finished sugar was trucked to the shipping facility at Port Allen under contract with Kaua'i Terminals, Ltd.[40] This was the first time in Hawai'i that a plantation used mechanical can harvesting and truck hauling exclusively. Most other plantations' transition to trucking would take place later, after the end of World War II, in 1946 or 1947.

[38] Conde, *Sugar Trains*. 135.
[39] "Hawaiian Sugar Co. is Experimenting with Cane-Loaders," *Honolulu Star Bulletin*. February 9, 1924. 2.; Clarice B. Taylor, "Olokele To Be First Fully Mechanized Plantation." *Honolulu Star Bulletin*. September 29, 1941. 2.
[40] William H. Flanagan, ed., Hawai'i Sugar Manual, 1947-1948. (New Orleans: Gilmore Publishing). 1948. 218.

Hawaiian Sugar Co. Roadways

The system of roadways in the Preliminary Project Study Area today has its origins with a ca. 1891 wagon road that connected 'Ele'ele with the Waimea Plantation. By December 1901, this section of wagon road was established as the Old Government Road.[41] By ca. 1910, the Old Government Road was enhanced with improvements (widening, paving, and some straightening of curves) by the County of Kaua'i that made it part of the Kaua'i Belt Road in the Makaweli area. Figure 13.

The ca. 1910 roadway retained the name Old Government Road and was also referred to as the Kaua'i Belt Road. The County of Kaua'i was established in 1905, five years after Hawai'i was annexed to the United States. The establishment of county government enabled infrastructure development on the island, including building a belt road to improve access, commerce, and construction for the residents and business owners. The first County Engineer was civil engineer Joseph Moragne (1864-1937), who largely completed the Kaua'i Belt Road by the end of his tenure in 1915.[42]



[41] L.E. Imlay, "Map of Kaua'i Compiled from Government Surveys and Private Surveys of Lands Belonging to Gay and Robinson." DAGS Registered Map 2246. 1891.; Arthur C. Alexander, "Map of the Makaweli Plantation of the Hawaiian Sugar Co." DAGS Registered Map # 2144. December 1901.

[42] Dawn Duensing, Hawai'i's Scenic Roads, Paving the Way for Tourism in the Islands. (Honolulu: University of Hawai'i Press). 2015. 58.

Figure 13. 1910 topographic map with added highlighting to show roads in the Preliminary Project Study Area. *Source: USGS, Hanapēpē Quadrangle. 1910.*

By 1901 today's Ka'awanui Village Road had also been built. Its name at that time is not known. This road was unpaved where it extended mauka of the Old Government Road, while the section going makai to Pākalā Village and Makaweli Landing was paved.[43] The section mauka of the Old Government Road provided access to Hawaiian Sugar Co. housing area Camp 6, which was called Ka'awanui/Ka'awanui Camp by 1949.[44] From 1910 to at least 1983 today's Ka'awanui Village Road extended a good distance mauka of the Old Government Road, about five and a half miles. This took the road over the Olokele Ditch and terminated at a group of three small buildings at the 1880' elevation level in Kunalele Valley. Today's Ka'awanui Village Road paralleled the lateral ditch that supplied Field 6 for a portion of this mauka section.[45]

By 1927 "Hanger Road" was built and Field 6 was divided into neat rectangles by it and other field roads. In 1927 the Old Government Road marked the makai boundary of Hawaiian Sugar Co. cane fields. Makai of this road the Preliminary Project Study Area is indicated as a "grove" on a historic (1927) map with the settlement of Pākalā at the coastline outside the Preliminary Project Study Area.[46] By 1950 the earlier neat pattern of roads in the Preliminary Project Study Area was changed by re-alignments and road additions, but the Old Government Road, Ka'awanui Village Road, and "Hanger Road" retained their historic alignments, as they do currently.[47] Field roads within the cultivated areas were formed and abandoned as planting and harvest needs shifted. For example, from about 1950 unnamed diagonal field roads crossed the cultivated fields. See Figure 14 and Figure 15.

[43] Arthur C. Alexander, "Map of the Makaweli Plantation of the Hawaiian Sugar Co." DAGS Registered Map # 2144. December 1901.; USGS, "Hanapēpē Quadrangle, topographic map." 1910.
[44] "Kaua'i Filipino Dies Following Stabbing," Honolulu Star-Bulletin. December 24, 1949. 37.
[45] USGS, "Hanapēpē Quadrangle, topographic map." Various dates.
[46] Conde, *Sugar Trains*. 136.
[47] USGS, "Aerial photograph, Flightline GS-MF, Photo K1-75." November 21, 1950.

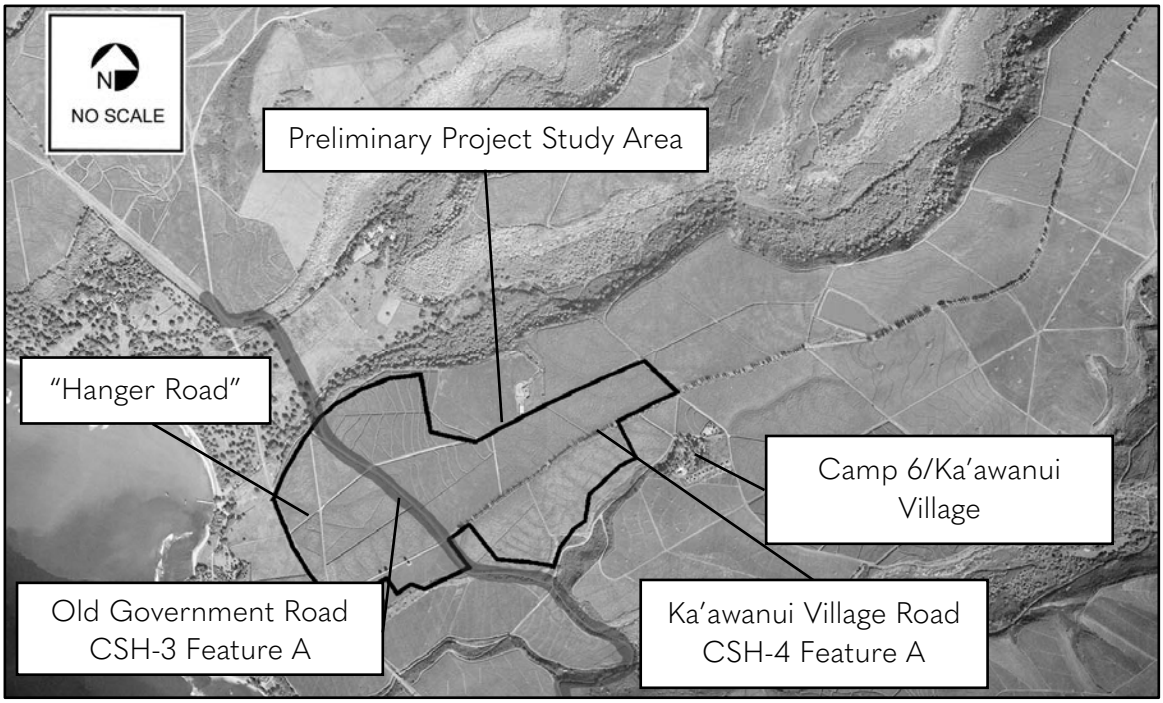


Figure 14. 1950 aerial with added highlighting. Ka'awanui Village Road and "Hanger Road" are visible. *Source: USGS, Flightline GS-MF, Photo K1-75. November 21, 1950.*

The current alignment of Kaumuali'i Highway (Route 50) that defines the makai boundary of the Preliminary Project Study Area was built ca. 1938. This highway bypassed the section of the Old Government Road from near Hawaiian Sugar Co.'s mill at Makaweli to the north rim of Kekupua Valley.[48]

[48] "Waimea Scans New Federal Highway Name," Honolulu Advertiser. August 6, 1938. 7.; USGS, "Hanapēpē Quadrangle, topographic map." 1963.

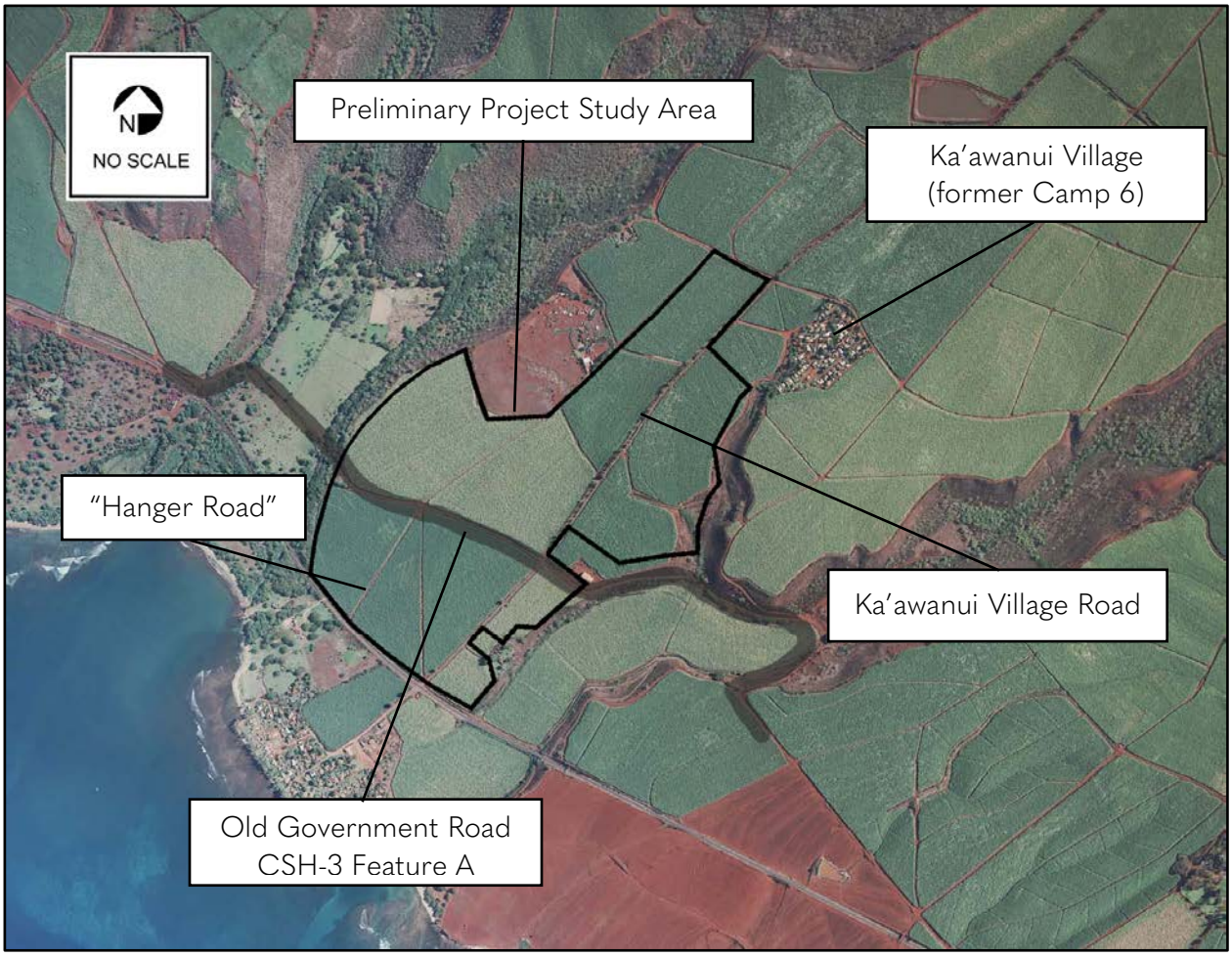


Figure 15. 2000 aerial with added highlighting. Ka'awanui Village Road and "Hanger Road" are apparent. *Source: MAGIS UH Mānoa, #2720. April 30, 2000.*

A separate portion of Kaua'i Belt Road – the North Shore Section - was added to the Hawai'i Register of Historic Places in 2003, and to the National Register of Historic Places (NRHP) in 2004.[49] It was listed with state and local significance in the NRHP Areas of engineering, transportation, social history, commerce under NRHP Criteria A and C. Additional documentation for the nomination prepared in 2021 identified an additional NRHP Area of significance under Criterion A; Conservation, for the substantial preservation efforts that occurred along the road since the 1970s. Assigned SIHP # 50-30-02-02334, the listed portion extends from Princeville to Hā'ena State Park and mostly follows the original ca. 1915 Kaua'i Belt Road alignment. This section of Kaua'i Belt Road is far outside the Preliminary Project Study Area, on the opposite side of the island. Yet it has a shared historic context with the roughly half-mile portion of Old Government Road within the current Preliminary Project Study Area, since it was part of the same planning and development effort undertaken during the 1905-1915 tenure of Kaua'i County Engineer Joseph Moragne. As mentioned above, Moragne was responsible for much of the initial construction of the Kaua'i Belt Road in the early 20th century.

[49] Dawn Duensing, "National Register Nomination Form for Kaua'i Belt Road (North Shore Section), April 8, 2002." Prepared on behalf of the Hanalei Roads Committee. 2002.; Hawai'i State Historic Preservation Division (SHPD), Online Historic Register listing, accessed on May 13, 2024.

However, the nomination notes that "This section of roadway is relatively unaltered and is the most spectacular portion of Kaua'i's belt road system, both in its historic character and scenery. It is the only portion of the Kaua'i Belt Road that retains historic integrity."[50]

[50] Dawn Duensing, National Register Nomination Form for Kaua'i Belt Road (North Shore Section), April 8, 2002. Prepared on behalf of the Hanalei Roads Committee. 6.

Architectural Descriptions

The resources surveyed as part of this study are described on the following pages, with brief alteration histories. The alteration histories are not meant to be a comprehensive list of every change, but a list of the most significant alterations noted. The descriptions are presented in the following section, ordered in groups of similar resource types. Irrigation features are presented first. These are followed by the Railroad Track Remnant and the Water Tank. The grouping of roadways is presented last. This order is also used in the Significance and Integrity section, Table 1. Although this order of the Architectural Descriptions and Significance and Integrity does not follow the chronological flow of the Historic Context, it allows the reader to better compare resources due to their ordering in groups.

Character defining features are only provided if the resource meets Hawai'i Register of Historic Places and HAR §13-284-6 significance and integrity criteria.

The feature numbers used as identifiers for the resources were assigned by Cultural Surveys Hawai'i, Inc. and are used to conform with their 2025 archaeological report.

Culvert -02269-CSH-2A (ca. 1910)



Figure 16. Culvert -02269-CSH-2A inlet. View facing southwest. *Source: MASON, 2025.*

Description

Culvert -02269-CSH-2A directs the flow of the west lateral ditch (SIHP # -02269) through a right angle turn that is accomplished at the outlet portal where the direction of the water flow changes from across the slope to straight downhill. The inlet of Culvert -02269-CSH-2A is concealed by natural stones placed in front of an above the inlet portal. The ditch above the inlet is widened into a slow-moving pool. The construction of the culvert pipe could not be observed during field work and its configuration and materials are not known. The culvert is about 15′ long from inlet to outlet, carrying the lateral ditch under a footpath. The outlet of Culvert -02269-CSH-2A is formed of irregular natural stones, set with cement where stones meet. Cement leaks out in some of the joints. The outlet empties through the left bank of the approximately 3′-wide ditch that extends downslope. The left bank of the ditch - for about 4′ below the outlet - is natural stones set with some concrete. Below this the left bank transitions to earth sides and the approximately 3′-wide ditch flow strongly. The right bank of this ditch opposite the outlet is concrete rubble masonry (CRM), about 2′ high, that extends about 6′, terminating in a single, concrete stanchion for a board adjusted gate. A small stilling wall serves to settle the water flow as it enters the ditch. A low weir is in the ditch at the upstream edge of the concrete stanchion. The opposite stanchion, on the left bank, is missing. Below the extant stanchion the right bank the ditch has earthen sides.

Alterations

- The CRM ditch wall appears to be a historic alteration.



Figure 17. Culvert -02269-CSH-2A outlet. View facing southeast. Note the right angle turn of the water flow *Source: MASON, 2025.*



Figure 18. Culvert -02269-CSH-2A showing the ditch above the inlet in the top center and the outlet and a portion of the ditch below the outlet in the foreground. View facing southeast. *Source: MASON, 2025.*



Figure 19. Culvert -02269-CSH-2A inlet. View facing northwest. *Source: MASON, 2025.*



Figure 20. Culvert -02269-CSH-2A outlet and a section of the ditch. The outlet flow is from the lower right. Note the short section of CRM sidewall of the ditch. The low stilling wall is at the right end of the ditch and at the left end of the ditch the low weir is seen at the base of the concrete stanchion for a board adjusted gate. *Source: MASON, 2025.*



Figure 21. The west lateral ditch below the outlet of Culvert -02269-CSH-2A. View facing northeast.
Source: MASON, 2025.

Culvert -02269-CSH-2C (ca. 2000)



Figure 22. Culvert -02269-CSH-2C inlet. View facing southwest. *Source: MASON, 2025.*

Description

Culvert -02269-CSH-2C is overgrown with dense vegetation and could not be observed. The west lateral ditch makes a turn to the south southeast, moving away from "Hanger Road," at Culvert -02269-CSH-2C. Both the inlet and outlet were not directly observable. A short section of the ditch below the outlet indicates that the ditch has earthen banks and is likely between 2' to 4' wide.

Alterations

- None apparent.



Figure 23. Culvert -02269-CSH-2C outlet. View facing west. *Source: MASON, 2025.*



Figure 24. A portion of the west lateral ditch just below Culvert -02269-CSH-2C outlet. View facing southwest. *Source: MASON, 2025.*

Ditch Diversion -02269-CSH-1A (ca. 1977)



Figure 25. Ditch Diversion -02269-CSH-1A on the east lateral, view facing southeast. The water flow through this gate was from the inlet at the bottom of this photograph to the outlet of the gate channel at the top. The abandoned east lateral ditch (SIHP # 50-30-09-02269) is seen in the bottom of this photo, extending from left to right. The water flow through this lateral was also left to right. *Source: MASON, 2025.*

Description

Ditch diversion -02269-CSH-1A on the east lateral is an abandoned, concrete board adjusted gate. This gate has concrete stanchions about 2′ high that are formed with vertical slots to hold the wood boards that were used to open and close the water flow. In addition to the concrete stanchions, the gate is built with a combination of earthen and CRM sidewalls and has an earthen bottom. The channel of this gate is about 35′ in total length and about 2′ to 3′ wide across the bottom. The route of the gate has two angles that direct the water flow. When this gate was in operation, it dumped excess ditch water from the east lateral ditch into a section of ditch leading to the nearby Ka'awanui Gulch, which lies about 840′ to the southeast. The original east lateral ditch that feeds this gate is blocked off with stones and earth just downstream of the gate. The ditch continuing out of the channel outlet of this gate toward Ka'awanui Gulch has natural earth walls and bottom.

Alterations

- Some sections of CRM sidewall were added after the original construction



Figure 26. Ditch diversion -02269-CSH-1A on the east lateral, view facing northwest. This is the outlet of the channel of the gate. *Source: MASON, 2025.*



Figure 27. A view of a concrete stanchion with vertical slot for adjustment boards. View facing northeast. This is the inlet of the gate, the east lateral ditch is at the left of this photo with the former water flow from top to bottom of the photo. *Source: MASON, 2025.*



Figure 28. A typical earthen side wall in the gate channel. View facing west. *Source: MASON, 2025.*



Figure 29. A section of CRM sidewall of the gate channel that appears to be original construction. View facing northeast. *Source: MASON, 2025.*



Figure 30. A section of CRM sidewall of the gate channel that appears to be built after the original construction. View facing southwest. *Source: MASON, 2025.*

Culvert -02269-CSH-1B (ca. 1977)



Figure 31. Inlet of Culvert -02269-CSH-1B, view facing south. This inlet has a 12" diameter of cast concrete pipe with a flared (bell) end. *Source: MASON, 2025.*

Description

Culvert -02269-CSH-1B is an abandoned culvert under a dirt road. The culvert is constructed of sections of bell-end, 12" diameter cast concrete pipe. Overall length of the culvert is about 20'. The culvert outlet is concealed by a stone slab above the opening that is supported on stones.

Alterations

- None apparent.



Figure 32. Overall view of Culvert -02269-CSH-1B with the inlet in the foreground. The outlet is out of view in the background. view facing south. *Source: MASON, 2025.*



Figure 33. Outlet of Culvert -02269-CSH-1B, view facing north. *Source: MASON, 2025.*

Culvert -02269-CSH-1C (ca. 1977)



Figure 34. Inlet of Culvert -0229-CSH-1C, view facing south. *Source: CSH. 2025.*

Description

Culvert -02269-CSH-1C is an abandoned culvert, about 13′ long that is constructed of 20″ diameter cast concrete pipe. The culvert is oriented approximately north-south at a point where the abandoned earthen ditch it carries shifts its flow from southward to the southeast. The culvert inlet has the remains of basalt and cement CRM wingwalls that flare out from the culvert pipe for about 2′ to channelize the inlet flow. The culvert outlet opens into an eroded and sedimented section of the earthen ditch, which extends toward Ka'awanui Gulch.

Alterations

- None apparent.



Figure 35. Outlet of Culvert -0229-CSH-1C, view facing north. *Source: CSH. 2025.*



Figure 36. View of the earthen ditch extending downstream from the outlet of Culvert -0229-CSH-1C, which is in the left foreground. View facing southeast. *Source: CSH. 2025.*

Check and Turnout -02269-CSH-1D (ca. 1946)



Figure 37. The ditch flowed past this feature in the foreground, from right to left. The longitudinal divider of three screen gates that separates the east chamber from the west chamber can be seen in the center of the turnout. The check gate is out of view to the left (downstream of the turnout). *Source: CSH. 2025.*

Description

Check and Turnout -02269-CSH-1D, is a vertical-walled, concrete constructed turnout alongside the west side of the ditch. It is about 21′ long x 8′ wide and 2′-6″ high. It is divided longitudinally into east and west chambers by three board adjusted gates that operate vertically in slots in the endwalls and in two concrete post set along the centerline. These three gates have the remains of wood-frame, metal mesh vertical sliding trash screens. A fourth vertical operating trash screen is in slots near the downstream end of the east chamber of the turnout. The check gate for the turnout is located about 10′ downstream of the turnout. The check gate across the ditch is a vertical operated, board adjusted gate that has concrete slots in CRM sections on both sides of the ditch. The CRM hardens the west side of the ditch wall from the turnout to the check gate. The east side of the ditch at the check gate is a short section of CRM about 36′ x 18′ in plan. The south end wall of the west chamber of the turnout has a 12″ diameter conduit with a control valve that extends underground.

Alterations

- None apparent

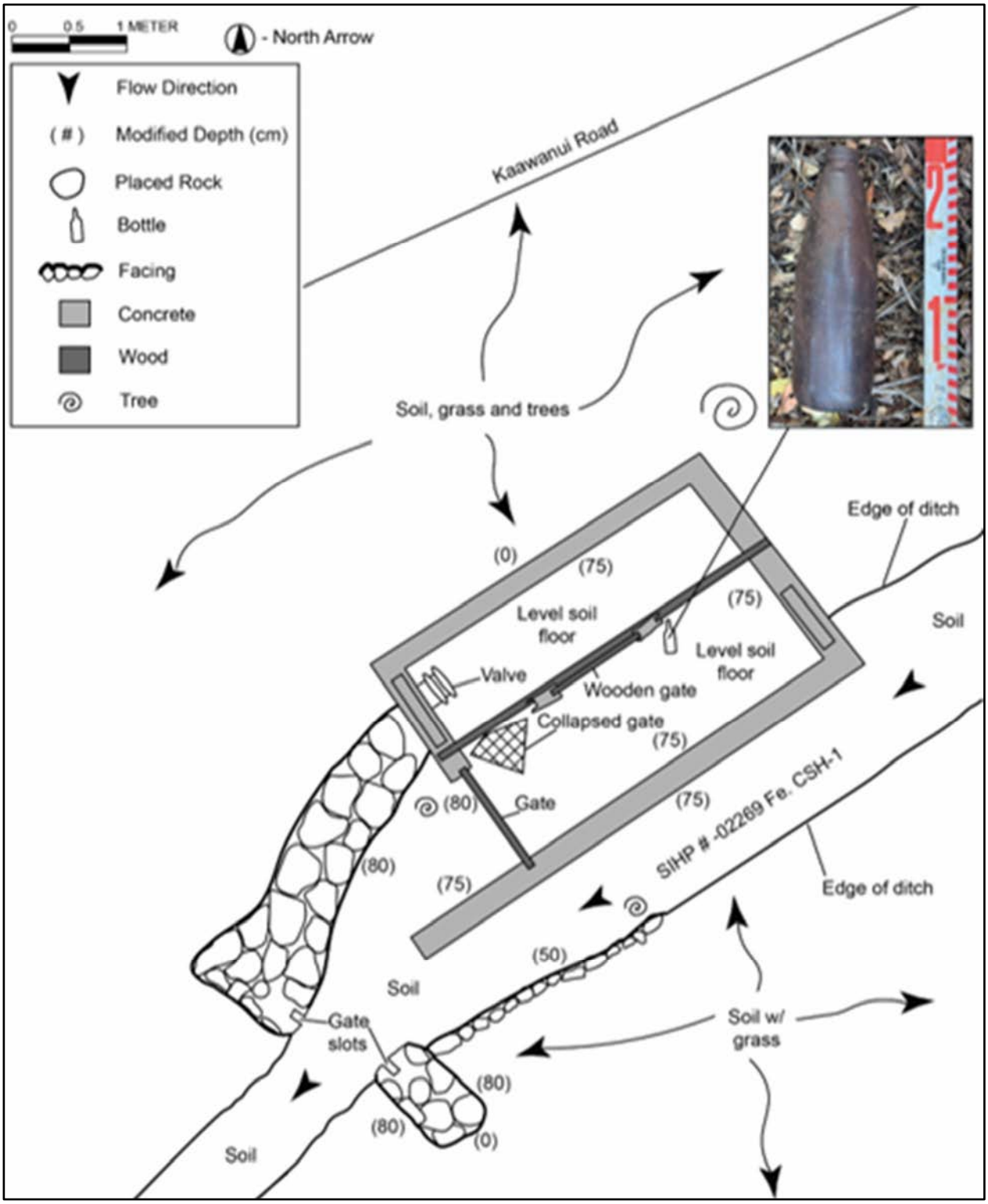


Figure 38. Plan sketch of the Check and Turnout -02269-CSH-1D that was prepared by Cultural Surveys Hawai'i, Ind. *Source: CSH. 2025.*



Figure 39. Check and Turnout -02269-CSH-1D, view facing northeast. The check gate is in the foreground and the vertical (east) sidewall of the east chamber can be seen in the background. *Source: CSH. 2025.*

Settling Box -02269-CSH-1E (ca. 1946)



Figure 40. Settling Box -02269-CSH-1E, view facing southwest. The ditch extends up the left side of the structure, the vertical slot for the board adjusted gate across the ditch can be seen in the concrete block at center foreground. *Source: CSH. 2025.*

Description

Settling Box -02269-CSH-1E is a vertical-walled, concrete constructed settling box alongside the west side of the ditch. It has an irregular L-shaped plan with overall dimensions of about 24′ long x 17′ wide and 3′high. It is divided into two chambers, each about 16′ x 7′ in plan. The north chamber forms the upright member of the L and the south chamber forms the base of the L. Adjacent to the north end of the north member there are concrete slots on each side of the ditch for a board adjusted gate across the ditch. The east slot is formed in a concrete block about 5′ x 2′ in plan and the west slot is formed in an irregular angular block of concrete that is cast against the walls of the settling box. This gate across the ditch appears to have formerly operated to back up ditch water so that water could enter the chambers of the settling box. This would still the water current enough so that carried sediment would settle out of the water flow and collect on the bottom of the settling box. Ditch water would then flow over the top of the sidewalls, out of the box and back into the ditch. Remains of broken concrete, appearing to be an open top chute to guide the outlet flow over the top of the box, are present between the box and the west side of the ditch.

The top edges of the sidewalls of the settling box have threaded bolts imbedded that protrude several inches above the sidewalls. This suggests that there was a framework of some type

secured to the top edges. The settling box has three inscriptions in the top edges of the sidewalls that indicate a 1946 construction date. An additional 1967 inscription on the east sidewall of the north chamber indicates that repairs or alterations were done there in that year.

Alterations

- Some repair or reconstruction of the east sidewall occurred in 1967

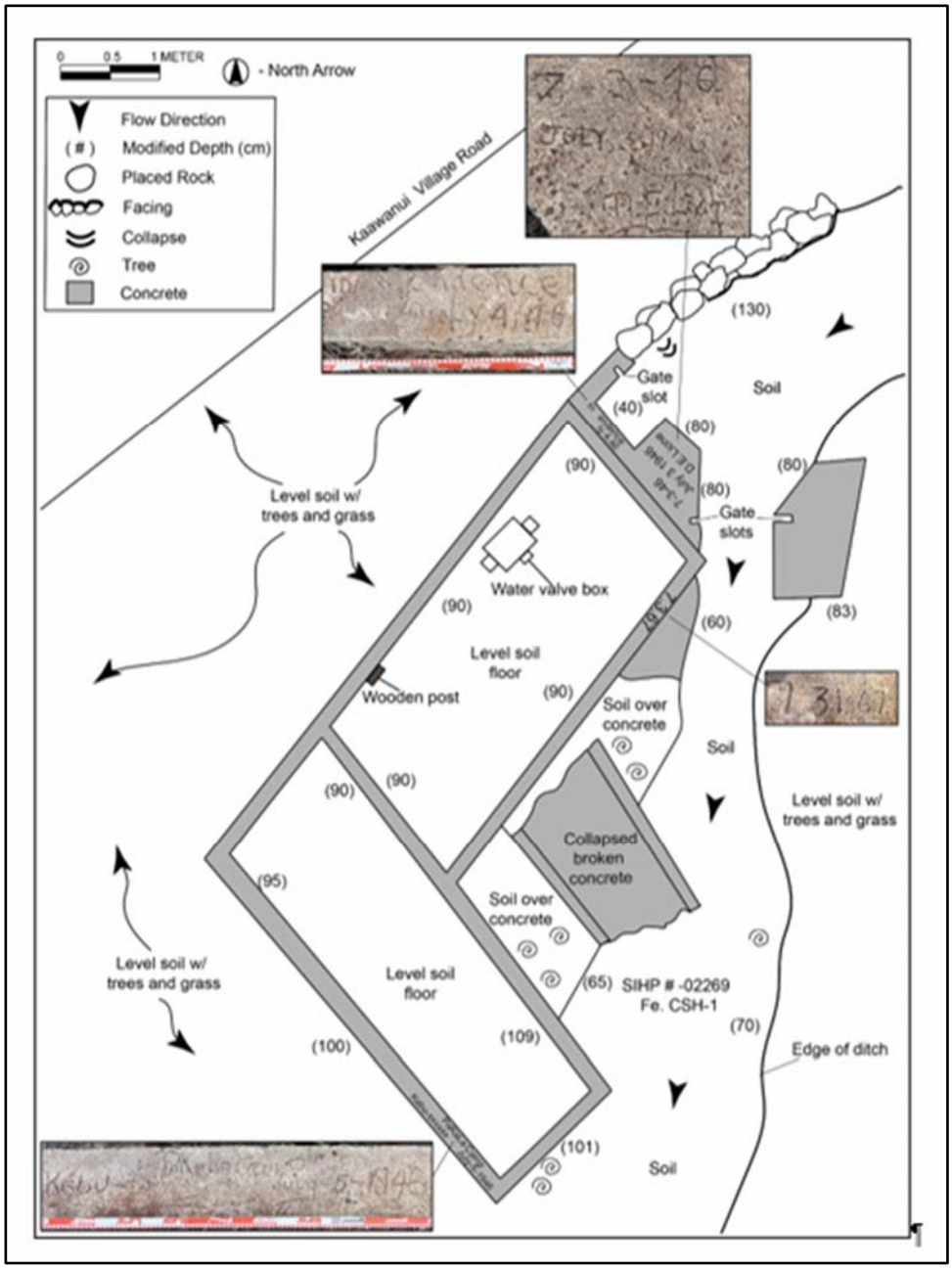


Figure 41. Plan sketch of the Settling Box -02269-CSH-1E that was prepared by Cultural Surveys Hawai'i, Inc. *Source: CSH. 2025.*



Figure 42. Settling Box -02269-CSH-1E, view facing northwest. *Source: CSH. 2025.*

Culvert -02269-CSH-2D (ca. 2000)



Figure 43. Culvert -02269-CSH-2D outlet. View facing north. *Source: MASON, 2025.*

Description

Culvert -02269-CSH-2D is an 18" diameter iron pipe along the west lateral (SIHP # -02269). The culvert passes under Old Government Road about 350' east of "Hanger Road". The inlet could not be observed due to dense vegetation, so the total length of the culvert is estimated at about 40' to 45'. The culvert outlet empties into a section of lateral ditch that is eroded into a small pool about 8' across. This pool quickly narrows to a typical ditch width of about 3' with earthen sides and bottom.

Alterations

- None apparent



Figure 44. Culvert -02269-CSH-2D inlet. View facing south. *Source: MASON, 2025.*



Figure 45. A view of the pool formed at the Culvert -02269-CSH-2D outlet. View facing north. *Source: MASON, 2025.*



Figure 46. West lateral ditch downstream from Culvert -02269-CSH-2D outlet. View facing northwest.
Source: MASON, 2025.

Culvert -02269-CSH-2E (ca. 2000)



Figure 47. Culvert -02269-CSH-2E inlet. View facing northwest. *Source: MASON, 2025.*

Description

Culvert -02269-CSH-2E is a 16" diameter iron pipe with its inlet and outlet reinforced by headwalls consisting of concrete with imbedded stones and an overall length of about 60'. However, this culvert has an approximately 4' length of its upper portion broken away, exposing the water that flows through the pipe. This broken area is about 25' from the inlet portal and is amid a dense growth of brush that prevents inspection of the breach, which does not impede or deflect the flow of water through the culvert. It is possible that this culvert is actually two separate culverts with outlet and inlet in the dense brush, but this could not be confirmed in the field.

The west lateral ditch (SIHP # -02269) above the culvert is typically about 5' across and widens to about 9' just above the inlet where the water has pooled. The culvert passes under "Hanger Road" just south of the intersection with Old Government Road. A dirt footpath also passes over the culvert on the east side of "Hanger Road," east of the dense brush. Culvert -02269-CSH-2E outlet empties into a small pool about 9' across. Typical width of the west lateral ditch (SIHP # -02269) below this pool is about 3' with earthen side walls and bottom.

Alterations

- None apparent
- It is possible that Culvert -02269-CSH-2E consists of two separate culverts that are separated by a short distance at the area of dense brush, but this could not be confirmed in the field.



Figure 48. View of the broken section of Culvert -02269-CSH-2E in dense brush. View facing north northeast. *Source: MASON, 2025.*



Figure 49. Detail view of Culvert -02269-CSH-2E inlet. View facing southwest. *Source: MASON, 2025.*



Figure 50. West lateral ditch above Culvert -02269-CSH-2E inlet. View facing southeast. *Source: MASON, 2025.*



Figure 51. Culvert -02269-CSH-2E outlet. View facing northeast. *Source: MASON, 2025.*



Figure 52. This photo shows the dense stand of vegetation about 25' from the inlet of Culvert -02269-CSH-2E, which is out of view to the right of this photo. View facing north. The asphalt paving seen on the left is "Hanger Road". The vehicle is parked at the north corner of the intersection of "Hanger Road" and Old Government Road. The west lateral ditch CSH-1 flows into Culvert -02269-CSH-2E from the right and the flow exits the outlet of Culvert -02269-CSH-2E out of view on the left. *Source: MASON, 2025.*



Figure 53. This photo shows a portion of "Hanger Road" at Culvert -02269-CSH-2E. View facing west. "Hanger Road" extends from the right foreground toward the center background. It goes out of sight behind the dense stand of vegetation (left center) that conceals the broken section of Culvert -02269-CSH-2E. The outlet of Culvert -02269-CSH-2E is in the stand of trees at the right background. *Source: MASON, 2025.*



Figure 54. Culvert -02269-CSH-2E outlet showing the downstream end of the small pool formed at the outlet. View facing northeast. *Source: MASON, 2025.*



Figure 55. A view of a typical section of west lateral ditch downstream of Culvert -02269-CSH-2E outlet. View facing northeast. *Source: MASON, 2025.*

Railroad Track Remnant CSH-6 (ca. 1995)



Figure 56. Railroad Track Remnant CSH-6 at the makai edge of Old Government Road. View facing southeast. *Source: MASON, 2025.*

Description

The Railroad Track Remnant CSH-6 is a pair of parallel sections of track, each 6'-2" long that are imbedded transversely in the pavement of Old Government Road along the makai edge of the roadway about 750' northwest of Ka'awanui Village Road. The remnant pair is 30 lb.[51] track (3 1/8" height, 3 1/8" base width, 1 11/16" width of top rail) with a measurement of 22 5/8" gauge (the distance from the inside of one rail to the inside of the other rail). The top of each rail is flush with the asphalt paving of the roadway. Upon the partial excavation of one end of one rail during the fieldwork, no ballast or ties were observable under the track. The track appears to be laid directly on basalt bedrock with a thin cushioning of compacted soil about 1/2" thick under the track base.

The remnant pair is oriented northeast-southwest and is in the approximate position of a ca. 1927 plantation railroad track that is indicated on a map of the plantation from the same year.[52] However, for several reasons the remnant pair is not evaluated as being an actual historic remnant of Hawaiian Sugar Co. working track:

- The Hawaiian Sugar Co. used 30" gauge track.
- The actual gauge of the remnant pair (22 5/8" gauge) is not a gauge that was ever utilized anywhere. The closest railroad gauges (distance from the inside of one rail to the inside of the other rail) that were historically used in Hawai'i are 24" and 60cm (23.62"). Twenty-four-inch gauge was used on some plantation railroads (Kīlauea Sugar Co. on Kaua'i used 24" gauge), and 60cm gauge was used at some US Army ammunition magazines at Schofield Barracks, O'ahu.

[51] Railroad track is described in the USA as its weight in pounds per yard. 30 lb. track has a weight of 30 lbs. per yard.
[52] Hawaiian Sugar Co. "Field Map Hawaiian Sugar Co. July 29, 1927. In Conde, *Sugar Trains*. 136.

- The remnant pair is set level with the existing pavement. It is doubtful that any track remining from ca. 1927 would have been laid at a level corresponding to the pavement of a later date.
- The remnant pair is set without any ballast or ties. Permanent railroad tracks are always set in a ballast that can absorb shocks, such as crushed stone. Permanent railroad tracks are always set on ties atop the ballast.
- The pair of rails is only 6'-2" in length. It is doubtful that the plantation would have cut rails in this configuration when removing the rail system. Rails are typically removed in their original lengths, which was 39'.

The pair was cut to 6'-2" length from historic 30lb rails and set in the grade when the existing asphalt of the Old Government Road was laid down. This was possibly in 1995 when G&R took possession of the Olokele Sugar Co. plantation; they may have undertaken road paving as part of infrastructure improvements that Olokele was deferring due to the uncertainty of a 2001 renewal of their lease from G&R. The rationale behind the suspected ca. 1995 placement of this track is unknown, but the remnant pair has a spacing measurement of 24" o.c. (from the center of one rail to the center of the other). This corresponds to 22 5/8" gauge.

Alterations

- None apparent



Figure 57. Railroad Track Remnant CSH-6 with scale devise showing the track gauge is 22 5/8". View facing southwest. Note the area at the south end of the northwest track, at upper right in photo, which was excavated during field work to examine for ballast and to measure the track. *Source: MASON, 2025.*



Figure 58. Railroad Track Remnant, the excavated end of the track. View facing northeast. *Source: MASON, 2025.*



Figure 59. Railroad Track Remnant, the excavated end of the track. View facing east. *Source: MASON, 2025.*



Figure 60. Railroad Track Remnant, the excavated end of the track. View facing west. *Source: MASON, 2025.*

Water Tank CSH-7 (ca. 1950)



Figure 61. The Water Tank CSH-7. View facing south. *Source: MASON, 2025.*

Description

The Water Tank CSH-7 is a cylindrical water reservoir that is constructed of corrugated metal on a concrete slab foundation. The tank cylinder is about 15′ in diameter and 13′ high with a conical metal roof that yields a total overall height of about 16′. The tank is in a fenced enclosure with a large-diameter (~12″) flanged iron pipe extending along the northwest side of the enclosure. A piping system within the enclosure on the southwest side of the tank appears to tap into this iron to supply the tank with water via a pipe extending up into the roof.

Alterations

- The corrugated metal siding and conical metal roof appear to be replacements



Figure 62. The Water Tank CSH-7, showing the associated piping on the southwest side. Note the large-diameter iron pipe in the left foreground. View facing east. *Source: MASON, 2025.*



Figure 63 The Water Tank, view facing northeast. Note the large-diameter iron pipe extending along the fencing of the enclosure. *Source: MASON, 2025.*

Ka'awanui Village Road CSH-4 Feature A (ca. 1901)



Figure 64. Ka'awanui Village Road CSH-4 Feature A, looking mauka from near the Kaumuali'i Highway. View facing northeast. *Source: MASON, 2025.*

Description

Ka'awanui Village Road CSH-4 Feature A is a two lane, asphalt paved roadway about 15' wide with minimal shoulders that are typically cut grass. It follows a rather straight route through the Preliminary Project Study Area, extending almost directly upslope from the Kaumualii Highway to a locked gate at the junction of the side road to Ka'awanui Village. Along this length it rises from 40' elevation at Kaumualii Highway to about 235' elevation at the locked gate. The paving of the roadway is crazed and degraded along most of its length with some portions covered with gravel and dust and numerous patched areas. Dry stack stone walls edge the road shoulder in many areas.

Alterations

- Repaved several times since 1901
- Numerous patched areas of paving
- Asphalt paving has degraded to gravel in some areas



Figure 65. Ka'awanui Village Road, looking makai from near the Water Tank. Kaumuali'i Highway is in the distance. View facing southwest. *Source: MASON, 2025.*



Figure 66. Ka'awanui Village Road, looking makai from near the junction with Old Government Road. View facing southwest. *Source: MASON, 2025.*



Figure 67. Ka'awanui Village Road, looking mauka from near the junction with Old Government Road. View facing northeast. *Source: MASON, 2025.*



Figure 68. Ka'awanui Village Road, looking makai from near the top of the road. View facing southwest. *Source: MASON, 2025.*



Figure 69. Ka'awanui Village Road showing a typical section of pavement. View facing east. *Source: MASON, 2025.*

Old Government Road CSH-3 Feature A (ca. 1910)



Figure 70. Old Government Road, a typical section of roadway. View facing northwest from near the junction with "Hanger Road". *Source: MASON, 2025.*

Description

Old Government Road CSH-3 Feature A has sections of old asphalt paving interspersed with areas of gravel and dirt. It is typically about 18′ wide with narrow shoulders of gravel and weeds. The paving at the sections where it is exposed is crazed with numerous patches and broken portions. Although the route through the Preliminary Project Study Area traverses across the highland between the Mahinauli Gulch (toward the southeast) and the Kekupua Valley (toward the northwest) the terrain of the roadway slopes downward toward the Kekupua Valley. The course of the roadway loses about 90′ of elevation along its path through the Preliminary Project Study Area, from about 110′ elevation at its southeast end to about 20′ elevation at its northwest end.

Alterations

- Repaved several times since 1910
- Numerous patched areas of paving
- Asphalt paving has degraded to gravel in some areas



Figure 71. Old Government Road, at its southeastern end where it intersects Ka'awanui Village Road. View facing northwest. *Source: MASON, 2025.*



Figure 72. Old Government Road, near the Railroad Track Remnant, View facing northwest. *Source: MASON, 2025.*



Figure 73. Old Government Road, near its northwest end. View facing southeast. *Source: MASON, 2025.*



Figure 74. Old Government Road, at its northwest end where it leaves the Preliminary Project Study Area and descends into Kekupua Valley. Note the remains of asphalt paving. View facing northwest. *Source: MASON, 2025.*

Unnamed Road ("Hanger Road") CSH-5 (ca. 1927)



Figure 75. "Hanger Road," a typical section of roadway. View facing northeast from near the upper end of the road. *Source: MASON, 2025.*

Description

This road is formally unnamed. CSH provided MASON with an explanation that, "Per James Robinson, this road has informally been referred to as ""Hanger Road"" for discussion of this project, but is technically an unnamed road."[53]

"Hanger Road" CSH-5 is a single lane roadway, typically about 10' wide. The road consists mostly of sections of old asphalt paving with some areas where the paving had degraded to gravel and dirt. The shoulders are typically mown grass and weeds with some sections wider (at up to about 6') than the Old Government and Ka'awanui Village Roads. These wider shoulder areas usually are edged with pasture fencing. "Hanger Road" extends mauka – makai in the Preliminary Project Study Area, from Kaumualii Highway at its lower end (elevation about 20') to a small aircraft Hanger at its upper end (elevation about 180').

Alterations

- Repaved over time
- Numerous patched areas of paving

[53] CSH, Project Correspondence with Dee Ruzicka, August, 2025.



Figure 76. A view of the lower end of "Hanger Road" CSH-5, showing autos travelling on Kaumualii Highway in the background. View facing southwest. *Source: MASON, 2025.*



Figure 77. "Hanger Road," looking mauka from near the bottom of the road. View facing northeast. *Source: MASON, 2025.*



Figure 78. "Hanger Road" is seen in this photo receding makai in the center background. The cross-road is Old Government Road. View facing southwest. *Source: MASON, 2025.*



Figure 79. "Hanger Road," extending mauka above Old Government Road. View facing northeast. *Source: MASON, 2025.*



Figure 80. "Hanger Road," near its upper end. The grassy pasture at the left in the background is the Shop Pen. View facing southwest. *Source: MASON, 2025.*

Evaluation of Significance and Integrity

Fourteen resources were surveyed and evaluated for this RLS.

Seven of the resources were built ca. 1977 or later. These are less than 50 years in age and thus cannot be considered historic properties:

- Culvert -02269-CSH-2C (ca. 2000)
- Ditch diversion -02269-CSH-1A (ca. 1977)
- Culvert -02269-CSH-1B (ca. 1977)
- Culvert -02269-CSH-1C (ca, 1977)
- Culvert –02269-CSH—2D (ca. 2000)
- Culvert -02269-CSH-2E (ca. 2000)
- Railroad Track Remnant CSH-6 (ca. 1995)

The remaining seven resources are older than 50 years in age and were assessed for significance in keeping with HAR §13-284-6 significance and integrity criteria.

- Culvert -02269-CSH-2A (ca. 1910)
- Check and Turnout -02269-CSH-1D (ca. 1946)
- Settling Box -02269-CSH-1E (ca. 1946)
- Water Tank CSH-7 (ca. 1950)
- Ka'awanui Village Road CSH-4 Feature A (ca. 1901)
- Old Government Road CSH-3 Feature A (ca. 1910)
- "Hanger Road" CSH-5 (ca. 1927)

No resources were evaluated as meeting HAR §13-284-6 significance and integrity criteria. See Table 1, Significance Evaluation and Integrity Assessments for all resources studied.

Property Types

This RLS was undertaken to identify historic resources, which includes the five property classification types (Buildings, Structures, Objects, Sites, and Districts) defined in the National Register Bulletin #15, "How to Apply the National Register Criteria for Evaluation."[54]

To follow is a discussion of these property classification types for the seven resources greater than fifty years of age as identified in the Preliminary Project Study Area. The seven resources less than fifty years of age are not included in this Property Type evaluation.

Buildings

According to the National Register Bulletin "How to Apply the National Register Criteria for Evaluation," a building "is created principally to shelter any form of human activity."

- None of the resources evaluated in the Preliminary Project Study Area meet this definition.

[54] National Park Service, Cultural Resources, *National Register Bulletin #15 How to Apply the National Register Criterion for Evaluation.* (Washington DC: U.S Department of the Interior)1997. 5

Structures

According to the National Register Bulletin "How to Apply the National Register Criteria for Evaluation," "[t]he term "structure" is used to distinguish from buildings those functional constructions made usually for purposes other than creating human shelter."

- All of the seven resources (50 years old or greater) evaluated in the Preliminary Project Study Area meet this definition.
    - Culvert -02269-CSH-2A (ca. 1910)
    - Check and Turnout -02269-CSH-1D (ca. 1946)
    - Settling Box -02269-CSH-1E (ca. 1946)
    - Water Tank CSH-7 (ca. 1950)
    - Ka'awanui Village Road CSH-4 Feature A (ca. 1901)
    - Old Government Road CSH-3 Feature A (ca. 1910)
    - "Hanger Road" CSH-5 (ca. 1927)

Objects

According to the National Register Bulletin "How to Apply the National Register Criteria for Evaluation," the term object is used to distinguish buildings and structures from constructions that are primarily artistic in nature or relatively small in scale and simply constructed. Although it may be movable by nature or design, an object is associated with a specific setting or environment. Small objects not designed for a specific location usually are not eligible. Such works include transportable sculpture, furniture, and other decorative arts that, unlike a fixed outdoor sculpture, do not possess association with a specific place. Objects should be in a setting appropriate to their significant historic use, roles, or character. Objects relocated to a museum are inappropriate for listing in the National Register.

- None of the resources evaluated in the Preliminary Project Study Area meet this definition.

Sites

According to the National Register Bulletin "How to Apply the National Register Criteria for Evaluation," 'sites' are defined as "the location of a significant event, prehistoric or historic occupation or activity, or a building or structure, whether standing, ruined, or vanished, where the location itself possesses historic, cultural or archaeological value regardless of the value of any existing structure."

- None of the resources evaluated in the Preliminary Project Study Area meet this definition.

Districts

According to the National Register Bulletin "How to Apply the National Register Criteria for Evaluation," the definition of a District is: "A district possesses a significant concentration, linkage, or continuity of sites, buildings, structures, or objects united historically or aesthetically by plan or physical development." The Bulletin explains that "the majority of the components that add to the district's historic character, even if they are individually undistinguished, must possess integrity."

- The resources were surveyed and evaluated for significance, both individually and as a collection. Since no historically significant resources were identified within the Preliminary Project Study Area, a historic district is not applicable.

Table 1: Significance Evaluation and Integrity Assessments

Name/Photo	Year Built	Evaluation of Significance (HAR §13-284-6 and Hawai'i Register criteria)	Integrity Assessment (HAR §13-284-6)
Culvert -02269-CSH-2A on West Lateral Ditch 	Ca. 1910	Does not meet requirements. Associated with Hawaiian Sugar Co. irrigation, but as a somewhat isolated and non-distinctive component on a lateral (not primary supply) irrigation ditch, it is evaluated as a non-significant structure that does not readily convey its historic period. Further it has no known association with the lives of important persons, and is not expected to yield information important in history.	Retains integrity of L, D, M, W, F, A. Integrity of S is only partially retained due to changes to surroundings.
Culvert -02269-CSH-2C on West Lateral Ditch 	Ca. 2000	Less than 50 years in age and thus cannot be considered as a historic property.	N/A
Ditch diversion (Board-adjusted gate) -02269-CSH-1A on East Lateral Ditch 	ca. 1977	Less than 50 years in age and thus cannot be considered as a historic property.	N/A
Culvert -02269-CSH-1B 	Ca. 1977	Less than 50 years in age and thus cannot be considered as a historic property.	N/A

Name/Photo	Year Built	Evaluation of Significance (HAR §13-284-6 and Hawai'i Register criteria)	Integrity Assessment (HAR §13-284-6)
Culvert -02269-CSH-1C 	Ca. 1977	Less than 50 years in age and thus cannot be considered as a historic property.	N/A
Check and Turnout -02269-CSH-1D 	Ca. 1946	Does not meet requirements. Associated with Olokele Sugar Co. irrigation, but as a somewhat isolated component on a lateral (not primary supply) irrigation ditch, it is evaluated as a non-significant structure that does not rise to a level necessary for eligibility. Further it has no known association with the lives of important persons, and is not expected to yield information important in history.	Retains integrity of L, D, M, W, F, A. Integrity of S is only partially retained due to changes to surroundings.
Settling Box -02269-CSH-1E 	Ca. 1946	Does not meet requirements. Associated with Olokele Sugar Co. irrigation, but as a somewhat isolated component on a lateral (not primary supply) irrigation ditch, it is evaluated as a non-significant structure that does not rise to a level necessary for eligibility. Further it has no known association with the lives of important persons, and is not expected to yield information important in history	Retains integrity of L, D, F, A. Integrity of W and M are partially retained due to 1967 repairs. Integrity of S is only partially retained due to changes to surroundings.
Culvert -02269-CSH-2D on West Lateral Ditch 	Ca. 2000	Less than 50 years in age and thus cannot be considered as a historic property.	N/A

Name/Photo	Year Built	Evaluation of Significance (HAR §13-284-6 and Hawai'i Register criteria)	Integrity Assessment (HAR §13-284-6)
Culvert -02269-CSH-2E on West Lateral Ditch 	Ca. 2000	Less than 50 years in age and thus cannot be considered as a historic property.	N/A
Railroad Track Remnant CSH-6 	Ca. 1995	Less than 50 years in age and thus cannot be considered as a historic property.	N/A
Water Tank CSH-7 	Ca. 1950	Does not meet requirements. Possibly associated with Olokele Sugar, but as utilitarian water tank, it is evaluated as a non-significant structure that does not readily convey its historic period. Further it has no known association with the lives of important persons and is not expected to yield information important in history.	Retains integrity of L. Integrity of S, D, M, W, F, A are only partially retained due to changes in the surroundings and replacement of tank wall and roof.
Ka'awanui Village Road CSH-4 Feature A 	Ca. 1901	Does not meet requirements. Although it is associated with the Hawaiian Sugar Co. as a road that provided direct access to plantation worker housing (Camp 6, later Ka'awanui Camp/Village) from the coastline, it is not evaluated as a major or significant resource on its own and does not exhibit any distinctive features or engineering aspects. It is not associated with an important person, nor is it expected to yield information important in history.	Retains integrity of L. Integrity of S is only partially retained due to changes in the surroundings. Integrity of D, M, W, F, A are partially retained due to re-pavement and patching of the asphalt.

Name/Photo	Year Built	Evaluation of Significance (HAR §13-284-6 and Hawai'i Register criteria)	Integrity Assessment (HAR §13-284-6)
Old Government Road CSH-3 Feature A 	Ca. 1910	Does not meet requirements. While this section of road was part of the main route to Līhu'e from the Preliminary Project Study Area locality starting ca. 1910, and is a component of the Old Government Road that became part of the Kaua'i Belt Road System, it represents less than half a mile of the original Kaua'i Belt Road, and does not exhibit any notable or distinctive features or characteristics from that period. It is a relatively mundane and isolated section of the Belt Road and does not readily convey its historic period. (Note: A section of the Kaua'i Belt Road on the North Shore between Princeville and Hā'ena was added to the Hawai'i Register in 2003 under SIHP # 50-30-02-02334, which is notable for its many distinctive historic bridges.)	Retains integrity of L. Integrity of S is only partially retained due to changes in the surroundings. Integrity of D, M, W, F, A are partially retained due to the degraded condition of the paving.
"Hanger Road" CSH-5 	Ca. 1927	Does not meet requirements. Although it was likely built during the Hawaiian Sugar Co. era, it is not evaluated as a major or significant resource on its own, and does not exhibit any distinctive features or engineering aspects. It is not associated with an important person, nor is it expected to yield information important in history.	Retains integrity of L. Integrity of S, D, M, W, F, A are partially retained due to changes in the surroundings and patching of the asphalt

**Integrity assessments provided in the table are abbreviations for the aspects of integrity specified in Hawai'i Administrative Rules Chapter 13-275-6. The seven aspects of integrity are: L = Location, D = Design, S = Setting, M = Materials, W = Workmanship, F = Feeling, and A = Association.*

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Appendices

Appendix A – Significance Criteria: HAR §13-284-6 Evaluation of Significance

The following is an excerpt from HAR §13-284-6:

(a) Once a historic property is identified, then an assessment of significance shall occur. The agency shall make this assessment or delegate this assessment, in writing, to the SHPD. This information shall be submitted in the survey report, if historic properties were found through the survey.

(b) To be significant, a historic property shall possess integrity of location, design, setting, materials, workmanship, feeling, and association and shall meet one or more of the following criterion:

(1) Criterion "a". Be associated with events that have made an important contribution to the broad patterns of our history;

(2) Criterion "b". Be associated with the lives of persons important in our past;

(3) Criterion "c". Embody the distinctive characteristics of a type, period, or method of construction, represent the work of a master, or possess high artistic value;

(4) Criterion "d". Have yielded, or is likely to yield, information important for research on prehistory or history; or

(5) Criterion "e". Have an important value to the native Hawaiian people or to another ethnic group of the state due to associations with cultural practices once carried out, or still carried out, at the property or due to associations with traditional beliefs, events or oral accounts--these associations being important to the group's history and cultural identity.

A group of sites can be collectively argued to be significant under any of the criteria.

Appendix B – HAR §13-284-7 Determining Effects to Significant Historic Properties

The following is an excerpt from HAR §13-284-7:

(a) The effects or impacts of a project on significant properties shall be determined by the agency. Effects include direct as well as indirect impacts. One of the following effect determinations must be established:

> (1) "No historic properties affected". The project will have no effect on significant historic properties; or
>
> (2) "Effect, with proposed mitigation commitments". The project will affect one or more significant historic properties, and the effects will be potentially harmful. However, the agency has proposed mitigation commitments involving one or more forms of mitigation to reasonably and acceptably mitigate the harmful effects.

(b) Effects include, but are not limited to, partial or total destruction or alteration of the historic property, detrimental alteration of the properties' surrounding environment, detrimental visual, spatial, noise or atmospheric impingement, increasing access with the chances of resulting damage, and neglect resulting in deterioration or destruction.

(c) Effect determinations shall be submitted to SHPD for review and approval. The determinations shall include a map showing the location of the project and a general discussion of the project's scope of work, so the nature of possible effects can be understood.

> (1) If the SHPD disagrees with the effect determinations, a letter that specifies the disagreements shall be sent within forty five days of SHPD receipt of the effect determinations. To proceed with the review process, the agency shall correct the problems, consulting with the SHPD as needed to resolve differences, and resubmit the effect determinations.
>
> (2) If the SHPD agrees with the effect determinations, the SHPD shall send a letter of agreement within forty five days of SHPD receipt of the effect determinations.

(d) No historic properties affected determinations for architectural properties shall be expedited when the SHPD agrees with the agency that minor changes to a building or structure will not affect its significant character. Because these changes are typically non-controversial and require prompt processing, the SHPD shall write its concurrence as a "no historic properties affected" determination.

> (1) The SHPD shall post notifications of any such "no historic properties affected" determinations every Friday either at the SHPD office or on the SHPD website. Should the office be closed on any Friday as a result of a holiday or some type of disaster, the information shall be posted on the first following working day.

(2) Interested persons have the opportunity to comment on such determinations within thirty days. At the end of thirty days if objections to the minor changes to the properties are submitted, the SHPD may reconsider its findings under the provisions of section 13-275-11.

(e) When the SHPD agrees that the action will not affect any significant historic properties, this is the SHPD's written concurrence and historic preservation review ends. If the project will have an "effect, with proposed mitigation commitments", then mitigation commitments and detailed mitigation plans shall be developed by the agency and approved by SHPD, as discussed in the following section.

Appendix C – HAR §13-284-8 Mitigation

The following is an excerpt from HAR §13-284-8:

(a) If a project will have an "effect" (impact) on significant historic properties, then a mitigation commitment proposing the form of mitigation to be undertaken for each significant historic property shall be submitted by the agency to the SHPD for review and approval.

(1) Mitigation can occur in five forms.

> (A) Preservation, which may include avoidance and protection (conservation), stabilization, rehabilitation, restoration, reconstruction, interpretation, or appropriate cultural use.
>
> (B) Architectural recordation, which involves the photographic documentation and possibly the measured drawing of a building, structure or object prior to its alteration or destruction.
>
> (C) Archaeological data recovery, which enables the recovery of an adequate and reasonable amount of the significant information from a significant historic property prior to its alteration or destruction. Data recovery may include archaeological mapping, surface collection, excavation, monitoring, laboratory analyses, and interpretive analyses.
>
> (D) Historical data recovery, which involves researching historical source materials to document an adequate and reasonable amount of information about the property when a property will be altered or destroyed.
>
> (E) Ethnographic documentation, which involves interviewing knowledgeable individuals and researching historical source materials to document an adequate and reasonable amount of information about the property when a property will be altered or destroyed.

Appendix D - Hawai'i Register of Historic Places Criteria: HAR §13-198-8

The following is an excerpt from HAR §13-198-8:

Criteria for decisions; considerations. In deciding whether a property should be entered and ordered into the Hawai'i register, the review board shall evaluate whether the property meets or possesses, individually or in combination, the following criteria or characteristics:

(1) The quality of significance in Hawaiian history, architecture, archaeology, and culture, which is present in districts, sites buildings, structures, and objects of State and local importance that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and:

(A) That are associated with events that have made a significant contribution to broad patterns of our American or Hawaiian history;

(B) That are associated with the lives of persons significant in our past;

(C) That embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic value, or that represent a significant and distinguishable entity whose components may lack individual distinction; or

(D) That have yielded, or may be likely to yield, information important in history;

(2) Environmental impact, i.e., whether the preservation of the building, site, structure, district of object significantly enhances the environmental quality of the State;

(3) The social, cultural, educational, and recreational value of the building, site, structure, district, or object, when preserved, presented, or interpreted, contributes significantly to the understanding and enjoyment of the history and culture of Hawai'i, the Pacific area, or the nation. [Eff 6/22/81; am and comp 3/9/89] (Auth: §§6E-5.5,91-2)

Exhibit R

SHPD Early Consultation Letter

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CONSERVATION AND COASTAL LANDS
CONSERVATION AND RESOURCES ENFORCEMENT
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

October 9, 2025

IN REPLY REFER TO:
Project No.:2025PR00506
Doc. No.: 2510LS03
Archaeology

Ka'āina S. Hull, Director
County of Kaua'i
Planning Department
Design & Permitting Section
4444 Rice Street, Suite A473
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c/o Paul Togioka, CE III
ptogioka@kauai.gov

Dear Ka'āina S. Hull:

SUBJECT: **Hawaii Revised Statutes (HRS) §6E-42 Historic Preservation Review – Early Consultation for the Ka'awanui Solar + Solar Project**
Kaumuali'i Hwy., Makaweli - Solar Photovoltaic and Battery Energy Storage Facility
Applicant(s): AES Clean Energy (AES), Kaawanui Solar, LLC
Makaweli Ahupua'a, Kona District, Island of Kaua'i
TMK: (4) 1-7-006:006 por. and 010 por.

This letter provides the State Historic Preservation Division's (SHPD) review of the proposed construction of a new solar photovoltaic system located along Kaumuali'i Highway in Makaweli on Kaua'i. The SHPD received the project submission documents on April 25, 2025, which included a cover letter dated April 24, 2025 from AES and Ka'awanui Solar, LLC requesting early consultation, an HRS 6E Submittal Form, a literature review and field inspection (LRFI) report titled *Draft Archaeological Literature Review and Field Inspection for the Ka'awanui Solar + Storage Project, Makaweli Ahupua'a, Waimea District, Kaua'i, TMKs: (4) 1-7-006:006 por. and 010 por.* [Bautista et al. 2025], additional documentation titled *Results of Archaeological Oversight for a Geotechnical Survey for the Ka'awanui Solar + Storage Project, Makaweli Ahupua'a, Waimea District, Kaua'i, TMK(s): portions (4) 1-7-006:006 por. and 010 por.* [Hammatt 2025], and a geographical information system aerial map of the project study area. The project will be located within an approximately 286-acre portion of TMKs: (4) 1-7-006:006 and 010 which is managed by Gay & Robinson, Inc.

According to the submittal, the proposed project includes a 43 MW photovoltaic solar facility with a 172 MWh battery energy storage system (BESS) in Makaweli. This project is being developed by AES Hawai'i to provide clean, stable energy to the Kaua'i Island Utility Cooperative (KIUC). Ground disturbing activities will involve excavation for installing posts for the solar photovoltaic racking system and concrete equipment pads, trenching for subsurface electrical conduit, constructing a project perimeter fence using mounted posts, and limited grading as needed for access roads and civil engineering purposes.

The applicant has confirmed that they have not yet submitted any permit applications. However, they do plan to submit their plans to the County of Kaua'i at a later date.

Cultural Surveys, Hawai'i (CSH) conducted an archaeological literature review and field inspection (Bautista et al. 2025) for the project, identifying numerous historic-era features associated with transportation and sugarcane

agriculture. These features included segments of plantation roads, the Old Government Road, rock walls, ditch systems, a railroad remnant, and a water tank. These potential historic properties have not been documented in an AIS. No pre-Contact archaeological features were observed during the survey. Proactive archaeological observation was also conducted during the project's geotechnical survey, but no subsurface cultural features were encountered (Wilkinson and Hammatt 2025).

TMK: (4) 1-7-006:006

A review of SHPD's records indicates that the Byerly and O'Day (2015) archaeological inventory survey (AIS) was reviewed and accepted by the SHPD on January 21, 2014 (Log No. 2014.00052, Doc. No. 1501MN13) for the 'A'aka 3 agricultural parcel. The AIS documented a historic irrigation ditch (Site 50-30-09-02269) within a 50-acre portion of the 4,847-acre parcel. According to the SHPD's geographical information system a portion of Makaweli House Sites (Site 50-30-09-00273) is located in the northern portion of the subject parcel (Bennet 1931).

TMK: (4) 1-7-006:010

A review of SHPD's records indicates that an AIS has not been completed for the subject parcel and no historic properties have been documented to date. The USDA soil survey (Foote et al. 1972) identifies the soils within the property as Makaweli silty clay loam, 0-6% slopes (MgB), Makaweli stony silty clay loam (MhB, MhC), Mamala stony silty clay loam, 0-12% slopes (MnC), Nonopahu stony clay, 2-12% slopes (NnC), Pakala clay loam, 2-10% slopes (PdC), and rock lands (rRR).

Based on the presence of historic properties within the current project area, **SHPD requests that the LRFI report be converted into an archaeological inventory survey (AIS)** report that meets the requirements of HAR §13-276-5. This report should be submitted to SHPD for review and acceptance before any project-related work is initiated. Prior to this, SHPD also requests that the project proponent and archaeological firm consult with our office to determine if AIS subsurface testing is necessary and, if so, for an appropriate AIS testing strategy be agreed to.

The AIS must be conducted by a qualified archaeologist to properly identify and document any archaeological historic properties that may be present, assess their significance, make project effect recommendations, and provide appropriate mitigation recommendations. A list of permitted archaeological firms can be found on the SHPD website at: http://dlnr.hawaii.gov/shpd/about/branches/archaeology/.

When the AIS is completed, submit an AIS report meeting the requirements of HAR §13-276-5, along with a copy of this letter and the filing review fee ($450) to HICRIS Project No. 2025PR00506 in response to our HICRIS request.

SHPD will notify the County of Kaua'i when the AIS report and any required mitigation plans are accepted, and the permit issuance process may continue.

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

Aloha,

Jessica L. Puff
Administrator, State Historic Preservation Division
Deputy State Historic Preservation Officer

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Exhibit S

Greenhouse Gas Analysis

Prepared for
Kauaʻi Island Utility Cooperative
Kauaʻi, HI

Prepared by
Ramboll Americas Engineering Solutions, Inc.
San Francisco, CA

Project Number
1940112688

Date
April 2025

KAʻAWANUI SOLAR GHG ANALYSIS

KAUAʻI ISLAND UTILITY COOPERATIVE

KAUAʻI, HI

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Figure 2 Avoided Stages for Consideration in GHG Analysis

Figure 3 Lifecycle GHG Emissions

ATTACHMENTS

Attachment A: Tables and Calculations

Attachment B: Stillwater Liquid Fuels GHG Lifecycle Analysis

1. INTRODUCTION

This report provides an estimate of the lifecycle emissions of greenhouse gases ("GHG" or "emissions") associated with the proposed Kaʻawanui Solar renewable energy generation project (the "Project") that is the subject of a proposed Power Purchase Agreement ("PPA") between Kauaʻi Island Utility Cooperative ("KIUC") and AES Hawaiʻi, and which will be capable of generating up to 110,069 megawatt-hours ("MWh") per year. This GHG emissions analysis is being provided pursuant to HRS § 269-6(b) and concludes that approval and completion of the Project would result in a significant reduction in lifecycle and operations GHG emissions relative to the baseline without the Project.

AES Hawaiʻi plans to construct a solar photovoltaic ("PV") system and battery energy storage system ("BESS") comprised of 43 megawatts alternating current ("MWac") of solar PV panels mounted with solar trackers. The facility will include a 172 MWh battery energy storage system consisting of five thousand five hundred fifty-three (5,553) 0.56-kilowatt-hour ("kWh") lithium-ion batteries in twenty-six (26) containers that will connect directly to the PV component of the Project. The BESS may be charged by energy collected from the PV system portion of the Project, or from the grid. The solar PV panels and the battery energy storage system will connect with a transmission line extension that will transport energy to the KIUC system. In addition, the Project scope includes installation of various components (equipment) for a new substation and switchyard. For the purposes of estimating lifecycle GHG emissions, Ramboll developed a GHG analysis for the Project using Project-specific information at the equipment-level for the Solar and BESS components, which are expected to constitute the majority of the Project Lifecycle GHG Emissions. For the T&D and substation components associated with the Project, Ramboll calculated the GHG emissions based on project-level T&D lifecycle GHG emissions data from ten (10) recently proposed utility-scale projects in Hawaiʻi. In this analysis, the overall Project lifetime was defined as the 25-year lifetime of the solar and battery system prescribed by the PPA. Replacement of Solar and BESS equipment with an estimated lifetime of less than the Project 25-year lifetime is accounted for by multiplying the number of equipment units installed by the ratio of the Project lifetime to the equipment lifetime (rounded up to the nearest integer) to determine the total number of pieces of equipment required throughout the Project lifetime, unless otherwise specified by the developer. For the T&D, substation, and switchyard infrastructure, the GHG intensity from other projects is multiplied by the Project lifetime production capacity to determine the lifecycle GHG emissions across the Project 25-year lifetime. Thus, this evaluation addresses a solar PV system, battery energy storage system, T&D transmission line extension, switchyard, and substation for the duration of the PPA, and end of life treatment of installed equipment. **Table 1** provides an overview of the Project.

Table 1. Overview of Kaʻawanui Solar Project Details

Project Input	Value
Project Location	Kauaʻi Island
Solar and Storage Power Capacity (MW)	43
Solar Generation Capacity (MWh/yr)	110,069
Storage System Energy Capacity (MWh)	172
Project Lifetime Generation Capacity (MWh)	2,608,134
Project Lifetime (years)	25

Ramboll Americas Engineering Solutions, Inc. ("Ramboll") has conducted an analysis on behalf of KIUC and AES to estimate the projected GHG emissions ("Project GHG emissions") and compare the Project GHG emissions with those that would result from fossil-fueled plants if the Project is not built ("Avoided GHG emissions"). Ramboll has provided the estimated Net GHG emissions impact from operation of the Project and the Net lifecycle GHG emissions impact and defines Net GHG emissions reduction as Avoided GHG emissions minus Project GHG emissions ("Net GHG emissions reductions").

This analysis is designed to provide the Commission with the information needed for it to give express consideration to the reduction of GHG emissions in its decision-making, consistent with HRS § 269-6(b). It evaluates the potential GHG emissions directly attributable to energy generation and storage at the Project facility, as well as the GHG emissions that may be produced at earlier lifecycle stages in the production process, such as component production and transportation. In addition, this analysis evaluates the potential GHG emissions related to the Project's downstream processes, such as decommissioning and disposal. Thus, this analysis evaluates upstream, downstream, and operations GHG emissions that would result from the Project for the duration of the Project Lifetime.

This analysis is intended to capture both the Project's direct emissions and reasonably foreseeable indirect emissions. The projected Project and Avoided GHG emissions are based on current Project information and reasonably available public data that has undergone scientific peer-review, including recent versions of emission factor databases, available to Ramboll at the time the analysis was prepared. Where practicable and reasonably estimable, this information was then localized to account for unique location-specific factors applicable to a project on Kauaʻi Island, such as significant transportation distances, and supplemented with direct emissions calculated to account for the Project's upstream and downstream emissions. The use of a combination of localized peer-reviewed published studies and direct emissions calculations for the Project represents the "GHG analysis" approach in this evaluation.

As part of the analysis, Ramboll reviewed peer-reviewed literature for solar PV and battery energy storage systems to develop GHG emissions estimates based on the best reasonably-available public data. When available and practicable, Ramboll adjusted these emissions estimates to reasonably account for Project-, technology- and site-specific factors representative of a project on Kauaʻi Island. Commission Order 36407 acknowledges that

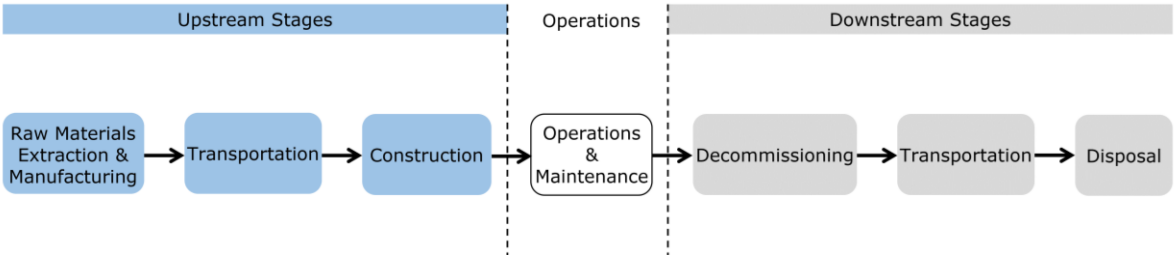
the use of emissions values based on peer-reviewed literature can serve as a reasonable proxy in the absence of detailed Kauaʻi Island - and/or Project-specific data, while encouraging use of Project-specific data when available.[1]

Section 2 provides the approach and resulting estimate of Project GHG emissions, with results summarized in **Section 2.8**. **Section 3** provides the approach and resulting estimates of Avoided emissions from fossil-fueled and biofueled plants, with results summarized in **Section 3.1**. **Section 4** provides the Net lifecycle GHG emissions reduction of the Project, with results summarized in **Section 4.1**. All responses involving calculated data are provided in the attached Excel-compatible spreadsheet file "Kaawanui Solar_Streamlined GHG Analysis.xlsx", also provided as a PDF in **Attachment A**. The attached Excel file includes a "Project Emissions" tab that provides the GHG Emissions for each Project stage; an "Avoided Emissions" tab that provides the avoided operations and avoided lifecycle GHG emissions; a "Net Emissions" tab that provides the net lifecycle GHG emissions; a "T&D Infrastructure Range" tab that provides the range of "Low" to "High" T&D emissions estimated for the project; "Solar – BESS I + A", and "Construction I + A" tabs that detail the Project-, technology-, and location-specific inputs and assumptions used in the analysis; and detailed calculation tabs for each Project stage. Each calculation tab provides live cell logic, unhidden and unprotected calculations and formulas, and references.

2. PROJECT GHG EMISSIONS

As described in the Introduction, the total Project GHG emissions were estimated using the GHG emissions analysis approach. As such, this approach addresses the Project's upstream, construction, operations, and downstream stages, as shown in **Figure 1**.

Figure 1. Stages for Consideration in Project GHG Emissions Calculation



Ramboll adjusted the emissions estimates found in the EPD for the solar PV system and the peer-reviewed literature for battery storage to reasonably account for site-specific factors representative of a project constructed and operated on Kauaʻi Island. For example, the shipping emissions analysis assumes that the base case in the peer-reviewed studies is for installations in the continental United States. The additional transportation emissions were calculated using an "inventory approach" where direct GHG emissions from transportation and construction are calculated based on Project- and Kauaʻi Island-specific data. Combining the adjusted lifecycle data with emissions based on the inventory approach results in a projected emissions calculation that is a conservative estimate of actual Project GHG

[1] See Commission Order 36407 (Docket 2018-0433).

emissions as some emissions may be included in both the adjusted lifecycle data and the inventory approach.

The following paragraphs provide an overview of the key data sources and assumptions for each Project stage and primarily focus on the raw materials extraction & production stages for solar and storage, which drive the overall Project GHG emissions.

2.1 T&D Infrastructure Range (Streamlined Approach)

Emissions for T&D infrastructure were calculated as a range of low to high using Project-specific capacity data and project-level T&D lifecycle GHG emissions data from 10 recently proposed utility-scale solar and BESS projects in Hawaiʻi. These solar and BESS projects are appropriate comparisons because they are similar in scope to the Kaʻawanui Solar Project. The project-level T&D lifecycle GHG intensity range (in kilograms per megawatt hour or "kg/MWh") was obtained from Exhibit 5, Appendix Table A1 of Docket 2023-0390.[2] The low and high Project lifecycle T&D GHG emissions across the Project's lifetime (25 years) are calculated by multiplying the low and high T&D lifecycle GHG intensities by the Project lifetime production capacity (in MWh) for Kaʻawanui Solar. The GHG intensity and GHG emissions account for all lifecycle stages (raw materials and extraction, transportation, construction, operations and maintenance, and decommissioning and disposal).

Appendix Table A1: T&D Infrastructure GHG Emissions Range provides detailed calculations, including the range of GHG emissions associated with the transmission line extension and substation equipment.

2.2 Solar PV Manufacturing, Including Material Extraction

The materials and equipment required for the solar PV system are detailed in the "Solar – BESS I + A" tab. The solar PV system includes 43 MWac of solar PV panels mounted on one thousand one hundred thirty-eight (1,138) solar trackers and requires eleven (11) inverters to step-down voltage and convert direct current ("DC") power to alternating current ("AC") power, and eleven (11) transformers to adjust voltage in the AC electrical circuit.

The GHG emission factor for the solar PV panel manufacturing is derived from the results and supporting information from the EPD for the LONGi LR5-72HTH PV modules.[3] The EPD PV module has similar specifications to the Project-specific LONGi panels, such as monocrystalline half-cut cells and gallium doped wafers. Some differences are that the EPD PV module has a power output range of 560-580 W, while the project-specific panels have a power of 545 W. Additionally, the EPD PV module has an up to 22.5% efficiency and 25-year service life, while the Project-specific panels have a 21.1% module efficiency over a lifetime of 35 years. The project-specific PV Solar Panel emissions are estimated by multiplying the GWP-GHG result for A1-A3 (raw material supply, transport, manufacturing) from the EPD, reported in kg CO_2e/Wp (peak power output), by the project-specific peak

[2] Maui Electric Company, Limited. (2023, September 29). Maui Electric Company, Ltd.'s Application; Exhibits 1 - 11; Verification; Docket No. 2023-0389.

[3] LONGi Green Energy Technology Co., Ltd. (2024). Environmental Product Declaration for Photovoltaic modules. Available at: https://api.environdec.com/api/v1/EPDLibrary/Files/fa598dea-c39c-4a99-51df-08dc2e3a662b/Data.

power output in Wp/module and the total number of modules. This adjustment normalizes the results consistent with the design of the PPA.

The GHG emission factor for the solar trackers is obtained from Smith et al., which is based on an inventory from Antonanzas et al. for single-axis trackers.[4,5] The GHG emission factor for the inverters is based on the ecoinvent database.[6,7] The GHG emission factor for the transformers is derived from the Jorge et al. study, which provides lifecycle inventory data for components of electrical grids.[8]

Appendix Table A2: Raw Materials Extraction & Manufacturing Solar GHG Emissions Calculations provides detailed calculations, including assumptions and inputs related to solar PV manufacturing.

2.3 Battery Storage Manufacturing, Including Material Extraction

The materials and equipment required for the battery storage system are detailed in the "Solar - BESS I + A" tab and account for expected equipment lifetime and augmentation to maintain system capacity. Over the Project lifetime, the battery storage system includes five thousand five hundred fifty-three (5,553) batteries and requires thirteen (13) inverters to step-down voltage and convert DC power to AC power, thirteen (13) transformers to adjust voltage in the AC electrical circuit, twenty-six (26) battery storage containers, two (2) cooling systems, two (2) fire suppression systems, six hundred seventeen (617) battery racks, and fifteen (15) concrete pads for the battery storage containers.

The GHG emissions factor for the battery storage manufacturing, including material extraction, is based upon information for a lithium-ion battery and Project-specific storage technology and capacity data, as detailed in the "Solar – BESS I + A" tab. The GHG emission factor for the lithium-ion battery is derived from the results of a 2017 carbon

[4] Smith, B., Sekar, A., Mirletz, H., Heath, G., and Margolis, R. (2024). An Updated Life Cycle Assessment of Utility-Scale Solar Photovoltaic Systems Installed in the United States. Golden, CO: National Renewable Energy Laboratory. NREL/TP-7A40-87372. Available at: https://www.nrel.gov/docs/fy24osti/87372.pdf. The GHG emission factor from Figure 9 of 130 kg CO_2e/kWp is converted to per kg of tracker assuming a tracker specific weight of 9.76 kg/m^2 module, module area of 1.99 m^2 per module, and module power rating of 405 W per module.

[5] Antonanzas, J., Arbeloa-Ibero, M., Quinn, J.C. (2019). Comparative life cycle assessment of fixed and single axis tracking systems for photovoltaics. Journal of Cleaner Production, Volume 240, 118016, ISSN 0959-6526, https://doi.org/10.1016/j.jclepro.2019.118016.

[6] The emission factor for the inverter is obtained from ecoinvent version 3.11 database and calculated using the IPCC Sixth Assessment Report GWPs. The inverter dataset represents one 500 kW average technology inverter for a global geography using the cut-off allocation methodology. In the cut-off allocation methodology, the primary production of materials is allocated to the first user of materials and producers of waste do not receive any credit for recycling or reuse of product. The emission factor is normalized based on the weight of one inverter, approximately 3,000 kg, provided in documentation of the dataset.

[7] Ecoinvent v3.11. (2024, November 18). Eleventh update of ecoinvent version 3 (ecoinvent v3.11) Database, available at: https://support.ecoinvent.org/ecoinvent-version-3.11. Accessed April 2025. Ecoinvent is a non-profit organization based in Switzerland which is managed by an international team and runs a repository of life-cycle information.

[8] Jorge, R. S.; Hawkins, T. R.; Hertwich, E. G. (2011b). Life cycle assessment of electricity transmission and distribution - part 2: transformers and substation equipment. International Journal of Life Cycle Assessment, 17, 2, 184-191. Available at: https://doi.org/10.1007/s11367-011-0336-0.

footprint of stationary grid applications study from Baumann et al.[9] The Baumann study was chosen because it is based on harmonized results from the Peters et al.[10] literature review of stationary battery storage technologies. The battery chemistry is composed of Lithium Nickel Cobalt Aluminum Oxide (NCA) and the appropriate emission factor from Baumann et al. was used to calculate the emissions of the raw materials extraction and manufacturing for the Project (See Footnote 9). The GHG emission factor for the transformers is derived from the Jorge et al. study (See Footnote 8). The battery storage system fire suppression system weight and composition are obtained from parameters provided in Pellow et al.[11] and the Electric Power Research Institute ("EPRI").[12] The GHG emission factors for the other battery storage components, such as battery racks and concrete pads, are based on the ecoinvent database.

Appendix Table A3: Raw Materials Extraction & Manufacturing Storage GHG Emissions Calculations provides detailed calculations, including assumptions and inputs related to battery storage manufacturing.

2.4 Upstream Fuel GHG Emissions

Ramboll calculated the estimated lifecycle GHG emissions from fuel consumed during transportation, construction, and operations of the Project. This includes the potential GHG emissions associated with fuel production, refining, and transportation, noting that combustion GHG emissions are covered in the sections below. To estimate the fuel consumption Ramboll used inputs provided by AES including vehicle miles traveled, horsepower, and hours of operation with fuel efficiency information, for specific equipment types, calculated from OFFROAD[13] and EMFAC[14] data. GHG emissions associated with upstream diesel consumption were calculated in the "Upstream Fuel" tab using emissions factors extracted from the 2020 Stillwater Liquid Fuels GHG Lifecycle Analysis[15]. Total upstream fuel GHG emissions from transportation, construction, and Project operations account for less than 2% of overall Project GHG emissions.

2.5 Transportation to and from Kauaʻi Island

Transportation emissions were calculated using an "inventory approach" where direct GHG emissions from transportation are calculated based on Project- and Kauaʻi-specific data.

[9] Baumann, M., Peters, J. F., Weil, M., & Grunwald, A. (2017). CO_2 Footprint and Life-Cycle Costs of Electrochemical Energy Storage for Stationary Grid Applications. Energy Technology, 5(7), 1071-1083.

[10] Peters, J. F., Baumann, M., Zimmermann, B., Braun, J., & Weil, M. (2017). The environmental impact of Li-Ion batteries and the role of key parameters–A review. Renewable and Sustainable Energy Reviews, 67, 491-506.

[11] Pellow et al. (2019, July). Research gaps in environmental life cycle assessments of lithium ion batteries for grid-scale stationary energy storage systems: End-of-life options and other issues. Available at https://www.sciencedirect.com/science/article/pii/S2214993718302318.

[12] Electric Power Research Institute (EPRI). (2017). Recycling and Disposal of Battery-Based Grid Energy Storage Systems: A Preliminary Investigation. Available at: https://www.herox.com/BatteryRecyclingPrize/resource/321

[13] California Air Resources Board (CARB) 2021. OFFROAD2017 - ORION. Available at: https://www.arb.ca.gov/orion/. Accessed February 2025.

[14] California Air Resources Board (CARB) 2022. EMFAC2021 v1.0.2. Available at: https://arb.ca.gov/emfac/emissions-inventory. Accessed February 2025.

[15] Stillwater Associates LLC. 2020. Liquid Fuels GHG Lifecycle Analysis. Available in Attachment B of this report.

This includes upstream and downstream transportation for all Project components from manufacturer locations to the Project site. The transportation emissions are calculated using the distance of each travel leg, the weight of the material transported, and the mode of such travel (including truck or marine shipping). The net weight is determined based on the weight of each system component and the quantity of each component, if available, or publicly available information for similar components. For a given transportation segment, if the mode of travel is not known and if multiple travel modes are available, the most emissions-intensive mode is selected.[16] Transportation emissions are estimated based on one-way travel from an origin to a destination with the exception of estimated emissions to or from the site. Emissions to and from the site are estimated based on the roundtrip distance. In some instances, RMEM emission factors for materials and fuels used in the Project include transportation emissions, as well as other RMEM components. However, to ensure the overall transportation emissions are reflective of the scenario on Kauaʻi and conservative, emissions from key individual transportation legs to ship the fuels to plants on Kauaʻi are also included in this analysis. Emission factors for road transportation were obtained from the United States Environmental Protection Agency ("US EPA", or "EPA") Scope 3 Inventory Guidance,[17] and the emission factor for shipping was obtained from Global Maritime Trade Lane Emissions Factors.[18] Shipping distances were estimated using the Sea Distance tool,[19] based on shipping distances from the nearest port to the manufacturer location to Los Angeles, from Los Angeles to Honolulu, and from Honolulu to Nāwiliwili. Truck distances from the manufacturer location to the nearest port and from Nāwiliwili to the site were estimated using Google Maps to determine driving distances.

Appendix Table A4: Material Transportation GHG Emissions Calculations provides detailed calculations, including assumptions and inputs related to material transport.

2.6 Project Construction

To adjust the lifecycle results to the Project and island-specific location, construction emissions were calculated using an "inventory approach" where direct GHG emissions from construction are calculated based on Project- and Kauaʻi-specific data.

Construction emissions were based on construction activity information, such as schedule, equipment mix, and on-road trip information, provided by the developer for specific construction activities. Emission factors for off-road equipment were obtained from

[16] The GHG emissions per ton-mile of transportation from maritime shipping are lower than for rail and trucks. As indicated in the above section, this analysis conservatively assumes the most emissions-intensive transportation mode if the travel mode is not known.

[17] EPA Scope 3 Inventory Guidance is available at: https://www.epa.gov/climateleadership/scope-3-inventory-guidance, and recommends emission factors from Table 8 of Emission Factors for Greenhouse Gas Inventories, available at: https://www.epa.gov/system/files/documents/2025-01/ghg-emission-factors-hub-2025.pdf. Accessed February 2025.

[18] The emission factor for ships is based on the Global Ocean Container Greenhouse Gas Emission Intensities (Clean Cargo, 2024) for dry (i.e., non-refrigerated) cargo shipping over all trade lanes for 2023 with a 70% utilization factor, assuming an average load weight of 10 tons in each container. Global Maritime Emission Factors are available at: https://smart-freight-centre-media.s3.amazonaws.com/documents/Clean_Cargo_-_2023_Global_Ocean_Container_Emissions_Report.pdf. Accessed February 2025.

[19] Available at: https://sea-distances.org. Accessed February 2025.

CalEEMod®.[20] CalEEMod® factors are based on the OFFROAD database, (See Footnote 13) which is a model that estimates emissions from heavy duty equipment created by the California Air Resources Board ("CARB"). Emission factors for on-road trips for workers and vendors were obtained from CARB's Emission FACtor ("EMFAC") website, which provides emissions inventories and associated documentation for on-road mobile sources in California. (See Footnote 14) GHG emissions from construction may already be included in some emission factors sourced from literature, which may result in double-counting of construction emissions.

Appendix Table A5: Construction GHG Emissions Calculations provides detailed calculations, including assumptions and inputs related to construction.

2.7 Operations & Maintenance

Project operations emissions include direct GHG emissions associated with the operation and maintenance of the project, as illustrated by the "operations" stage shown in **Figure 1**. **Appendix Table A6: Project Operations GHG Emissions Calculations** provides detailed calculations, including assumptions and inputs related to operations and maintenance of the proposed Project.

2.8 Decommissioning & Disposal

To adjust lifecycle results to the Project-specific scopes of work, the additional decommissioning and disposal emissions were calculated to account for the solar PV and storage systems, including battery containers. The decommissioning emissions are assumed to be 3% of construction emissions.[21,22] The disposal emission factors are multiplied by the mass of system components or material to estimate GHG emissions from decommissioning and disposal. The disposal estimates account for potential end of life treatment including landfill, incineration, and recycling, and conservatively do not take credit for recycling. Unless noted in the "Solar – BESS I +A" tab, the downstream transportation emissions include transportation of material from the Project site to a disposal site in Los Angeles, California. The scrap yard at Los Angeles was selected as the disposal site as a reasonable, conservative assumption.[23] The equipment and materials that are disposed of locally are noted in the "Solar – BESS I +A" tab. The GHG emissions factors for the disposal of the system components are obtained from peer-reviewed lifecycle studies and databases that

[20] California Emissions Estimator Model (CalEEMod®) v2022.1 Appendix G. Available at: https://www.caleemod.com/documents/user-guide/08_Appendix%20G.xlsx. Accessed February 2025.

[21] Based on GHG emissions estimated for construction and deconstruction phases for the SEPV Mojave West Solar Project in California, which is of similar scope to this Project.

[22] SEPV Mojave West Solar Project (PP13287), Environmental Impact Report. Chapters 1 through 11 available online at: https://psbweb.co.kern.ca.us/planning/pdfs/eirs/SEPV_mojave_solar/SEPV_mojave_solar_deir_vol1.pdf. EIR appendices available online at: https://psbweb.co.kern.ca.us/planning/pdfs/eirs/SEPV_mojave_solar/SEPV_mojave_solar_deir_vol2.pdf. Accessed April 2025.

[23] At this stage in the Project lifecycle, the end-of-life fate of the Project equipment is not known. There are several potential options for equipment end-of-life, including reuse of equipment in Hawaiʻi, disposal in Hawaiʻi, or transportation back to Los Angeles for disposal. Of the potential end-of-life activities, the latter of sending all equipment to a Los Angeles scrap yard is the most conservative assumption.

provide lifecycle GHG emissions data for the system components and scope relevant to this Project, as detailed in **Appendix Table A7: Decommissioning & Disposal GHG Emissions Calculations**. This table provides detailed calculations, including assumptions and inputs. For T&D infrastructure systems, the additional decommissioning and disposal emissions for the equipment at end of life are already included within the GHG intensity range used in the analysis. GHG emissions from decommissioning and disposal may already be included in some emission factors sourced from literature, which may result in double-counting of construction emissions.

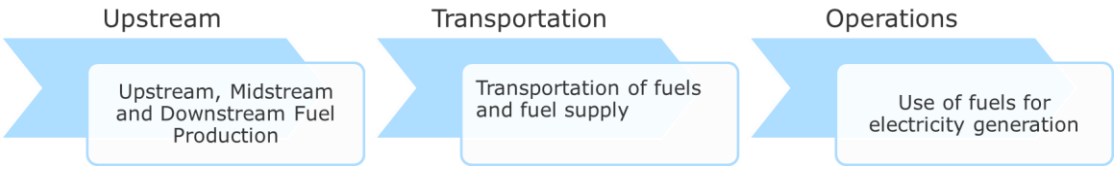
2.9 Project GHG Emissions Results

The GHG analysis of the Project results in an estimated Project lifecycle GHG emissions range from **92,361 MT CO_2e** to **109,682 MT CO_2e** or **35 kg CO_2e/MWh** to **42 kg CO_2e/MWh**,[24] noting the range in GHG emissions is due to the low and high range of T&D infrastructure results. The GHG analysis for the Project includes projected GHG emissions directly attributable to the Project as well as indirect GHG emissions from upstream and downstream activities, modified to the Project and its location, all as described above in this report. Project GHG emissions results are summarized in **Table 1** and in **Appendix Table 1: Project GHG Emissions by Stage**.

3. AVOIDED EMISSIONS

As set forth above, the Avoided GHG emissions include both the potential GHG emissions that would be directly attributable to the generation of electricity from all other resources, including fossil fueled and biofueled plants, in KIUC's system and the potential GHG emissions that may be produced at earlier stages in the fuel lifecycle, such as fuel production, refining, and transportation if the Project were not built. The approach is shown in **Figure 2** below.

Figure 2. Avoided Stages for Consideration in GHG Analysis



The lifecycle fuel GHG emissions considered include the following:

- **Upstream:** The Project's Avoided upstream GHG emissions include the extraction, production, upstream transportation, and refining of the fuels that would be consumed if the Project were not approved and built but would be avoided if the Project is approved and built.
- **Transportation:** The Project's Avoided transportation GHG emissions include transportation of individual fuels to Kauaʻi Island.

[24] This value represents the GHG intensity of the Project and is calculated by dividing the Project GHG Emissions by the Project lifetime capacity to present the GHG emission rate relative to the energy produced by the project.

- **Operations:** The Avoided operations GHG emissions are assumed to equal the direct generation (i.e., combustion) emissions and are calculated based on the combustion emissions of the fuel that would be consumed at KIUC's system facilities if the Project were not built, but which would be avoided if the project is built.

This Project supports transitioning from fossil fuels to renewable energy generation by generating renewable electricity and providing load shifting and fast-frequency response services to Kauaʻi Island's electric grid, thereby enabling renewable energy sources to displace fossil fuels and biofuels. Avoided GHG emissions were analyzed using projected avoided fuel use for years 2028 to 2053 provided by KIUC and as further discussed in Exhibits 2 and 3 of the Application.[25]

The Avoided GHG emissions from direct (stack) generation represent the GHG emissions from the combustion of fossil fuels and biofuels over the 25-year Project horizon based on current fuel use projections. While the mix of fossil fuels is expected to change over time as more renewable energy is integrated into the electric grid and certain fossil fuel generating stations are retired, the emissions associated with the combustion of these fossil fuels are relatively similar and, therefore, changing liquid fossil fuel mix is unlikely to have any significant impact on the Avoided GHG emissions. Carbon dioxide ("CO_2") emissions from combustion of biodiesel fuel are treated as zero for this analysis' overall results.[26] This is consistent with the State of Hawaiʻi Greenhouse Gas Emissions regulation (Hawaiʻi Administrative Rule 11-60 Subchapter 11), which excludes CO_2 emissions from biogenic sources such as biofuels in the emissions calculation for reporting GHG emissions (methane ("CH_4") and nitrous oxide ("N_2O") are counted but are very low), and with 2006 International Panel on Climate Change ("IPCC") guidance. Biogenic CO_2 results from combustion of biodiesel are reported separately in **Appendix Table A8: Avoided GHG Emissions Calculations**, and conservatively exclude biogenic CO_2 removals from the atmosphere during upstream renewable fuel feedstock production, which could balance the biogenic CO_2 emissions from biodiesel combustion shown in the results.

The Avoided GHG analysis was developed for the fuels that would be consumed if the Project were not approved and built but would be avoided if the Project is approved and built. These fuels include ultra-low sulfur diesel (ULSD), naphtha, and biodiesel. The methodology to calculate the Avoided GHG emissions is detailed below.

3.1 Ultra-Low Sulfur Diesel and Naphtha

To calculate the lifecycle GHG emissions for ULSD and naphtha avoided fuels, Ramboll used the total well-to-grid (WTG) factors provided in the Liquid Fuels GHG Lifecycle Analysis report (See Footnote 15), developed by Stillwater Associates LLC for KIUC's fuels. The factors provided by Stillwater include production of crude oil, its shipment to refineries, production of liquid fuels at petroleum refineries, the transport of the liquid fuels to KIUC's

[25] For this Project, the avoided fuel consumption accounts for increased displacement of fossil fuels with renewable energy from grid sources stored by this Project that would otherwise be lost. Negative avoided fuel consumption for certain fossil fuels correlates to the potential increase in fuel consumption due to the Project.

[26] The GHG emissions from the Project are significantly lower than the GHG emissions that would occur if the Project is not approved. For future projects that come before the Commission, where there is a smaller net GHG emissions reduction, the addition of other indirect GHG emissions to the projected Avoided GHG Emissions may be warranted and can be evaluated on a case-by-case basis.

power stations, and the combustion of the liquid fuels at the power stations to generate electricity. The report developed by Stillwater, including inputs, assumptions, and methodology details is provided in **Attachment B**.

3.2 Biodiesel

Since biodiesel is used at KIUC's generating facilities, but was not included in the Stillwater report used for ULSD and naphtha, Ramboll used the following approach to estimate the Avoided lifecycle GHG emissions from biodiesel consumption:

3.2.1 AVOIDED UPSTREAM GHG EMISSIONS

The R&D GREET model[27] was used to determine the fuel's upstream GHG emission factor due to the model's widespread regulatory, industry and academic acceptance. Upstream emission factor for biodiesel was extracted from the R&D GREET® 1 2024 Fuel-Cycle Model for 2024 using the electricity grid mix for the United States Grid Mix region. GREET® emission factors for biofuels include feedstock and fuel emissions, including losses. The emission factor for biodiesel in this analysis is obtained from a tallow fuel pathway.

Appendix Table A8: Avoided GHG Emissions Calculations and **Appendix Table A9a: Raw Materials Extraction & Manufacturing Fuel GHG Emissions Calculations** provide detailed calculations, including assumptions and inputs related to extraction and production of biodiesel.

3.2.2 AVOIDED TRANSPORTATION GHG EMISSIONS

To adjust the Upstream Avoided GHG emissions to the Project and island-specific locations, additional transportation emissions were calculated using an "inventory approach" where direct GHG emissions from transportation are calculated based on Kauaʻi-specific data. This includes transportation of biodiesel from the Port of Los Angeles to Pacific Biodiesel Plant in Keaau City, Hawaiʻi Island and from the Pacific Biodiesel Plant to Nāwiliwili Harbor, Kauaʻi. The weight of biodiesel is determined based on based on fuel consumption, heat content, and fuel density, as provided in the GREET® model The transportation emissions are calculated using the distance of each travel leg, the weight of the material transported, and the mode of such travel (including truck, barge, oil tanker, ship, or pipeline). For a given transportation segment, if the mode of travel is unknown and multiple travel modes are available, the most emissions-intensive mode is selected.[28] Emission factors for road transportation were obtained from the United States Environmental Protection Agency ("US EPA" or "EPA") Scope 3 Inventory Guidance,[29] the emission factor for transport by ship was obtained from Global Maritime Trade Lane Emissions Factors,[30] and the emission factors for

[27] Argonne National Laboratory. 2024. Greenhouse gases, Regulated Emissions, and Energy use in Transportation Model (GREET) 2023 Excel Model: Fuel-Cycle Model. Revision 1. Available at: https://greet.es.anl.gov/greet_1_series.

[28] The GHG emissions per ton-mile of transportation from maritime shipping are lower than for rail and trucks. As indicated in the above section, this analysis conservatively assumes the most emissions-intensive transportation mode if the travel mode is not known.

[29] EPA Scope 3 Inventory Guidance is available at: https://www.epa.gov/climateleadership/scope-3-inventory-guidance, and recommends emission factors from Table 8 of Emission Factors for Greenhouse Gas Inventories, available at: https://www.epa.gov/system/files/documents/2025-01/ghg-emission-factors-hub-2025.pdf. Accessed April 2025.

[30] The emission factor for ships is based on the Global Ocean Container Greenhouse Gas Emission Intensities for dry (i.e., non-refrigerated) cargo shipping over all trade lanes for 2023 with a 70% utilization factor, assuming an average load weight of 10 tons in each container. Available at: https://smart-freight-centre-

barge and oil tanker were obtained from Global Logistics Emission Council – Smart Freight Centre's GHG Emission Factors for Inland Waterways Transport.[31] Barge distances were estimated using Google Earth Pro to determine shipping distances, and truck distances were estimated using Google Maps to determine driving distances.

Appendix Table A9b: Fuel Transportation GHG Emissions Calculations provides detailed calculations, including assumptions and inputs related to fuel transport.

3.2.3 AVOIDED OPERATIONS GHG EMISSIONS

As detailed above, the Avoided Operations GHG emissions are assumed to equal the direct generation (i.e., combustion) emissions and are calculated based on the combustion emissions of the fuel that would be consumed at KIUC generating facilities if the Project were not built, but which would be avoided if the Project is built.

The avoided fuel consumption for biodiesel is negative, which means that the biodiesel use increases if the Project is built, which therefore reduces the Avoided lifecycle GHG emissions with the Project. Project direct operations GHG emissions from biodiesel consumption are calculated using emission factors from the US EPA's Emission Factors for Greenhouse Gas Inventories, Table 1.[32]

The avoided GHG emissions also evaluate the potential biogenic CO_2 emissions from biodiesel combustion. Biogenic CO_2 results from combustion of biodiesel are reported separately in **Appendix Table A8: Avoided GHG Emissions Calculations**, and conservatively exclude biogenic CO_2 removals from the atmosphere during upstream renewable fuel feedstock production, which could balance the biogenic CO_2 emissions from biodiesel combustion shown in the results.

Appendix Table A8: Avoided GHG Emissions Calculations and **Appendix Table A9c**: **Fuel Combustion Emission Factors** provides detailed calculations, including assumptions and inputs related to the operations emissions.

3.3 Avoided GHG Emissions Results

Using the direct GHG emissions calculation described above, Avoided lifecycle GHG emissions are estimated to be **2,350,053 MT CO_2e** or **901 kg CO_2e/MWh**. **Appendix Table A8: Avoided GHG Emissions Calculations** provides detailed calculations, including assumptions and inputs.

4. NET GHG EMISSIONS

As described above, the estimated Net GHG emissions reduction is defined as the estimated Avoided GHG emissions from fossil-fueled and biofueled plants minus estimated GHG

media.s3.amazonaws.com/documents/Clean_Cargo_-_2023_Global_Ocean_Container_Emissions_Report.pdf. Accessed November 2024.

[31] The barge GHG emission factor was selected for general cargo, dry - and liquid bulk vessels (Motor vessels 135 m) and the oil tanker GHG emission factor was selected for liquid bulk vessels (Tanker vessels 135 m), available at: https://smart-freight-centre-media.s3.amazonaws.com/documents/GLEC-report-on-GHG-Emission-Factors-for-Inland-Waterways-Transport-SFC2018.pdf. Accessed November 2024.

[32] EPA (2025). Emission Factors for Greenhouse Gas Inventories. Available at: https://www.epa.gov/system/files/documents/2025-01/ghg-emission-factors-hub-2025.pdf. Accessed April 2025.

emissions from the Project. The lower the Project's GHG Emissions relative to the Avoided GHG Emissions, the higher the Net Emissions GHG reduction. The below sections describe the net operations GHG emissions reduction from operation of the Project (**Section 4.1**) and the net lifecycle GHG emissions reduction from the Project (**Section 4.2**).

4.1 Net Operations GHG Emissions Reduction Results

The net operations GHG emissions reduction associated with the operation and maintenance of the Project is estimated to be **1,862,735 MT CO_2e** or **714 kg CO_2e/MWh**. Note this estimate excludes emissions associated with the T&D infrastructure given data from the T&D portion of the project is aggregated as lifecycle GHG emissions. However, GHG emissions from T&D operations is not expected to significantly impact the overall operations emissions for the Project. The estimated net operations GHG emissions reduction (in units of MT CO_2e) is calculated as follows:

Net Operations Emissions Reduction	=	Avoided Operations Emissions	-	Project Operations Emissions
1,862,735 MT CO_2e	=	**1,870,787** MT CO_2e	-	**8,051** MT CO_2e

To obtain the Net Operations GHG Intensity Reduction (in units of kg CO_2e/MWh), the above Net Operations Emissions Reduction is divided by the Project's lifetime capacity:

$$\text{Net Operations Intensity Reduction} = \frac{\text{Net Operations Emissions Reduction}}{\text{Project Lifetime Capacity}}$$

$$\textbf{714}\ \text{kg } CO_2e/\text{MWh} = \frac{\textbf{1,862,735}\ \text{MT } CO_2e * 1{,}000\ \text{kg}}{2{,}608{,}134\ \text{MWh} * 1\ \text{MT}}$$

4.2 Net Lifecycle GHG Emissions Reduction Results

The net lifecycle GHG emissions reduction associated with the Project is estimated to range from **2,240,372 MT CO_2e** to **2,257,692 MT CO_2e** or **866 kg CO_2e/MWh** to **859 kg CO_2e/MWh,** noting the range in GHG emissions is due to the low and high range of T&D infrastructure results for Project GHG emissions. Based on these estimates the approval and completion of the Project would result in a reduction in net GHG emissions relative to the baseline without the Project. This estimate is calculated as follows:

	Net Emissions Reduction	=	Avoided Emissions	-	Project Emissions
Net Project Lifecycle – Low	**2,257,692** MT CO_2e	=	**2,350,053** MT CO_2e	-	**92,361** MT CO_2e
Net Project Lifecycle - High	**2,240,372** MT CO_2e	=	**2,350,053** MT CO_2e	-	**109,682** MT CO_2e

To obtain the Net GHG intensity reduction (in units of kg CO_2e/MWh), the above Net emissions reduction is divided by the Project's lifetime capacity:

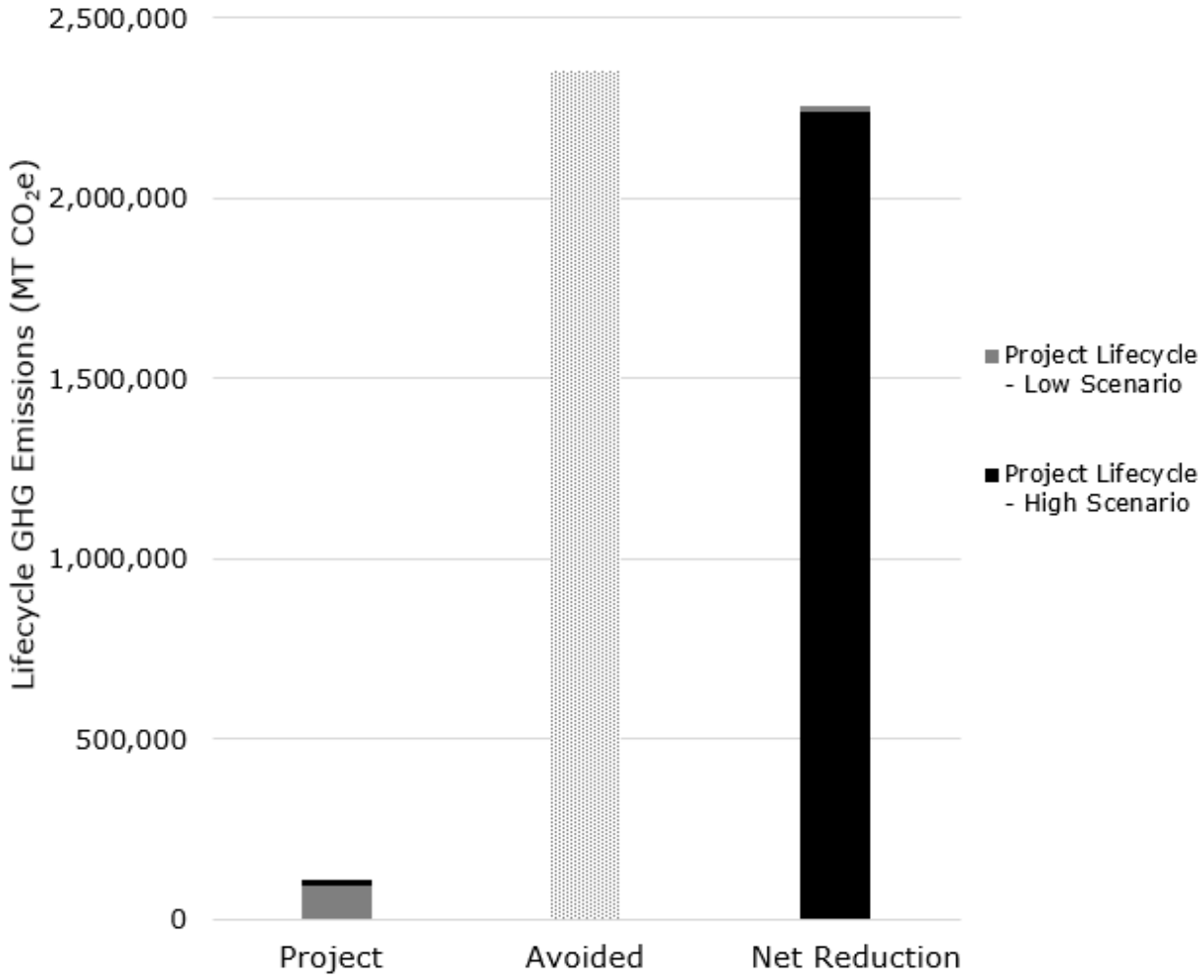
	Net Intensity Reduction	=	$\frac{\text{Net Emissions Reduction}}{\text{Project Lifetime Capacity}}$
Net Project Lifecycle – Low	**866** kg CO_2e/MWh	=	**2,257,692** $\frac{\text{MT } CO_2e * 1{,}000 \text{ kg}}{2{,}608{,}134 \text{ MWh} * 1 \text{ MT}}$
Net Project Lifecycle - High	**859** kg CO_2e/MWh	=	**2,240,372** $\frac{\text{MT } CO_2e * 1{,}000 \text{ kg}}{2{,}608{,}134 \text{ MWh} * 1 \text{ MT}}$

Table 2 and Figure 3 below summarize the Avoided emissions, Project emissions, and resulting Net GHG emissions reduction from the Project. **Figure 3** shows the results corresponding with the high Project lifecycle GHG emissions in black and the results corresponding to the low Project lifecycle GHG emissions in gray.

Table 2. Overview Summary of Project Lifecycle GHG Emissions by Stage

Project Stage		GHG Intensity (kg CO_2e/MWh)				GHG Emissions (MT CO_2e)			
		T&D Infrastructure		Solar	Storage	T&D Infrastructure		Solar	Storage
		Low	High			Low	High		
Upstream	Equipment Raw Materials Extraction & Production	0.71	7.3	15	13	1,847	19,168	38,543	32,706
	Fuel Raw Materials Extraction & Manufacturing			1.0				2,734	
	Transportation			1.8				4,655	
	Construction			0.40				1,045	
Project Operations	Operations & Maintenance			3.1				8,051	
Downstream	Transportation			0.085	0.15			222	389
	Decommissioning & Disposal			0.83				2,168	
Total Project Lifecycle - Low		**35**				**92,361**			
Total Project Lifecycle - High		**42**				**109,682**			
Avoided Lifecycle		**901**				**2,350,053**			
Net Project Lifecycle Reduction – Low		**866**				**2,257,692**			
Net Project Lifecycle Reduction - High		**859**				**2,240,372**			

Figure 3. Lifecycle GHG Emissions



As demonstrated by the above GHG analysis results, approval and completion of the Project would result in a significant reduction in lifecycle and operations GHG emissions relative to the baseline without the Project.

ATTACHMENT A

Tables and Calculations

ATTACHMENT B

Stillwater Liquid Fuels GHG Lifecycle Analysis

Exhibit T

Traffic Impact Analysis Report

Kaawanui Solar:

Transportation Impact Analysis Report (TIAR)

Prepared for:

G70

August 27, 2025 Revised

FEHR PEERS

SD25-0563

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1. Executive Summary

This Transportation Impact Analysis Report (TIAR) presents the results of the mobility study conducted by Fehr & Peers for the proposed Kaawanui Solar project (Project) located on the mauka side of Kaumualiʻi Highway to the northeast of the Pākalā Village community on the island of Kauaʻi.

The TIAR assists with the development of the Project site plan by providing input on required transportation infrastructure (e.g., roadways) to provide access to the site. The solar project will generate a negligible amount of vehicle traffic once fully operational. Having conducted numerous studies of similar facilities, we understand that the primary traffic operation issues for solar projects are associated with temporary construction traffic impacts and permanent site access. As such, the TIAR is focused on identifying the impacts of the construction phase of the project on the surrounding transportation system and evaluating site access once fully operational.

The proposed project is a 43-megawatt (MW) photovoltaic array paired with 4 hours of battery storage capacity [172 MWh Battery Energy Storage System (BESS)] to be constructed across a preliminary site area of approximately 269 buildable acres of land located on the mauka side of Kaumualiʻi Highway opposite the Pākalā Village. Primary project access points include two (2) existing driveways opposite the access roadway serving Pākalā Village and Pākalā Plantation Estate. On-site circulation will be provided via a network of internal roadways. According to the project team, the proposed site construction is expected to start in early 2027 and be completed by mid-2028.

Transportation Impact Analysis Summary

The following provides the key TIAR findings under three study scenarios: Existing, Future Baseline (2028), and Future Baseline (2028) + Project conditions.

Under the Existing Conditions, intersection operations at two (2) existing driveways were evaluated as part of this report. All study intersections were calculated as currently operating at a desirable Level of Service (LOS) C or better (as detailed in Section 3.5). These operations are generally consistent with our field observations.

To evaluate the potential impacts of traffic generated from the construction phase of the project on the surrounding street system, baseline future conditions in the area were developed (as further described in Section 6.2) to reflect traffic increases due to regional growth plus traffic from nearby projects. All intersections were estimated (as further described in Section 4.5) to continue operating at a desirable LOS D or better under Future Baseline (2028) conditions.

The transportation network was evaluated under future conditions with the addition of the proposed construction traffic. During the construction phase, the project is estimated to generate approximately 291 net new daily trips including 115 trips (100 inbound / 15 outbound) in the morning peak hour and 115 trips (15 inbound / 100 outbound) in the evening peak hour during the highest activity level of the construction phase.

During the construction period, project-generated vehicles are expected to use one or both study intersections at varying levels. A sensitivity analysis was conducted to determine if traffic focused at one study intersection would result in any traffic operations issues. The results of this analysis showed that if more than 25% of exiting project traffic were to turn left from Project Driveway 1 (opposite Pakala Village Road) onto Kaumualiʻi Highway in the PM peak hour, the project driveway approach would operate at an undesirable LOS (i.e., LOS E or F). While longer delays would occur if all exiting construction traffic were to turn left onto the highway from this driveway towards Hanapepe in the PM peak hour, the volume would not be high enough to satisfy the typical signal warrant. A comparable situation would occur at Project Driveway 2 if more than 50% of Hanapepe-bound traffic were to turn left onto the highway during the PM peak hour. Essentially, anything other than a 25%-50% split at Project Driveways 1 and 2, respectively, may result in an undesirable LOS during the highest construction activity level.

Based on these findings, no significant intersection impacts from the construction phase of the proposed development were identified under Future Baseline (2028) + Project conditions (as further described in Section 6.2). Additionally, the construction of the proposed development is not anticipated to preclude the implementation of any potential enhancements to walking, biking, transit, or auto facilities along Kaumualiʻi Highway.

Recommended Improvements

Project Site Access:

To minimize delays to exiting construction traffic and to minimize the impact on overall traffic operations and safety, PM peak hour Project-generated construction traffic turning left out of Project Driveways 1 and 2 should be limited to no more than 25% and 50%, respectively, when feasible. If construction activities and on-site circulation will result in an exceedance of these thresholds, then manual traffic control on the highway should be implemented *if* delays to exiting traffic become excessive (i.e., average delays exceed the LOS E/F threshold of 50 seconds per vehicle). During periods when the number of on-site construction employees is lower, the split between Project Driveways 1 and 2 will be less critical from an operational perspective. Alternatively, staggering construction traffic departures and /or providing shuttle services to off-site parking areas could help reduce congestion and queuing at the Project driveways and ameliorate any potential future operational issues.

On-Site Circulation and Parking:

During the construction phase, on-site circulation will be facilitated by dirt roads within the Project site. Additionally, all construction traffic and trucks will be required to park on-site to prevent disruptions to traffic along Kaumualiʻi Highway. Once the Project is operational, negligible traffic is expected, primarily from maintenance crews. On-site parking is planned to be provided to accommodate these vehicles as needed.



2. Introduction

This Transportation Impact Analysis Report (TIAR) presents the results of the mobility study conducted by Fehr & Peers for the proposed Kaawanui Solar Project (Project) located on the mauka side of Kaumuali'i Highway to the northeast of the Pākalā Village community on the island of Kaua'i.

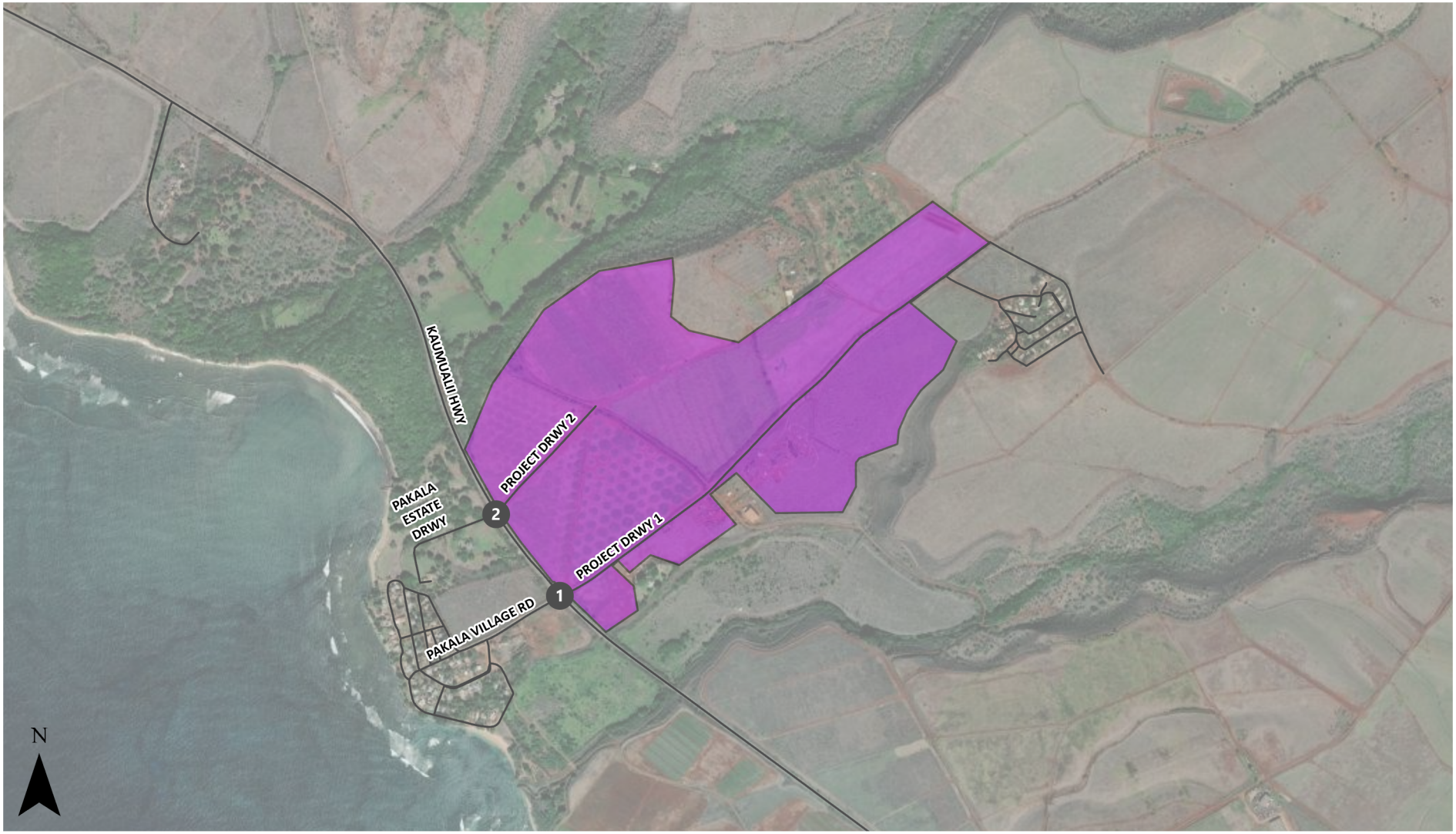
The TIAR assists with the development of the Project site plan by providing input on required transportation infrastructure (e.g., roadways) to provide access to the site. The solar Project will generate a negligible amount of vehicle traffic once fully operational. Having conducted numerous studies of similar facilities, we understand that the primary traffic operation issues for solar Projects are associated with temporary construction traffic impacts and permanent site access. As such, the TIAR is focused on identifying the impacts of the construction phase of the Project on the surrounding transportation system and evaluating site access once fully operational.

This chapter includes a description of the proposed Project, the assumptions, and methods used to conduct the study, as well as a discussion of the criteria used to identify significant impacts.

2.1 Project Description

The proposed Project is a 43-megawatt (MW) photovoltaic array paired with 4 hours of battery storage capacity [172 MWh Battery Energy Storage System (BESS)] to be constructed across a preliminary site area of approximately 269 buildable acres of land located on the mauka side of Kaumuali'i Highway opposite Pākalā Village. Primary Project access points are two (2) existing driveways: one opposite the access roadway serving Pākalā Village and one opposite the access to Pākalā Plantation Estate. On-site circulation will be provided via a network of internal roadways. According to the Project team, the proposed site construction is expected to be completed by the middle of 2028. During the construction phase, it is projected that up to 200 employees and six (6) trucks will be commuting to the site on a daily basis.

Figure 1 illustrates the study area for the proposed Project, and **Figure 2** illustrates the Project's preliminary site plan.



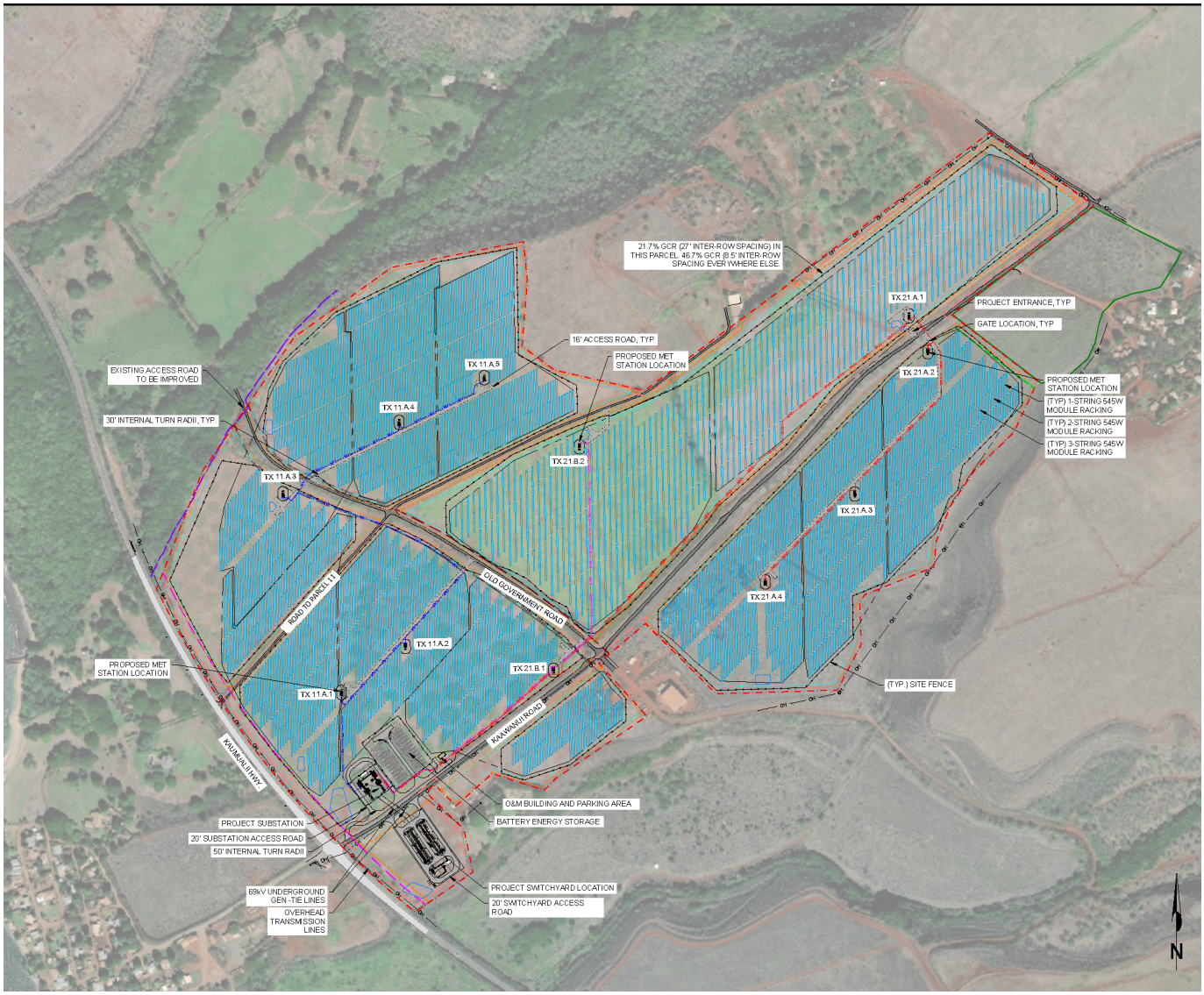
Resource Mapping Hawaii, Maxar

Figure 1

Study Intersections

Preliminary Project Site Development Area

Project Study Area



Source: AES, August 2025

LEGEND:

EXISTING		PROPOSED			
	PAVED ROAD		ACCESS ROAD	UG	UNDERGROUND GEN-TIE LINE
	UNPAVED ROAD		LEASE BOUNDARY		RESERVED FOR STORM WATER MANAGEMENT
OH	OVERHEAD ELECTRICAL LINES		LEASE BOUNDARY SETBACK	MV1	BESS MEDIUM VOLTAGE LINE 1
	TMK BOUNDARY SETBACK		FENCELINE	MV2	BESS MEDIUM VOLTAGE LINE 2
	PUBLIC ROAD SETBACK		FENCE BUILDABLE LIMIT LINE	MV3	BESS MEDIUM VOLTAGE LINE 3
	UTILITY/SITE FEATURE SETBACK		RACKING AREA	MV4	BESS MEDIUM VOLTAGE LINE 4
	GULCH/STREAM MINIMUM SETBACK		PCS BLOCK BOUNDARY	MV5	BESS MEDIUM VOLTAGE LINE 5
	KAAWANUI VILLAGE URBAN ZONING EXPANSION SETBACK	MV1	PV MEDIUM VOLTAGE LINE 1	MV6	BESS MEDIUM VOLTAGE LINE 6
	KAAWANUI VILLAGE URBAN ZONING EXPANSION AREA SETBACK	MV2	PV MEDIUM VOLTAGE LINE 2		TYPICAL PCS PAD
		MV3	PV MEDIUM VOLTAGE LINE 3		

Figure 2

Preliminary Project Site Plan

2.2 Project Study Location

The transportation analysis focuses on evaluating the potential Project-related traffic impacts at the following two (2) existing intersections in the vicinity of the site:

1. Kaumualiʻi Highway/Pākalā Village Road-Kaawanui Road
2. Kaumualiʻi Highway/Pākalā Plantation Estate Driveway-Road to Parcel 11

The side street approaches on the mauka side of the highway will serve as future Project Driveways 1 and 2 at each location. These locations were selected for analysis as they will have the greatest concentration of conflicting turning movements that will impact Kaumualiʻi Highway operations.

2.3 Analysis Scenarios

The operations of the study intersection were evaluated during the morning and evening peak hours for the following scenarios:

Existing (2024) Conditions – The analysis of existing traffic conditions was based on 2024 counts collected for the weekday peak hours. The existing conditions analysis includes a description of key area streets and an assessment of active transportation, and transit facilities serving in the study area.

Future Baseline (2028) No Project – Future traffic volumes in the anticipated completion year of the full Project buildout were Projected by increasing the existing volumes using an annual growth factor to account for ambient growth. This scenario also includes the Projected construction traffic for a 35-megawatt solar project on the west side of the island on the Mānā Plain, given the potential overlap of its construction phase with the Kaawanui Solar Project. This scenario does not include any Kaawanui Project-generated traffic.

Future Baseline (2028) Plus Project– This scenario includes traffic projections from Baseline (2028) No Project plus traffic estimated from the construction phase of the Kaawanui Project. The impact of the Project under this scenario was also assessed for potential impacts to bicycle, pedestrian, and transit facilities and services.

2.4 Analysis Methods

The analysis of roadway operations performed for this study is based on procedures presented in the *Highway Capacity Manual 7th Edition* (HCM 7), published by the Transportation Research Board in 2022. The operations of roadway facilities are described with the term level of service (LOS). LOS is a qualitative description of traffic flow based on such factors as speed, travel time, delay, and freedom to maneuver. Six levels are defined from LOS A, which is the least congested operating conditions, to LOS F, which is the

most congested operating conditions. LOS E represents "at-capacity" operations. Operations are designated as LOS F when volumes exceed capacity, resulting in stop-and-go conditions. The methodology for unsignalized intersections is described below. Unsignalized intersections in this report refer to uncontrolled or stop sign-controlled intersections.

2.4.1 Unsignalized Intersections

Unsignalized intersection operations were evaluated using the methods contained in Chapter 20 of the HCM 7. LOS ratings for stop-sign-controlled intersections are based on the average control delay expressed in seconds per vehicle. At a two-way or side-street-stop-controlled (SSSC) intersection, the average control delay is calculated for each minor-street-stopped movement and the major street left turns, not for the intersection as a whole. For approaches composed of a single lane, the control delay is computed as the average of all movements in that lane. For approaches with multiple lanes, the control delay is computed for each movement; the movement with the worst (i.e., longest) delay is presented. For all-way stop-controlled locations, the average delay is calculated for the intersection as a whole.

The average control delay for signalized intersections is calculated using Synchro 12.0 software. LOS criteria for unsignalized intersections are shown in **Table 1**.

Table 1: Unsignalized Intersection Level of Service Criteria

LOS	Description	Delay in Seconds
A	Little or no delay	≤ 10.0
B	Short traffic delay	> 10.0 to 15.0
C	Average traffic delays	> 15.0 to 25.0
D	Long traffic delays	> 25.0 to 35.0
E	Exceptionally long traffic delays	> 35.0 to 50.0
F	Extreme traffic delays with intersection capacity exceeded	> 50.0

Source: Highway Capacity Manual 7th Edition, Transportation Research Board, 2022.

2.4.2 Significant Impact Criteria for Traffic

The analysis of future conditions compares the baseline or "no project" condition with conditions that include Project-generated traffic. This is being done to determine whether the addition of Project traffic is expected to result in a significant impact on the surrounding roadways. For this study, the minimum desired operating level for an intersection or critical movement is LOS D, and this guideline is employed

by the State of Hawai'i Department of Transportation Highways Division (HDOT), which has jurisdiction over Kaumuali'i Highway, and the County of Kaua'i.

At an unsignalized intersection, if the addition of Project traffic is expected to degrade desirable service levels (LOS D or better) to undesirable service levels (LOS E or F), then the new development is considered to have a Project-specific impact. Alternatively, if the intersection LOS is determined to be LOS E or F without the Project and the Project adds traffic to this location, causing the delay of the critical undesirable movement to increase by five (5) seconds or more, then this result would be characterized as a cumulative project impact. However, in both cases, the project is only determined to have a potentially *significant* impact when one or more traffic signal volume warrants are met. The signal volume warrants used for this evaluation are those described in Chapter 4C of the Manual of Uniform Control Devices (MUTCD, 2009) published by the U.S. Department of Transportation Federal Highways Administration (FHWA). These include the eight-hour (Warrant 1), four-hour (Warrant 2), and peak-hour (Warrant 3) warrants. Satisfaction of a warrant would provide justification for the installation of a traffic signal or a roundabout to increase intersection capacity and enhance safety.

2.4.3 Significant Impact Criteria for Non-Auto Modes

HDOT and the County of Kaua'i do not publish formal impact criteria for pedestrian, bicycle, and transit impacts. For this analysis, these impacts are evaluated based on whether a proposed project would: 1) conflict with the existing or planned pedestrian, bicycle, or transit facilities and services, or 2) create substantive walking, bicycling, or transit use demand without providing adequate and appropriate facilities for non-motorized mobility. Existing facilities for pedestrians, bicycles, and transit users were inventoried to evaluate the quality and scope of facilities/services currently in place. The assessments of planned pedestrian, bicycle, and transit facilities were conducted using the information in planning documents, such as the Statewide Pedestrian Master Plan (2013) and West Kaua'i Community Plan (2020). For these modes, if the proposed project is expected to conflict with existing or planned improvements to pedestrian and bicycle facilities, or if the project is expected to generate a substantial demand that could warrant additional transit service, then the project would be determined to have a project-specific impact to non-motorized modes of transportation.

3. Existing Conditions

This chapter describes the study area's existing transportation network and includes a discussion of roadway, bicycle, pedestrian, and transit facilities. Overall, the assessment of the existing conditions relevant to this study establishes the scenario against which the future baseline and proposed project changes are compared.

3.1 Roadway System

The key roadways providing access to the site are described below.

Kaumuali'i Highway (State Route 50) is a two- to four-lane highway extending from the Pacific Missile Range Facility Airport on the west side of the island to central Līhu'e. Along the project site frontage, this roadway is a two-lane highway (officially classified as a minor arterial) and is not on the National Highway System (NHS). The posted speed limit is 45 miles per hour (mph) along the project site frontage. No designated areas for on-street parking are provided along Kaumuali'i Highway near the project site. However, some vehicles park along select shoulder sections where people desire to access beach areas (e.g., near the south end of Pākalā Beach) west of the Project site.

Pākalā Village Road is a two-lane local roadway makai of Kaumuali'i Highway in the Waimea area. This roadway provides access to a number of residential properties south of Kaumuali'i. No speed limit signs are posted along this roadway. Also, no designated areas for on-street parking are provided along Pākalā Village Road near the highway. On the mauka side of the highway, an unnamed paved road with a striped double yellow provides access to properties that include both residential and agricultural uses.

Pākalā Plantation Estate Driveway is a private driveway makai of Kaumuali'i Highway in the Waimea area. This roadway provides exclusive access to the Pākalā Plantation Estate located south of Kaumuali'i. No speed limit signs are posted along this roadway. Also, no designated areas for on-street parking are provided along Pākalā Village Road near the highway.

Road to Parcel 11 located on the mauka side of the highway (opposite Pākalā Plantation Estate Driveway) is an unnamed paved private road without striping that provides access to residential and agricultural uses properties mauka of the project site.

Kaawanui Road located on the mauka side of the highway (opposite Pākalā Village Road) is an unnamed paved, private road without striping that provides access to residential and agricultural properties mauka of the project site.

3.2 Transit Facilities

The Kaua'i Bus (Kaua'i's transit service) operates two (2) bus routes along Kaumuali'i Highway near the project study area. Route 100 provides service from Kekaha to Līhu'e and Route 200 provides service from Līhu'e to Kekaha. Service on these routes is provided at 60-minute headways on weekdays and weekends between 5:30 am and 9:30 pm. The closest bus stop near the project site is located adjacent to the Makaweli Post Office at the Kaumuali'i Highway/Pākalā Village Road intersection.

3.3 Pedestrian Facilities

Pedestrian facilities consist of crosswalks, curb ramps, and pedestrian signals at signalized intersections, as well as sidewalks and paths near segments between intersections. Currently, no designated or formal pedestrian facilities are provided along the project's highway frontage. Pedestrian facilities are only available near the Waimea community on the west side of the Makaweli River.

3.4 Bicycle Facilities

Bicycle facilities generally consist of bike lanes, shared-use paths, bike routes, bike signals, separated bike routes, and cycle tracks. Currently, no designated bicycle facilities are provided along the Project's highway frontage. Based on data collected along Kaumuali'i Highway, limited bicycle activity was observed only near the intersection at Menehune Road in Waimea. In general, Kaumuali'i Highway is considered a higher-speed roadway where no substantial bicycle activity occurs.

3.5 Existing Traffic Operations

3.5.1 Roadway Segment

Roadway segment counts were collected between April 18th and April 20th, 2024, along Kaumuali'i Highway west of Pākalā Village. The segment counts were used to identify any potential variation in weekday and weekend volumes and to assess corridor operations from a planning-level perspective in terms of the number of travel lanes. **Table 2** provides a summary of the counts, and the detailed volume count sheets are provided in **Appendix A**.

Table 2: Existing Roadway Segment Volumes on Kaumuali'i Hwy

Day of Week	Two-way Daily Traffic Volume (vehicles per day)
Thursday	11,941
Friday	13,413
Saturday	11,489
Average Daily Traffic (ADT)	***12,682***

Source: Fehr & Peers, April 2024

Based on the data presented in **Table 2**, Kaumuali'i Highway serves an average daily traffic (ADT) volume of 12,682 vehicles near the study area. The Saturday volume is roughly the same as the Thursday volume, and the Friday volume includes an additional 1,500 vehicles, which is expected where Tuesday through Thursday data is used for transportation impact analyses as they represent the typical weekdays with the traditional work week. Regardless, the planning capacity of a road of this type with one travel lane in each direction is 15,000 to 18,000 ADT depending on the turning lanes provided. As such, the highway does have a surplus daily capacity in this area.

3.5.2 Intersections

Multimodal intersection turning movement counts were collected on Thursday, April 18th, 2024 when schools were in session (See **Appendix A** for the count data sheets). **Figure 3** shows the existing AM and PM peak hour turning movement volumes used in the analysis.

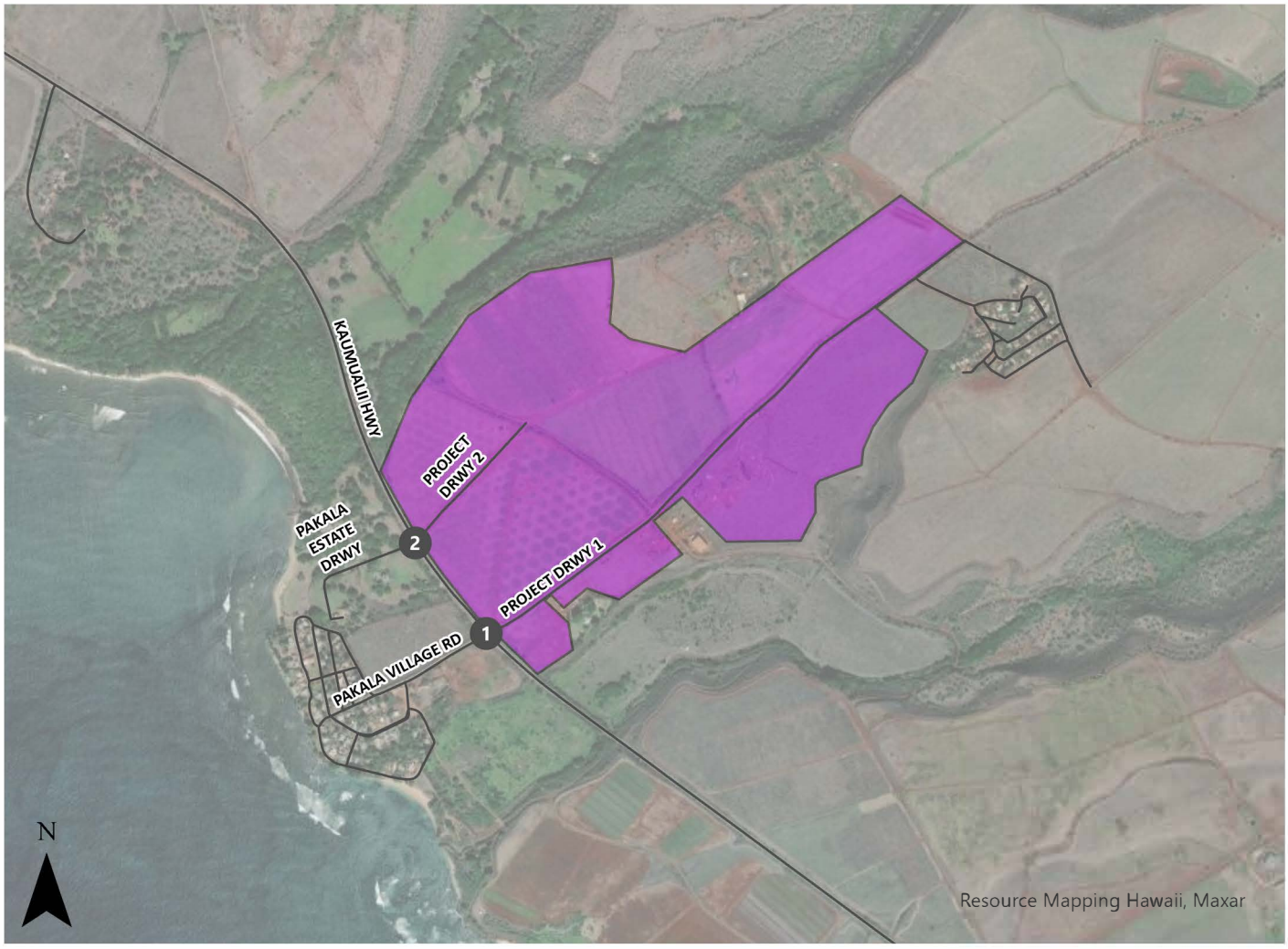
Operations at the study intersections were calculated using the existing volumes, existing traffic control devices, and the methodology described in Section 2.4. The results of the existing LOS analysis are presented below in **Table 3**, and the corresponding LOS calculation sheets are included in **Appendix B**.

Table 3: Existing Intersection Level of Service

Study Intersection	Traffic Control	Peak Hour	Existing (2024) Conditions	
			Delay (sec/veh)	LOS
1. Kaumuali'i Highway & Pākalā Village Road/Project Driveway 1	SSSC [a]	AM	23.3	C
		PM	21.7	C
2. Kaumuali'i Highway & Pākalā Plantation Estate Driveway/Project Driveway 2	SSSC	AM	16.9	C
		PM	16.6	C

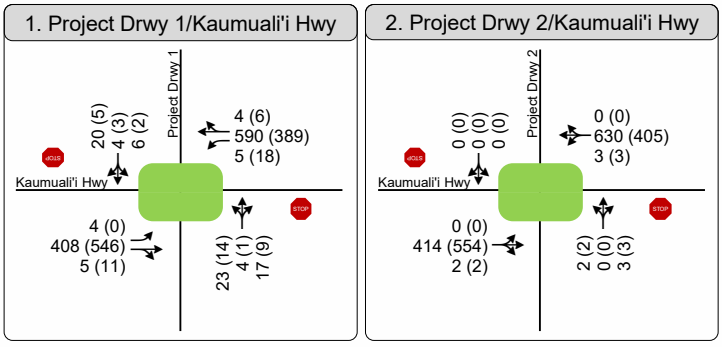
a. Side-Street Stop-Controlled

The results of the existing LOS calculations indicate that turning movements at the study intersections operate at LOS C or better during both the AM and PM peak periods. The specific movement operating at LOS C at each location is the NB left-turn movement at Intersection 1 and the NB left-turn movement at Intersection 2. Traffic on the highway operates at LOS A at both of these intersections.



Study Intersections

Preliminary Project Site Development Area



LEGEND

AM (PM) Peak Hour Traffic Volumes

Lane Configuration

AM / PM | A-C | D | E | F — Level of Service (LOS)

Figure 3

Peak Hour Traffic Volumes & Lane Configurations
Existing (2024) Conditions

3.6 Field Observations

Field observations conducted in April 2024 showed that traffic generally moves well throughout the study area during the AM and PM peak hours. No significant vehicle queues were observed for through movements on the highway at any of the study intersections. Vehicles on the side street approaches did experience some delay, but adequate gaps in traffic were available throughout most of each peak hour. The calculated existing peak hour intersection operating levels at the study intersections are shown on **Figure 3** are generally representative of field conditions. Additionally, very low pedestrian and bicycle activity was observed during the field review.

4. Baseline (2028) No Project Conditions

To evaluate the potential impacts of traffic generated by the construction phase of the proposed project on the surrounding street system, it was necessary to first develop estimates of future traffic conditions in the area without the project. Baseline traffic conditions without the project reflect traffic increases due to regional growth and nearby development. This scenario is referred to as baseline or "no project" conditions. The forecasted future traffic volumes were then used as a baseline to identify impacts on the roadway system from the project. The development of this baseline traffic scenario is described in this chapter.

4.1 Planned Active Transportation Improvements

Based on the review of the Kaua'i Active Transportation Map, the only planned active transportation improvements near the project site is a Multi-Use Path proposed along the south side of Kaumuali'i Highway between Kekaha Beach Park and Hanapepe Park. No information regarding the implementation schedule of the proposed improvement is available at this time.

4.2 Planned Transit Improvements

No bus transit improvements are planned along Kaumuali'i Highway adjacent to the project site. However, the bus service is periodically adjusted to respond to demand and to improve service and access for transit patrons.

4.3 Baseline (2028) Street Roadway Improvements

HDOT's Statewide Transportation Improvement Program (STIP) was reviewed to identify future construction projects that are expected within the study area. No new capacity improvements are currently funded or planned for construction within the timeframe of the proposed project opening year of 2028. Therefore, no change was assumed in the condition of the roadway infrastructure near the project site.

4.4 Baseline (2028) Traffic Volumes

4.4.1 Ambient Growth

A background annual growth rate of 0.5% was applied to the existing traffic volumes to account for background traffic growth in the study area. This rate has historically been used in various traffic studies to reflect the growth in the region but reflects the fact that a limited number of new development projects would add traffic to the study roadway network.

The growth rate was compounded over the 4.5-year timeframe (2024 to the middle of 2028) to help establish Baseline 2028 conditions. The growth rate was applied to the existing intersection turning movement traffic volumes. While select turning movements at some intersections may not realistically increase at the projected rate depending on the growth potential along those corridors, the resulting volumes provide a conservative analysis for this planning exercise.

4.4.2 Cumulative Projects

During the construction of the Kaawanui Solar Project, another solar project will also be under construction on the west side of the island, on the Mānā Plain. Construction for the Mānā Plain project is set to begin in June 2027 and will overlap with the Kaawanui Solar Project for one year (12 months). Although no publicly available Traffic Study exists for this project, this study estimates cumulative project traffic based on the ratio of the size of the two facilities. With a capacity of 35 megawatts, the Mānā Plain Solar Project is calculated to generate construction traffic volumes equivalent to approximately 80% of that of the Kaawanui Solar Project. All traffic associated with the cumulative project is assigned to the through movements on the Kaumuali'i Highway. **Figure 4** illustrates the forecasted peak hour traffic volumes for Baseline (2028) No Project Conditions.

4.5 Baseline (2028) No Project Levels of Service

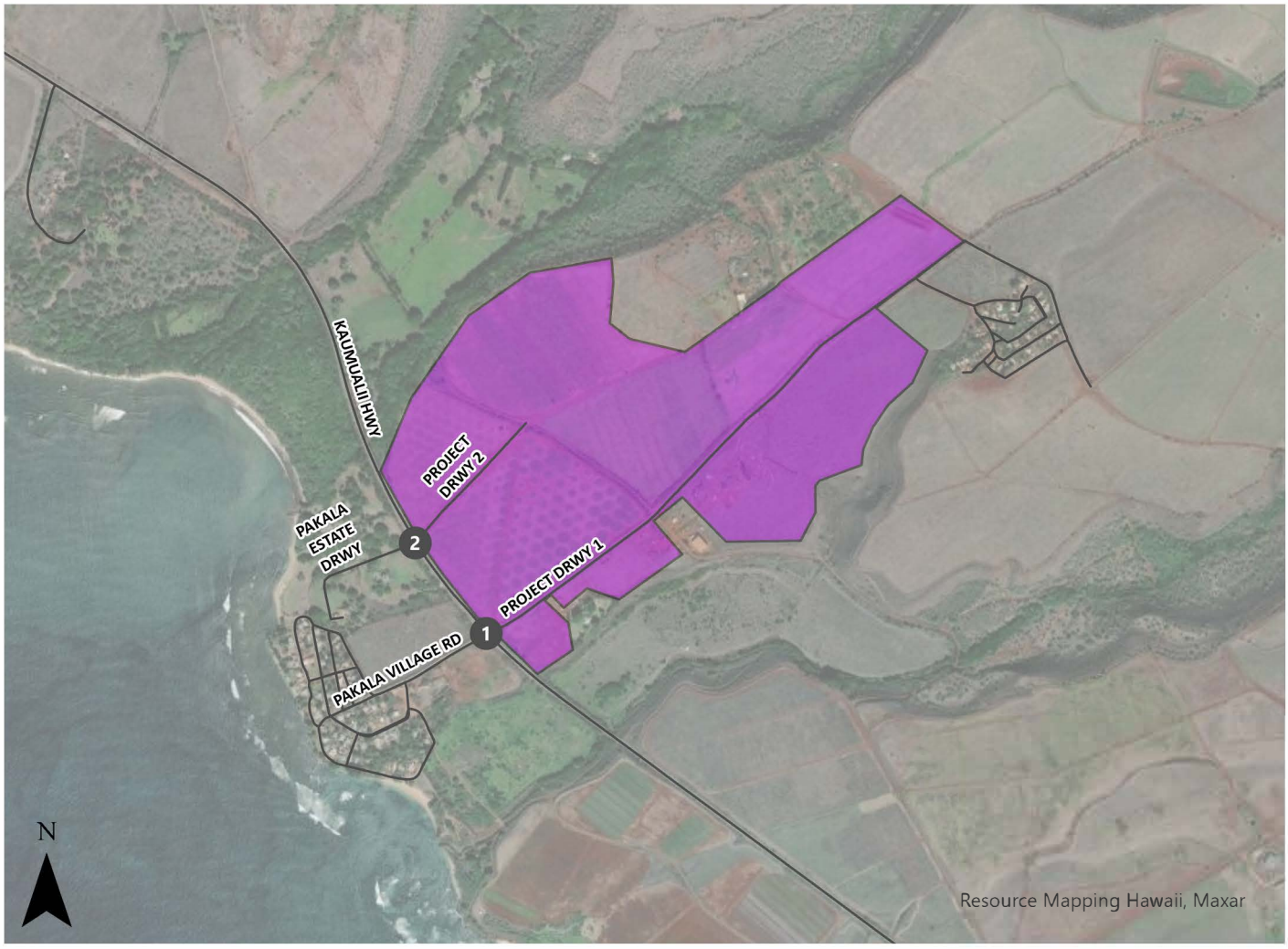
Levels of service (LOS) calculations were conducted using the volume data in **Section 4.4** and the existing lane configurations and traffic control to evaluate the operating levels of the study intersection under Baseline (2028) No Project Conditions with the forecasted growth in traffic. The results of the LOS analysis are presented in **Table 4**. The corresponding LOS calculation sheets are included in **Appendix C**.

Table 4: Baseline (2028) No Project Intersection Level of Service

Study Intersection	Traffic Control	Peak Hour	Future Baseline (2028) Conditions	
			Delay (sec/veh)	LOS
1. Kaumualiʻi Highway & Pākalā Village Road/Project Driveway 1	SSSC [a]	AM	28.9	D
		PM	26.3	D
2. Kaumualiʻi Highway & Pākalā Plantation Estate Driveway/Project Driveway 2	SSSC	AM	19.7	C
		PM	19.4	C

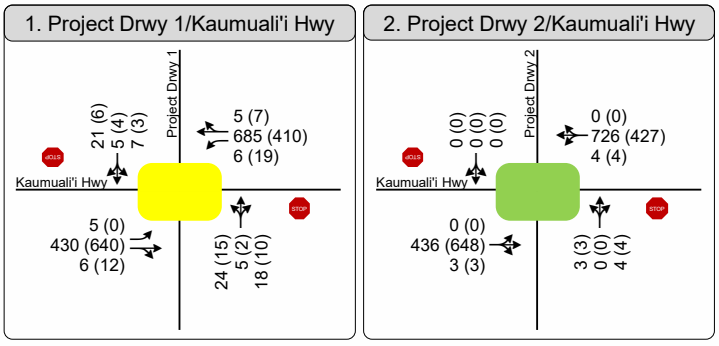
a. Side-Street Stop-Controlled

The analysis results indicate that the critical movements at the study intersections are estimated to operate at a desirable LOS D or better under Future Baseline (2028) No Project Conditions. The increases in delay over Existing Conditions are the result of the addition of the forecast traffic growth from other developments including the Mānā Plain solar project.



Study Intersections

Preliminary Project Site Development Area



LEGEND

AM (PM) Peak Hour Traffic Volumes

Lane Configuration

AM / PM — A-C | D | E | F — Level of Service (LOS)

Figure 4

Peak Hour Traffic Volumes & Lane Configurations
Future Baseline (2028) Conditions

5. Project Traffic Estimates

This chapter describes the anticipated number of vehicle trips and the directionality of those trips that would result from the construction phase of the proposed project. Future traffic added to the roadway system by the project is estimated using a three-step process: (1) trip generation, (2) trip distribution, and (3) trip assignment. The first step estimates the amount of project-generated traffic which will be added to the roadway network. The second step identifies the direction of travel to and from the project site and the proportion of traffic on each potential travel path. The new trips are assigned to specific street segments and intersection turning movements during the third step. This process is described in more detail below.

5.1 Trip Generation

The vehicle trip generation for the proposed project was estimated directly based on the number of construction workers. Based on input from the project team, the project is anticipated to have 200 workers and 6 trucks serving during the construction phase. The construction hours are planned to start at 7 am and end at 4 pm on weekdays and weekends. While most of the inbound traffic is anticipated to arrive before the morning peak hour, this analysis conservatively assumes that 80% of the daily trips arrive or depart the site during the peak hour. Additionally, the truck traffic arrivals to the construction site are anticipated to be distributed evenly throughout the day. The analysis conservatively assumes two-thirds of the truck traffic arrives or departs the site during peak hours.

Based on **Table 5**, the proposed project is expected to generate a total construction traffic volume of 291 new daily vehicle trips on a weekday, including 115 new vehicle trips during the AM peak hour (100 inbound/15 outbound) and 115 new vehicle trips during the PM peak hour (15 inbound/100 outbound). Note that this is based on the highest number of construction workers on the site at one time. On multiple days during the course of site development, the number of on-site workers will be lower and the resulting traffic volumes will be lower than estimated here.

Once fully operational, the project site is expected to generate fewer than 10 AM or PM peak-hour trips on a typical weekday. These trips would be made by maintenance personnel and others servicing the solar array. This volume is negligible and would have no appreciable effect on traffic operations. As such, the project impacts are focused on the construction traffic estimated in **Table 5**.

Table 5: Project Vehicle Trip Generation Estimates

Construction Traffic	PEAK AM Rate	PEAK PM Rate	Daily Trips	AM Peak					P.M. Peak				
				%		trips		Total	%		trips		Total
				in	out	in	out		in	out	in	out	
200 Workers[1,2]	40%[3]	40%[3]	267	90%	10%	96	11	107	10%	90%	11	96	107
6 Trucks[4,5]	33%[6]	33%[6]	24	50%	50%	4	4	8	50%	50%	4	4	8
Total Driveway Trips			*291*			*100*	*15*	*115*			*15*	*100*	*115*

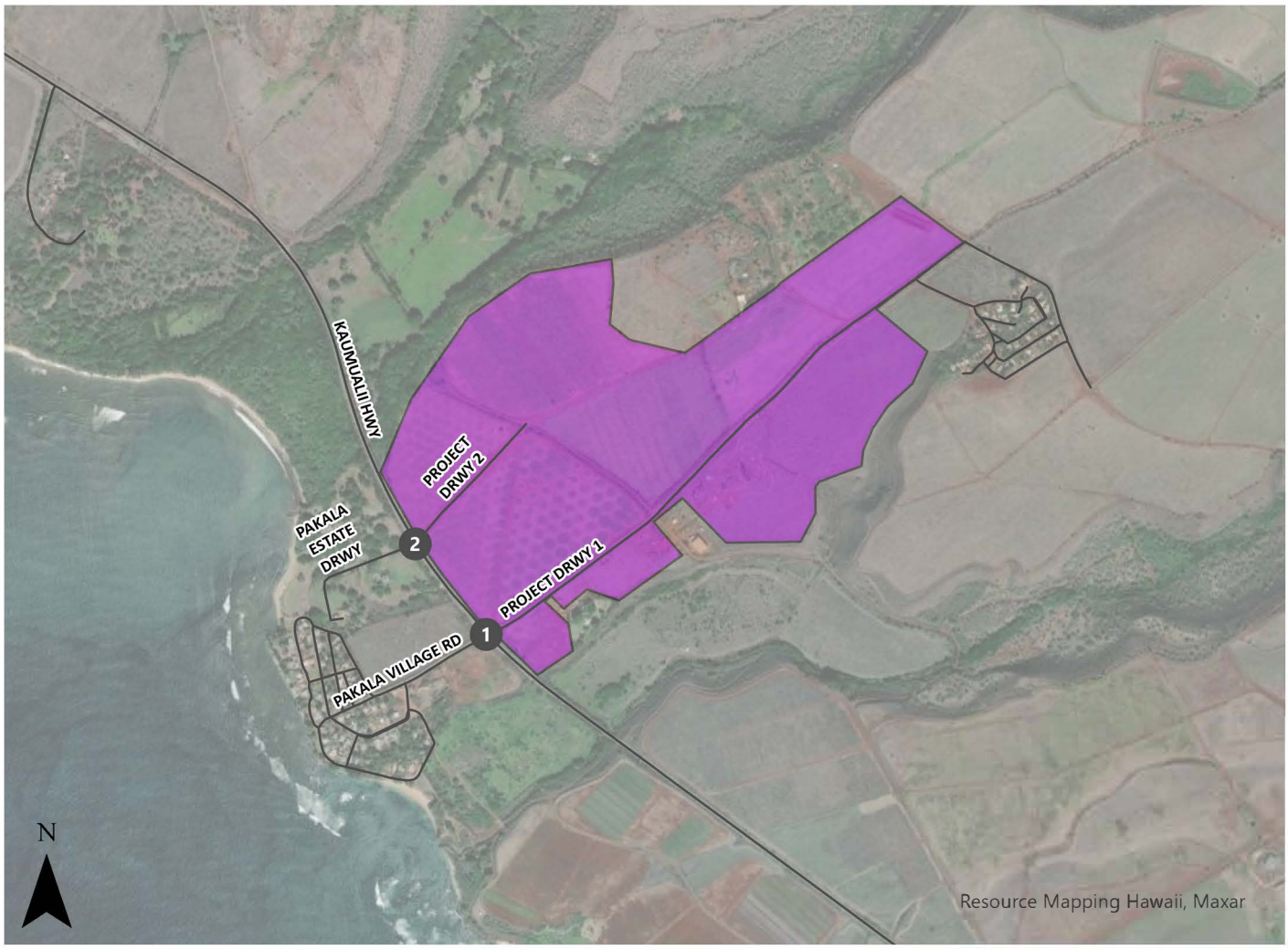
Notes:
1. Based on input from the project team, an Average Vehicle Occupancy (AVO) of 1.50 construction workers per vehicle is assumed.
2. Each worker is assumed to generate 2 trips per day (1 inbound and 1 outbound trip)
3. Based on input from the project team, construction starts at 7 am. The analysis assumes that 80% of the daily construction traffic arrives/departs during the peak hours (40% during each peak hour).
4. A Passenger Car Equivalent (PCE) factor of 2 was applied to convert the truck to passenger car equivalent.
5. Each truck is assumed to generate 2 trips per day (1 inbound and 1 outbound trip)
6. Based on input from the project team, truck traffic is distributed evenly throughout the day. The analysis conservatively assumes that two-thirds of the daily truck traffic arrives/departs during the peak hours (33% during each peak hour).

5.2 Trip Distribution and Assignment

The geographic distribution of construction traffic generated by the proposed project is dependent on the characteristics of the street system serving the project site, the level of accessibility of routes to and from the project site, and residential areas where construction workers would be commuting. Based on input from the project team, the majority of construction workers are anticipated to commute from Kapa'a, Līhu'e, Kekaha, and Waimea. Based on the County population distribution data for 2023, it was estimated that approximately 75% of construction worker vehicle trips would travel to/from the east and 25% of traffic traveling to/from the west (i.e., from Kekaha and Waimea). Additionally, based on input from the project team, all truck traffic is estimated to arrive from Nawiliwili Harbor located on the east side of the island. Therefore 100% of truck traffic was assigned to/from the east.

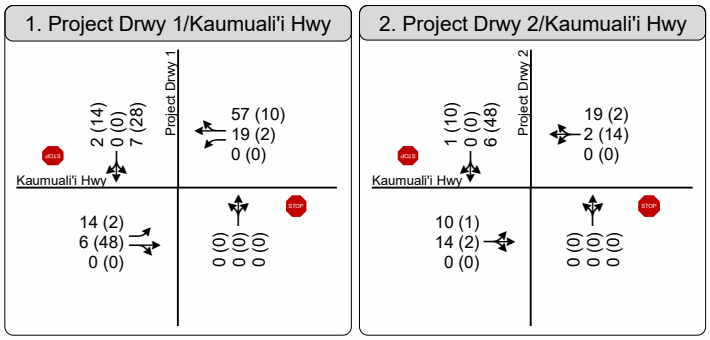
During the construction period, project-generated vehicles are expected to use one or both study intersections at varying levels. A sensitivity analysis was conducted to determine if traffic focused at one study intersection would result in any traffic operations issues. The results of this analysis showed that if more than 25% of exiting project traffic were to turn left from Project Driveway 1 (opposite Pakala Village Road) onto Kaumuali'i Highway in the PM peak hour, the project driveway approach would operate at an undesirable LOS (i.e., LOS E or F). While longer delays would occur if all exiting construction traffic were to turn left onto the highway from this driveway towards Hanapepe in the PM peak hour, the volume would not be high enough to satisfy the typical signal warrant. A comparable situation would occur at Project Driveway 2 if more than 50% of Hanapepe-bound traffic were to turn left onto the highway during the PM peak hour. Essentially, anything other than a 25%-50% split at Project Driveways 1 and 2, respectively, may result in an undesirable LOS during the highest construction activity level.

Using the estimated trip generation and the distribution patterns discussed above, the traffic generated by the proposed project was assigned to the individual turning movements at intersections within the street network. **Figure 5** details the project's trip assignment at the study intersection.



Study Intersections

Preliminary Project Site Development Area



LEGEND

AM (PM) Peak Hour Traffic Volumes

Lane Configuration

Figure 5

Peak Hour Traffic Volumes & Lane Configurations
Project Traffic Only

6. Baseline (2028) Plus Project Conditions

This section describes the analysis of the potential impacts of the proposed Project on the adjacent roadway system under Future Baseline Conditions in 2028. The Baseline (2028) Plus Project roadway network is the same network assumed under the Baseline No Project scenario. The analysis compares the project levels of service (LOS) at each study intersection with and without the addition of project-generated trips to determine potential impacts on the transportation network.

6.1 Active Transportation and Transit Impacts

Implementation of the construction phase of the project is not expected to conflict with any existing transit, pedestrian, or bicycle facilities, and it will not preclude the implementation of any other potential enhancements to walking, biking, or transit activity (e.g., a path or sidewalk along with a facility where it does not currently exist). All project-generated traffic would use existing turning movements at the study intersections, and no new conflicts with active transportation or transit users would occur. Accordingly, no significant active transportation or transit impacts are anticipated.

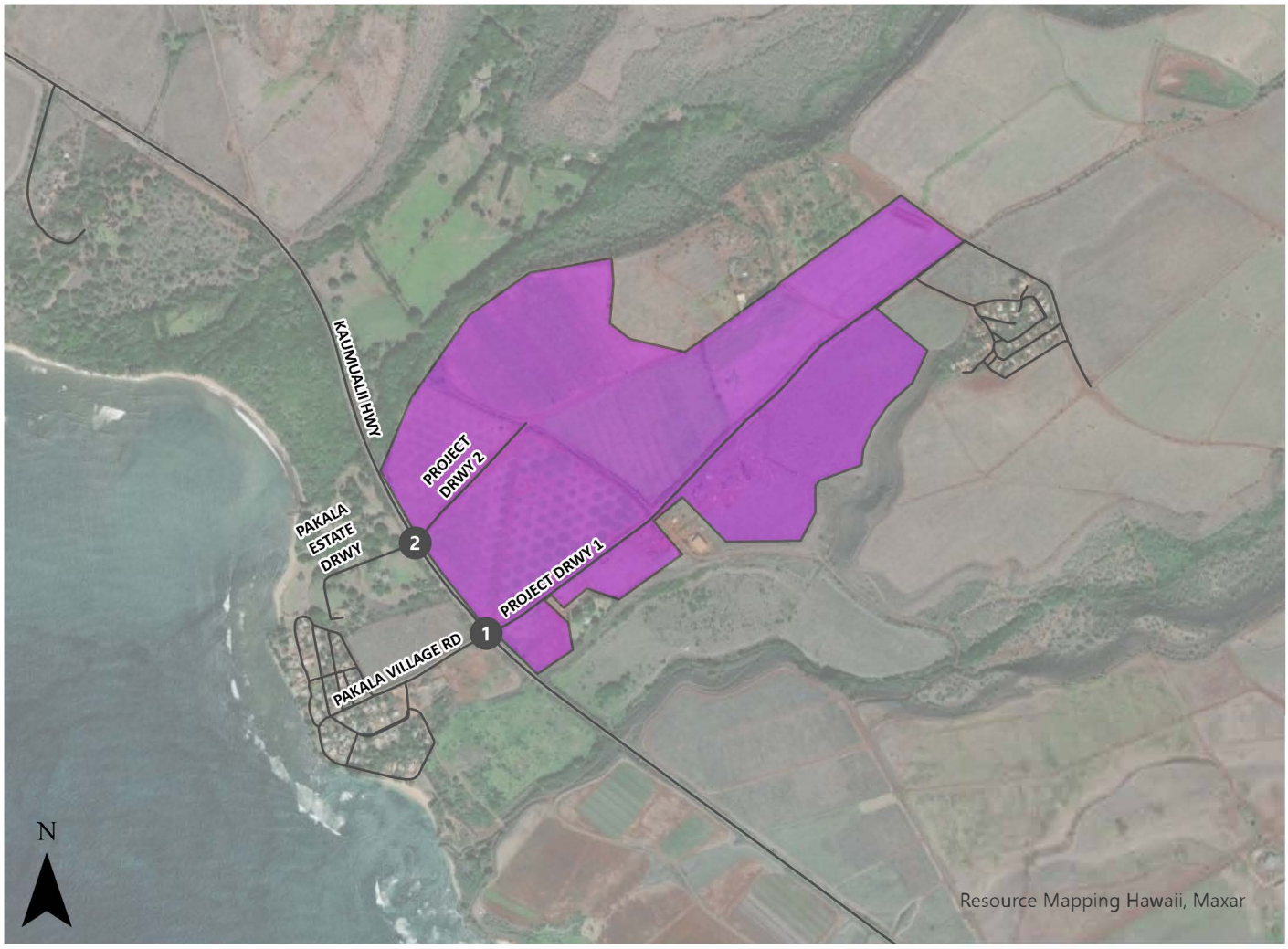
6.2 Baseline (2028) Plus Project Intersection Level of Service

Figure 6 presents the forecasted Baseline (2028) Plus Project AM and PM peak hour volumes. The peak hour volumes were used to analyze operations using the LOS methodology described in **Section 2.4**. The results of the LOS analysis are presented in **Table 6**. Detailed LOS results for intersection movements and corresponding LOS calculation sheets are included in **Appendix D**.

Table 6: Baseline (2028) Plus Project Intersection Level of Service

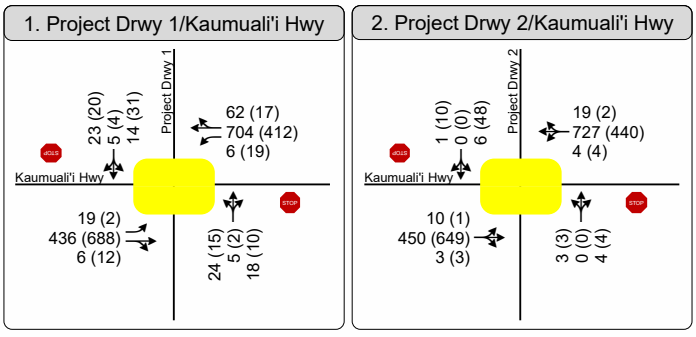
Study Intersection	Traffic Control	Peak Hour	Baseline (2028) Conditions		Baseline (2028) + Project Conditions		Δ in Delay (sec)
			Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	
1. Kaumualiʻi Highway & Pākalā Village Road/Project Driveway 1	SSSC [a]	AM	28.9	D	33.0	D	4.1
		PM	26.3	D	32.1	D	5.8
2. Kaumualiʻi Highway & Pākalā Plantation Estate Driveway/Project Driveway 2	SSSC	AM	19.7	C	31.6	D	11.9
		PM	19.4	C	34.7	D	15.3

a. Side-Street Stop-Controlled



Study Intersections

Preliminary Project Site Development Area



LEGEND

AM (PM) Peak Hour Traffic Volumes

Lane Configuration

AM / PM | A-C | D | E | F — Level of Service (LOS)

Figure 6

Peak Hour Traffic Volumes & Lane Configurations
Future Baseline (2028) + Project Conditions

Based on the results in **Table 6** the study intersections are calculated to continue operating at a desirable operating LOS D with the addition of the proposed project based on the assumptions described in **Section 5.1**. While the delays are close to the LOS D/E threshold of 35 seconds, According to **Table 6**, the implementation of the construction phase of the project site is not expected to result in any significant impacts on the roadway network during the construction phase.

6.3 Other Potential Traffic Operations Issues

It should be noted that the analysis in **Table 6** assumes the distribution of project trips noted in Section 5.2 where 25% of PM peak hour traffic will exit to turn left onto the highway from Project Driveway 1 and 50% during this hour will turn left onto the highway from Project Driveway 2. This distribution can be managed by providing separate construction worker parking areas connected to each driveway.

If this distribution varies by more than several percent, it will result in a higher calculated delay for the critical movement at the intersection with a higher proportion of traffic. This would technically result in operations at an undesirable operating level (i.e., LOS E or F). However, the signal warrant would not be met in this case since the driveway approach volumes would not meet the minimum volume threshold; as a result, a *significant* traffic impact would not be identified.

Even without a significant impact, it is possible that construction worker vehicles at one of the driveways could experience lengthy delays during the PM peak hour if site logistics prevent the desired distribution of traffic. When side street delays become excessive from a driver's perspective, drivers may use poor judgment in determining appropriate gaps in traffic to make a turn. Should lengthy delays be anticipated or occur, the project sponsor should implement manual traffic control to manage side street delays or provide off-site parking and shuttle service to reduce overall traffic demand at the site. Regardless of driveway distribution, appropriate signage should be installed on the highway indicating construction activities, the presence of heavy vehicles, etc.



7. Site Access, Circulation, and Parking Assessment

7.1 Site Access Assessment

As outlined in the project description, primary access to the project site is proposed via two (2) existing driveways opposite the access roadways serving Pākalā Village and Pākalā Plantation Estate. All traffic exiting toward eastbound Kaumualiʻi Highway from the project site must stop before crossing the intersection toward eastbound.

Project driveways should be maintained clear at all times to provide adequate sight distance and allow vehicles to exit and enter the roadway without substantially impacting traffic on the highway. Additionally, temporary signage is recommended to be installed before project driveways in both directions, notifying the through highway traffic of the vehicles entering and exiting each driveway.

Overall, the proposed site access is considered adequate, and no additional access points are recommended.

7.2 On-Site Circulation & Parking

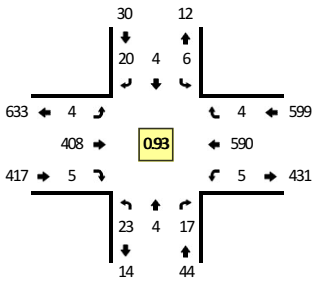
During the construction phase, on-site circulation will be facilitated by dirt roads within the project site. Additionally, all construction traffic and trucks will be required to park on-site to prevent disruptions to traffic along Kaumualiʻi Highway. Based on input from the project team, once the project is operational, negligible traffic is expected, primarily from maintenance crews. On-site parking is recommended to be provided to accommodate these vehicles as needed.

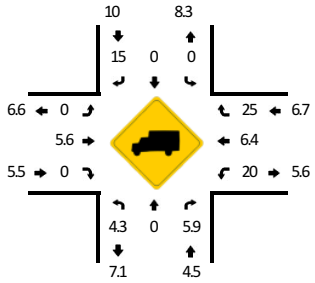
Appendix A: Intersection and Segment Counts

Type of peak hour being reported: Intersection Peak | Method for determining peak hour: Total Entering Volume

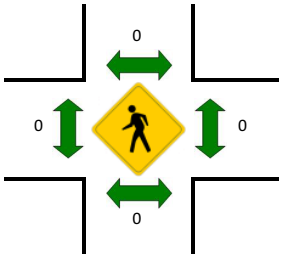
LOCATION: Pakala Village Rd -- Kaumualii Hwy | **QC JOB #:** 16547703
CITY/STATE: Pakala Village, HI | **DATE:** Thu, Apr 18 2024

Peak-Hour: 7:00 AM -- 8:00 AM
Peak 15-Min: 7:30 AM -- 7:45 AM

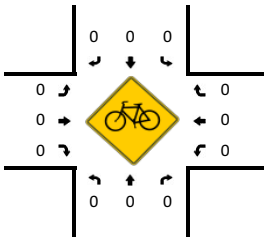


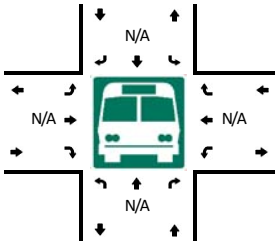




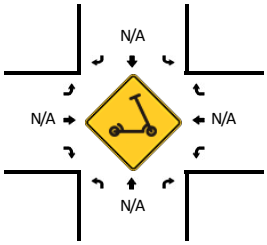












15-Min Count Period Beginning At	Pakala Village Rd (Northbound)				Pakala Village Rd (Southbound)				Kaumualii Hwy (Eastbound)				Kaumualii Hwy (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	7	2	6	0	1	3	2	0	0	78	0	0	2	139	1	0	241	
7:15 AM	9	1	6	0	3	0	1	0	1	102	0	0	0	165	1	0	289	
7:30 AM	2	1	2	0	2	0	16	0	1	113	4	0	2	148	2	0	293	
7:45 AM	5	0	3	0	0	1	1	0	2	115	1	0	1	138	0	0	267	1090
8:00 AM	0	0	3	0	0	0	0	0	0	86	2	0	3	133	3	0	230	1079
8:15 AM	2	0	1	0	1	0	2	0	0	92	3	0	3	133	0	0	237	1027
8:30 AM	1	0	4	0	0	0	0	0	0	99	1	0	3	97	2	0	207	941
8:45 AM	4	0	2	0	4	1	1	0	2	76	1	0	4	74	1	0	170	844

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	8	4	8	0	8	0	64	0	4	452	16	0	8	592	8	0	1172
Heavy Trucks	0	0	0		0	0	12		0	40	0		0	24	4		80
Buses																	
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Scooters																	

Comments:

Report generated on 4/26/2024 11:57 AM | SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

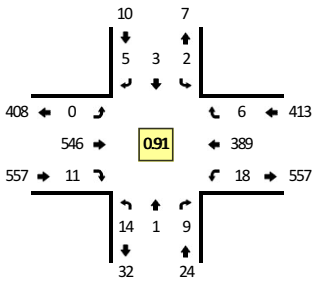
Type of peak hour being reported: Intersection Peak

Method for determining peak hour: Total Entering Volume

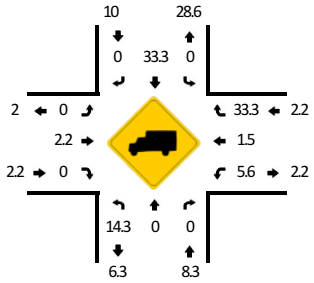
LOCATION: Pakala Village Rd -- Kaumualii Hwy
CITY/STATE: Pakala Village, HI

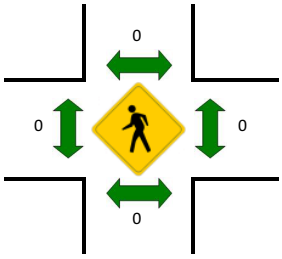
QC JOB #: 16547704
DATE: Thu, Apr 18 2024

Peak-Hour: 4:00 PM -- 5:00 PM
Peak 15-Min: 4:15 PM -- 4:30 PM

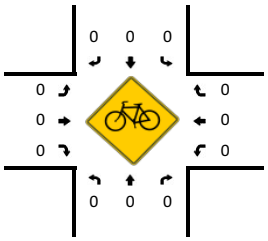


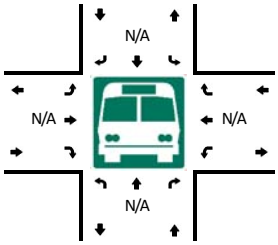




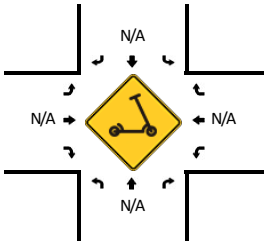












15-Min Count Period Beginning At	Pakala Village Rd (Northbound)				Pakala Village Rd (Southbound)				Kaumualii Hwy (Eastbound)				Kaumualii Hwy (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	4	1	2	0	0	0	0	0	0	156	3	0	5	95	4	0	270	
4:15 PM	4	0	1	0	2	0	2	0	0	143	6	0	3	114	1	0	276	
4:30 PM	3	0	1	0	0	2	2	0	0	100	1	0	5	82	0	0	196	
4:45 PM	3	0	5	0	0	1	1	0	0	147	1	0	5	98	1	0	262	1004
5:00 PM	2	0	3	0	2	0	0	0	1	106	3	0	8	82	0	0	207	941
5:15 PM	4	0	4	0	1	0	0	0	2	93	0	0	2	76	1	0	183	848
5:30 PM	1	0	2	0	0	0	0	0	1	69	2	0	4	82	1	0	162	814
5:45 PM	3	0	1	0	2	0	1	0	0	63	1	0	4	87	2	0	164	716

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	16	0	4	0	8	0	8	0	0	572	24	0	12	456	4	0	1104
Heavy Trucks	0	0	0		0	0	0		0	8	0		0	4	0		12
Buses																	
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Scooters																	

Comments:

Report generated on 4/26/2024 11:57 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of report: Tube Count - Volume Data

LOCATION: Kaumualii Highway 5,000 ft east of Kaumualii Hwy - Menehune intersection
QC JOB #: 16547707
SPECIFIC LOCATION:
DIRECTION: EB, WB
CITY/STATE: Kaumakani, HI
DATE: Apr 18 2024 - Apr 20 2024

Start Time	Mon	Tue	Wed	Thu 18 Apr 24	Fri 19 Apr 24	Average Weekday Hourly Traffic	Sat 20 Apr 24	Sun	Average Week Hourly Traffic	Average Week Profile
12:00 AM				42	35	39	80		52	
01:00 AM				27	30	29	46		34	
02:00 AM				25	33	29	46		35	
03:00 AM				28	32	30	49		36	
04:00 AM				81	88	85	74		81	
05:00 AM				325	313	319	157		265	
06:00 AM				831	779	805	338		649	
07:00 AM				**1030**	**1006**	**1018**	469		**835**	
08:00 AM				815	794	805	616		742	
09:00 AM				620	663	642	727		670	
10:00 AM				614	768	691	748		710	
11:00 AM				703	788	746	**887**		793	
12:00 PM				760	779	770	784		774	
01:00 PM				798	857	828	**813**		823	
02:00 PM				947	**1027**	**987**	722		899	
03:00 PM				911	997	954	801		**903**	
04:00 PM				**948**	942	945	730		873	
05:00 PM				679	797	738	770		749	
06:00 PM				591	745	668	697		678	
07:00 PM				424	610	517	562		532	
08:00 PM				291	466	379	461		406	
09:00 PM				195	416	306	383		331	
10:00 PM				158	302	230	326		262	
11:00 PM				98	146	122	203		149	
Day Total				11941	13413	12682	11489		12281	
% Weekday Average				94.2%	105.8%					
% Week Average				97.2%	109.2%	103.3%	93.6%			
AM Peak Volume				7:00 AM 1030	7:00 AM 1006	7:00 AM 1018	11:00 AM 887		7:00 AM 835	
PM Peak Volume				4:00 PM 948	2:00 PM 1027	2:00 PM 987	1:00 PM 813		3:00 PM 903	

Comments:

Report generated on 4/25/2024 8:57 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Appendix B: Existing (2024) Conditions Intersection Analysis Worksheets

Intersection	
Int Delay, s/veh	1.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	4	408	5	5	590	4	23	4	17	6	4	20
Future Vol, veh/h	4	408	5	5	590	4	23	4	17	6	4	20
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	230	-	-	240	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	2	7	2	7	7	7	7	2	7	2	2	7
Mvmt Flow	4	439	5	5	634	4	25	4	18	6	4	22

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	639	0	0	444	0	0	1097	1099	441	1097	1100	637
Stage 1	-	-	-	-	-	-	450	450	-	647	647	-
Stage 2	-	-	-	-	-	-	647	649	-	449	453	-
Critical Hdwy	4.12	-	-	4.17	-	-	7.17	6.52	6.27	7.12	6.52	6.27
Critical Hdwy Stg 1	-	-	-	-	-	-	6.17	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.17	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.263	-	-	3.563	4.018	3.363	3.518	4.018	3.363
Pot Cap-1 Maneuver	945	-	-	1090	-	-	186	212	606	191	212	469
Stage 1	-	-	-	-	-	-	579	572	-	459	466	-
Stage 2	-	-	-	-	-	-	451	465	-	589	570	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	945	-	-	1090	-	-	172	210	606	179	210	469
Mov Cap-2 Maneuver	-	-	-	-	-	-	172	210	-	179	210	-
Stage 1	-	-	-	-	-	-	576	569	-	457	464	-
Stage 2	-	-	-	-	-	-	424	463	-	564	567	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	0.08	0.07	23.29	17.72
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	244	945	-	-	1090	-	-	315
HCM Lane V/C Ratio	0.194	0.005	-	-	0.005	-	-	0.102
HCM Control Delay (s/veh)	23.3	8.8	-	-	8.3	-	-	17.7
HCM Lane LOS	C	A	-	-	A	-	-	C
HCM 95th %tile Q(veh)	0.7	0	-	-	0	-	-	0.3

Intersection	
Int Delay, s/veh	0.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	0	414	2	3	630	0	2	0	3	0	0	0
Future Vol, veh/h	0	414	2	3	630	0	2	0	3	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	450	2	3	685	0	2	0	3	0	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	685	0	0	452	0	0	1142	1142	451	1141	1143	685
Stage 1	-	-	-	-	-	-	451	451	-	691	691	-
Stage 2	-	-	-	-	-	-	691	691	-	450	452	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	909	-	-	1108	-	-	177	200	608	178	200	448
Stage 1	-	-	-	-	-	-	588	571	-	435	445	-
Stage 2	-	-	-	-	-	-	435	445	-	589	570	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	909	-	-	1108	-	-	177	199	608	176	199	448
Mov Cap-2 Maneuver	-	-	-	-	-	-	177	199	-	176	199	-
Stage 1	-	-	-	-	-	-	588	571	-	433	443	-
Stage 2	-	-	-	-	-	-	433	443	-	585	570	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	0	0.04	16.92	0
HCM LOS			C	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	307	909	-	-	9	-	-	-
HCM Lane V/C Ratio	0.018	-	-	-	0.003	-	-	-
HCM Control Delay (s/veh)	16.9	0	-	-	8.3	0	-	0
HCM Lane LOS	C	A	-	-	A	A	-	A
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-	-	-

Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	546	11	18	389	6	14	1	9	2	3	5
Future Vol, veh/h	0	546	11	18	389	6	14	1	9	2	3	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	230	-	-	240	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	91	91	91	91	91	91	91	91	91	91	91	91
Heavy Vehicles, %	2	7	2	7	7	7	7	2	7	2	2	7
Mvmt Flow	0	600	12	20	427	7	15	1	10	2	3	5

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	434	0	0	612	0	0	1075	1080	606	1071	1082	431
Stage 1	-	-	-	-	-	-	606	606	-	470	470	-
Stage 2	-	-	-	-	-	-	469	474	-	601	612	-
Critical Hdwy	4.12	-	-	4.17	-	-	7.17	6.52	6.27	7.12	6.52	6.27
Critical Hdwy Stg 1	-	-	-	-	-	-	6.17	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.17	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.263	-	-	3.563	4.018	3.363	3.518	4.018	3.363
Pot Cap-1 Maneuver	1126	-	-	943	-	-	193	218	488	199	217	614
Stage 1	-	-	-	-	-	-	475	487	-	574	560	-
Stage 2	-	-	-	-	-	-	566	558	-	487	484	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1126	-	-	943	-	-	184	214	488	189	213	614
Mov Cap-2 Maneuver	-	-	-	-	-	-	184	214	-	189	213	-
Stage 1	-	-	-	-	-	-	475	487	-	562	548	-
Stage 2	-	-	-	-	-	-	545	546	-	476	484	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	0	0.39	21.66	17.25
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	242	1126	-	-	943	-	-	305
HCM Lane V/C Ratio	0.109	-	-	-	0.021	-	-	0.036
HCM Control Delay (s/veh)	21.7	0	-	-	8.9	-	-	17.2
HCM Lane LOS	C	A	-	-	A	-	-	C
HCM 95th %tile Q(veh)	0.4	0	-	-	0.1	-	-	0.1

Intersection	
Int Delay, s/veh	0.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	0	554	2	3	405	0	2	0	3	0	0	0
Future Vol, veh/h	0	554	2	3	405	0	2	0	3	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	602	2	3	440	0	2	0	3	0	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	440	0	0	604	0	0	1050	1050	603	1049	1051	440
Stage 1	-	-	-	-	-	-	603	603	-	447	447	-
Stage 2	-	-	-	-	-	-	447	447	-	602	604	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1120	-	-	973	-	-	205	227	499	205	227	617
Stage 1	-	-	-	-	-	-	486	488	-	591	574	-
Stage 2	-	-	-	-	-	-	591	574	-	486	488	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1120	-	-	973	-	-	204	226	499	203	226	617
Mov Cap-2 Maneuver	-	-	-	-	-	-	204	226	-	203	226	-
Stage 1	-	-	-	-	-	-	486	488	-	588	571	-
Stage 2	-	-	-	-	-	-	588	571	-	483	488	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	0	0.06	16.58	0
HCM LOS			C	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	316	1120	-	-	13	-	-	-
HCM Lane V/C Ratio	0.017	-	-	-	0.003	-	-	-
HCM Control Delay (s/veh)	16.6	0	-	-	8.7	0	-	0
HCM Lane LOS	C	A	-	-	A	A	-	A
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-	-	-

Appendix C: Baseline (2028) Conditions Intersection Analysis Worksheets

Intersection	
Int Delay, s/veh	1.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	430	6	6	685	5	24	5	18	7	5	21
Future Vol, veh/h	5	430	6	6	685	5	24	5	18	7	5	21
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	230	-	-	240	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	2	7	2	7	7	7	7	2	7	2	2	7
Mvmt Flow	5	462	6	6	737	5	26	5	19	8	5	23

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	742	0	0	469	0	0	1228	1231	466	1228	1232	739
Stage 1	-	-	-	-	-	-	476	476	-	752	752	-
Stage 2	-	-	-	-	-	-	752	755	-	476	480	-
Critical Hdwy	4.12	-	-	4.17	-	-	7.17	6.52	6.27	7.12	6.52	6.27
Critical Hdwy Stg 1	-	-	-	-	-	-	6.17	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.17	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.263	-	-	3.563	4.018	3.363	3.518	4.018	3.363
Pot Cap-1 Maneuver	865	-	-	1067	-	-	151	177	587	155	177	409
Stage 1	-	-	-	-	-	-	560	556	-	402	418	-
Stage 2	-	-	-	-	-	-	395	417	-	570	555	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	865	-	-	1067	-	-	137	175	587	143	175	409
Mov Cap-2 Maneuver	-	-	-	-	-	-	137	175	-	143	175	-
Stage 1	-	-	-	-	-	-	557	553	-	400	415	-
Stage 2	-	-	-	-	-	-	366	414	-	542	551	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	0.1	0.07	28.94	21.28
HCM LOS			D	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	200	865	-	-	1067	-	-	256
HCM Lane V/C Ratio	0.252	0.006	-	-	0.006	-	-	0.138
HCM Control Delay (s/veh)	28.9	9.2	-	-	8.4	-	-	21.3
HCM Lane LOS	D	A	-	-	A	-	-	C
HCM 95th %tile Q(veh)	1	0	-	-	0	-	-	0.5

Intersection	
Int Delay, s/veh	0.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	0	436	3	4	726	0	3	0	4	0	0	0
Future Vol, veh/h	0	436	3	4	726	0	3	0	4	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	474	3	4	789	0	3	0	4	0	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	789	0	0	477	0	0	1273	1273	476	1272	1275	789
Stage 1	-	-	-	-	-	-	476	476	-	798	798	-
Stage 2	-	-	-	-	-	-	798	798	-	474	477	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	831	-	-	1085	-	-	144	167	589	145	167	391
Stage 1	-	-	-	-	-	-	570	557	-	380	398	-
Stage 2	-	-	-	-	-	-	380	398	-	571	556	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	831	-	-	1085	-	-	143	166	589	142	166	391
Mov Cap-2 Maneuver	-	-	-	-	-	-	143	166	-	142	166	-
Stage 1	-	-	-	-	-	-	570	557	-	377	395	-
Stage 2	-	-	-	-	-	-	377	395	-	567	556	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	0	0.05	19.71	0
HCM LOS			C	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	252	831	-	-	10	-	-	-
HCM Lane V/C Ratio	0.03	-	-	-	0.004	-	-	-
HCM Control Delay (s/veh)	19.7	0	-	-	8.3	0	-	0
HCM Lane LOS	C	A	-	-	A	A	-	A
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-	-	-

Intersection	
Int Delay, s/veh	1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	640	12	19	410	7	15	2	10	3	4	6
Future Vol, veh/h	0	640	12	19	410	7	15	2	10	3	4	6
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	230	-	-	240	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	91	91	91	91	91	91	91	91	91	91	91	91
Heavy Vehicles, %	2	7	2	7	7	7	7	2	7	2	2	7
Mvmt Flow	0	703	13	21	451	8	16	2	11	3	4	7

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	458	0	0	716	0	0	1204	1210	710	1201	1213	454
Stage 1	-	-	-	-	-	-	710	710	-	496	496	-
Stage 2	-	-	-	-	-	-	495	500	-	704	716	-
Critical Hdwy	4.12	-	-	4.17	-	-	7.17	6.52	6.27	7.12	6.52	6.27
Critical Hdwy Stg 1	-	-	-	-	-	-	6.17	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.17	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.263	-	-	3.563	4.018	3.363	3.518	4.018	3.363
Pot Cap-1 Maneuver	1103	-	-	862	-	-	157	183	425	162	182	595
Stage 1	-	-	-	-	-	-	417	437	-	556	545	-
Stage 2	-	-	-	-	-	-	547	543	-	427	434	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1103	-	-	862	-	-	148	178	425	152	177	595
Mov Cap-2 Maneuver	-	-	-	-	-	-	148	178	-	152	177	-
Stage 1	-	-	-	-	-	-	417	437	-	542	532	-
Stage 2	-	-	-	-	-	-	524	530	-	414	434	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	0	0.4	26.32	20.38
HCM LOS			D	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	198	1103	-	-	862	-	-	248
HCM Lane V/C Ratio	0.15	-	-	-	0.024	-	-	0.058
HCM Control Delay (s/veh)	26.3	0	-	-	9.3	-	-	20.4
HCM Lane LOS	D	A	-	-	A	-	-	C
HCM 95th %tile Q(veh)	0.5	0	-	-	0.1	-	-	0.2

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	0	648	3	4	427	0	3	0	4	0	0	0
Future Vol, veh/h	0	648	3	4	427	0	3	0	4	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	704	3	4	464	0	3	0	4	0	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	464	0	0	708	0	0	1179	1179	706	1177	1180	464
Stage 1	-	-	-	-	-	-	706	706	-	473	473	-
Stage 2	-	-	-	-	-	-	473	473	-	704	708	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1097	-	-	891	-	-	167	191	436	168	190	598
Stage 1	-	-	-	-	-	-	427	439	-	572	558	-
Stage 2	-	-	-	-	-	-	572	558	-	427	438	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1097	-	-	891	-	-	166	189	436	165	189	598
Mov Cap-2 Maneuver	-	-	-	-	-	-	166	189	-	165	189	-
Stage 1	-	-	-	-	-	-	427	439	-	568	555	-
Stage 2	-	-	-	-	-	-	568	555	-	423	438	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	0	0.08	19.42	0
HCM LOS			C	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	257	1097	-	-	17	-	-	-
HCM Lane V/C Ratio	0.03	-	-	-	0.005	-	-	-
HCM Control Delay (s/veh)	19.4	0	-	-	9.1	0	-	0
HCM Lane LOS	C	A	-	-	A	A	-	A
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-	-	-

Appendix D: Baseline (2028) Plus Project Conditions Intersection Analysis Worksheets

Intersection	
Int Delay, s/veh	2.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	19	436	6	6	704	62	24	5	18	14	5	23
Future Vol, veh/h	19	436	6	6	704	62	24	5	18	14	5	23
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	230	-	-	240	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	2	7	2	7	7	7	7	2	7	2	2	7
Mvmt Flow	20	469	6	6	757	67	26	5	19	15	5	25

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	824	0	0	475	0	0	1285	1349	472	1316	1319	790
Stage 1	-	-	-	-	-	-	513	513	-	803	803	-
Stage 2	-	-	-	-	-	-	773	837	-	512	516	-
Critical Hdwy	4.12	-	-	4.17	-	-	7.17	6.52	6.27	7.12	6.52	6.27
Critical Hdwy Stg 1	-	-	-	-	-	-	6.17	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.17	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.263	-	-	3.563	4.018	3.363	3.518	4.018	3.363
Pot Cap-1 Maneuver	806	-	-	1061	-	-	138	151	582	135	157	382
Stage 1	-	-	-	-	-	-	535	536	-	377	396	-
Stage 2	-	-	-	-	-	-	385	382	-	544	534	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	806	-	-	1061	-	-	121	146	582	122	152	382
Mov Cap-2 Maneuver	-	-	-	-	-	-	121	146	-	122	152	-
Stage 1	-	-	-	-	-	-	521	522	-	375	394	-
Stage 2	-	-	-	-	-	-	353	380	-	508	521	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	0.39	0.07	33.04	27.9
HCM LOS			D	D

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	178	806	-	-	1061	-	-	202
HCM Lane V/C Ratio	0.284	0.025	-	-	0.006	-	-	0.224
HCM Control Delay (s/veh)	33	9.6	-	-	8.4	-	-	27.9
HCM Lane LOS	D	A	-	-	A	-	-	D
HCM 95th %tile Q(veh)	1.1	0.1	-	-	0	-	-	0.8

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	10	450	3	4	727	19	3	0	4	6	0	1
Future Vol, veh/h	10	450	3	4	727	19	3	0	4	6	0	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	11	489	3	4	790	21	3	0	4	7	0	1

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	811	0	0	492	0	0	1311	1332	491	1320	1323	801
Stage 1	-	-	-	-	-	-	513	513	-	809	809	-
Stage 2	-	-	-	-	-	-	799	820	-	511	514	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	815	-	-	1071	-	-	136	154	578	134	156	385
Stage 1	-	-	-	-	-	-	544	536	-	374	393	-
Stage 2	-	-	-	-	-	-	379	389	-	545	535	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	815	-	-	1071	-	-	132	150	578	129	152	385
Mov Cap-2 Maneuver	-	-	-	-	-	-	132	150	-	129	152	-
Stage 1	-	-	-	-	-	-	534	526	-	371	391	-
Stage 2	-	-	-	-	-	-	375	386	-	531	525	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	0.2	0.04	20.77	31.59
HCM LOS			C	D

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	236	39	-	-	10	-	-	143
HCM Lane V/C Ratio	0.032	0.013	-	-	0.004	-	-	0.053
HCM Control Delay (s/veh)	20.8	9.5	0	-	8.4	0	-	31.6
HCM Lane LOS	C	A	A	-	A	A	-	D
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-	-	0.2

Intersection	
Int Delay, s/veh	2.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	2	688	12	19	412	17	15	2	10	31	4	20
Future Vol, veh/h	2	688	12	19	412	17	15	2	10	31	4	20
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	230	-	-	240	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	91	91	91	91	91	91	91	91	91	91	91	91
Heavy Vehicles, %	2	7	2	7	7	7	7	2	7	2	2	7
Mvmt Flow	2	756	13	21	453	19	16	2	11	34	4	22

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	471	0	0	769	0	0	1264	1280	763	1265	1277	462
Stage 1	-	-	-	-	-	-	767	767	-	504	504	-
Stage 2	-	-	-	-	-	-	497	513	-	762	774	-
Critical Hdwy	4.12	-	-	4.17	-	-	7.17	6.52	6.27	7.12	6.52	6.27
Critical Hdwy Stg 1	-	-	-	-	-	-	6.17	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.17	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.263	-	-	3.563	4.018	3.363	3.518	4.018	3.363
Pot Cap-1 Maneuver	1090	-	-	823	-	-	143	166	397	146	166	589
Stage 1	-	-	-	-	-	-	387	411	-	550	541	-
Stage 2	-	-	-	-	-	-	546	536	-	398	409	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1090	-	-	823	-	-	130	161	397	136	162	589
Mov Cap-2 Maneuver	-	-	-	-	-	-	130	161	-	136	162	-
Stage 1	-	-	-	-	-	-	387	411	-	536	527	-
Stage 2	-	-	-	-	-	-	508	522	-	384	408	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	0.02	0.4	29.43	32.1
HCM LOS			D	D

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	177	1090	-	-	823	-	-	192
HCM Lane V/C Ratio	0.168	0.002	-	-	0.025	-	-	0.315
HCM Control Delay (s/veh)	29.4	8.3	-	-	9.5	-	-	32.1
HCM Lane LOS	D	A	-	-	A	-	-	D
HCM 95th %tile Q(veh)	0.6	0	-	-	0.1	-	-	1.3

Intersection	
Int Delay, s/veh	1.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	1	649	3	4	440	2	3	0	4	48	0	10
Future Vol, veh/h	1	649	3	4	440	2	3	0	4	48	0	10
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	1	705	3	4	478	2	3	0	4	52	0	11

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	480	0	0	709	0	0	1196	1198	707	1196	1199	479
Stage 1	-	-	-	-	-	-	709	709	-	488	488	-
Stage 2	-	-	-	-	-	-	487	489	-	708	711	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1082	-	-	890	-	-	163	185	435	163	185	586
Stage 1	-	-	-	-	-	-	425	437	-	561	550	-
Stage 2	-	-	-	-	-	-	562	549	-	426	436	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1082	-	-	890	-	-	159	184	435	160	184	586
Mov Cap-2 Maneuver	-	-	-	-	-	-	159	184	-	160	184	-
Stage 1	-	-	-	-	-	-	424	436	-	557	546	-
Stage 2	-	-	-	-	-	-	548	546	-	421	436	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	0.01	0.08	19.91	34.67
HCM LOS			C	D

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	249	3	-	-	16	-	-	183
HCM Lane V/C Ratio	0.031	0.001	-	-	0.005	-	-	0.344
HCM Control Delay (s/veh)	19.9	8.3	0	-	9.1	0	-	34.7
HCM Lane LOS	C	A	A	-	A	A	-	D
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-	-	1.4

Exhibit U

View Study

+ Storage

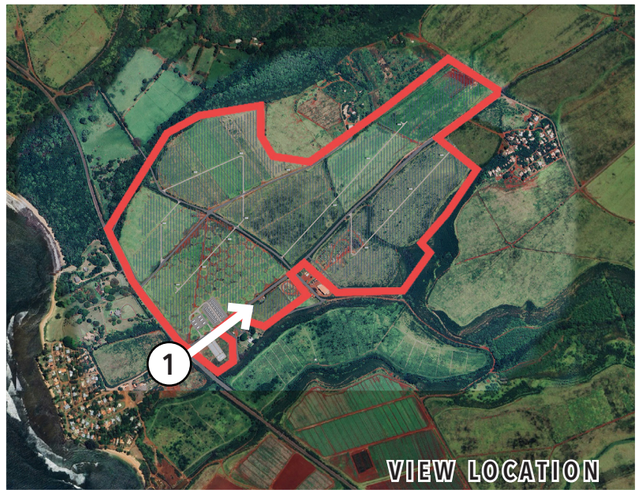
KAAWANUI SOLAR

Visual Simulations

September 23, 2025

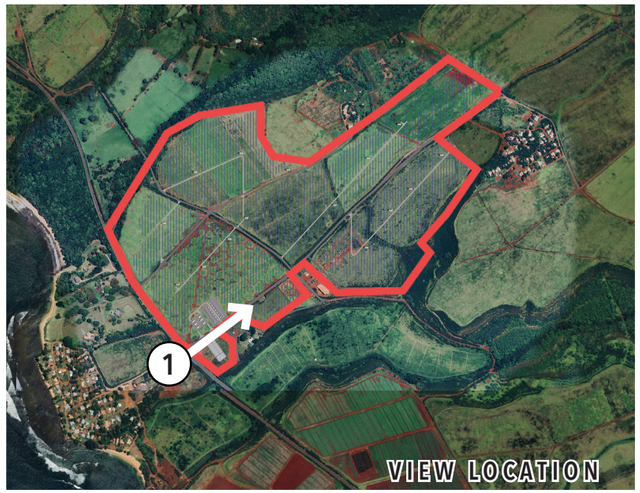

8
Waimea
7
Kaumualiʻi Highway
3
5
Kaawanui
Village
Project Site
4
1
9
2
Pākalā
Village
Kaumualiʻi Highway
6
Hanapēpē
Heights


Kaumualiʻi Highway
Kaawanui Village
Battery Energy Storage System
AES Hawai'i Substation
Project Entry
Pākalā Village
Operations and Maintenance Shed
Kaawanui Substation
Makaweli Post Station


1
VIEW LOCATION

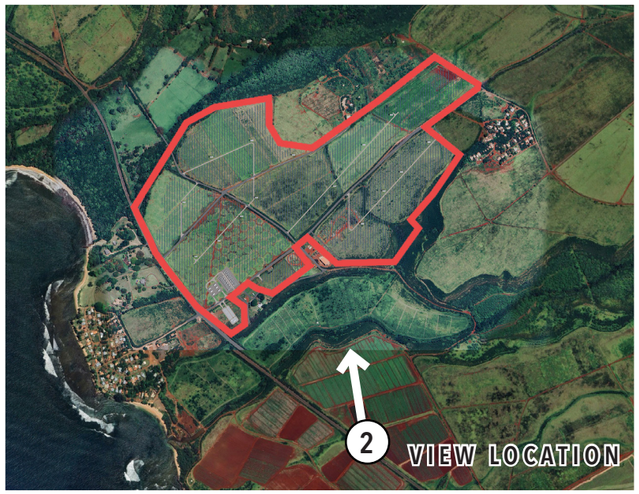

STOP
BEFORE

STOP
Project elements blocked
from view in this location


1
VIEW LOCATION

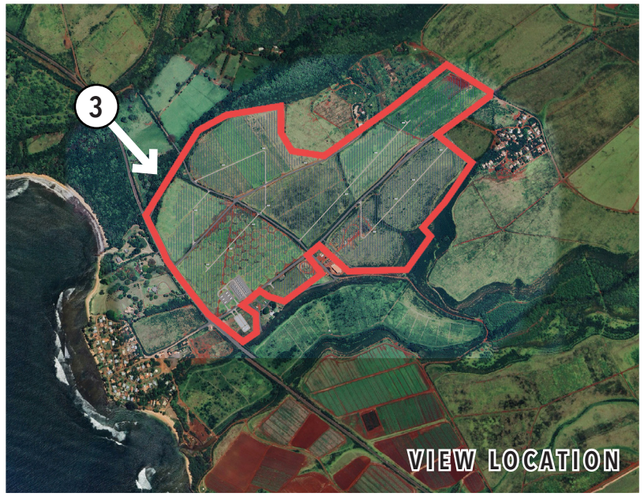

STOP
BEFORE


STOP
Project elements blocked
from view in this location


2
VIEW LOCATION


BEFORE

Project elements blocked
from view in this location





Project elements blocked from view in this location


4
VIEW LOCATION

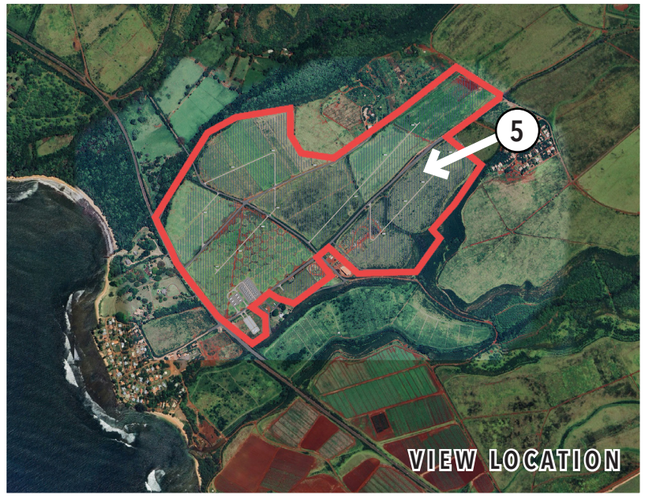

BEFORE


MILE
2
1


4
VIEW LOCATION

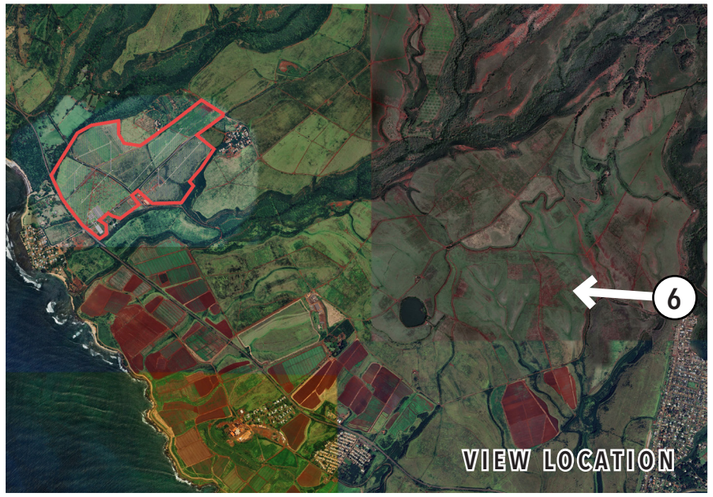

BEFORE

MILE
21





Project elements blocked from view in this location


6
VIEW LOCATION

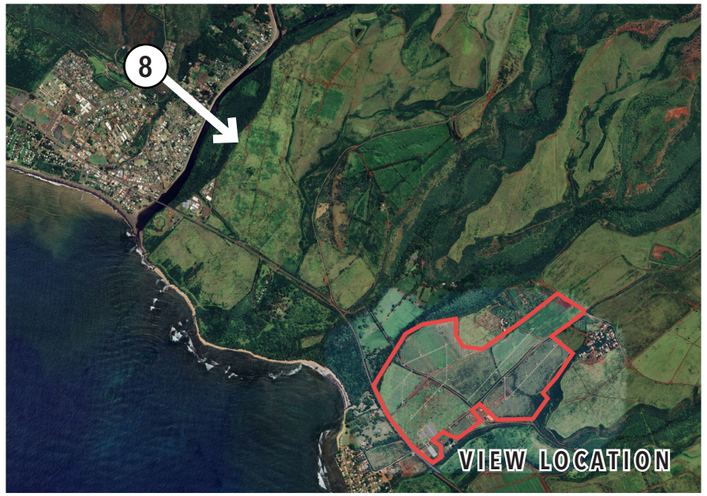

BEFORE


Project elements blocked
from view in this location


7
VIEW LOCATION


BEFORE


Project elements blocked
from view in this location


8
VIEW LOCATION


BEFORE




9
VIEW LOCATION


SPEED LIMIT 45
BEFORE

SPEED LIMIT 45


9
VIEW LOCATION


SPEED LIMIT 45
BEFORE

Exhibit V

Glare Analysis

Kaawanui Solar Project Glare Hazard Analysis
Kauai, Hawaii

September 30, 2025

Prepared for:

Kaawanui Solar, LLC

Prepared by:

Stantec Consulting Services Inc.
6920 Professional Parkway
Sarasota, FL 34240

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Appendix A: ForgeSolar Reports



Executive Summary

Stantec Consulting Services Inc. (Stantec) utilized the web-based ForgeSolar glare hazard analysis program to analyze the potential for glare from the proposed Kaawanui Solar Project (Project), a utility-scale solar-powered electric generation facility located on the island of Kauai, Hawaii, and depicted in **Figure 1**. The Project will include photovoltaic (PV) solar panels mounted as a single axis rotation system to maximize solar energy capture and electric generation of the array. The Preliminary Project Study Area encompasses approximately 235 acres of proposed panels in a rural agricultural area located between the villages of Kaawanui and Pakala on the southwest coast of Kauai.

The ForgeSolar program identifies the three following types of glare (no color indicates no glare predicted):

GREEN - Low potential for temporary after-image.
YELLOW - Potential for temporary after-image.
RED - Potential for permanent eye damage.

No glare is predicted for the Port Allen Airport or for helicopters hovering 500 feet above the Manawaiopuna Falls Island Helicopters helipad.

A small amount of green glare is predicted for one of the six road segments included in the analysis for 5-ft tall vehicles. A maximum of 2-3 minutes per day of green glare is predicted for 5-ft vehicles traveling on Kaawanui Village Road from May through July at sunrise. A small amount of green and yellow glare is predicted for Kaawanui Village Road for 9-ft tall vehicles. This glare is predicted to occur for a maximum of 10 minutes per day from May through August. A small amount of green glare is also predicted for Hanger Road for a maximum of approximately 3 minutes per day from April through August for 9-ft vehicles only. Glare is not predicted for the 39 structures (primarily houses) included in the analysis and located in the vicinity of the array.

Abbreviations

AGL	Above Ground Level
ARC	anti-reflective coating
ATCT	Air Traffic Control Tower
deg	degrees (0 is due north, 180 is due south)
DNI	Direct Normal Irradiance
FAA	Federal Aviation Administration
FP	Flight Path (landing path from threshold to two miles out)
ft	Foot/Feet
GMT	Greenwich Mean Time
kW	Kilowatt
kWh	kilowatt hour
m	Meter
mi	Mile
min	Minute
mrad	Milliradian
MWac	Megawatt alternating current
MSL	Mean Sea Level
OP	Observation Point (e.g., control tower, structure)
PV	Photovoltaic
W	watt

Glossary

Correlate Slope Error with Surface Type?	Correlates the slope error value based on the surface material type; default value is 8.43 milliradians (mrads).
Eye Focal Length (m)	Typical distance between the cornea and the retina of the human eye, default is 0.017 meters (m), though some sources indicate that the typical length is 0.022m.
Glide Slope (deg)	Angle at which the plane approaches the runway during landing (default is 3 degrees [deg] from horizontal).
Maximum Tracking Angle (deg)	Rotation limit of panels in either direction. Full rotation is 2x maximum tracking angle. E.g., maximum tracking angle of 60 deg indicates full panel rotation range of 120 deg.
Resting Angle (deg)	Angle modules return to after maximum angle is reached.
Observation Point	A specific location, such as a control tower or structure, from which an observer might experience glare.
Ocular Transmission Coefficient	Related to the ability of the eye to transmit light, set at 0.5 by Forge Solar.
Offset angle of module (deg)	Additional tilt/elevation angle between the tracking axis and the panel.
Orientation of Tracking Axis (deg)	Azimuthal position of tracking axis measured clockwise from true north. Tracking systems in the northern hemisphere are typically oriented near 180 deg. Tracking systems in the southern hemisphere are typically oriented near 0 deg.
Peak DNI (W/m^2)**	This value is set at 1,000 by ForgeSolar and is the amount of solar radiation per unit surface area by a surface perpendicular to the sun's rays in a straight line from the direction of the sun at its current position in the sky.
Pupil Diameter (m)	Typical pupil diameter for observer, default is 0.002 m.
PV Array Axis Tracking	Panel tracking mode, if any. Panel can be set to track along one (single) or two (dual) axis tracking. This parameter affects the positioning of the panels at every time step when the sun is up.
PV Array Panel Material	Surface material of panels, including use of anti-reflective coating (ARC). Options include: smooth glass without ARC, smooth glass with ARC, light-textured glass without ARC, light-textured glass with ARC, and deeply textured glass.
Rated Power (kW)	Power rating of the solar array - used to estimate the energy output per year of the array (optional).
Slope Error (mrad)	Accounts for beam scatter of sunlight on the array. Default is 8.43 mrads but the value may be adjusted based on the panel material type.
Subtended Angle of Sun (mrad)	The angle above horizontal at which the viewer observes the sun, default value is 9.3 mrad.
Threshold	The physical beginning of the runway. Aircraft are typically expected to be 50 ft above ground at this point.



Time Interval (min)	Time step intervals used by the program for analyses. Default is set to analyze for glare at every one-minute interval throughout the year.
Time zone	Time zone difference from Greenwich Mean Time (GMT) at the location of the analysis.
Tilt of Tracking Axis (deg)	The elevation angle of the tracking axis upon which panels rotate (e.g., torque tube), measured from flat ground. 0 deg implies the axis is on level, flat ground. Values between 0 and 30 deg are typical.
Vary Reflectivity	Varies panel reflectivity with sun position at each time step.
Maximum Downward Viewing Angle (deg)	The angle extending downward from the horizon indicating the maximum downward viewing angle from the cockpit. Used to determine whether glare is visible by the pilot along the flight path. Default is 30 degrees.

Sources:

Ho, Clifford, K., Cianan A. Sims, Julius E. Yellowhair. 2015. Solar Glare Hazard Analysis Tool (SGHAT) User's Manual v. 2H. Sandia National Laboratories.

ForgeSolar – PV Planning & Glare Analysis. https://www.forgesolar.com/

**Source: http://www.3tier.com/en/support/solar-online-tools/what-direct-normal-irradiance-solar-prospecting/



1.0 INTRODUCTION

On behalf of Kaawanui Solar LLC, Stantec Consulting Services Inc. (Stantec) utilized the web based ForgeSolar glare hazard analysis program to complete a glare analysis for the Kaawanui Solar Project (the Project) to determine the potential for glint/glare from the photovoltaic (PV) solar panels to affect residents in the area, automobile drivers passing through the vicinity of the array, and aircraft flying or landing in the vicinity of the array. The Preliminary Project Study Area is located on the southwest coast of the island of Kauai, Hawaii (**Figure 1**), between the villages of Pakala and Kaawanui.

ForgeSolar is an interactive tool that provides a quantified assessment of (1) when and where glare will occur throughout the year for a prescribed solar project, and (2) potential effects on the human eye at locations where glare occurs. Glare can occur from the reflection of sunlight on the PV solar panels of utility-scale, solar-powered, electric generating facilities. While PV solar panels absorb direct sunlight, some reflection can occur especially when the panels are tilted close to horizontal, as depicted in **Figure 2** below.

ForgeSolar employs an interactive Google map for site location, mapping the proposed PV array(s), and specifying observer locations, vehicular travel routes, or flight paths. Latitude, longitude, and elevation are automatically recorded through the Google interface, providing necessary information for sun position and vector calculations. Additional information regarding the orientation and tilt of the PV solar panels, reflectance, environment, and ocular factors are entered by the user.

If glare is found, the tool calculates the retinal irradiance and subtended angle (size/distance) of the glare source to predict potential ocular hazards ranging from temporary after-image to retinal burn. The results are presented in a plot that specifies when glare will occur throughout the year, with color codes indicating the potential ocular hazard.

This report assumes a resting angle of 5-degrees.

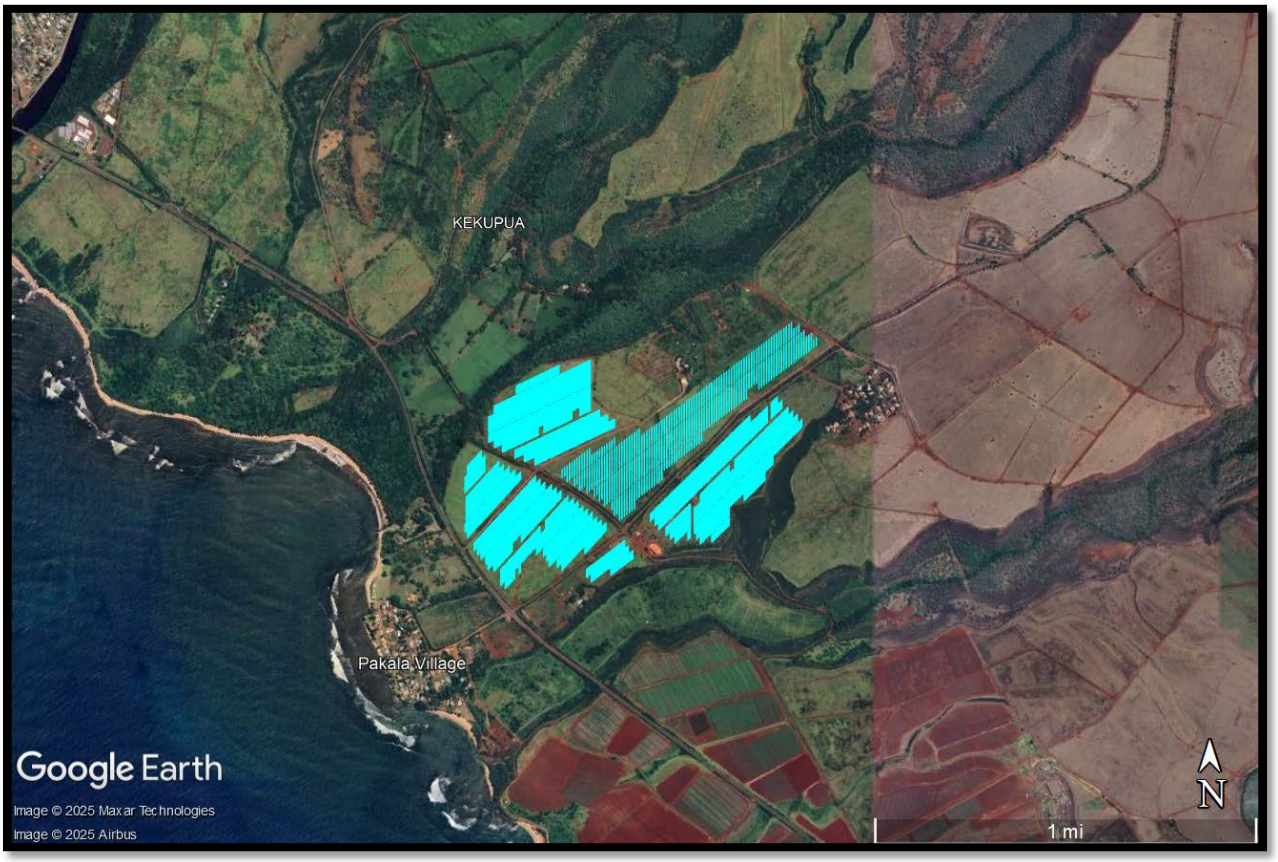

Figure 1. Project Location Map *Blue polygons represent the PV array. Imagery Source: Google Earth Imagery

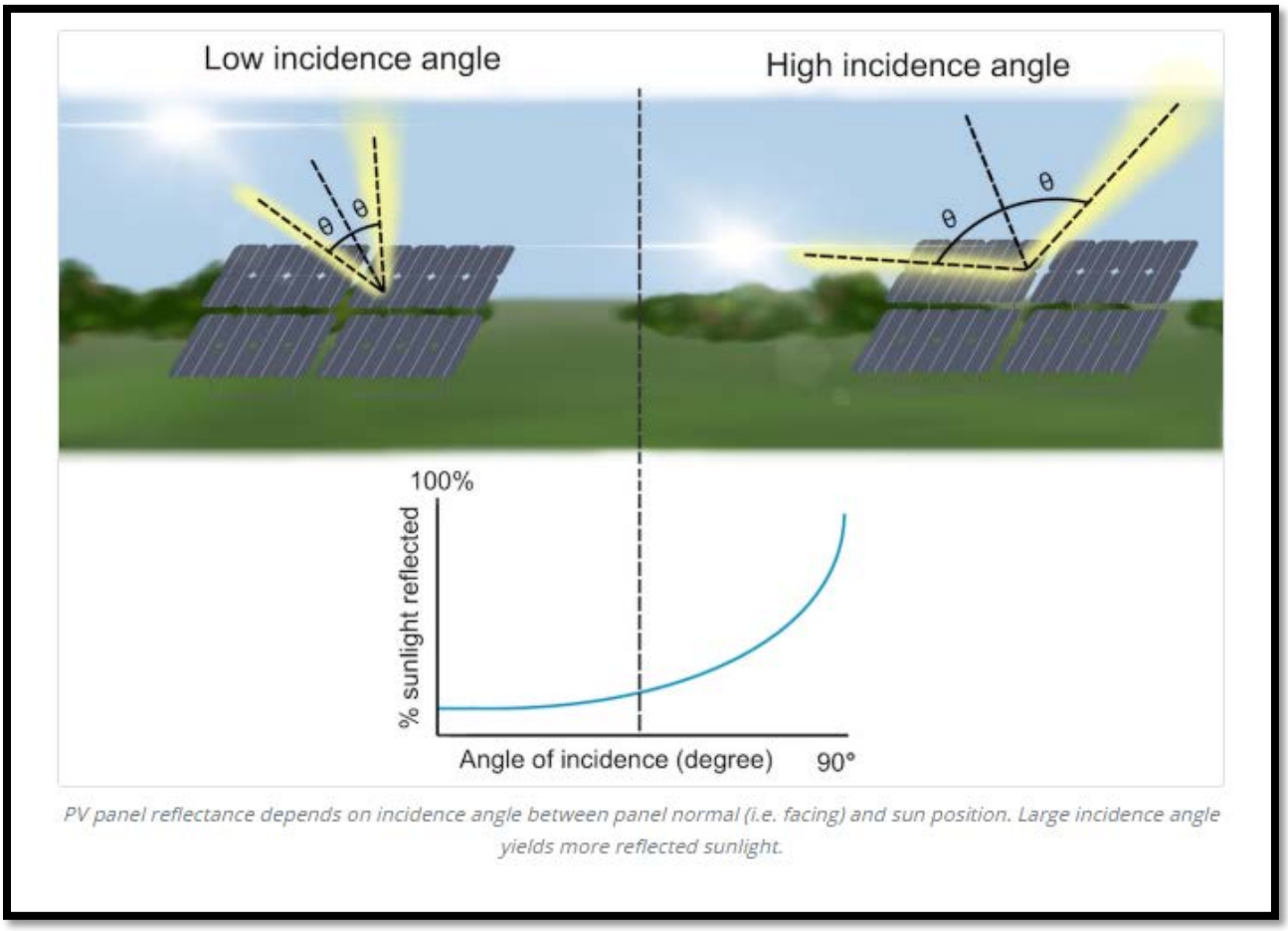

Figure 2. Reflectivity differences between low and high incidence angles.
Source: ForgeSolar.com 2025



Figure 3: Project analysis area and aerodromes. Source: Google Earth Imagery

2.0 DATA INPUT SUMMARY

The parameters used for the analyses are listed in **Table 1** below. "Default" indicates the default parameter value set by ForgeSolar and is generally considered a conservative value for the parameter. "Provided" parameters are Project specific information provided by the client. Arrays, routes, and structures are shown in **Figure 4** below**.** All features were analyzed using 6.56-ft above ground level (AGL) panel heights for the single axis tracking panels.

2.1 SOLAR ARRAY

The location of the solar array and array parameters used for the analyses are based on information provided by Kaawanui Solar. A detailed description of each parameter is provided in the Glossary.

Table 1: Solar Panel Parameters Used for the Glare Analysis

Parameter	Value Used	Default or Provided?
Axis tracking	Single Axis Tracking	Provided
Tilt (deg)	Calculated by ForgeSolar	Shade Slope Backtracking Chosen
Tracking Axis Orientation (deg)	180.0	Provided
Tracking Axis Panel Offset (deg)	NA	Provided
Maximum Tracking Angle (deg)	55	Provided
Resting Angle (deg)	5	Provided
Rated Power (kW)	Not Used	NA
Vary reflectivity?	Yes	Default
Panel material	Lightly textured glass with anti-reflective coating	Provided
Time zone offset	-10	Based on site location
Subtended angle of sun (mrad)	9.3	Default
Peak DNI (W/m^2)	1,000	Default
Ocular transmission coefficient	0.5	Default
Pupil diameter (m)	0.002	Default
Eye focal length (m)	0.017	Default
Time interval (min)	1	Default
Correlate slope error with surface type?	Yes	Default
Slope error (mrad)	9.16	Default
Ground Cover Ratio (%)	50	Provided

2.2 AIRPORT APPROACH PATHS AND AIR TRAFFIC CONTROL TOWER

There is one airport and one helipad located within ten miles of the project area, including the Port Allen Airport and the Manawaiopuna Falls Island Helicopters helipad (**Figure 3**). There are no air traffic control towers within 10 miles of the project site.

2.3 ROADWAYS AND PROPERTIES LOCATED ADJACENT TO THE SOLAR ARRAYS

Glare was analyzed for six road segments within close proximity to the Preliminary Project Study Area as shown in **Figure 4** below, including Hanger Road, Kaawanui Village Access Road, Kaawanui Village Road, Kaumualii Highway, Old Government Road, and Pakala Village Access Road.

The ForgeSolar program sets the default viewing angle of the array at 50 degrees from the driver's direct line of sight (when looking forward). The Federal Aviation Administration (FAA) has determined that glare beyond 50 degrees from the line of sight will be mitigated for the viewer [1]. Potential glare to drivers was evaluated for both passenger vehicles and semi-trucks, where the passenger vehicles were assumed to have a maximum viewing height of 5-ft AGL while the viewing height for drivers of semi-trucks was assumed to be a maximum of 9-ft AGL. It is presumed that there will be minimal use of the area off of Kaumualii Highway by larger trucks on this small island.

Potential glare to viewers at 39 structures, primarily houses, shown as observation points (OPs) in **Figure 4**, in the vicinity of the Preliminary Project Study Area was also analyzed at 16-ft AGL viewing heights. All structures and roadways were analyzed for 6.56-ft panel heights with a 5-degree resting angle.

[1] Rogers, J. A., et al. (2015). Evaluation of Glare as a Hazard for General Aviation Pilots on Final Approach, Federal Aviation Administration (https://www.faa.gov/sites/faa.gov/files/data_research/research/med_humanfacs/oamtechreports/201512.pdf)

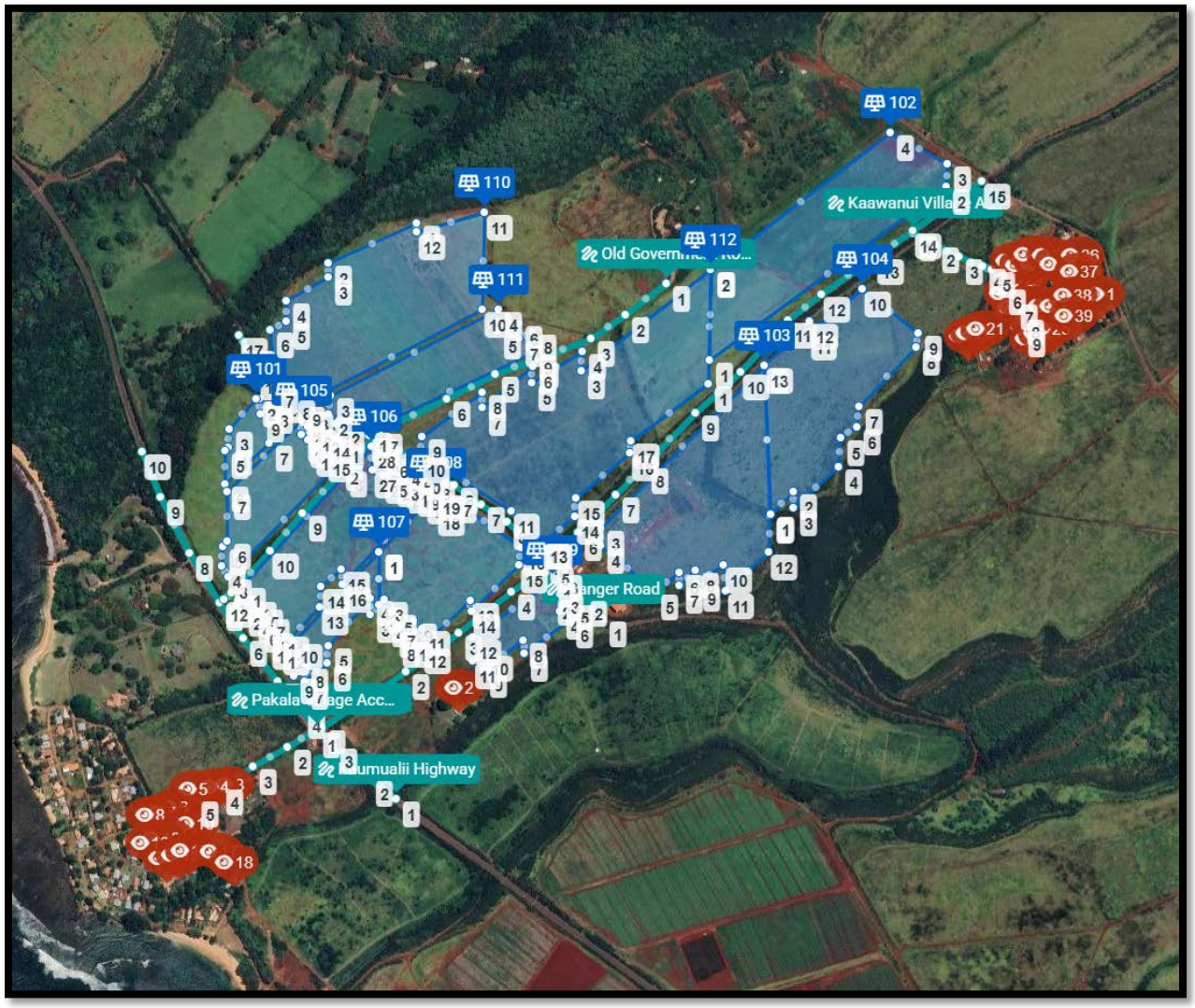

Figure 4. Analysis area, structures, and roadways*

*Blue polygons indicate PV arrays, turquoise lines indicate roads, and red pins indicate structures. Source: ForgeSolar, Google Earth Imagery.

3.0 GLARE ANALYSES RESULTS

The web-based ForgeSolar program was used to analyze glare potential in one-minute increments throughout the year and results are presented in **Appendix A** (ForgeSolar reports). The program identifies the three following types of glare (no color indicates no glare predicted):

GREEN - Low potential for temporary after-image.
YELLOW - Potential for temporary after-image.

RED - Potential for permanent eye damage.

3.1 AIRPORT APPROACH PATHS AND CONTROL TOWERS

There is one airport and one helipad, located within ten miles of the Project. Glare is not predicted for either of these facilities. There are no air traffic control towers within 10 miles of the array.

3.2 ROADWAYS AND PROPERTIES LOCATED ADJACENT TO THE SOLAR ARRAYS

Glare is not predicted for four of the six road segments included in this analysis. Minimal green glare is predicted for 5-ft vehicles on Kaawanui Village Road only. This green glare is predicted for only 49 minutes per year at sunrise for 2-3 minutes per day from May through July.

Nine foot high vehicles are predicted to see up to 115 minutes per year of green glare and 389 minutes of yellow glare per year on Kaawanui Village Road from PV subarray 104. This glare is predicted to occur for up to 10 minutes per day from May through early August. PV subarray 109 is predicted to cause green glare to Hanger Road for 168 minutes per year for 9-ft vehicles only. This glare is predicted for late evening hours from April through August for approximately three minutes per day. While taller trucks may use the Kaumuali Highway adjacent to the array, no glare is predicted for this highway and minimal use by taller vehicles is anticipated on these roads off the highway. Therefore, minimal effects to drivers of taller vehicles are expected.

Glare is not predicted for any of the 39 structures included in the analysis as shown on **Figure 4**.

4.0 CONCLUSIONS

No glare is predicted for the Port Allen Airport or for helicopters hovering 500 feet above the Manawaiopuna Falls Island Helicopters helipad.

A small amount of green glare is predicted for one of the six road segments included in the analysis for 5-ft tall vehicles. A maximum of 2-3 minutes per day of green glare is predicted for 5-ft vehicles traveling on Kaawanui Village Road from May through July at sunrise. A small amount of green and yellow glare is predicted for Kaawanui Village Road for 9-ft tall vehicles. This glare is predicted to occur for a maximum of 10 minutes per day from May through August. A small amount of green glare is also predicted for Hanger Road for 9-ft vehicles only for a maximum of approximately 3 minutes per day from April through August. Glare is not predicted for the 39 structures (primarily houses) included in the analysis and located in the vicinity of the array.

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APPENDIX A

ForgeSolar Reports



Exhibit W

Community Outreach Report

Kaawanui Solar
Community Outreach Report

October 10, 2025



Photo: Lāwa'i Solar + Storage

Introduction

In March 2025, the Kauaʻi Island Utility Cooperative (KIUC) announced its collaboration with AES Hawaiʻi to pursue the Kaawanui Solar project (Project). This initiative aims to deliver clean, locally sourced renewable energy to Kauaʻi and aligns with KIUC's strategic goal of producing 100 percent of the island's electricity from renewable resources by 2033. The project, which AES will develop, is situated on land managed by Gay & Robinson, Inc. in Makaweli.

The proposed Project will consist of a 43 MW photovoltaic (solar) array paired with four hours of battery storage, resulting in a total Battery Energy Storage System (BESS) capacity of 172 MWh. The Project team examined approximately 269 acres to identify a suitable site for the Project, with the aim of avoiding sensitive areas and minimizing potential impacts. The Project Area will be contained within a subset of this study area. All major components—including solar panels, batteries, the substation, and additional infrastructure—are expected to occupy less than 225 acres. The Project will require approval from the State Public Utilities Commission (PUC) for a 25-year Power Purchase Agreement (PPA) between AES and KIUC, which will provide a stable price for electricity over the duration of the agreement.

To facilitate the development of this important Project, AES Hawaiʻi prepared a comprehensive Community Outreach Plan in collaboration with KIUC and Gay & Robinson, Inc. From the outset, we prioritized early, transparent communication and meaningful stakeholder involvement. Outreach efforts have included engagement with elected officials, Native Hawaiian organizations, cultural practitioners, local businesses, residents, and community groups. Activities ranged from open houses in nearby villages and meetings with community associations to a public meeting hosted by AES Hawaiʻi, ensuring the opportunity for broad participation and inclusivity.

This report documents our outreach activities, summarizes the feedback and questions received, outlines the follow-up actions taken, and describes how stakeholder input has shaped project planning. It also outlines the process for cultural consultation—including the Cultural Impact Assessment—and describes targeted engagement with Gay & Robinson employees, area elected officials, neighboring villages, and community leaders. Throughout, our commitment remains focused on fostering trust, transparency, and collaboration as the Kaawanui Solar project moves forward.

Please note that the names and identities of elected officials, individuals acting in a professional capacity, and specific community or cultural leaders have not been redacted.

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Timeline of Community Outreach

- March 2025: Project announced
- May – June 2025: Cultural Impact Assessment outreach
- July 2025: Open houses, elected officials, and community leader meetings
- September 2025: Public meeting
- Ongoing: Stakeholder updates

Community Outreach Plan

Dated: 10/10/2025

Project Description

Kaawanui Solar is a proposed 43 MW photovoltaic array paired with 4 hours of battery storage capacity [172 MWh Battery Energy Storage System (BESS)]. The proposed Project is located on land managed by Gay and Robinson, Inc. (Gay & Robinson) in Makaweli. The Project will be developed and operated by AES Hawai‘i. It will deliver power at a low, fixed price to Kaua‘i Island Utility Cooperative’s island-wide electrical grid for 25 years. The Project will include the design and construction of a switchyard, “Kaawanui Substation,” which will allow the Project to connect to KIUC’s electrical grid. The Project is anticipated to enter commercial operation in 2028.

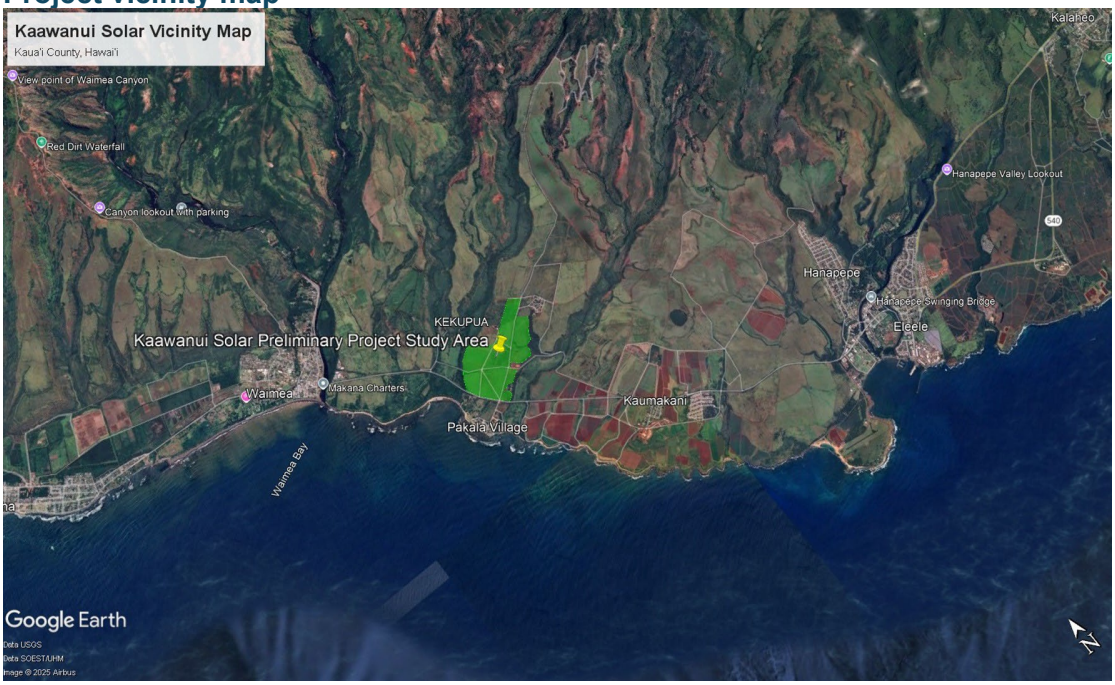
- **Specifications:** 43 MW solar photovoltaic array plus 172 MWh containerized lithium-ion BESS.
- **Power Purchase Agreement (PPA):** Under a 25-year PPA, the Project will deliver power to KIUC's electrical grid to serve Kaua‘i residents.
- **Decommissioning:** At the end of the Project’s life, AES Hawai‘i will restore the land to its existing condition (or comparable).
- **Preliminary Project Study Area:** The Project will be sited within an approximate 269-acre Preliminary Project Study Area. The Project Area, which houses the Project infrastructure, will be a smaller subset of the Preliminary Study Area.
- **Compatible Agriculture:** In alignment with State law, the Project is being developed to include considerations for compatible agriculture. AES Hawai‘i is in active partnership discussions about robust agricultural activities that would be co-located at this site, thereby not only helping to achieve 100% renewable energy but also activating the agricultural uses of this land.

Kaua‘i’s 100% clean energy future

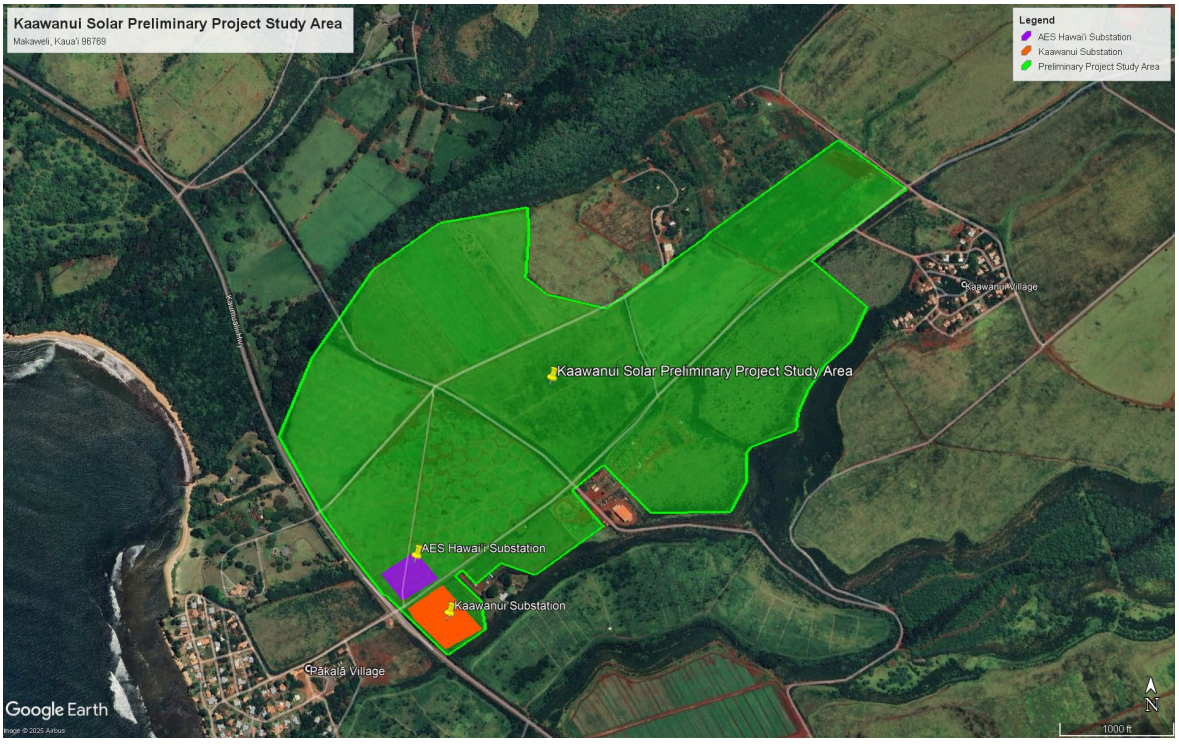
AES Hawai‘i is partnering with Kaua‘i Island Utility Cooperative (KIUC) to help realize their strategic goal of generating 100% of Kaua‘i’s electricity from renewable sources by 2033. This effort aims to reduce power costs, decrease reliance on imported fossil fuels, and increase the amount of energy generated from Kaua‘i’s resources. In 2019, we made history together by bringing online the Lāwa‘i Solar + Storage Project, which was the largest operational solar and energy storage system in the world at the time. In 2021, in collaboration with the U.S. Navy, we also brought Kekaha Solar + Storage online (also known as the AES PMRF Project). Working together, we are co-creating solutions that help stabilize rates, increase grid reliability, and support Kaua‘i’s goals for renewable generation.

Site maps

Project vicinity map



Preliminary Project Study Area



Project Layout



Project schedule

The proposed timeline for Project development and execution is included below. Please note that this schedule is subject to change and will be updated as necessary.

Q3 2024
Project awarded through KIUC's Request for Proposal

Q3 2024 – Q4 2026
Project design and engineering

Q1 – Q4 2025
Public Utilities Commission PPA review and approval

Q1 2025 – Q1 2027
Agency consultation, approvals, and permitting

Q1 2027 – Q2 2028
Construction and commissioning

2028 Operation
Proposed commercial operation date

Government Approvals

Discretionary and non-discretionary land use, environmental, and construction permits and approvals based on preliminary review: (tentative)

Federal

- FAA Filing of Notice
- USACE Determination
- USFWS Biological Survey consultation

State

- State Special Permit – Land Use Commission
- Chapter 6E Compliance (Historic Preservation Review)
- Construction-related State permits may be required, including:
  - National Pollutant Discharge Elimination System (NPDES) Permit – Department of Health (DOH)
  - Noise Permit – DOH
  - Permit to Perform Work on State Highways – Hawai‘i Department of Transportation (HDOT)

County

- County Use Permit – Kaua‘i Planning Commission
- Zoning Permit – Kaua‘i Planning Commission
- Grading, Grubbing, and Stockpiling Permits – Kaua‘i Department of Public Works (DPW)
- Building & Electrical Permit – Kaua‘i DPW

Community Outreach Plan

AES Hawai‘i is committed to being an active and invested member in the communities we serve. Being a responsible community partner is fundamental to our values and drives our approach to developing Kaawanui Solar. We developed our community outreach plan collaboratively with input from both KIUC and Gay & Robinson, Inc.

We are committed to proactively engaging with and consulting stakeholders throughout the Project’s lifecycle. Our community outreach efforts will include, but are not limited to, informing stakeholders and neighboring communities of the Project’s proposed design, soliciting feedback and answering questions, and proactively identifying and mitigating concerns.

We intend to make every effort to maintain and update our stakeholder list throughout the Project’s lifecycle. To date, AES Hawai‘i has identified the following organizations, landowners, community leaders, and key decision-makers who have or will be engaged in the Project outreach process:

- Elected officials
  - Senate President Ron Kouchi
  - Representative Dee Morikawa
  - Representative Luke Evslin
  - Representative Nadine Nakamura
  - Mayor Derek S.K. Kawakami

    - County Kauaʻi Councilmembers
- County of Kauaʻi Planning Department
    - Kaʻāina Hull, Planning Director
    - Jodi Higuchi-Sayegusa
- Pacific Missile Range Facility, Commanding Officer
- Native Hawaiian Groups
- Gay & Robinson Employees and Subcontractors
- Community Organizations, Businesses, and Community Leaders:
    - Kauaʻi Chamber of Commerce
    - Kauaʻi Economic Development Board
    - West Kauaʻi Business & Professional Association
    - Hanapēpē Economic Alliance
    - Līhuʻe Business Association
- Residents of Pākalā Village, Kaawanui Village, Kaumakani Village

As we engage with interested stakeholders, our standard practice is to invite them to help identify other community members who should be contacted. This approach enables the Project Team to continually expand and refine its engagement efforts. Stakeholder input will also be welcomed through dedicated communication channels, which include a Project website, email address, and a hotline. AES Hawaiʻi will maintain a comprehensive and regularly updated stakeholder list and document all stakeholder engagement activities.

Cultural and archaeological resources

AES Hawaiʻi takes the archaeological and cultural resources review very seriously. As we have done for all Hawaiʻi projects previously developed or currently in development, this Project will undergo extensive archaeological and cultural reviews to gain a comprehensive understanding of the land and any potential impacts resulting from the proposed development. All steps will be taken to carefully record, avoid, and/or mitigate impacts on archeological and cultural resources to the extent practicable. Past practices utilized for this Project include, but are not limited to, hiring a local on-island firm to perform an Archaeological Inventory Survey (AIS), Ka Paʻakai Analysis, Cultural Impact Assessment (CIA), and Archeological Literature Review and Field Inspection Report (LRFI). These initiatives include interviews and consultation with lineal and cultural descendants, kūpuna, Native Hawaiian Organizations (NHOs), agencies, and area cultural leaders, as well as presentations to interested groups and parties.

AES Hawaiʻi has engaged a local archeological firm and cultural consultancy to conduct an early-stage initial analysis that identifies:

- Valued cultural, historical, or natural resources in the area in question, including the extent to which traditional and customary Native Hawaiian rights are exercised in the area;
- The extent to which those resources, including traditional and customary Native Hawaiian rights, will be affected or impaired by the proposed action; and

- The feasible action, if any, to be taken to reasonably protect any identified cultural, historical, or natural resources in the area in question, as well as the reasonable protection of traditional and customary Native Hawaiian rights in the affected area.

Archaeological

- The Project's first step was to commission an LRFI. This study includes a thorough archaeological literature review and a field inspection designed to survey and visually inspect the proposed project area, identifying potential archaeological and historic property features. The results of this study informed AES Hawai'i's consultation with the State Historic Preservation Division (SHPD) as part of the Hawai'i Revised Statutes (HRS) §6E review.
- The Project has also conducted a complete Archaeological Inventory Survey (AIS).

Cultural

- AES Hawai'i has conducted a Ka Pa'akai Analysis and Cultural Impact Assessment.

Communications Plan

Our goal is to inform stakeholders and neighboring communities about the Project and its progress, collect their feedback, and answer their questions. We are committed to maintaining community collaboration and consultation throughout the project lifecycle. Strategies to share information and gather input include, but are not limited to:

- Project Website: A dedicated Project website for Kaawanui Solar has been established at www.aes-hawaii.com/kaawanuisolar on AES Hawai'i's website and maintains current project information, including summaries of public outreach meetings.
- Project Hotline: A project hotline (808-800-3942) was established and is listed on the project website.
- Dedicated Email Address: The project email address kaawanuisolar@aes.com serves as a channel for collecting input and distributing updates. It is shared on the project website and during all community engagement meetings to ensure accessibility and transparency.
- Issuance of Public Community Meeting Notice(s)
- Conducting Public Community Meeting(s)
- Conducting strategic outreach to area organizations, community leaders, and elected officials
- News releases:
  - Public notice following PPA filing.
  - Issuance of news releases for community engagement opportunities, when milestones are reached, or during public comment periods.

- *Currents* Magazine: Provide project updates in quarterly issues.
- Issuance of Project status updates: Maintain a mailing list of individuals who have expressed interest in the project and provide updates biannually or at project milestones.
- Social media: Use of social media to promote project benefits and invite feedback during public comment periods.

Public comments supporting and opposing the proposed Project will be compiled and shared with KIUC to be filed with the Public Utilities Commission.

Project Benefits

1. Project construction will result in economic output benefiting Hawai'i's economy.
    a. The Project is anticipated to create approximately 1,064 direct, indirect, and induced full-time-equivalent (FTE) jobs.
    b. The Project is anticipated to generate more than $216 million in direct, indirect, and induced economic activity on Kaua'i and throughout the state.
2. The Project is anticipated to reduce environmental impacts and increase energy resilience with local renewable power production.
    a. The Project is anticipated to generate approximately 17.5% of Kaua'i's energy needs.
    b. Upon completion, the Project is estimated to power the equivalent of more than 16,000 homes annually with clean, locally produced energy.
    c. The Project is projected to reduce fuel consumption by over 7.1 million gallons each year. Over its 25-year lifespan, it is expected to result in an estimated reduction of more than 179 million gallons of fuel and approximately 2.35 million metric tons of carbon dioxide equivalent emissions.
3. The Project will deliver power at a low, fixed cost.
4. The energy produced from this Project will help Kaua'i achieve its goal of 100% renewable energy generation by 2033 and offset the island's reliance on price-volatile, imported fossil fuel.

Project Website, Email, and Community Engagement Representative

Project Website

AES Hawai‘i established a Project website that provides a description and overview of the Project. Additionally, the website features a web form that allows users to register for updates and submit questions, feedback, and comments.

Website: www.aes-hawaii.com/kaawanuisolar

Project Email and Hotline

A dedicated Project email and telephone hotline were established to receive questions, comments, feedback, and requests for information. The email and hotline are posted on the Project website.

Email: kaawanuisolar@aes.com

Hotline: +1 (808) 800-3942

Community Engagement Representative

AES Hawai‘i’s Senior Manager of Stakeholder Relations, Carrice Gardner, serves as the “Community Engagement Representative” on matters related to the Kaawanui Solar project.

Cultural Outreach and Consultation (Cultural Impact Assessment)

Upon project award, AES Hawai‘i retained Cultural Surveys Hawai‘i (CSH) to conduct a Cultural Impact Assessment (CIA) to understand the potential effects the project may have on local cultural practices and features associated with the project area. As part of that effort, CSH reached out to Native Hawaiian Organizations, agencies, cultural practitioners, kūpuna, and other community members in the area. Outreach began in May 2025 through calls, letters, and emails informing 48 groups and individuals about the project and requesting feedback on cultural concerns. Letters were re-sent on June 27, 2025. Six recipients responded, one provided written testimony, and three participated in detailed interviews with CSH.

The following table lists the names, affiliations, contact dates, and comments from NHOs, individuals, organizations, and agencies contacted for this project, arranged in alphabetical order.

Name	Affiliation	Notes
Acain, Dom	Former president, E Ola Mau Na Leo O Kekaha	Letter and figures sent via email 29 May 2025 Letter and figures sent via email 27 June 2025
Ahuna, Dan	OHA Representative – Kaua‘i Island	Letter and figures sent via email 29 May 2025 Letter and figures sent via email 27 June 2025
Akana, Kaipo	Born and raised in Waimea Valley, hunter	Letter and figures sent via USPS 29 May 2025 Letter and figures sent via USPS 27 June 2025
Albao, Liberta	Pelekikena; Queen Deborah Kapule Hawaiian Civic Club	Letter and figures sent via USPS 29 May 2025 Letter and figures sent via USPS 27 June 2025
Alu Like, Kaua‘i	NHO	Letter and figures sent via USPS 29 May 2025 Letter and figures sent via USPS 27 June 2025
Bailey, Roselle	Kumu Hula (dance teacher) and founder of Ka ‘Imi	Letter and figures sent via USPS 29 May 2025

	Naʻauao o Hawaiʻi Nei Institute	Letter and figures sent via USPS 27 June 2025 Ms. Bailey called 9 July 2025 Ms. Bailey shared project details with several referrals (Pat Finberg, Heuʻi Wyeth, Sally Jo Keahi Manea, Mary Gentry, Niheu ʻOhana, and Aipolani ʻOhana) Ms. Bailey called 10 July 2025 Summary of phone call sent from review 17 July 2025 Summary approved 21 July 2025
Ballantine, Jimmy	Owner of Kōkeʻe Lodge	Letter and figures sent via USPS 29 May 2025 Letter and figures sent via USPS 27 June 2025
Beniamina, Iolama and Kuuleiaukai	ʻOhana Niʻihau	Letter and figures sent via USPS 29 May 2025 Letter and figures sent via USPS 27 June 2025
Buckley, David	Kauaʻi Lead Archaeologist, SHPD	Letter and figures sent via email 29 May 2025 Letter and figures sent via email 27 June 2025
Castaneda, Tano	President, West Kauaʻi Hawaiian Homestead Association	Letter and figures sent via email 29 May 2025 Letter and figures sent via email 27 June 2025
Cristobal, Nikki	Executive Director, Kamāwaelualani	Letter and figures sent via email 29 May 2025 Letter and figures sent via email 27 June 2025
Cummings, Frank	Connection to and history on Puʻu ʻŌpae lands	Letter and figures sent via USPS 29 May 2025 Letter and figures sent via USPS 27 June 2025
Cummings, Roslyn	Poʻo, E Ola Kākou Hawaiʻi	Letter and figures sent via USPS 29 May 2025 Letter and figures sent via email 29 May 2025

		Ms. Cummings replied via email 4 June 2025 CSH replied via email 5 June 2025 Ms. Cummings replied via email 9 June 2025 CSH replied via email 24 June 2025 Ms. Cummings replied via email 24 June 2025 CSH replied via email 3 July 2025
Danner, Robin (Ms.)	Familiar with Puʻu ʻŌpae lands	Letter and figures sent via USPS 29 May 2025 Letter and figures sent via USPS 27 June 2025
E Ola Mau Na Leo O Kekaha		Letter and figures sent via USPS 29 May 2025 Letter and figures sent via email 29 May 2025 Letter and figures sent via email 27 June 2025
Faulkner, Kiersten	Executive Director, Historic Hawaiʻi Foundation	Letter and figures sent via USPS 29 May 2025 Letter and figures sent via email 29 May 2025 Letter and figures sent via email 27 June 2025
Faye, Chris	Executive Director, Hui O Laka – Kōkeʻe Natural History Museum	Letter and figures sent via USPS 29 May 2025 Letter and figures sent via email 29 May 2025 Letter and figures sent via email 27 June 2025
Faye, Mike	Longtime resident; family ties to Waimea; used to work for Kekaha Sugar on Puʻu ʻŌpae lands; owner of Kikiaola Construction	Letter and figures sent via USPS 29 May 2025 Letter and figures sent via email 29 May 2025 Letter and figures sent via email 27 June 2025
Ferreira, Stacy Kealohalani	*Ka Pouhana*, Chief Executive Officer, Office of Hawaiian Affairs (OHA)	Letter and figures sent via USPS 29 May 2025 Letter and figures sent via email 29 May 2025 Kaweni Ibarra, Compliance Advocate for OHA, replied via email 6 June 2025

		suggesting contacting OHA's Beneficiary Services agent on Kauaʻi, Kaliko Santos CSH replied via email 6 June 2025 thank Ms. Ibarra for responding
Flores, E. Kalani	Representative, Flores-Case ʻOhana	Letter and figures sent via USPS 29 May 2025 Letter and figures sent via email 29 May 2025 Letter and figures sent via email 27 June 2025
Flores, Peleke	Field Operations & Cultural Resources Manager, Mālama Hulēʻia	Letter and figures sent via email 29 May 2025 Letter and figures sent via email 27 June 2025
Garma, Makana	*Kamaʻāina* of Makaweli	Recommended by Sabra Kauka Letter and figures sent via email 9 June 2025 Mr. Garma replied via email on 10 June 2025 expressing interest in meeting CSH replied 10 June 2025 to schedule meeting CSH met with Mr. Garma on 23 June 2025 Interview summary sent for review 17 July 2025 Summary approved 21 August 2025
Harada, Wayne Palala	Waimea/Napali Representative, Kauaʻi/Niʻihau Island Burial Council	Letter and figures sent via USPS 29 May 2025 Letter and figures sent via USPS 27 June 2025
Jacintho, Wayne	West Kauaʻi hunter, Craftsman	Letter and figures sent via USPS 29 May 2025 Letter and figures sent via email 29 May 2025 Letter and figures sent via email 27 June 2025
Jardin, Leināʻala (Mrs.)	*Kumu Hula* of Hālau Ka Lei Mokihana o Leināʻala	Letter and figures sent via USPS 29 May 2025 Letter and figures sent via USPS 27 June 2025

Kalili, Dre	*Pelekikena* (President), Association of Hawaiian Civic Clubs (AHCC)	Letter and figures sent via USPS 29 May 2025 Letter and figures sent via email 29 May 2025 Letter and figures sent via email 27 June 2025
Kaohelaulii, Billy	Kona Representative, Aha Moku – Kauaʻi; Hui Malama o Kanelolouma	Letter and figures sent via USPS 29 May 2025 Letter and figures sent via email 29 May 2025 Letter and figures sent via email 27 June 2025
Kauahi, Anthony	*Kupuna*	Letter and figures sent via USPS 29 May 2025 Letter and figures sent via USPS 27 June 2025
Kauaʻi Historical Society		Letter and figures sent via USPS 29 May 2025 Letter and figures sent via USPS 27 June 2025
Kauka, Sabra	Hawaiian Studies Kumu, Island School	Letter and figures sent via USPS 29 May 2025 CSH spoke with Ms. Kauka via phone 9 June 2025 Summary sent for review 12 June 2025 Summary approved 17 July 2025
Kawakami, Galen	Former Forester, Forestry and Wildlife Kauaʻi Branch Manager, DLNR	Letter and figures sent via USPS 29 May 2025 Letter and figures sent via email 29 May 2025 Letter and figures sent via email 27 June 2025
Kinimaka-Alquiza, Kapu	*Kumu Hula*, Na Hula o Kaohikukapulani	Letter and figures sent via USPS 29 May 2025 Letter and figures sent via USPS 27 June 2025
Kubo, Klayton	Hunter	Letter and figures sent via email 29 May 2025 CSH spoke with Mr. Kubo 29 May 2025
Kyono, Alvin	Forestry Consultant, Formerly at Forestry and Wildlife, DLNR; longtime resident of Waimea	Letter and figures sent via USPS 29 May 2025 Letter and figures sent via email 29 May 2025 Letter and figures sent via email 27 June 2025

Makua, Kaina	Kumano I Ke Ala (KIKA); long time Waimea/Kekaha connection	Letter and figures sent via USPS 29 May 2025 Letter and figures sent via email 29 May 2025 Letter and figures sent via email 27 June 2025
Manini, Eben	Waimea resident, comes from *ʻohana* of hunters	Letter and figures sent via USPS 29 May 2025 Letter and figures sent via USPS 27 June 2025
Martin, Umi	Farmer	Letter and figures sent via USPS 29 May 2025 Letter and figures sent via email 29 May 2025 Letter and figures sent via email 27 June 2025
Nobrega-Olivera, Malia	Kumu hula, educator Hanapēpē; President, Hui Hana Paʻakai o Hanapēpē	Letter and figures sent via USPS 29 May 2025 Letter and figures sent via email 29 May 2025 Letter and figures sent via email 27 June 2025
Peters, Sarah	Kaumualiʻi Hawaiian Civic Club President	Letter and figures sent via USPS 29 May 2025 Letter and figures sent via email 29 May 2025 Letter and figures sent via email 27 June 2025
Robinson, Robin	Long standing history with ditch system and existing infrastructure	Letter and figures sent via USPS 29 May 2025 Letter and figures sent via USPS 27 June 2025
Sakai, Teri	Lifelong resident of Waimea	Letter and figures sent via USPS 29 May 2025 Letter and figures sent via USPS 27 June 2025
Santos, Donna Kaliko	Nā Kuleana o Kanaka ʻōiwi	Letter and figures sent via USPS 29 May 2025 Letter and figures sent via email 29 May 2025 Letter and figures sent via email 27 June 2025
Say, Barbara	Kamaʻāina of Waimea. Historic and Cultural sites. One of the founders of Kauaʻi Burial Council	Letter and figures sent via USPS 29 May 2025 Letter and figures sent via USPS 27 June 2025
Summers, Molly	Educator, Kauaʻi Community College	Letter and figures sent via USPS 29 May 2025

		Letter and figures sent via USPS 27 June 2025
Taylor, Lynn Maile	President/CEO, Kauaʻi Sea Farm	Letter and figures sent via USPS 29 May 2025 Letter and figures sent via email 29 May 2025 Letter and figures sent via email 27 June 2025
Turalde, Kane	Kamaʻāina, salt and taro farmer	Letter and figures sent via email 29 May 2025 Letter and figures sent via email 27 June 2025
West Kauaʻi Heritage Center		Letter and figures sent via USPS 29 May 2025 Letter and figures sent via email 29 May 2025 Letter and figures sent via email 27 June 2025
Wichman, Randy	Historian, Former President Kauaʻi Historical Society	Letter and figures sent via USPS 29 May 2025 Letter and figures sent via USPS 27 June 2025

Gay & Robinson Employees and Subcontractors

On July 2, 2025, the Project Team presented an overview of the project to Gay & Robinson, Inc. employees and subcontractors. The purpose of the presentation was to provide information, address questions, and gather feedback on the Project. A summary of their feedback and questions is included below.

Number of Attendees: 51

Questions

- The main access road for the Project exits right onto the highway with a blind turn when you're coming from Kaawanui. I'm concerned about getting onto the highway from the access road. Will you have people helping to direct traffic or stop traffic to let big trucks out?
    - A Traffic Impact Analysis Report has been conducted to find the best time for deliveries (around non-peak hours), and we will have manual flagging on the highway as needed. The traffic engineer will help determine the best plan of action, which will be captured in a Construction Traffic Management Plan.
- Have you seen how bad Kaawanui Road is? Will there be improvements made?
    - Yes, we will improve access points as needed.
- Do you have a picture of what the substation will look like?
    - Substation visual simulation is currently being rendered with our planner, will be ready in the coming weeks, and we will distribute it through G&R.
- Will there be any foliage for screening?
    - Yes. We are working with a landscape architect to design screening along the highway.
- Will the new substation and switchyard replace the existing one? It would be good for G&R to free that space for a commercial area.
    - The new Kaawanui Substation will be designed to replace the existing Kaumakani Substation. G&R will need to work with KIUC to amend the existing PPA to move the interconnection point from Kaumakani Substation to Kaawanui Substation.
- Will the batteries be in one area or scattered throughout the site?
    - All batteries will be grouped on one concrete pad mauka of the Project substation, as it is an AC-coupled project.
- What is the life expectancy of battery units?
    - In terms of degradation, we account for 20-25 years. The industry standard is to account for a 40-year useful life, so we overbuild the batteries to meet the minimum as they degrade over time.
- Why are the inverters separate from the panel rather than integrated?
    - There is a difference between DC and AC coupled systems. In AC-coupled projects, PV inverters are separate and located in the field, while BESS inverters sit near the batteries—unlike DC-coupled setups that use a single larger inverter at the BESS. We have shifted to AC-coupled

systems because they offer better grid reliability and output compared to DC-coupled.

- What is the life expectancy of inverters?
  - The same as the batteries. Technically, they allow a 40-year useful life, but we incorporate spare inverters into our projects.
- How much does a battery weigh?
  - We are switching to a heavier, more dense battery for this project and are looking to preload in containers before shipping to avoid the need for special equipment.
- How has your infrastructure withstood natural disasters statewide?
  - Wind is our main concern—while Hawai‘i hasn't experienced major wind events recently, its high wind risk requires construction to withstand a 700-year storm for insurance. Due to land constraints, all Hawai‘i projects currently use a 2P system. We've seen some failures around the 2P system, which requires a hefty post to maintain. Going forward, we will be switching to a 1P system.
- Regarding livestock and agriculture - are we leaning towards anything?
  - We are hopeful about securing something in the next couple of months. The ideas include sheep, miniature animals, and chickens, as smaller and non-aggressive animals. We'll have multiple, individually fenced array areas. The agricultural tenant will rotate between those areas.
- Have your sites had any problems with lightning? They've had a lot of lightning strikes recently, and power lines have been taken out.
  - We're unsure about the mainland but haven't had issues in Hawai‘i. The substation is equipped with lightning masts positioned to reduce the risk of equipment damage.
- Is there a need for a backup generator of the same capacity?
  - No. KIUC has plenty of backup in case Kaawanui Solar becomes unavailable for any reason.

Comments

- The substation will affect the view regardless, even with screening. Please move taller, bulkier things closer to Kaawanui Road.
- This Project is expected to account for about 20% of the island's Renewable Portfolio Standard. The entire G&R property, with hydro power included, supplies roughly a third of the island's energy, and that is something to be proud of.
- KIUC is also looking at hardening the entire west side transmission line from PMRF to Port Allen to support this project. This will make the west side more resilient.

<u>Follow Up:</u>

- Sent KIUC-related questions to their team, then shared their answers with G&R. Shared rendering of the substation with G&R.

Open Houses

After meeting with the Gay & Robinson employees and subcontractors, the Project Team reached out to the three closest residential villages. On July 1st, postcards were sent to residents of Kaʻawanui Village, Pākalā Village, and Kaumakani Village, inviting them to attend a Kaawanui Solar Open House.

On July 16, 2025, an Open House for Kaʻawanui Village and Pākalā Village residents took place in Pākalā Village. The next day, the team held an Open House in Kaumakani Village. These Open Houses allowed the Project Team to share information, answer questions, and collect feedback. Community members' input and questions are summarized below.

Pākalā Village – July 16, 2025

Number of Attendees:11

Questions

- What benefits will we see?
  - This Project will help to stabilize electricity rates and bring Kauaʻi closer to being 100% renewably powered. It will make the island more energy-independent and less reliant on imported fossil fuels, while also being better for the environment.
- Will you be improving Kaawanui Road?
  - Yes, we will improve access points as needed.
- Will there be any impact on water? Water pressure?
  - No impact on water or water pressure
- Will my electricity bill go down?
  - The project will provide energy at a low and stable cost, lower than the current price of fossil fuels. It will also help to hedge against the volatility of fossil fuel prices. Over time, KIUC's ability to advance renewables has helped Kauaʻi have the lowest energy prices in the state.
- Will you be able to see it from the road?
  - Some of the Project arrays will be visible from the highway, as well as the substation.
- Will we be getting solar on our rooftops?
  - No, this is a utility-scale project on land managed by G&R, mauka of the highway. It will provide enough power to the KIUC grid to power around 16,000 homes.
- Does this Project power the villages?
  - No, the power generated by this project would benefit the grid used by the entire island of Kauaʻi. It also provides infrastructure improvements benefiting the west side.
- What kind of agriculture are you planning to have – sheep?

- We are considering sheep and smaller livestock. We are having conversations with potential partners and hope to secure a plan in the next few months.

Comments

- Thank you for starting us on the path, especially on the west side of Kauaʻi.
- I am looking forward to this project.



July 16 Open House: Pākalā Village & Kaawanui Village

Kaumakani Village – July 17, 2025

Number of Attendees:12

Questions

- What benefits will we see?
  - This Project will help to stabilize electricity rates and bring Kauaʻi closer to being 100% renewably powered. This initiative will enhance the island's sustainability by generating locally produced energy and reducing its dependence on imported fossil fuels. It is also better for the environment and helps to reduce carbon emissions.
- How does Gay & Robinson benefit?

    - G&R will receive land easement payments that will provide stable and predictable income. This income will help support their business operations.
- Where will the project be located?
    - The project will be located in Makaweli, mauka of Pākalā Village. (Project board maps were provided and used during the event.)
- Will my electricity bill go down?
    - The project will assist KIUC in providing electricity at a low, stable rate and reduce Kauaʻi's reliance on imported fossil fuels. Kauaʻi enjoys the lowest energy costs in Hawaiʻi because of increased use of renewable energy sources.
- Will you be able to see it from the road?
    - Parts of the project, including the substation, will be visible from the highway.
- Is this project for the villages?
    - The power generated by this project would benefit KIUC's grid and the entire island of Kauaʻi. It also provides infrastructure improvements, benefiting the West Side.

Comments

- I'm glad that tourists driving by will be able to see it and see that Kauaʻi uses solar energy.
- This project sounds like a good idea. It'll benefit Kauaʻi and is better for our environment.



July 17 Open House: Kaumakani Village

Area Elected Officials

After outreach to the three closest residential villages, the Project team held in-person meetings with local elected officials. The purpose of these meetings was to provide a Project overview, answer questions, and gather feedback on regional issues. Invitations were extended to the offices of Mayor Derek S.K. Kawakami, Senator Ronald Kouchi, Representative Nadine Nakamura, Representative Daynette “Dee” Morikawa, and all County of Kauaʻi Councilmembers. The Project Team met with a total of eight elected officials. A summary of discussions held with officials who accepted meeting invitations is provided below.

Mayor Derek S.K. Kawakami
County of Kauaʻi

Meeting Summary

On July 17, 2025, the project team, along with representatives from Kauaʻi Island Utility Cooperative and Gay & Robinson, provided a comprehensive overview of the Kaawanui Solar project to Mayor Kawakami and Keith Perry. The goal of this presentation was to share relevant information, answer questions, and gather feedback about the project. A summary of the questions and comments received is included below.

Questions

- Have you received any opposition?
    - We are still in the very early stages of outreach. We are conducting a Cultural Impact Assessment (CIA) and received feedback from one resident. We have responded to the concerns raised and will incorporate their feedback into the CIA.
- Have there been any federal impacts on the project?
    - The project is scheduled to be operational in 2028 and will remain eligible for tax credits. Adhering to the schedule is crucial. Agency consultation is currently underway. We will host a public meeting in September, then submit our application for a County Use Permit before the end of the year.
- How visible will this project be from the highway?
    - The project will be visible. We have 1P (single-portrait) tracking systems, which are smaller than the ones at the Lāwaʻi Solar + Storage project; however, the substation will be the most visible feature. We are working

on visual simulations, which will be ready by the time of our community meeting.

Comments

- I am supportive. Kauaʻi benefits from projects like this.
- I hope this project keeps moving forward.

Follow-up:

- Shared the public community meeting notice.

Representative Daynette “Dee” Morikawa
Hawaiʻi State Legislature

Meeting Summary

On July 17, 2025, the Project team delivered a virtual presentation regarding the Kaawanui Solar project to Representative Morikawa. Gay & Robinson also attended the meeting. The purpose of the presentation was to provide information, address any questions, and gather feedback on the Project. A summary of Representative Morikawa's feedback and questions is included below:

Questions

- Visibility of the Project will be a concern, so I recommend landscaping. People may see it and mistakenly perceive nonexistent impacts.
    - We will move the project away from the highway to the extent possible. This project also utilizes single-portrait solar panels, which are smaller than the ones at Lāwaʻi Solar. Visual simulations are being developed and will be shared at the community meeting.
- An Old Government Road runs through the area. What is being done about that?
    - Gay & Robinson’s attorneys are working to negotiate a purchase. The State Department of Transportation is our lead in managing this. With this project, Gay & Robinson will provide approximately 30% of the island's energy. It’s a priority.
- Besides concerns about construction traffic and visual impacts, there is also opposition to pesticides.
    - We don’t plan to use pesticides at the Project site.

- There is no water use for this Project, which often presents challenges; however, it will include compatible agriculture. The biggest complaint about farming is the presence of dirt and dust.
    - Screening and best management practices will be integrated.
- What type of compatible agriculture will be included?
    - Discussions with potential partners are ongoing. Livestock will be incorporated, with consideration given to sheep and other smaller animals.
- I noticed you have used sheep in other projects.
    - They do help to manage vegetation. We will also use hand mowing if it's needed.

Comments

- This project will be good for Kauaʻi.

Follow-up:

- Shared public community meeting notice.

Chair Mel Rapozo and Vice Chair KipuKai
Kauaʻi County Council

Meeting Summary

The Project team, joined by Gay & Robinson, presented an overview of the Kaawanui Solar project to County of Kauaʻi Council Chair Mel Rapozo and Vice Chair KipuKai Kualiʻi on July 29, 2025. The purpose of the presentation was to provide information, answer questions, and gather feedback on the Project. A summary of their feedback and questions is included below:

Questions

- Is this project permitted under existing zoning?
    - Yes, solar is permitted with compatible agriculture.
- Is this employee housing near the project?
    - Yes, there are two plantation camps, Kaawanui and Pākalā Village. Much of it is G&R employee housing, but others also live there.
- This is the first time I've heard of this project. A major concern is when the public is unaware of a project and feels uninformed.
    - We are still in the early stages of outreach and have met with G&R employees and the nearby communities. We plan to continue community outreach after we meet with elected officials.
- Have you thought about providing community benefits?

    - We try to be responsive to community concerns. To date, visual impacts have been the most common concerns we've heard from community members, so we are considering buffers. Whether that is fruit-bearing trees or plants native to Kaua'i, will have to be considered.
- Where does Kaua'i currently stand in terms of renewable energy production?
    - Around 50%

Comments

- Fruit-bearing trees would complement the agricultural component of the project.
- The visual aspect is probably the most significant impact. I remember thinking that the Anahola Solar project was very noticeable, but now I see these projects as beautiful. We are lucky because Kaua'i has experienced these renewable energy developments and supports them. The amount of renewable energy we produce on our island is quite significant.

Follow-up:

- Shared public community meeting notice.

Councilmembers Bernard Carvalho and Arryl Kaneshiro Kaua'i County Council

Meeting Summary

The Project team, accompanied by Gay & Robinson, provided an overview of the Kaawanui Solar project to County of Kaua'i Council members Bernard Carvalho and Arryl Kaneshiro on July 29, 2025. The presentation was intended to share information, address questions, and gather feedback regarding the Project. Below is a summary of the feedback and questions received.

Questions

- What is on the property now?
    - Cattle.
- Will there be complaints (about cattle being displaced by solar)?
    - No. Gay & Robinson has several thousand acres of land. A significant amount of land is available for cattle, and this project utilizes only approximately 240 acres.
- How well can the project withstand weather events?
    - This project is built to withstand a 700-year storm. It is also a requirement for our insurance. In the event of a storm or high winds, we can also stow panels based on the direction of the wind.
- I did not know that. And does the project include built-in fire suppression?

- Yes. Safety is our top priority, and we have established emergency response plans that are overseen by the county.

Comments

- Grading may be better than grubbing. Grubbing at Lāwaʻi caused uneven land, which could complicate farming. You may also want to check with your insurance provider; the fire guidelines are now much stricter. Grass must stay under one foot, but guinea grass can reach that height in just a week here. Without the sheep, it would not be easy. They may also request fire buffers beyond your leased land, which are sometimes unavailable.
  - There are many considerations to balance with project and insurance requirements, and we are working to address all of them. We do have a specific response plan for thermal events, and the County reviews our emergency response plan. We also coordinate with the Fire Department to ensure they are aware of emergency access points and can use them if necessary.

Follow-up:

- Shared public community meeting notice.

Councilmember Felicia Cowden
Kauaʻi County Council

Meeting Summary

The Project team, joined by Gay & Robinson, presented an overview of the Kaawanui Solar project to County of Kauaʻi Councilmember Felicia Cowden on August 1, 2025. The purpose of the presentation was to provide information, answer questions, and gather feedback on the Project. A summary of her feedback and questions is included below:

Questions

- What is the size of the project area?
  - It's about 200 acres currently, but as you know, G&R has thousands of acres. Fortunately, we (G&R) have two thousand acres leased and still have thousands more in transition.
- How long is the contract for?
  - The Power Purchase Agreement is for 25 years with the option to extend.
- Does the contract require equipment removal at decommissioning and restoration of the land to its existing or similar condition?

    - Yes.
- Is this similar to what was put in Lāwa‘i?
    - It’s slightly different. The panels are lower to the ground. Batteries have similar technology. The project is AC-coupled.
- Are the batteries lithium-ion?
    - Yes.
- Are you aware of the fires that are happening?
    - We are aware of the (Vistra Energy) California fire. That fire occurred with older technology, and I will address our fire safety measures and current technology during our presentation.
- Are the batteries used overnight to meet demand from sundown to morning?
    - It can be deployed anytime, but it's mainly intended for evening use when energy demand is high, and we aren’t generating solar energy.
- Does the fire suppressant foam contain PFAS?
    - There are no PFAs.
- Has any action been taken regarding these containers to prevent the batteries' exposure to salt air and corrosion?
    - Yes, that is all monitored closely. The project's batteries are stored in sealed, climate-resistant containers. The containers have an HVAC system, and the temperature is monitored.
- What do you mean when you say the project is “safe harbored”?
    - It means that we’ve ordered the transformer, which is important for tax credits, and means we’ve technically started the project.
- To whom does the tax credit go?
    - AES gets the tax credit, which is passed on to KIUC via a lower electricity sale rate to KIUC. This also benefits rate payers.
- What does LSB stand for, and is B-second best?
    - Land Soil Bureau. And yes, B is second best.
- Where is the $216 million for the economy going?
    - This amount reflects local expenditures—excluding equipment costs—and covers lease payments, wages for local labor over the project's lifespan, and studies conducted by local firms.
- How much does the project cost? Over 100 million or 200 million?
    - Yes. It's hard to provide an exact cost, but it’s costly.
- What about jobs – is that calculated based on local hires? If so, I recommend specifying that it’s local spending and employment – that is important.
    - Yes. Mainland labor doesn’t go into this calculation.
- Were you here for the hurricanes? After Hurricane Iniki, we adjusted the panels in our residential solar business so that they could lie flat in the event of a hurricane. It would be ideal if your project did that because when the wind comes, all these panels are in launch position.
    - We build our projects to withstand storms and have requirements based on our lenders and insurance. Our panels have tracking systems that the operations team sets to flat stow during high winds.
- The next concern is that you could lose the entire panel and that string if a panel has a crack. We have a history of wind issues; if the wind picks up, one panel

could fly across the field. It will hit like a skipping stone, and most of those panels are connected in series, right? If you damage the one in the series, you may lose the whole series.
    - The current setup employs a single panel closer to the ground and features a smaller sail, as specified by the insurance provider's requirements.
    - I don't think that damage to one panel would result in the failure of the entire array; however, we will confirm this to ensure accuracy.
- My home solar panels stopped working after 11 years. I was told that replacing the whole system would be more cost-effective than repairing it, and I'd get newer components than my original setup. However, disposing of the damaged panels still poses a challenge and would add to landfill waste.
    - Our contracts require that we produce energy at a certain level. However, if panels were damaged or at the end of their project lifecycle, we would not put them in the landfill; they would be shipped to the continent. We have partnerships that support recycling. Progress in this area is expected to continue over the coming 25 years.

Comments

- I was opposed to all the GMOs and know that was a hit (for G&R). This can help provide income.
    - The energy division represents a central component of Gay & Robinson's business operations. This project is projected to supply more than 17% of the island's total energy requirements. When combined with G&R's hydroelectric contributions, which account for an additional 7–10%, the company's overall impact on the island's energy provision is substantial.
- Matson is going to stop shipping electric vehicles (EVs) because battery exposure to salt air during transport caused EVs to catch fire, causing a ship to sink. These are very difficult fires to extinguish.
    - Fire safety and preparedness are top priorities. Our fire safety measures include smoke detectors and foam applications within the battery cells. If a thermal event were to occur, each battery cell would shut down, and the fire suppression foam would be directly applied to prevent a larger reaction.
    - An emergency response plan is created in collaboration with the local fire department before issuing any permits. There's also a tailored vegetation management plan that specifies setbacks, buffers, and limits on vegetation height.
- When those cars caught fire in the ocean, they weren't functioning – it was just salt and lithium. Apparently, we're having trouble with electric lawn mowers and weed whackers exploding because of too much salt. I've heard garages are blowing up.
    - Again, these are fully contained units with fire suppression technology. We need to keep the two technologies separate. This is designed differently

and is a much better design and newer than those in Northern California.
- Good job. I appreciate it.

Follow-up:

- Respond to Councilmembers' concerns about salt air exposure to lithium-ion and batteries, fire risks, and whether damage to panels would affect service.
- Shared public community meeting notice.

August 8, 2025: Sent information via email to Council Services in response to Council Member Cowden's inquiries.

- **Concerns about salt air causing ignition of lithium-ion batteries**
  - AES Hawai'i takes battery safety very seriously, especially in coastal environments like Kaua'i. While salt air can contribute to corrosion in certain types of exposed electrical equipment, the lithium-ion batteries used in the Kaawanui Solar project are housed in sealed, containerized enclosures specifically designed to withstand Hawai'i's climate—including humidity, salt air, and heat. These enclosures include:
    - Fire suppression systems
    - Thermal monitoring and automatic shutdown protocols
    - Corrosion-resistant materials and coatings

  During our August 1 meeting, we acknowledged the fire incident in California (Moss Landing) and clarified that it involved older battery technologies. The Kaawanui project will utilize modern lithium-ion systems equipped with enhanced safety features and real-time monitoring capabilities.

- **Concern that solar panels may catch sail and lift during a hurricane**
  - AES Hawai'i designs all solar projects to meet or exceed Hawai'i's building codes and environmental requirements, which are among the most stringent in the country due to our unique exposure to tropical storms and hurricanes.
  - The Kaawanui project will use tracker ground-mounted solar panels that are securely anchored to the ground using engineered foundations. These systems are:
    - **Hurricane-Force Wind Rating**: Rated for hurricane-force winds, including uplift and lateral forces.
    - **Regulatory Oversight**: All systems are subject to structural review and permitting by Kaua'i County and the State of Hawai'i.
    - **Wind Stow Functionality:** Unlike other objects in the building and natural world that are susceptible to wind lift, the tracking systems are also designed to adjust their position in response to high wind

conditions, i.e., wind stow. This proactive measure helps minimize exposure and enhance system stability during storms.
    - **Proven Safety Record**: AES has successfully deployed similar systems at sites like Lāwa‘i and Kekaha and on neighbor islands with no reported fire or wind-related incidents. We also maintain close coordination with local fire departments and emergency responders to ensure readiness and safety
- **Will one damaged panel cause the entire string to go out?**
    - It depends on the level of damage. It is possible that if the module is damaged enough, it could take out a string. There are also bypass diodes within a module, so if the damage is localized, the string could still produce.

Our partners at Gay & Robinson informed us that Councilmember Cowden had additional inquiries regarding the longevity and safety of our batteries. To address these concerns, we shared the following information:

- **How long do batteries last?**
    - AES Hawai‘i uses battery energy storage systems (BESS) that are typically designed for a useful life of up to 25 years and include built-in safety and monitoring systems. While the batteries are expected to degrade gradually over time, they are engineered to maintain performance and safety throughout the project’s lifespan.
- **How will batteries be shipped off island/ recycled?**
    - When a project reaches its end of life, BESS system components shall be disconnected, collected, and returned per the Collection and Recycling Program commercially available at the time of decommissioning. The Project’s Decommissioning Plan also includes abiding by all local and state decommissioning requirements. Our goal is to ensure that battery end-of-life handling is safe, transparent, and aligned with Hawai‘i’s clean energy and waste reduction goals.
- **Concerned that Matson will not ship batteries here or outbound for recycling.** (She expressed concern that Matson suspended shipment of EVs.)
    - Matson has a shipping process in place for energy storage systems. Additionally, the project Battery Supplier manages shipping, permits, and paperwork, makes all shipping contract decisions—not AES—and may select other carriers.
- **Will one damaged panel cause the entire string to go out?**
    - It depends on the level of damage. It is possible that if the module is damaged enough, it could take out a string. There are also bypass diodes within a module, so if the damage is localized, the string could still produce.

We also assure the Councilmember that at AES Hawai‘i, safety is our priority, and the Kaawanui Solar Project has been engineered with Hawai‘i’s stringent building codes and environmental conditions in mind.

Councilmember Addison Bulosan
Kaua‘i County Council

Meeting Summary

The Project team, joined by Gay & Robinson and KIUC, virtually presented an overview of the Kaawanui Solar project to County of Kaua‘i Councilmember Addison Bulosan and staff member Yvette Amshoff on August 5, 2025. The purpose of the presentation was to provide information, address any questions, and gather feedback on the Project. A summary of their feedback and questions is included below:

Questions

- Is the 25-year timeline a standard lease or practice for your projects?
    - Yes, 20-25 is the standard time of a Power Purchase Agreement; panels have a useful life of 35-40 years, so there’s usually an option to extend, but technology is likely to improve in 25 years.
- Are any current projects at the end of their term?
    - Not yet, the first project was in 2017
- Are there any conflicts or potential conflicts with agricultural partners?
    - This will add to Gay & Robinson’s agricultural portfolio.
    - The HRS sets a minimum standard; both commissioners and the Department of Agriculture expect solar farms to produce agricultural goods and seek partners who will bring these products to market.
- Are there any potential threats to the project that would come before the County Council?
    - We will be heavily involved with planning and progress to LUC. I don’t think the Council will have direct involvement, but we wanted to set the stage to make sure the Council is comfortable with the project as the community learns about it.
- What is the opposing perspective? What would be the challenge?
    - There is one person opposed to the project so far, but it was more of a carte blanche opposition to development in general.
    - We’ve gotten questions about safety, fire, and visual impacts, so that’s where we’re focusing our engineering and development efforts, and we will show visual renderings at the community meeting.

Comments

- I’m willing to advocate for this. It’s much needed and part of our island’s goals. We’re always looking for long-term solutions and understand that technology may change in 25 years.
- I’m excited to have more solar; it’s great for our island.

Follow-up:

- Shared public community meeting notice.

Community Leader and Association Meetings

Following outreach with elected officials, AES Hawai‘i contacted community leaders and local associations, offering to present the project, solicit feedback, and address questions.

A list of those who responded and were consulted is provided below. Meetings were not recorded, but their questions and feedback are summarized here.

Mike Faye

Meeting Summary

The Project team, joined by Kaua‘i Island Utility Cooperative, briefed Mike Faye, Executive Director of Kekaha Agricultural Association, on the Kaawanui Solar project on August 8, 2025. The presentation aimed to inform, answer questions, and collect feedback, which is summarized below:

Questions

- What does the agricultural plan look like?
    - We are making design considerations. Certain sections will have expanded inter-row spacing to accommodate livestock. It will have a sheep component, and we’re considering crops with the inter-row spacing.
- Some may worry about its proximity to the highway—is there a buffer or specific reason it's located so close?
    - The siting of the project was based on the interconnection point and the land’s topography. Sitting closer to the highway was the best parcel for the project, and we will interconnect right on the corner, which keeps all of the project infrastructure close by.
    - Through design and engineering, the project is being moved away from the highway as much as possible. At the same time, collaboration with a landscape architect and a potential agricultural partner is in progress to explore the use of a vegetative buffer.
- Will the can haul roads be left open?
    - Gay & Robinson will make us party to the access roads; the fence will be inside the road, so current users can still access them.
- Will there be any impact to the Robinson’s helicopter path/helipad?

- Access to the helipad remains unchanged, as it is located adjacent to the project area. A glare analysis was performed, including consideration of the flight path, and no issues or safety impacts were identified.

Comments

- The West Kauaʻi Business & Professional Association could be a good group to host an event and get more project feedback.
- Farm workers at Aloun Farms noted that sloped land captures solar radiation efficiently, resulting in larger or more productive melons.
- This was interesting. Good luck to the project.

Follow-up:

- Provided notice of the community meeting once scheduled.

West Kauaʻi Business and Professional Association Board

Meeting Summary

The Kaawanui Project team presented an overview of the Kaawanui Solar project to Board members of the West Kauaʻi Business and Professional Association (WKBPA) on August 18, 2025. The purpose of the presentation was to provide information, address any questions, and gather feedback on the Project. A summary of the members' feedback and questions is included below:

Questions:

- To what extent does this project advance progress toward achieving the state's energy objectives?
  - Between this project and Mana Solar, the two projects will get us to 80% when they come online. This project will be the largest solar project on Kauaʻi.
- When you say 43 MW and 172 MW hours, what does that mean?
  - The megawatt hours refer to the batteries, which operate for 4 hours. So, 43 MW of solar multiplied by 4 hours of storage equals 172 megawatt-hours. When it's sunny, we'll be charging batteries and also sending energy to the grid.
- What happens on cloudy days?

    - You still generate electricity, although maybe not as much. There are days when Kauaʻi is at 100% renewable energy even when it's not completely sunny.
- Is the energy only available for 4 hours when the sun goes down?
    - You'll need other energy sources too, but it's very helpful to have the battery storage during that peak period when people come home from work until they go to sleep, after which energy demand decreases. We also have battery storage at all of our other projects. If demand is high, KIUC can draw energy from other projects as well. KIUC makes that determination.
- With all this solar, you'll still have excess capacity. Are there any plans to use that energy? Is there a possibility of having additional storage capacity?
    - Not for this project.
- How long do the batteries last?
    - They're designed to last 30-40 years, but they do degrade over time, so we overbuild the project to ensure we still have the same amount of energy available over 25 years.
- When is the public meeting?
    - It's on September 24, from 5:30 to 7:00 p.m. at Hanapēpē Neighborhood Center. Do you want to be on the project mailing list for updates?
    - I'll send you a list of email addresses. Thank you; this helps. I'm also the Vice President of the Hanapēpē Economic Alliance. Since the community meeting is in Hanapēpē, I will announce it to them the week before.

Comments

- We have many new homes in the works. There are new projects in Eleʻele Nani, Port Allen, and soon, the Waimea 400 Housing Project, so this is very timely. I'd also recommend attending some of the Waimea 400 meetings.
- This sounds like a great project. The good thing about being on the West side is that we get lots of sunshine. Aloun Farms has said the land has the perfect slope to maximize the sun's irradiance.

Follow-up

- Added Randy Francisco and contacts shared to the project mailing list.

Public Community Meeting and Open House

Meeting Summary

On September 24, 2025, the Project Team provided an in-person presentation of the Kaawanui Solar project to approximately 46 attendees at the Hanapēpē Neighborhood Center. Team members from Kauaʻi Island Utility Cooperative (KIUC) and Gay and Robinson were also present. The Project Team delivered a 30-minute overview of Kaawanui Solar, then answered questions from attendees and collected their feedback. A summary of the community members' questions and feedback is included below:

Number of Attendees: ~46

Questions:

- Of those more than 1000 jobs, how many will be left on Kauaʻi in 2028 when construction is done – how many permanent jobs will be created on the island?
    - There will be operations staff of about 3-5 permanent jobs; there will also be decommissioning staff at the end of the project's life
- What is the price per kWh, and how does that compare to previous projects?
    - PPA signed at 13 cents/kWh – Lāwa'i and Kekaha are both around 11 cents/kWh
- How does that cost get broken down between solar and battery? What's the value for each?
    - Hard to determine, but maybe around 50/50 (Brad Rockwell, KIUC)
- I live in Pākalā Village. My main concern is that Lithium battery fires are very hard to extinguish. How confident are you in the fire suppression system? The fires are also highly toxic, and if water is used to extinguish them, the runoff becomes toxic and will flow into streams and the ocean.
    - We are very confident in the fire suppression system; these systems are currently deployed on other operational projects. Extensive testing has been conducted on batteries and battery containers – any potential fire would be confined to the battery unit, and the foam would neutralize it at the smallest level. The foam is non-toxic.

      Fire suppression technology has improved significantly and is more advanced than it was in the past, directly in response to recent developments.

      Batteries sit on concrete pads, which separate any content from the ground.

If a wildfire were to occur in the area, we would deenergize as soon as possible before it would become an issue.

- Is there any hum or noise from the system or panels?
    - All of the noise during operations is very minimal; substations produce a slight hum, but nothing louder than an air conditioner in a window.
- I live in Hanapepe Heights. Is there any way to reduce the impact of construction equipment during the building process, such as using biodiesel-powered machinery to lower pollution, switching to electric equipment to make the project more carbon-neutral, and other methods?
    - Absolutely, I will bring that back to EPC negotiations.
- Who is funding this, including salaries and construction? I've seen projects abandoned because of funding issues and I want to see them completed.
    - We are in a good position and can fund all of our projects using our own financing.

      When bidding a project to a utility, we incorporate these expenses – including salaries, construction and development costs, permitting, and others – into the PPA price. Tax credits offset the PPA price, and this Project qualifies for tax credits. This project is in a great position and is safe harbored with equipment. As long as we are online before 2029, we will tax credits and save money for you, allowing us to provide lower rates.

- Hurricanes with winds reaching 125 mph have affected this part of the island, similar to other areas. How is the structure built to withstand those wind events?
    - The project will use a single-portrait (1P) system rather than a two-portrait (2P) system like Lāwa'i and Kekaha because of wind studies. The 1P system has a lower profile and is closer to the ground. Additionally, the rotating axis of the panels allows them to stow depending on the wind event.
- Who pays for the project if it was damaged?
    - Our insurance policy would pay. AES will secure insurance for the project. It is required for financing purposes.

Comments:

- David Bissell, CEO of KIUC: All projects are facing pricing pressures – overall, project costs are likely to increase due to tariffs, and the broader economic environment will also pressure prices.

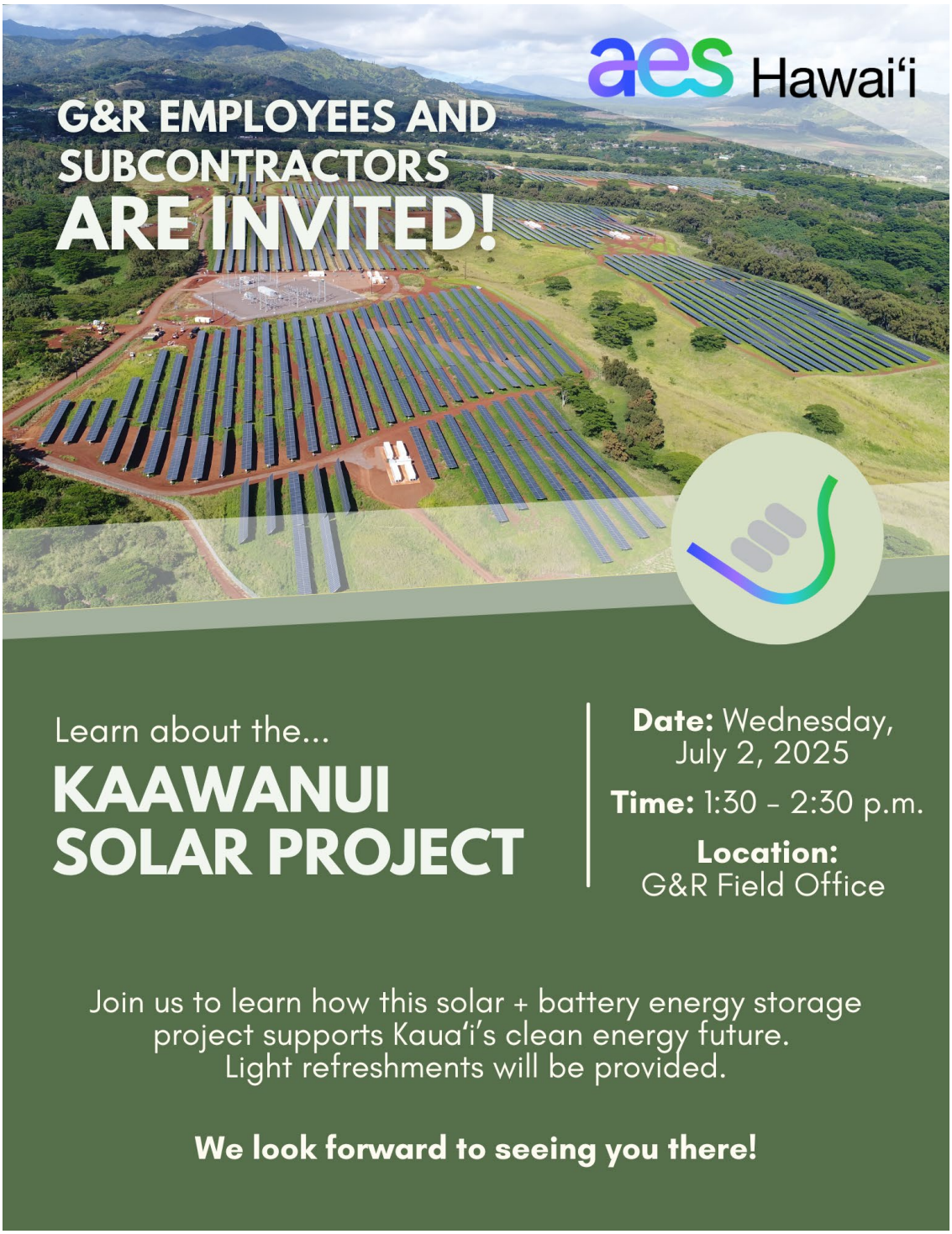

aes Hawai'i
Project Specifications
aes Hawai'i
Accelerating Hawai'i's sustainable energy future





Exhibit 1: Notifications, Advertising, and Paid Media

Flyer sent to Gay & Robinson Employees & Subcontractors on 6/24/25



Postcard sent to 103 residents in Kaawanui and Pākalā Villages on 7/1/25:



Postcard sent to 226 residents in Kaumakani on 7/1/25:



Email Invitations (sent 8/27/25 & 9/10/25) and reminder (sent 9/23/25) sent to 103 recipients on the Project Stakeholder List for Community Meeting & Open House

Outlook

You're invited! AES Hawai'i Kaawanui Solar Community Meeting

From Kaawanui Solar <kaawanuisolar@aes.com>
Date Wed 8/27/2025 8:44 AM

CAUTION: This email originated from outside AES. Do not click links or open attachments unless you recognize the sender.

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Kaawanui Solar Community Meeting & Open House

AES Hawai'i will provide a project overview, answer questions, and gather feedback on Kaawanui Solar. Please join us to learn how this solar + battery energy storage project supports Kaua'i's clean energy future.

Outlook

REMINDER: AES Hawai'i Kaawanui Solar Community Meeting Tomorrow!

From Kaawanui Solar <kaawanuisolar@aes.com>
Date Tue 9/23/2025 8:16 AM

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Kaawanui Solar Community Meeting & Open House

AES Hawai'i will provide a project overview, answer questions, and gather feedback on Kaawanui Solar. Please join us to learn how this solar + battery energy storage project supports Kaua'i's clean energy future.

Outlook

You're invited! AES Hawai'i Kaawanui Solar Community Meeting

From Kaawanui Solar <kaawanuisolar@aes.com>
Date Tue 9/16/2025 10:59 AM

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Outlook

You're invited! AES Hawai'i Kaawanui Solar Community Meeting

From Kaawanui Solar <kaawanuisolar@aes.com>
Date Tue 9/16/2025 10:59 AM

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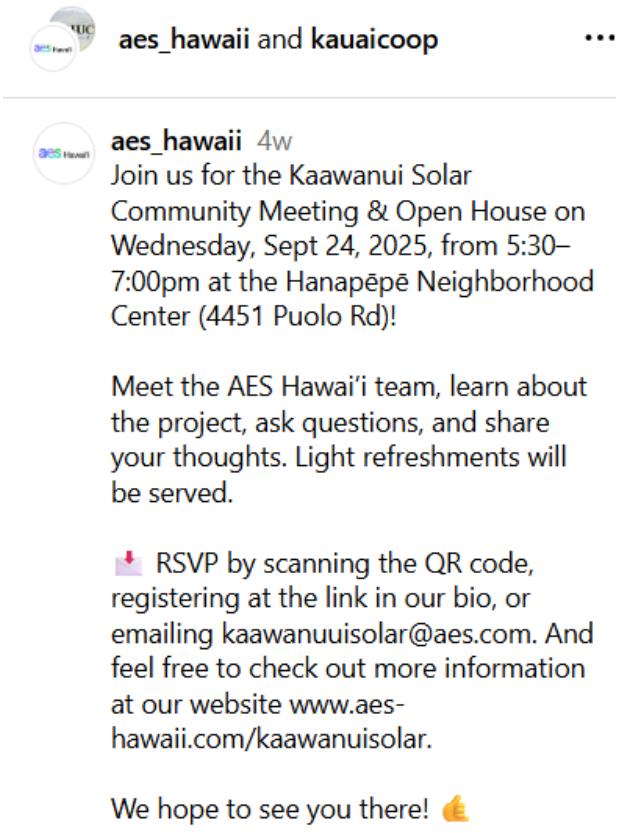
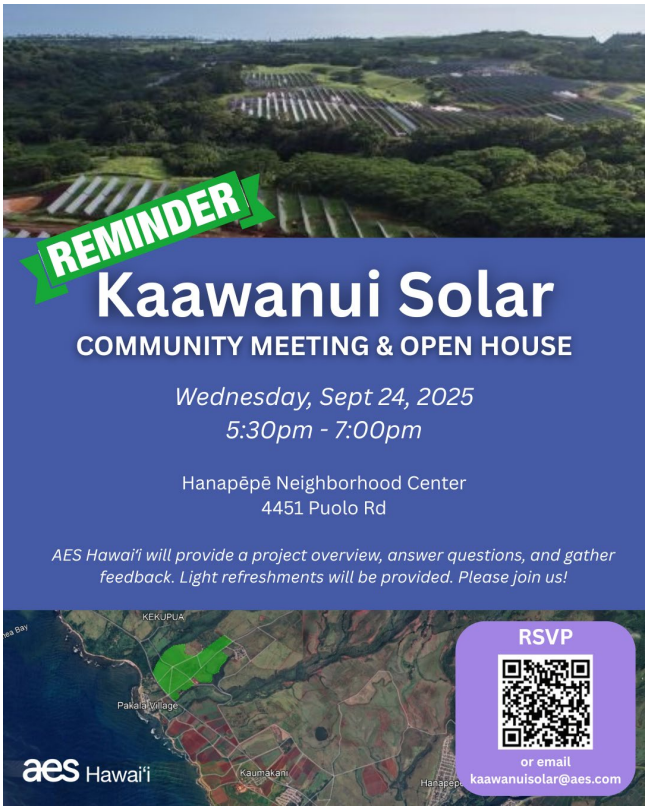
Social Media Posts for Community Meeting & Open House Shared on LinkedIn and Instagram

LinkedIn announcement posted on 9/3/25 & reminder on 9/17/25



Instagram Announcement posted on 9/3/25 & reminder on 9/17/25


aes_hawaii and kauaicoop
aes_hawaii 4w
Join us for the Kaawanui Solar Community Meeting & Open House on Wednesday, Sept 24, 2025, from 5:30–7:00pm at the Hanapēpē Neighborhood Center (4451 Puolo Rd)!
Meet the AES Hawai'i team, learn about the project, ask questions, and share your thoughts. Light refreshments will be served.
RSVP by scanning the QR code, registering at the link in our bio, or emailing kaawanuuisolar@aes.com. And feel free to check out more information at our website www.aes-hawaii.com/kaawanuisolar.
We hope to see you there!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RSVP
or email
kaawanuisolar@aes.com
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Please Join Us!
To RSVP please scan the QR code
or email kaawanuisolar@aes.com
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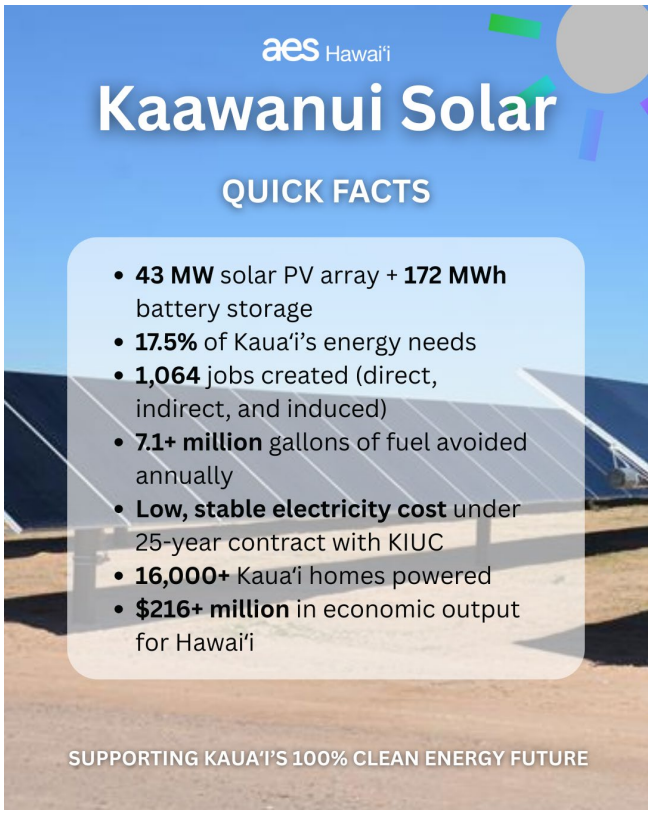
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Kaawanui Solar
QUICK FACTS
43 MW solar PV array + 172 MWh battery storage
17.5% of Kaua'i's energy needs
1,064 jobs created (direct, indirect, and induced)
7.1+ million gallons of fuel avoided annually
Low, stable electricity cost under 25-year contract with KIUC
16,000+ Kaua'i homes powered
$216+ million in economic output for Hawai'i
SUPPORTING KAUA'I'S 100% CLEAN ENERGY FUTURE

aes Hawai'i

Advertisement Posted in *The Garden Island* on 8/23/25 and 8/27/25

TRUMP THREATENS FEDERAL INTERVENTION IN CHICAGO, GOVERNMENT TAKEOVER IN D.C.

REUTERS

WASHINGTON, D.C. — U.S. President Donald Trump said on Friday he would probably expand his crime crackdown to Chicago, intervening in another city governed by Democrats, and threatened to take full control of Washington, D.C., rather than only its policing.

Saying without evidence that violent crime was out of control in the nation's capital, Trump deployed D.C. National Guard soldiers and federal agents on the streets last week with a mandate to reduce crime.

"It was horrible and Mayor Bowser better get her act straight or she won't be mayor very long, because we'll take it over with the federal government, run it like it's supposed to be run," Trump told reporters, referring to Washington Mayor Muriel Bowser.

Recent statistics, which Trump dismissed, show crime has declined in the U.S. capital since a 2023 peak.

Washington is a unique federal enclave, established in the U.S. Constitution and falling under the jurisdiction of Congress, not belonging to any state.

In 1973, Congress passed the District of Columbia Home Rule Act, allowing residents to elect a mayor and council members.

Continuing his off-the-cuff remarks at the White House, Trump mused about extending his efforts to other cities. He has declined to explain how the federal government could intervene in local law enforcement in cities outside of the federal enclave of D.C.

"Chicago is a mess," Trump said, deriding its mayor. "And we'll straighten that one out probably next."

Trump said some of his supporters in Chicago have been "screaming for us to come."

"I did great with the Black vote, as you know, and they want something to happen," he said. "So I think Chicago will be our next, and then we'll help with New York."

As in Washington, crime, including murders, has declined in Chicago in the last year.

Chicago Mayor Brandon Johnson said he took Trump's comments seriously but has not received formal communication from the administration about federal law enforcement or military deployments.

The mayor said Trump's approach has been "uncoordinated, uncalled for and unsound." He added: "There are many things the federal government could do to help us reduce crime and violence in Chicago, but sending in the military is not one of them."

New York City, also criticized by Trump, has reported a steady decline in violent crime in recent decades, and now has a relatively low murder rate among big American cities. Trump also threatened federal government intervention in San Francisco, another city governed by Democrats.

While the Republican president has cast his efforts as an urgent move to help residents feel safe again, Democrats and other critics say he aims to expand the powers of the president beyond the bounds of the Constitution and assert federal control over cities run by Democratic officials.

The U.S. Constitution's Tenth Amendment generally prevents the federal government from commandeering state or municipal officials and from intervening in states' legal and criminal justice systems unless citizens' constitutional rights are being violated.



AL DRAGO / REUTERS

Members of the Mississippi National Guard eat ice cream and boba tea on the National Mall in Washington, D.C., on Thursday, Aug. 21, 2025.

Hegseth authorizes troops in D.C. to carry weapons

Greg Jaffe
NEW YORK TIMES

WASHINGTON — Defense Secretary Pete Hegseth has authorized National Guard troops deployed to Washington to bring their weapons with them on their mission. But it was not clear whether the troops would be armed as they walked through the city or simply store their weapons in their vehicles, which would not be a significant change over their current status.

The decision on whether they will be armed will ultimately be made by Brig. Gen. Leland D. Blanchard II, the interim commanding general of the D.C. National Guard.

Blanchard will coordinate with the D.C. Metropolitan Police and federal law enforcement, a Defense Department official said.

President Donald Trump ordered the deployment, saying that the troops would help an array of federal agents crack down on crime in the city. But much about their exact mission remains vague.

An Army National Guard spokesperson said this week that guard members "may be armed consistent with their mission and training." But as of Friday, troops stationed in Washington were in many cases still storing their weapons in secure rooms at the D.C. Armory.

Hegseth's decision to sign an authorization order allowing the troops to carry weapons was reported earlier by ABC News.

Military officials have downplayed the likelihood that the troops will carry weapons as they walk the streets. Army officials appear to be eager to keep the soldiers in a support role as police and federal agents focus on the law enforcement mission.

Nearly 2,000 troops are in the process of being mobilized for the mission in Washington. Most who have been dispatched do not have law enforcement training. They could also be at risk if someone lunged for their weapon while they were frisking them or in close contact, officials said.

The first wave of about 800 National Guard troops came from the D.C. National Guard, which the president can call out directly. They are being augmented by soldiers from Louisiana, Mississippi, Ohio, South Carolina and West Virginia, according to the governors of those states.

Most of the troops have been deployed to tourist-heavy parts of the city, including near the National Mall, entertainment sites and Metro stations in those areas.

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This article originally appeared in The New York Times.

FBI searches home of Trump adviser turned critic John Bolton

BLOOMBERG NEWS

FBI agents searched the home of John Bolton, President Donald Trump's former national security adviser, in a sign that the White House is stepping up a campaign of retribution against some of its fiercest critics.



Bolton

The search is linked to an inquiry into whether Bolton retained or disseminated classified documents, according to a person familiar with the matter who asked not to be identified discussing private information. Another person familiar with the situation said CIA Director John Ratcliffe gave FBI Director Kash Patel limited access to intelligence that underpinned the search warrant.

In a social media post on Friday, Patel wrote "NO ONE is above the law."

Trump denied knowing about the raid in advance, saying he first heard about it on television Friday morning and would probably be briefed later. In an interview with NBC News, Vice President JD Vance denied that the investigation had to do with Bolton's criticism.

"Not at all," Vance said. "Classified documents are certainly part of it, but I think that there's a broad concern about Ambassador Bolton."

In Trump's first term, prosecutors had investigated Bolton over his tell-all 2020 memoir, "The Room Where It Happened," which detailed Bolton's belief that Trump was unfit for the presidency. Trump accused Bolton of using classified information in the book and sued unsuccessfully to block publication.

"Washed up Creepster John Bolton is a lowlife who should be in jail, money seized, for disseminating, for profit, highly Classified information," Trump posted after the book was published. Bolton argued at the time that he cleared the book with a senior career government official.

Bolton had escalated his criticism in recent days in response to the president's decision to meet Russian leader Vladimir Putin. Bolton's repeated television appearances prompted Trump to write a social media post blasting the media for quoting "fired losers and really dumb people like John Bolton."

Bolton didn't respond to a request for comment on Friday. The New York Post reported earlier that his home had been raided.



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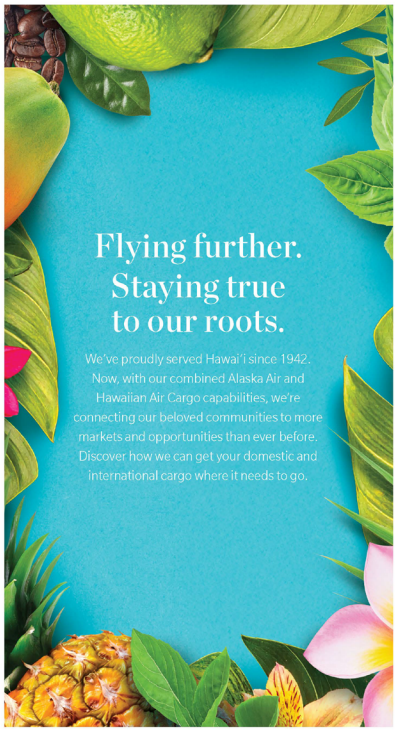

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aes Hawai'i

WHISTLEBLOWER: DOGE PUT SOCIAL SECURITY DATA AT RISK

Nicholas Nehamas
NEW YORK TIMES



ADRIANA ZEHBRAUSKAS / NEW YORK TIMES FILE

People wait in line for a Social Security office to open in Glendale, Ariz., April 8, 2025.

WASHINGTON, D.C. — Members of the Department of Government Efficiency uploaded a copy of a crucial Social Security database in June to a vulnerable cloud server, putting the personal information of hundreds of millions of Americans at risk of being leaked or hacked, according to a whistleblower complaint filed by the Social Security Administration's chief data officer.

The database contains records of all Social Security numbers issued by the federal government. It includes individuals' full names, addresses and birth dates, among other details that could be used to steal their identities, making it one of the nation's most sensitive repositories of personal information.

The account by the whistleblower, Charles Borges, underscores concerns that have led to lawsuits seeking to block young software engineers at the agency built by Elon Musk from having access to confidential government data. In his complaint, Borges said DOGE members copied the data to an internal agency server that only DOGE could access, forgoing the type of "independent security monitoring" normally required under agency policy for such sensitive data and creating "enormous vulnerabilities."

Borges did not indicate that the database had been breached or used inappropriately.

But his disclosure stated that as of late June, "no verified audit or oversight mechanisms" existed to monitor what DOGE was using the data for or whether it was being shared outside the agency. That kind of oversight would typically be provided by the agency's career information security professionals, Borges said in his account.

And his complaint cites an official agency security assessment that described the project as "high risk" and that warned of "catastrophic impact" to Social Security beneficiaries and programs if the database were to be compromised.

"Should bad actors gain access to this cloud environment, Americans may be susceptible to widespread identity theft, may lose vital health care and food benefits, and the government may be responsible for reissuing every American a new Social Security number at great cost," Borges' complaint said. He alleged that DOGE did not involve him in discussions about the project, despite his role as chief data officer, leaving him to piece together evidence of what had happened after the fact.

Included in his account, a copy of which was reviewed by The New York Times, are more than two dozen pages of internal emails, memos and other records to document his claims. Borges' complaint said DOGE's actions "potentially violated multiple federal statutes" designed to protect government data.

Lawyers at the Government Accountability Project, a whistleblower protection group, filed Borges' account Tuesday with the Office of Special Counsel as well as with congressional lawmakers. Borges, 49, joined the Social Security Administration in January after working for more than three years at other government agencies, including the Centers for Disease Control and Prevention, and serving 22 years in the Navy, according to his complaint. His lawyers declined to make him available for an interview with the Times.

A spokesperson for the Social Security Administration, Nick Perrine, said the agency took whistleblower complaints seriously.

"SSA stores all personal data in secure environments that have robust safeguards in place to protect vital information," he said. "The data referenced in the complaint is stored in a long-standing environment used by SSA and walled off from the internet. High-level career SSA officials have administrative access to this system with oversight by SSA's information security team."

Perrine added that the agency was "not aware of any compromise to this environment" and remained "dedicated to protecting sensitive personal data."

A White House spokesperson referred questions to the Social Security Administration.

The complaint includes documents showing that DOGE leaders sought to upload the data despite warnings that they could be exposing Americans' personal information. The documents do not reveal why DOGE pushed for the project, although Borges said he was later told that the reason was to improve the way the agency exchanged data with other parts of government.

"I have determined the business need is higher than the security risk associated with this implementation and I accept all risks," wrote Aram Moghaddassi, who worked at two of Musk's companies, social platform X and Neuralink, before becoming Social Security's chief information officer, in a July 15 memo.

Moghaddassi did not immediately respond to a request for comment.

DOGE's access to Social Security data became one of the earliest flash points in Musk's contentious spell in Washington. The billionaire and his allies pushed for DOGE to have unfettered access to the agency's data, which is strictly protected under federal law, ousting career officials who stood in their way. Musk advanced false claims of widespread fraud at Social Security to justify the urgency of DOGE's work.

Privacy advocates and Democrats warned that the confidentiality of Americans' personal information might be at risk. Social Security data is highly sought after by criminals and foreign governments, who can use the information for identity theft or to gather intelligence. A federal judge temporarily blocked DOGE's access to sensitive Social Security data in March, but the Supreme Court overruled that decision June 6.

The agency has also shared data with immigration authorities, as President Donald Trump seeks to carry out his mass deportation agenda.

Although Musk and many of his allies left Washington after the billionaire fell out with Trump in May, members of DOGE have continued to occupy key roles in the federal bureaucracy, including Moghaddassi.

At issue in Borges' complaint is the so-called Numident file, a critical database that contains the personal information of everyone who has ever held a Social Security number, living or dead. The agency has issued more than 548 million numbers.

In his complaint, Borges provided documents showing that DOGE member John Solly, a software engineer working at Social Security, called a career agency employee June 10 to open discussions about copying Numident data to a "virtual private cloud" server operated by Social Security. Edward Coristine, a 19-year-old DOGE software engineer, was also involved in the project and would be given access to the server, other records show. The request came shortly after the Supreme Court allowed members of DOGE to have access to the agency's data.

Solly and Coristine did not immediately respond to requests for comment.

Borges' complaint also includes documents that he said backed up two additional allegations.

He said that in March, DOGE officials bypassed normal security procedures and were given "improper and excessive access" to other databases that contained sensitive information about Social Security applicants, including the ability to edit data.

Borges also said DOGE officials briefly "appeared to have circumvented" the March 20 temporary court order that locked them out of Social Security data, regaining access to the data over the following weekend before being cut off again March 24.

•••

This article originally appeared in The New York Times.

Fed Governor Cook will sue to keep her job as Trump mulls replacement

REUTERS

WASHINGTON, D.C. — Federal Reserve Governor Lisa Cook will file a lawsuit to prevent President Donald Trump from firing her, a lawyer for the embattled central bank official said on Tuesday, kicking off what could be a protracted legal fight over the White House's effort to shape U.S. monetary policy. "His attempt to fire her, based solely on a referral letter, lacks any factual or legal basis. We will be filing a lawsuit challenging this illegal action," Cook's lawyer, prominent Washington attorney Abbe Lowell, said in a statement.

The statement was issued a day after Trump said he would fire Cook, the first Black woman to serve on the central bank's governing body, for alleged "deceitful and potential criminal conduct" related to mortgages she took out in 2021.

Trump's attempt to remove her, unprecedented in the 111-year history of the nominally independent U.S. Federal Reserve Board, is consistent with his style of breaking norms and prompting opponents to challenge him in court.

It follows other largely successful efforts to bring other elements of the U.S. government under his direct control. Since returning to office in January, the president has overseen the departure of hundreds of thousands of civil servants, dismantled several agencies and withheld billions of dollars of spending authorized by Congress.

"We need people that are 100% above board and it doesn't seem like she was," Trump told reporters at a meeting. He said he had several "good people" in mind to replace Cook but would abide by any court decision that left her in her job. Trump pressured the Fed to lower interest rates during his first term in the White House and he has escalated that campaign in recent months. The president has demanded that rates be cut by several percentage points and threatened to fire Fed Chair Jerome Powell, although he recently backed down from that.

Cook's departure would allow Trump to pick a majority of the Fed's seven-member board, including two incumbents and the pending nomination of White House economist Stephen Miran. Trump said he may consider Miran, whom he nominated for a temporary seat on the Fed board that is due to expire in January, for Cook's seat should it become vacant. The Wall Street Journal reported that former World Bank Group President David Malpass, a longtime Trump ally, was also discussed for the job.

Tisch is said to tell Bondi that New York doesn't need National Guard

Chelsia Rose Marcius and Grace Ashford
NEW YORK TIMES

NEW YORK — Police Commissioner Jessica Tisch told U.S. Attorney General Pam Bondi on Monday that New York, where crime has been dropping for months, does not need the presence of the National Guard, according to a law enforcement official with knowledge of the matter.

During the 30-minute meeting, held late Monday afternoon at Police Department headquarters in Manhattan, Tisch noted the city's record-low number of shootings and shooting victims, the official said.

She also touted the department's use of drone technology to solve crimes and its quality-of-life teams that crack down on motorized scooters on sidewalks, double-parked vehicles and blaring music, the official said.

The Trump administration has spent weeks painting major cities as urban hellscapes that require dramatic intervention from the federal government. An executive order Monday formalizes the creation of specially trained National Guard units that can be mobilized for "ensuring the public safety and order."

The administration this month sent armed National Guard troops into the streets of Washington, D.C., saying that crime was out of control in the city, and the White House has said that Chicago, Baltimore and New York could be next. In fact, violent crime in Chicago, Washington and other major cities has fallen in recent years.

The president has not suggested sending troops to cities in Republican-leaning states. His order appears to carve out a much larger role for the National Guard than it has previously had, creating a force that the president could deploy regardless of whether state and local law enforcement is able to handle any civil unrest.

Efforts to reach the Justice Department for comment on the meeting were not immediately successful. The Police Department did not issue a public comment on the meeting.

Monday's meeting in New York came hours after President Donald Trump signed another executive order aimed at stopping states from limiting the use of bail in lower-level criminal cases. As part of the order, he directed Bondi to identify jurisdictions that have "substantially eliminated cash bail as a potential condition for crimes that pose a clear threat to public safety." Trump threatened federal funding cuts in those states.

In 2019, New York rewrote its bail laws to bar judges from requiring bail in some misdemeanor and low-level felony cases. For decades criminal justice advocates had said that the bail system penalized poor people who remained in jail while those with resources got out on bail. The changes were bitterly opposed by some law enforcement officials.

Since taking office in 2021, however, Gov. Kathy Hochul has repeatedly persuaded the Legislature to make the state's revised bail laws stricter, giving judges more discretion to keep people they deem dangerous behind bars before trial.

"President Trump has no concept of how the law works in New York," a spokesperson for Hochul, Jen Goodman, said in a statement Monday. Not only had the state not eliminated cash bail, she said, but its violent crime rate was at a six-decade low.

She called the president's threat to withhold federal funds "reckless," saying it "would only undercut law enforcement and make our communities less safe."

In March 2024, Hochul sent the National Guard to patrol the New York City subway to address what she said were persistent concerns about safety. She has framed that deployment as a success, pointing to decreases in crime rates in the 12 months that followed. Even so, the move was sharply criticized by Democrats from across the political spectrum who said that the sight of armed soldiers on the streets made New Yorkers feel less, not more safe.

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This article originally appeared in The New York Times.



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Exhibit 2: Media Advisory shared on 8/28/25

FOR EVENTS OCCURING
Wednesday, September 24, 2025

Contact:
Carrice Gardner
kaawanuisolar@aes.com

Media Advisory / Community Meeting

AES Hawai'i to host community meeting regarding Kaawanui Solar, a proposed solar project on Kaua'i.

What: A community meeting and open house will be held for area residents and interested parties to learn more about Kaawanui Solar, a proposed utility-scale project in Makaweli, Kaua'i.

AES Hawai'i team members will provide an overview of the project, answer questions, and gather feedback.

Where: Hanapēpē Neighborhood Center: 4451 Puolo Road, Hanapēpē, HI 96716

When: Wednesday, September 24, 2025, at 5:30-7:00 p.m.

Who: All interested parties are invited to participate, especially area community members.

Attendees are encouraged to RSVP at www.aes-hawaii.com/kaawanuisolar or by email to: kaawanuisolar@aes.com

Kaawanui Solar specifications:

- 43 MW of renewable, locally produced energy paired with 4 hours of battery storage capacity [172 MWh Battery Energy Storage System (BESS)].
- 16,000+ homes powered by clean energy (about 17.5% of Kaua'i's energy needs).
- Approximately 1,064 jobs created (direct, indirect, and induced full-time-equivalent), and more than $216+ million in economic output generated (direct, indirect, and induced full-time-equivalent) on Kaua'i and throughout the state.
- 7.1+ million gallons of imported fuel avoided annually (equal to 179+ million gallons of fuel and 2,350,000 metric tons of CO_2 avoided over the project's 25-year lifespan)
- Low and stable electricity cost protects against the cost volatility of imported fossil fuels. The Project will deliver power to KIUC's electrical grid under a 25-year Power Purchase Agreement.

Learn more at: aes-hawaii.com/kaawanuisolar

Exhibit 3: Media Coverage

KIUC Currents Magazine, Summer 2025 Issue



Moving Forward on Strategic Goals

By Beth Amaro

Two new renewable energy projects are expected to bring Kaua'i close to 80% renewable energy by 2028.

"Our board of directors has set an aggressive goal of reaching 100% renewable by 2033," KIUC President and CEO David Bissell says. "Successful completion of these projects will allow us to progress toward achieving the State of Hawai'i mandate 12 years ahead of schedule."

Project Details

The two solar-plus-battery-storage projects would be developed by AES Hawai'i under power purchase agreements (PPA) submitted to the Hawai'i Public Utilities Commission for approval. Project details include:

- Mānā Solar + Storage: 35 megawatts (MW) solar with four-hour storage capacity to produce an average of 86,000 megawatt hours (MWh) annually of dispatchable renewable energy over the 25-year PPA. The project is proposed to be on land owned by the Agribusiness Development Corp. on the Mānā Plain and is expected to displace the use of 5.9 million gallons of diesel a year.
- Ka māno o ka lā o Ka'awanui (Ka'awanui Solar + Storage): 43 MW solar with four-hour storage capacity to produce an average of more than 100,000 MWh annually of dispatchable renewable energy over the 25-year PPA. The project is proposed to be on land managed by Gay & Robinson Inc. in Makaweli and is expected to displace the use of 12.9 million gallons of diesel a year.

In total, the two projects are expected to account for 35% to 40% of KIUC's annual energy production and generate enough electricity to power more than 30,000 homes.

Supporting Agriculture

Because both projects are proposed on lands zoned for agriculture, state law requires they include considerations for compatible agriculture. AES is in active partnership discussions on robust ag activities that would be co-located at these sites, thereby not just helping achieve 100% renewable energy, but also activating agricultural uses of these lands.

In Mānā, discussions on uses such as dry land kalo production and honey production are ongoing. AES is working with Gay & Robinson to identify appropriate agricultural activity for the Ka'awanui site.

Financial Benefits

According to David, the two projects are expected to benefit members' pocketbooks. At $0.127 per kilowatt-hour, Mānā Solar + Storage is estimated to save KIUC members $6.4 million in the first year of operation, with a cumulative total estimated savings of $370 million over the life of the 25-year PPA. Ka'awanui Solar + Storage, at a proposed price of $0.1334 per kilowatt-hour, is estimated to save KIUC members $7 million in the first year of operation, with a cumulative total estimated savings of $429 million over the life of the 25-year PPA.

"We've already experienced significant rate stabilization over the past five years due to the high percentage of power generation from renewable projects on fixed-price PPAs," David says. "Our rates have gone from being the highest in the state by a large margin to among the lowest in just 20 years. With these projects we'll be essentially buffered from oil-price volatility, in line with our board's strategic goal of delivering electricity at the lowest possible cost."

David cautions, however that the potential impact of recent tariff increases on the projects is unknown.

"There is the possibility that pricing could be affected by these events, and adjustments may be necessary," he says. If approved by the PUC later this year, the projects could be operational as early as 2028.

We (heart) truck drivers!

Truck Driver Appreciation Week is Sept. 14-20

Dennis Fujimoto
THE GARDEN ISLAND

HONOLULU — The Hawaii Transportation Association, along with the Amerivan Trucking Association and the entire trucking industry, on Sunday announced that the group is starting a weeklong celebration of the millions of professional truck drivers who deliver America's freight safely and securely every day.

"Many of the materials, supplies, equipment and goods are transported with trucks and drivers operating those trucks that make our life in Hawaii possible," said HTA Director Kelvin Kohatsu.

Celebrated annually, this year's National Truck Driver Appreciation Week runs from Sept. 14-20.

Professional truck drivers always step up when they are needed most, and power the economy forward despite facing unprecedented obstacles, the HTA said.



DENNIS FUJIMOTO / THE GARDEN ISLAND

Damien Rapozo, a Fedex driver, makes a delivery on Monday, Sept. 8, 2025, at the Coconut Marketplace.

The HTA is marking National Truck Driver Appreciation Week to raise public awareness about the essential role truck drivers play in our daily lives. HTA recognizes these men and women who show their dedication, perseverance and determination on our nation's highways.

According to HTA, there are nearly 3.6 million professional truck drivers nationwide — including approximately 4,000 drivers in Hawaii — delivering the essential goods our families rely on, from food to fuel to medicine to clothing.

The hard-working men and women behind the wheel safely transport more than 11 billion tons of goods and products every year, which accounts for nearly 73 percent of America's total annual freight. Eighty percent of United States communities depend solely on trucking to deliver goods.

The HTA, this year, invites people to join them and the ATA in recognizing the significant contributions professional truck drivers make to our lives. Their efforts contribute greatly to our quality of life and truly move America forward, the HTA said.

To learn more about National Truck Driver Appreciation Week 2025, visit the website www.trucking.com/national-truck-driver-appreciation-week.

briefly

Learn more about the Kaawanui Solar Project

HANAPEPE — AES Hawaii is hosting a community meeting and open house for community residents and interested parties to learn more about Kaawanui Solar, a proposed utility-scale project in Makaweli, Kauai.

At the meeting that will be held at the Hanapepe Neighborhood Center on Sept. 24 from 5:50 to 7 pm, AES Hawaii team members will provide an overview of the project, answer questions, and gather feedback from the community.

All interested parties and community members are invited to participate. People planning to attend are encouraged to RSVP at www.aed-hawaii.com/kaawanuisolar, or email kaawanuisolar@aes.com.

Some of the specifications of Kaawanui Solar include the project being capable of producing 43 MW of renewable, locally-produced energy paired with 4 hours of battery storage capacity (172MWh Battery Energy Storage System, or BESS).

Kaawanui Solar can power more than 16,000 homes, or about 17.5 percent of Kauai's energy needs, with clean energy, and approximately 1,064 jobs will be created (direct, indirect, and induced full-time-equivalent), and more than $216 million in economic output generated (direct, indirect, and induced full-time-equivalent) on Kauai, and throughout the state.

Over the project's 25-year lifespan, AES officials claim more than 7.1 million gallons of imported fuel will be avoided, annually, or equal to more than 179 million gallons of fuel, and 2,350,000 metric tons of CO2 avoided.

Low and stable electricity cost protects against the cost volatility of imported fossil fuels, and Kaawanui Solar will deliver power to the Kauai Island Utility Cooperative's electrical grid under a 25-year Power Purchase Agreement.

For more information, visit the AES Hawaii website at www.aes-hawaii.com/kaawanuisolar.

Wilcox's Cardiac Rehabilitation Program restarts

LIHUE — Wilcox Medical Center announced that it is once again offering a cardiac rehabilitation program — a medically-supervised program for people who have had heart conditions such as a heart attack, heart surgery, or heart disease.

Wilcox Medical Center said this is the first time it has made this program available since the pandemic.

Heart disease remains the leading cause of death in Hawaii and the United States. The Centers for Disease Control and Prevention, the National Institutes of Health, and the American Heart Association all say a cardiac rehabilitation program can reduce mortality, lessen the chance of another heart attack, and increase a person's quality of life.

The Cardiac Rehabilitation Program that is available for eligible patients through a physician order runs between 12 and 36 weeks, depending on a participant's needs, and focuses on low-impact aerobic exercises and strength training.

Each treatment program is personalized to a participant's ability. Participants come into the clinic for an hour twice a week.

Exercise equipment for all levels of fitness is available, and the latest software and tools will be used to monitor vital signs and cardiovascular health.

During the program, Wilcox staff members will educate participants on diabetes, heart failure, nutrition, medication management, and lifestyle modifications.

•••

The Garden Island

obituaries

Gerald 'Butchie' Thomas Okano

Gerald "Butchie" Thomas Okano, 81, of Pearl City, Hawaii, passed away on July 18, 2025. He was from Kapaa, Hawaii.

He is survived by his wife Ruby Okano, daughters Charyl (Sheldon) Makanui, Gerilynn (Christopher) Maria, siblings Merle Spence, Laraine Yamashita, Bryan Okano, two granddaughters and one grandson.

Private services to be held on Oahu. Inurnment to be held on Kauai.



MERVIN S. TAKASHIMA

Mervin S. Takashima, of Aiea, passed away peacefully on June 17, 2025. Born August 30, 1946 on Kauai, raised in Kapaa and was a proud Vietnam Veteran. He is survived by his wife Julene, children Ashley Takashima (Kevin Crawford) and Zachary Takashima, Grandchildren Kein and Yoki Crawford, and Siblings Wayne (Lynn) Takashima, Lynn Kurata and Merle Takashima.

Celebration of Life service will be held on Sunday, October 5, 2025 at the Hawaii Okinawa Center from 5:30 PM. Casual / Aloha Attire.

Arrangements Provided By: Mililani Mortuary

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aes Hawai'i

Hawaii Public Radio, 9/23/25

Local News

Energy developer seeks community input on Kaua‘i solar project

Hawai‘i Public Radio | By HPR News Staff
Published September 23, 2025 at 11:31 AM HST

LISTEN • 1:09



AES Hawai'i

FILE - The Lāwa'i Solar and Energy Storage Project on Kaua'i.

The energy developer AES Hawai'i is hosting a community meeting Wednesday on Kaua'i to discuss a proposed solar farm.

AES Hawai'i, the state's largest provider of renewable power, brought major solar farms online in Central Maui and West O'ahu last summer and has others in the works across the islands.

Its Kaua'i project, called Kaawanui Solar, is slated for Makaweli. If approved and constructed, AES said that it will produce enough electricity to power 16,000 homes.

That could cut down the island's annual fuel use by 7 million gallons.

Wednesday's meeting will be held at the Hanapēpē Neighborhood Center from 5:30 p.m. to 7 p.m.

AES Hawai'i members will be available to answer questions about the project. To register for the meeting, click here.

Tags Local News | Kaua'i | Energy | Renewable Energy

HPR News Staff
See stories by HPR News Staff

Exhibit 4: Correspondence

Outlook

Re: You're invited! AES Hawai'i Kaawanui Solar Community Meeting

From Fern Holland <fholland@kauai.gov>
Date Wed 8/27/2025 9:24 AM
To Kaawanui Solar <kaawanuisolar@aes.com>

CAUTION: This email originated from outside AES. Do not click links or open attachments unless you recognize the sender.

Aloha!

Mahalo for the invite, unfortunately I cannot attend as I am already committed on the evening of Sept 24th.

Thank you so much for including us.

Mahalo,
Fern

Fern Ānuenue Holland
Councilmember
Parks & Recreation/ Transportation Committee Chair
Public Safety & Human Services Committee Vice Chair
Kaua'i County Council
4396 Rice Street, Suite 209
Līhu'e, Hawai'i 96766
Cellular: (808) 634-6242
Telephone: (808) 241-4095

From: Kaawanui Solar <kaawanuisolar@aes.com>
Date: Wednesday, August 27, 2025 at 8:47 AM
To: Fern Holland <fholland@kauai.gov>
Subject: You're invited! AES Hawai'i Kaawanui Solar Community Meeting

CAUTION: This email originated from outside the County of Kauai. Do not click links or open attachments even if the sender is known to you unless it is something you were expecting.

aes Hawai'i



Kaawanui Solar Community Meeting & Open House

AES Hawai'i will provide a project overview, answer questions, and gather feedback on Kaawanui Solar. Please join us to learn how this solar + battery energy storage project supports Kaua'i's clean energy future.

Wednesday, September 24, 2025

5:30pm - 7:00pm
Hanapēpē Neighborhood Center
4451 Puolo Rd.
Hanapēpē, Hawai'i 96716

Light refreshments will be provided.

Please click here to RSVP

Learn more at: aes-hawaii.com/kaawanuisolar

Unsubscribe

Outlook

RE: You're invited! AES Hawai'i Kaawanui Solar Community Meeting

From Chauncie Racca <cracca@kauai.gov>
Date Tue 9/23/2025 8:38 AM
To Kaawanui Solar <kaawanuisolar@aes.com>

CAUTION: This email originated from outside AES. Do not click links or open attachments unless you recognize the sender.

Aloha,

I am writing to inform you that Council Chair Mel Rapozo will no longer be in attendance, as he has a prior commitment to attend.

Mahalo,

Chauncie Racca
Secretarial Assistant
Office of the County Clerk | Council Services Division
4396 Rice Street, Suite 209 | Lihue, HI 96766
Ph. (808) 241-4187 | Fax (808) 241-6349
cracca@kauai.gov

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From: Kaawanui Solar <kaawanuisolar@aes.com>
Sent: Wednesday, September 10, 2025 8:19 AM
To: Chauncie Racca <cracca@kauai.gov>
Subject: You're invited! AES Hawai'i Kaawanui Solar Community Meeting

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aes Hawai'i



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Light refreshments will be provided.

Please click here to RSVP

Learn more at: aes-hawaii.com/kaawanuisolar

Unsubscribe

Outlook

RE: Kaawanui Meeting In Hanapepe Tonight

From Cameron Haughey <cameron.haughey@aes.com>
Date Wed 9/24/2025 6:25 PM
To [redacted]; Kaawanui Solar <kaawanuisolar@aes.com>
[redacted]

Aloha [redacted]

I was not able to make the community meeting tonight, but may be the best to discuss your questions. I know we have spoken many times before and you and your company was very helpful during our Lawai build, especially with Sabre Industries.

Feel free to reach out and we can schedule a time to talk, in addition, I can introduce you to our construction team who may also be able to help answer some of your questions.

Cameron Haughey, CEM
Director of Project Management,
AES Hawai'i
808-634-0032

[redacted]
Sent: Wednesday, September 24, 2025 8:13 AM
To: Cameron Haughey <cameron.haughey@aes.com>; Kaawanui Solar <kaawanuisolar@aes.com>
[redacted]
Subject: Kaawanui Meeting In Hanapepe Tonight

CAUTION: This email originated from outside AES. Do not click links or open attachments unless you recognize the sender.

Aloha AES - I will be attending the Kaawanui project meeting in Hanapepe tonight. I want to hear a discussion about the jobs created by the project(1064 jobs??). How many permanent jobs on Kauai?

Specifically, I would like to sidebar with AES representatives to discuss local labor suppliers who will be brought onto the project during the construction phase.

Thank You,

--

Outlook

Re: REMINDER: AES Hawai'i Kaawanui Solar Community Meeting Tomorrow!

From Fern Holland <fholland@kauai.gov>
Date Sat 10/4/2025 7:00 AM
To Carrice Gardner <carrice.gardner@AES.COM>; Kaawanui Solar <kaawanuisolar@aes.com>

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Mahalo!!!

Get Outlook for iOS

From: Carrice Gardner <carrice.gardner@AES.COM>
Sent: Friday, October 3, 2025 3:03:59 PM
To: Fern Holland <fholland@kauai.gov>; Kaawanui Solar <kaawanuisolar@aes.com>
Subject: Re: REMINDER: AES Hawai'i Kaawanui Solar Community Meeting Tomorrow!

CAUTION: This email originated from outside the County of Kauai. Do not click links or open attachments even if the sender is known to you unless it is something you were expecting.
Aloha Councilmember Holland,

Thank you for letting us know. While we missed your presence, we completely understand and support your need to be with your family in Kapa'a.

Sending warm wishes to you and your family.

Mahalo,
The Kaawanui Solar Team

From: Fern Holland <fholland@kauai.gov>
Sent: Wednesday, September 24, 2025 3:05 PM
To: Kaawanui Solar <kaawanuisolar@aes.co
Subject: Re: REMINDER: AES Hawai'i Kaawanui Solar Community Meeting Tomorrow!

CAUTION: This email originated from outside AES. Do not click links or open attachments unless you recognize the sender.

Unfortunately something has come up with family and I need to stay in Kapa'a this afternoon and evening. Sending my sincere regrets that I can't be there to support this evening.

Mahalo for understanding,
Fern

Get Outlook for iOS

From: Kaawanui Solar <kaawanuisolar@aes.com>
Sent: Tuesday, September 23, 2025 8:16:37 AM
To: Fern Holland <fholland@kauai.gov>
Subject: REMINDER: AES Hawai'i Kaawanui Solar Community Meeting Tomorrow!

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Kaawanui Solar Community Meeting & Open House

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Wednesday, September 24, 2025

5:30pm - 7:00pm
Hanapēpē Neighborhood Center
4451 Puolo Rd.
Hanapēpē, Hawai'i 96716

Light refreshments will be provided.

Please click here to RSVP

Learn more at: aes-hawaii.com/kaawanuisolar

Outlook

Information request on Kaawanui Solar

[redacted]

Date Fri 10/3/2025 11:15 AM

To Kaawanui Solar <kaawanuisolar@aes.com>

CAUTION: This email originated from outside AES. Do not click links or open attachments unless you recognize the sender.

Hi,

I am a research engineer working for the R&D department of EDF, the main French electricity company. One of EDF's subsidiaries (EDF SEI) is a vertically-integrated utility in the French Caribbean islands. Doing some R&D work for them, I especially focus my studies on the Hawaiian Islands and the topics related to grid stability. I've seen that AES Hawai'i has announced two new PV+BESS projects on Kauai Island, with Mana Solar and Kaawanui Solar. If that would be possible, I'd really appreciate discussing with some engineers working on the Kaawanui Solar project, especially regarding the control mode chosen for the battery (grid forming or grid following, to make it short). Do you think that setting up a quick call with a project manager/engineer would be possible?

I understand it's not a common request and you might not be authorized to share this kind of info publicly, so let me know if you think it'd be possible.
Thanks in advance,

[redacted]

aes Hawai'i



Kaawanui Solar Community Meeting & Open House

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4451 Puolo Rd.
Hanapēpē, Hawai'i 96716

Light refreshments will be provided.

Please click here to RSVP

Learn more at: aes-hawaii.com/kaawanuisolar

Exhibit X

Ka Pa‘akai Analysis & Cultural Impact Assessment

DRAFT
Cultural Impact Assessment and Ka Paʻakai Analysis for the Kaawanui Solar Project, Makaweli Ahupuaʻa, Waimea District, Kauaʻi TMKs: (4) 1-7-006:006 por. and 010 por.

Prepared for
G70

on behalf of
Kaawanui Solar, LLC

Prepared by
Kellen Tanaka, B.A.,
and
Hallett H. Hammatt, Ph.D.

Cultural Surveys Hawaiʻi, Inc.
Kailua, Hawaiʻi
(Job Code: MAWAWELI 13)

October 2025

Oʻahu Office
P.O. Box 1114
Kailua, Hawaiʻi 96734
Ph.: (808) 262-9972
Fax: (808) 262-4950

www.culturalsurveys.com

Maui Office
1860 Main St.
Wailuku, Hawaiʻi 96793
Ph: (808) 242-9882
Fax: (808) 244-1994

Management Summary

Reference	Cultural Impact Assessment and Ka Pa‘akai Analysis for the Kaawanui Solar Project, Makaweli Ahupua‘a, Waimea District, Kaua‘i, TMKs: (4) 1-7-006:006 por. and 010 por. (Tanaka and Hammatt 2025)
Date	October 2025
Project Number(s)	Cultural Surveys Hawai‘i, Inc. (CSH) Job Code: MAKAWELI 13
Agencies	State Office of Planning and Sustainable Development (OPSD), Environmental Review Program (ERP); County of Kaua‘i Department of Planning
Land Jurisdiction	Private
Project Location	The Preliminary Project Study Area is located on the southwestern coast of Kaua‘i near the village of Pākalā. The Preliminary Project Study Area is depicted on a portion of the 1996 Hanapepe U.S. Geological Survey (USGS) 7.5-minute topographic quadrangle (Figure 1), tax map plat (Figure 2), and 2022 aerial photo (Figure 3).
Project Description	AES is proposing the 43-Megawatt (MWac) Kaawanui Solar Project located along Kaumuali‘i Highway in Makaweli on Kaua‘i. The project is targeting commercial operations by 30 June 2028. The major equipment will consist of photo-voltaic (PV) solar modules, trackers, Power Conversion Stations (PCSs), Battery Energy Storage System (BESS) containers, and Generator Step-Up transformers (GSUs). The 43-MW collection will be routed to a proposed 57/69 kV project substation and related interconnection and ancillary facilities, the “Kaawanui Substation.”
Project Acreage	The project will be sited within an approximately 268.4-acre Preliminary Project Study Area. The project area, which houses the project infrastructure, will be a smaller subset of the Preliminary Project Study Area.
Document Purpose and Regulatory Context	This cultural impact assessment (CIA) supports compliance for the Kaawanui Solar Project with: • The mandate set forth by the Hawai‘i State Constitution (Articles IX and XII), courts, Hawai‘i Revised Statutes (HRS), Hawai‘i Administrative Rules (HAR), and other Hawai‘i State laws requiring government agencies to promote and preserve cultural beliefs, practices, and resources of Native Hawaiians and other ethnic groups • The State of Hawai‘i’s environmental review process under HRS §343, which requires consideration of the proposed project’s potential effects on cultural practices and cultural features in order to “promote responsible decision making” (HRS §343)

	• The State of Hawai‘i’s historic preservation review process under HAR §13-275-6 and §13-284-6, which requires the identification and mitigation of adverse effects proposed by a potential project in order to “promote the use and conservation of historic properties for the education of the citizens of Hawai‘i” (HAR §13-275-6) This CIA contains information gathered from archival research and consultation, compiled to “analyze the impact of a proposed action on cultural practices and features associated with the project area” (Environmental Council 1997). Cultural practices and cultural features may include traditional cultural properties (TCPs), designated significant historic properties under State of Hawai‘i significance Criterion e, pursuant to HAR §13-275-6 and §13-284-6. Significance Criterion e refers to historic properties that “have an important value to the native Hawaiian people or to another ethnic group of the state due to associations with cultural practices once carried out, or still carried out, at the property or due to associations with traditional beliefs, events or oral accounts—these associations being important to the group’s history and cultural identity” (HAR §13-275-6 and §13-284-6). A Ka Pa‘akai Analysis is a legal framework that requires government agencies to consider the impact of proposed land and water use on Native Hawaiian rights. The framework was established by the Hawai‘i State Supreme Court in 2000 in the case Ka Pa‘akai O Ka ‘Āina vs. Land Use Commission, State of Hawai‘i. The County of Kaua‘i Planning Department has indicated a need for a Ka Pa‘akai Analysis to attend this proposed project. The purpose of the Ka Pa‘akai Analysis is to 1) assist the Planning Department and any other relevant agencies in their effort to ensure the applicant has sufficiently assessed that the proposed project/action will not harm traditional and customary practices exercised by Native Hawaiians; and 2) to provide sufficient documentation to support the applicant’s assessment. This work is designed to address the letter and spirit of the following: • Ka Pa‘akai O Ka‘aina v. Land Use Commission (94 Hawai‘i 31), in which the Hawai‘i Supreme Court established a three-part analytical framework to assist the state and counties in fulfilling their constitutional obligation to preserve and protect traditional and customary practices exercised by Native Hawaiians and any other concerned parties, to the extent feasible, and • The mandate set forth by the Hawai‘i State Constitution (Articles IX and XII), courts, HRS, and HAR, and other Hawai‘i State laws requiring government agencies to promote and

	preserve cultural beliefs, practices, and resources of Native Hawaiians and other ethnic groups. The purpose of the Ka Pa‘akai Analysis is to assist the client and responsible overseeing agencies to ensure the applicant has sufficiently assessed that the proposed project/action will not harm traditional and customary practices exercised by Native Hawaiians; and to provide sufficient documentation to support the overseeing agency’s assessment. In Ka Pa‘akai O Ka ‘Aina v. Land Use Commission, the Hawai‘i Supreme Court [...] articulated an analytical framework to assist state agencies in balancing the State’s obligation to protect traditional and customary practices against private property (as well as competing public) interests, by requiring specific findings and conclusions about: 1) the identity and scope of ‘valued cultural, historical, or natural resources’ in the relevant area, including the extent to which traditional and customary native Hawaiian rights are exercised in relevant area; 2) the extent to which those resources—including traditional and customary native Hawaiian rights—will be affected or impaired by the proposed action; and 3) the feasible action, if any, to be taken by the [agency] to reasonably protect native Hawaiian rights if they are found to exist. [*Ka Pa‘akai O Ka ‘Aina v. Land Use Comm’n*, 94 Hawai‘i 31, 35, 47 and 52–53, 7 P.3d 1068, 1072, 1084 and 1089–90 (2000)]
Results of Background Research	Background research for this project yielded the following information (presented in approximately chronological order): 1. The *ahupua‘a* (traditional land division usually extending from the mountains to the sea) of Makaweli comprises approximately 21,844 acres, bounded on the west by Waimea Ahupua‘a and on the east by Hanapēpē Ahupua‘a. Its *mauka* (toward the mountains) edge runs along the Waimea-Hanalei District border including Mt. Wai‘ale‘ale and part of the Alaka‘i Swamp. A large portion of upper Makaweli Ahupua‘a lies in the Nā Pali–Kona Forest Reserve. 2. Makaweli has several meanings associated with its name. Pukui et al. (1974:142) note Makaweli, which means “fearful features,” refers to a landing, a land division (*ahupua‘a*), and a river in what is presently called the Waimea district on the south coast of Kaua‘i. Mary Kawena Pukui (1983:117) also translates Makaweli as “terrifying eyes,” which refers to sending a god on

	an errand of destruction. Wichman (1998:22) explained there are variations of the meaning of Makaweli, which seem to correlate to *heiau* (pre-Contact place of worship) and human sacrifice. However, a more ancient name for Makaweli is Ho‘ānuanu which means “to cause cold” (Pukui et al. 1974:47). 3. There are several named rains within the Makaweli Ahupua‘a, including the Kapa‘ahoa or Kapakapa‘ahoa, Kiu, Maka‘upili, Pa‘ūpili, and ‘Ūkiukiu (Akana and Gonzalez 2015:65, 67, 105–106, 173, 227). 4. The Pūnohu‘ula wind of Makaweli is mentioned by the goddess Pele and her sister, Hi‘iakaikapoliopele in *The Epic Tale of Hi‘iakaikapoliopele* (Ho‘oulumāhiehie 2008a:16, 253; Ho‘oulumāhiehie 2008b:15–16, 237). 5. Traditional *mo‘olelo* (stories) note Makaweli was home to the *menehune* (legendary race of small people) who constructed trails, *heiau*, fishponds, and *‘auwai* (irrigation ditch) (Rice 1977:40–42; Wichman 1998:23–24). 6. Makaweli River is formed by the joining of Mokuone and Kahana streams. These streams are fed by water from Alaka‘i Swamp. Kahana Stream also joins with a stream that flows out of Olokele Canyon (Handy and Handy 1972:432). Makaweli River flows into the Waimea River which bounds the western side of Makaweli Ahupua‘a (Handy and Handy 1972:405). 7. Handy (1940:63–64) observed numerous terraces along the banks of Makaweli River. Handy and Handy (1972:275) also noted the flatlands where Waimea and Makaweli rivers meet were “still intensively cultivated in wet taro” in 1935. 8. At the time of the Mahele in 1848, Victoria Kamāmalu held seven *‘āina* (land) on the island of Kaua‘i. Five of these *‘āina* were relinquished to the *Mō‘ī* (King) and she retained two *‘āina* for herself. The *ahupua‘a* of Makaweli was kept for Kamāmalu (LCA 7713). 9. Mahele records indicate 117 *kuleana* (small piece of property, as within an *ahupua‘a*) claims comprising 119 *‘āpana* (lots) were filed in Makaweli during the Mahele. These *‘āpana* were within the *‘ili* (traditional land division smaller than an *ahupua‘a*) of Hakioa, Kaho‘omano, Kakalae, Kaloulu, Kapalawai, Koleakalo Manawai, Pu‘ulima, Wai‘awa‘awa, and Waikaia all located along the Waimea River, the Makaweli River, or a major western tributary of the Makaweli River. No *kuleana* claims are indicated within the Preliminary Project Study Area, or the majority of Makaweli to the east of the Waimea-Makaweli-Mokuone river basin. 10. In 1865, Eliza Sinclair purchased the *ahupua‘a* of Makaweli (21,844 acres) from Victoria Kamāmalu Ka‘ahumanu for

	\$15,000. A new home built in the cool uplands at about 1,800 feet (ft) elevation became known as the “Makaweli house” and sometime in the early 1870s the Sinclair family moved from Ni‘ihau to settle there (Dorrance and Morgan 2000:32–33). 11. The Hawaiian Sugar Company (a.k.a. Makaweli Plantation) was founded at Makaweli Ahupua‘a shortly after the signing of the Reciprocity Treaty of 1876 by representatives of the Scottish Mirlees, Watson & Yaryan Company. Samuel T. Alexander and Henry P. Baldwin took over the plantation, incorporating it in 1889 (Condé and Best 1973:134). A large mill was established in present-day Kaumakani Town and approximately a dozen camps for sugar workers were scattered amongst the fields. 12. In 1889, Francis Gay and Aubrey Robinson formed the family partnership known as Gay & Robinson (G&R) to manage the various family businesses, such as Makaweli Ranch and Makaweli Plantation. By the early 1880s the Robinsons became involved in the sugar business, not only planting their own crops but also leasing large tracts of land to Hawaiian Sugar Company (Wilcox 1996:86). The Robinsons were always looking for new and creative ways to utilize their land. For many years, they raised bees for honey and experimented with other agricultural crops. 13. Makaweli Plantation was one of the most successful and profitable plantations in Hawai‘i, due in large part to improvements in irrigation at the start of the twentieth century (Wilcox 1996:89). The Hawaiian Sugar Company was one of the first plantations to construct family housing for its workers with amenities such as a plantation store (Dorrance and Morgan 2000:33). It established 11 or 12 small camps scattered among their fields in Makaweli Ahupua‘a around the turn of the century. 14. Hawaiian Sugar Company was dissolved in 1940 due to disputes over new leasing agreements. Olokele Sugar Company was formed under the new management of C. Brewer & Company and operated on the former Hawaii Sugar Company plantation lands (Wilcox 1996:89). C. Brewer & Company sold Olokele Sugar Company to Gay & Robinson as its lease was nearing expiration in 1994. The plantation and mill continued to operate under the name Gay & Robinson until it was closed in the first decade of the twenty-first century.
Results of Community Consultation	CSH attempted to contact Hawaiian organizations, agencies, and community members as well as cultural and lineal descendants to identify individuals with cultural expertise and/or knowledge of the Preliminary Project Study Area and vicinity. Community outreach

	letters were sent to 48 individuals or groups; six responded, one provided written testimony, and three of these *kama‘āina* (native-born) and/or *kūpuna* (elder/of the grandparent's generation) met with CSH for more in-depth interview(s). Consultation was received from: 1. Roslyn Cummings, *Po‘o* (director), E Ola Kākou Hawai‘i 2. Sabra Kauka, cultural practitioner and *kumu* (teacher) of Hawaiian Studies at Island School 3. Makana Garma, *kama‘āina* of Makaweli 4. Roselle Bailey, *Kumu hula* (dance teacher) and Founder of Ka ‘Imi Na‘auao o Hawai‘i Nei Institute
Identification of Cultural Practices	Based on the results of community consultation and background research conducted as part of this CIA and Ka Pa‘akai Analysis, CSH has identified the following cultural resources and practices within Makaweli Ahupua‘a: 1. Agricultural practices 2. Gathering practices 3. Ranching 4. Freshwater resources 5. Marine resources 6. *Mo‘olelo* and *wahi pana* (storied places) 7. Recreational activities 8. Burial practices
Identification of Impacts to Cultural Practices	No impacts to ongoing cultural practices were identified within the Preliminary Project Study Area during background research and community consultation for this CIA and Ka Pa‘akai Analysis. Consultation identified concerns related to the environment and the broader community: 1. Marine resources 2. Recreational activities
Impacts and Mitigations	Based on information gathered from the community consultation, participants voiced their concerns in the following cultural context: 1. Makana Garma mentioned the area along Kaumuali‘i Highway near the western end of the Preliminary Project Study Area is a popular parking area for people who access the beach to surf and fish. He noted the ocean off Pākalā is a popular surfing spot. 2. Mr. Garma mentioned some families in Makaweli continue to sustain themselves through fishing. 3. Mr. Garma expressed concern regarding the potential impacts to the health of the residents living in the vicinity of the Preliminary Project Study Area from chemicals such as pesticides that may

	be used during the construction and operation of the proposed project. 4. Sabra Kauka expressed her support for the proposed project stating it is a “fabulous idea” that will bring down the cost of electricity for the community. 5. Mr. Garma expressed his support for the project. He pointed out there are many parcels of land including the Preliminary Project Study Area that were once thriving sugar fields that have been vacant for many years and have the potential to benefit the community. 6. Mr. Garma asked how the community will benefit from the project. He noted many of the families in Pākalā and Ka‘awanui villages are living on fixed incomes and struggle to afford the high costs of electricity. He wondered how this project can ensure these families are taken care of. 7. Roslyn Cummings expressed concern regarding the “potential and actual impacts to wai (freshwater), kai (saltwater), and the sacred waiwai of the people.” She noted *wai* is “a living entity tied to Kanaloa, Lono ancestral fertility, food sovereignty, and Ku the integrity of ahupua‘a-based cultural systems as Kane the life giving force through ‘I’O the creator and its creation.” 8. Ms. Cummings emphasized, “I do not give blind consent for this project.” She stated the proposed project “directly threatens the spiritual, ecological, and cultural integrity of Makaweli.” 9. Roselle Bailey mentioned the Preliminary Project Study Area had rich soil formed by silt from the mountains that collected in the area. She recalled that the fields on the *mauka* side of Kaumuali‘i Highway near the Makaweli Post Office were known as the “gold fields of sugarcane.” 10. Ms. Bailey also mentioned the ocean located *makai* (toward the sea) of the Preliminary Project Study Area is abundant with marine resources. She noted that people gather *pa‘akai* (salt) and *limu* (seaweed) along the shore near Pākalā Village. 11. Ms. Bailey asked what kinds of waste will be produced during the construction and operation of the proposed project. She also expressed concern that waste that is not properly disposed of could run off into the ocean and negatively impact marine resources such as *pa‘akai* and *limu*. 12. Project construction workers and all other personnel involved in the construction and related activities of the project should be informed of the possibility of inadvertent cultural finds, including human remains. In the event that any potential historic properties are identified during construction activities, all activities will cease and the SHPD will be notified pursuant to HAR §13-280-3. In the event that *iwi kūpuna* (ancestral remains)

	are identified, all earth moving activities in the area will stop, the area will be cordoned off, and the SHPD and Police Department will be notified pursuant to HAR §13-300-40. In addition, in the event of an inadvertent discovery of human remains, the completion of a burial treatment plan, in compliance with HAR §13-300 and HRS §6E-43, is recommended. 13. In the event that *iwi kūpuna* and/or cultural finds are encountered during construction, project proponents should consult with cultural and lineal descendants of the area to develop a reinterment plan and cultural preservation plan for proper cultural protocol, curation, and long-term maintenance.
Ka Pa‘akai Analysis	In *Ka Pa‘akai vs Land Use Commission*, 94 Hawai‘i (2000) the Court held the following analysis must also be conducted: 1. The identity and scope of valued cultural, historical, or natural resources in the project area, including the extent to which traditional and customary native Hawaiian rights are exercised in the project area; 2. The extent to which those resources—including traditional and customary native Hawaiian rights—will be affected or impaired by the proposed action; and 3. The feasible action, if any, to be taken by the LUC to reasonably protect native Hawaiian Rights if they are found to exist. Based on information gathered from the cultural and historical background, and community consultation for this project, there are a number of traditional cultural practices and resources to consider. The Preliminary Project Study Area has been used for various agricultural endeavors and ranching. Most of the Preliminary Project Study Area currently comprises fallow agricultural fields and fenced pens used for grazing cattle and water buffalo. A taro patch surrounded by an electrified fence is present in the northern tip of the Preliminary Project Study Area. The Preliminary Project Study Area has a variety of vegetative habitats including open grassy areas and heavy *kiawe* forest. During consultation, Makana Garma noted the Preliminary Project Study Area was formerly sugarcane fields. Sabra Kauka also stated the Preliminary Project Study Area is currently used as pastureland for cattle. Mr. Garma noted many of the native and indigenous plants have been destroyed to make way for agriculture except for residents who intentionally grew them in their yards.

	Mr. Garma mentioned the area along Kaumuali‘i Highway near the western end of the Preliminary Project Study Area is a popular parking area for people who access the beach to surf and fish. He mentioned some families in Makaweli continue to sustain themselves through fishing. Roslyn Cummings expressed concern regarding the “potential and actual impacts to wai (freshwater), kai (saltwater), and the sacred waiwai of the people.” She noted *wai* is “a living entity tied to Kanaloa, Lono ancestral fertility, food sovereignty, and Ku the integrity of ahupua‘a-based cultural systems as Kane the life giving force through ‘I’O the creator and its creation.” In response to Ms. Cummings’ concerns, AES Hawai‘i stated that the Kaawanui Solar Project will not impact freshwater resources within or in the vicinity of the Preliminary Project Study Area. No natural springs or permanent streams have been documented within the Preliminary Project Study Area. This project will not use any water to generate energy; instead, it will utilize photovoltaic panels to harness the sun’s power. AES Hawai‘i’s complete response to Ms. Cummings is included in Appendix C. Ms. Cummings emphasized, “I do not give blind consent for this project.” She stated that the proposed project “directly threatens the spiritual, ecological, and cultural integrity of Makaweli.” Mr. Garma expressed concern regarding the potential impacts to the health of the residents living in the vicinity of the Preliminary Project Study Area from chemicals such as pesticides that may be used during the construction and operation of the proposed project. In response to Mr. Garma’s concerns, AES Hawai‘i stated the Kaawanui Solar Project is designed and built to meet national safety standards and does not pose a risk to human health or the environment. AES Hawai‘i will not use pesticides at any stage of the project, including development, construction, and operations. AES Hawai‘i’s complete response to Mr. Garma is included in Appendix D. Mr. Garma also asked how the community will benefit from the project. He noted many of the families in Pākalā and Ka‘awanui villages are living on fixed incomes and struggle to afford the high costs of electricity. He wondered how this project can ensure these families are taken care of. Ms. Bailey asked what kinds of waste will be produced during the construction and operation of the proposed project. She also expressed concern that waste not properly disposed of could run off into the ocean and negatively impact marine resources such as *pa‘akai* and *limu*.

	In response to Ms. Bailey's concerns, AES Hawai‘i stated that waste generated by the Kaawanui Solar Project will not impact the ocean, salt, or *limu* gathering along the shore. Waste generated by the project will vary depending on the project's stage in either construction, operations, or demolition. The project will mainly produce Construction and Demolition (C&D) waste at the beginning and end of the project's lifespan. All waste will be managed in accordance with local, state, and federal regulations. Best management practices will be followed to containerize and store waste and prevent it from leaving the project site and contaminating the environment. At the end of the project's lifespan, AES will decommission the project and restore the land to its existing condition or a comparable condition. Equipment and materials will be salvaged, recycled, or put to their best and highest use in coordination with licensed sub-contractors, recycling facilities, and local waste removers. AES Hawai‘i's complete response to Ms. Bailey is included in Appendix E. Ms. Kauka expressed her support for the proposed project stating it is a "fabulous idea" that will bring down the cost of electricity for the community. Mr. Garma expressed his support for the project. He pointed out there are many parcels of land including the Preliminary Project Study Area that were once thriving sugar fields that have been vacant for many years and have the potential to benefit the community. Project construction workers and all other personnel involved in the construction and related activities of the project should be informed of the possibility of inadvertent cultural finds, including human remains. In the event that any potential historic properties are identified during construction activities, all activities will cease and the SHPD will be notified pursuant to HAR §13-280-3. In the event that *iwi kūpuna* are identified, all earth-moving activities in the area will stop, the area will be cordoned off, and the SHPD and Police Department will be notified pursuant to HAR §13-300-40. In addition, in the event of an inadvertent discovery of human remains, the completion of a burial treatment plan, in compliance with HAR §13-300 and HRS §6E-43, is recommended. In the event that *iwi kūpuna* and/or cultural finds are encountered during construction, project proponents should consult with cultural and lineal descendants of the area to develop a reinterment plan and cultural preservation plan for proper cultural protocol, curation, and long-term maintenance.

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Section 1 Introduction

1.1 Project Description

At the request of G70, and on behalf of Kaawanui Solar, LLC, Cultural Surveys Hawai‘i (CSH) has prepared a cultural impact assessment (CIA) and Ka Pa‘akai Analysis for the Kaawanui Solar Project within Makaweli Ahupua‘a, Waimea District, including TMKs: (4) 1-7-006:010 por. and 006 por. The Preliminary Project Study Area is located on the southwestern coast of Kaua‘i near the village of Pākalā. The Preliminary Project Study Area is depicted on a portion of the 2024 Hanapepe U.S. Geological Survey (USGS) 7.5-minute topographic quadrangle (Figure 1), tax map plat (Figure 2), and 2022 aerial photo (Figure 3).

Kaawanui Solar, LLC is proposing the 43-MWac Kaawanui Solar Project located along Kaumuali‘i Highway in Makaweli on Kaua‘i. The project is targeting commercial operations by 30 June 2028. The major equipment will consist of photo-voltaic (PV) solar modules, trackers, Power Conversion Stations (PCSs), Battery Energy Storage System (BESS) containers, and Generator Step-Up transformers (GSUs). The 43-MW collection will be routed to a proposed 57/69 kV project substation and related interconnection and ancillary facilities, the “Kaawanui Substation.” The project will be sited within an approximately 268.4-acre Preliminary Project Study Area. The project area, which houses the project infrastructure, will be a smaller subset of the Preliminary Project Study Area.

1.2 Regulatory Context

This CIA supports compliance for the Kaawanui Solar Project with:

- The mandate set forth by the Hawai‘i State Constitution (Articles IX and XII), courts, Hawai‘i Revised Statutes (HRS), and Hawai‘i Administrative Rules (HAR) and other Hawai‘i State laws requiring government agencies to promote and preserve cultural beliefs, practices, and resources of Native Hawaiians and other ethnic groups
- The State of Hawai‘i’s environmental review process under HRS §343, which requires consideration of the proposed project’s potential effects on cultural practices and cultural features in order to “promote responsible decision making” (HRS §343)
- The State of Hawai‘i’s historic preservation review process under HAR §13-275-6 and §13-284-6, which requires the identification and mitigation of adverse effects proposed by a potential project in order to “promote the use and conservation of historic properties for the education of the citizens of Hawai‘i” (HAR §13-275-6)

A Ka Pa‘akai Analysis is a legal framework that requires government agencies to consider the impact of proposed land and water use on Native Hawaiian rights. The framework was established by the Hawai‘i State Supreme Court in 2000 in the case Ka Pa‘akai O Ka ‘Āina vs. Land Use Commission, State of Hawai‘i.

The County of Kaua‘i Planning Department has indicated a need for a Ka Pa‘akai Analysis to attend this proposed project. The purpose of the present Ka Pa‘akai Analysis to 1) assist the Planning Department and any other relevant agencies in their effort to ensure the applicant has sufficiently assessed that the proposed project/action will not harm traditional and customary

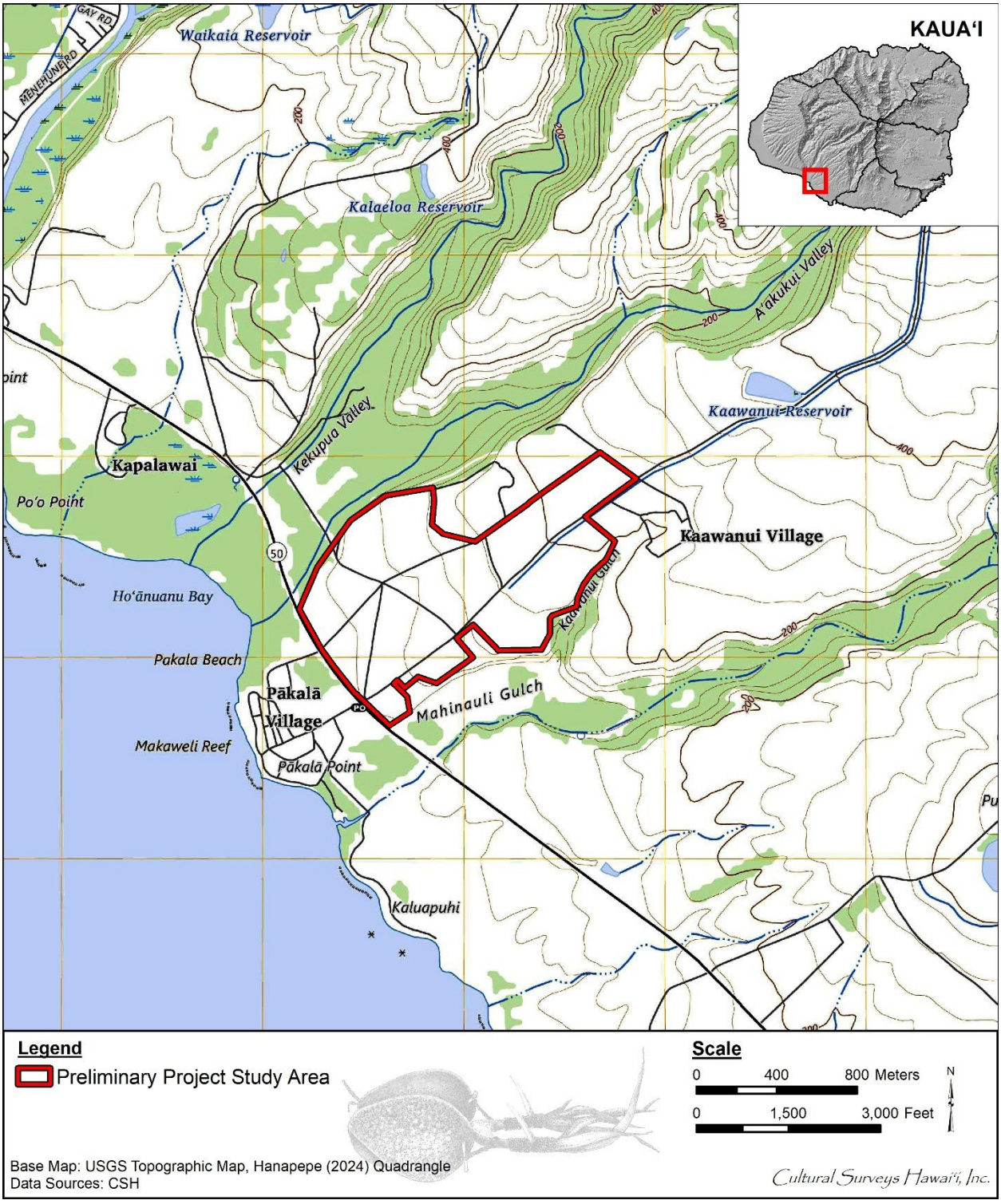

Figure 1. Portion of the 2024 Hanapepe USGS 7.5-minute topographic quadrangle showing the location of the Preliminary Project Study Area

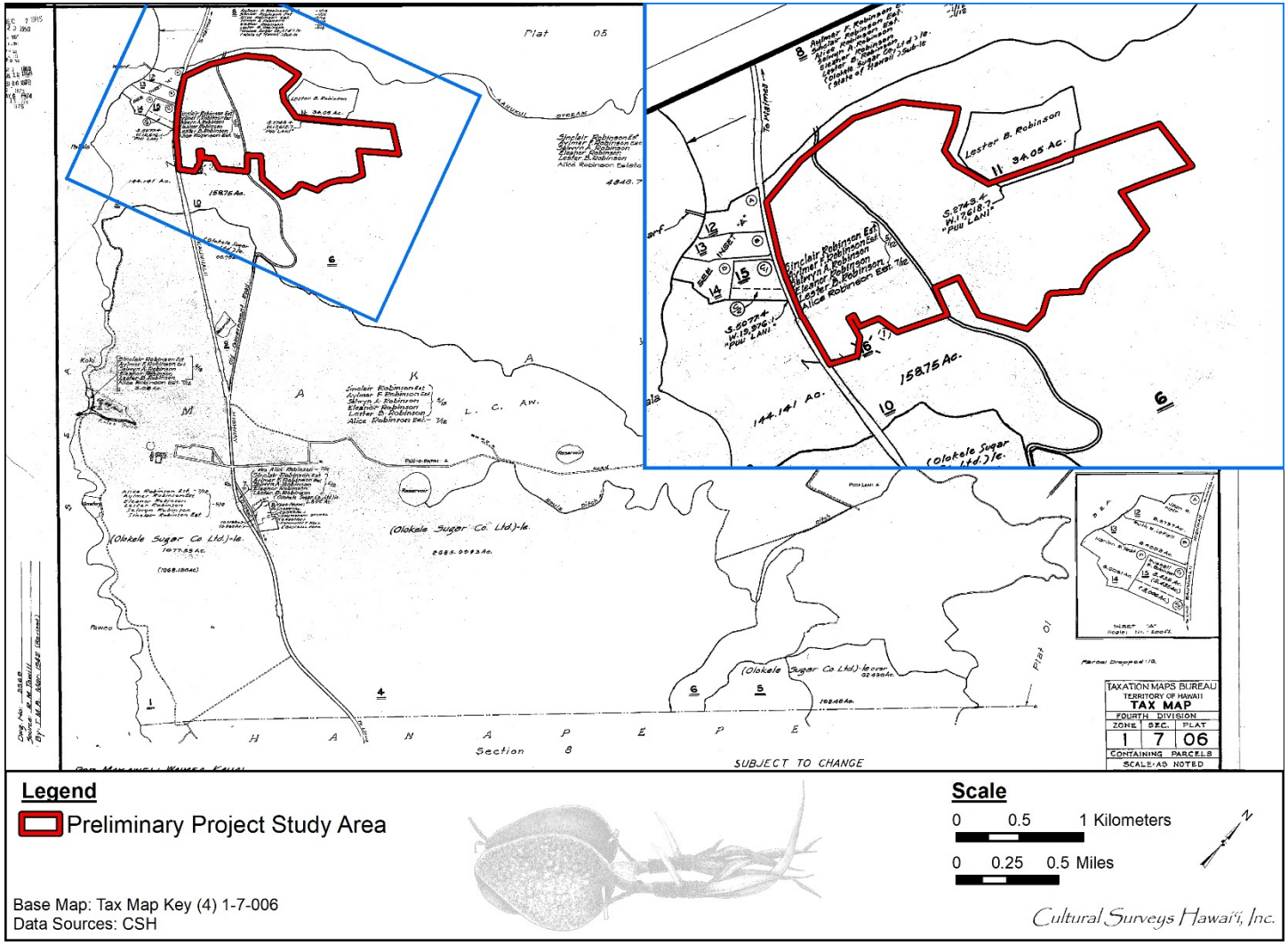

Figure 2. Tax Map Key (TMK) (4) 1-7-006 showing the Preliminary Project Study Area in portions of parcels 006 and 010 (Hawai‘i TMK Service 2025)

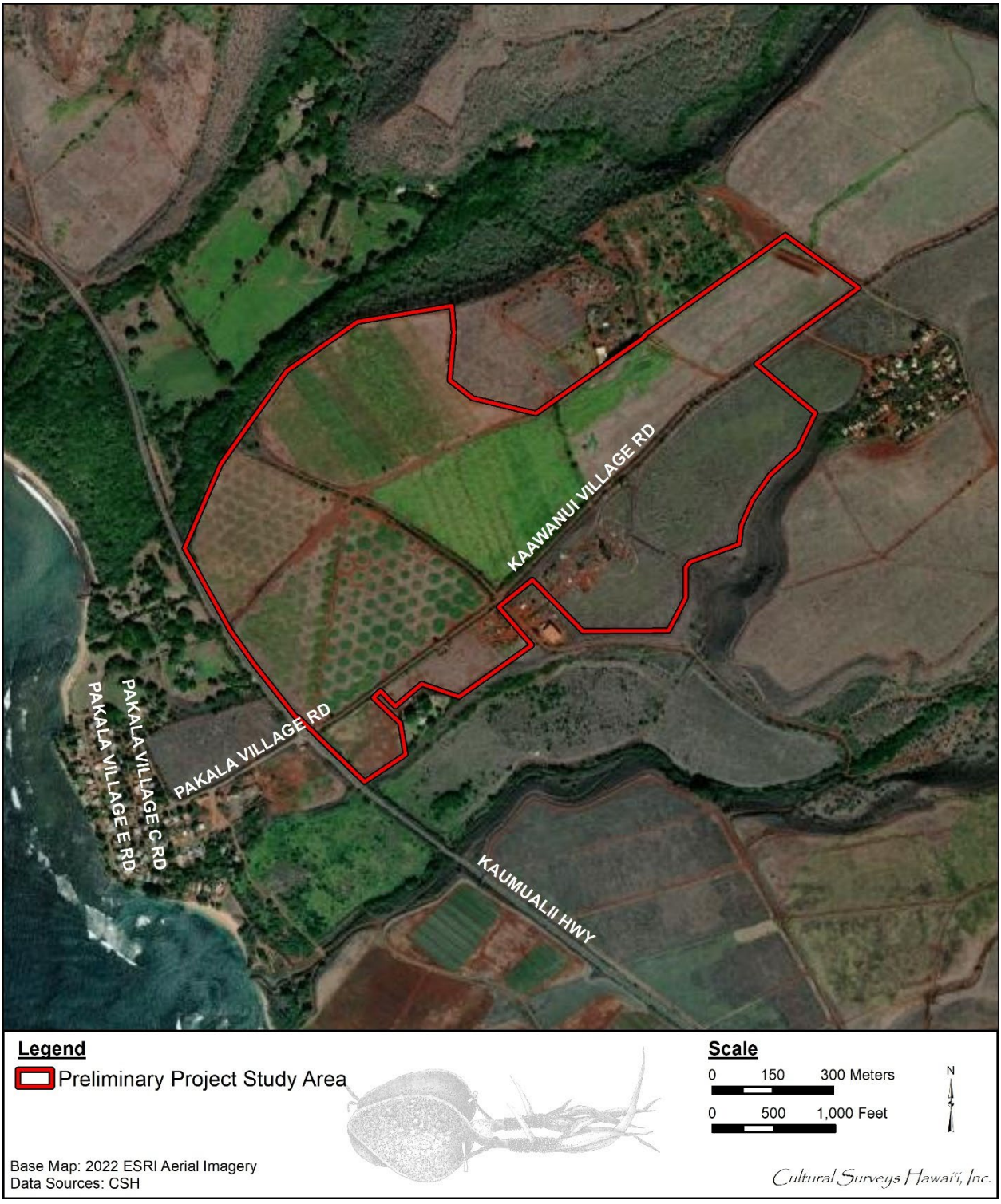

Figure 3. Aerial photograph of the Preliminary Project Study Area (ESRI 2022)

practices exercised by Native Hawaiians; and 2) to provide sufficient documentation to support the applicant's assessment.

This work is designed to address the letter and spirit of the following:

- *Ka Pa‘akai O Ka‘aina v. Land Use Commission* (94 Hawai‘i 31), in which the Hawai‘i Supreme Court established a three-part analytical framework to assist the state and counties in fulfilling their constitutional obligation to preserve and protect traditional and customary practices exercised by Native Hawaiians and any other concerned parties, to the extent feasible, and
- The mandate set forth by the Hawai‘i State Constitution (Articles IX and XII), courts, HRS, HAR, and other Hawai‘i State laws requiring government agencies to promote and preserve cultural beliefs, practices, and resources of Native Hawaiians and other ethnic groups.

1.3 Document Purpose

This CIA contains information gathered from archival research and consultation, compiled to "analyze the impact of a proposed action on cultural practices and features associated with the project area" (Environmental Council 1997). Cultural practices and cultural features may include traditional cultural properties (TCPs), designated significant historic properties under State of Hawai‘i significance Criterion e, pursuant to HAR §13-275-6 and §13-284-6. Significance Criterion e refers to historic properties that "have an important value to the native Hawaiian people or to another ethnic group of the state due to associations with cultural practices once carried out, or still carried out, at the property or due to associations with traditional beliefs, events or oral accounts—these associations being important to the group's history and cultural identity" (HAR §13-275-6 and §13-284-6).

The purpose of the Ka Pa‘akai Analysis is to assist the client and responsible overseeing agencies to ensure the applicant has sufficiently assessed that the proposed project/action will not harm traditional and customary practices exercised by Native Hawaiians; and to provide sufficient documentation to support the overseeing agency's assessment.

In Ka Pa‘akai O Ka ‘Aina v. Land Use Commission, the Hawai‘i Supreme Court

> [...] articulated an analytical framework to assist state agencies in balancing the State‘s obligation to protect traditional and customary practices against private property (as well as competing public) interests, by requiring specific findings and conclusions about:

1) the identity and scope of 'valued cultural, historical, or natural resources' in the relevant area, including the extent to which traditional and customary native Hawaiian rights are exercised in relevant area;
2) the extent to which those resources—including traditional and customary native Hawaiian rights—will be affected or impaired by the proposed action; and
3) the feasible action, if any, to be taken by the [agency] to reasonably protect native Hawaiian rights if they are found to exist. [*Ka Pa‘akai O Ka ‘Aina v. Land Use Comm’n*, 94 Hawai‘i 31, 35, 47 and 52–53, 7 P.3d 1068, 1072, 1084 and 1089–90 (2000)]

1.4 Natural Environment

The 268.4-acre Preliminary Project Study Area is in the *ahupua‘a* of Makaweli off the western coast of Kaua‘i. The *ahupua‘a* of Makaweli comprises approximately 21,844 acres, bounded on the west by Waimea Ahupua‘a and on the east by Hanapēpē Ahupua‘a. Its *mauka* (inland, toward the mountains) edge runs along the Waimea-Hanalei District border including Mt. Wai‘ale‘ale and part of the Alaka‘i Swamp. A large portion of upper Makaweli Ahupua‘a lies in the Nā Pali–Kona Forest Reserve. The Preliminary Project Study Area is situated in the more *makai* (seaward) portion of Makaweli, within gently sloping lands situated between Kekupua Valley to the north and Ka‘awanui Gulch to the south.

The Preliminary Project Study Area is located on the drier leeward coast of Kaua‘i, where it receives an average of 20 inches in annual rainfall (Giambelluca et al. 1986). The Preliminary Project Study Area has a variety of vegetative habitats including open grassy areas and heavy *kiawe* (*Neltuma pallida*) forest. The vegetative zones are described in the *Manual of Flowering Plants of Hawai‘i, Volume I*, as “Coastal Dry Forest - Kiawe (Prosopis) Forest, subtype inland kiawe forest” which

> often has an open woodland aspect. It occurs in low, warm areas, especially in dry situations near the coasts on all of the main islands, primarily below 300m in elevation. This community is usually very species-poor and consists almost exclusively of species introduced since the 19th century. [Wagner et al. 1990:62]

1.4.1 *Nā Lepo* (Soils)

According to the U.S. Department of Agriculture (USDA) Soil Survey Geographic (SSURGO) database (2001) and soil survey data gathered by Foote et al. (1972), the Preliminary Project Study Area primarily consists of Makaweli series soils—specifically Makaweli silty clay loam, 0 to 6% slopes (MgB); Makaweli stony silty clay loam, 6 to 12% slopes (MhB); and Makaweli stony silty clay loam, 6 to 12% slopes (MhC) (Figure 4). Makaweli soils are described as follows:

> […] well-drained soils on uplands on the island of Kauai. These soils developed in material weathered from basic igneous rock. They are gently sloping to steep. Elevations range from nearly sea level to 500 feet. The annual rainfall amounts to 20 to 35 inches. Three-fourths of it occurs from October through March. The mean annual soil temperature is 74° F […]
>
> These soils are used for irrigated sugarcane, pasture, and homesites. The natural vegetation consists of kiawe, lantana, fingergrass, klu, koa haole, and piligrass. [Foote et al. 1972:90]

A few small pockets of Nonopahu clay, 2 to 10% slopes (NnC) are present throughout the Preliminary Project Study Area (see Figure 4). Nonopahu soils are described as:

> […] moderately well drained soils on uplands on the island of Kauai. These soils developed in material weathered from basic igneous rock relatively high in olivine. They are gently sloping to moderately sloping. Elevations range from nearly sea level to 800 feet. The annual rainfall amounts to 23 to 40 inches. The mean annual soil temperature is 74° F […]

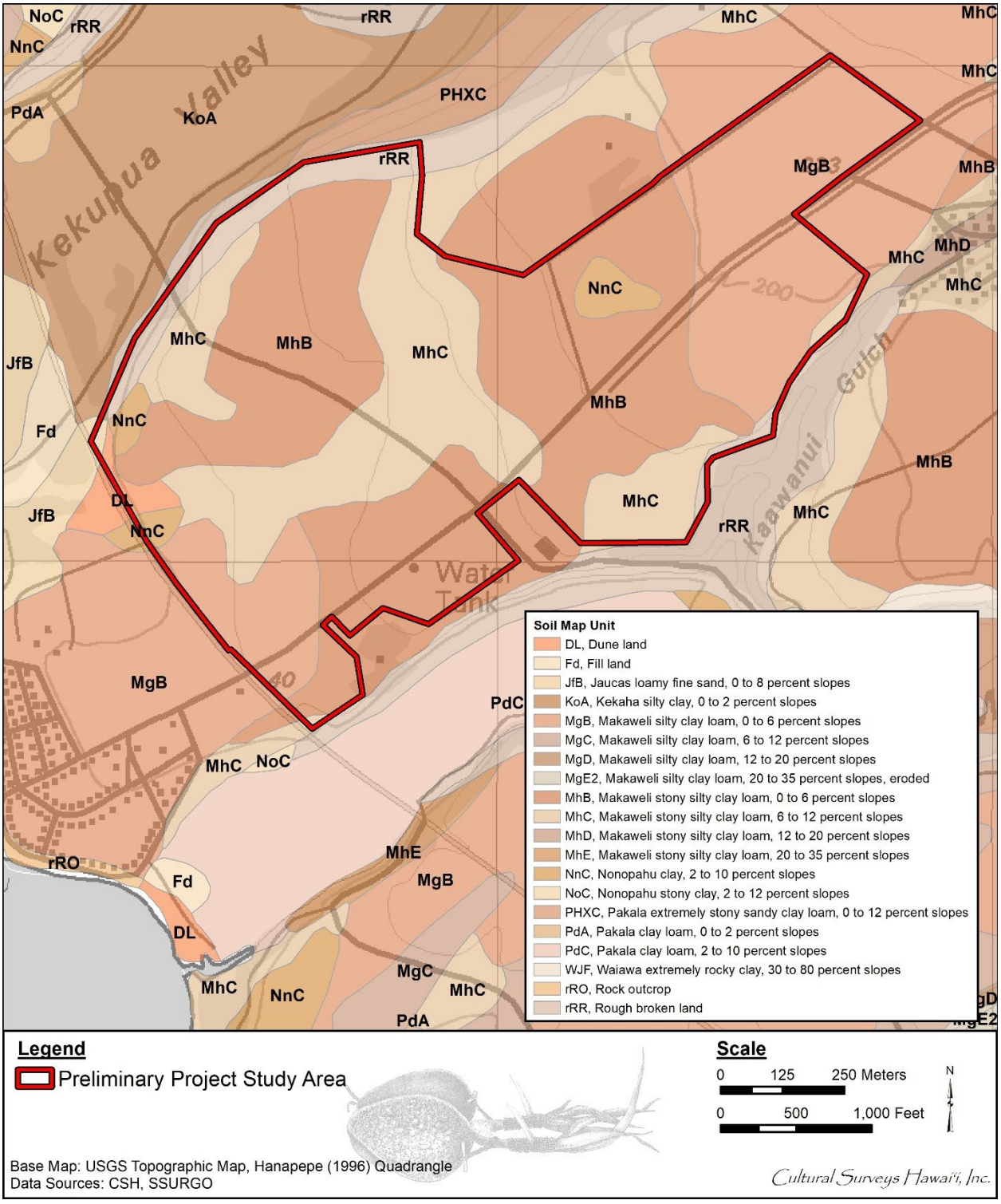

Figure 4. Overlay of *Soil Survey of the Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii* (Foote et al. 1972), indicating soil types within and surrounding the Preliminary Project Study Area (USDA SSURGO 2001)

> These soils are used for irrigated sugarcane and pasture. The natural vegetation consists of koa haole, klu, and feather fingergrass. [Foote et al. 1972:100]

A small area of Dune land (DL) (see Figure 4) is along the *makai* boundary of the Preliminary Project Study Area. This miscellaneous land type

> […] consists of hills and ridges of sand-size particles drifted and piled by wind. The hills and ridges are actively shifting or are so recently fixed or stabilized that no soil horizons have developed. The sand is dominantly from coral and seashells. This miscellaneous land type occurs in coastal areas on the islands of Maui and Kauai. Elevations range from nearly sea level to 150 feet. The annual rainfall amounts to 15 to 90 inches. [Foote et al. 1972:29]

Areas of Rough broken land (rRR) are found along the northern and southern boundaries of the Preliminary Project Study Area, correlating with the edges of Kekupua Valley and Ka‘awanui Gulch, respectively (see Figure 4). This miscellaneous land type is characterized as “very steep land broken by numerous intermittent drainage channels […] It occurs in gulches and on mountainsides on all the Islands except Oahu” (Foote et al. 1972:119). This land type is generally used for watershed and wildlife habitat but is also used in some places for pasture and woodland.

1.4.2 *Nā Ua* (Rains)

Precipitation is a major component of the water cycle accountable for depositing fresh water on local flora. Pre-Contact *kānaka ʻōiwi* (Native Hawaiians) recognized two distinct annual seasons. The first, known as *kau* (period of time, especially summer) lasts typically from May to October and is a season marked by a high-sun period corresponding to warmer temperatures and steady trade winds. The second season, *hoʻoilo* (winter, rainy season) continues through the end of the year from November to April and is a much cooler period when trade winds are less frequent, and widespread storms and rainfall become more common (Giambelluca et al. 1986:17). Typically, the maximum rainfall occurs in January and the minimum in June (Giambelluca et al. 1986:17).

Each small geographic area on Kaua‘i had a Hawaiian name for its own rains. According to Akana and Gonzalez (2015):

> Our kupuna had an intimate relationship with the elements. They were keen observers of their environment, with all of its life-giving and life-taking forces. They had a nuanced understanding of the rains of their home. They knew that one place could have several different rains, and that each rain was distinguishingable from another. They knew when a particular rain would fall, its color, duration, intensity, the path it would take, the sound it made on the trees, the scent it carried, and the effect it had on people. [Akana and Gonzalez 2015:XV]

There are several named rains within the Makaweli Ahupua‘a, including the Kapa‘ahoa or Kapakapa‘ahoa, Kiu, Maka‘upili, Pa‘ūpili, and ‘Ūkiukiu (Akana and Gonzalez 2015:65, 67, 105–106, 173, 227).

The Kapa‘ahoa rain is associated with Olokele, a valley, and Kahana, an *ʻili āina* (land division whose chief pays tribute to the chief of the *ahupuaʻa* of which it is a part, rather than directly to the king) and valley, in Makaweli. It is mentioned in a *makena*, or lament, composed for ‘Emalani Kaleleonalani.

Aia ka ua i Olokele	There is the rain at Olokele
He ua Kapa‘ahoa ko Kahana	A Kapa‘ahoa rain belongs to Kahana
He ua hanahanai ‘o‘opu ‘ai lehua	A rain that nurtures the lehua-eating ‘o‘opu fish
He i‘a kia ahi manu no Mokihana	A fish that attracts birds of Mokihana

[Akana and Gonzalez 2015:65]

Kapa‘ahoa is also mentioned in a lament for Lono-opio composed by Pelekaia.

Ku‘u hoa i ka ua Kapa‘ahoa o Kahana	My companion in the Kapa‘ahoa rain of Kahana
Ku‘u hoa pili i ke anu o ka mauna	My close companion in the cold of the mountain

[Akana and Gonzalez 2015:65]

Kapa‘ahoa is also known as Kapakapa‘ahoa. The Kapakapa‘ahoa rain is mentioned in a *kanikau*, or lament, composed for Ka‘ahumanu.

Ku‘u hoa o ka wai ‘ula me ka wai ‘iliahi	My dear friend of the red water and the ‘iliahi-colored water
Kapakapa‘ahoa o Kahana	Kapakapa‘ahoa rain of Kahana
Ua ‘Ūkiukiu o Hikilei	‘Ūkiukiu rain of Hikilei
Maka‘ūpili o Pe‘ape‘a, ‘oia [*‘a*]*ne‘i*	Maka‘ūpili rain of Pe‘ape‘a, so it is

[Akana and Gonzalez 2015:67]

The *kanikau* also mentions the ‘Ūkiukiu and Maka‘upili rains. According to Akana and Gonzalez (2015:67), the ‘Ūkiukiu rain has been recorded by Fornander as being a “teasing rain,” with high wind gusts. The Maka‘upili rain is also associated with Pe‘ape‘a, a *pu‘u* (hill) in Makaweli. It is mentioned in the legend of Kapakohano.

> *‘Olelo ‘o Kanaenae, he lepo waiwai ‘ole, ua ihola ka ua Maka‘upili o uka o Pe‘ape‘a, kahe maila ka ka ‘omaka wai, ku maila ka ‘ehu o ka lepo, ‘a‘ohe kaua, moeia.*
>
> Kanaenae said the soil was worthless. Then the Maka‘upili rained in the uplands of Pe‘ape‘a, the stream flowed from its source, the dust from the ground rose up; there would be no war, so he slept.
>
> [Akana and Gonzalez 2015:173]

The Pa‘ūpili rain is associated with Pe‘ape‘a. The Pa‘ūpili rain is mentioned in a *makena* composed for the passing of Kamehameha IV.

He ua Pa‘ūpili ko Pe‘ape‘a	Pe‘ape‘a has a Pa‘ūpili rain
Ke kahiko maila i ka la‘au	It is adorning the trees
‘O ke koa, pulu ka lau o ka ‘ama‘u	The koa, the ‘ama‘u fronds are soaked
Lau palai o Mahaikona	Palai fronds of Mahaikona

[Akana and Gonzalez 2015:227]

The Kiu rain of Makaweli is described as a mist in the name chant composed for Wahinaloha.

‘A‘ala ka ‘iliahi o Makaweli	The ‘iliahi tree of Makaweli is fragrant
‘A‘ala ke kiele me ke kupukupu	The kiele plant and ferns are fragrant
E a‘oa‘o ana ke ‘ala	The fragrance confers
Me ka lehua maka noe i ke anu	With the lehua maka noe shrub in the cold
Anu mā‘e‘ele i ka noe a ke Kiu	Numb with cold in the mist of the Kiu
‘A‘ala ka hala o Māpuana i ke kai	The hala trees of Māpuana by the sea are fragrant

[Akana and Gonzalez 2015:105–106]

1.4.3 *Nā Makani* (Winds)

Similar to rain, *makani* (wind) were named for various reasons such as describing the intensity or direction of the wind, relating the wind to a story, or even relating the wind to the landscape. David Malo, a Native Hawaiian historian, explains some general terms related to wind:

> […] There was the *kona*, a wind from the south, of great violence and of wide extent. It affected all sides of an island, east, west, north, and south, and continued for many days […] The *kona* wind often brings rain, though sometimes it is rainless […] The *hoolua*, a wind that blows from the north, sometimes brings rain and sometimes is rainless […] The *hau* is a wind from the mountains, and they are thought to be the cause of it, because this wind invariably blows from the mountains outwards towards the circumference of the island. [Malo 1951:14]

A‘e loa is a term given to the prevailing northeasterly trade winds (Andrews 1922:27; Nakuina 1992:138; Pukui and Elbert 1986:4) along with *A‘e* (Andrews 1922:26; Nakuina 1992:138; Pukui and Elbert 1986:3), *Moa‘e* (Andrews 1922:432; Nakuina 1992:140; Pukui and Elbert 1986:249), and *Moa‘e Lehua* (Andrews 1922:432; Pukui and Elbert 1986:249).

In the *mo‘olelo* of Hi‘iakaikapoliopele, the goddess Pele chants the winds of the various places within Kaua‘i. Below is a section of the chant that introduces the wind names of Makaweli:

A pā noua ka makani o Kaua‘i	The winds of Kaua‘i blow, urged on
Puhuia ka makani a La‘a	The winds of La‘a are sent forth
Ke ahe Ko‘olauwahine, ka makani o lalo	The Ko‘olauwahine breeze, a wind from below
‘O Kaua‘i ka‘u i ‘ike	Kaua‘i is what I see and know
[…]	[…]
He Kiuwa‘ula ko Kikīaola	Kīkīaola has a Kiuwai‘ula wind
He Wau‘alae ko Koai‘e	Koai‘e has a Wai‘alae wind
He Kumulipoho‘ouluali‘i ko Mokihana	Mokihana has a Kumulipoho‘ouluali‘i wind
He Waikea ko Waiahulu	Waiahulu has a Waikea wind
He Pūnohu‘ula ko Makaweli	Makaweli has a Pūnohu‘ula wind
[Ho‘oulumāhiehie 2008a:16]	[Ho‘oulumāhiehie 2008b:15–16]

The Pūnohu‘ula wind of Makaweli is also mentioned by Hi‘iakaikapoliopele as she and her *‘aikāne* (friend), Wahine‘ōma‘o and Pa‘ūopala‘ā, sailed through Kaua‘i on their journey to bring Lohi‘auipo to Hawai‘i Island to marry her sister, Pele.

> *‘O Makaweli ka ‘āina, ‘o Pūnohu‘ula ka makani, a no ‘one‘i ka ‘ōlelo ‘ia ‘ana, ‘e lawe ke ō, he Hinana, ka i‘a kuhi lima, makani o Pohākomo.’* [Ho‘oulumāhiehie 2008a:253]
>
> The land is Makaweli, and the wind if the Pūnohu‘ula, and it is for this place that the sayings goes, ‘Take provisions; the Hinana, like the fish easily caught by hand, is the wind of Pohākomo’. [Ho‘oulumāhiehie 2008b:237]

In the *mo‘olelo* “the Wind Gourd of La‘amaomao,” Pāka‘a and his son Kūapāka‘a are descendants of the wind goddess La‘amaomao whose traditional home was in a gourd that also contained all the winds of Hawai‘i. They control the winds of Hawai‘i contained in the gourd by chanting their names. Kūapāka‘a’s chant mentioned no specific wind name for the Makaweli Ahupua‘a. However, within the *mauka* region of Makaweli Ahupua‘a, there is a place called Kahana, where the wind Kapa‘ahoa blows:

> There, see the wind,
> A wind, the wind gourd of La‘amaomao,
> The Kiu, the Ko‘olauwahine breeze
> [of Kaua‘i] where I left it,
> Calling out to the multitudes, to the row of mountains,
> A cloud sign of the scattering wind,
> A cloud formed by winds gathering a Kapa‘a,
> There they are, the winds of Kaua‘i
>
> […]
>
> Waipao is of Waimea,
> Kapaahoa is of Kahana,
> Makaupili is of Pe‘ape‘a
> Aoao is of Hanapēpē
>
> [Nakuina 1992:52–53]

1.4.4 *Nā Kahawai* (Streams and Freshwater)

Makaweli, along with its neighboring *ahupua‘a*, Waimea and Hanapēpē, were all abundant with freshwater resources. Handy and Handy (1972) shared that

> […] fresh-water fish were abundant in the great streams (Waimea, Makaweli, Hanapepe) which drained the boggy uplands of central Kaua‘i. That island [Kaua‘i], being quite old geologically, was blessed with very large streams. [Handy and Handy 1972:275]

Makaweli River is formed by the joining of Mokuone and Kahana streams. These streams are fed by water from Alaka‘i Swamp. Kahana Stream also joins with a stream that flows out of Olokele Canyon (Handy and Handy 1972:432).

Handy (1940:63–64) observed numerous terraces along the banks of Makaweli River:

> At the end of the road up the east side of Makaweli River about 2 miles from the highway, there are terraces completely cultivated extending for about a quarter of a mile along the east bank. Crossing the stream and ascending on the west side, a terrace area, still intensively cultivated in taro, extends for about a third of a mile along the stream bank. Above this point and as far as the junction of the Olokele and Mokuone Streams, all the flatlands on both the east and west sides of the river are covered with abandoned terraces. Bennett speaks of terraces in Olokele Canyon, which branches off from Makaweli Valley at the juncture of their streams. [Handy 1940:63–64]

Makaweli River flows into the Waimea River which bounds the western side of Makaweli Ahupua‘a (Handy and Handy 1972:405). Handy and Handy (1972:275) also noted the flatlands where Waimea and Makaweli rivers meet were “still intensively cultivated in wet taro” in 1935.

Historical accounts describe the Waimea River as abundant with fish including *‘o‘opu* (Hawaiian freshwater goby; *Lentipes concolor*) and *hinana* (young *‘o‘opu*) (Titcomb 1972:122–123; Wichman 2003:6).

> The river itself was generous in its gift of *‘o‘opu* (goby). Once a year the spawn of the *‘o‘opu* (*hinana*) swam down the rivers to the sea in such numbers that they touched the skin of anyone entering the water. *Hinana* were only one or two inches in length and were easily netted. They quickly became a favorite food. Better yet, after a season in the ocean the *hinana* returned as adult *‘o‘opu* to their spawning grounds, and their life cycle began again. [Wichman 2003:6]

The spirited act of *hinana* harvesting is described in Margaret Titcomb’s (1972:122–123), *Native Use of Fish in Hawaii*.

> *Hinana* (spawn) were especially popular as dainty food.
>
> By the mouth of the river of Waimea, Kauai, was a multitude of men and women along the banks, for those were good days in which to catch *hinana* in nets. The fish were as plentiful as rubbish in that land when the *hinana* season came. The natives there call it “*ke i‘a ili kanaka o Waimea*” (the fish of Waimea that touches the skin of man) (75.51).
>
> The *hinana* was a fish of which the natives of Waimea and thereabouts were so fond that they hardly shared with others […] *Hinana* was *i‘a pi ia* (fish stingily regarded). ‘There were people so lucky in fishing that they were said to have skins like Ku‘ula (‘ili Ku‘ula). If there were such persons in a locality only they were allowed to dive into the water with *hinana* nets. No others went into the water at that time, for that would counteract the influence or *mana* of the diver. If there were only one such person she had to go alone. Strangely, all the *‘ili Ku‘ula* people I knew were women.
>
> […] The spawn, *hinana*, a very popular food, were gathered in vast quantities in certain areas. Even today the coming of this fish is worth talking about. (1940) An informant from Waimea, Kauai, says that the well-known fish of the land has appeared (May). This fish was well liked from the time of our ancestors. “*‘Ai wale*

> *i ka hinana, ka i‘a kaulana o ka ‘aina.*” (Eat freely of the *hinana*, the well-known fish .of the land.) [Titcomb 1972:122–123]

1.4.5 *Ka Lihi Kai a me Ka Moana* (the Coast and Ocean)

The *makai* portion of Makaweli is known for its various surfing spots as well as a landing area for boats/ferries. Pākalā Beach is a popular surfing spot amongst *kama‘āina* (native born) of Makaweli and its neighboring *ahupua‘a*. Toward the west side of Pākalā Village there is a surf spot given the name “Infinities” by Randy Wier, who surfed waves at Pākalā during the summer as a teenager and “compared them to surfing into infinity” (Clark 2002:122). Another surfing spot located at the “second-reef site outside of Pakala, or Infinities” is known as Tigers (Clark 2002:356). The spot was initially named for Tiger Espere, who surfed the site in the early 1970s along with Carlos Andrade and Kaleo Hookano, however, over the years, the name has been reinforced due to numerous sightings of tiger sharks in the area (Clark 2002:356). The surfing spot known as Big Rights is also located south of Pākalā Point (Clark 2002:28).

Makaweli Landing, also known as the Robinson Landing, is a small private boat harbor which accommodates a private ferry service operated by Ni‘ihau Ranch that transports livestock, food, dry goods, and other necessities between Lehua Landing on Ni‘ihau and the Makaweli Landing in Pākalā (Clark 2002:226, 330). The “section of beach fronting Pakala next to Robinson Landing” is known as Mahinauli Beach (Clark 2002:226).

The Kaulakahi channel that runs between the *moku* (district) of Waimea and Ni‘ihau was said to be plentiful in marine resources supplying “such fishes as the *ulua* (jackfish), *mahimahi* (dolphin), *ono* (mackerel), and *a‘u* (marlin), all large enough to feed many people” (Wichman 2003:6). Furthermore, Wichman states that people in Waimea benefited from the “reef fish, sea urchins, squid, and seaweeds (Wichman 2003:6)” of the shallow water.

In a nineteenth century oral history project, Kanakahelelā identified two “fishing grounds” in Makaweli. Descriptions of both “fishing grounds” are given below.

> Hiki is another fishing ground. Pueohulunui is in Mahinauli. It is a promontory on the upland side of Kikihale. When it appears to be above the ditch of Kekupua and a sand mound appears to be close by [that is one landmark]. When the black stone in Mahinauli appears above Pu‘u Ale‘ale‘a, that marks the position of the canoe. There are many more fishing grounds but their landmarks cannot be clearly defined. [HEN 1885:2]

> Hinaia is another fishing ground. When the point [or brow] of Kikī a ‘Ola appears above the black hill of Kailiopaia that is the lower mark. There is a black rock on Mahinauli when it looks as though it had been lifted and placed on Pakala a rocky point on the shore, that marks the position of the canoe. [HEN 1885:2]

The place name “Kailiopaia” is marked within the *‘ili* of Kapalawai on the 1891 Gay and Robinson map (see Figure 6). In Francis Gay’s ledger notes on Makaweli place names, he translates Ka ‘Ilio pa ‘ia as the fenced in dog. He records that “it is a pond which was named for a supernatural dog” (Gay 1873:2). It is interesting to note the literal meaning of Kekupua:

> Demigod or culture hero, especially a supernatural being possessing several forms (as Kama-pua‘a and Laenihi); one possessing mana; to possess kupua (magic) powers. [Pukui and Elbert 1986:186]

It is not certain where this particular Ka ‘Ilio pa ‘ia is located or if it is the same as the one noted on the 1891 Gay and Robinson map (see Figure 6).

1.5 Built Environment

The 268.4-acre Preliminary Project Study Area is situated in lands used for sugarcane agriculture for over 100 years. It is bounded on the southwest by Kaumuali‘i Highway and on the northeast by agricultural parcels. Plantation settlements Pākalā Village and Ka‘awanui Village are situated nearby to both the *makai* and *mauka* ends of the Preliminary Project Study Area, respectively. Overhead electrical transmission lines are located along Ka‘awanui Village Road.

Plantation-era infrastructure is found throughout the Preliminary Project Study Area and includes a network of unpaved and paved plantation roads, culverts, ditches, stone walls, and water storage. Remnants of plantation-era machinery are scattered about the landscape, particularly in the central eastern portion of the Preliminary Project Study Area. A section of the Old Government Road, which predated the plantation in this area, bisects the *makai* portion of the Preliminary Project Study Area.

Since the demise of the sugarcane industry the Preliminary Project Study Area has been used for various other agricultural endeavors and ranching. Most of the Preliminary Project Study Area currently comprises fallow agricultural fields and fenced pens used for grazing cattle and water buffalo, which have been sectioned into named “pens” (Figure 5). A taro patch surrounded by an electrified fence is present in the northern tip of the Preliminary Project Study Area.

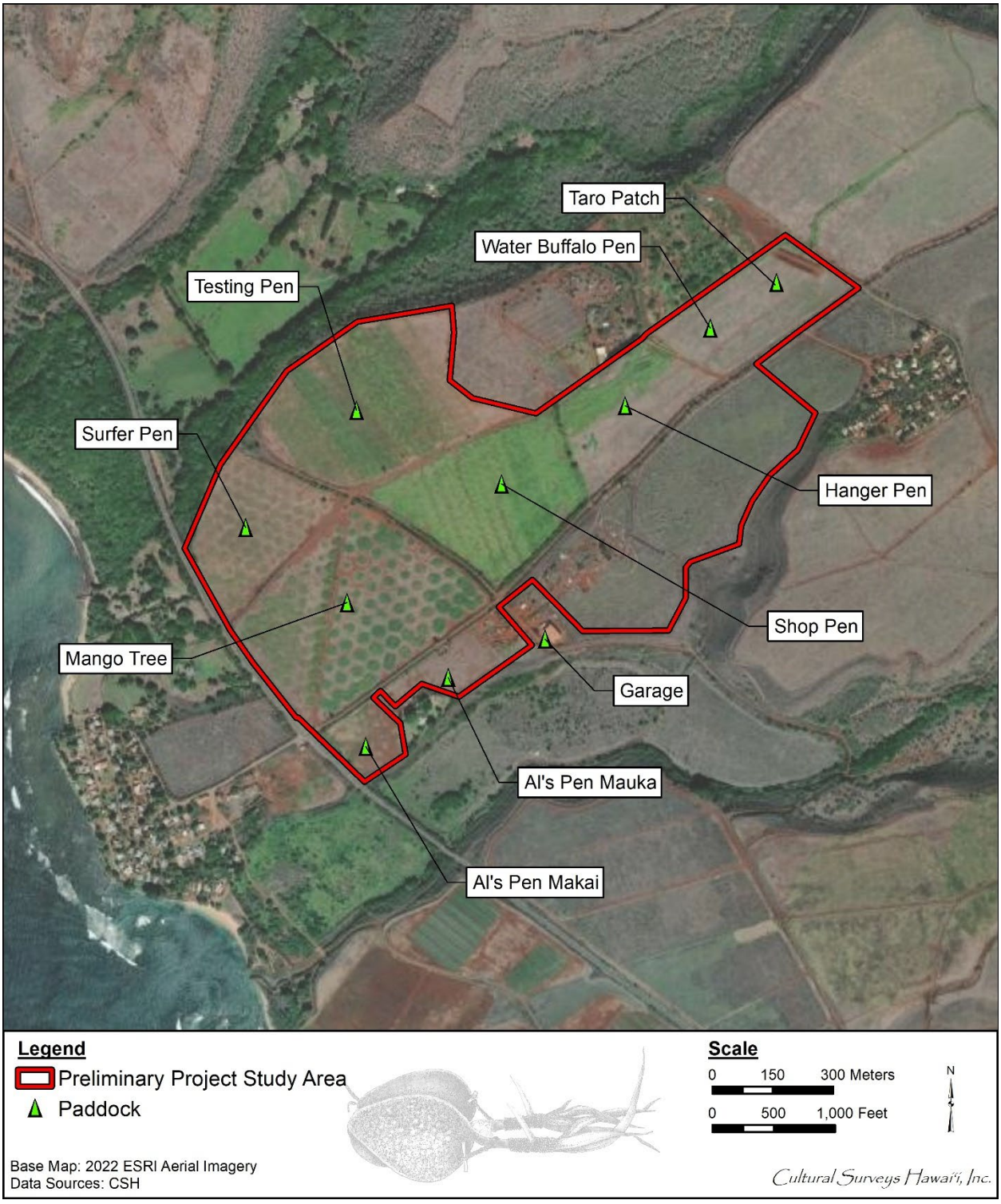

Figure 5. Aerial photograph (ESRI 2022) showing the various named modern pens utilized in modern agricultural activities throughout the Preliminary Project Study Area after sugar plantation closure

Section 2 Methods

2.1 Archival Research

Research centers on Hawaiian activities including *ka‘ao* (legends), *wahi pana* (storied places), *‘ōlelo no‘eau* (proverbs), *oli* (chants), *mele* (songs), traditional *mo‘olelo* (stories), traditional subsistence and gathering methods, ritual and ceremonial practices, and more. Background research focuses on land transformation, development, and population changes beginning with the early post-Contact era to the present day.

Cultural documents, primary and secondary cultural and historical sources, historic maps, and photographs were reviewed for information pertaining to the study area. Research was primarily conducted at the CSH library. Other archives and libraries including the Hawai‘i State Archives, the Bishop Museum Archives, the University of Hawai‘i at Mānoa’s Hamilton Library, Ulukau, the Hawaiian Electronic Library (Ulukau.org 2014), the State Historic Preservation Division (SHPD) Library, the State of Hawai‘i Land Survey Division, the Hawaiian Historical Society, and the Hawaiian Mission Houses Historic Site and Archives are also repositories where CSH cultural researchers gather information. Information on Land Commission Awards (LCAs) were accessed via Waihona ‘Aina Corporation’s Māhele database (Waihona ‘Aina 2025), the Office of Hawaiian Affairs (OHA) Papakilo Database (Office of Hawaiian Affairs 2015), and the Ava Konohiki Ancestral Visions of ‘Āina website (Ava Konohiki 2015).

2.2 Consultation

Throughout the course of this assessment, an effort was made to contact and consult with Native Hawaiian Organizations (NHO), agencies, and community members including descendants of the area to identify individuals with cultural expertise and/or knowledge of the *ahupua‘a* of Makaweli.

2.2.1 Scoping for Participants

The CSH cultural department commences our consultation efforts by utilizing our previous community contact list to facilitate the interview process. We then review an in-house database of *kūpuna* (elders), *kama‘āina*, cultural practitioners, lineal and cultural descendants, Native Hawaiian Organizations (NHOs; includes Hawaiian Civic Clubs and those listed on the Department of Interior’s NHO list), and community groups. CSH also contacts agencies such as SHPD, OHA, and the appropriate Island Burial Council where the proposed project is located for their response on the project and to identify lineal and cultural descendants, individuals and/or NHO with cultural expertise and/or knowledge of the study area. CSH is also open to referrals and new contacts.

2.2.2 Talk Story Sessions

Prior to the interview, CSH cultural researchers explain the nature of cultural consultation, how the consent process works, the project purpose, the intent of the study, and how their *‘ike* (knowledge) and *mana‘o* (thought, opinion) will be used in the report. The interviewee is given an Authorization and Release Form to read and sign.

“Talk Story” sessions range from the formal (e.g., sit down and *kūkā* [consultation, discussion] in the participant’s place of choice over set interview questions) to the informal (e.g., email,

telephone, Zoom-type, or face-to-face consultation, hiking to cultural sites near the study area and asking questions based on findings during the field outing). In some cases, interviews are recorded and transcribed later.

CSH may also conduct group interviews, which range in size. Group interviews usually begin with set, formal questions. As the group interview progresses, questions are based on interviewee's answers. Group interviews are always transcribed and notes are taken. Recorded interviews assist the cultural researcher in 1) conveying accurate information for interview summaries, 2) reducing misinterpretation, and 3) missing details to *mo‘olelo*.

CSH seeks *kōkua* (assistance) and guidance in identifying past and current traditional cultural practices of the study area. Those aspects include general history of the *ahupua‘a*; past and present land use of the study area; knowledge of cultural sites (for example, *wahi pana*, archaeological sites, and burials); knowledge of traditional gathering practices (past and present) within the study area; cultural associations (*ka‘ao* and *mo‘olelo*); referrals; and any other cultural concerns the community might have related to Hawaiian cultural practices within or in the vicinity of the study area.

2.2.3 Interview Completion

After an interview, CSH cultural researchers transcribe and create an interview summary based on information provided by the interviewee. Cultural researchers give a copy of the transcription and interview summary to the interviewee for review and ask that they make any necessary edits. Once the interviewee has made those edits, CSH incorporates their *‘ike* and *mana‘o* into the report. When the draft report is submitted to the client, cultural researchers then prepare a finalized packet of the participant's transcription, interview summary, and any photos taken during the interview. We also include a thank you card and honoraria.

"*I ulu no ka lālā i ke kumu*—the branches grow because of the trunk," is an *‘ōlelo no‘eau* (#1261) shared by Mary Kawena Pukui with the simple explanation: "Without our ancestors we would not be here" (Pukui 1983:137). As cultural researchers, we often lose our *kūpuna* but we do not lose their wisdom and words. We routinely check obituaries and gather information from other community contacts if we have lost our *kūpuna*. CSH makes it a point to reach out to the *‘ohana* (family) of our *kūpuna* who have passed on and pay our respects including sending past transcriptions, interview summaries, and photos for families to have on file for genealogical and historical reference.

Section 3 Traditional Background

3.1 *Ka‘ao* and *Mo‘olelo* (Legends and Stories)

Hawaiian storytellers of old were greatly honored; they were a major source of entertainment and their stories contained teachings while interweaving elements of Hawaiian lifestyles, genealogy, history, relationships, arts, and the natural environment (Pukui and Green 1995:XII). According to Pukui and Green (1995:XII), storytelling is better heard rather than read for much becomes lost in the transfer from the spoken to the written word and *ka‘ao* are often full of *kaona* or “double meanings.”

Ka‘ao are defined by Pukui and Elbert as a “legend, tale [...], romance, [and/or], fiction” (Pukui and Elbert 1986:108). *Ka‘ao* may be thought of as oral literature or legends, often fictional or mythic in origin, and have been “consciously composed to tickle the fancy rather than to inform the mind as to supposed events” (Beckwith 1970:1). Conversely, Pukui and Elbert define *mo‘olelo* as a “story, tale, myth, history, [and/or] tradition” (Pukui and Elbert 1986:254). The *mo‘olelo* are generally traditional stories about the gods, historic figures or stories that cover historic events and locate the events with known places. *Mo‘olelo* are often intimately connected to a tangible place or space.

In differentiating *ka‘ao* and *mo‘olelo* it may be useful to think of *ka‘ao* as expressly delving into the *wao akua* (realm of the gods), discussing the exploits of *akua* (gods) in a primordial time. However, it is also necessary to note there are exceptions, and not all *ka‘ao* discuss gods of an ancient past. *Mo‘olelo* on the other hand, reference a host of characters from *ali‘i* (royalty), to *akua* and *kupua* (supernatural beings), to finally *maka‘āinana* (commoners), and discuss their varied and complex interactions within the *wao kānaka* (realm of man). Beckwith elaborates, “In reality, the distinction between ka‘ao as fiction and mo‘olelo as fact cannot be pressed too closely. It is rather in the intention than in the fact” (Beckwith 1970:1). Thus, a so-called *mo‘olelo*, which may be enlivened by fantastic adventures of *kupua*, “nevertheless corresponds with the Hawaiian view of the relation between nature and man” (Beckwith 1970:1).

Both *ka‘ao* and *mo‘olelo* provide important insight into a specific geographical area, adding to a rich fabric of traditional knowledge. The preservation and passing on of these stories through oration remains a highly valued tradition. Additionally, oral traditions associated with the study area communicate the intrinsic value and meaning of a place, specifically its meaning to both *kama‘āina* as well as others who also value that place.

The following section presents traditional accounts of ancient Hawaiians living in the vicinity of the Kaawanui Solar Preliminary Project Study Area. Many relate an age of mythical characters whose epic adventures inadvertently lead to the Hawaiian race of *ali‘i* and *maka‘āinana*. The *ka‘ao* in and around the Preliminary Project Study Area shared below are some of the oldest Hawaiian stories that have survived. They still speak to the characteristics and environment of the area and its people.

3.1.1 The Menehune

According to Rice (1977:40), within the Kumulipo, a Native Hawaiian creation chant, “it is told that there were a great many men and women from Ka-houpo-o-Kane who went to Kahiki-kapaia-

haa, and in those emigrations there was one called He-ma, the progenitor of the Maori race. When He-ma went, at about that time the Menehune people went, too, from Kauai-a-mano-ka-lani-po." The following tells of the Menehune and their return to Kaua‘i:

> When the Menehune returned to Kauai, they began to increase. The tribe grew until there were enough grown men to form two rows, reaching all the way from Makaweli to Wailua. There were so many, counting the women and children, that the only fish of which each could have one to himself, was the shrimp.
>
> The menehunes were a small people, but they were broad and muscular and possessed of great strength. Contrary to common belief, they were not possessed of any supernatural powers, but it was solely on account of their tremendous strength and energy and their great numbers that they were able to accomplish the wonderful things they did. [Rice 1977:40]

The Menehune are accredited with being a very skillful race able to complete tasks at extraordinary speed, intelligent and organized, and able to survive on their own without the need to borrow or take from others. No one truly knew the exact location where the Menehune lived, but many believed they lived in caves and hollow logs. On Kaua‘i, there are many trails built by the Menehune.

> On the cliffs of Kauai are still seen many paths and roads which were built by them and which are still called Ke-ala-pii-a-ka-Menehune, the Trails-of-the-Menehunes. These trails are still to be seen above Hanapepe, Makaweli, Mana, Napali, Milolii, Nualolo, and Hanapu. In the little hollows on the cliffs, they planted wild taro, yams, ferns, and bananas. No cliff was too steep for them to climb. [Rice 1977:40–42]

However, one curious fact about the Menehune is that they did not work in the daylight to avoid being seen by people. Many of the tasks they undertook were completed in a single night.

> They also built many *heiaus,* including those of Elekuna, Poli-hale, and Kapa-ula, near Mana, Malae at Wailua, on the Lihue side of the river, just above the road, and Poli-ahu on the high land, between the branching of the Wailua River and the Opai-kaa stream. All the stones for these *heiaus* were brought from Makaweli. The Menehunes formed two lines, and passed the stones from man to man They also built the *heiau* at Kiha-wahine one Ni‘ihau.
>
> After their return, the Menehunes built the wall of Alakoko fishpond at Niumalu. Standing in two rows they passed the stones from hand to hand all the way from Makaweli to Niumalu Daylight came before they had finished the work, and two gaps were left in the wall. These were filled in by Chinamen in later years, and the pond is still in use. [Rice 1977:40–42]

3.1.2 The Story of Ola

In another tale, The Story of Ola, Rice (1977:54–56) tells that king of the Ke-na-mu on Kauai-o-mano-ka-lani-po was Kualu-nui-pauku-moku-moku, Big-Kualu-of-the-Broken-Rope. While living in Waimea, he falls in love with a princess by the name of Kuhapuola from Waimea. After spending many happy days with her, the king returns to his duties at Kekaha. He calls Kuhapuola

to his side giving to her his personal items such as his *malo* (loincloth)*,* and *lei niho palaoa,* a necklace made of many braided strands of human hair, fastened by a hooked ivory ornament. His instruction was that these items could be worn only by high chiefs and that if a boy were born to her, she should name him after the king's family, but if a girl were born, she might select the name herself. Here Rice relates how a princess saves her son from disaster:

> After a time the princess gave birth to a boy, whom she called Kualu-nui, as she had been told. As the child grew older he became very mischievous and headstrong. He refused to regard the *kapu* of the *kahunas* and was always in trouble.
>
> At one time the people had gathered to make a *kahe* or fishtrap in the Makaweli River to catch the fish which the freshet would carry down. An order was issued that no one was to touch the *kahe* until the *kahuna* had removed the *kapu.* But the boy disregarded this order and ate of the fish that had been caught. In great anger the *kahuna* caught him and took him to Kekaha where he was tried the following day before the king.
>
> Hearing that her son was in trouble, the princess hurried to her *kahuna,* asking what she should do to save her boy. The *kahuna* answered, 'Take the *malo* and the *lei palaoa* of the king and six *kukui* nuts. You must walk to Kekaha, and as you go you must be ever tossing the six nuts into the air and catching them. If you drop one, your child will die. If you catch all, his life will be spared.' The princess at once set out for Kekaha. Her journey was successful, for not once did she let fall a nut.
>
> When she came into the presence of the king, who was sitting in the *heiau* of Hauola, she saw her son bound, ready to be offered as a sacrifice for his crime of breaking the sacred *kapu.* Going before the king, she showed him his *malo* and *lei palaoa.* He at once recognized the princess and spared the life of his son, whom he called Ola, or Life, and named him as his successor. [Rice 1977:54–56]

Similar to Rice's (1977:54–56) version, Wichman (1998:23–24) recounts the same *mo‘olelo*. About a quarter of the way up the valley is an area called Wai‘awa‘awa, "bitter water," where the spring Kukui-‘ula, "red candlenut tree," gives fresh water. A red *kukui* (Candlenut tree; *Aleurites moluccana*) tree was planted there by Kahapula, the mother of Ola, after she was banished to Mokuone by her husband, Kū‘alunuipaukūmokumoku. When they parted, he gave her a loincloth, a feather cape, a helmet, and a spear as gifts for their unborn son and a *kukui* nut that she was told to plant as soon as she arrived.

> Many years later, Ola was captured by the evil high priest and condemned to death. Kahapula prayed and was told to pick two kukui nuts from the tree she had planted. Then she was to juggle them in the air as she walked from Mokuone to Waiawa, a distance of at least fifteen miles. If she arrived without dropping either nut, Ola would be saved. Going slowly and carefully, with her friends and retainers clearing the path ahead of her, Kahapula succeeded.
>
> Ola is still remembered for having ordered the building of the Menehune Ditch in Waimea. In order to pay for Kīkīaola, the Waimea irrigation ditch, Ola promised the Menehune one shrimp each as payment for their work. Ola ordered his chief officer, Pi‘i, to make sure there were enough shrimp. Naturally, Pi‘i ordered every

> ‘opae (shrimp) that could be found in the streams of the canyon complex to be gathered. He went himself to make sure, and in so doing, he left his name in several places.
>
> One such place was ‘Opae-pi‘i, ‘climbing shrimp’ or ‘Pi‘i’s shrimp,’ for certainly he would have placed a taboo on all shrimp so that no one would eat them. A path in upper Mokuone is called Ala-pi‘i, ‘upward path’ or ‘Pi‘i’s path.’ Near the end of the canyon is Hali‘opae, ‘fetched shrimp.’ So it seems that the inhabitants of Mokuone where Ola had grown up provided all the shrimp they had. In the end, every Menehune did have one shrimp apiece. [Wichman 1998:23–24]

The Kipapa-a‘ola trail is said to have been developed by Ola to guide travelers safely through the Alaka‘i Swamp area. The portion of the trail lined with planks of *hāpu‘u* (*Cibotium splendens*, formerly called *C. chamissoi*) is said to have been constructed by *menehune* and is called the Ka-lā‘au-kipapa-a-Ola (Wooden pavement of Ola) (Wichman 2003:12–13).

3.1.3 Hōlua-manu

In the following legend, Rice (1977:104) tells of a boy named Manu who lived in the mountains of Waimea and delighted in the sport of *hōlua* (slide). This *wahi pana* is understood to be the location of the Kahōluamanu House, a property owned by Gay & Robinson.

> Manu, Bird, lived with his parents in the mountains above Waimea Valley. His greatest delight was to slide down the steep *pali* sides on his sled.
>
> This sport caused his parents a great deal of worry, for they feared that he would meet with some accident. So they placed two immense rocks on the path he used most. But Manu could not be stopped by this. He jumped over the rocks and struck the path below. However, he did not enjoy the jar, so he climbed back and rolled one of the rocks down to the river, where it stands today, as large as a house.
>
> Manu’s parents prevented his crossing the river by the sending a freshet to stop him. The freshet would start at the same moment the Manu started to slide and it would always reach the river first.
>
> At last, discouraged, Manu took his sled and went to the highest *pali* of the Waimea Valley, where he enjoyed his sport without interruption. This spot is still called Ka-holua-manu, or the Slide-of-Manu. [Rice 1977:104]

Like Rice (1977:104), Wichman (1998:24) recounts the *mo‘olelo* about Kahōluamanu. In the Olokele canyon, the highest cliff is known as Kahōluamanu.

> Manu’s parents made him do all the work preparing the family’s food, from growing it to cooking it, so he had no time to learn to ride the *hōlua* (sled). This sled was about eight inches wide and its narrow platform was connected to two runners. It needed a specially constructed course down a steep hillside, usually of rocks smoothed with water-polished pebbles and covered with rushes. A *hōlua* rider would take a running start, throw himself on top of the sled, and attempt to slide down—a steep, quick, and dangerous rush straight down. Superb riders could actually stand on the sled, but a fall at that speed onto rocks often proved fatal. One day Manu watched a Menehune slide on the *hōlua*. The Menehune fell and the sled

> was broken. Manu repaired the sled during the little spare time he had from his parent's demands. In return, the Menehune gave him a specially crafted *hōlua* of his own. Each time Manu tried to ride his sled, his parents either threw stones onto the course or caused freshets in the stream where the course ended. Manu left them in disgust and became a famous *hōlua* rider on this slide especially built for him by the Menehune. [Wichman 1998:24]

3.1.4 The Girl and the *Mo‘o*

Rice (1977:104) retells the story of The Girl and the Mo-o. In this retelling a young girl living at Holuamanu in the mountains above Makaweli caused her parents so many troubles that they sent her to live with a lizard or crocodile *mo‘o* (reptile; water spirit).

> Living at Holuamanu in the mountains above Makaweli was a family in which there was one child, a girl, who caused her parents much annoyance by her continual crying. In a cave beneath a waterfall nearby lived a *mo‘o,* which looked like a huge lizard or crocodile. One day when the child was crying as usual, her father in anger pushed her out of the house, saying thoughtlessly, 'Go to the *mo‘o* and live with him.'
>
> The child hurried to the cave and was welcomed by the *mo‘o,* who gladly cared for her and carefully brought her up. On warm, sunny days the girl and the monster would come out above the waterfall and sun themselves. If any approached, the *mo‘o* would jump over the fall into the cave, and the girl would spring through a hole which led into it.
>
> As the years went by, the girl's parents grew more and more anxious to recover their child. Asking advice of the *kahuna,* they were told to cover the hole above the waterfall with a net, to trap her. One day they did as they were told. Soon the *mo‘o* and the girl came out. The parents approached and the *mo‘o* safely jumped over the waterfall, but the girl was caught in the net. Realizing that there was no escape for her, she cried, 'In my youth you drove me from you. The *mo‘o* cared for me. Now, why do you want me again?'
>
> She was like a wild animal, struggling to be free. Not daring to keep her so near the cave, the parents moved to Waimea, where gradually they tamed the girl until she grew accustomed to her old life. She had become very beautiful, and later she was married to the prince of Waimea. [Rice 1977:104]

3.2 *Wahi Pana* (Storied Places)

Wahi pana are legendary or storied places in a landscape. These legendary or storied places can be a variety of natural or human-constructed features. Oftentimes dating to the pre-Contact period, many but not all *wahi pana* are connected to particular *mo‘olelo*. Dr. Davianna McGregor outlines the types of natural and human-made structures that may constitute *wahi pana*:

> Natural places have mana or spiritual power, and are sacred because of the presence of the gods, the akua, and the ancestral guardian spirits, the ‘aumakua. Human-made structures for the Hawaiian religion and family religious practices are also sacred. These structures and places include temples, and shrines, or heiau, for war,

> peace, agriculture, fishing, healing, and the like; pu‘uhonua, places of refuge and sanctuaries for healing and rebirth; agricultural sites and sites of food production such as the lo‘i pond fields and terraces slopes, ‘auwai irrigation ditches, and the fishponds; and special function sites such as trails, salt pans, hōlua slides, quarries, petroglyphs, gaming sites, and canoe landings. [McGregor 1996:22]

As McGregor makes clear, *wahi pana* can refer to natural geographic locations such as streams, peaks, rock formations, ridges, offshore islands and reefs, or they can refer to Hawaiian land divisions such as *ahupua‘a* or *‘ili*, and man-made structures such as fishponds. In this way, the *wahi pana* of Makaweli tangibly link the *kama‘āina* of Makaweli to their past. It is common for places and landscape features to have multiple names, some of which may only be known to certain *‘ohana* or even certain individuals within an *‘ohana*, and many have been lost, forgotten or kept secret through time. Place names also convey *kaona* and *huna* (secret) information that may have political or subversive undertones. Before the introduction of writing to the Hawaiian Islands, cultural information was exclusively preserved and perpetuated orally. Hawaiians gave names to literally everything in their environment, including individual garden plots and *‘auwai* (water courses), house sites, intangible phenomena such as meteorological and atmospheric effects, *pōhaku* (stone), *pūnāwai* (springs), and many others. According to Landgraf (1994:v), Hawaiian *wahi pana* “physically and poetically describes an area while revealing its historical or legendary significance.” *Wahi pana* in the vicinity of the current Preliminary Project Study Area are shown on in Imlay’s 1891 map of Gay and Robinson lands (Figure 6).

3.2.1 Makaweli Ahupua‘a

Makaweli, which means “fearful features,” refers to a landing, a land division (*ahupua‘a*) and a river in what is presently called the Waimea district on the south coast of Kaua‘i (Pukui et al. 1974:142). An *‘ōlelo no‘eau* which sheds possible light on the meaning of Makaweli and which has been passed down over time is “*Ho ‘olele ka uila o Makaweli*.” Mary Kawena Pukui translates this as, “Sending the lightning of Makaweli flying.” She explains this is a play on the word “*maka-weli*” or terrifying eyes, which refers to sending a god on an errand of destruction (Pukui 1983:117). At one time, Makaweli might have been known for this particular kind of sorcery or perhaps *akua lele* (flying gods) were commonly seen in this region. Specific information regarding this seems to have been lost over time.

Wichman (1998:22) explained there are variations of the meaning of Makaweli, which seem to correlate to *heiau* pre-Christian place of worship) and human sacrifice.

> Maka-weli has several interconnected meanings: ‘glaring, threatening eyes,’ a reference, some say, to the shining mother-of-pearl eyes of the fierce wooden idols that surrounded any *heiau* where human sacrifices were offered; ‘fearful eyes,’ of the victims themselves; and ‘terrifying eyes,’ of the idols hungry for blood. [Wichman 1998:22]

However, a more ancient name for Makaweli is Ho‘ānuanu which means “to cause cold” (Pukui et al. 1974:47). This older name is no longer used to refer to Makaweli Ahupua‘a as a whole; however, it is a name still used to refer to Ho‘ānuanu Bay along the ocean.

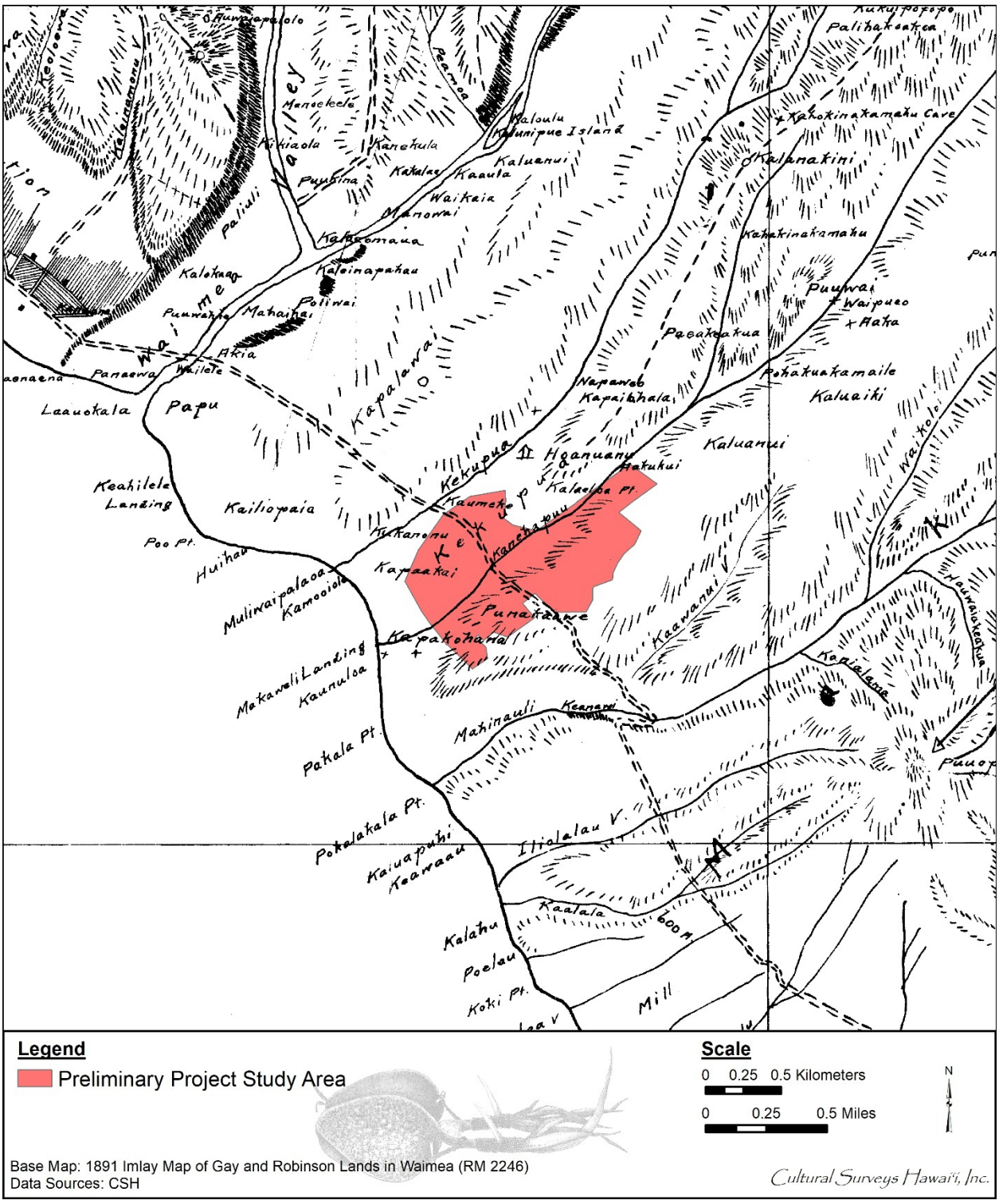

Figure 6. Portion of 1891 Imlay map of Gay and Robinson lands (RM 2246) showing place names in and around the Preliminary Project Study Area

Another interpretation of Makaweli, given by Warren Robinson, who has lived and worked the land most his life, is that Makaweli means “red eyes.” This is because of the dry, dusty climate and especially the fine red dirt Makaweli is famed for, which makes the eyes red (McGuire et al. 1999:8).

A similar meaning of “burning eyes” was given by Ed Rice during an interview. Following is an excerpt from the interview in which Mr. Rice describes this fine red dirt:

> […] the red dirt gets as fine as talcum powder […] you could stomp your foot in it, and it will rise above your head. The dust is so fine it's actually lighter than air. It just floats up. I had always thought that the “burning eyes” came from the fact […] when the wind blows that stuff does burn. I've had my eyes full of that red dirt. [McGuire et al. 1999:11]

These last two interpretations are likely to be more recent interpretations of the name, Makaweli. Mr. Rice related that he was told this interpretation in the 1960s, which was when he relocated to Hawai‘i. As with all place names, meanings may change over time according to usage or to mark events of a particular period.

3.2.2 Pākalā

Pākalā, like other Hawaiian place names can be interpreted in many ways dependent on the spelling and pronunciation. Some of these variations include Pākala (unicorn fish enclosure), Pākalā (shining sun), or Pākālā (money field). Clark (2002:279–280) included a *mo‘olelo* shared by Carlos Andrade in his conversation with a *kama‘āina* of Ni‘ihau.

> […] He told me that there were several perspectives on the name without fully committing to singling out one as being ‘right.’ Pākala with only one *kahako* on the first a could be translated as an enclosure for the unicorn fish known as kala. Pākalā, with *kahako* over the first and last a’s, has to do with the shining (*pā*) of the sun (*ka lā*). Pākalā is in the lee of Kaumakani, where the clouds and wind stop and rest, and till this day the onshore wind that is common on Pākalā on especially clear mornings has to do with the shining of the sun at this place, heating the land and causing convective winds to come in off the sea even on days when the trades are strong on the east side of Kaua‘i. Apela also told me that if the name were pronounced with all three a’s covered by the *kahako* [Pākālā], it could mean ‘money field.’ The sugarcane plantation of the Robinsons is legendary for its production of sugar in pounds per acre. A combination of lots of sunshine and abundant water from the Waimea, Hanapēpē, and Olokele valleys makes this possible. It is one of the last surviving sugar plantations because of these phenomena. Close to what is the little village of Pākalā today are the most productive of the fields, according to Apela, of the entire plantation. Hence the possibility of ‘money field,’ the fields that produced the most profit […]. [Clark 2002:279–280]

3.2.3 The Menehune Ditch

Hawaiian legends discuss the origins of the cut stone-lined *‘auwai* called Kīkīaola, popularly known as the “Menehune Ditch.” The *‘auwai* is also labeled Pe‘ekaua‘i, meaning “hidden Kaua‘i.” Wichman (1998:9) say the original settlers named the farmland in this area Pe‘e Kaua‘i after the name of their ancient homeland. In the Mahele land records, Pe‘ekaua‘i is listed as the name of an

‘ili near the Waimea coast and along the west bank of the Waimea River. The Pe‘ekaua‘i *‘auwai* watered the plain west of the Waimea River, and its most notable section transported water along the face of a cliff, some 20 feet (ft) above the river, by means of an aqueduct constructed of intricately fitted, cut, and dressed stones (Bennett 1931:23, 105–107).

Martha Beckwith (1970:329–330) associates the name Kīkīaola, meaning, “container acquired by ‘Ola” (Pukui et al. 1974:110), with three versions of the legend of Ola, an *ali‘i* of Waimea. In one version (Rice 1923:45), Ola wishes “to bring water to the taro patches of the Waimea flats […] [and] summon[s] the Menehune people [who] each bring a stone and the watercourse (Kiki-a-Ola) is laid in a single night.” In the Thrum (1908:110–111) version of the tale, Kīkīaola is not the name of the watercourse itself: “Pi is the chief of Waimea who gets the Menehune to construct for him a dam across the Waimea river and a watercourse leading from it to a place above Kiki-a-ola.” Thrum says of the *menehune*,

> Their dwelling place was in the mountains, above Waimea, near, perhaps, to a place known as Waineki […] The watercourse of Kikiaola, above the Waimea river, was built by this race of Menehunes […] The chief that encouraged this race of Menehunes to the task rejoiced greatly at hearing of and seeing the completion of the watercourse of Kikiaola, to benefit the laboring people residing at *Paliuli*, and the water flowing down its course to enable the taro to grow thriftily for their sustenance. [Thrum 1923:214, 216]

Thus, Thrum identifies the land east and adjacent to the Kīkīaola Ditch as the land (*‘ili*) of Pali‘uli, a Hawaiian word for “green cliff.” References to Pali‘uli often invoke images of an “earthly paradise of the gods” (Beckwith 1970:72). Pukui et al. (1974:178) describe “Paliuli” as a legendary land of plenty and joy, where chiefs were raised. Although, “Paliuli” is generally believed to be in the Puna District of Hawai‘i Island, many places across the island chain are also called Pali‘uli. Tradition recalls “Paliuli” as a “floating island,” found either suspended above the clouds or resting upon the earth, “at the will of its keeper” (Beckwith 1970:72). “Paliuli” is also identified as “the original paradise where the first two human beings were made and where they first dwelt” (Beckwith 1970:72). This Eden is described in chant,

> O Paliuli, hidden land of Kane,
>
> Land in Kalanai Hauola
>
> In Kahiki-ku, in Kapakapaua of Kane,
>
> Land with springs of water, fat and moist,
>
> Land greatly enjoyed by the god. [Beckwith 1970:72]

Both Thrum and Luomala refer to a “beautiful floating island,” however, Luomala (1951:23) clarifies that this island is anchored near Kaua‘i, and is the home to both the *menehune* and the *mu* (legendary people of Lā‘au-haele-mai, Kaua‘i, said to be relatives of the *menehune*). Luomala’s version of the Kīkīaola story also identifies “Kiki-a-ola […] [as] the chief of Waimea” who “seems to be the sacrifice to be offered” at the completion of the dam and watercourse of Waimea by the *menehune* (Luomala 1951:23).

The *menehune* overseer of the Pe‘ekaua‘i *‘auwai* project was named Papa‘ena‘ena, which means “red, hot, lowland,” according to information on place names collected by Francis Gay

(1873:33). In Rice’s (1923:36) version, Papa‘ena‘ena is the name of a stone on the Waimea shore. “At one time the Menehune hollowed out a huge stone, and carried it to Waimea, where the head Menehune fisherman used it as a house. It was called Papa‘ena‘ena, from his name. He sat in this house, and watched his men fish.” Wichman (1998:8) also states this is the stone Papa‘ena‘ena sat on to direct his *menehune* workers when they built the irrigation ditch, Kīkīaola, which means “container acquired by Ola.”

3.2.4 Kukui‘ula Spring

Kukui‘ula or “red candlenut” is a spring within the Wai‘awa‘awa valley.

> A red kukui tree was planted here by Kahapula, the mother of Ola, after she was banished to Mokuone by her husband, Kū‘alunuipaukūmokumoku. When they parted, he gave her a loincloth, a feather cape, a helmet, and a spear as gifts for their unborn son and a *kukui* nut that she was told to plant as soon as she arrived. [Wichman 1998:23]

3.2.5 Kahōluamanu

Kahōluamanu means “sled of Manu”; it is the highest *pali* (cliff) located in Olokele Canyon (Wichman 1998:24). This *pali* was named after Manu, a boy who was mistreated and overworked by his parents, who did not have time to learn the sport of *hōlua*.

One day, Manu watched as a Menehune slid down the hill on a *hōlua*. This Menehune unfortunately fell and his sled broke. Manu, being a kind child, repaired the Menehune’s sled in between all his chores. As a thank you, the Menehune gifted Manu a special *hōlua* sled (Wichman 1998:24).

3.2.6 *Heiau*

Heiau were pre-Contact places of worship. Construction of some *heiau* was elaborate, consisting of large communal structures, while others were simple earth terraces or shrines (McAllister 1933:8). *Heiau* are most commonly associated with important religious ceremony; large structures with platforms or altars of one or more terraces were indicative of such function (McAllister 1933:8).

‘A‘akukui Heiau rests by the Kekupua Valley and has been described as “a paved and walled heiau in good preservation” by Thrum (Bennett 1931:111; Thrum 1907:38). Bennett was unable to locate Kapakaniau Heiau (Bennett 1931:152), however, it has been recorded by Thrum that Kapakaniau Heiau was “a paved, open platform heiau; in good condition” (Thrum 1907:38). Located at the ridge near Hikilei and Kunalele valleys, Kaunumelemele Heiau is said to be as Thrum describes, “an open platform heiau in good condition” (Bennett 1931:111; Thrum 1907:38). Kūwiliwili Heiau rested in the cane fields, by Makaweli Camp 3. Thrum (1907:38) has described the *heiau* as “a large, high walled enclosure of pookanaka [human sacrifice] class now destroyed” (Bennett 1931:112). Unfortunately, not much is known about Mahaihai Heiau except that it was destroyed (Thrum 1907:38). It was previously noted on an old map by Frances Gay (Bennett 1931:111). The location of Peeamoa Heiau is unknown, however, it has been described by Thrum as “an unwalled heiau” (Bennett 1931:152; Thrum 1907:38).

Two additional *heiau*, Kaunuloa and Kuanalili, were documented in Kekupua in a nineteenth century oral history project conducted by the students of Lahainaluna School on Maui. An

interview with Kanakahelelā by a Lahainaluna student was conducted in Waimea, Kaua‘i on 22 August 1886. Kanakahelelā described

> The *Heiaus* of Kekupua
>
> 1. A‘akukui was a *heiau* that stood at *Kekupua*.
>
> 2. Kaunuloa was another.
>
> 3. Kuanalili was another.
>
> These were heiaus in which human sacrifices were offered, but Kuanalili had a *lele* altar, that is, a high place on which to lay the victims. When the *kahuna* thought that it was the proper time, then the victims were carried to A‘akukui or to Kaunuloa. Kapuahi and ‘Aimoku were priests who officiated in these *heiaus*. There were more priests but these were the principal ones. Kaumuali‘i was the chief to whom these *heiaus* belonged. There are no other places of importance there. [HEN 1885:4]

3.3 *‘Ōlelo No‘eau* (Proverbs)

Hawaiian knowledge was shared by way of oral histories. Indeed, one’s *leo* (voice) is oftentimes presented as *ho‘okupu* (“a tribute or gift” given to convey appreciation, to strengthen bonds, and to show honor and respect); the high valuation of the spoken word underscores the importance of the oral tradition (in this case, Hawaiian sayings or expressions), and its ability to impart traditional Hawaiian “aesthetic, historic, and educational values” (Pukui 1983:vii). Thus, in many ways these expressions may be understood as inspiring growth within reader or between speaker and listener:

> They reveal with each new reading ever deeper layers of meaning, giving understanding not only of Hawai‘i and its people but of all humanity. Since the sayings carry the immediacy of the spoken word, considered to be the highest form of cultural expression in old Hawai‘i, they bring us closer to the everyday thoughts and lives of the Hawaiians who created them. Taken together, the sayings offer a basis for an understanding of the essence and origins of traditional Hawaiian values. The sayings may be categorized, in Western terms, as proverbs, aphorisms, didactic adages, jokes, riddles, epithets, lines from chants, etc., and they present a variety of literary techniques such as metaphor, analogy, allegory, personification, irony, pun, and repetition. It is worth noting, however, that the sayings were spoken, and that their meanings and purposes should not be assessed by the Western concepts of literary types and techniques. [Pukui 1983:vii]

Simply, *‘ōlelo no‘eau* may be understood as proverbs. The Webster dictionary notes it as “a phrase which is often repeated; especially, a sentence which briefly and forcibly expresses some practical truth, or the result of experience and observation.” It is a pithy or short form of folk wisdom. Pukui equates proverbs as a treasury of Hawaiian expressions (Pukui 1995:xii). Oftentimes within these Hawaiian expressions or proverbs are references to places. This section draws from the collection of author and historian Mary Kawena Pukui and her knowledge of Hawaiian proverbs describing *‘āina*, chiefs, plants, and places relative to Makaweli Ahupua‘a and the larger Kona Moku.

3.3.1 *‘Ōlelo No‘eau* # 1097

This *‘ōlelo no‘eau* refers to the meaning of Makaweli and speaks of a time when a god is sent to destroy.

> *Ho‘olele ka uila o Makaweli.*
>
> Sending the lightning of Makaweli flying.
>
> A play on *maka-weli* (terrifying eyes), this saying refers to the sending of a god on an errand of destruction. [Pukui 1983:117]

3.3.2 *‘Ōlelo No‘eau* # 1662

This *‘ōlelo no‘eau* reference the moments when Waimea River would run red.

> *Ka wai ‘ula ‘iliahi o Waimea.*
>
> The red sandalwood water of Waimea.
>
> This expression is sometimes used in old chants of Waimea, Kaua‘i. After a storm Waimea Streak is said to run red. Where it meets Makaweli Stream to form Waimea River, the water is sometimes red on one side and clear on the other. The rede side is called *wai ‘ula ‘iliahi*. [Pukui 1983:179]

3.3.3 *‘Ōlelo No‘eau* # 1905

This *‘ōlelo no‘eau* describes the cloudy skies above the *moku* of Kona.

> Kukui-lau-nui-o-Kaona.
>
> *Thickly leafed kukui of Kona.*
>
> A thick cloud that shuts out the light of the sun, like a heavily leafed kukui tree. This expression was used in the Kona district of Kaua‘i. [Pukui 1983:205]

3.4 *Oli* (Chants)

Oli, according to Mary Kawena Pukui (Pukui 1995:xvi–xvii) are often grouped according to content. Chants often were imbued with *mana* (divine power); such *mana* was made manifest through themes and *kaona*. According to Pukui, chants for the gods (prayers) came first, and chants for the *ali‘i*, “the descendants of the gods,” came second in significance. Chants “concerning the activities of the earth peopled by common humans,” were last in this hierarchy (Pukui 1995:xvi–xvii). Emerson conversely states,

> In its most familiar form the Hawaiians—many of whom [were lyrical masters]—used the oli not only for the songful expression of joy and affection, but as the vehicle of humorous or sarcastic narrative in the entertainment of their comrades. The dividing line, then, between the oli and those other weightier forms of the mele, the inoa, the kanikau (threnody), the pule, and that unnamed variety of mele in which the poet dealt with historic or mythologic subjects, is to be found almost wholly in the mood of the singer. [Emerson 1965:254]

While *oli* may vary thematically, subject to the perspective of the *ho‘opa‘a* (chanter), it was undoubtedly a valued art form used to preserve oral histories, genealogies, and traditions, to recall

special places and events, and to offer prayers to *akua* and *‘aumākua* (family gods) alike. Perhaps most importantly, as Alameida (1993:26) writes, “chants […] created a mystic beauty […] confirming the special feeling for the environment among Hawaiians: their *one hānau* (birthplace), their *kula iwi* (land of their ancestors).”

3.4.1 Kūnihi Ka Mauna

This *oli* was first composed and chanted by Hi‘iakaikapoliopele when she arrived to Wailua, Kaua‘i. In this *oli*, many place names of Kaua‘i are referenced.

Kunihi ka mauna i ka la‘i, e,	The mountain turns the cold shoulder,
O Wai-aleale, la, i Wai-lua;	Facing away from Wai-lua,
Huki iluna ka popo ua o Ka-wai-kini;	Albeit in time of fair weather.
Alai ia a‘e la e Nounou,	Wai-kini flaunts, toplofty, its rain-cap;
Nalo ka Ipu-ha‘a,	And the view is cut off by Nounou,
Ka laula ma uka o Ka-pa‘a, e.	Thus Humility Hill is not seen.
I pa‘a i ka leo, he ole e hea mai.	Nor Ka-pa‘a’s broad upland plain.
E hea mai ka leo, e!	You seal your lips and are voiceless:
	Best to open your mouth and speak.

[Emerson 1915:19]

In the *oli,* the line “*Huki iluna ka popo ua o Ka-wai-kini*” is chanted. Kawaikini is a *pu‘u* located *mauka* of Makaweli. There are many variations and stylings of this *oli* as many people and organizations use this chant as an *oli kāhea*, a permission chant performed to request entrance.

3.5 *Mele* (Songs)

The following section draws from the Hawaiian art of *mele*, poetic song.

> Words and word combinations were studied to see whether they were auspicious or not. There were always two things to consider the literal meaning and the *kaona*, or ‘inner meaning.’ The inner meaning was sometimes so veiled that only the people to whom the chant belonged understood it, and sometimes so obvious that anyone who knew the figurative speech of old Hawai‘i could see it very plainly. There are but two meanings: the literal and the *kaona*, or inner meaning. The literal is like the body and the inner meaning is like the spirit of the poem. [Pukui 1949:247]

> The Hawaiians were lovers of poetry and keen observers of nature. Every phase of nature was noted and expressions of this love and observation woven into poems of praise, of satire, of resentment, of love and of celebration for any occasion that might arise. The ancient poets carefully selected men worthy of carrying on their art. These young men were taught the old *meles* and the technique of fashioning new ones. [Pukui 1949:247]

Few late nineteenth, twentieth, and twenty-first century *mele* concern or mention Makaweli Ahupua‘a. These particular *mele* may also be classified as *mele wahi pana* (songs for legendary or historic places). *Mele wahi pana* such as those presented here may or may not be accompanied by *hula* (dance) or *hula wahi pana* (dance for legendary or historic places). As the Hula Preservation Society notes,

> Hula Wahi Pana comprise a large class of dances that honor places of such emotional, spiritual, historical, or cultural significance that chants were composed for them. Only the composers of the chants could know the deepest meanings, as they would be reflections of their feelings and experiences […] Since the subjects of Wahi Pana compositions are extremely varied, their implementation through hula are as well. Coupled with the differences from one hula style and tradition to the next, Hula Wahi Pana can be exceptionally diverse. They can be done sitting or standing, with limited body movement or wide free movement; with or without the use of implements or instruments; with the dancers themselves chanting and/or playing an implement or being accompanied by the *ho‘opa‘a* [drummer and *hula* chanter (memorizer)]. Beyond the particular hula tradition, what ultimately determines the manner in which a Hula Wahi Pana is performed are the specific place involved, why it is significant, the story being shared about it, and its importance in the composer’s view. [Hula Preservation Society 2014]

3.5.1 Kaua‘i Mele

This *mele* from Kaua‘i highlights the complexities of local color and topography with mention of Makaweli.

Auhea wale oe, e ka Makani Inu-wai?	Whence art thou, thirsty wind,
Pa kolonahe i ka ili-kai,	That gently kissest the sea,
Hoohui me ka Naulu,	Then, wed to the ocean breeze,
Na ulu hau i ka hapapa.	Playest fan with the bread-fruit tree?
Anō au ike i ke ko Hala-li‘i,	Here sprawl Hala-ili’s canes,
I keia wa nana ia Lehua.	There stands bird-haunted Lehua.
Pale II	Canto II
Aia i Waimea ku‘u haku-lei;	My wreath-maker dwells at Waimea.
Hui pu me ka wai ula ili-ahi,	Partnered is she to the swirling river;
Mohala ka pua i ke one o Pawehe;	They plant with flowers the sandy lea,
Ka lawe a ke Koolau	While the bearded surf tossed by the breeze,
Noho pu me ka ua punonohu ula i ka nahele,	Vaunts on the hills as the sun-bow,
Ike i ka wai kea o Makaweli;	Looks on the crystal stream Makaweli,
Ua noho pu i ka nahele	And in the wildwood makes her abode.
Me ka lei hinahina o Maka-li‘i.	With Hinahina of silvern wreaths.
Liilii ka uka o Koae‘a;	Koae‘a’s a speck to the eye,
Nana i ka ua lani-pili,	Under the low-hanging rain-cloud,
Ka o-ō, manu le‘a o ka nahele.	Woodland home of the plaintive o-ō.
I Pa-ie-ie au, noho pu me ke anu.	From frost-bitten Pa-ie-ie
E ha‘i a‘e oe I ka puana:	I bid you, guess me the fable:
Ke kahuna kalai-hoe o Puu-ka-Pele.	Paddle-maker of Pele’s mount.

[Emerson 1965:110–111]

Section 4 Historic Background

In ancient times, Kaua‘i was divided into five traditional *moku*: Halele‘a, Ko‘olau, Puna, Kona, and Nā Pali. However, after the battle of Wahiawa in 1824, the land of Kaua‘i was redistributed and district boundaries changed. The new district names became Hanalei, Kawaihau, Līhu‘e, Kōloa, and Waimea; the Waimea District consisted of Waimea, Makaweli, and Hanapēpē.

4.1 Pre-Contact Period

Immediately west of Makaweli Ahupua‘a (where the current Preliminary Project Study Area is located) is the *ahupua‘a* of Waimea, the largest *ahupua‘a* on the island of Kaua‘i. Early accounts from this *ahupua‘a* indicate a coastal settlement pattern. Cultural layers and burials have been recorded along the shore, which is a typical pattern throughout the Hawaiian Islands. In addition to coastal settlements, the fertile Waimea River Valley had the resources to support a substantial population, evidenced by early agricultural settlements. For example, Hammatt and Ida (1993:36) identified a prehistoric cultural layer (State Inventory of Historic Places [SIHP] # 50-30-05-04012) in present-day Waimea Town, and the layer was charcoal carbon dated to AD 910-1275. In contrast, there has not been as much modern development within the *ahupua‘a* of Makaweli and little previous archaeology has been done, but interpretations of pre-Contact land use within Makaweli can be extrapolated from Waimea. Coastal occupation and river valley settlement patterns would have mirrored those in Waimea only on a smaller scale.

Clearly Kaua‘i in general and the Waimea District in particular were largely isolated from the political intrigues and strife that marked much of late pre-Contact Hawai‘i. Studies of Kaua‘i’s political history (Fornander 1969:291–298; Hommon 1976:329–331) indicate 18 out of 24 transfers of political rule were cases of orderly succession. Prior to Cook’s arrival, there may have been only two military conflicts in the history of Kaua‘i, a raid by a Big Island chief, ca. 1460, and a dynastic struggle between the cousins Kawelo‘aikanaka and Kawelo-a-Maihunali‘i (who was aided by O‘ahu forces), ca. 1680.

To some extent, Cook’s arrival coincided with an increase in Hawaiian political and military aggression. In 1779 there were the “Goat Wars” with Ni‘ihau. In 1791, Kaua‘i forces were involved in fighting at O‘ahu (death of the Kaua‘i chief Ka‘eokiilani) and in the “Red-Mouth Gun” fighting against Kamehameha I at Hamakua, Hawai‘i. In 1796, Keawe, the son of Kamakahelei and Kiha, led a revolt against Kaumuali‘i from which Keawe emerged as *ali‘i nui* (head chief) (Kuykendall 1968:48, 51). From 1796 to 1804 a state of war existed with Kamehameha I which was rekindled in the Kaua‘i rebellion of 1824.

From Captain Cook’s landing, western impact exacerbated native political tensions. Cook’s lieutenants, George Vancouver, George Dixon, and Nathan Portlock, returned to Waimea repeatedly and established it as a major port and entrepôt. While Waimea may have always been a royal center for the *ali‘i* of Kaua‘i, this position was greatly reinforced after Western Contact.

4.2 Early Historic Period (1778 to Late 1800s)

Written accounts of Hawai‘i began when Captain James Cook anchored a mile offshore at Waimea Bay on the southwest side of Kaua‘i on 20 January 1778. The squadron consisted of two ships, the *Resolution* and the *Discovery*. Cook went ashore to investigate the availability of water

and the temperament of the people to see if they were friendly and if a trade for supplies could be negotiated:

> The very instant I leaped ashore, they all fell flat on their faces, and remained in that humble posture till I made signs to them to rise. They then brought a great many small pigs and gave us without regarding whether they got any thing [*sic*] in return or no [*sic*] indeed the most of them were present[ed] to me with plantain trees, in a ceremonious way as is usual on such like occasions, and I ratified these marks of friendship by presenting them with such things as I had with me. [Beaglehole 1974:269]

It is most likely that during much of the early historic period, Native Hawaiians in the Waimea Ahupua‘a, specifically those nearest to Waimea River, had close association with the people on the east side of the river. Cook notes the following:

> [I] took a walk up the Valley, accompanied by Dr. Anderson and Mr. Webber; conducted by one of the Natives […] Our road lay in the plantations, which were chiefly of Tara [taro], and sunk a little below the common level so as to contain the water necessary to nourish the roots. As we ranged down the coast from the East in the Ships, we observed at every Village one or more elevated objects, like Pyramids and we had seen one in this valley that we were desireous [*sic*] of going to see. Our guide understood us, but as this was on the other side of the river, he conducted us to one on the same side we were upon; it proved to be in a Morai which in many respects was like those of Otaheite. [Beaglehole 1967:269–279]

This “Morai” on the west side of the river is thought to be Keaalii Heiau. The *heiau* “on the other side of the river” was probably Mahaihai Heiau, whose location is noted on a map by Francis Gay (Bennett 1931:104, 111, see Figure 6).

In 1792, the HMS *Discovery* anchored off the bay of Waimea, Kaua‘i. Archibald Menzies, a surgeon and naturalist aboard the ship, writes about a shore visit with Captain Vancouver. The account gives a description of the dry, flat plains of Makaweli being covered with *pili* grass (*Heteropogon contortus*).

> […] in returning back in the dusk of the evening, we observed a large fire kindled a few miles to the eastward of Waimea [in the Makaweli direction], and spreading over the face of that plain country, which was mostly covered with dry, rank grass that burnt with great rapidity. This alarmed Captain Vancouver, who supposed that it might be a signal for commencing hostilities on the part of the islanders […] the fire had been kindled to burn down the old shrivelled [*sic*] grass and low vegetables, and for no other purpose whatever, which I believe was literally the case, as I recollected well that the same fields were burnt down in the same manner when I was here a few years ago. I mentioned this to Captain Vancouver, and that the natives then gave the same reason for doing it, adding that by this means the next crop of grass grew up clear and free of stumps, and was therefore better adapted for thatching their houses, which was the principal use they make of it. [Menzies 1920:32]

In this account, the Hawaiians are utilizing controlled burning as a method to promote agricultural productivity. The account portrays a picture of what the Makaweli plains looked like in 1792. It also is an indication that *pili* grass, commonly used to thatch houses, was an item that would have been gathered during traditional times.

However, on this drier southwestern side of Kaua‘i, evidence of well-terraced and cultivated areas deep in the canyons of Waimea, Makaweli, Olokele, and Hanapēpē support the idea of a large inland population rather than a coastal one. Mountain trails that led to the sea allowed for trade with coastal dwellers on the more heavily populated northern shores of Wainiha, Hanalei, and Kalalau. A particular taro variety, the *haokea*, was said to be fast-growing and well-adapted to the cold stream water and shallow soil at higher elevations. Another variety, *nā kalo a ‘Ola*, was reputed to have grown in high inaccessible places deep in the canyon recesses (Handy and Handy 1972:397). Freshets from mountain streams provided freshwater fish and shellfish such as *‘o‘opu* (*Eleotridae, Gobiidae* and *Blennidae*), *‘ōpae* (*Palaemon*), and *hīhīwai* (*Neritina granosa*). On the hillsides above the flood plains the *mōhihi* varieties of sweet potato were planted. As in other places, *kō* (sugarcane), *mai‘a* (banana), and *pia* (arrow root) would have been grown on the outer edges of cultivated patches. Other plants such as *uhi* (yam), *‘awa* (Piper methysticum), *wauke* (paper mulberry), and *olonā* (*Touchardia latifolia*) probably grew wild in the wet gulches. There would also have been *kukui* (*Aleurites moluccana*) as well as *‘ulu* (breadfruit; *Artocarpus altilis*) and *kī* (*Cordyline terminalis*). Native woods would have been utilized for floats, weapons, canoes and paddles. Bird catchers would have had access to feathers for *lei* (garland), royal *kahili* (standard), capes, and helmets. All these items would have provided the necessary food and supplies to sustain a large inland population (Handy and Handy 1972:397–400).

A few early historic documents describe areas possibly located in Makaweli, but these are intertwined with early histories of Waimea and Hanapēpē *ahupua‘a*. The history of Georg Schaffer on Kaua‘i is one such history that ties Makaweli with Waimea and Hanapēpē and involves the sandalwood trade and establishment of Russian forts and trading posts.

4.2.1 Russia’s Arrival

After Cook’s death at Kealakekua on 14 February 1779, Charles Clerke took charge and headed for Waimea once again. After provisioning at Waimea and Ni‘ihau, he sailed for Kamchatka in Russia and finally anchored at Petropavlovsk. Clerke was dying of tuberculosis and, anticipating that he might never reach England, he entrusted Captain Cook’s journal, maps, and reports with the Russian governor, Major Behm, who was returning to St. Petersburg. Behm was to pass the documents on to the British ambassador who would in turn hand them over to the proper authorities in London. These events led to the Russians being the first to learn about Cook’s discovery of the Hawaiian Islands before the rest of Europe and the world (Joesting 1984:41). This set the stage for Russian involvement in the Hawaiian Islands.

The Russians recognized the importance of Hawai‘i for provisioning their ships along the fur trade route between the Northwest and China. In 1815, a Russian-owned ship full of furs hit a reef and sank off Waimea Bay, Kaua‘i. The crew abandoned ship and was left stranded on Kaua‘i for two and a half months. Meanwhile, Kaumuali‘i, paramount chief of Kaua‘i, retrieved the ship’s goods (furs included) and kept them, despite the Russians’ objections. Georg Schaffer was sent to Hawai‘i under Russian orders to retrieve the goods as diplomatically as possible. It has been debated whether Schaffer was following orders or whether he acted on his own behalf when he

raised the Russian flag on Kaua‘i. An agreement was reached when Kaumuali‘i asked for protection in exchange for a Russian monopoly of the sandalwood trade. Kaumuali‘i agreed to provide 500 men as an army to conquer the other islands and Schaffer was to provide the ships, ammunition, and weapons. An important part of the agreement was that Schaffer would oversee all construction of future forts and trading posts. The Russian fort at Waimea was built by the Russian-American Company in 1816 under the direction of Schaffer. Kamehameha I, hearing of Schaffer's plans and feeling intimidated by the threat of Russian invasion, sent a message to Kaumuali‘i asking that Schaffer be deported. By June 1817, Schaffer and his men were forced to leave Kaua‘i (Mills 1996:30–37).

4.2.2 The Kaua‘i Rebellion of 1824

In 1824, Kaumuali‘i became very ill. Gathered around him were his sisters, his wife Ka‘ahumanu, his daughter Kapo, and the prime minister of the Kingdom, Kalanimōkū. When Kalanimōkū asked him how the lands were to be redistributed after his death, Kaumuali‘i answered, "let the lands be as they are; those chiefs who have lands to hold them, those who have not to have none" (Kamakau 1992:265).

Kalanimōkū decided to disregard Kaumuali‘i's wish that the land not be redistributed. All Kaua‘i lands were seized. Some of the Kaua‘i chiefs, dissatisfied with the redistribution of the lands, rebelled and stormed the Russian Fort where Kahalai‘a had been left in charge. News of the rebellion reached Honolulu and companies of soldiers were sent to Kaua‘i as backup. In the end, the rebel chiefs were defeated and Kalanimōkū redistributed the lands. It was at this time that Kaua‘i and the rest of the islands were turned over to the child king, Kauikeaouli Kamehameha III (Liholiho Kamehameha II's younger brother), and Kaikio‘ewa was appointed the new governor (Kamakau 1992:265–269). Kaikio‘ewa was an old warrior chief who was the guardian (*kahu*) of Kauikeaouli.

> […] Sometime before Kahalai‘a left the fort, the *‘ili* of Kaho‘omano in the *ahupua‘a* of Makaweli was given by Ka‘ahumanu to Kahalai‘a for the use of soldiers stationed at the fort. This land belonged with the fort since the days of Kaumuali‘i and continued to be used by soldiers, or ‘*koa*’ into the early 1850s. [Mills 1996:198–199]

4.2.3 The Mahele and the Kuleana Act

Following the death of Kaumuali‘i, there was a great rebellion and a vying for political power among the Hawai‘i and Maui island chiefs and the Kaua‘i chiefs. It was at this time that the Kamehameha family won control of Kaua‘i. The Kaua‘i chiefs were punished for their rebellion and were excluded from the *kālai‘āina* (distribution of lands) when the lands were redistributed.

At the end of the 1824 rebellion, as Hawaiian historian Samuel Kamakau, notes, "The lands held by chiefs of Hawai‘i were tabu; Waimea and Makaweli were held by Ka-‘ilinaoa and Ka‘u‘uku-ali‘i […]" (Kamakau 1992:268).

Following the death of Kamehameha I, Ka‘ahumanu, his favorite wife, inherited his lands. When Ka‘ahumanu died in 1832, her heir was Elizabeth Kahō‘anokū Kīna‘u, daughter of Kamehameha I and Kaheiheimālie (Ka‘ahumanu's sister). Kīna‘u inherited Ka‘ahumanu's *‘āina* as well as the position of *Kuhina Nui* (Premier). In 1827, Kīna‘u married Mataio Kekūanaō‘a and bore five children. The first two sons died young. But the other three children would continue the

Kamehameha legacy: Alexander Liholiho would eventually reign as Kamehameha IV and Lota Kapuāiwa would reign as Kamehameha V. Kīna‘u died in 1839 only four months after her daughter, Victoria Kamāmalu Ka‘ahumanu, was born. Since Kīna‘u’s death was sudden and she did not leave a *kauoha* (command), it was decided by the *Ali‘i Nui* that Victoria Kamāmalu would inherit her lands and her position of *Kuhina Nui*. Kamāmalu’s guardians were John ‘Ī‘ī and her father, Mataio Kekūanaō‘a (Kame‘eleihiwa, 1992:120–124).

Following the enactment of a series of new laws from the mid-1840s to mid-1850s, Kamehameha III divided the land into four categories: Crown Lands reserved for himself and the royal house; Government Lands for the government; Konohiki Lands claimed by *ali‘i* and their *konohiki* (supervisors); and *kuleana*, small plots claimed by the *maka‘āinana* (commoners) (Chinen 1958:8–15). These claims are described in Land Commission Award (LCA) testimony from the claimant and witnesses. A Royal Patent (RP), which quitclaimed the government’s interest in the land, was issued on most Land Commission Awards (Chinen 1958:14). In some cases, more than one RP number was issued for an LCA, especially in cases where there were several widely separated *‘āpana*, such as an award with agricultural land in one *ahupua‘a* and a house lot in another.

Ali‘i were required to pay a commutation fee to the government for their confirmed Konohiki Land titles; this payment could be in cash or in the return of land to the government or crown. Many *ali‘i* elected to return substantial portions of their awarded lands to avoid the one-third commutation cash fee. The Kuleana Act of 1850 allowed *maka‘āinana*, in principle, to own land parcels where they were currently and actively cultivating and/or residing. In 1851, certain Government Lands became available for purchase in lots of 1 to 50 acres in fee simple; this new category of land ownership became known as Royal Patent Grants or Land Grants.

At the time of the Mahele in 1848, Victoria Kamāmalu held seven *‘āina* on the island of Kaua‘i. Five of these *‘āina* were relinquished to the *Mo‘i* and she retained two *‘āina* for herself, including the *ahupua‘a* of Makaweli (LCA 7713). Since Kamāmalu was only 7 years old in 1848, her guardians, Mataio Kekuanaō‘a and Ioane ‘Ī‘ī, acted on her behalf. In 1857, Kekuanaō‘a and ‘Ī‘ī agreed to a *Palapala Ho‘olimalima Kula* (lease for *kula* lands) to a *hui* (group) of people from Makaweli and Waimea. The group consisted of 120 people who all signed the lease. The lease reads as follows:

> *Eia nā mea i koe ma kēia ho‘olimalima ‘ana o ka loko nui i Kekupua a me nā loko li‘ili‘i, ‘o ka i‘a ho‘omalu, ‘o ka lā‘au kapu o nā kumu ‘alani i Waikae, ‘o nā lo‘i Pō‘alima a me nā kumu nui o Mahaihai a me Kekupua, ‘o nā kuleana o nā kānaka a me ka Pāpūkapu, ka wahie inā he mea kū‘ai koe no ia ma kēia ho‘olimalima ‘ana.*
>
> Translation: Here are the things exempt from this lease. The large pond in Kekupua and the small ponds, the protected [by taboo] fish, the sanctioned wood of the orange trees at Waikae, the Po‘alima taro fields and the large trees of Mahaihai and Kekupua, the kuleana of the people and the reserved fort, the firewood, if it is for sale, is exempted by this lease.

The above exemptions are obviously a carry-over of the ancient *kapu* (forbidden) system. The lease indicates the kinds of items that were *kapu*. Traditionally, large ponds were often reserved

for the *ali‘i*. The lease also indicates that even though the *kapu* system was done away with in 1819, certain provisions were still being observed by the *ali‘i* and their people as late as 1857.

A sizable population was present in Makaweli during this period. Mahele records indicate 117 *kuleana* claims comprising 119 *‘āpana* (parcel) were filed in Makaweli during the Mahele. These *‘āpana* were within the *‘ili* of Hakioa, Kaho‘omano, Kakalae, Kaloulu, Kapalawai, Koleakalo Manawai, Pu‘ulima, Wai‘awa‘awa, and Waikaia all located along the Waimea River, the Makaweli River, or a major western tributary of the Makaweli River (Figure 7). No *kuleana* claims are indicated within the Preliminary Project Study Area, or the majority of Makaweli to the east of the Waimea-Makaweli-Mokuone river basin.

The fort, at the mouth of the Waimea River on the Makaweli side, had seen action in the Rebellion of 1824, when O‘ahu forces put down the uprising against the Kamehameha dynasty. The *koa* or soldiers at the fort were given *lo‘i* lands nearby the fort so they could help raise their own food. Twenty-two of the Makaweli claims are for fort soldiers, who generally claimed a single *lo‘i* or *mo‘o* (narrow strip of land, smaller than an *‘ili*). Most fort soldiers were given land in the *‘ili* of Kaho‘omano, with some others in Hakioa; both *‘ili* are located quite close to the fort (Esh et al. 2008:37).

Within the 119 claimed *‘āpana* in Makaweli, 223 *lo‘i* or *mo‘o* (which presumably included *lo‘i*) are enumerated. The majority of these *lo‘i ‘āpana* are in Hakioa (28), Kaho‘omano (26), and Kakalae (23). Thus, the vast majority of *lo‘i* claims were in seaward portions of the Waimea and Makaweli rivers. There are claims for 31 house lots. Presumably, some or all of the 22 soldiers awarded *lo‘i* were still garrisoned at the fort; the house lots tend to be in *‘ili* closer to the shore, and some along the rivers.

The Mahele land documents suggest a pattern of the extensive exploitation of the Waimea-Makaweli-Mokuone river basin. The *ahupua‘a* of Makaweli is bounded by the Waimea River on the western side at the shore. The Waimea River is fed by the Makaweli River tributary a short distance up the river, and the Makaweli River, in turn, is fed by other streams such as the Mokuone Stream. At the time of the Mahele, people were settled along these river basins. Waimea, at this same time, had the greatest population on the island of Kaua‘i; Makaweli’s land use is closely linked to Waimea, with some claimants living in one place and farming in the other or vice versa. There is a slight preference for a house lot in Waimea, but several have house lots in both *ahupua‘a*. Visiting ships were probably supplied with food from both districts when they stopped at Waimea Bay.

A major problem in reconstructing Māhele-era settlement patterns is that tax maps and other readily available historic maps do not show *‘ili* areas for claims or awards in Huakaule, Kahalai, Kahana, Kahola, Kaikolu, Kalā‘au‘ōkala, Kamaka‘eli‘eli, Kamo‘ouli (Kamo‘oali‘i), Kaneli, Kaohuilihau, Kapuemanu, Kaunuloa, Kiele, Kohiana, Kukuihoehoe, Kula‘amokualuli, Kumuiki, Mahaihai (Mahaemae), Manini, Mokuone, Nonopahu, Ololokalau, Olokele, Palaloa, Piliamo‘o, Poleiwale, Uhilau, Waikui, or Wailele. It is difficult to understand the entire *ahupua‘a* settlement pattern when so many of the geographic areas of settlement are unknown. Perhaps these *‘ili* were all along the westernmost margin of Makaweli as is the case with the geographically identifiable *‘ili*, but for all we know they may have been widely spread out over Makaweli Ahupua‘a.

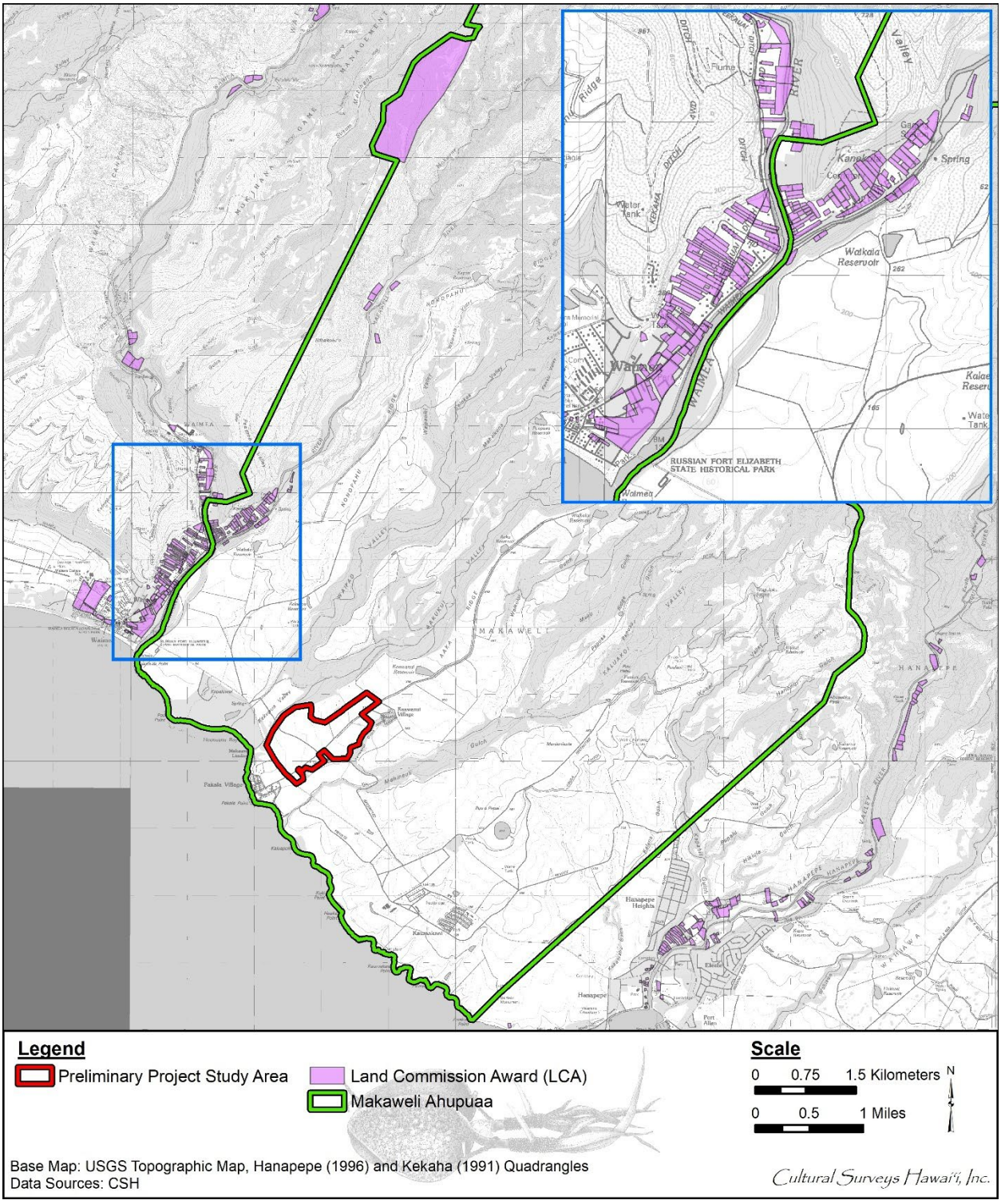

Figure 7. Portion of the 1996 Hanapepe and 1991 Kekaha USGS 7.5-minute topographic showing the LCAs nearest to the Preliminary Project Study Area in Makaweli Ahupua‘a

Thus, while the Mahele provides a very detailed record of the western end of Makaweli, which was extensively cultivated along the Waimea-Makaweli-Mokuone river valleys, little is known about the eastern and central part of the *ahupua‘a.* Records indicate the *ali‘i* used the Kekupua Fishpond and the Kapalawai area north of Pākalā Village, and there were a few salt ponds along the shore. From our knowledge of Waimea and Hanapēpē, it is likely the land just *mauka* of the shore provided *pili* grass for housing, and that there were possibly even wetland terraces in other valleys to the west of the Makaweli River.

4.2.4 Ranching

In 1793, Captain Vancouver gave Kamehameha a gift of a longhorn bull and a heifer, which were pastured on the island of Hawai‘i. A ten-year sanction (*kapu*) was put on the cattle to ensure their survival and growth. These strange looking animals were called *pua‘a bipi* (pig-beef) because of their strange stare. Kamakau (1992:164) notes, “this was the beginning of the wild herds of Waimea and Mauna Kea.” By the 1820s, the unchecked cattle population had used up its grazing lands and was attacking the farmlands. In 1832, Kamehameha III recruited Spanish vaqueros to teach Hawaiians how to ride horses and rope cattle (Ronck 1984:57).

In 1803, Richard Cleveland brought the first horses to Kaua‘i. Kamehameha did not see much use in them since they were not used for food like cattle were (Ronck 1984:57).

In 1831, ranching was introduced to Kaua‘i when Richard Charlton, the British consul, leased some land in the Hanalei district. He started with a herd of about 100 head of cattle. Other ranchers followed suit and in 1848 the practice of registering brands to distinguish ownership of cattle was started on Kaua‘i. Kaumuali‘i’s favorite wife, Deborah Kapule, kept a large herd along the Wailua River (Ronck 1984:57).

Articles in Hawaiian language newspapers of the time indicate “wild cattle” were still a problem on all the islands even in the late 1800s. In 1874, G.K. Maka from Waiolama, Hilo writes a letter asking for support of a bill of complaint to the Legislature:

> In these days in which we are living here, we are surrounded by cattle and live together [...] Therefore, you people who are so fond of your lands that you hold them back, do not lease them. We are living in trouble. O my fellow representatives, from Hawai‘i to Kaua‘i [...] Perhaps now our king will agree, just as he promised to here in Hilo, to let you fence in your patches and homes and if cattle enter take the (creature) to the Pound. Here is a good idea, let the lease holder put up the fences [...] [*Nūpepa Kūoko‘a* 13 June 1874]

By 1899, “wild cattle” as well as goats had become a big problem on Kaua‘i. Notes from Henry Pratt Judd of a hunting trip to Makaweli indicate that over a two-day period, 180 goats and 11 cattle were shot (Judd manuscript 1899, Kaua‘i Historical Society).

4.2.5 Sugar

In 1835, Ladd and Company started the first successful sugar plantation in Hawai‘i at Kōloa, Kaua‘i. William Ladd, William Hooper, and Peter Brinsmade took out a 50-year lease on 980 acres of land at Kōloa from Kamehameha III. As other sugar plantations were organized, more labor was needed to work the fields. Plantation owners began recruiting laborers from outside the

Hawaiian Islands. The Chinese were the first to arrive in 1852, followed by the Japanese in 1868 and Portuguese workers in 1878.

The Hawaiian Sugar Company (a.k.a. Makaweli Plantation) was founded at Makaweli Ahupua‘a shortly after the signing of the Reciprocity Treaty of 1876 by representatives of the Scottish Mirlees, Watson & Yaryan Company. Samuel T. Alexander and Henry P. Baldwin took over the plantation, incorporating it in 1889 (Condé and Best 1973:134). A large mill was established in present-day Kaumakani Town and approximately a dozen camps for sugar workers were scattered amongst the fields (Figure 8 and Figure 9).

4.2.6 The Sinclair-Robinson-Gay Family

The Sinclairs arrived in Honolulu in 1863 and immediately began looking for large tracts of land to purchase. Disappointed with what they saw, the family decided to head for California in search of better prospects. King Kamehameha IV, hearing of their plans to leave, offered them the island of Ni‘ihau. Unusually heavy rainfall was recorded for 1861–1863, and Ni‘ihau was exceptionally lush and green when the two Sinclair brothers, Francis and James, did a site inspection of the island. Excited at their discovery, they hoped to re-establish the cattle and sheep business they had left behind in New Zealand. The two brothers accepted the King’s offer and purchased the island of Ni‘ihau for $10,000 in gold. There they raised Merino sheep and Shorthorn cattle from the continental United States, Australia, and New Zealand.

In 1865, Eliza Sinclair purchased the *ahupua‘a* of Makaweli (21,844 acres) from Victoria Kamāmalu Ka‘ahumanu for $15,000. A new home built in the cool uplands at about 1,800 ft elevation became known as the “Makaweli house” and sometime in the early 1870s the Sinclair family moved from Ni‘ihau to settle there (Dorrance and Morgan 2000:32–33).

The Kapalawai house was built by Aubrey Robinson for his wife Alice Gay Robinson; Figure 10 indicates the house was located northwest of the current Preliminary Project Study Area. The exact date of construction is not known, but the house was probably built around the mid-1890s. The original house plans do not show a date, but the Robinsons have a photo of the house with the date 1897 written on the back (Ed Rice in McGuire et al. 1999:79), thus making the house at least 103 years old. The Kapalawai house was designated as SIHP # 50-30-9-00764 Feature A.

In 1889, Francis Gay and Aubrey Robinson formed the family partnership known as Gay & Robinson (G&R). Through this partnership, the various family businesses, such as Makaweli Ranch and Makaweli Plantation, were managed. By the early 1880s the Robinsons became involved in the sugar business, not only planting their own crops but also leasing large tracts of land to Hawaiian Sugar Company (Wilcox 1996:86). The Robinsons were always looking for new and creative ways to utilize their land. For many years, they raised bees for honey and experimented with other agricultural crops.

4.3 1900s to the Present

Makaweli Plantation was one of the most successful and profitable plantations in Hawai‘i, due in large part to improvements in irrigation at the start of the twentieth century (Wilcox 1996:89). The Hawaiian Sugar Company was one of the first plantations to construct family housing for its workers with amenities such as a plantation store (Dorrance and Morgan 2000:33). It established 11 or 12 small camps scattered among their fields in Makaweli Ahupua‘a around the turn of the

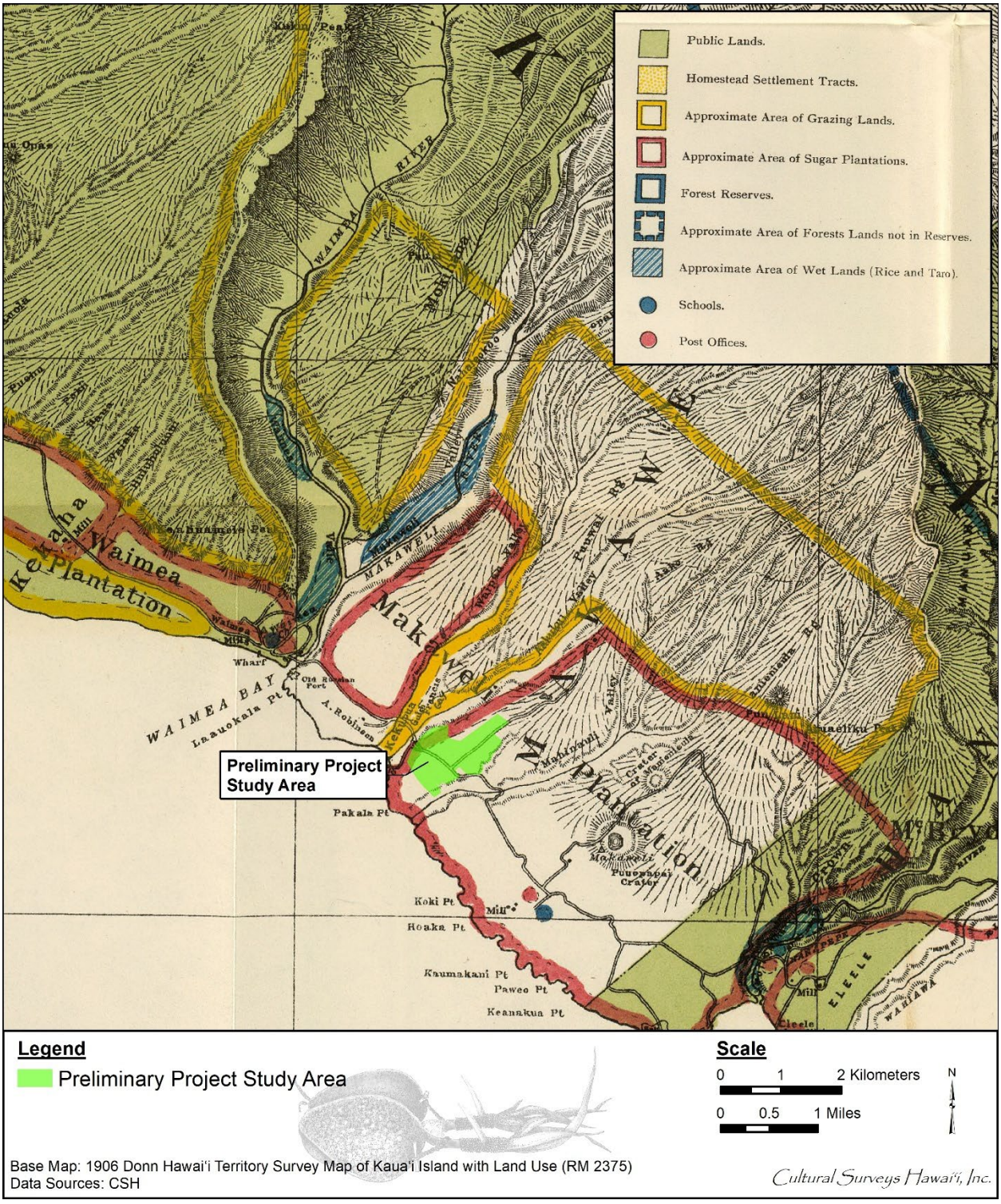

Figure 8. Portion of 1906 Donn map of Kaua‘i, showing the Preliminary Project Study Area within the bounds of the Makaweli Plantation

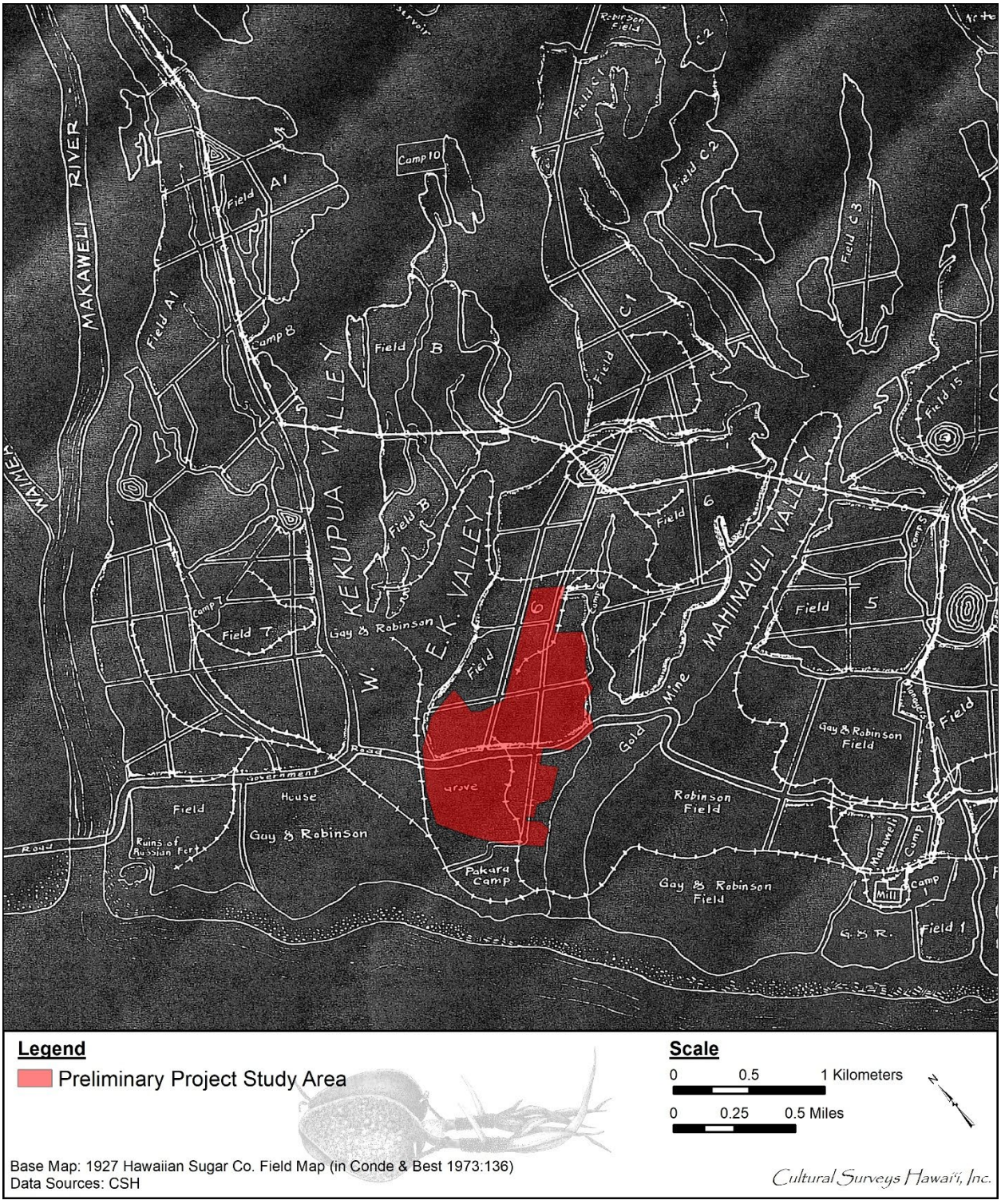

Figure 9. 1927 Hawaiian Sugar field map (Condé and Best 1973:136) showing Preliminary Project Study Area in relation to plantation features such as planting fields, camps, cane roads, and rail lines

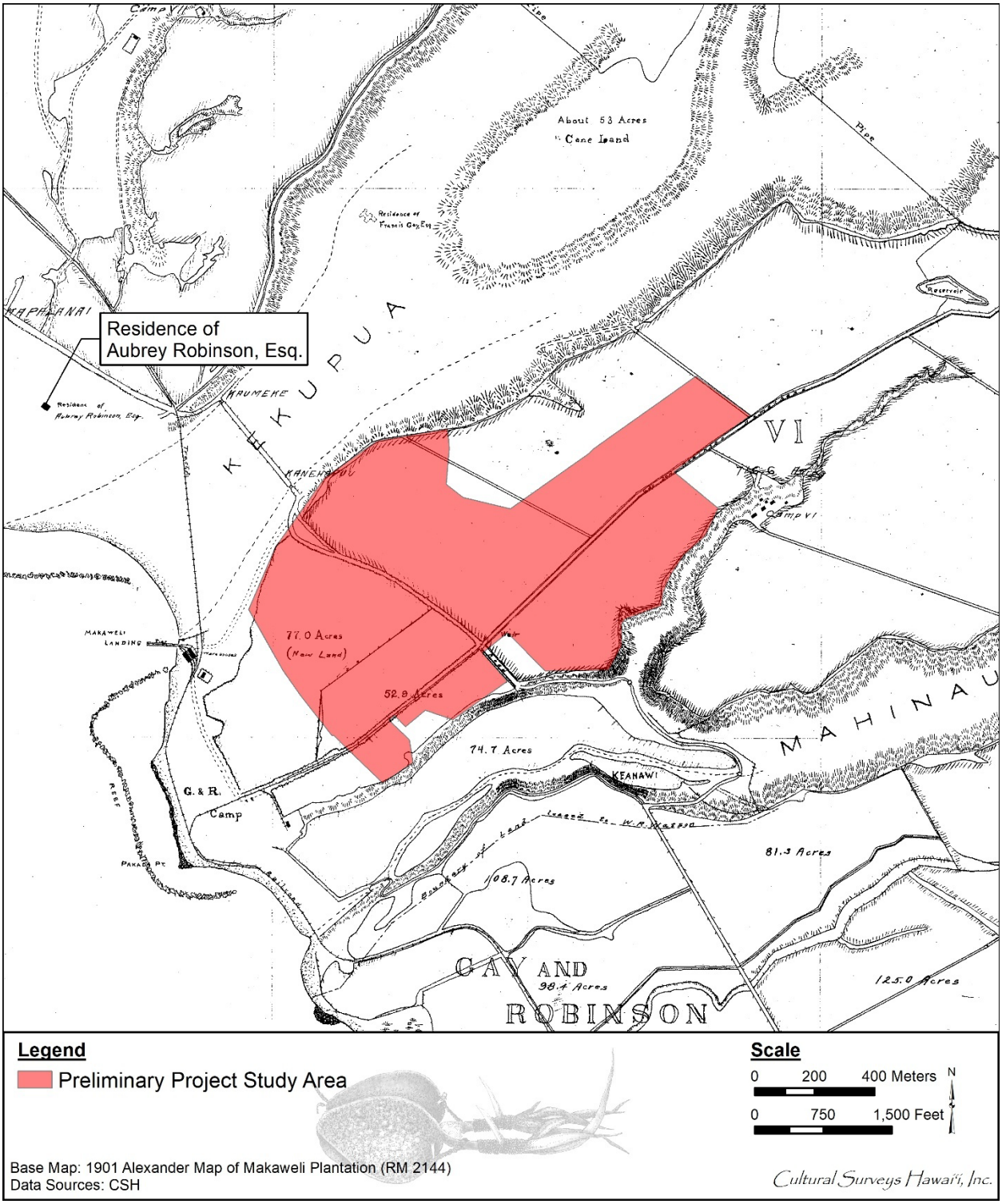

Figure 10. Portion of the 1901 Alexander map of Makaweli Plantation (RM 2144) showing the location of Aubrey Robinson’s northwest of the Preliminary Project Study Area

century. The town of Kaumakani grew up from the settlements around the sugar mill known as “Makaweli Camp” and “Camp 1.” Ka‘awanui Village grew up from “Camp 6,” and Pākalā Village grew up from “Pakala Camp”; these settlements are depicted in relation to the Preliminary Project Study Area on Figure 9 and Figure 11.

Between 1910-1920, the Territorial Government constructed a new Belt Road system on Kaua‘i (MKE Associates LLC/Fung Associates, Inc.:8-20). The portion of the new Belt Road through southwestern Kaua‘i is Kaumuali‘i Highway (Route 50), which replaced the Old Government Road as the main transportation route through the area. Kaumuali‘i Highway is visible in relation to the Preliminary Project Study Area, villages, and plantation infrastructure such as cane roads and water features in Figure 12. Notably, the portion of the Old Government Road within the Preliminary Project Study Area is labeled “Private Road” in Figure 12, indicating it became subsumed into the plantation holdings.

Hawaiian Sugar Company was dissolved in 1940 due to disputes over new leasing agreements. Olokele Sugar Company was formed under the new management of C. Brewer & Company and operated on the former Hawaii Sugar Company plantation lands (Wilcox 1996:89). A 1970s aerial photo shows the Preliminary Project Study Area under continued cultivation (Figure 13). C. Brewer & Company sold Olokele Sugar Company to Gay & Robinson as its lease was nearing expiration in 1994. The plantation and mill continued to operate under the name Gay & Robinson until it was closed in the first decade of the twenty-first century.

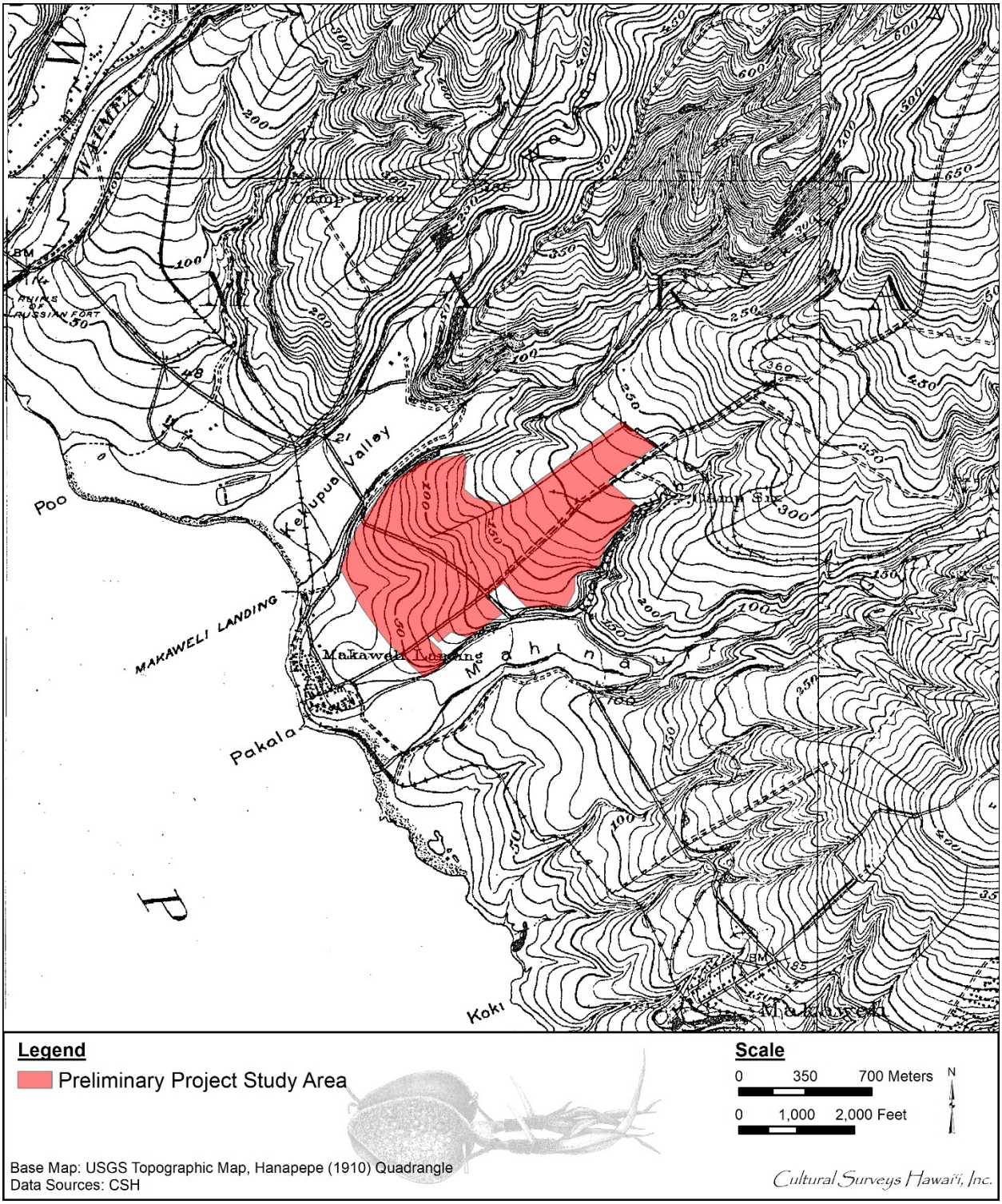

Figure 11. Portion of the 1910 Hanapepe USGS topographic quadrangle showing the Preliminary Project Study Area

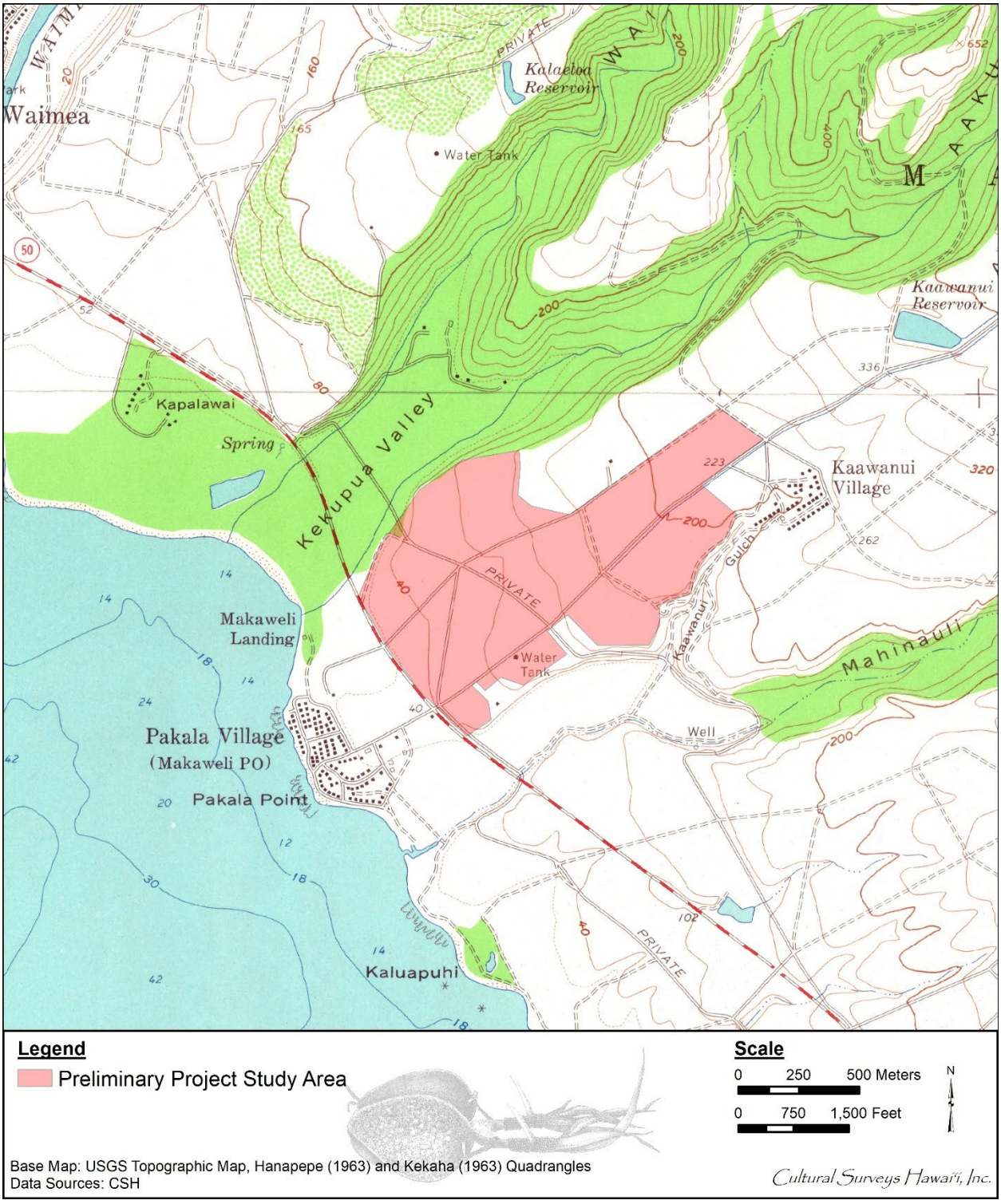

Figure 12. Portion of the 1963 Hanapepe and Kekaha USGS topographic quadrangles showing the Preliminary Project Study Area

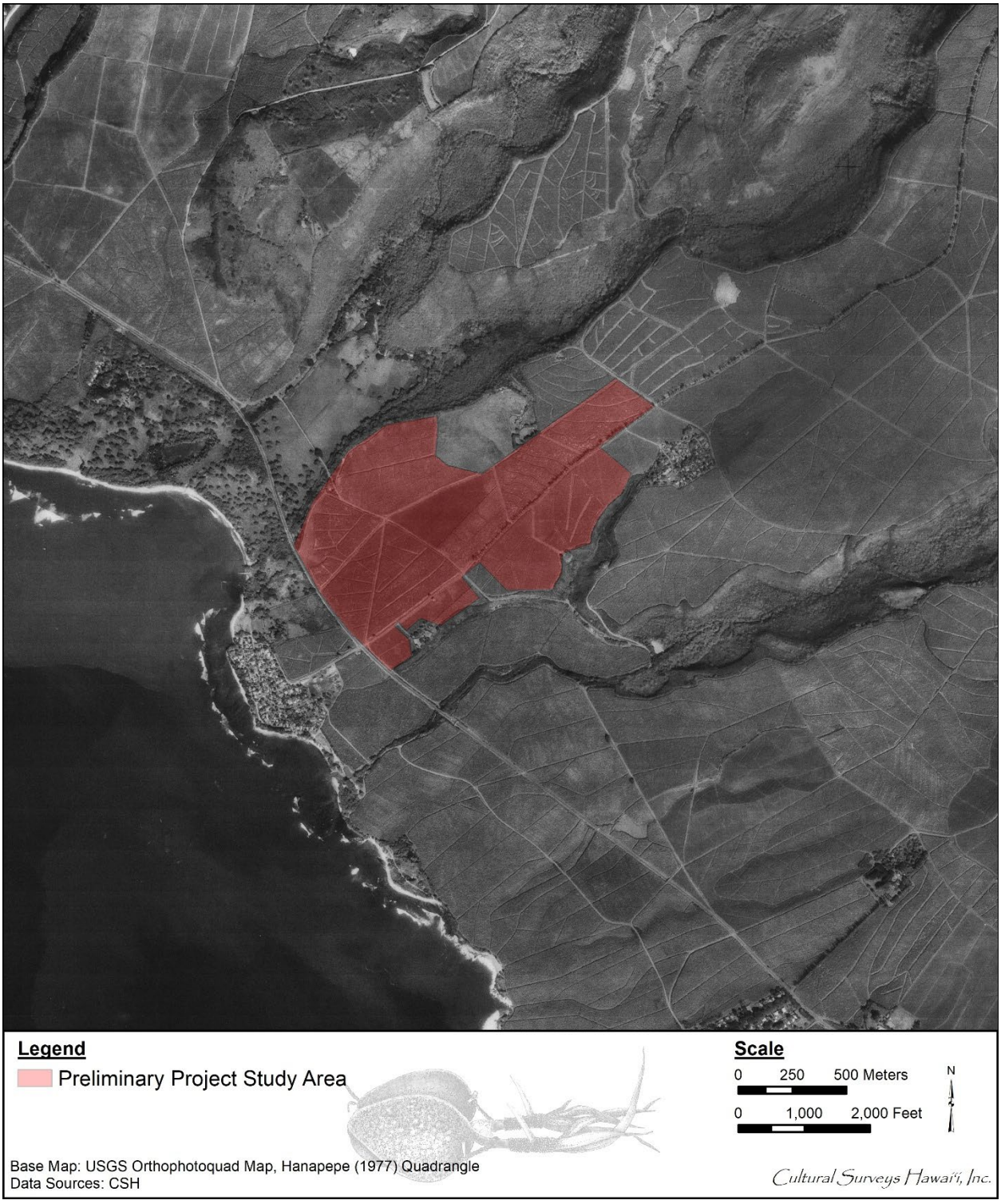

Figure 13. Portion of the 1977 USGS Hanapepe orthophotoquad showing the Preliminary Project Study Area

Section 5 Previous Archaeological and Cultural Research

5.1 Previous Archaeological Research

Seven prior archaeological studies have been conducted within 1.5 km of the current Preliminary Project Study Area; none of these overlap with the current Preliminary Project Study Area. These seven prior studies are depicted in relation to the current Preliminary Project Study Area in Figure 14 and summarized in Table 1.

Archaeological sites previously documented within 2.5 km of the Preliminary Project Study Area are located in Figure 15 and listed in Table 2. These include Māha‘iha‘i Heiau and ‘A‘akukui Heiau, both documented in upland Makaweli during early surveys by Thrum (1907) and Bennett (1931); human burials at the coast (SIHP #s 50-30-09-00792 Feature B and -06011); Pe‘ekaua‘i (Menehune) Ditch (SIHP # -00026) along the Waimea River; Kekupua fishpond (SIHP # -00765); and historic-era sites associated with the Robinson family and/or sugar plantation land use (SIHP #s -00762, -00763, -00764, -00766, and -02269).

5.1.1 SHPD Inadvertent Finding near Manhinauli Gulch – McMahon 1993

In 1993, SHPD archaeologist Nancy McMahon assessed the inadvertent discovery of a coastal burial, southwest of the current Preliminary Project Study Area (McMahon 1993; see Figure 14). SIHP # -06011 is located just south of the inlet of Mahinauli Gulch, and just north of the Robinson Landing barge harbor (see Figure 15). The discovery exposed a cultural deposit including midden and basalt debitage. It was unclear whether the burial was traditional Hawaiian or historic.

5.1.2 Kapalawai – Zulick et al. 2000; McDermott and Hammatt 2001

CSH conducted an archaeological inventory survey (AIS) with subsurface testing for the 170-acre Kapalawai Resort project located immediately west of the current Preliminary Project Study Area (Zulick et al. 2000; see Figure 14). Six historic properties were identified: SIHP # -00762, a series of rock walls (Features A through E), a terrace (Feature F), and an iron pot (Feature G); SIHP # -00763, an oval-shaped stone platform; SIHP # -00764, a housing complex of 14 historic buildings (Feature A, the main house; Feature B, the guest house; Feature C, offices; Feature D, the carriage house; Feature E, the tack room; Feature F, the greenhouse; Features G through N, employee cottages); SIHP # -00765, Kekupua Fishpond; SIHP # -00766, a Portuguese brick oven; and SIHP # -00792, a cultural deposit (Feature A) which includes a human burial (Feature B) (see Figure 15).

The subsurface testing program included 23 backhoe trenches throughout the Preliminary Project Study Area; nine hand-excavated test units, eight being related to SIHP # -00763, and one excavated along the shoreline; and seven random coring samples within Kekupua Fishpond (SIHP # -00765) (Zulick et al. 2000:9). Charcoal from the core sample at Kekupua Pond was radiocarbon dated to AD 895-1225, and two charcoal samples from SIHP # -00792 range from the fifteenth century to the twentieth century (sample 139725 [CSH ID# Kapal0a]) yielded a calendar age range of AD 1400 to 2000. Sample 139726 (CSH ID# Kapal0b) yielded a calendar age range of AD 1480 to 1960 (Zulick et al. 2000:171).

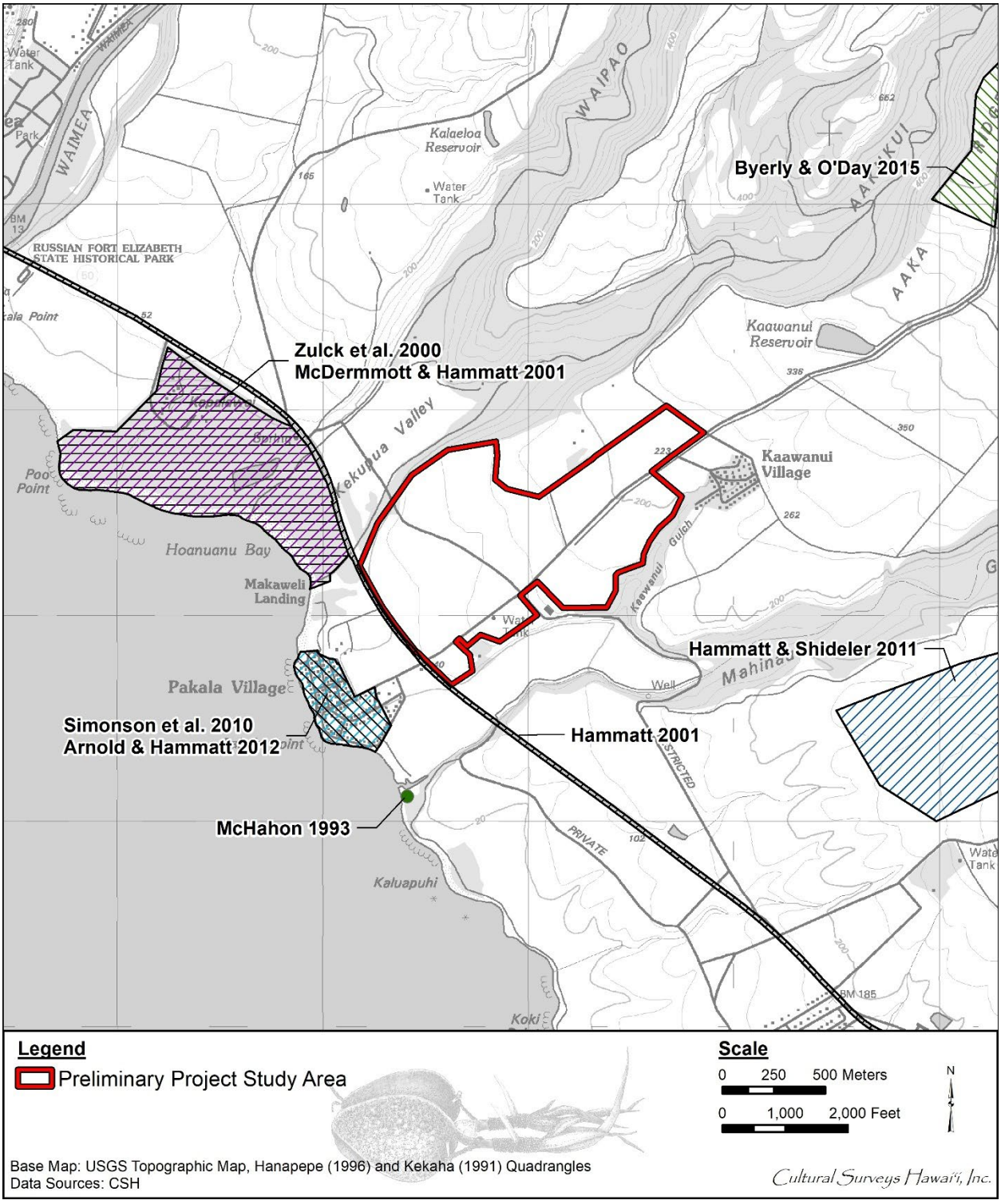

Figure 14. Portion of the 1996 Hanapepe and 1991 Kekaha USGS 7.5-minute topographic quadrangles showing previous archaeological studies located within 1.5 km of the current Preliminary Project Study Area

Table 1. Previous archaeological studies within 1.5 km of the current Preliminary Project Study Area

Reference	Type of Study	Location	Results
McMahon 1993	Inadvertent burial discovery and disinterment	Near Mahinauli gulch east of Pākalā Village	SIHP # 50-30-09-06011, human burial discovered and disinterred
Zulick et al. 2000	Archaeological inventory survey with subsurface testing	Kapalawai	Documented six newly identified historic properties: SIHP #s 50-30-09-00762, walls, terrace, and iron pot; -00763, platform; -00764, house complex; -00765, Kekupua fishpond; -00766, historic structure; and -00792, cultural deposit and human burial
Hammatt 2001	Archaeological inventory survey (recorded as an archaeological assessment)	Approx. 51-mile road corridor between Kekaha and Moloa‘a	Concluded portion of corridor adjacent to current Preliminary Project Study Area has low potential for subsurface archaeological features
McDermott and Hammatt 2001	Addendum archaeological inventory survey	Kapalawai	Identified and documented two new features of SIHP # 50-30-09-00762 (pump house with related pipeline and outflow basin, and subsurface culvert)
Simonson et al. 2010	Archaeological inventory survey (recorded as an archaeological assessment)	Pākalā Village	No historic properties documented
Hammatt and Shideler 2011	Archaeological literature review	Eight potential landfill locations including Pu‘u o Pāpa‘i in Makaweli	Research indicated no known historic properties and low potential for undocumented historic properties within Pu‘u o Pāpa‘i (Makaweli) project area, based on its distance from coast and prior land disturbance
Arnold and Hammatt 2012	Archaeological monitoring	Pākalā Village	No historic properties documented
Byerly and O’Day 2015	Archaeological inventory survey	50-acre agricultural parcel in Makaweli, TMK: (4) 1-7-006:006	Documented SIHP # 50-30-09-02269, historic irrigation ditch system

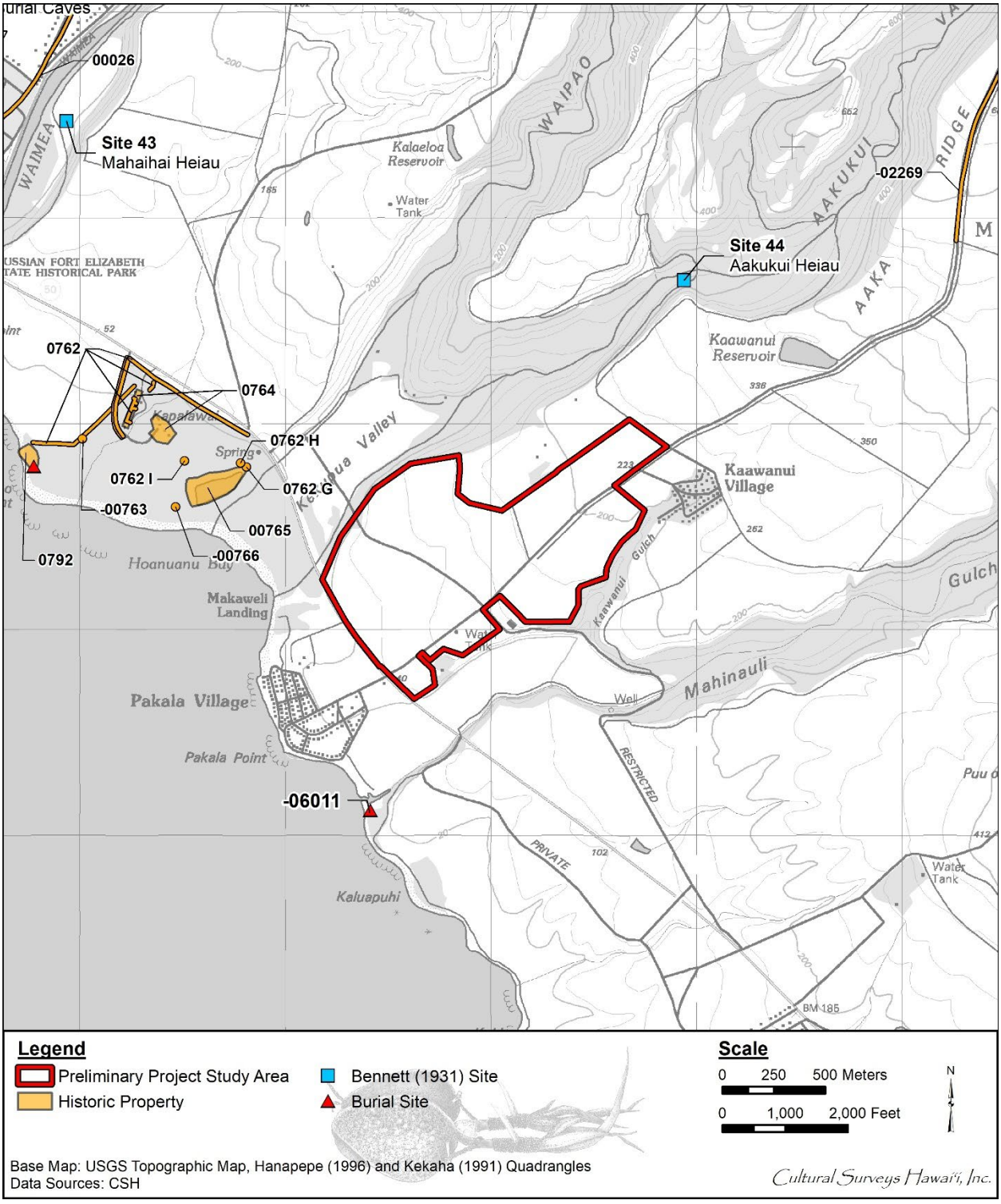

Figure 15. Portion of the 1996 Hanapepe and 1991 Kekaha USGS 7.5-minute topographic quadrangle showing archaeological sites previously documented within 2.5 km of the Preliminary Project Study Area

Table 2. Previously documented archaeological sites within 2.5 km of the Preliminary Project Study Area

SIHP # 50-30-09-*****	Site Type	Reference
Site 43	Māha‘iha‘i Heiau	Thrum 1907; Bennett 1931
Site 44	‘A‘akukui Heiau	Thrum 1907; Bennett 1931
-00026 (Site 26)	Pe‘ekaua‘i (Menehune) Ditch, also known as Kīkīaola	Vancouver 1789; 1918 Thrum and Evans map (RM 2686); Menzies 1920; Bennett 1931; Damon 1931; 1910 USGS topo map; 1963 USGS topo map; Hawai‘i Register 1974; Joerger and Streck 1979; National Register 1984; 1996 USGS topo map; Kamai and Hammatt 2015; Tomonari-Tuggle and Duarte 2017; Tomonari-Tuggle and Stephens 2017
-00762	Robinson-era complex including rock walls, terrace, iron pot, pump house and related structure, and a subsurface culvert	Zulick et al. 2000 (-00762 Features A–G); McDermott and Hammatt 2001 (-00762 Features H-I)
-00763	Platform/possible plantation clearing mound	Zulick et al. 2000
-00764	Robinson Homestead complex	Zulick et al. 2000
-00765	Kekupua fishpond	Zulick et al. 2000
-00766	Portuguese oven	Zulick et al. 2000
-00792A	Pre-Contact cultural layer	Zulick et al. 2000
-00792B	Human burial	Zulick et al. 2000
-02269	Historic sugar plantation irrigation ditch system	Byerly and O’Day 2015
-06011	Human burial	McMahon 1993

CSH subsequently conducted an addendum to the 2000 AIS (McDermott and Hammatt 2001; see Figure 14) that recorded two new features of SIHP # -00762: Feature H is a pump house and related pipeline and out-flow basin, and Feature I is a subsurface culvert.

An archaeological monitoring plan (Hammatt and Shideler 2006a), preservation plan (Hammatt and Shideler 2006b), and burial treatment plan (Hammatt and Shideler 2006c) were later prepared for the project.

5.1.3 Highway Corridor – Hammatt 2001

In 2001, CSH conducted an archaeological inventory survey (lack of finds recorded as an archaeological assessment) for an approximately 82-km (51-mile) road corridor for a proposed fiberoptic cable project between Kekaha and Moloa‘a (Hammatt 2001). The corridor included a portion of Kaumuali‘i Highway immediately west of the current Preliminary Project Study Area (see Figure 14). The objective of the survey was to identify areas within the corridor having potential for subsurface historic properties including human burials and cultural deposits (Hammatt 2001:1). The project corridor was evaluated based on previous studies including soil surveys, tax and historic maps, LCA documents and locations, previous archaeological studies, and field inspections as appropriate. The results were synthesized to produce a scale representing four levels of potential for yielding subsurface archaeological resources: low, moderate, high, and very high (Hammatt 2001:12). Section 3 of the corridor, which extended from the eastern end of the Waimea River Bridge past the current Preliminary Project Study Area to the sand deposit in the vicinity of Makaweli Landing, was evaluated as having a low potential for yielding subsurface historic properties (Hammatt 2001:16–17).

5.1.4 Pakala Village Wastewater Treatment – Simonson et al. 2010; Arnold and Hammatt 2012

CSH conducted an AIS with subsurface testing for a wastewater project in Pākalā Village located southwest of the Preliminary Project Study Area (Simonson et al. 2010; see Figure 14). No historic properties were documented, and therefore the AIS was termed an archaeological assessment pursuant to HAR §13-284-5(A). Despite these findings, archaeological monitoring was recommended for the project based on the potential for encountering human skeletal remains within the natural Jaucas sand sediments underlying agricultural fill and alluvial material in a portion of the project area.

Archaeological monitoring of the project was subsequently conducted by CSH (Arnold and Hammatt 2012; see Figure 14). No cultural materials were identified.

5.1.5 Kaua‘i Landfill – Hammatt and Shideler 2011

CSH in 2011 prepared an archaeological literature review of eight potential locations for a new municipal solid waste landfill (Hammatt and Shideler 2011). One of the eight proposed locations was at Pu‘u o Pāpa‘i in Makaweli, located southeast of the Preliminary Project Study Area (see Figure 14). Research indicated no known historic properties were present within the Pu‘u o Pāpa‘i project area. Although no prior archaeological survey has been done at that location, it was assessed as having a low probability of containing “highly significant” historic properties based on its distance from the coast and prior agricultural disturbance.

5.1.6 Byerly and O’Day 2015

Garcia and Associates in 2015 completed an AIS of 50 acres located northeast of the current Preliminary Project Study Area (Byerly and O’Day 2015; see Figure 14). One historic property was documented and designated as SIHP # 50-30-09-02269 (see Figure 15). The site is a historic irrigation ditch system comprising six features including a linear earthen ditch with culverts and concrete floodgates. Other modern agricultural features related to the former sugarcane plantation were also observed, including irrigation features dating from the 1980s to 2010.

5.2 Previous Cultural Research

A review of previous cultural studies has been conducted for the Preliminary Project Study Area. Unlike archaeological inventory survey reports, the study areas for cultural studies include the immediate project area and extend to the wider land regions which can include the entire *ahupua‘a* and possibly the *moku*. Since Native Hawaiian traditions recognize and value the relationship with land from *mauka* to *makai*, the project area denotes the location of the project, however, the term “study area” denotes the larger context of land that is critical in any cultural study. An effort was made to locate community members with ties to Makaweli who live or had lived in the region or who, in the past, used the area for traditional and cultural purposes. Previous cultural studies (McGuire et al. 1999) in close proximity to the Preliminary Project Study Area are shown in Figure 16 and presented below in Table 3.

In 1999, CSH conducted a *Hawaiian Traditional Customs and Practices Study for Kapalawai* (McGuire et al. 1999). CSH interviewed eight individuals from the communities of Makaweli, Waimea, and Hanapēpē to discuss traditional customs and practices which occurred within the 170-acre Kapalawai Resort project area located immediately west of the current Kaawanui Solar Preliminary Project Study Area.

Interviewees noted traditional settlement in Makaweli was located in the *mauka* areas. Hawila Kaleohano (McGuire et al. 1999:43) noted most Hawaiians were living “up in the mountain” in Makaweli Valley. Aletha Ka‘ohi (McGuire et al. 1999:48) also shared her opinion that *kuleana* parcels would have been in the *mauka* areas.

Several interviewees discussed agricultural practices in Makaweli. Ed Rice (McGuire et al. 1999:55) stated, “[…] there was no cultivation anywhere on the tableland at all. Possibly in some of the valleys and gulches, but most of them don’t have year-round water, so there’s a limit to that […]”

‘Ohu Ho‘okano (McGuire et al. 1999:36–37) mentioned that employees at Makaweli Ranch cultivated *lo‘i* for their personal use. Mr. Kaleohano (McGuire et al. 1999:39) and Kala Kapahu (McGuire et al. 1999:49) also mentioned there were *lo‘i* located near Kekupua Fishpond.

Mr. Ho‘okano (McGuire et al. 1999:36–37) noted the *lo‘i* were irrigated with water from Kekupua Pond. Mr. Kapahu (McGuire et al. 1999:49) also mentioned water from Kekupua Fishpond was used for irrigating pastures and washing potatoes.

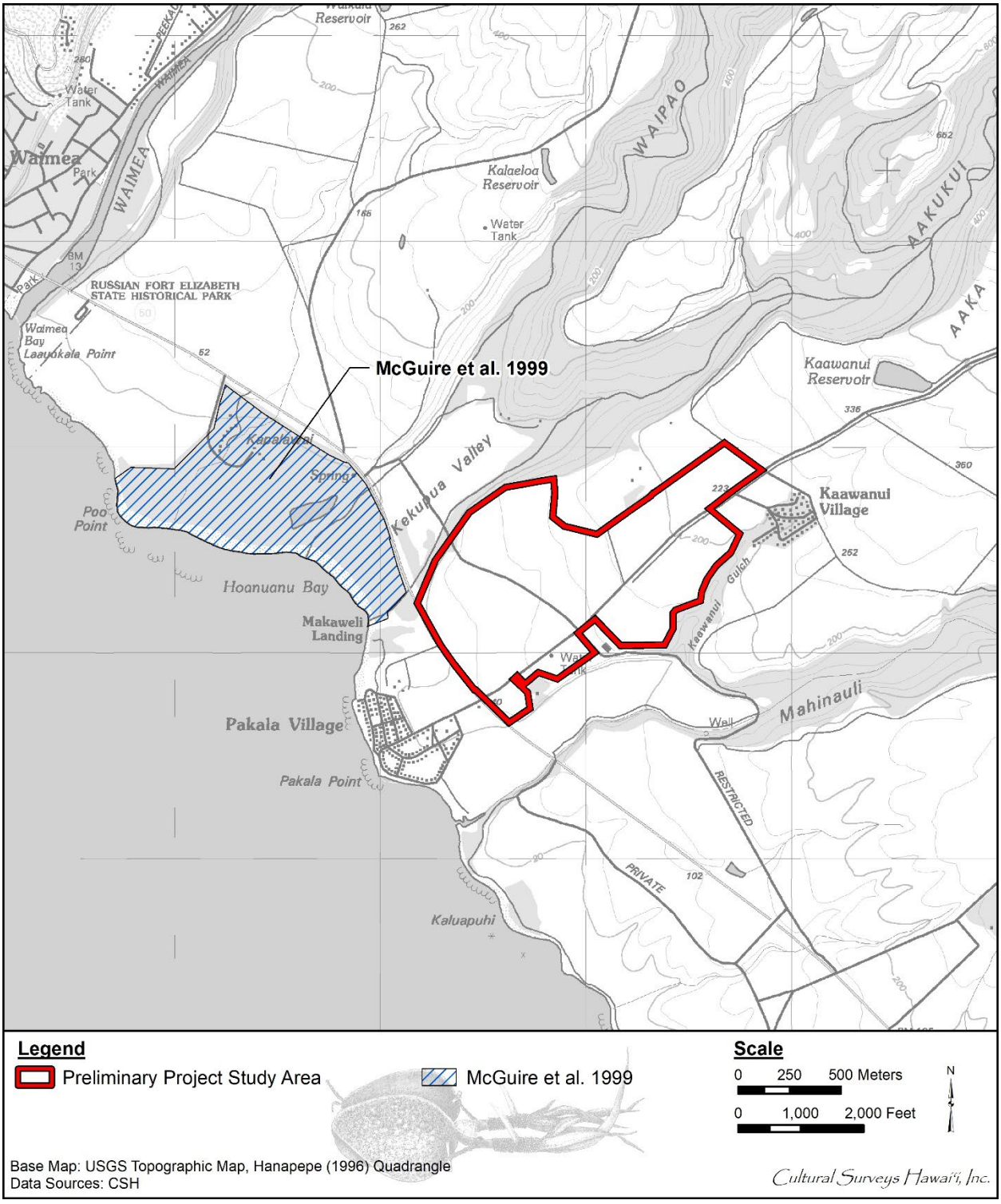

Figure 16. Portion of the 1996 Hanapepe USGS topographic quadrangle with previous cultural studies in the vicinity of the Preliminary Project Study Area

Table 3. Previous cultural research within the Preliminary Project Study Area vicinity

Reference	Location	Community Participants	Traditional Cultural Practices Identified
McGuire et al. 1999	Kapalawai	‘Ohu Ho‘okano, Toshio Ikeda, Hawila Kaleohano, Aletha Ka‘ohi, Marni Kapahu, Kala Kapahu, Kawika Kapahulehua, Ed Rice, Warren Robinson, Bruce Robinson	Agricultural practices; burial practices; freshwater resources; gathering practices; marine resources; *mo‘olelo* and *wahi pana*; recreational activities

Mr. Ho‘okano (McGuire et al. 1999:35–36) noted Kapalawai consisted of “open pasture area with horses and paddocks.” Mr. Kaleohano (McGuire et al. 1999:43) mentioned “the pastures were well-kept and not wildly overgrown.” He noted that *kiawe* grew in the pastures and “all the way down the beach line.” Mr. Kapahu (McGuire et al. 1999:50) also recalled trimming *kiawe* trees and using the cut branches for firewood.

Mr. Ho‘okano (McGuire et al. 1999:35–36) worked as a *paniolo* (cowboy) for Makaweli Ranch. He recalled rounding up and driving cattle from deep mountain forests back to Makaweli Ranch and the dairy at Kapalawai.

Warren Robinson (McGuire et al. 1999:58–59) described Kapalawai as their “family farm” with huge vegetable gardens, fruit orchards, cows for milking, pastures which held horses and cattle. Mr. Kaleohano (McGuire et al. 1999:39) also recalled milking cows for the Robinsons. Mr. Kapahu (McGuire et al. 1999:50) mentioned the Robinsons raised goats and sheep.

Mr. Rice (McGuire et al. 1999:55) mentioned the Robinson’s farm experimented with several agricultural endeavors including cultivating potatoes and citrus, and bee keeping. Mr. Robinson (McGuire et al. 1999:58–59) also noted that in the 1950s, the Robinsons produced about 80,000 pounds of honey a year.

Momi Kapahu and Mr. Kapahu (McGuire et al. 1999:51) also mentioned the Robinsons had a large garden of fruits and vegetables such as mangos, beets, lettuce, and spinach. Kawika Kapahulehua (McGuire et al. 1999:53) recalled tending the Robinsons’ gardens.

Interviewees discussed freshwater resources. Mr. Kaleohano (McGuire et al. 1999:44) mentioned the *makai* portion of Mahaikona Stream is called Kekupua Stream.

Mr. Kaleohano (McGuire et al. 1999:40, 47) mentioned Kekupua Fishpond is fed by three spring holes in the pond. Mr. Kapahu (McGuire et al. 1999:50) also confirmed the freshwater springs in the pond. Kawika Kapahulehua (McGuire et al. 1999:53) also noted Kekupua Fishpond gets water from an “underground spring.”

Bruce Robinson (McGuire et al. 1999:59–60) mentioned the springs in Kekupua Fishpond are called Kahe, Kekupua, and Ma‘o, however, he also noted “there are lots of different names that were used at different times.”

Several interviewees discussed Kekupua Fishpond (SIHP # -00765). Mr. Kaleohano (McGuire et al. 1999:39) mentioned “in the old days” Kekupua Fishpond was owned by “the King and

Queen.” He also noted “the mullet [*Mugil cephalus*] was so big. You put ‘em in the burlap bag [and] the tail stick out.” Mrs. Ka‘ohi (McGuire et al. 1999:48) also mentioned mullet in Kekupua Fishpond were so large it “couldn’t fit into a refrigerator.” Mr. Kapahulehua (McGuire et al. 1999:53) noted, “There’s lotta small fish” in Kekupua Fishpond.

Kekupua Fishpond is located on land owned by the Robinson family. Warren Robinson (McGuire et al. 1999:61) recalled catching mullet in Kekupua Fishpond.

Mr. Kaleohano (McGuire et al. 1999:41) mentioned people could fish in Kekupua Fishpond if they asked permission, however, he reiterated that people were not allowed to fish for mullet for personal use. They were only allowed to catch *‘o‘opu*, tilapia, and *awa* (Milkfish; *Chanos chanos*).

Mr. Kapahu (McGuire et al. 1999:49, 51) also mentioned that workers who lived at Kapalawai were allowed to fish in the Kekupua Fishpond for personal use. He noted mullet were off-limits. He pointed out that a picket fence was constructed around the fishpond to prevent people from fishing in the pond.

Mr. Kapahulehua (McGuire et al. 1999:54) also noted that as long as an employee asked permission, they were allowed to hunt and fish on Robinson’s land. He noted fishing for mullet in Kekupua Fishpond was off limits.

Warren and Bruce Robinson (McGuire et al. 1999:61) discussed the type of *limu* (seaweed) in the Kekupua Fishpond. Warren Robinson stated, “It’s probably a fresh water *limu*. […] It looks very similar to the stuff on the beaches, […] and the *limu* that grows in the fresh water ditches.”

Mr. Kaleohano (McGuire et al. 1999:40–41) mentioned the *limu* in the Kekupua Fishpond was “so thick, you cannot walk in.” He noted the *limu* was “not edible.” He recalled clearing the pond of *limu* every day until tilapia were introduced to the pond and ate all the *limu*.

Mr. Ho‘okano (McGuire et al. 1999:37) mentioned that as an employee of Makaweli Ranch, he was allowed to hunt and fish on Robinson property, however, he pointed out that Kekupua Fishpond was off limits.

Mr. Kaleohano (McGuire et al. 1999:44–45) discussed the *mo‘o wahine* (a water spirit who can change forms, in this case, half-lizard and half-human) that lived in Kekupua Pond. He stated,

> […] you go up there by the monkeypod tree, under the coconut, get one flat rock. […] this *kupua* [supernatural being having more than one form] sits there. […] you go early in the morning before sunrise, you see her sitting on the rock, combing her hair. […]

He recalled,

> […] one man was taken by that lady way in the old days. […] The lady brought him back. […] He said under where the lady took him, she just took him under the arm and then went. He say he cannot tell where it is, but he say underneath is real nice. Nice place. He stay there for one month, then [she] brought him back. […]

Several interviewees discussed fishing practiced along the Makaweli shoreline. Mr. Ho‘okano (McGuire et al. 1999:37) recalled fishing with his father along the beach. He noted there were fish of “all kind” including *manini* (*Acanthurus triostegus*) and mullet. He also noted most people fished “at Pakala or down by the Russian Fort.” Mr. Rice (McGuire et al. 1999:56) also observed

people fishing on the Pakala reef. Mrs. Ka‘ohi (McGuire et al. 1999:48) recalled fishing with her father along the shore near Kapalawai. Mr. Kapahulehua (McGuire et al. 1999:54) also mentioned people fished along the shore. He recalled that fishing was “still good” but the *limu* was “dirty.”

Mr. Kaleohano (McGuire et al. 1999:44) recalled the abundance of fish in the “old days.” He recalled “mullet, *manini*, *limu ‘ele‘ele* (*Enteromorpha prolifera*), and all kine.” He stated,

> […] Until this OSHA law came up. They stop the water from flowing in the ocean. That was it. Never had no fish. You know, the *limu* use to grow when the water flow to the ocean. And, when they had the law, for water flowing to the ocean because of poison or what, never had no *limu* growing on the reef. Before that [was] nice and green ... I know. I use to go dive around there and it’s bare the reef. Before, it's nice and green, the *limu*. Since the law came out, *pau*. That was it.

Toshio Ikeda (McGuire et al. 1999:68) recalled catching *moi* (Threadfish; *Polydactylus sexfilis*), *‘oio* (Ladyfish, bonefish; *Albula Vulpes*), and *pāpio* (young *ulua*) and gathering *limu kohu* (*Asparagopsis taxiformis*), *ogo* (Japanese name for *Limu Manauea* [*Gracilaria coronopifolia*]), and a seaweed he called “ambalam.”

Mrs. Ka‘ohi (McGuire et al. 1999:67) and Mr. Ho‘okano (McGuire et al. 1999:67) mentioned ‘A‘akukui Heiau in Kekupua Valley. Mr. Ho‘okano (McGuire et al. 1999:37–38) mentioned that night marchers often traveled between A‘akukui Heiau and Kekupua Fishpond. He mentioned a “*heiau*” in a “fenced out” area of Makaweli Ranch, however, he did not have concrete information supporting the claim.

Mr. Kaleohano (McGuire et al. 1999:44) mentioned surf spots at Pakala and Infinity Beach.

Mr. Ho‘okano (McGuire et al. 1999:38) mentioned burials are located in *mauka* areas such as Makaweli Valley.

Section 6 Consultation Results

6.1 Introduction

Throughout the course of this assessment, an effort was made to contact and consult with NHO, agencies, and community members including descendants of the area to identify individuals with cultural expertise and/or knowledge of the *ahupua‘a* of Makaweli. CSH initiated its outreach effort in May 2025 through letters, emails, and/or telephone calls.

6.2 Community Outreach Letter

Letters along with maps and aerial photographs of the Preliminary Project Study Area were mailed with the following text:

> *Aloha mai kākou*,
>
> With this letter, Cultural Surveys Hawai‘i (CSH) humbly requests your *mana‘o* and *‘ike* (experience, insights, and perspectives) regarding past and ongoing cultural practices, beliefs, and resources within Makaweli Ahupua‘a.
>
> Consultation with *kūpuna*, *kama‘āina*, and Hawai‘i’s diverse ethnic communities is an important and deeply valued part of our work and the environmental review process for proposed projects in Hawai‘i. Your contributions will revitalize and keep alive knowledge of cultural practices, storied places, and life experiences that will remind Hawai‘i’s children of their history for generations to come.
>
> Project Description
>
> At the request of G70, CSH is preparing a cultural impact assessment (CIA) and Ka Pa‘akai Analysis for the Ka mana o ka lā o Ka‘awanui (Ka‘awanui Solar + Storage) Project within Makaweli Ahupua‘a, Waimea District, including TMKs: (4) 1-7-006:010 por. and 006 por. The Preliminary Project Study Area is located on the southwestern coast of Kaua‘i near the village of Pākalā. The Preliminary Project Study Area is depicted on a portion of the 1996 Hanapepe U.S. Geological Survey (USGS) 7.5-minute topographic quadrangle (Figure 1) and 2022 aerial photo (Figure 2).
>
> AES is proposing the 43 MWac Ka‘awanui Solar Project located along Kaumuali‘i Highway in Makaweli on Kaua‘i. The project is targeting commercial operations by 30 June 2028. The major equipment will consist of photo-voltaic (PV) solar modules, trackers, Power Conversion Stations (PCSs), Battery Energy Storage System (BESS) containers, and Generator Step-Up transformers (GSUs). The 43 MW collection will be routed to a proposed 57/69 kV project substation and related interconnection and ancillary facilities, the “Ka‘awanui Substation.” The project will be sited within an approximate 286-acre Preliminary Project Study Area. The project area, which houses the project infrastructure, will be a smaller subset of the Preliminary Project Study Area.
>
> Purpose of this Study

The purpose of a cultural impact assessment is to gather information on Hawai‘i’s cultural resources, practices, or beliefs that have occurred or still occur within the proposed Preliminary Project Study Area and Makaweli Ahupua‘a. This is accomplished through consultation and background research using previously written documents, studies, and interviews. This information is used to assess potential impacts of the proposed project on the specific identified resources, practices, and beliefs in the project area and throughout Makaweli Ahupua‘a.

The purpose of a Ka Pa‘akai Analysis is to 1) identify and scope valued cultural, historical, or natural resources in the study areas, including the extent to which traditional and customary Native Hawaiian rights are exercised in the study areas; 2) identify the extent to which those resources, including traditional and customary Native Hawaiian rights, will be affected or impaired by the proposed action; and 3) identify the feasible action, if any, to be taken by the responsible overseeing agency to reasonably protect Native Hawaiian rights if they are found to exist.

As a traditional cultural practitioner or holder of long-term community knowledge, your insight, input, and perspective provide a valuable contribution to the assessment of potential effects of this project and an understanding of how to protect these resources and practices.

Insights focused on the following topics in the Preliminary Project Study Area (shown on the attached Figure 1 and Figure 2) are especially helpful and appreciated:

- Your knowledge of traditional cultural practices of the past within the proposed Preliminary Project Study Area and Makaweli Ahupua‘a
- Your specific traditional cultural practice and its connection to the proposed Preliminary Project Study Area and Makaweli Ahupua‘a
- The different natural resources associated with your specific traditional cultural practice
- Legends, stories, or chants associated with your specific traditional cultural practices and their relationships to the proposed Preliminary Project Study Area and Makaweli Ahupua‘a
- Referrals to other *kūpuna*, *kama‘āīna*, and traditional cultural practitioners knowledgeable about the proposed Preliminary Project Study Area and Makaweli Ahupua‘a
- Your comments or thoughts on the potential impacts the proposed project may have on your ongoing traditional cultural practices and natural resources within the proposed Preliminary Project Study Area and Makaweli Ahupua‘a
- Your knowledge of cultural sites and *wahi pana* (storied places) within the proposed Preliminary Project Study Area and Makaweli Ahupua‘a

- Your comments or thoughts on the potential impacts the proposed project may have on cultural sites and *wahi pana* within the proposed Preliminary Project Study Area and Makaweli Ahupua‘a

Consultation Information

Consultation is an important and deeply valued part of a cultural impact assessment and Ka Pa‘akai Analysis. Your contributions will revitalize and keep alive our combined knowledge of past and ongoing cultural practices, historic places, and experiences, reminding our children of their history generation after generation.

Your agreement to participate in this study will contribute to the comprehensive understanding of the area’s traditions and will be part of the public record.

As a part of this process, your knowledge may be used to inform future heritage studies of cultural practices and resources that need protection from the impacts of proposed future projects. If you engage in consultation, and the *mana‘o* and *‘ike* you provide appear in the study, we would like to recognize your contribution by including your name. If you prefer not to allow your name to be included, your information can be attributed to an anonymous source.

The consultation interview structure and format are flexible. We will accommodate your preference on how to get together: talk story, over the phone, by email correspondence, remotely via Zoom, MS Teams, Google Chat, or other remote meeting platform.

Your knowledge of the resources and potential effects of the project on traditional practices in the Preliminary Project Study Area and Makaweli Ahupua‘a, focusing on the topics in the bullet points above, can also be submitted in a written statement. CSH will provide return postage for your written statement on request.

CSH is happy to provide a list of topics for discussion, a more structured questionnaire of interview questions, or any other assistance that might be helpful.

[…]

Mahalo nui loa for your time and attention to this request for consultation.

[…]

6.3 Community Outreach Table

Table 4 contains the names, affiliations, dates of contact, and comments from NHOs, individuals, organizations, and agencies contacted for this project. Results are presented below in alphabetical order.

Table 4. Community outreach table

Name	Affiliation	Notes
Acain, Dom	Former president, E Ola Mau Na Leo O Kekaha	Letter and figures sent via email 29 May 2025 Letter and figures sent via email 27 June 2025

Name	Affiliation	Notes
Ahuna, Dan	OHA Representative – Kaua‘i Island	Letter and figures sent via email 29 May 2025 Letter and figures sent via email 27 June 2025
Akana, Kaipo	Born and raised in Waimea Valley, hunter	Letter and figures sent via USPS 29 May 2025 Letter and figures sent via USPS 27 June 2025
Albao, Liberta	*Pelekikena*; Queen Deborah Kapule Hawaiian Civic Club	Letter and figures sent via USPS 29 May 2025 Letter and figures sent via USPS 27 June 2025
Alu Like, Kaua‘i	NHO	Letter and figures sent via USPS 29 May 2025 Letter and figures sent via USPS 27 June 2025
Bailey, Roselle	*Kumu Hula* (dance teacher) and founder of Ka ‘Imi Na‘auao o Hawai‘i Nei Institute	Letter and figures sent via USPS 29 May 2025 Letter and figures sent via USPS 27 June 2025 Ms. Bailey called 9 July 2025 Ms. Bailey shared project details with several referrals (Pat Finberg, Heu‘i Wyeth, Sally Jo Keahi Manea, Mary Gentry, Niheu ‘Ohana, and Aipolani ‘Ohana) Ms. Bailey called 10 July 2025 Summary of phone call sent from review 17 July 2025 Summary approved 21 July 2025
Ballantine, Jimmy	Owner of Kōke‘e Lodge	Letter and figures sent via USPS 29 May 2025 Letter and figures sent via USPS 27 June 2025
Beniamina, Iolama and Kuuleiaukai	‘Ohana Ni‘ihau	Letter and figures sent via USPS 29 May 2025 Letter and figures sent via USPS 27 June 2025
Buckley, David	Kaua‘i Lead Archaeologist, SHPD	Letter and figures sent via email 29 May 2025 Letter and figures sent via email 27 June 2025
Castaneda, Tano	President, West Kauai Hawaiian Homestead Association	Letter and figures sent via email 29 May 2025 Letter and figures sent via email 27 June 2025
Cristobal, Nikki	Executive Director, Kamāwaelualani	Letter and figures sent via email 29 May 2025 Letter and figures sent via email 27 June 2025
Cummings, Frank	Connection to and history on Pu‘u ‘Ōpae lands	Letter and figures sent via USPS 29 May 2025 Letter and figures sent via USPS 27 June 2025
Cummings, Roslyn	*Po‘o*, E Ola Kākou Hawai‘i	Letter and figures sent via USPS 29 May 2025 Letter and figures sent via email 29 May 2025 Ms. Cummings replied via email 4 June 2025 CSH replied via email 5 June 2025 Ms. Cummings replied via email 9 June 2025 CSH replied via email 24 June 2025 Ms. Cummings replied via email 24 June 2025 CSH replied via email 3 July 2025

Name	Affiliation	Notes
Danner, Robin (Ms.)	Familiar with Pu‘u ‘Ōpae lands	Letter and figures sent via USPS 29 May 2025 Letter and figures sent via USPS 27 June 2025
E Ola Mau Na Leo O Kekaha		Letter and figures sent via USPS 29 May 2025 Letter and figures sent via email 29 May 2025 Letter and figures sent via email 27 June 2025
Faulkner, Kiersten	Executive Director, Historic Hawaii Foundation	Letter and figures sent via USPS 29 May 2025 Letter and figures sent via email 29 May 2025 Letter and figures sent via email 27 June 2025
Faye, Chris	Executive Director, Hui O Laka – Kōke‘e Natural History Museum	Letter and figures sent via USPS 29 May 2025 Letter and figures sent via email 29 May 2025 Letter and figures sent via email 27 June 2025
Faye, Mike	Longtime resident; family ties to Waimea; used to work for Kekaha Sugar on Pu‘u ‘Ōpae lands; owner of Kikiaola Construction	Letter and figures sent via USPS 29 May 2025 Letter and figures sent via email 29 May 2025 Letter and figures sent via email 27 June 2025
Ferreira, Stacy Kealohalani	*Ka Pouhana*, Chief Executive Officer, Office of Hawaiian Affairs (OHA)	Letter and figures sent via USPS 29 May 2025 Letter and figures sent via email 29 May 2025 Kaweni Ibarra, Compliance Advocate for OHA, replied via email 6 June 2025 suggesting contacting OHA’s Beneficiary Services agent on Kaua‘i, Kaliko Santos CSH replied via email 6 June 2025 thank Ms. Ibarra for responding
Flores, E. Kalani	Representative, Flores-Case ‘Ohana	Letter and figures sent via USPS 29 May 2025 Letter and figures sent via email 29 May 2025 Letter and figures sent via email 27 June 2025
Flores, Peleke	Field Operations & Cultural Resources Manager, Mālama Hulē‘ia	Letter and figures sent via email 29 May 2025 Letter and figures sent via email 27 June 2025
Garma, Makana	*Kama‘āina* of Makaweli	Recommended by Sabra Kauka Letter and figures sent via email 9 June 2025 Mr. Garma replied via email on 10 June 2025 expressing interest in meeting CSH replied 10 June 2025 to schedule meeting CSH met with Mr. Garma on 23 June 2025 Interview summary sent for review 17 July 2025 Summary approved 21 August 2025
Harada, Wayne Palala	Waimea/Napali Representative,	Letter and figures sent via USPS 29 May 2025 Letter and figures sent via USPS 27 June 2025

Name	Affiliation	Notes
	Kaua‘i/Ni‘ihau Island Burial Council	
Jacintho, Wayne	West Kaua‘i hunter, Craftsman	Letter and figures sent via USPS 29 May 2025 Letter and figures sent via email 29 May 2025 Letter and figures sent via email 27 June 2025
Jardin, Leinā‘ala (Mrs.)	*Kumu Hula* of Hālau Ka Lei Mokihana o Leinā‘ala	Letter and figures sent via USPS 29 May 2025 Letter and figures sent via USPS 27 June 2025
Kalili, Dre	*Pelekikena* (President), Association of Hawaiian Civic Clubs (AHCC)	Letter and figures sent via USPS 29 May 2025 Letter and figures sent via email 29 May 2025 Letter and figures sent via email 27 June 2025
Kaohelaulii, Billy	Kona Representative, Aha Moku – Kaua‘i; Hui Malama o Kanelolouma	Letter and figures sent via USPS 29 May 2025 Letter and figures sent via email 29 May 2025 Letter and figures sent via email 27 June 2025
Kauahi, Anthony	*Kupuna*	Letter and figures sent via USPS 29 May 2025 Letter and figures sent via USPS 27 June 2025
Kaua‘i Historical Society		Letter and figures sent via USPS 29 May 2025 Letter and figures sent via USPS 27 June 2025
Kauka, Sabra	Hawaiian Studies Kumu, Island School	Letter and figures sent via USPS 29 May 2025 CSH spoke with Ms. Kauka via phone 9 June 2025 Summary sent for review 12 June 2025 Summary approved 17 July 2025
Kawakami, Galen	Former Forester, Forestry and Wildlife Kaua‘i Branch Manager, DLNR	Letter and figures sent via USPS 29 May 2025 Letter and figures sent via email 29 May 2025 Letter and figures sent via email 27 June 2025
Kinimaka-Alquiza, Kapu	*Kumu Hula*, Na Hula o Kaohikukapulani	Letter and figures sent via USPS 29 May 2025 Letter and figures sent via USPS 27 June 2025
Kubo, Klayton	Hunter	Letter and figures sent via email 29 May 2025 CSH spoke with Mr. Kubo 29 May 2025
Kyono, Alvin	Forestry Consultant, Formerly at Forestry and Wildlife, DLNR; longtime resident of Waimea	Letter and figures sent via USPS 29 May 2025 Letter and figures sent via email 29 May 2025 Letter and figures sent via email 27 June 2025
Makua, Kaina	Kumano I Ke Ala (KIKA); long time Waimea/Kekaha connection	Letter and figures sent via USPS 29 May 2025 Letter and figures sent via email 29 May 2025 Letter and figures sent via email 27 June 2025
Manini, Eben	Waimea resident, comes from *‘ohana* of hunters	Letter and figures sent via USPS 29 May 2025 Letter and figures sent via USPS 27 June 2025

Name	Affiliation	Notes
Martin, Umi	Farmer	Letter and figures sent via USPS 29 May 2025 Letter and figures sent via email 29 May 2025 Letter and figures sent via email 27 June 2025
Nobrega-Olivera, Malia	*Kumu hula*, educator Hanapēpē; President, Hui Hana Pa‘akai o Hanapēpē	Letter and figures sent via USPS 29 May 2025 Letter and figures sent via email 29 May 2025 Letter and figures sent via email 27 June 2025
Peters, Sarah	Kaumuali‘i Hawaiian Civic Club President	Letter and figures sent via USPS 29 May 2025 Letter and figures sent via email 29 May 2025 Letter and figures sent via email 27 June 2025
Robinson, Robin	Long standing history with ditch system and existing infrastructure	Letter and figures sent via USPS 29 May 2025 Letter and figures sent via USPS 27 June 2025
Sakai, Teri	Lifelong resident of Waimea	Letter and figures sent via USPS 29 May 2025 Letter and figures sent via USPS 27 June 2025
Santos, Donna Kaliko	Nā Kuleana o Kanaka ‘ōiwi	Letter and figures sent via USPS 29 May 2025 Letter and figures sent via email 29 May 2025 Letter and figures sent via email 27 June 2025
Say, Barbara	*Kama‘āina* of Waimea. Historic and Cultural sites. One of the founders of Kaua‘i Burial Concil	Letter and figures sent via USPS 29 May 2025 Letter and figures sent via USPS 27 June 2025
Summers, Molly	Educator, Kaua‘i Community College	Letter and figures sent via USPS 29 May 2025 Letter and figures sent via USPS 27 June 2025
Taylor, Lynn Maile	President/CEO, Kaua‘i Sea Farm	Letter and figures sent via USPS 29 May 2025 Letter and figures sent via email 29 May 2025 Letter and figures sent via email 27 June 2025
Turalde, Kane	*Kama‘āina*, salt and taro farmer	Letter and figures sent via email 29 May 2025 Letter and figures sent via email 27 June 2025
West Kaua‘i Heritage Center		Letter and figures sent via USPS 29 May 2025 Letter and figures sent via email 29 May 2025 Letter and figures sent via email 27 June 2025
Wichman, Randy	Historian, Former President Kaua‘i Historical Society	Letter and figures sent via USPS 29 May 2025 Letter and figures sent via USPS 27 June 2025

6.4 Written Responses

6.4.1 Roslyn Cummings

On 4 and 9 June 2025, Roslyn Cummings, *Po‘o* of E Ola Kākou Hawai‘i, provided written testimony via email regarding the CIA and Ka Pa‘akai Analysis for the Kaawanui Solar Project. Her comments are provided in their entirety in Appendix B.

Ms. Cummings requested “greater clarity and full transparency on the potential and actual impacts to wai (freshwater), kai (saltwater), and the sacred waiwai of the people.” She noted *wai* is “a living entity tied to Kanaloa, Lono ancestral fertility, food sovereignty, and Ku the integrity of ahupua‘a-based cultural systems as Kane the life giving force through ‘I’O the creator and its creation.”

She had several questions regarding the project’s “Hydrogical Impact,” “Disruption of Ancestral Practice,” “Ka Pa‘akai Responsibilities,” and “Consent and Transparency.” She also requested a “chain of title for land acquisition.”

She emphasized that, “I do not give blind consent for this project.” She stated the proposed project “directly threatens the spiritual, ecological, and cultural integrity of Makaweli.”

AES Hawai‘i’s complete response to Ms. Cummings is included in Appendix C.

6.5 *Kama‘āina* Interview Discussions

6.5.1 Sabra Kauka

On 9 June 2025, CSH took a call with Sabra Kauka, cultural practitioner and *kumu* of Hawaiian Studies at Island School in Līhu‘e, Kaua‘i, to discuss the cultural impact assessment and Ka Pa‘akai Analysis for the Kaawanui Solar Project and her recollections of the Preliminary Project Study Area.

Ms. Kauka stated she is unaware of any cultural sites or resources within the Preliminary Project Study Area and noted the area is currently used as pastureland for cattle. She also recalled riding horses in the Preliminary Project Study Area.

Ms. Kauka expressed her support for the proposed project stating it is a “fabulous idea” that will bring down the cost of electricity for the community.

Ms. Kauka recommended contacting Makana Garma. She noted Mr. Garma was born and raised in Pākala and is familiar with the area.

6.5.2 Makana Garma

On 23 June 2025, CSH met with Makana Garma via Zoom to discuss the cultural impact assessment and Ka Pa‘akai Analysis for the Kaawanui Solar Project and to hear his stories of growing up in the vicinity of the Preliminary Project Study Area.

Mr. Garma was born and raised in Pākalā Village which is located *makai* of the Preliminary Project Study Area. His mother is originally from the island of Ni‘ihau. His father emigrated from the Philippines and worked as a “sabidong” for the Gay & Robinson plantation until he retired.

Mr. Garma is a Senior Coordinating Project Manager at Kamehameha Schools. One of Mr. Garma’s first projects at Kamehameha Schools was developing curriculum for the Ho‘olauna, Hawaiian Culture Based Education (HCBE) place-based program. Ho‘olauna was built upon Kamehameha Schools’ Ho‘omāka‘ika‘i or Explorations program which provides students entering grade 6 a “week-long residential experience” at Kamehameha Schools’ Kapālama campus on O‘ahu where they “engage in hands-on cultural learning activities” (Kamehameha Schools 1996-2025).

> Ho‘omāka‘ika‘i sets the course in embracing Hawaiian culture and identity by introducing keiki [children] to foundational values and practices through a study of ahupua‘a [traditional land division usually extending from the mountains to the sea]. Through learning experiences that include work in a lo‘i kalo [irrigation taro patch], fishpond restoration, mele [song] hula [dance] and more, keiki gain an awareness of the values and practices of their kupuna [elders]. […]. [Kamehameha Schools 2015]

Like the Ho‘omāka‘ika‘i program, Ho‘olauna provided students in grades 6 and 7 a “one-week boarding program” at nine sites across the state including the island of Kaua‘i (Kamehameha Schools 2015).

> Ho‘olauna builds upon Ho‘omāka‘ika‘i by immersing students in learning experiences designed to develop a deeper understanding of the relationship between honua (environment) and kanaka (people). Ho‘olauna students engage in hands-on cultural practices, visit wahi pana (significant places), and work with various community members and kūpuna [elders] within specific moku (districts). [Kamehameha Schools 2015]

Mr. Garma noted “one of the main focuses” of Ho‘olauna was to “develop programs that students would experience on their own home island.”

While developing curriculum for the Ho‘olauna program on Kaua‘i, Mr. Garma worked closely with several *kūpuna* from Kaua‘i and Ni‘ihau to identify the *mo‘olelo* and *wahi pana* they felt students from Kaua‘i should be learning about their island.

Mr. Garma recalled having conversations with Aunty Aletha Kaohi and Aunty Janet Kahalekomo where discussions included the significance of Pā‘ula‘ula, the remnants of a fort located on the Makaweli side of the mouth of the Waimea River. Historically, Pā‘ula‘ula was the residence of the *ali‘i* of Kaua‘i during *ho‘oilo* (winter, rainy season) when the weather on the western side of the island was mild. During *kau* (summer, warmer season), the *ali‘i* resided in the *ahupua‘a* of Wailua, the seat of government on the eastern side of the island.

An historic account mentioned the “king [Kaumuali‘i], chiefs, and about 150 warriors” were living in Pā‘ula‘ula in 1818 (Corney 1896:89).

Aunty Aletha noted *wahi pana* where warriors tested their stamina and trained by running through the soft sand on a stretch of beach near Pā‘ula‘ula known as Keoneluhi. Mr. Garma pointed out that the name Keoneluhi translates to “the tiring sands.”

Aunty Aletha and Aunty Janet also told Mr. Garma about a *loko pu‘uone* (pond near the shore, connected to the sea by a stream or ditch) located to the east of the mouth of Waipao Stream. They noted the *ali‘i* residing at Pā‘ula‘ula were fed with fish from this fishpond because they were the most desired.

Mr. Garma visited the fishpond as a child. He remembers helping to clear the water lilies that “grew like weeds” in the pond. Although he does not recall observing people fishing in the pond, he noted there were mullet there, shared by Aunty Janet in his talk story with her.

Pā‘ula‘ula was formerly known as the Russian Fort or Fort Elisabeth. It was named in honor of the Russian Empress Elisabeth during its brief occupation by the Russian-American Company in 1816-1817 (McCoy 1972:7). The site was designated SIHP # 50-30-05-01000 (McCoy 1972:5).

Aunty Aletha emphasized the importance of students learning the site's traditional name. She contributed the story of Pā‘ula‘ula in the student workbook. She strongly advocated for the reclamation of the site for many years and in 2022, the Russian Fort Elisabeth State Park was officially renamed Pā‘ula‘ula State Historical Park (Hawaii News Now 2022).

Mr. Garma noted the *kūpuna* had a deep understanding of the areas and this is demonstrated in the names of places. He noted Mary Kawena Pukui translates the name Pākalā as "the sun shines" (Pukui et al. 1974:175). He recalled that growing up in Pākalā the "sun was always beating on you" and the "weather was always warm."

Mr. Garma also shared an alternate meaning for Pākalā he learned from cousin ‘Īlei Beniamina, a *kupuna* and native speaker from Ni‘ihau who lived in Ka‘awanui Village. She noted that when Pākalā is spelled "Pākala," with a *kahakō* over only the first "a" in the name, it translates to "fence of bright striking color" referring to the huge rock walls along the road leading to the ocean from the Makaweli Post Office. He stated,

> […] I remember her sharing with me that when driving that road as the sun is setting, those boulders or those rocks that make up the wall are huge, ginormous, and I imagine that they were actually moved over to create that wall from the fields, wherever they grew sugarcane. So all of those rocks were moved to a space and then she would say because these rocks were deep in red dirt by the time they made these walls, and then over the years the sun would beat at them so then they start to turn red or orange in color those rocks and when you're driving down that road towards the ocean side in the afternoon when the sun is setting, it creates this beautiful hues of orange so '*pā*' meaning fence, '*kala*' meaning color, so fence which is of that bright striking color.

Mr. Garma also discussed the meaning of the name Ka‘awanui. He noted the name translates to "the large *‘awa* (*Piper methysticum*)." He stated that *‘awa* may have been growing in abundance in the area during traditional times, however, he has never observed any *‘awa* in the area. He pointed out that many of the native and indigenous plants have been destroyed to make way for agriculture except for residents who intentionally grew them in their yards. He also noted most of the plants in Ka‘awanui and Pākalā villages are introduced. He stated, "You may have a *kukui* [candlenut; *Aleurites moluccana*] tree here an *ulu* [breadfruit; *Artocarpus altilis*] tree there, but they're intentionally planted."

Mr. Garma noted the Preliminary Project Study Area was formerly sugarcane fields. When he was a child, he visited the area with his father and siblings to gather tomatoes, beans, bitter melon, okra, and other vegetables that were planted throughout the fields. The sugar fields had an extensive ditch watering system. Since his father's job was to monitor the fields, he would throw seeds along the ditch and knew where the vegetables were located and when they were ready to be harvested. His father also grew vegetables at their home in Pākalā.

Mr. Garma mentioned the area immediately to the west of the Preliminary Project Study Area was his "playground" when he was young. He stated,

> […] From Pākalā all the way up. You know how kids are right. You like to go venture off and kind of check out what's going on here and there. […] all of the kids in Pākalā would go and play up there, go check it out, you know. Kind of those children's adventures when you're growing up.

He recalled the area was primarily *kiawe* trees, however, "there might be a *kukui* tree here and there."

Mr. Garma mentioned the area along Kaumuali‘i Highway near the western end of the Preliminary Project Study Area is a popular parking area for people who access the beach to surf and fish. He noted the ocean off Pākalā is a popular surfing spot. John R.K. Clark (1990:56–57) also noted,

> Pakala is one of Kaua‘i's most famous beaches. Its fame resides not in the beach itself, but in the surfing waves offshore. The surfing break is known either as Pakala or Infinity, or the plurals of both-Pakalas or Infinities. Of the four options, the most commonly used name is Infinities. [Clark 1990:56–57]

Mr. Garma mentioned some families in Makaweli continue to sustain themselves through fishing. He recalled fishing off Makaweli Landing when he was growing up. He stated, "[W]e cast our lines right out there in the ocean." He also recalled his father used to catch prawns in the stretch of A‘akukui Stream near Makaweli Landing.

Mr. Garma expressed his support for the project. He pointed out that many parcels of land including the Preliminary Project Study Area were once thriving sugar fields that have been vacant for many years. He noted these parcels have the potential to benefit the community. He noted,

> […] the word to *mahi* is 'to cultivate' and so when they would *mahi* the food on the land or *mahi ‘ai* [to farm] the food on the land, that's a way to ensure everyone is fed. But also, the idea behind this project is that we're *mahi*-ing the energy, we're cultivating, harvesting the energies of the sun.

Mr. Garma asked how the community will benefit from the project. He noted many of the families in Pākalā and Ka‘awanui Villages are living on fixed incomes and struggle to afford the high costs of electricity. Mr. Garma wondered how this project can ensure these families are taken care of.

Mr. Garma also expressed concern regarding the potential impact the project may have on the health of the residents living in the vicinity of the Preliminary Project Study Area. He asked,

> What, if any, kinds of impact something like this have on the residents? I mean health wise. You know, cause other agricultural businesses for many years, folks even to this very day, in conversations that I've had, especially on the west side, share a lot about the way that agriculture businesses have been spraying pesticides and what have you and its impact on the health of the community. Run off. Increased cases of cancer. Those kinds of things.

AES Hawai‘i's complete response to Mr. Garma is included in Appendix D.

6.5.3 Roselle Bailey

On 9 and 10 July 2025, CSH spoke with Roselle Bailey, *kumu hula* and founder of Ka ‘Imi Na‘auao o Hawai‘i Nei Institute, over the phone to discuss the cultural impact assessment and Ka Pa‘akai Analysis for the Kaawanui Solar Project and her *‘ike* of the Preliminary Project Study Area and marine resources on the shoreline of Makaweli Ahupua‘a.

Ms. Bailey mentioned the Preliminary Project Study Area had rich soil formed by silt from the mountains that collected in the area. She recalled the fields on the *mauka* side of Kaumuali‘i Highway near the Makaweli Post Office were known as the “gold fields of sugarcane.”

Ms. Bailey also mentioned the ocean located *makai* of the Preliminary Project Study Area is abundant with marine resources. She noted people gather *pa‘akai* and *limu* along the shore near Pākalā Village.

Ms. Bailey asked what kind of waste will be produced during the construction and operation of the proposed project. She also expressed concern about the potential for waste that is not properly disposed of to run off into the ocean and negatively impact marine resources such as *pa‘akai* and *limu*.

Ms. Bailey suggested additional resources for more information on Makaweli. She mentioned Ka ‘Imi Na‘auao o Hawai‘i Nei Institute has a collection of historic maps of the area, the coordinates of the place names of the area, and the manuscripts of William Goodwin which include *mele* and *oli* of Kaua‘i.

Ms. Bailey also shared several referrals of *po‘e* (people), *kama‘āina* and *‘ohana* who are knowledgeable about Makaweli and the Preliminary Project Study Area including Pat Finberg, Heu‘i Wyeth, Sally Jo Keahi Manea, Mary Gentry, the Niheu ‘Ohana, the Aipolani ‘Ohana, and the Ho‘okano ‘Ohana. Ms. Bailey attempted to contact them on behalf of CSH and left messages requesting they contact CSH if they were interested in participating in the CIA and Ka Pa‘akai Analysis.

AES Hawai‘i’s complete response to Ms. Bailey is included in Appendix E.

Section 7 Traditional Cultural Practices

Timothy R. Pauketat succinctly describes the importance of traditions, especially in regard to the active manifestation of one's culture or aspects thereof. According to Pauketat,

> People have always had traditions, practiced traditions, resisted traditions, or created traditions […] Power, plurality, and human agency are all a part of how traditions come about. Traditions do not simply exist without people and their struggles involved every step of the way. [Pauketat 2001:1]

It is understood that traditional practices are developed within the group, in this case, within the Hawaiian culture. These traditions are meant to mark or represent aspects of Hawaiian culture that have been practiced since ancient times. As with most human constructs, traditions are evolving and prone to change, resulting from multiple influences including modernization as well as other cultures. It is well known that within Hawai‘i, a "broader 'local' multicultural perspective exists" (Kawelu 2015:3). While this "local" multicultural mix is deservedly celebrated, it must be noted that it often comes into contact with "traditional Hawaiian culture." This contact among cultures and traditions has undoubtedly resulted in numerous cultural entanglements. These cultural entanglements have prompted questions regarding the legitimacy of newly evolved traditional practices. The influences of "local" culture are well noted throughout this section and understood to represent survival or "the active sense of presence, the continuance of native stories, not a mere reaction, or a survivable name. Native survivance stories are renunciations of dominance, tragedy and victimry" (Vizenor 1999:vii). Acknowledgement of these "local" influences helps to inform nuanced understandings of entanglement and of a "living [Hawaiian] contemporary culture" (Kawelu 2015:3). This section strives to articulate traditional Hawaiian cultural practices practiced within the *ahupua‘a* in ancient times, and the aspects of these traditional practices that continue to be practiced today; however, this section also challenges "tropes of authenticity" (Cipolla 2013:12–22) and acknowledges the multicultural influences and entanglements that may "change" or "create" a tradition.

This section integrates information from Sections 1–6 in examining cultural resources and practices identified within or in proximity of the Preliminary Project Study Area in the broader context of the encompassing Makaweli landscape.

7.1 Agricultural and Gathering Practices

The lower portions of Kaua‘i's southwest plains, which include the *ahupua‘a* Makaweli, are dry and get little rainfall. Historic accounts describe the dry, flat plains of Makaweli being covered with *pili* grass which was commonly used to thatch houses.

On this drier southwestern side of Kaua‘i, evidence of well-terraced and cultivated areas deep in the canyons of Waimea, Makaweli, Olokele, and Hanapēpē support the idea of a large inland population. A particular taro variety, the *haokea*, was said to be fast-growing and well-adapted to the cold stream water and shallow soil at higher elevations. Another variety, *nā kalo a ‘Ola*, was reputed to have grown in high inaccessible places deep in the canyon recesses (Handy and Handy 1972:397). The *mōhihi* varieties of sweet potato were planted on the hillsides above the flood plains. *Kō*, *mai‘a*, and *pia* were grown on the outer edges of cultivated patches. *Uhi*, *‘awa*, *wauke*,

olonā, *kukui*, *‘ulu*, and *kī* were also grown. Native woods were also used for floats, weapons, canoes, and paddles (Handy and Handy 1972:397–400).

Records indicate 117 *kuleana* claims comprising 119 *‘āpana* were filed in Makaweli during the Mahele. Within the 119 claimed *‘āpana* in Makaweli, 223 *lo‘i* or *mo‘o* (which presumably included *lo‘i*) are enumerated. The majority of these *lo‘i ‘āpana* are in the *‘ili* of Hakioa (28), Kaho‘omano (26), and Kakalae (23). Thus, the vast majority of *lo‘i* claims were in seaward portions of the Waimea and Makaweli rivers. No *kuleana* claims are indicated within the Preliminary Project Study Area, or the majority of Makaweli to the east of the Waimea-Makaweli-Mokuone river basin.

An 1857 lease between the guardians of Victoria Kamamalu and a group of 120 people from Makaweli and Waimea indicate the *kapu* items exempted from the lease were the orange trees at Waikea, the large trees of Maha‘iha‘i, the fort, the Po‘alima taro fields, and firewood—if it was for sale for personal and monetary gain. Thus, for example, firewood for personal use could be gathered, along with any other traditional resource items not mentioned, such as *pili* grass for thatching, *hau* for cordage, and plants for medicinal use. It is likely any existing resources were utilized unless a specific *kapu* was placed on a particular item, as mentioned above.

Handy (1940:63–64) observed numerous terraces along the banks of Makaweli River. Handy and Handy (1972:275) also noted the flatlands where Waimea and Makaweli rivers meet were “still intensively cultivated in wet taro” in 1935.

The Hawaiian Sugar Company (a.k.a. Makaweli Plantation) was founded at Makaweli Ahupua‘a shortly after the signing of the Reciprocity Treaty of 1876 (Condé and Best 1973:134). Makaweli Plantation was one of the most successful and profitable plantations in Hawai‘i, due in large part to improvements in irrigation at the start of the twentieth century (Wilcox 1996:89).

By the early 1880s the Robinsons became involved in the sugar business, not only planting their own crops but also leasing large tracts of land to Hawaiian Sugar Company (Wilcox 1996:86). For many years, the Robinsons raised bees for honey and experimented with other agricultural crops.

Previous archaeological studies conducted in the vicinity of the Preliminary Project Study Area have identified historic-era sites associated with the Robinson family and/or sugar plantation land use including SIHP # 50-30-09-00762, a series of rock walls (Features A through E), a terrace (Feature F), and an iron pot (Feature G), a pump house and related pipeline and out-flow basin (Feature H), and a subsurface culvert (Feature I) (McDermott and Hammatt 2001; Zulick et al. 2000); SIHP # -00763, an oval-shaped stone platform (Zulick et al. 2000); SIHP # -00764, a housing complex of 14 historic buildings (Feature A, the main house; Feature B, the guest house; Feature C, offices; Feature D, the carriage house; Feature E, the tack room; Feature F, the greenhouse; Features G through N, employee cottages) (Zulick et al. 2000); SIHP # -00766, a Portuguese brick oven; (Zulick et al. 2000); and SIHP # -02269, a historic irrigation ditch system (Byerly and O’Day 2015).

In a previous cultural study, community members noted traditional settlement in Makaweli focused on the *mauka* areas such as Makaweli Valley (McGuire et al. 1999:43, 48). A community member noted that due to the lack of water sources, cultivation was occurring in the “valleys and gulches” (McGuire et al. 1999:55).

Previous cultural research discussed the various agricultural and ranching activities occurring at Makaweli Ranch in Kapalawai (McGuire et al. 1999:35–36, 39, 50, 51, 55, 58–59). Community members noted the Kapalawai area was known as the Robinsons' "family farm" with vegetable gardens and fruit orchards, pastures for cows, horses, goats, and sheep, and bees raised for honey. The open pasture of Kapalawai consisted of *kiawe* trees which were trimmed and the cut branches used for firewood (McGuire et al. 1999:35–36, 43, 50).

Several community members mentioned employees of Makaweli Ranch cultivated *lo‘i* located near Kekupua Pond (McGuire et al. 1999:36–37, 39). The *lo‘i* were irrigated with water from Kekupua Pond.

The Preliminary Project Study Area is situated in lands used for sugarcane agriculture for over 100 years. Following the demise of the sugarcane industry, the Preliminary Project Study Area has been used for various other agricultural endeavors and ranching. Most of the Preliminary Project Study Area currently comprises fallow agricultural fields and fenced pens used for grazing cattle and water buffalo. A taro patch surrounded by an electrified fence is present in the northern tip of the Preliminary Project Study Area. Plantation-era infrastructure is found throughout the Preliminary Project Study Area including a network of unpaved and paved plantation roads, culverts, ditches, stone walls, and water storage.

Makana Garma noted the Preliminary Project Study Area was formerly sugarcane fields. He visited the area with his father and siblings to gather tomatoes, beans, bitter melon, okra, and other vegetables that were planted throughout the fields. Mr. Garma's father also grew vegetables at their home in Pākalā.

Roselle Bailey mentioned the Preliminary Project Study Area had rich soil formed by silt from the mountains that collected in the area. She recalled the fields on the *mauka* side of Kaumuali‘i Highway near the Makaweli Post Office were known as the "gold fields of sugarcane."

Mr. Garma noted the name Kaawanui translates to "the large *‘awa*." He stated that *‘awa* may have grown in abundance in the area during traditional times, however, he has never observed any *‘awa* in the area. He pointed out many of the native and indigenous plants have been destroyed to make way for agriculture except for residents who intentionally grew them in their yards. He also noted most of the plants in Kaawanui and Pākalā villages including *kukui* and *‘ulu* are primarily introduced.

Sabra Kauka stated the Preliminary Project Study Area currently used as pastureland for cattle.

7.2 Floral Resources

In Makaweli Ahupua‘a, native plants including *uhi*, *‘awa*, *wauke*, *olonā*, *kukui*, *‘ulu,* and *kī* grew wild in the wet gulches (Handy and Handy 1972:397–400). Native woods were also utilized for floats, weapons, canoes and paddles.

The Preliminary Project Study Area has a variety of vegetative habitats including open grassy areas and heavy *kiawe* forest.

Mr. Garma mentioned the area to the west of the Preliminary Project Study Area was primarily *kiawe* and "a *kukui* tree here and there."

7.3 Faunal Resources

In traditional times, feathers from birds were used to create various crafts for the *ali‘i* including *‘ahu‘ula* (feather cape), *mahiole* (feather helmet), *lei*, and *kāhili*. To acquire these feathers, the *ali‘i* employed men called *kia manu* who specialized in catching birds to gather. N.B. Emerson noted,

> The methods used by one hunter in the capture of the birds differed from those used by another. They also varied somewhat, no doubt, in different districts, on the different islands, at different seasons of the year and even in the different hours of the day. [Emerson 1894:103]
>
> There could be nothing stereotyped in the way the hunter of birds practiced his art. While the method might remain essentially the same, it was necessarily subject to a wide range of modification, to suit the skill and ingenuity of each hunter in his efforts to meet the habits and outwit the cunning of the birds themselves. [Emerson 1894:103]

Bird catchers accessed *mauka* areas of the *ahupua‘a* to gather feathers for *lei*, royal *kahili*, capes and helmets. Handy and Handy (1972:258) identified several species of forest birds caught for their feathers including the *‘ō‘ū* (Hawaiian honey creeper; *Psittirostra psittacea*), *‘ō‘mao* (Hawai‘i thrush; *Phaeornis obscurus obscurus*), *‘ō‘ō* (Black honey eater; *Moho nobilis*), *mamo* (Black Hawaiian honey creeper; *Drepanis pacifica*), *‘i‘iwi* (Scarlet Hawaiian honey creeper; *Vestiaria coccinea*), *‘apapane* (Hawaiian honey creeper; *Himatione sanguinea*), *‘akihi pōlena*, *koa‘e ‘ula* (Red-tailed tropic bird; *P. rubricauda rothschildi*), *u‘a*, *‘ākohekohe* (Crested honey creeper; *Palmeria dolei*), *mū* (name of a small, yellow bird), *‘amakihi* (Hawaiian honey creepers; *Loxops virens*), and *‘akialoa* (Hawaiian honey creepers with long, curved bill, olive or yellow-green above, lighter below; *Hemignathus obscurus*).

Handy and Handy (1972:398) also noted, “The wild jungle fowl (*moa*) of the upland were certainly hunted for food, and doubtless domesticated. Other wild fowl included small birds, plover (*kolea*), migrant duck (*koloa*) and the heron” (Handy and Handy 1972:398).

Historic accounts indicate “wild cattle” were a problem on all the islands even in the late 1800s. By 1899, wild cattle as well as goats had become a big problem on Kaua‘i. Notes from Henry Pratt Judd of a hunting trip to Makaweli indicate that over a 2-day period a total of 180 goats and 11 cattle were shot (Judd manuscript 1899, Kaua‘i Historical Society).

7.4 Freshwater Resources

Makaweli River is formed by the joining of Mokuone and Kahana streams. These streams are fed by water from Alaka‘i Swamp. Kahana Stream also joins with a stream that flows out of Olokele Canyon (Handy and Handy 1972:432). Makaweli River flows into the Waimea River which bounds the western side of Makaweli Ahupua‘a (Handy and Handy 1972:405).

It is also important to note the importance of streams as a soure of subsistance. Streams play a vital role in sustaining wetland wildlife and Native Hawaiian agriculture. Streams provide freshwater to *lo‘i kalo* (taro patches), wetland marshes, and *loko i‘a* (fishponds). These areas are habitats for various species including *‘o‘opu*, *hīhīwai* (Endemic grainy snail, *Neritinu graposa*),

‘ōpae, *‘alae ke‘oke‘o* (Hawaiian Coot; *Fulica americana alai*), *‘alae ‘ula* (Hawai‘i Gallinule a.k.a. the Hawaiian Common Moorhen; *Gallinula chloropus sandvicensis*), *ae‘o* (Hawaiian Stilt; *Himantopus mexicanus knudseni*), and others (CWRM and RTCAP 1993:136, 175, 206–207).

Freshets from mountain streams provided freshwater fish and shellfish such as *‘o‘opu*, *‘ōpae*, and *hīhīwai* (Handy and Handy 1972:397–400). The 1857 lease between the guardians of Victoria Kamamalu and tenants of Makaweli and Waimea indicated the small and large ponds in Kekupua and *‘o‘opu* were *kapu*.

Previous cultural research discussed freshwater resources including Kekupua Stream and Kekupua Fishpond (McGuire et al. 1999:40, 44, 47, 50, 53, 59–60). Community members noted Kekupua Fishpond is fed by three underground springs named Kahe, Kekupua, and Ma‘o (McGuire et al. 1999:40, 44, 47, 50, 53, 59–60). Water from Kekupua Fishpond was also used for irrigating *lo‘i* and pastures and for washing potatoes (McGuire et al. 1999:49).

Kekupua Fishpond (SIHP # 50-30-09-00765) was known for producing unusually large-sized mullet. Historic records also indicate Kekupua Fishpond was reserved for the chiefs and thus, the mullet would have been *kapu* to the native tenants. When Eliza Sinclair acquired Makaweli Ahupua‘a, she continued the practice of reserving the mullet for personal use and keeping the pond resources *kapu* to the native tenants.

Previous cultural research discussed Kekupua Fishpond (SIHP # -00765) (McGuire et al. 1999:39, 40–41, 48, 53, 54, 61). Community members noted the pond had very large mullet and a lot of “small fish” such as *‘o‘opu*, tilapia, and *awa*. While fishing in Kekupua Fishpond was allowed with permission, mullet were reserved for the Robinsons and were “off-limits” to the community. The pond was also abundant with *limu*, however, community members mentioned the *limu* is “not edible.”

Mr. Garma learned from Aunty Aletha Kaohi and Aunty Janet Kahalekomo that the *ali‘i* residing at Pā‘ula‘ula were fed with fish from a *loko pu‘uone* located to the east of the mouth of Waipao Stream. Mr. Garma visited the pond as a child. He noted there were mullet in the pond, however, he does not recall observing people fishing there.

Mr. Garma recalled his father used to catch prawns in the stretch of A‘akukui Stream near Makaweli Landing.

7.5 Coastal and Marine Resources

Traditionally, the seashore and ocean areas were vitally important for resource extraction in the early days of settlement. Fishermen along the coast maintained a respected status within traditional Hawaiian society.

In ancient Hawai‘i, the *konohiki* of an *ahupua‘a* managed the fisheries for the *ali‘i nui*. Traditionally, the marine resources of an *ahupua‘a* (from the shoreline to the edge of the reef) were shared by the *konohiki* and the tenants of the *ahupua‘a*. Anything beyond the reef was considered open fishing grounds for all. The tenants were required to reserve part of their catch for the *ali‘i nui* and the *konohiki*. Often, a particular area or marine species would be *kapu* to the native tenants and were reserved for the chief.

Two “fishing grounds” in Makaweli, known as Hiki and Hinaia, were identified by an informant in a nineteenth century oral history project (HEN 1885:2).

Almost equally as important as food, salt was a preserver and staple in the days of old. Mahele records also indicate there were a few salt ponds along the shore.

Previous cultural research discussed the abundance of marine resources available along the Makaweli shoreline and reef (McGuire et al. 1999:37, 44, 48, 54, 56, 68). Community members recalled fishing for *manini*, mullet, *moi*, *‘oio*, and *pāpio*. Gathering *limu kohu*, *limu ‘ele‘ele*, *ogo* (*limu manauea*), and a seaweed called “ambalam.”

Mr. Garma mentioned some families in Makaweli continue to sustain themselves through fishing. He recalled fishing off Makaweli Landing when he was growing up.

Ms. Bailey mentioned people gather *pa‘akai* and *limu* along the shore near Pākalā Village.

7.6 *Mo‘olelo* and *Wahi Pana*

Numerous *ka‘ao* and *mo‘olelo* of Makaweli mention the *menehune*, a mythical race of small industrious people, who were believed to have built many of the fishponds, irrigation systems, and *heiau* on Kaua‘i (Mills 1996:63; Rice 1977:40–42). Joestings (1984:21) describes the *menehune* of Kaua‘i saying that they “grew taro, bananas, yams, and ferns, and fished in the lagoons and sea to sustain themselves.” Many paths and roads on the cliffs of Kaua‘i are said to have been built by *menehune* and are still called Ke-ala-pii-a-ka-Menehune, the Trails-of-the-Menehunes (Rice 1977:40–42). These trails are located above Hanapēpē, Makaweli, Mānā, Nāpali, Miloli‘i, Nu‘alolo, and Hanapu.

Wichman (2003:12–13) noted the Kipapa-a‘ola Trail was developed by Ola to guide travelers safely through the Alaka‘i Swamp area. A portion of the trail which was lined with planks of *hāpu‘u* is known as the Ka-lā‘au-kipapa-a-Ola (Wooden pavement of Ola) and is said to have been constructed by *menehune*.

Another noteworthy feat of engineering credited to the *menehune* is the cut stone-lined *‘auwai* called Kīkīaola, popularly known as the “Menehune Ditch” (SIHP # -00026). The *‘auwai* is also labeled Pe‘ekaua‘i, meaning “hidden Kaua‘i.” The Pe‘ekaua‘i *‘auwai* watered the plain west of the Waimea river, and its most notable section transported water along the face of a cliff, some 20 ft above the river, by means of an aqueduct constructed of intricately fitted, cut, and dressed stones (Bennett 1931:23, 105–107).

Other *mo‘olelo* of Makaweli Ahupua‘a include the stories of the goddesses Hi‘aka and Pele as they journeyed through Kaua‘i (Ho‘oulumāhiehie 2008a; Ho‘oulumāhiehie 2008b); *the Story of Ola* (Rice 1977:54–56; Wichman 1998:23–24); *Holua-manu* (Rice 1977:104; Wichman 1998:24); and *the Girl and the Mo‘o* (Rice 1977:104).

Wendell Bennett (1931:111–112) recorded four *heiau* within Makaweli including Mahaihai (Site 43), Aakukui (Site 44), Kaunumelemele (Site 45), and Kuwiliwili Heiau (Site 48). In addition to these four *heiau*, three other *heiau* were identified by Thomas Thrum, in 1907, including Peeamoa, Kapakaniau, and Naulili Heiau (Thrum 1907:38). Two additional *heiau*, Kaunuloa and Kuanalili, were documented in Kekupua Valley in a nineteenth century oral history project conducted by the students of Lahainaluna School on Maui (HEN 1885:4).

Previous cultural research also mentioned ‘A‘akukui Heiau in Kekupua Valley (McGuire et al. 1999:37–38, 64, 67). A community member also recalled that night marchers often traveled between A‘akukui Heiau and Kekupua Fishpond.

Community members also mentioned a *mo‘o wahine* that lived in Kekupua Pond (McGuire et al. 1999:44–45). The *mo‘o wahine* would reveal herself in the early morning at a particular *pōhaku* near the pond’s edge.

Traditionally, *mo‘o* are associated with fishponds, springs, and water resource areas which they guard and protect. They are known to take on more than one form (*kino lau*), many times taking on the form of a part-human or human. These guardian *mo‘o* are not the small house lizards we commonly see today. *Mo‘o* could take on terrifying forms and perhaps were more dragon-like than anything else. Samuel Kamakau (1964:83) describes *mo‘o* as having “extremely long and terrifying bodies.” Often, large ponds were associated with a particular named *mo‘o*, who was worshiped and to whom offerings were made.

The presence of a *mo‘o* in a pond ensured fish would be abundant and that the health and productivity of the pond, as well as the welfare of the people making the offerings, would be maintained. Some *mo‘o* were known to protect the welfare of the people when they were mistreated by overbearing landlords and chiefs. Retaliation was achieved by withdrawing the abundant supply of fish. There are many Hawaiian legends about *mo‘o*. Some famous *mo‘o* in Hawaiian culture are Hauwahine of Kawainui and Ka‘elepulu ponds, Kihawahine of Maui, Kanekua‘ana of ‘Ewa, and Laniwahine of ‘Uko‘a in Waialua, just to mention a few.

Often, *mo‘o* would reveal themselves in the form of beautiful human beings. Sometimes this appearance foretold a catastrophic event (Kamakau 1964:83). Or, sometimes, the *mo‘o* would use their beautiful, transfigured forms to lure humans into their watery underworld where they, too, would be transformed into *mo‘o*.

Ms. Kauka stated she is unaware of any cultural sites or resources within the Preliminary Project Study Area.

Mr. Garma recalled his conversations with Aunty Aletha Kaohi and Aunty Janet Kahalekomo discussing Pā‘ula‘ula, the compound where the *ali‘i* of Kaua‘i resided when the weather on the western side of the island is mild. Aunty Aletha also mentioned warriors trained on a stretch of beach near Pā‘ula‘ula known as Keoneluhi. Mr. Garma pointed out that Keoneluhi translates to “the tiring sands.” Aunty Aletha emphasized the importance for students learning about the site to refer to it by its traditional name.

Mr. Garma also discussed multiple meanings for the place name Pākalā. He shared Mary Kawena Pukui’s translation of the name Pākalā as “the sun shines” (Pukui et al. 1974:175). He also shared a translation he learned from cousin ‘Īlei Beniamina. She noted that when Pākalā is spelled “Pākala,” it translates to “fence of bright striking color” referring to the huge rock walls along the road leading to the ocean from the Makaweli Post Office.

7.7 Recreational Activities

Numerous Kaua‘i seashores have been utilized for the sport of *he‘e nalu* or surfing including numerous spots offshore of Makaweli. Offshore of Pākalā Village is a popular surfing spot known as Pākalā or Infinities (Clark 1990:56). Located at the “second-reef site outside of Pakala, or

Infinities” is another surfing spot known as Tigers (Clark 2002:356). The surfing spot known as Big Rights is also located south of Pākalā Point (Clark 2002:28).

Previous cultural research also identified surf spots at Pakala and Infinity Beach (McGuire et al. 1999:44).

Mr. Garma mentioned the ocean off Pākalā is a popular surfing spot. He noted the area along Kaumuali‘i Highway near the western end of the Preliminary Project Study Area is a popular parking area for people who access the beach to surf.

Ms. Kauka also recalled riding horses in the Preliminary Project Study Area.

Mr. Garma mentioned the area immediately to the west of the Preliminary Project Study Area was his “playground” when he was young.

7.8 Burials

Traditional Hawaiian burials and historic burials can be found in a variety of locations. Along the coast they are often found interred in Jaucus sands. Hawaiian pre-Contact and post-Contact burials are also found at habitation sites, such as on *kuleana* lots.

Previous archaeological studies have identified human burials at the coast (SIHP #s 50-30-09-00792 [Feature B] and -06011). SIHP # 50-30-09-06011 is located just south of the inlet of Mahinauli Gulch, and just north of the Robinson Landing barge harbor (McMahon 1993). SIHP # -00792 (Feature B), is located at the Kapalawai Resort located immediately west of the current Preliminary Project Study Area (McDermott and Hammatt 2001; Zulick et al. 2000).

Previous cultural research mentioned burials are located in *mauka* areas such as Makaweli Valley (McGuire et al. 1999:38).

Section 8 Summary and Recommendations

CSH undertook this CIA and Ka Pa‘akai Analysis at the request of G70, and on behalf of Kaawanui Solar, LLC. The research broadly covered the *ahupua‘a* of Makaweli.

8.1 Results of Background Research

Background research for this project yielded the following information (presented in approximately chronological order):

1. The *ahupua‘a* of Makaweli comprises approximately 21,844 acres, bounded on the west by Waimea Ahupua‘a and on the east by Hanapēpē Ahupua‘a. Its *mauka* edge runs along the Waimea-Hanalei District border including Mt. Wai‘ale‘ale and part of the Alaka‘i Swamp. A large portion of upper Makaweli Ahupua‘a lies in the Nā Pali–Kona Forest Reserve.
2. Makaweli has several meanings associated with its name. Pukui et al. (1974:142) note Makaweli, which means “fearful features,” refers to a landing, a land division (*ahupua‘a*), and a river in what is presently called the Waimea district on the south coast of Kaua‘i. Mary Kawena Pukui (1983:117) also translates Makaweli as “terrifying eyes,” which refers to sending a god on an errand of destruction. Wichman (1998:22) explained there are variations of the meaning of Makaweli, which seem to correlate to *heiau* and human sacrifice. However, a more ancient name for Makaweli is Ho‘ānuanu which means “to cause cold” (Pukui et al. 1974:47).
3. There are several named rains within the Makaweli Ahupua‘a, including the Kapa‘ahoa or Kapakapa‘ahoa, Kiu, Maka‘upili, Pa‘ūpili, and ‘Ūkiukiu (Akana and Gonzalez 2015: 65, 67, 105–106, 173, 227).
4. The Pūnohu‘ula wind of Makaweli is mentioned by the goddess Pele and her sister, Hi‘iakaikapoliopele in *The Epic Tale of Hi‘iakaikapoliopele* (Ho‘oulumāhiehie 2008a:16, 253; Ho‘oulumāhiehie 2008b:15–16, 237).
5. Traditional *mo‘olelo* note Makaweli was home to the *menehune* who constructed trails, *heiau*, fishponds, and *‘auwai* (Rice 1977:40–42; Wichman 1998:23–24).
6. Makaweli River is formed by the joining of Mokuone and Kahana streams. These streams are fed by water from Alaka‘i Swamp. Kahana Stream also joins with a stream that flows out of Olokele Canyon (Handy and Handy 1972:432). Makaweli River flows into the Waimea River which bounds the western side of Makaweli Ahupua‘a (Handy and Handy 1972:405).
7. Handy (1940:63–64) observed numerous terraces along the banks of Makaweli River. Handy and Handy (1972:275) also noted the flatlands where Waimea and Makaweli rivers meet were “still intensively cultivated in wet taro” in 1935.
8. At the time of the Mahele in 1848, Victoria Kamāmalu held seven *‘āina* on the island of Kaua‘i. Five of these *‘āina* were relinquished to the *Mō‘ī* and she retained two *‘āina* for herself. The *ahupua‘a* of Makaweli was kept for Kamāmalu (LCA 7713).
9. Mahele records indicate 117 *kuleana* claims comprising 119 *‘āpana* were filed in Makaweli during the Mahele. These *‘āpana* were within the *‘ili* of Hakioa, Kaho‘omano, Kakalae, Kaloulu, Kapalawai, Koleakalo Manawai, Pu‘ulima, Wai‘awa‘awa, and Waikaia all located along the Waimea River, the Makaweli River,

or a major western tributary of the Makaweli River. No *kuleana* claims are indicated within the Preliminary Project Study Area, or the majority of Makaweli to the east of the Waimea-Makaweli-Mokuone river basin.

10. In 1865, Eliza Sinclair purchased the *ahupua‘a* of Makaweli (21,844 acres) from Victoria Kamāmalu Ka‘ahumanu for $15,000. A new home built in the cool uplands at about 1,800 ft elevation became known as the “Makaweli house” and sometime in the early 1870s the Sinclair family moved from Ni‘ihau to settle there (Dorrance and Morgan 2000:32–33).
11. The Hawaiian Sugar Company (a.k.a. Makaweli Plantation) was founded at Makaweli Ahupua‘a shortly after the signing of the Reciprocity Treaty of 1876 by representatives of the Scottish Mirlees, Watson & Yaryan Company. Samuel T. Alexander and Henry P. Baldwin took over the plantation, incorporating it in 1889 (Condé and Best 1973:134). A large mill was established in present-day Kaumakani Town and approximately a dozen camps for sugar workers were scattered amongst the fields.
12. In 1889, Francis Gay and Aubrey Robinson formed the family partnership known as Gay & Robinson (G&R) to manage the various family businesses, such as Makaweli Ranch and Makaweli Plantation. By the early 1880s the Robinsons became involved in the sugar business, not only planting their own crops but also leasing large tracts of land to Hawaiian Sugar Company (Wilcox 1996:86). The Robinsons were always looking for new and creative ways to utilize their land. For many years, they raised bees for honey and experimented with other agricultural crops.
13. Makaweli Plantation was one of the most successful and profitable plantations in Hawai‘i, due in large part to improvements in irrigation at the start of the twentieth century (Wilcox 1996:89). The Hawaiian Sugar Company was one of the first plantations to construct family housing for its workers with amenities such as a plantation store (Dorrance and Morgan 2000:33). It established 11 or 12 small camps scattered among their fields in Makaweli Ahupua‘a around the turn of the century.
14. Hawaiian Sugar Company was dissolved in 1940 due to disputes over new leasing agreements. Olokele Sugar Company was formed under the new management of C. Brewer & Company and operated on the former Hawaii Sugar Company plantation lands (Wilcox 1996:89). C. Brewer & Company sold Olokele Sugar Company to Gay & Robinson as its lease was nearing expiration in 1994. The plantation and mill continued to operate under the name Gay & Robinson until it was closed in the first decade of the twenty-first century.

8.2 Results of Community Consultation

CSH attempted to contact Hawaiian organizations, agencies, and community members as well as cultural and lineal descendants to identify individuals with cultural expertise and/or knowledge of the Preliminary Project Study Area and vicinity. Community outreach letters were sent to 48 individuals or groups; six responded, one provided written testimony, and three of these *kama‘āina* and/or *kūpuna* met with CSH for more in-depth interview(s). Consultation was received from:

1. Roslyn Cummings, *Po‘o*, E Ola Kākou Hawai‘i
2. Sabra Kauka, cultural practitioner and *kumu* of Hawaiian Studies at Island School
3. Makana Garma, *kama‘āina* of Pākalā

4. Roselle Bailey, *Kumu hula* and Founder of Ka ‘Imi Na‘auao o Hawai‘i Nei Institute

8.3 Impacts and Mitigation

Based on information gathered from the community consultation, participants voiced their concerns in the following cultural context:

1. Makana Garma mentioned the area along Kaumuali‘i Highway near the western end of the Preliminary Project Study Area is a popular parking area for people who access the beach to surf and fish. He noted the ocean off Pākalā is a popular surfing spot.
2. Mr. Garma mentioned some families in Makaweli continue to sustain themselves through fishing.
3. Mr. Garma expressed concern regarding the potential impacts to the health of the residents living in the vicinity of the Preliminary Project Study Area from chemicals such as pesticides that may be used during the construction and operation of the proposed project.
4. Mr. Garma asked how the community will benefit from the project. He noted many of the families in Pākalā and Ka‘awanui villages are living on fixed incomes and struggle to afford the high costs of electricity. He wondered how this project can ensure these families are taken care of.
5. Sabra Kauka expressed her support for the proposed project stating it is a “fabulous idea” that will bring down the cost of electricity for the community.
6. Mr. Garma expressed his support for the project. He pointed out there are many parcels of land including the Preliminary Project Study Area that were once thriving sugar fields that have been vacant for many years and have the potential to benefit the community.
7. Roslyn Cummings expressed concern regarding the “potential and actual impacts to wai (freshwater), kai (saltwater), and the sacred waiwai of the people.” She noted *wai* is “a living entity tied to Kanaloa, Lono ancestral fertility, food sovereignty, and Ku the integrity of ahupua‘a-based cultural systems as Kane the life giving force through ‘I’O the creator and its creation.”
8. Ms. Cummings emphasized, “I do not give blind consent for this project.” She stated the proposed project “directly threatens the spiritual, ecological, and cultural integrity of Makaweli.”
9. Roselle Bailey mentioned the Preliminary Project Study Area had rich soil formed by silt from the mountains that collected in the area. She recalled the fields on the *mauka* side of Kaumuali‘i Highway near the Makaweli Post Office were known as the “gold fields of sugarcane.”
10. Ms. Bailey also mentioned the ocean located *makai* of the Preliminary Project Study Area is abundant with marine resources. She noted people gather *pa‘akai* and *limu* along the shore near Pākalā Village.
11. Ms. Bailey asked what kind of waste will be produced during the construction and operation of the proposed project. She also expressed concern about the potential for waste that is not properly disposed of to run off into the ocean and negatively impact marine resources such as *pa‘akai* and *limu*.
12. Project construction workers and all other personnel involved in the construction and related activities of the project should be informed of the possibility of inadvertent

cultural finds, including human remains. In the event any potential historic properties are identified during construction activities, all activities will cease and the SHPD will be notified pursuant to HAR §13-280-3. In the event *iwi kūpuna* (Native Hawaiian skeletal remains) are identified, all earth moving activities in the area will stop, the area will be cordoned off, and the SHPD and Police Department will be notified pursuant to HAR §13-300-40. In addition, in the event of an inadvertent discovery of human remains, the completion of a burial treatment plan, in compliance with HAR §13-300 and HRS §6E-43, is recommended.

13. In the event *iwi kūpuna* and/or cultural finds are encountered during construction, project proponents should consult with cultural and lineal descendants of the area to develop a reinterment plan and cultural preservation plan for proper cultural protocol, curation, and long-term maintenance.

Section 9 Ka Pa‘akai Analysis

9.1 Overview

In *Ka Pa‘akai vs Land Use Commission*, 94 Hawai‘i (2000) the Court held the following analysis must also be conducted:

1. The identity and scope of valued cultural, historical, or natural resources in the project area, including the extent to which traditional and customary native Hawaiian rights are exercised in the project area;
2. The extent to which those resources—including traditional and customary native Hawaiian rights—will be affected or impaired by the proposed action; and
3. The feasible action, if any, to be taken by the LUC to reasonably protect native Hawaiian Rights if they are found to exist.

Based on information gathered from the cultural and historical background, and community consultation for this project, there are a number of traditional cultural practices and resources to consider.

9.1.1 Agricultural Practices

The Preliminary Project Study Area has been used for various agricultural endeavors and ranching. Most of the Preliminary Project Study Area currently comprises fallow agricultural fields and fenced pens used for grazing cattle and water buffalo. A taro patch surrounded by an electrified fence is present in the northern tip of the Preliminary Project Study Area. Plantation-era infrastructure is found throughout the Preliminary Project Study Area including a network of unpaved and paved plantation roads, culverts, ditches, stone walls, and water storage.

Makana Garma noted the Preliminary Project Study Area was formerly sugarcane fields. He visited the Preliminary Project Study Area with his father and siblings to gather tomatoes, beans, bitter melon, okra, and other vegetables that were planted throughout the fields. Mr. Garma’s father also grew vegetables at their home in Pākalā.

Sabra Kauka stated the Preliminary Project Study Area is currently used as pastureland for cattle.

Roselle Bailey mentioned the Preliminary Project Study Area had rich soil formed by silt from the mountains that collected in the area. She recalled the fields on the *mauka* side of Kaumuali‘i Highway near the Makaweli Post Office were known as the “gold fields of sugarcane.”

9.1.2 Floral Resources

The Preliminary Project Study Area has a variety of vegetative habitats including open grassy areas and heavy *kiawe* forest.

Mr. Garma noted many of the native and indigenous plants have been destroyed to make way for agriculture except for residents who intentionally grew them in their yards. He also noted most of the plants in Ka‘awanui and Pākalā villages including *kukui* and *‘ulu* are primarily introduced.

He also mentioned the area to the west of the Preliminary Project Study Area was primarily *kiawe* and “a *kukui* tree here and there.”

9.1.3 Faunal Resources

No faunal resources were identified within the Kaawanui Solar Preliminary Project Study Area in the historic documentation, archaeological investigations, or *kama‘āina* interviews included in this CIA and Ka Pa‘akai Analysis.

9.1.4 Freshwater Resources

No freshwater resources were identified within the Kaawanui Solar Preliminary Project Study Area in the historic documentation, archaeological investigations, or *kama‘āina* interviews included in this CIA and Ka Pa‘akai Analysis.

Mr. Garma recalled his father used to catch prawns in the stretch of A‘akukui Stream near Makaweli Landing. He also mentioned a *loko pu‘uone* located to the east of the mouth of Waipao Stream provided fish to the *ali‘i*. He noted there were mullet in the pond, however, he did not recall observing people fishing in there.

Previous cultural research (McGuire et al. 1999:39, 40–41, 48, 53, 54, 61) also noted Kekupua Fishpond (SIHP # -00765) had very large mullet and a lot of “small fish” such as *‘o‘opu*, tilapia, and *awa*. While fishing in Kekupua Fishpond was allowed with permission, mullet were “off-limits.” The pond was also abundant with *limu*, however, community members mentioned the *limu* is “not edible.”

9.1.5 Marine Resources

No marine resources were identified within the Kaawanui Solar Preliminary Project Study Area in the historic documentation, archaeological investigations, or *kama‘āina* interviews included in this CIA and Ka Pa‘akai Analysis.

Mr. Garma mentioned some families in Makaweli continue to sustain themselves through fishing. He recalled fishing off Makaweli Landing when he was growing up. He mentioned the area along Kaumuali‘i Highway near the western end of the Preliminary Project Study Area is a popular parking area for people who access the beach to fish.

Ms. Bailey mentioned noted people gather *pa‘akai* and *limu* along the shore near Pākalā Village.

Previous cultural research (McGuire et al. 1999:37, 44, 48, 54, 56, 68) discussed the abundance of marine resources available along the Makaweli shoreline and reef including fish and *limu*.

9.1.6 *Mo‘olelo* and *Wahi Pana*

No *wahi pana* were identified within the Kaawanui Solar Preliminary Project Study Area in the historic documentation, archaeological investigations, or *kama‘āina* interviews included in this CIA and Ka Pa‘akai Analysis.

Ms. Kauka stated she is unaware of any cultural sites or resources within the Preliminary Project Study Area.

9.1.7 Trails

No trails have been identified within the Kaawanui Solar Preliminary Project Study Area in the historic documentation, archaeological investigations, or *kama‘āina* interviews included in this CIA and Ka Pa‘akai Analysis.

9.1.8 Recreational Activities

Ms. Kauka recalled riding horses in the Preliminary Project Study Area.

Mr. Garma mentioned the ocean off Pākalā is a popular surfing spot. He noted the area along Kaumuali‘i Highway near the western end of the Preliminary Project Study Area is a popular parking area for people who access the beach to surf. He also mentioned the area immediately to the west of the Preliminary Project Study Area was his “playground” when he was young.

9.1.9 Burials

No burials were identified within the Kaawanui Solar Preliminary Project Study Area in the historic documentation, archaeological investigations, or *kama‘āina* interviews included in this CIA and Ka Pa‘akai Analysis.

Previous archaeological studies have identified human burials at the coast (SIHP #s 50-30-09-00792 [Feature B] and -06011) (McDermott and Hammatt 2001; McMahon 1993; Zulick et al. 2000). SIHP # -00792 (Feature B) is located at the Kapalawai Resort located immediately west of the current Preliminary Project Study Area.

Previous cultural research also mentioned burials are in *mauka* areas such as Makaweli Valley (McGuire et al. 1999:38).

9.2 Analysis

9.2.1 Valued Cultural, Historical, or Natural Resources in the Preliminary Project Study Area

The Preliminary Project Study Area has been used for various agricultural endeavors and ranching. Most of the Preliminary Project Study Area currently comprises fallow agricultural fields and fenced pens used for grazing cattle and water buffalo. A taro patch surrounded by an electrified fence is present in the northern tip of the Preliminary Project Study Area.

Makana Garma noted the Preliminary Project Study Area was formerly sugarcane fields. Sabra Kauka also stated the Preliminary Project Study Area is currently used as pastureland for cattle.

The Preliminary Project Study Area has a variety of vegetative habitats including open grassy areas and heavy *kiawe* forest.

Mr. Garma noted many of the native and indigenous plants have been destroyed to make way for agriculture except for residents who intentionally grew them in their yards.

Ms. Bailey mentioned people gather *pa‘akai* and *limu* along the shore near Pākalā Village.

Mr. Garma mentioned the area along Kaumuali‘i Highway near the western end of the Preliminary Project Study Area is a popular parking area for people who access the beach to surf and fish. He noted the ocean off Pākalā is a popular surfing spot.

Mr. Garma mentioned some families in Makaweli continue to sustain themselves through fishing.

9.2.2 The Extent to which Traditional and Customary Native Hawaiian Resources will be Affected by the Proposed Action

Roslyn Cummings expressed concern regarding the “potential and actual impacts to wai (freshwater), kai (saltwater), and the sacred waiwai of the people.” She noted *wai* is “a living entity tied to Kanaloa, Lono ancestral fertility, food sovereignty, and Ku the integrity of ahupua‘a-based cultural systems as Kane the life giving force through ‘I’O the creator and its creation.”

Ms. Cummings emphasized that “I do not give blind consent for this project.” She stated the proposed project “directly threatens the spiritual, ecological, and cultural integrity of Makaweli.”

Mr. Garma expressed concern regarding the potential impacts to the health of the residents living in the vicinity of the Preliminary Project Study Area from chemicals such as pesticides that may be used during the construction and operation of the proposed project.

Mr. Garma also asked how the community will benefit from the project. He noted many of the families in Pākalā and Ka‘awanui villages are living on fixed incomes and struggle to afford the high costs of electricity. He wondered how this project can ensure these families are taken care of.

Ms. Bailey asked what kinds of waste will be produced during the construction and operation of the proposed project. She also expressed concern that waste not properly disposed of could run off into the ocean and negatively impact marine resources such as *pa‘akai* and *limu*.

Ms. Kauka expressed her support for the proposed project stating it is a “fabulous idea” that will bring down the cost of electricity for the community.

Mr. Garma expressed his support for the project. He pointed out there are many parcels of land including the Preliminary Project Study Area that were once thriving sugar fields that have been vacant for many years and have the potential to benefit the community.

9.2.3 Feasible Action, if any, to be Taken to Reasonably Protect Native Hawaiian Rights

In response to Ms. Cummings’ concerns, AES Hawai‘i stated that the Kaawanui Solar Project will not impact freshwater resources within or in the vicinity of the Preliminary Project Study Area. No natural springs or permanent streams have been documented within the Preliminary Project Study Area. This project will not use any water to generate energy; instead, it will utilize photovoltaic panels to harness the sun’s power. AES Hawai‘i’s complete response to Ms. Cummings is included in Appendix C.

In response to Mr. Garma’s concerns, AES Hawai‘i stated the Kaawanui Solar Project is designed and built to meet national safety standards and does not pose a risk to human health or the environment. AES Hawai‘i will not use pesticides at any stage of the project, including development, construction, and operations. AES Hawai‘i’s complete response to Mr. Garma is included in Appendix D.

In response to Ms. Bailey’s concerns, AES Hawai‘i stated waste generated by the Kaawanui Solar Project will not impact the ocean, salt, or *limu* gathering along the shore. Waste generated by the project will vary depending on the project’s stage in either construction, operations, or demolition. The project will mainly produce Construction and Demolition (C&D) waste at the

beginning and end of the project’s lifespan. All waste will be managed in accordance with local, state, and federal regulations. Best management practices will be followed to containerize and store waste and prevent it from leaving the project site and contaminating the environment.

At the end of the project’s lifespan, AES will decommission the project and restore the land to its existing condition or a comparable condition. Equipment and materials will be salvaged, recycled, or put to their best and highest use in coordination with licensed sub-contractors, recycling facilities, and local waste removers. AES Hawai‘i’s complete response to Ms. Bailey is included in Appendix E.

Project construction workers and all other personnel involved in the construction and related activities of the project should be informed of the possibility of inadvertent cultural finds, including human remains. Should any potential historic properties be identified during construction activities, all activities will cease and the SHPD will be notified pursuant to HAR §13-280-3. In the event that *iwi kūpuna* are identified, all earth moving activities in the area will stop, the area will be cordoned off, and the SHPD and Police Department will be notified pursuant to HAR §13-300-40. In addition, in the event of an inadvertent discovery of human remains, the completion of a burial treatment plan, in compliance with HAR §13-300 and HRS §6E-43, is recommended.

Should *iwi kūpuna* and/or cultural finds be encountered during construction, project proponents should consult with cultural and lineal descendants of the area to develop a reinterment plan and cultural preservation plan for proper cultural protocol, curation, and long-term maintenance.

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Appendix A Community Outreach Letter

CULTURAL SURVEYS HAWAI'I
ARCHAEOLOGICAL, CULTURAL, AND HISTORICAL DOCUMENTATION SERVICES - SINCE 1982

P.O. Box 1114 Kailua, Hawai‘i 96734 Ph: (808) 262-9972 Fax: (808) 262-4950

Aloha mai kākou,

With this letter, Cultural Surveys Hawai‘i (CSH) humbly requests your *mana‘o* and *‘ike* (experience, insights, and perspectives) regarding past and ongoing cultural practices, beliefs, and resources within Makaweli Ahupua‘a.

Consultation with *kūpuna*, *kama‘āina*, and Hawai‘i’s diverse ethnic communities is an important and deeply valued part of our work and the environmental review process for proposed projects in Hawai‘i. Your contributions will revitalize and keep alive knowledge of cultural practices, storied places, and life experiences that will remind Hawai‘i’s children of their history for generations to come.

Project Description

At the request of G70, CSH is preparing a cultural impact assessment (CIA) and Ka Pa‘akai Analysis for the Ka mana o ka lā o Ka‘awanui (Ka‘awanui Solar + Storage) Project within Makaweli Ahupua‘a, Waimea District, including TMKs: (4) 1-7-006:010 por. and 006 por. The Preliminary Project Study Area is located on the southwestern coast of Kaua‘i near the village of Pākalā. The Preliminary Project Study Area is depicted on a portion of the 1996 Hanapepe U.S. Geological Survey (USGS) 7.5-minute topographic quadrangle (Figure 1) and 2022 aerial photo (Figure 2).

AES is proposing the 43 MWac Ka‘awanui Solar project located along Kaumuali‘i Highway in Makaweli on Kaua‘i. The project is targeting commercial operations by 30 June 2028. The major equipment will consist of photo-voltaic (PV) solar modules, trackers, Power Conversion Stations (PCSs), Battery Energy Storage System (BESS) containers, and Generator Step-Up transformers (GSUs). The 43 MW collection will be routed to a proposed 57/69 kV project substation and related interconnection and ancillary facilities, the “Ka‘awanui Substation.” The project will be sited within an approximate 286-acre Preliminary Project Study Area. The project area, which houses the project infrastructure, will be a smaller subset of the Preliminary Project Study Area.

Purpose of this Study

The purpose of a cultural impact assessment is to gather information on Hawai‘i’s cultural resources, practices, or beliefs that have occurred or still occur within the proposed Preliminary Project Study Area and Makaweli Ahupua‘a. This is accomplished through consultation and background research using previously written documents, studies, and interviews. This information is used to assess potential impacts of the proposed project on the specific identified resources, practices, and beliefs in the project area and throughout Makaweli Ahupua‘a.

The purpose of a Ka Pa‘akai Analysis is to 1) identify and scope valued cultural, historical, or natural resources in the study areas, including the extent to which traditional and customary Native Hawaiian rights are exercised in the study areas; 2) identify the extent to which those

resources, including traditional and customary Native Hawaiian rights, will be affected or impaired by the proposed action; and 3) identify the feasible action, if any, to be taken by the responsible overseeing agency to reasonably protect Native Hawaiian rights if they are found to exist.

As a traditional cultural practitioner or holder of long-term community knowledge, your insight, input, and perspective provide a valuable contribution to the assessment of potential effects of this project and an understanding of how to protect these resources and practices.

Insights focused on the following topics in the Preliminary Project Study Area (shown on the attached Figure 1 and Figure 2) are especially helpful and appreciated:

- Your knowledge of traditional cultural practices of the past within the proposed Preliminary Project Study Area and Makaweli Ahupua‘a
- Your specific traditional cultural practice and its connection to the proposed Preliminary Project Study Area and Makaweli Ahupua‘a
- The different natural resources associated with your specific traditional cultural practice
- Legends, stories, or chants associated with your specific traditional cultural practices and their relationships to the proposed Preliminary Project Study Area and Makaweli Ahupua‘a
- Referrals to other *kūpuna*, *kama‘āīna*, and traditional cultural practitioners knowledgeable about the proposed Preliminary Project Study Area and Makaweli Ahupua‘a
- Your comments or thoughts on the potential impacts the proposed project may have on your ongoing traditional cultural practices and natural resources within the proposed Preliminary Project Study Area and Makaweli Ahupua‘a
- Your knowledge of cultural sites and *wahi pana* (storied places) within the proposed Preliminary Project Study Area and Makaweli Ahupua‘a
- Your comments or thoughts on the potential impacts the proposed project may have on cultural sites and *wahi pana* within the proposed Preliminary Project Study Area and Makaweli Ahupua‘a

Consultation Information

Consultation is an important and deeply valued part of a cultural impact assessment and Ka Pa‘akai Analysis. Your contributions will revitalize and keep alive our combined knowledge of past and ongoing cultural practices, historic places, and experiences, reminding our children of their history generation after generation.

Your agreement to participate in this study will contribute to the comprehensive understanding of the area’s traditions and will be part of the public record.

As a part of this process, your knowledge may be used to inform future heritage studies of cultural practices and resources that need protection from the impacts of proposed future projects.

If you engage in consultation, and the *mana‘o* and *‘ike* you provide appear in the study, we would like to recognize your contribution by including your name. If you prefer not to allow your name to be included, your information can be attributed to an anonymous source.

The consultation interview structure and format are flexible. We will accommodate your preference on how to get together: talk story, over the phone, by email correspondence, remotely via Zoom, MS Teams, Google Chat, or other remote meeting platform.

Your knowledge of the resources and potential effects of the project on traditional practices in the Preliminary Project Study Area and Makaweli Ahupua‘a, focusing on the topics in the bullet points above, can also be submitted in a written statement. CSH will provide return postage for your written statement on request.

CSH is happy to provide a list of topics for discussion, a more structured questionnaire of interview questions, or any other assistance that might be helpful.

If you have questions regarding consultation or are interested in participating in this study, please contact Kellen Tanaka by email at ktanaka@culturalsurveys.com or Chantellee Spencer at cspencer@culturalsurveys.com. We are both available by phone at (808) 262-9972. Please respond no later than July 18, 2025.

Mahalo nui loa for your time and attention to this request for consultation.

Kellen Tanaka

CSH Cultural Researcher

Appendix B Roslyn Cummings Testimony

Subject: Response to Cultural Impact Assessment Consultation – Makaweli Ahupua‘a / Ka‘awanui Solar + Storage Project

From: Roslyn Nicole Manawaiakea Mālama mare Cummings known as Roslyn Cummings

On behalf of: Malama:Cummings ‘Ohana GodTrust | Ho‘oilina, Hoa‘āina, Kumu teacher of Mana Lomi, Kahu of Aina, Kilokilo practitioner of environmental observation as law and guidance, Kahea one who responds to spiritual call, and protects wahi pana, one who can summon and or awaken, Kakau one who documents, a keeper of documentation preserving oral, legal, and genealogical Mo’okuauhau records that uphold Pono balance and rightful claims and equity. A mo’opuna of William Nuiaola Kualu of Makaweli

Date: June 4, 2025

Aloha mai kākou,

Mahalo for reaching out. I acknowledge receipt of your request and am responding as a kanaka who has customary and traditional practice to the ahupua’a of Makaweli known as kuleana and ho‘oilina (heir) with familial, spiritual, and genealogical ties to lands within Makaweli Ahupua‘a, including surrounding areas that rely on shared water systems, burial protection, and the lawful exercise of ancestral practices tied to the ‘āina known as waiwai our 🧬 generational wealth: imprints, natural resources, nutrients

I am requesting greater clarity and full transparency on the potential and actual impacts to wai (freshwater), kai (saltwater), and the sacred waiwai of the people—not only as a natural resource, but as a living entity tied to Kanaloa, Lono ancestral fertility, food sovereignty, and Ku the integrity of ahupua‘a-based cultural systems as Kane the life giving force through ‘I’O the creator and its creation.

Specific Questions and Concerns for Clarification:

1. Hydrological Impact
    - What studies have been conducted to assess the impact on groundwater, freshwater flow, and traditional irrigation systems within Makaweli and neighboring ahupua‘a?
    - How will this project impact natural springs, ‘auwai, loko i‘a, lo’i or traditional water routes used historically for food cultivation and cultural protocol?
2. Disruption of Ancestral Practice
    - Will AES or its contractors disturb or redirect access to any wahi pana or known burial corridors?
    - Have lineal descendants been properly notified or invited to protect ancestral remains and kuleana land claims in or near TMK (4) 1-7-006:010 and 006?

3. Ka Pa‘akai Responsibilities
    - What protections are in place to ensure that Native Hawaiian religious and ceremonial access will not be impaired?
    - How will the proposed substation and 43 MW system affect the spiritual balance and environmental vibration of the area, especially as it relates to practices invoking Kanaloa, Lono, or Kū?
4. Consent and Transparency
    - Have any beneficiary consultation meetings or public trust evaluations occurred?
    - Has the Office of Hawaiian Affairs been fully engaged to advocate for our constitutional rights under Article XII, Section 7?

Final Notes:

I do not give blind consent for this project. I reserve all rights under:

- HRS Chapter 92F (UIPA),
- Hawaiian Kingdom customary law,
- Public Law 103-150,
- And as a lawful descendant under equity jurisdiction.

Please respond to these questions in writing, and if a consultation is requested, I am available via email or Zoom with proper notice.

I’d like to add- a chain of title for land acquisition. Where does the current warranty deed holder get their title to assert that transparency is being met. On conditions set forth for “agricultural lands” by LUC and if that condition has condition our let the RECORD reflect the Clearfield Doctrine. Putting all United States Domestic Government, State of Hawaii, and County of Kauai’s Agencies and their agents on notice by serving them this disclosure. Their duty is to do data and analysis not push the kuleana fiduciary duty to developers, development, investors, and private hire. That is called unjust enrichment. It is a crime.

Mahalo for respecting the voice of the ‘āina and the rights of those who descend from it.

Piha Pono Ku,

Roslyn Nicole Manawaiakea Mālama mare Cummings known as Manawaiakea

Kalaheo, Kaua‘i – Hawaiian Kingdom

[…]

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Mea Pono

Subject: Response to Cultural Impact Assessment Consultation – Makaweli Ahupua‘a / Ka‘awanui Solar + Storage Project

Date: June 9, 2025

From: Roslyn Nicole Manawaiakea Mālama mare Cummings

On behalf of: Malama:Cummings ‘Ohana GodTrust

Kalaheo, Kaua‘i – Hawaiian Kingdom

[…]

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To: Cultural Surveys Hawai‘i

Cc: AES Corporation, Office of Hawaiian Affairs, Land Use Commission, DLNR, County of Kaua‘i Planning Department, Department of Hawaiian Home Lands, U.S. Fish and Wildlife Service, U.S. Department of the Interior – Office of Native Hawaiian Relations

Aloha mai kākou,

I acknowledge receipt of your outreach and submit this formal response as a ho‘oilina—a rightful heir and descendant through the maternal mo‘okū‘auhau of my ‘ohana whose genealogical roots are embedded in the lands of Makaweli Ahupua‘a and adjacent areas. I am the mo‘opuna (descendant) of William Nuiaola Kualu of Makaweli, and I stand in direct succession to ancestral kuleana, land stewardship, and traditional water practices within this wahi pana.

As a native tenant (hoa‘āina) and spiritual and cultural practitioner, I respond not only with inherited rights but with responsibility—kuleana—to protect the sacred imprint of our ‘āina, wai, and iwi kūpuna. I do so in the capacity of:

- Kahu of ‘Āina – caretaker and protector of sacred sites,
- Kilokilo practitioner – observer of celestial, ecological, and seasonal law,
- Kahea – one who responds to spiritual summons and ancestral alignment,
- Kākau – a documenter of living genealogical records, oral tradition, and rightful land claims,
- And Trustee of the Malama:Cummings ‘Ohana GodTrust, which preserves and asserts equity rights on behalf of our ‘ohana lineal inheritance.

FORMAL QUESTIONS & REMEDY REQUEST

This proposed project—Ka‘awanui Solar + Storage—directly threatens the spiritual, ecological, and cultural integrity of Makaweli. I hereby raise the following questions and put your agencies on formal notice:

1. WAI & WAIWAI – IMPACT TO ANCESTRAL WATER SYSTEMS

- What documented hydrological or cultural assessments have been conducted to ensure protection of freshwater systems, ‘auwai, loko i‘a, and lo‘i?
- How will this project impact the living waiwai (ancestral wealth) passed through our genealogies and sustained by Kane, Lono, and Kanaloa?

2. WĀHI PANA, IWI, AND ACCESS

- Have any burials, iwi kūpuna, or traditional ceremonial sites been located, disturbed, or redirected in TMK (4) 1-7-006:010 or surrounding lands?
- Has proper consultation with lineal descendants—not just agencies—been initiated, documented, and honored?

3. TITLE TRANSPARENCY AND LAND STATUS

- Provide the full chain of title for this parcel. Under what authority or conveyance was this land alienated?
- Are Land Use Commission (LUC) agricultural conditions still in effect? If so, has AES met those obligations?

4. CONSENT AND FIDUCIARY BREACH

- What formal consent procedures have taken place involving Native Hawaiian beneficiaries and rightful descendants?
- Why has the fiduciary duty to protect Native Hawaiian cultural and spiritual rights been delegated to private contractors, developers, or investors?

NON-CONSENT & LEGAL DISCLOSURE

Let the record reflect: I do not consent to this project or its advancement without complete answers and remedy. Your failure to address these issues places your agencies in direct violation of:

- Hawaiian Kingdom law (unrepealed),
- Customary international legal norms,
- Public Law 103-150 (Apology Resolution),
- HRS Chapter 92F (UIPA),
- The Clearfield Doctrine, which distinguishes corporate actors from lawful governance and revokes sovereign immunity when engaging in commerce,
- And federal trust and treaty obligations under the 1849 Treaty of Friendship, Commerce, and Navigation.

Any government agency, entity, or agent who advances this development without full disclosure, title verification, and lawful consultation with ho‘oilina and lineal descendants will be held accountable under equity and trust law for:

- Unjust enrichment,

- Cultural desecration,
- Fiduciary malfeasance,
- And administrative fraud.

REMEDY DEMAND

I hereby request:

1. Written responses to the concerns listed above;
2. Copy of all archaeological, cultural, and water impact assessments;
3. Copy of the land title chain and original conveyance source;
4. List of all government agencies involved in approval or permitting;
5. Official record of public comment and consultation meetings;
6. Proof of LUC compliance regarding agricultural land designation;
7. Affirmation from OHA, DLNR, and DOI of their fiduciary compliance.

Ua mau ke ea o ka ʻāina i ka pono.

This is not a symbolic phrase—it is a living law. The ea (sovereignty) of the land lives in the pono (balance) of its caretakers. I carry that kuleana forward as a hoʻoilina—not by permission, but by lawful descent.

Respectfully submitted,

Roslyn Nicole Manawaiakea Mālama mare Cummings

Hoʻoilina heir and moʻopuna of Makaweli

President, E Ola Kākou Hawai‘i

Ecclesiastical Trustee, Malama:Cummings ʻOhana GodTrust

Kalaheo, Kaua‘i – Hawaiian Kingdom

[…]

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Appendix C AES Hawai‘i Response to Roslyn Cummings

AES Hawai‘i provided the following response to Roslyn Cummings’ emails dated 4 and 9 June 2025 (see Section 6.4.1).

AESHI Response to Roslyn Cummings’ 6/4/25 & 6/9/25 CIA Emails

Aloha Ms. Cummings,

Mahalo for your response to our outreach for the cultural impact assessment (CIA) and Ka Pa‘akai Analysis for the Ka‘awanui Solar + Storage project. We plan to include both of your responses (4 and 9 June 2025) verbatim as an appendix to this study.

AES Hawai‘i provided answers to your questions in the following areas:

1. Wai, Waiwai, Hydrological Impact, and Impact to Ancestral Water Systems

AES Hawai‘i understands water resources are essential, and we are taking every step to conduct thorough due diligence. No natural springs or permanent streams have been documented within the Preliminary Project Study Area. This project will not use any water to generate energy; instead, it will utilize photovoltaic panels to harness the sun's power, providing renewable energy to Kaua‘i residents.

Ka‘awanui Solar is a temporary land use, and AES Hawai‘i will comply with state law by removing all infrastructure from the land at the end of the project’s contract term, restoring the land to its original state or a comparable condition.

2. Wāhi Pana, Iwi, Access, and Ancestral Practice

Ka‘awanui Solar is currently undergoing thorough archaeological and cultural due diligence to gain a comprehensive understanding of the land. All steps will be taken to carefully record, avoid, and/or mitigate impacts on archeological and cultural resources to the extent practicable. AES Hawai‘i has partnered with a local on-island firm to perform an archeological literature review and field inspection report (LRFI), CIA with Ka Pa‘akai Analysis, and an archaeological inventory survey (AIS). These initiatives will include interviews and consultation with lineal and cultural descendants, *kūpuna*, Native Hawaiian Organizations (NHOs), agencies, and area cultural leaders, as well as presentations to interested groups and parties.

3. Ka Pa‘akai Responsibilities

AES Hawai‘i is conducting a Ka Pa‘akai Analysis. The Ka Pa‘akai Analysis will include the following:

1. The identity and scope of valued cultural, historical, or natural resources in the specified area, including the extent to which traditional and customary Native Hawaiian rights are exercised in the specified area;

2. the extent to which those resources—including traditional and customary Native Hawaiian rights—will be affected or impaired by the proposed action; and
3. the feasible action, if any, to be taken to reasonably protect Native Hawaiian rights if they are found to exist in the specified area.

4. Consent and Transparency

AES Hawai‘i is conducting a Ka Pa‘akai Analysis and CIA. The Office of Hawaiian Affairs has been contacted as part of this due diligence effort to provide feedback and share their knowledge of the history and cultural practices in this area. Recognized NHOs are also contacted, as well as community members (focusing on cultural descendants) who have participated in the past, and any recommendations to individuals we receive during outreach.

5. Title Transparency and Land Status

AES Hawai‘i will not purchase the land for this project. Instead, the landowner, Robinson Family Partners, will grant temporary site control to AES Hawai‘i for the duration of the project’s contract term (25 years).

Ka‘awanui Solar is a temporary land use. AES Hawai‘i will remove all infrastructure from the land at the end of the project’s contract term and restore the land to its existing state or comparable.

AES Hawai‘i will not commence construction until all necessary permits and approvals are obtained.

6. Consent and Fiduciary Breach

AES Hawai‘i is committed to developing this project respectfully. AES Hawai‘i will follow all laws and procedural permitting processes required by the County of Kaua‘i and the State of Hawai‘i. AES Hawai‘i will meet all Land Use Commission agricultural conditions and obtain the necessary permits before any construction starts.

7. Request for Documentation

Ka‘awanui Solar is in the early stages of development. Please refer to the Public Utilities Commission docket number 2025-0198 for all public information on the project. AES Hawai‘i will develop this project in compliance with applicable laws and procedural processes.

We appreciate your feedback, questions, and involvement in this cultural consultation. Please feel free to share any additional information you may have regarding the traditional cultural resources and practices in the preliminary project study area, which will help us protect these resources and practices.

Mahalo,

[...]

Appendix D AES Hawai‘i Response to Makana Garma

AES Hawai‘i provided the following response and fact sheets to address Makana Garma’s concerns regarding the potential health impacts to the residents living in the vicinity of the Preliminary Project Study Area from chemicals such as pesticides that may be used during the construction and operation of the Kaawanui Solar Project and his questions regarding how the project will benefit the community (see Section 6.5.2).

Potential Health Impacts & Pesticides

The health and safety of our communities and environment are top priorities for AES Hawai‘i. Kaawanui Solar, like all AES Hawai‘i solar and battery energy storage projects, is designed and built to meet national safety standards and does not pose a risk to human health or the environment. For more detailed information, please refer to the attached fact sheets on the safety of solar panels and battery energy storage systems.

AES Hawai‘i will not use pesticides at any stage of the project, including development, construction, and operations.

Considerations for Kaawanui and Pākalā Village

Kaawanui Solar will produce renewable energy, improve West Kaua‘i’s grid reliability, and support local business. The project will generate clean, renewable energy for Kaua‘i residents, including those in Kaawanui and Pākalā Village. This energy is sold at a low, fixed rate to the Kaua‘i Island Utility Cooperative (KIUC) at a cost lower than that of fossil fuels, which will help stabilize and lower electricity rates. The project also includes the construction of a new KIUC substation, which will help improve grid stabilization and reliability for West Kaua‘i, including Kaawanui and Pākalā Village. Land easement payments from Kaawanui Solar will be made to Gay & Robinson, Inc. and will support G&R’s local business operations.

We recognize that Kaawanui and Pākalā Village families are among our most important stakeholders, as they are closest to the project. As part of our commitment to transparency and early engagement, our first public outreach event for Kaawanui Solar is an open house on Wednesday, July 16, 2025, for residents of Kaawanui and Pākalā villages to learn about the project, ask questions, and provide feedback.

Throughout the development, construction, and operation of Kaawanui Solar, AES Hawai‘i will coordinate closely with Gay & Robinson (G&R) to ensure timely communication with village residents. A dedicated project website, email, and telephone hotline will provide residents with multiple channels of communication to stay connected with the project team, ask questions, and share concerns.

Solar

Solar Panels are Safe for Your Community



Key Takeaways

1. **Solar panels are made of** materials like glass, aluminum, copper, and semiconductors commonly found in household appliances and technology.
2. In the U.S., the **two most used solar cells**—Crystalline Silicon (c-Si) at 62%[1] of current installations, with Thin Film Cadmium Telluride (CdTe) making up the majority of the remaining market—**do not pose a danger** to human health or the environment.
3. Testing shows that **both c-Si and CdTe panels are safe** in worst-case conditions of abandonment or damage in a disaster.

Background

Solar energy continues to grow rapidly across America. As facilities are proposed in more communities, community members have questions about what materials are included in solar photovoltaic (PV) panels, and if they pose an environmental or health risk to surrounding neighbors.

Explore below the materials in solar panels and how **utility-scale solar facilities are safe for your community.**

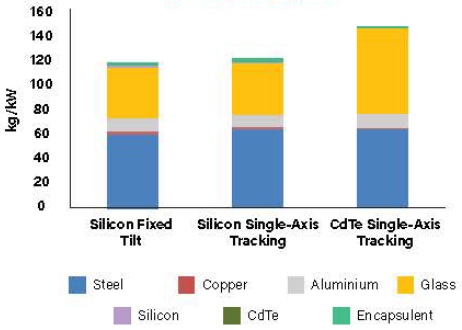
What's inside of a solar panel?

Solar panels are made up of glass, aluminum, copper, and solar cells.

Solar cells are semiconductor materials, made up of thin layers of silicon or other photovoltaic material responsible for converting energy from sunlight into electricity. The thin layer of solar cells is sealed on both sides and covered with glass, a polymer sealant, and—sometimes—an aluminum frame for protection from outside elements.

The main solar cell technologies are crystalline silicon (c-Si) and thin film cadmium telluride (CdTe).

20 MW PV Plant Component Materials by Weight (kg/kW)



Source: U.S. Department of Energy Solar Energy Technologies Office. Photovoltaics End-of-Life Action Plan. March 2022. Accessible: https://www.energy.gov/sites/default/files/2022-03/Solar-Energy-Technologies-Office-PV-End-of-Life-Action-Plan_0.pdf

Can solar panels leach chemicals or metals?

Solar panels are designed and manufactured to withstand harsh **environmental conditions and extreme weather events. These** hardened structures protect the solar cells from the elements and support plans to keep the facilities operating for up to 40 years.

Extended-stress testing[2] and leaching tests reflective of real-world conditions show that crystalline silicon and thin film cadmium telluride **solar panels pose little risk of leaching during operation, removal and disposal**, including in the event of a natural disaster. In order to operate, the internal components of modules must be protected from the elements, particularly moisture, to prevent corrosion and the release of materials.[3]

Furthermore, the Environmental Protection Agency requires that solar panel modules pass toxicity characteristic leaching procedure (TCLP) testing before being disposed of in a landfill. TCLP testing assesses impacts of landfill conditions on solar panels, including leaching potential. This test is typically conducted during manufacturing to ensure the solar panels will meet the requirements of disposal at end-of-life.[4] **Testing shows that both c-Si and CdTe panels are safe in worst-case conditions of abandonment or damage in a disaster.**[5]

Are the materials in solar panels safe?

Solar panels do not contain sufficient hazardous materials to pose a danger to the environment and human health.

Even in the event of breakage or fire, studies show that crystalline silicon and thin film cadmium telluride solar panels do not pose a danger to the environment or human health.[6,7]

Crystalline Silicon (c-Si) Panels

The primary component in crystalline silicon solar cells is silicon, the second-most common element on earth and found in most consumer electronics, from cell phones to computer chips.[8,9]

- An assessment by the Ohio Department of Health highlighted the safety of crystalline silicon panels, concluding "Information to date does not indicate a public health burden from the use of crystalline silicon (c-Si) in solar farms...[as] crystalline silicon itself is **non-toxic to humans.**"[10]

Other components used in c-Si cells include gallium, which is increasing in popularity over boron for putting cells together,[11] and phosphorus—both of which are also non-hazardous to the environment and human health. Most commercially available crystalline silicon panels contain trace amounts (less than 0.1%) of lead used to join the c-Si cells; however, manufacturers are seeking to decrease the use of lead for this purpose.[12] While a large solar energy project contains hundreds of panels, the leaded portions of the panel are enclosed in nonporous, non-toxic substances like glass and polymer, preventing the lead material from escaping or leaching into the ground.[13,14]

- The amount of lead needed to solder the cells is roughly 1/750th of the amount used in a conventional car battery, or half of the amount in a single 12-gauge shotgun shell.

Cadmium is sometimes used in trace amounts in c-Si solar panels for glass frit, the material used in the electrodes to make electrical contact with the PV cell. It may also be found in the solder that is used to join cells. According to the North Carolina Clean Energy Technology Center, research demonstrates the amount of **cadmium found in c-Si solar panels poses negligible toxicity risk to public health** and safety, even in the case of breakage.[15]

Thin Film Cadmium Telluride (CdTe) Panels

Thin film cadmium telluride (CdTe) panels are increasing in popularity, making up about 32% of total installations from 2007-2022, and 38% of new (2022) installations.[16]

CdTe solar panels consist of a semiconductor layer fully encapsulated between two sheets of glass and sealed with an industrial laminate. The CdTe semiconductor layer is approximately 3% of the thickness of a human hair. CdTe is a highly stable compound that differs from elemental cadmium due to its strong bonding and extremely high chemical and thermal stability.[17]

CdTe also has a much lower risk of being released and does not dissolve in water.[18]

- Because coal and oil-fired generators routinely emit cadmium, increased use of solar energy reduce public exposure to cadmium.[19]

For every five megawatts of solar power installed, it is estimated that 157 grams of cadmium are prevented from being released into the environment because of the reduction in traditional energy generation.[20]

To discover more about decommissioning solar facilities and disposal, visit What Happens When a Solar Project is Decommissioned and Solar Panel Recycling and Disposal.

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2 IEC. 2021. IEC TS 63209-1 & -2 - Photovoltaic modules – Extended-stress testing – Part 1, Modules; - Part 2: Polymeric component materials. IEC TS 63209-1:2021 | IEC Webstore; IEC TS 63209-2:2022 | IEC Webstore.

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4 North Carolina Department of Environmental Quality and the Environmental Management Commission. 2021. "Final Report on the Activities Conducted to Establish a Regulatory Program for the Management and Decommissioning of Renewable Energy Equipment." Accessed at: https://files.nc.gov/ncdeq/documents/files/DEQ_H329%20FINAL%20REPORT_2021-01-01.PDF

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11 Yuyan Zhi et al., Ga-doped Czochralski silicon with rear p-type polysilicon passivating contact for high-efficiency p-type solar cells, Volume 230, 2021, 111229, ISSN 0927-0248, https://doi.org/10.1016/j.solmat.2021.111229.

12 Mirletz et al. "Unfounded concerns about photovoltaic module toxicity and waste are slowing decarbonization." Nature Physics, Oct 2023. https://www.nature.com/articles/s41567-023-02230-0

13 Ohio Department of Health, 2022.

14 U.S. Department of Energy, Solar Photovoltaics Supply Chain Deep Dive Assessment, 2022. https://www.energy.gov/sites/default/files/2022-02/Solar%20Energy%20Supply%20Chain%20Report%20-%20Final.pdf

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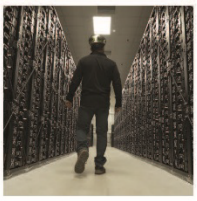
Solar Panels are Safe for Your Community June 2024 cleanpower.org AMERICAN CLEAN POWER



Battery Energy Storage Systems

Latest technology and standards prioritize safety

Utility-scale battery energy storage systems (BESS) serve as an essential component to a resilient, cost-effective and flexible electric grid by being a “force-multiplier” for carbon-free energy. Energy storage allows for the integration of more solar, wind and distributed energy resources, ensuring we can deploy the stored energy to the grid when and where its needed most and reducing the need for new thermal generation. Energy storage can enhance reliability and stability in local electricity distribution systems, including to help avoid blackouts and brownouts.



AES leadership in energy storage

At AES, safety is our highest priority, and we are committed to supporting a safe and reliable clean energy transition by accelerating the deployment of thoughtfully and responsibly designed energy storage systems.

AES is a global leader in energy storage, both through our project portfolio and through Fluence Energy, our joint venture with Siemens. We are recognized for pioneering grid-scale energy storage technology over 15 years ago and launching the global energy storage industry as we know it. Today, nearly half of our new projects include a battery storage component.



Enhanced safety standards and technology advancements

The energy storage technology being deployed today looks and operates very differently from the technology installed just three to five years ago. The industry has also developed a much deeper understanding of the technical and safety of BESS installations now incorporate the latest design standards management of thermal hazards.

Today, many rigorous standards and codes exist to regulate battery energy storage systems. For example, National Fire Protection Association (NFPA) 855 Standard for the Installation of Stationary Energy Storage Systems provides mandatory requirements for the design, installation, commissioning, operation, maintenance and decommissioning of energy storage facilities. The standard includes requirements for maximum energy output, spacing between units and required documentation on file with regulating entities. Further, UL 9540 Standard for Safety of Energy Storage Systems and Equipment includes requirements for safety specifications and ensures that equipment is tested, certified and safe for operation.

Also, all battery energy storage systems undergo testing compliant with UL 9540A Standard for Test Method for Evaluating Thermal Runaway Fire Propagation in Battery Energy Storage Systems to analyze and assess mitigation mechanisms for thermal incidents. Further, as a leader in battery energy storage systems, AES has continued to innovate in additional design and safety improvements for our planned facilities.



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Mitigating thermal incidents

It's important to remember that thermal incidents at battery storage facilities are rare occurrences. Further, BESS technology, system design, safety features, and operational practices have advanced significantly in just the past few years. For example, new layered protections are designed to to address specific battery failure modes to greatly diminish the likelihood of any singular battery cell failure from cascading into a larger thermal runaway event Containment mechanisms at the cell, enclosure, and system level are key to AES' management of thermal hazard mitigation in the unlikely event of an occurrence.

According to research from the Electric Power Research Institute (EPRI), which collects and analyzes data about BESS failure incidents, "the technology's overall safety record is strong and improving." There were about the same number of safety incidents in 2023 as there were in 2019, even as global battery storage deployments have increased twenty-fold. According to EPRI, there were fewer than ten BESS failure events in the entire country in 2023.

Today, AES works closely with local fire departments and emergency responders to develop Hazard Mitigation Analysis and Emergency Response Plans to ensure there is proper training and awareness to mitigate all hazard at a BESS facility.

Advancements in BESS design and safety standards

	Earlier BESS Design	Current, Advanced BESS Design
Enclosure Type	Walk-in design	Non-walk-in (electrical equipment)
Battery Management System Protection	Yes	Yes
Gas Detection & Explosion Prevention	No	Gas detection, ventilation, deflagration panels
Smoke & Heat Detection	Yes	Yes
Fire Suppression	Non-targeted clean agent or sprinkler system	Targeted suppression at module level (clean agent, aerosol, water, etc.)
NFPA 855 Compliant	No	Yes
UL9540A Tested	No	Yes

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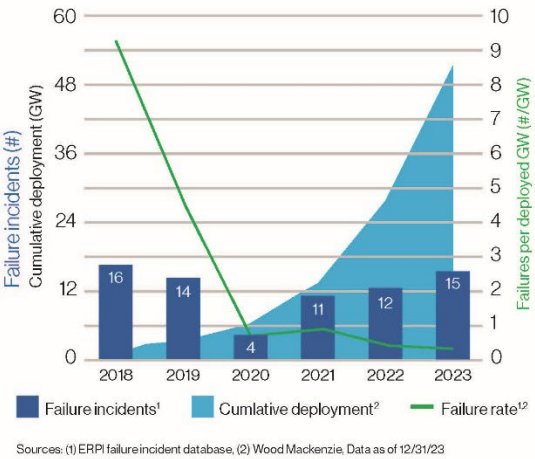
By locating battery cells in specially designed enclosures equipped with advanced safety and fire suppression systems, today's BESS systems greatly diminish the likelihood that any singular battery cell failure will cascade into adjacent cells or units.

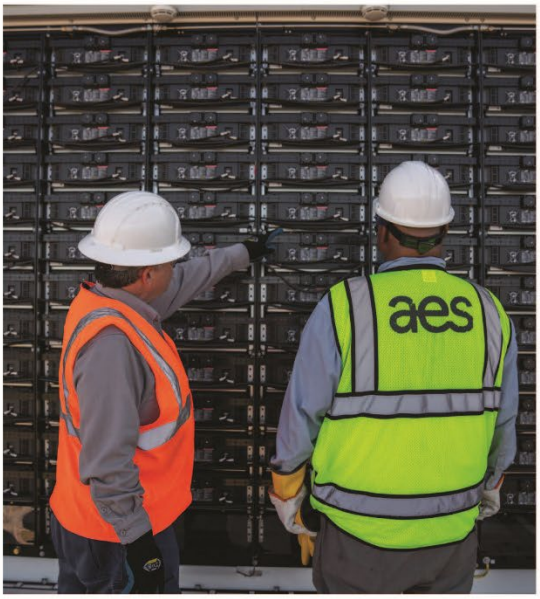


New BESS systems feature layered active and passive safety,monitoring, and fire suppression systems.



Sources: (1) EPRI failure incident database, (2) Wood Mackenzie, Data as of 12/31/23

According to EPRI statistics, BESS failure incidents are decreasing while deployments are increasing substantially. The rate of BESS failure incidents fell 97% between 2018 and 2023. During this time, codes and standards regulating BESS have rapidly evolved to better address safety concerns.



For more information, please visit:
www.energystorage.org

aes

Appendix E AES Hawai‘i Response to Roselle Bailey

AES Hawai‘i provided the following response to Roselle Bailey’s concerns regarding the waste that will be generated by the Kaawanui Solar Project and the potential impacts to the ocean and marine resources if the waste is not disposed of properly (see Section 0).

> Waste generated by Kaawanui Solar (Project) will not impact the ocean, salt, or limu gathering along the shore. Waste generated by the Project will vary depending on the Project’s stage in either construction, operations, or demolition. The Project will mainly produce Construction and Demolition (C&D) waste at the beginning and end of the Project’s lifespan. All waste will be managed in accordance with Local, State, and Federal regulations. Best management practices will be followed to containerize and store waste and prevent it from leaving the Project site and contaminating the environment.
>
> At the end of the Project’s lifespan, AES will decommission the project and restore the land to its existing condition or a comparable condition. Equipment and materials will be salvaged, recycled, or put to their best and highest use in coordination with licensed sub-contractors, recycling facilities, and local waste removers.