JOSH GREEN, M.D.
GOVERNOR
STATE OF HAWAII
Ke Kia'āina o ka Moku'āina 'o Hawai'i

SYLVIA J. LUKE
LT. GOVERNOR
STATE OF HAWAII
Ka Hope Kia'āina o ka Moku'āina 'o Hawai'i

KALI WATSON
CHAIRPERSON, HHC
Ka Luna Ho'okele

KATIE L. LAMBERT
DEPUTY TO THE CHAIR
Ka Hope Luna Ho'okele

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
Ka 'Oihana 'Āina Ho'opulapula Hawai'i
P. O. BOX 1879
HONOLULU, HAWAII 96805

September 26, 2024

Mary Alice Evans, Director
State of Hawai'i
Office of Planning and Sustainable Development
Environmental Review Program
235 South Beretania Street, Room 702
Honolulu, Hawai'i 96813

Subject: HO'OLEHUA SCATTERED LOTS; HO'OLEHUA, MOLOKA'I; PUBLICATION OF THE DRAFT ENVIRONMENTAL ASSESSMENT AND ANTICIPATED FINDING OF NO SIGNIFICANT IMPACT

Dear Ms. Evans:

The Hawaiian Homes Commission hereby submits the Draft Environmental Assessment and Anticipated Finding of No Significant Impact (DEA-AFNSI) for the Ho'olehua Scattered Lots project for publication in the next available edition of the Environmental Notice. The proposed project involves Tax Map Keys (TMKs) (2)5-2-005:031, (2)5-2-026:003, :014, :016 and :017.

In addition to this letter, we have also submitted the electronic version of the Environmental Review Program Publication Form and a searchable PDF-formatted copy of the DEA-AFNSI through the online submission platform.

If you have any questions, please contact Emily Murai of Munekiyo Hiraga, project consultant, at (808) 983-1233 or via email at planning@munekiyohiraga.com.

Mahalo,

Kali Watson

Kali Watson, Chairperson
Hawaiian Homes Commission

cc: Neil Nugent, Department of Hawaiian Home Lands
Emily Murai, Munekiyo Hiraga

ITEM E-7
EXHIBIT A

From: webmaster@hawaii.gov
To: DBEDT OPSD Environmental Review Program
Subject: New online submission for The Environmental Notice
Date: Friday, October 11, 2024 8:37:17 AM

Action Name

Ho‘olehua Scattered Lots Subdivision and Related Improvements

Type of Document/Determination

Draft environmental assessment and anticipated finding of no significant impact (DEA-AFNSI)

HRS §343-5(a) Trigger(s)

- (1) Propose the use of state or county lands or the use of state or county funds

Judicial district

Moloka‘i, Maui

Tax Map Key(s) (TMK(s))

(2)5-2-005:031; (2)5-2-026:003; (2)5-2-026:014; (2)5-2-026:016; and (2)5-2-026:017;

Action type

Agency

Other required permits and approvals

Chapter 6E, HRS, Historic Preservation Compliance, Department of Health - National Pollutant Discharge Elimination System Permit, Department of Health - Noise Permit, as applicable, Construction and Operating Permits, Construction Permits (Building, Grading, and/or Grubbing), Lot consolidation and Subdivision approval.

Proposing/determining agency

Department of Hawaiian Home Lands

Agency contact name

Neil Nugent

Agency contact email (for info about the action)

cornelius.f.nugent@hawaii.gov

Email address for receiving comments

planning@munekiyohiraga.com

Agency contact phone

(808) 730-0319

Agency address

91-5420 Kapolei Parkway
Kapolei, Hawai‘i 96707
United States
Map It

Is there a consultant for this action?

ITEM E-7
EXHIBIT A

Yes

Consultant

Munekiyo Hiraga

Consultant contact name

Emily Murai

Consultant contact email

planning@munekiyohiraga.com

Consultant contact phone

(808) 983-1233

Consultant address

305 High Street
Suite 104
Wailuku, Hawai'i 96793
United States
Map It

Action summary

The State of Hawai'i, Department of Hawaiian Home Lands (DHHL) proposes the Ho'olehua Scattered Lots Subdivision and Related Improvements project in Ho'olehua, Moloka'i, Hawai'i. The project entails subdividing five (5) parcels within the Ho'olehua area on Moloka'i into twelve (12) lots to be designated for agricultural use and improving them for lease to DHHL beneficiaries. In addition, DHHL proposes to demolish a dilapidated house and greenhouse located on parcels identified by TMK (2)5-2-026:014 and (2)5-2-026:016, and would close a septic tank on TMK (2)5-2-026:014 in accordance with Department of Health regulations. The newer, abandoned home on portions of TMKs (2)5-2-026:016 and (2)5-2-026:003 will be assessed to determine if it can be leased.

Reasons supporting determination

Refer to Significance Criteria Assessment in the Draft EA.

Attached documents (signed agency letter & EA/EIS)

- Hoolehua_Scattered_Lots_DHHL_AFNSI_092624.pdf
- DHHL_Hoolehua_Scattered_Lots_Draft_EA_October_2024.pdf

Action location map

- Hoolehua_Shapefile.zip

Authorized individual

Emily Murai

Authorization

- The above named authorized individual hereby certifies that he/she has the authority to make this submission.

ITEM E-7
EXHIBIT A

Draft Environmental Assessment

HO‘OLEHUA SCATTERED LOTS SUBDIVISION AND RELATED IMPROVEMENTS

(TMK NOS. (2)5-2-005:031, (2)5-2-026:003, 014, 016 and 017)

Prepared for:

State of Hawai‘i
Department of Hawaiian Home Lands

Approving Agency:

Hawaiian Homes Commission

October 2024

Copyright © 2024
by Munekiyo Hiraga

MUNEKIYO HIRAGA

Planning. Project Management. Sustainable Solutions.

ITEM E-7
EXHIBIT A

Draft Environmental Assessment

HOʻOLEHUA SCATTERED LOTS SUBDIVISION AND RELATED IMPROVEMENTS

(TMK NOS. (2)5-2-005:031, (2)5-2-026:003, 014, 016 and 017)

Prepared for:

State of Hawaiʻi
Department of Hawaiian Home Lands

Approving Agency:

Hawaiian Homes Commission

October 2024

Copyright © 2024
by Munekiyo Hiraga

MUNEKIYO HIRAGA

CONTENTS

Page

Executive Summary iv
List of Acronyms vii

I. PROJECT OVERVIEW 1
A. PROPERTY BACKGROUND, EXISTING USE AND LAND OWNERSHIP 1
B. PROJECT NEED 1
C. PROPOSED ACTION 4
D. LAND USE REGULATORY CONSIDERATIONS 5
E. CHAPTER 343, REVISED STATUTES, ENVIRONMENTAL ASSESSMENT 9
F. ESTIMATED CONSTRUCTION SCHEDULE AND COSTS 9

II. DESCRIPTION OF THE EXISTING CONDITIONS, POTENTIAL IMPACTS AND MITIGATION MEASURES 10
A. PHYSICAL SETTING 10
1. Surrounding Land Use 10
2. Climate 11
3. Topography and Soil Conditions 11
4. Agricultural Productivity Considerations 15
5. Flood, Tsunami, and Sea Level Rise 18
6. Streams and Wetlands 19
7. Flora and Fauna 19
8. Archaeological and Historical Resources 22
9. Cultural Resources 24
10. Wildfire Hazards 27
11. Air Quality 30
12. Greenhouse Gas Considerations 31
13. Noise Quality 32
14. Hazardous Materials 33
15. Scenic and Open Space Resources 35
B. SOCIO-ECONOMIC ENVIRONMENT 36
1. Land Use and Community Character 36
2. Population 36
3. Economy 37
4. Housing 37
C. PUBLIC SERVICES 38
1. Solid Waste Collection and Disposal 38
2. Police, Fire, and Medical Facilities 38
3. Educational Facilities 39
4. Recreational Facilities 40
D. INFRASTRUCTURE 40
1. Roadways 40
2. Potable Water 41
3. Non- Potable Water 42
4. Wastewater 43
5. Drainage 43

6. Electric, Telephone, and Cable 45
E. CUMULATIVE AND SECONDARY IMPACTS 46

III. RELATIONSHIP TO GOVERNMENTAL PLANS, POLICIES, AND CONTROLS 48
A. STATE LAND USE DISTRICTS 48
B. DEPARTMENT OF HAWAIIAN HOME LANDS PLANNING SYSTEM 48
1. General Plan 48
2. Moloka‘i Island Plan 53
3. Moloka‘i Regional Plan 53
C. HAWAI‘I STATE PLAN 55
D. STATE FUNCTIONAL PLANS 64
E. GENERAL PLAN OF THE COUNTY OF MAUI 70
F. MOLOKA‘I ISLAND COMMUNITY PLAN 73
G. COUNTY ZONING 75
H. HAWAI‘I COASTAL ZONE MANAGEMENT PROGRAM 76
1. Recreational Resources 76
2. Historic Resources 77
3. Scenic and Open Space Resources 77
4. Coastal Ecosystems 78
5. Economic Uses 79
6. Coastal Hazards 79
7. Managing Development 80
8. Public Participation 81
9. Beach and Coastal Dune Protection 81
10. Marine and Coastal Resources 82

IV. ALTERNATIVES TO THE PROPOSED ACTION 84
A. PREFERRED ALTERNATIVE 84
B. ALTERNATIVE CONFIGURATIONS 85
C. NO ACTION ALTERNATIVE 85
D. DEFERRED ACTION ALTERNATIVE 85

V. SUMMARY OF ADVERSE ENVIRONMENTAL EFFECTS WHICH CANNOT BE AVOIDED 87

VI. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES 88

VII. LIST OF PERMITS AND APPROVALS 89

VIII. SIGNIFICANCE CRITERIA ASSESSMENT 90

IX. PARTIES CONSULTED DURING THE PREPARATION OF THE DRAFT ENVIRONMENTAL ASSESSMENT; LETTERS RECEIVED AND RESPONSES TO SUBSTANTIVE COMMENTS 96

X. REFERENCES i

List of Figures

Page

Figure 1. Regional Location Map 2
Figure 2. Property Location Map 3
Figure 3. Conceptual Lot Site Plans 6
Figure 4. Maui County Zoning Map 7
Figure 5. Maui County Molokaʻi Island Community Plan Map 8
Figure 6. Soil Association Map 12
Figure 7. Soil Classification Map 14
Figure 8. Agricultural Lands of Importance to the State of Hawaiʻi Map 16
Figure 9. Land Study Bureau Map 17
Figure 10. Streams and Wetlands Map 20
Figure 11. Wildfire Hazard Map 29
Figure 12. State Land Use District Map 49
Figure 13. DHHL Molokaʻi Island Plan Map 54

List of Tables

Page

Table 1. Proposed Subdivided Lots by TMK 1
Table 2. Hawaiʻi State Plan, Chapter 226, HRS Part I. Overall Themes, Goals, Objectives, and Policies (HRS 226-1 to 226-27) 57
Table 3. Hawaiʻi State Plan, Chapter 226, HRS Part III. Priority Guidelines (Chapters 226-101 to 226-109) 63
Table 4. Relationship Between the Proposed Hoʻolehua Scattered Lots and the State Functional Plans 66
Table 5. Analysis of the Project's Conformance to the Countywide Policy Plan 71

List of Appendices

Appendix A. Preliminary Development Plans
Appendix B. Preliminary Engineering and Drainage Report
Appendix C. U.S. Fish and Wildlife Service Official Species List
Appendix D. Biological Resources Survey
Appendix E. Literature Review and Field Inspection Report
Appendix E-1. Supplemental Literature Review and Field Inspection Report
Appendix E-2. State Historic Preservation Division Chapter 6E Determination Letters
Appendix F-1. Cultural Impact Assessment Report
Appendix F-2. Supplemental Cultural Impact Assessment Report
Appendix G. Limited Hazardous Material Survey
Appendix H-1. Analysis of Project Applicability to Hawaiʻi State Plan
Appendix H-2. Analysis of Project Applicability to Countywide Policy Plan

Executive Summary

Project Name:	Hoʻolehua Scattered Lots Subdivision And Related Improvements
Type of Document:	Draft Environmental Assessment
Legal Authority:	Chapter 343, Hawaiʻi Revised Statutes Title 11, Chapter 200.1, Hawaiʻi Administrative Rules
Anticipated Determination:	Anticipated Finding of No Significant Impact (AFNSI)
Applicable Environmental Assessment "Trigger":	Use of State Lands; Use of State Funds
Location:	Molokaʻi Island Hoʻolehua TMK Nos. (2)5-2-005:031, (2)5-2-026:003, 014, 016 and 017
Landowner:	State of Hawaiʻi, Department of Hawaiian Home Lands
Applicant:	State of Hawaiʻi Department of Hawaiian Home Lands Contact: Neil Nugent Land Development Division 91-5420 Kapolei Parkway Kapolei, Hawaiʻi 96707 Phone No.: (808) 620-9500
Approving Agency:	State of Hawaiʻi Department of Hawaiian Home Lands Hawaiian Homes Commission Contact: Kali Watson, Chairperson 91-5420 Kapolei Parkway Kapolei, Hawaiʻi 96707 Phone No.: (808) 620-9500
Consultant:	Munekiyo Hiraga 305 High Street, Suite 104 Wailuku, Hawaiʻi 96793 Contact: Emily Y.K. Murai, Associate Phone No.: (808) 983-1233

Project Summary:

The State of Hawai‘i, Department of Hawaiian Home Lands (DHHL) proposes to subdivide five (5) parcels, totaling approximately 51.7 acres, into twelve (12) subsistence agricultural lots for its beneficiaries. The proposed project will be implemented on land identified by Tax Map Key Nos. (TMK) (2)5-2-005:031 (Parcel 31), TMK (2)5-2-026:003) (Parcel 3), (2)5-2-026:014 (Parcel 14), (2)5-2-026:016 (Parcel 16) and (2)5-2-026:017 (Parcel 17) and owned by the DHHL in Ho‘olehua, Moloka‘i, Hawai‘i. The lots are currently vacant, with the exception of several abandoned structures, and surrounded by other DHHL lands including developed homesteads and vacant agricultural lands.

Improvements needed to make the subdivided lots suitable for lease include the construction of access driveways from Mo‘omomi Avenue and Farrington Avenue and access driveways from Pu‘u Kapele Avenue. Roadway improvements include minimal grading and a 20-foot wide paved road to provide access to the sites. Lot improvements include paved driveways and an assumed development area of 5,000 square feet per lot. Additional improvements include the construction of waterlines to provide irrigation and domestic water to the homestead lots.

The subject properties have been designated for “Agricultural” use by the State Land Use Commission and are designated “Agriculture” by both Maui County Zoning and the Moloka‘i Community Plan. The proposed project will be implemented under the jurisdiction of the DHHL. The mission of the DHHL is to effectively manage the Hawaiian Home Lands trust and to develop and deliver land to native Hawaiians. The Hawaiian Homes Commission Act (HHCA) vests onto the DHHL, the authority to use its lands at its discretion. Specifically, HHCA Section 204 states, *“all available lands shall immediately assume the status of Hawaiian home lands and be under the control of the department to be used and disposed of in accordance with the provisions of this Act”.* As DHHL owns the subject properties, the above-noted provision grants DHHL the authority to proceed with the project without the lands being fully entitled for residential use.

As previously mentioned, the subject parcels are owned by the DHHL. The use of State lands and State funds trigger compliance with the environmental review requirements of the Hawai‘i Revised Statutes (HRS), Chapter 343. As such, this Environmental Assessment

(EA) has been prepared pursuant to Chapter 343, HRS and Chapter 200.1 of Title 11, Hawai'i Administrative Rules (HAR). Accordingly, this document addresses the technical characteristics and potential environmental impacts of the proposed project, as well as advances findings and mitigative measures relative to the project. The Hawaiian Homes Commission will serve as the approving agency for the EA.

List of Acronyms

ALISH	Agricultural Lands of Importance to the State of Hawai‘i
ACM	Asbestos Containing Materials
AFNSI	Anticipated Finding of No Significant Impact
amsl	above mean sea level
BMPs	Best Management Practices
Calpac	California Packing Corporation
CFL	Compact Florescent Light
CFR	Code of Federal Regulations
cfs	cubic feet per second
CIA	Cultural Impact Assessment
CO2 EQ	carbon dioxide equivalent
CSH	Cultural Surveys Hawai‘i
CTAHR	College of Tropical Agriculture and Human Resources
CWPP	Community Wildfire Protection Plan
CWRM	Commission on Water Resource Management
DHHL	Department of Hawaiian Home Lands
DLNR	Department of Land and Natural Resources
DOA	Department of Agriculture
DOE	Department of Education
DOFAW	Division of Forestry and Wildlife
DOH	State Department of Health
EA	Environmental Assessment
EPA	Environmental Protection Agency
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
GHG	Greenhouse gases
GIS	Geographic Information System
HAR	Hawai‘i Administrative Rules
HCZMP	Hawai‘i Coastal Zone Management Program
HECO	Hawaiian Electric Company
HHC	Hawaiian Homes Commission
HHCA	Hawaiian Homes Commission Act
HIOSH	Hawai‘i Occupational Safety and Health
HRS	Hawai‘i Revised Statutes
HUD	U.S. Department of Housing and Urban Development
HWMO	Hawai‘i Wildfire Management Organization
IPaC	Information for Planning and Consultation
IWS	Individual Wastewater System
LBP	Lead-based paint

LCP	Lead-containing paint
LRFI	Literature Review and Field Inspection
LSB	Land Study Bureau
MIP	Molokaʻi Island Plan
MIS	Molokaʻi Irrigation System
MuA	Molokai silty clay loam, 0 to 3 percent slopes
MuB	Molokai silty clay loam, 3 to 7 percent slopes
MuC3	Molokai silty clay loam, 7 to 15 percent slopes
MvD3	Molokai silty clay loam, 15 to 25 percent slopes
NGO	Native Hawaiian Organizations
NAGPRA	Native American Graves Protection and Repatriation Act
NPDES	National Pollutant Discharge Elimination System
OSHA	Occupational Safety and Health Administration
PcBs	Polychlorinated biophenyls
POA	Plan of Action
SHPD	State Historic Preservation Division
SIHP	State Inventory of Historic Places
SLRVA	Sea Level Rise Vulnerability and Adaption Report
TMK	Tax Map Key
TSCA	Toxic Substances Control Act
U.S.	United States
US EPA	United States Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
WSS	Water System Standards
WUPA	Water Use Permit application

PROJECT OVERVIEW

I

I. PROJECT OVERVIEW

A. PROPERTY BACKGROUND, EXISTING USE AND LAND OWNERSHIP

The State of Hawai‘i, Department of Hawaiian Home Lands (DHHL) proposes the Ho‘olehua Scattered Lots Subdivision and Related Improvements project (“project”) in Ho‘olehua, Moloka‘i, Hawai‘i. See **Figure 1**. The project entails subdividing five (5) parcels within the Ho‘olehua area on Moloka‘i into twelve (12) lots to be designated for agricultural use and improving them for lease to DHHL beneficiaries. The affected properties are owned by DHHL identified in **Table 1**. below. See **Figure 2**.

Table 1. Proposed Subdivided Lots by TMK

TMK	Existing Acreage
(2)5-2-005:031 (Parcel 31)	31.69 Acres
(2)5-2-026:003 (Parcel 3)	4.72 Acres
(2)5-2-026:014 (Parcel 14)	4.73 Acres
(2)5-2-026:016 (Parcel 16)	4.73 Acres
(2)5-2-026:017 (Parcel 17)	5.83 Acres

The proposed action will subdivide five (5) parcels in the Ho‘olehua area of Moloka‘i into a total of 12 lots. Refer to **Table 1** for the affected parcels.

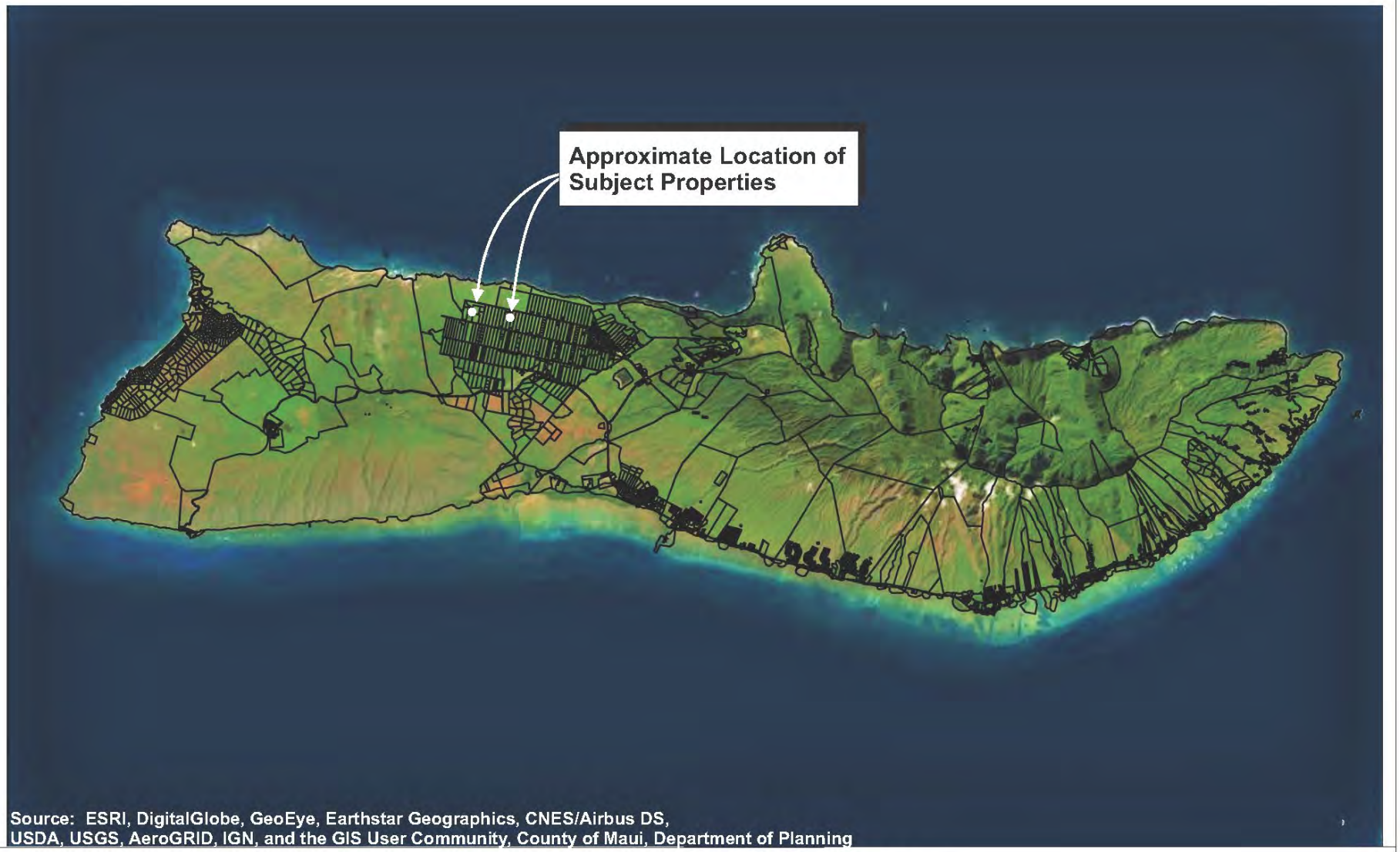
In addition, DHHL proposes to demolish a dilapidated house and greenhouse located on Parcels 14 and 16, and would close the septic tank on Parcel 14 in accordance with Department of Health regulations. The newer, abandoned home on portions of Parcels 16 and 3 will be assessed to determine if it can be leased.

The subject properties have been designated for “Agricultural” use by the State Land Use Commission and are designated “Agriculture” by both Maui County Zoning and the Moloka‘i Community Plan. The subject properties are currently vacant and surrounded by other DHHL-owned agricultural homesteads or vacant lots.

B. PROJECT NEED

The mission of the DHHL is to effectively manage the Hawaiian Home Lands trust and to develop and deliver land to Native Hawaiians. The Hawaiian Homes Commission Act (HHCA), codified within the constitution of the State of Hawai‘i, states as its purpose:

> *(a) The Congress of the United States and the State of Hawaii declare that the policy of this Act is to enable native Hawaiians to return to their lands in order to fully support self-sufficiency for native Hawaiians and the self-determination of native Hawaiians in the administration of this Act, and the preservation of the values, traditions, and culture of native Hawaiians.*



Source: ESRI, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community, County of Maui, Department of Planning

Figure 1

DHHL Ho'olehua Scattered Lots Subdivision and Improvements

Regional Location Map

0 11,250 Feet

5,625 22,500

MUNEKIYO HIRAGA

Prepared for: State of Hawai'i, Department of Hawaiian Home Lands

SOH DHHL\Hoolehua Scattered Lots\Applications\Figures\Regional Location Map

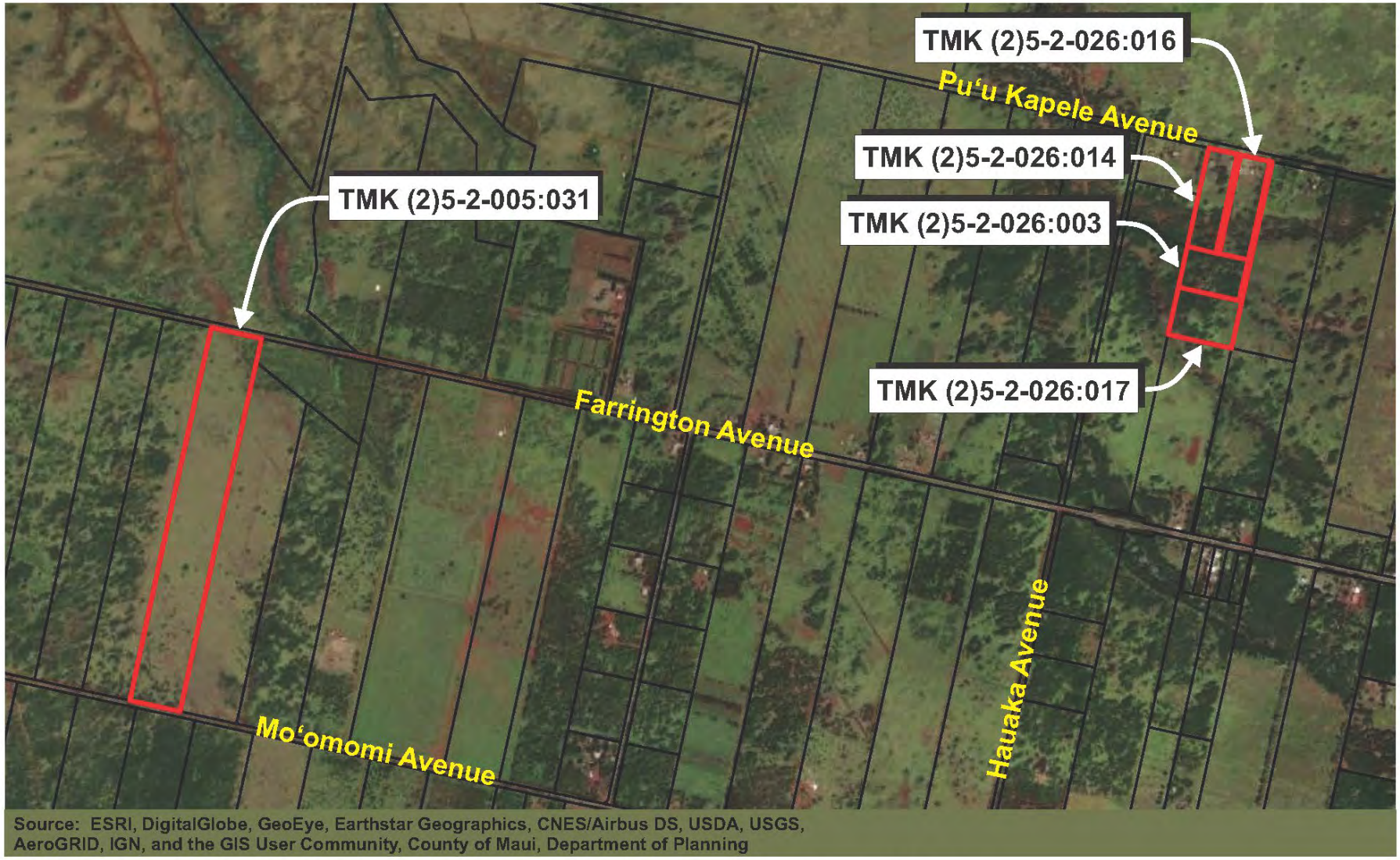


Figure 2

DHHL Ho'olehua Scattered Lots Subdivision and Improvements

Property Location Map

0 600 Feet
300 1,200

MUNEKIYO HIRAGA

Prepared for: State of Hawai'i, Department of Hawaiian Home Lands

SOH DHHL\Hoolehua Scattered Lots\Applications\Figures\PropLoc_DEA

(b) The principal purposes of this Act include but are not limited to:

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

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

(3) Preventing alienation of the fee title to the lands set aside under this Act so that these lands will always be held in trust for continued use by native Hawaiians in perpetuity;

DHHL beneficiary demand for homesteading opportunities is very high; DHHL maintains a waitlist comprised of thousands of beneficiary applicants awaiting an opportunity to be awarded a homestead lease. As of June 2023, the Molokaʻi Agricultural Waiting List stands at approximately 1,135. The proposed project aims to award leases and provide homesteading and subsistence agricultural opportunities to beneficiaries, thereby, fulfilling the above stated purposes of the HHCA. Further, based on a 2004 beneficiary survey conducted for the 2005 DHHL Molokaʻi Regional Plan, agricultural and pastoral applicants expressed an overwhelming preference to live on their homesteads. Most agricultural applicants also expressed a preference for smaller agricultural lots between three (3) to five (5) acres. The beneficiary survey also sought to determine award location preferences; although most applicants did not have a preference for location, the majority of applicants that did indicate a preference in location favored homesteads in the Hoʻolehua area. The proposed project responds to the demand for homesteading and subsistence agricultural opportunities and preferences of DHHL beneficiaries. In addition, it is noted that pursuant to the proposed Subsistence Agriculture use as designated by DHHL, lessees of the subdivided lots will be able to reside on the properties in addition to undertaking small-scale agricultural activities.

C. PROPOSED ACTION

DHHL proposes to subdivide five (5) lots into 12 lots for lease to beneficiaries on Molokaʻi. Seven (7) of the lots, which are three (3) acres or less will be leased as Subsistence Agriculture lots. As described in the DHHL General Plan, Subsistence Agriculture Homesteads provide opportunities for beneficiaries to live on and farm their lots on a smaller scale. The four (4) subdivided lots larger than their (3) acres will be designated and leased as Supplemental Agriculture lots, which are intended to provide opportunities for agricultural production for supplemental income and home use. An agricultural plan is required for these larger, Supplemental Agriculture lots. It is noted that there are several existing structures on Parcels 14, 3 and 16. There is an existing dilapidated, abandoned home on Parcel 14 that records indicate was constructed in the 1970's, in addition to a

septic tank. There is also an abandoned greenhouse on Parcel 16 that was constructed in the early 2000's. It is further noted that there is a third structure, an abandoned home that records indicate was built in the early 2000's, that is located on a portion of Parcel 16 and a portion of Parcel 3. The existing homes and structures were previously in use by DHHL beneficiaries, but have all since been abandoned. DHHL plans to demolish the dilapidated house and greenhouse, and would close the septic tank in accordance with Department of Health regulations. The newer, abandoned home on portions of Parcels 16 and 3 will be assessed to determine if it can be leased.

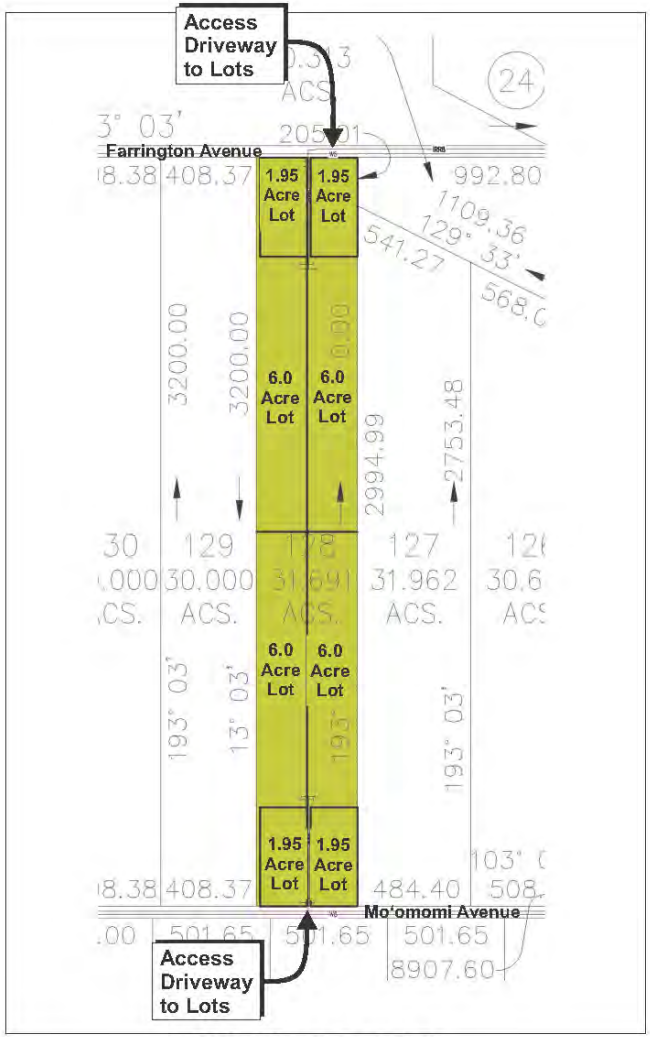
Improvements to be undertaken include creating access driveways to each of the newly created lots with connections for domestic water and irrigation water for each lot, provided within the access driveways from existing systems in the neighboring roadways. Beneficiaries do not need to reside on the lots, but have the ability to construct a home on the lot if they choose. See **Figure 3** and **Appendix "A"**, Preliminary Development Plans.

D. LAND USE REGULATORY CONSIDERATIONS

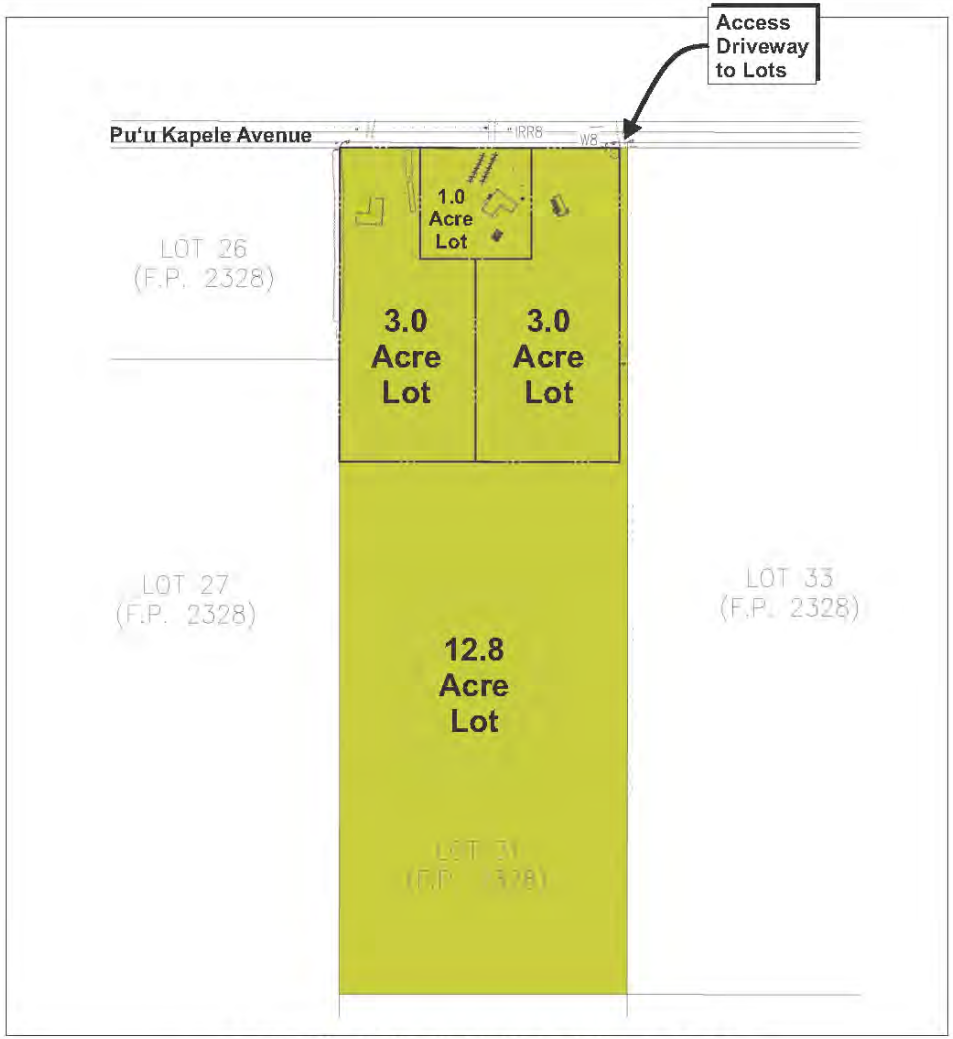
The subject properties have been designated for "Agricultural" use by the State Land Use Commission and are designated "Agriculture" by both Maui County Zoning and the Molokaʻi Island Community Plan. See **Figure 4** and **Figure 5**.

As previously stated, the proposed project will be implemented under the jurisdiction of the DHHL. The mission of the DHHL is to effectively manage the Hawaiian Home Lands trust and to develop and deliver land to native Hawaiians. The HHCA vests onto the DHHL, the authority to use its lands at its discretion. Specifically, HHCA Section 204 states, "*all available lands shall immediately assume the status of Hawaiian home lands and be under the control of the department to be used and disposed of in accordance with the provisions of this Act*". As DHHL owns the subject properties, the above-noted provision grants DHHL the authority to proceed with the project without the lands being fully entitled for residential use.

As such, the DHHL has implemented its own planning system consisting of a General Plan, Island Plans, community-specific Regional Plans, project-specific Program Plans, and Special Area Plans. The DHHL Molokaʻi Island Plan (MIP), adopted in 2005, serves as a comprehensive resource for planning and managing the Molokaʻi island lands and establishes land use designations to encourage orderly social, physical, and economic development. Most of the land in the Hoʻolehua area is designated for agricultural use. The DHHL MIP further classifies Agricultural land as "General Agriculture", "Supplemental Agriculture", and "Subsistence Agriculture". The subdivided lots will be awarded as Subsistence Agriculture homesteads, allowing lessees to reside on the properties in addition to agricultural activity.



TMK (2)5-2-005:031



TMK (2)5-2-026:003, 014, 016, and 017

Source: R.M. Towill Corporation

Figure 3

DHHL Ho'olehua Scattered Lots Subdivision and Improvements

Conceptual Lot Site Plans

NOT TO SCALE

MUNEKIYO HIRAGA

Prepared for: State of Hawai'i, Department of Hawaiian Home Lands

SOH DHHL\Hoolehua Scattered Lots\Applications\Figures\Rev Conceptual Lot Site Plans.DEA

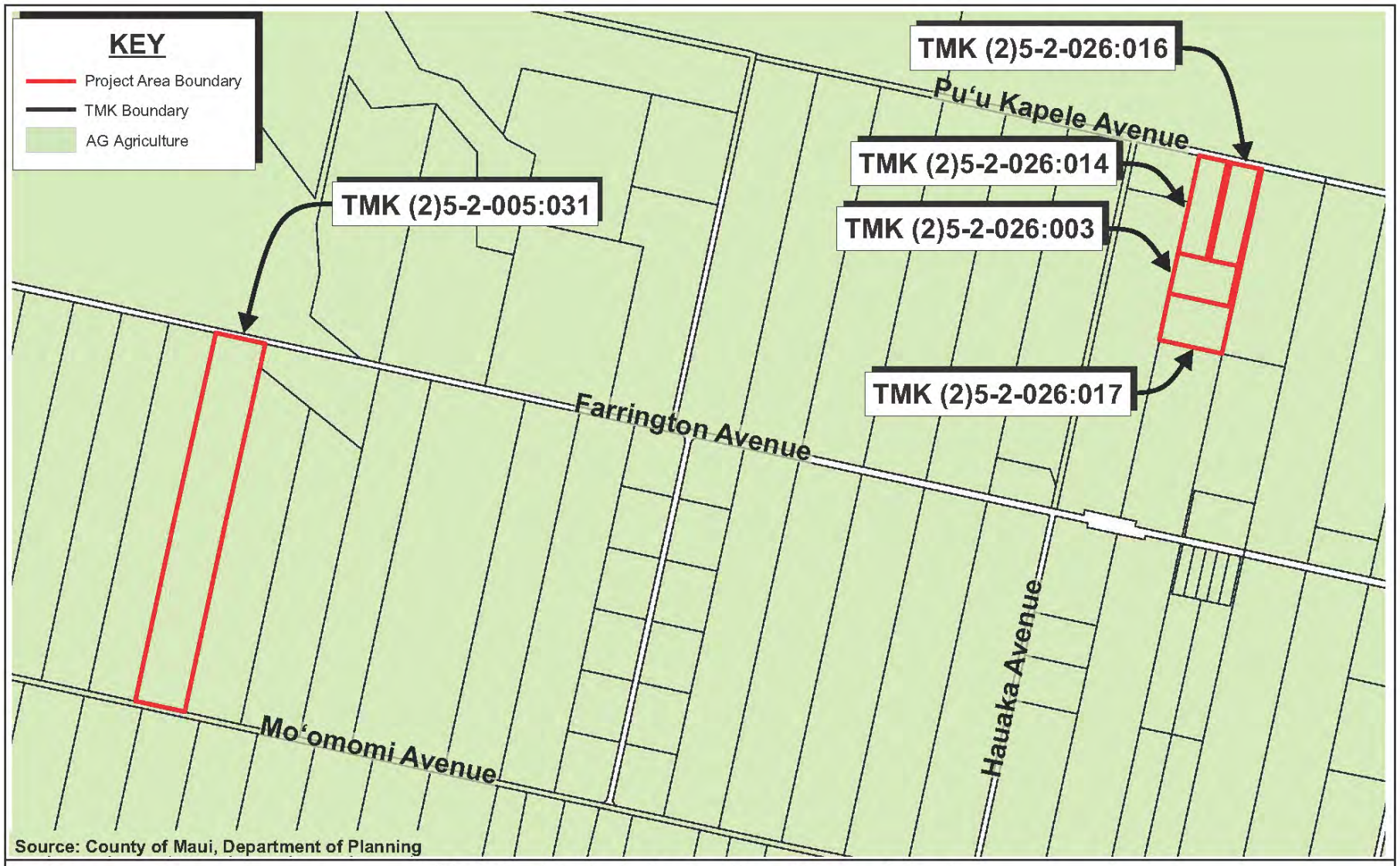


Figure 4

DHHL Ho'olehua Scattered Lots Subdivision and Improvements

Maui County Zoning Map

0 600 Feet
300 1,200

MUNEKIYO HIRAGA

Prepared for: State of Hawai'i, Department of Hawaiian Home Lands

SOH DHHL\Hoolehua Scattered Lots\Applications\Figures\MCZ

Figure 5

DHHL Ho'olehua Scattered Lots Subdivision and Improvements

Maui County Moloka'i Island Community Plan Map

0 600 Feet
300 1,200

MUNEKIYO HIRAGA

Prepared for: State of Hawai'i, Department of Hawaiian Home Lands

SOH DHHL\Hoolehua Scattered Lots\Applications\Figures\MICP

E. CHAPTER 343, REVISED STATUTES, ENVIRONMENTAL ASSESSMENT

As previously mentioned, the subject parcels are owned by the DHHL. The use of State lands and State funds trigger compliance with the environmental review requirements of HRS, Chapter 343. As such, this Environmental Assessment (EA) has been prepared pursuant to Chapter 343, HRS and Chapter 200.1 of Title 11, Hawai'i Administrative Rules (HAR). Accordingly, this document addresses the technical characteristics and potential environmental impacts of the proposed project, as well as advances findings and mitigative measures relative to the project.

The Hawaiian Homes Commission will serve as the approving agency for the EA.

F. ESTIMATED CONSTRUCTION SCHEDULE AND COSTS

The project will have an anticipated development timeframe of approximately one (1) year. The total estimated construction cost for the proposed project is approximately $7.7 million dollars.

DESCRIPTION OF THE EXISTING CONDITIONS, POTENTIAL IMPACTS AND MITIGATION MEASURES

II

II. DESCRIPTION OF THE EXISTING CONDITIONS, POTENTIAL IMPACTS AND MITIGATION MEASURES

A. PHYSICAL SETTING

1. Surrounding Land Use

a. Existing Conditions

The five (5) project parcels encompass approximately 51.7 acres in the Hoʻolehua area located in the northern central plateau of Molokaʻi. Hoʻolehua is a rural agricultural and residential community situated primarily on prime agricultural land. Much of the land in Hoʻolehua is owned by the Department of Hawaiian Homes Lands (DHHL) and is home to the oldest DHHL homestead community. South of Hoʻolehua is Maunaloa Highway and the Molokaʻi Airport. The southern Molokaʻi coast and Kaunakakai, the island's town center, is located south and southeast of the project site, respectively. The slopes of Maunaloa or the West Molokaʻi Volcano are located to the west and Wailau, or the East Molokaʻi Volcano is east of the project sites. Also to the east is Molokaʻi Ranch, which ceased operations in 2008. To the north of Hoʻolehua is the northern Molokaʻi coast and Moʻomomi Bay. DHHL designates most of the land in Hoʻolehua for subsistence, supplemental, or general agricultural use with approximately 55 acres of land designated for residential use within its Molokaʻi Island Plan. It is noted that many homesteaders that reside in the residential areas also have larger, unattached lots for agricultural use. Other smaller portions of Hoʻolehua are designated for pastoral, conservation, or community use.

b. Potential Impacts and Mitigation Measures

The project sites are located in an appropriate location adjacent to agricultural and residential homesteads and vacant agricultural land. The proposed project is compatible with the surrounding existing uses of the area. In the context of surrounding land uses, the proposed project is not anticipated to have a significant adverse effect on the surrounding landscape. The proposed project will provide much needed homesteading opportunities for Department of Hawaiian Home Lands' (DHHL) beneficiaries through the provision of twelve (12) lots available for lease.

2. Climate

a. Existing Conditions

Moloka‘i’s climate is relatively consistent throughout the year. The island’s climate varies as the terrain changes. Characteristic of Moloka‘i’s climate, the proposed project site experiences mild and uniform temperatures year round, moderate humidity, and consistent trade winds.

Average temperatures at the general project area (based on temperatures recorded at Moloka‘i Airport) range from the mid-60s to mid-80s (Fahrenheit). September is historically the warmest month, while January is the coolest. The annual precipitation rainfall average in 2022 was approximately 14.96 inches (Maui County Data Book, 2022). Winds blow predominantly out of the northeasterly direction.

b. Potential Impacts and Mitigation Measures

The proposed action will occur on DHHL lands reserved for agricultural homesteads and is adjacent to other homesteads and agricultural land. The proposed project is not anticipated to have an adverse effect on climate.

3. Topography and Soil Conditions

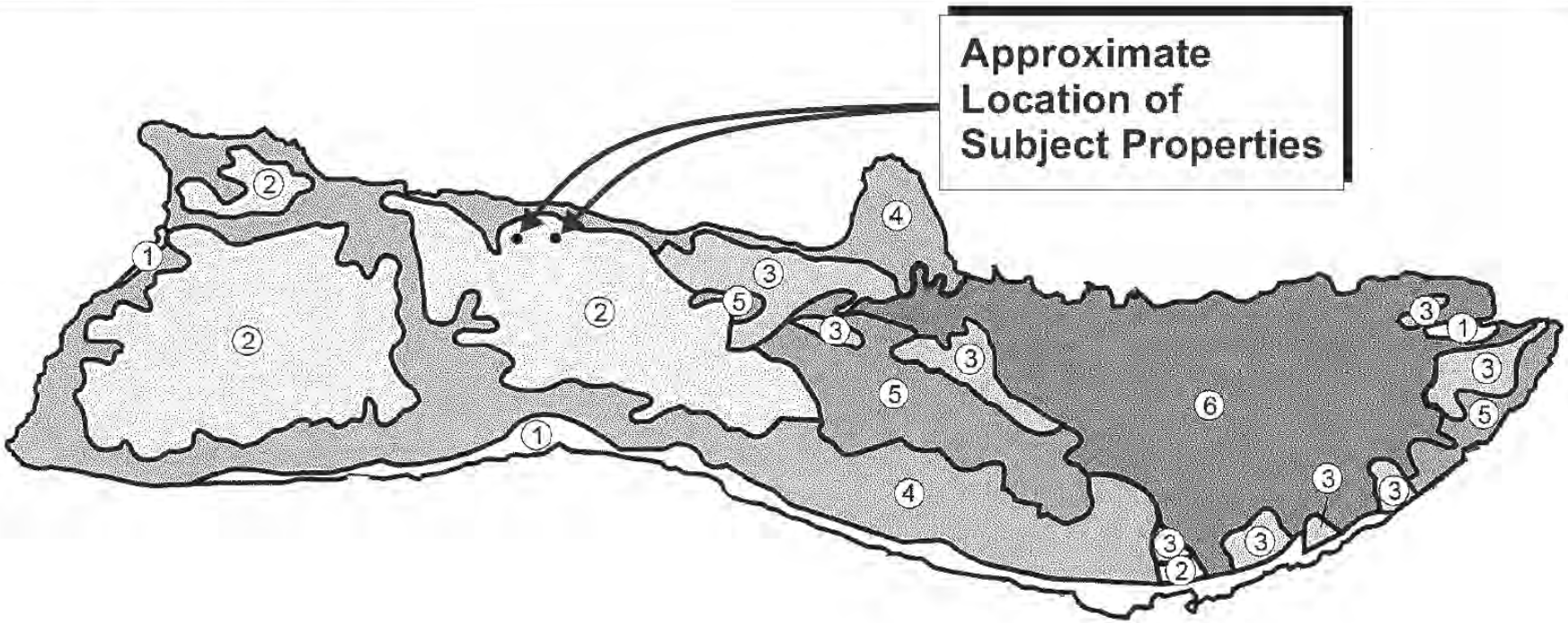
a. Existing Conditions

The existing elevation at the eastern project parcels is approximately 420 feet above mean sea level (amsl) and slopes toward Nānēhānaupō stream, which lies southwest of the project site, at approximately 5 percent. The existing elevation at Parcel 31 is approximately 360 feet amsl and is relatively level. Anahaki Gulch is located to the east and crosses Farrington Avenue near the project site. See **Appendix “B”**, Preliminary Engineering Report.

Underlying the project site and surrounding area are soils belonging to the Molokai-Lahaina association. According to the Soil Survey of the Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii, prepared by the United States Department of Agriculture Soil Conservation Service, these soils are characterized as well-drained, fine textured and moderately fine textured soils. These soils are suitable for agricultural cultivation, pasture and wildlife (Foote et al, 1972). See **Figure 6**.

LEGEND

① Jaucas-Mala-Pulehu Association
② Molokai-Lahaina Association
③ Kahanui-Kalae-Kanepuu Association
④ Very stony land-Rock land Association
⑤ Rough broken land-Oli Association
⑥ Rough mountainous land-Amalu-Olokui Association



Source: U.S. Department of Agriculture, Soil Conservation Service

Figure 6

DHHL Ho'olehua Scattered Lots
Subdivision and Improvements
Soil Association Map

NOT TO SCALE

MUNEKIYO HIRAGA

Prepared for: State of Hawai'i, Department of Hawaiian Home Lands

SOH DHHL\Hoolehua Scattered Lots\Applications\Figures\SoilAssoc

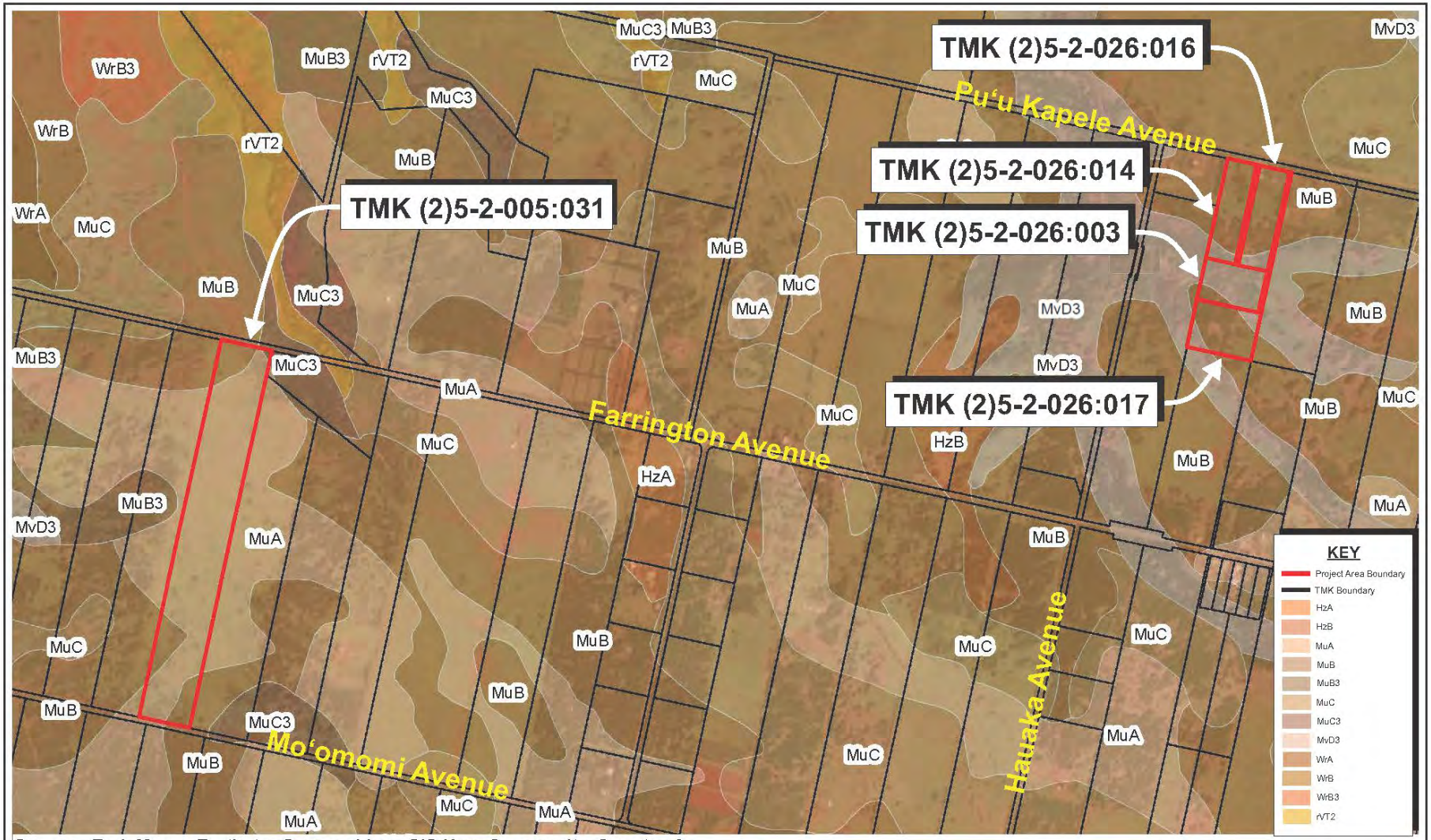
The project area is located on soils identified as Moloka'i silty clay loam, 0 to 3 percent slopes (MuA), Molokai silty clay loam, 3 to 7 percent slopes (MuB), Molokai silty clay loam, 7 to 15 percent slopes (MuC3), and Molokai silty clay loam 15 to 25 percent slopes (MvD3). MuA is classified as having slow runoff and a slight erosion hazard. MuB is classified as having slow to medium runoff and a slight to moderate erosion hazard. MuC3 is classified as having medium and medium to rapid runoff. MvD3 is reported to produce a low to medium amount of runoff and have a severe erosion hazard. See **Figure 7**.

b. Potential Impacts and Mitigation Measures

Onsite drainage areas will be maintained in the proposed condition. It is assumed that existing drainage patterns will not change and grading will be minimal. Improvements that affect drainage are grading and installation of impervious surfaces. All proposed drainage improvements were designed in accordance with County of Maui drainage standards. Mitigation measures to divert offsite runoff are not recommended. Offsite flows from adjacent areas will continue to flow through the site. However, a culvert is recommended at the Farrington Avenue/Anahaki Gulch crossing to accommodate offsite drainage flowing across the road. Onsite drainage areas will be maintained in the proposed condition. It is assumed that existing drainage patterns will not change and grading will be minimal. The proposed lot improvements are not anticipated to significantly increase the peak flow runoff since the increase in impervious area relative to the overall project site is small. The volume of runoff increase for the lot areas totals approximately 500 cubic feet per lot.

Mitigation for this increase can be accommodated by using a small basin on each lot with dimensions of 25 foot wide x 25 foot long x 1 foot deep. The volume of additional runoff generated from the roadway improvements varies from 10,000 to 20,000 cubic feet. Mitigation options for the additional roadway runoff can be accommodated by discharging runoff into an existing drainage way, storing runoff in a drainage basin, or storing runoff in infiltration trenches located beneath road swale.

In addition, Best Management Practices (BMPs) will be implemented during construction to minimize impacts from soil erosion resulting from wind and water (e.g., dust and silt fencing, watering for dust control, etc.). An application for a National Pollutant Discharge Elimination System (NPDES) permit will be submitted to the State Department of Health (DOH) for review and approval prior to the start of construction of the proposed action. Grading Permits will also be obtained for the proposed action. The



Source: Esri, Maxar, Earthstar Geographics, GIS User Community, County of Maui Department of Planning, and the USDA Soil Survey Geographic Database

Figure 7

DHHL Ho'olehua Scattered Lots Subdivision and Improvements

Soil Classification Map

0 600 300 1,200 Feet

MUNEKIYO HIRAGA

Prepared for: State of Hawai'i, Department of Hawaiian Home Lands

SOH DHHL\Hoolehua Scattered Lots\Applications\Figures\SoilClass

underlying soils do not pose limitations with respect to project constructability. The proposed project is not anticipated to have an adverse effect on topography and soils. Refer to **Appendix "B"**.

4. Agricultural Productivity Considerations

a. Existing Conditions

In 1977, the State Department of Agriculture developed a classification system to identify Agricultural Lands of Importance to the State of Hawai'i (ALISH). The classification system is based primarily, but not exclusively, on the soil classification of the land. The three (3) categories are "Prime", "Unique" and "Other Important" agricultural lands, with all remaining lands identified as "Unclassified".

"Prime" agricultural lands have soil quality, growing season, and moisture supply needed to produce sustained high yield crops economically. "Unique" agricultural lands possess a combination of soil quality, growing season, and moisture supply to produce sustained high yields of specific crop. "Other" important agricultural lands are lands that have not been rated "Prime" or "Unique" agricultural lands that are also of statewide or local importance for agricultural use.

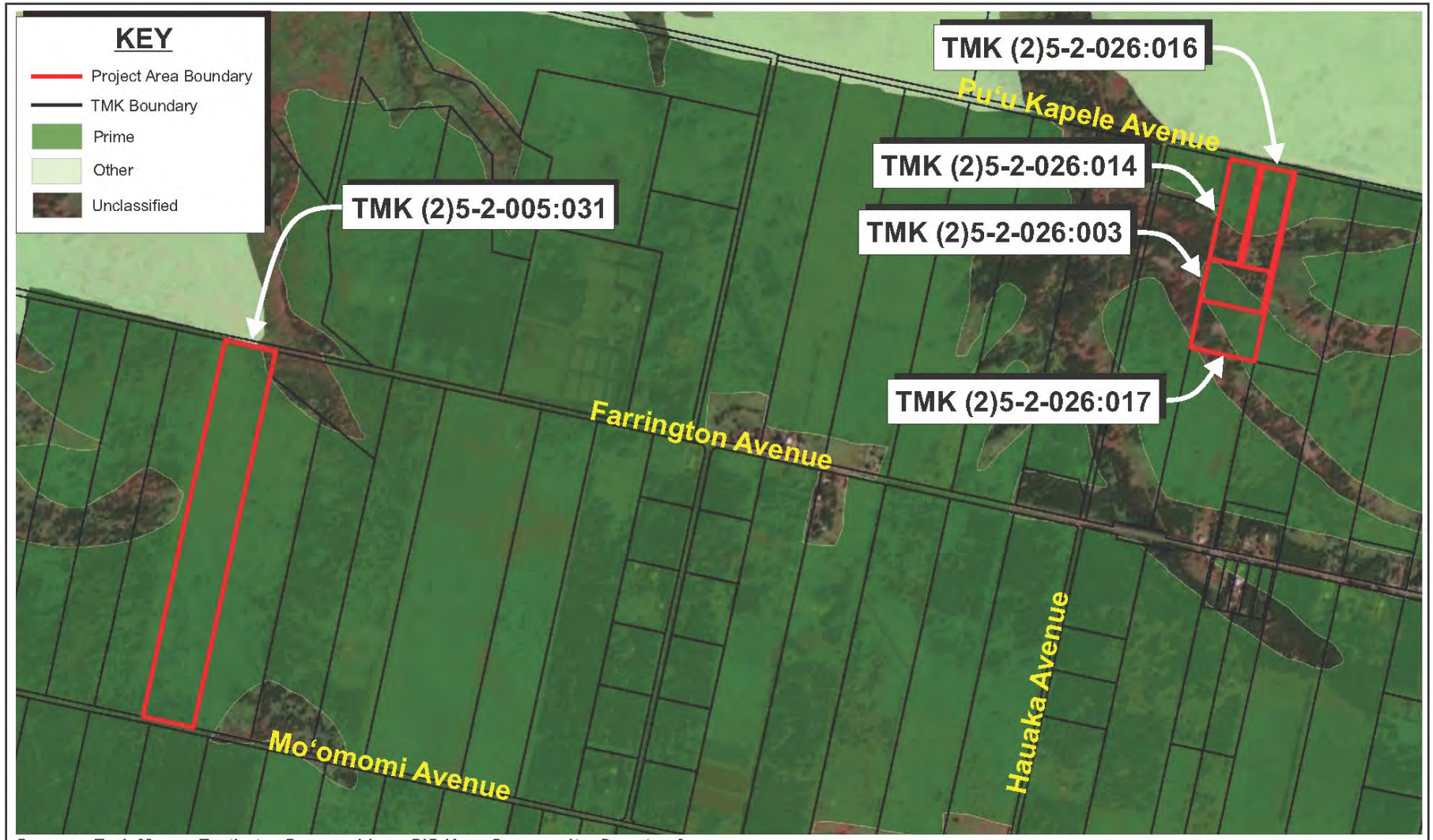
The project sites are mostly located within the ALISH's "Prime" land area with a portion of the project area "Unclassified". See **Figure 8**.

Separately, the University of Hawai'i, Land Study Bureau (LSB) developed the Overall Productivity Rating, which classified soils according to five (5) productivity levels, with "A" representing the class of highest productivity soils and "E" representing the lowest.

The project sites have been classified "D" and "E" by the LSB. See **Figure 9**.

b. Potential Impacts and Mitigation Measures

The proposed project will subdivide lots designated for agricultural homesteads and will provide access and infrastructure to allow for the use of the lots for agricultural uses and optional residential uses. The DHHL recognizes the value of prime and productive agricultural lands of Ho'olehua and the proposed action will encourage agricultural activity. As such, the project is not expected to have a substantial adverse impact on agricultural designated lands on Moloka'i. On the contrary, the project seeks to enhance and foster agriculture on Moloka'i.



Source: Esri, Maxar, Earthstar Geographics, GIS User Community, County of Maui Department of Planning, and the State of Hawai'i Department of Agriculture

Figure 8

DHHL Ho'olehua Scattered Lots Subdivision and Improvements

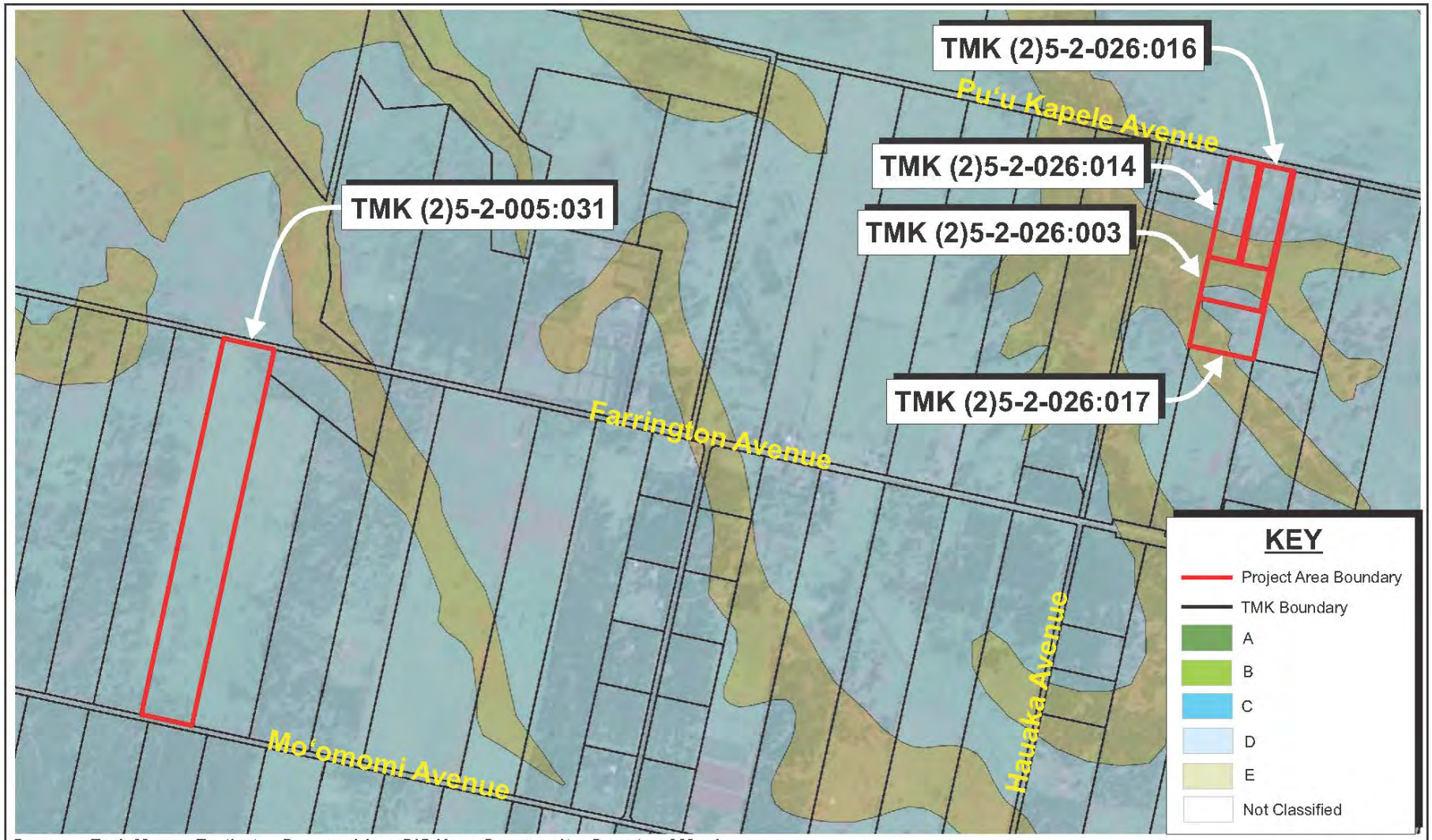
Agricultural Lands of Importance to the State of Hawai'i Map

0 600 Feet
300 1,200

MUNEKIYO HIRAGA

Prepared for: State of Hawai'i, Department of Hawaiian Home Lands

SOH DHHL\Hoolehua Scattered Lots\Applications\Figures\ALISH_REV



Source: Esri, Maxar, Earthstar Geographics, GIS User Community, County of Maui Department of Planning, and the University of Hawai'i Land Study Bureau

Figure 9

DHHL Ho'olehua Scattered Lots Subdivision and Improvements

Land Study Bureau Map

0 600 Feet
300 1,200

MUNEKIYO HIRAGA

Prepared for: State of Hawai'i, Department of Hawaiian Home Lands

SOH DHHL\Hoolehua Scattered Lots\Applications\Figures\LSB_REV

5. Flood, Tsunami, and Sea Level Rise

a. Existing Conditions

The Flood Insurance Rate Map (FIRM), Geographic Information System (GIS) layer provided by the United States (U.S.) Federal Emergency Management Agency (FEMA) indicates the project sites are situated in Flood Zone X, outside both the floodplain and tsunami zone. Flood Zone X (unshaded) represents areas outside of the 0.2 percent annual chance flood plain and there are no restrictions upon development within this zone.

As a result of climate change associated impacts from greenhouse gas emissions, sea level rise and flooding are expected to worsen which may have deleterious impacts on the Hawaiian Islands. The Hawai'i Sea Level Rise Vulnerability and Adaptation Report (SLRVAR), written to address climate change related threats to public health, natural resources, and the economy, was initially published in 2017 and updated in 2022. The 2022 update has new projections that show an expected three (3) to four (4) foot sea level rise by 2100.

Recent science, presented in the 2022 SLRVAR update has raised the projected intermediate-high sea level rise scenario to 5.9-feet by 2100. Based on this, SLRVAR recommends planning for 5.9-feet of sea level rise by 2100 for planning and design of public infrastructure projects and projects with a low tolerance for flood risk. SLRVAR recommends planning for four (4)-feet of sea level rise by 2100 as the minimum for all other projects. Mid-century modeling shows 1.3-feet of sea level rise by 2050 at the intermediate-high scenario (Sweet et al., 2022).

b. Potential Impacts and Mitigation Measures

The proposed project and related infrastructure improvements will comply with the County of Maui's drainage standards and will utilize stormwater runoff BMPs during construction. The project is located inland, outside of the projected sea-level rise exposure area and outside of the tsunami evacuation zone. As such, there are no significant adverse impacts to drainage conditions and flooding anticipated as a result of the proposed project. In addition, due to the project's upland location, there is no anticipated risk of coastal flooding hazards. Accordingly, significant adverse impacts associated with floods, tsunamis, and sea level rise are not anticipated.

6. Streams and Wetlands

a. Existing Conditions

The Nānēhānaupō Stream runs adjacent to the eastern project parcels. An unnamed riverine, goes through the southern corner of Parcel 17 and south of Parcel 14. Anakahi Gulch flows past Parcel 31 to the east. See **Figure 10**. There are no wetlands within the project area.

b. Potential Impacts and Mitigation Measures

The U.S. Army Corps of Engineers (USACE) was consulted and noted that there appears to be a streambed present on the Southwest corner of Parcel 17. The USACE noted that a Department of the Army (DA) permit may be required if this streambed is affected by the project. DHHL confirms that no work will be conducted within or near any streambed or wetland that would cause alternation, dredging or filling to nearby wetlands or waterbodies. Thus, the project sites are located in the midst of DHHL homesteads and vacant agricultural lots. Appropriate BMPs will be used during construction along with applicable drainage detention and water quality measures. DHHL will make every effort to ensure that the project will not have a direct impact upon the waterbodies in the region.

7. Flora and Fauna

a. Existing Conditions

Much of the project area is vacant, consisting of fallow agricultural lands, with the exception of several abandoned structures. Former land uses of the project sites include cattle ranching and grazing for cattle, goats, pigs, and deer. Subsequent land uses include pineapple cultivation and various other agricultural activities. Through consultation with the U.S. Fish and Wildlife Service (USFWS), an official species list was obtained from the USFWS Information for Planning and Consultation (IPaC) website to identify threatened and endangered species that may be present near or within the project area. See **Appendix "C"**.

A biological resources survey was conducted within and near the project area in April 2023 in order to identify and document flora and fauna species their abundance in the project area, and to identify threatened or endangered species. The survey was conducted for the larger DHHL Molokaʻi Water System Improvements project, but included the Hoʻolehua Scattered Lots, with the exception of lots with existing structures. See **Appendix "D"**. Introduced species are non-native species that have been

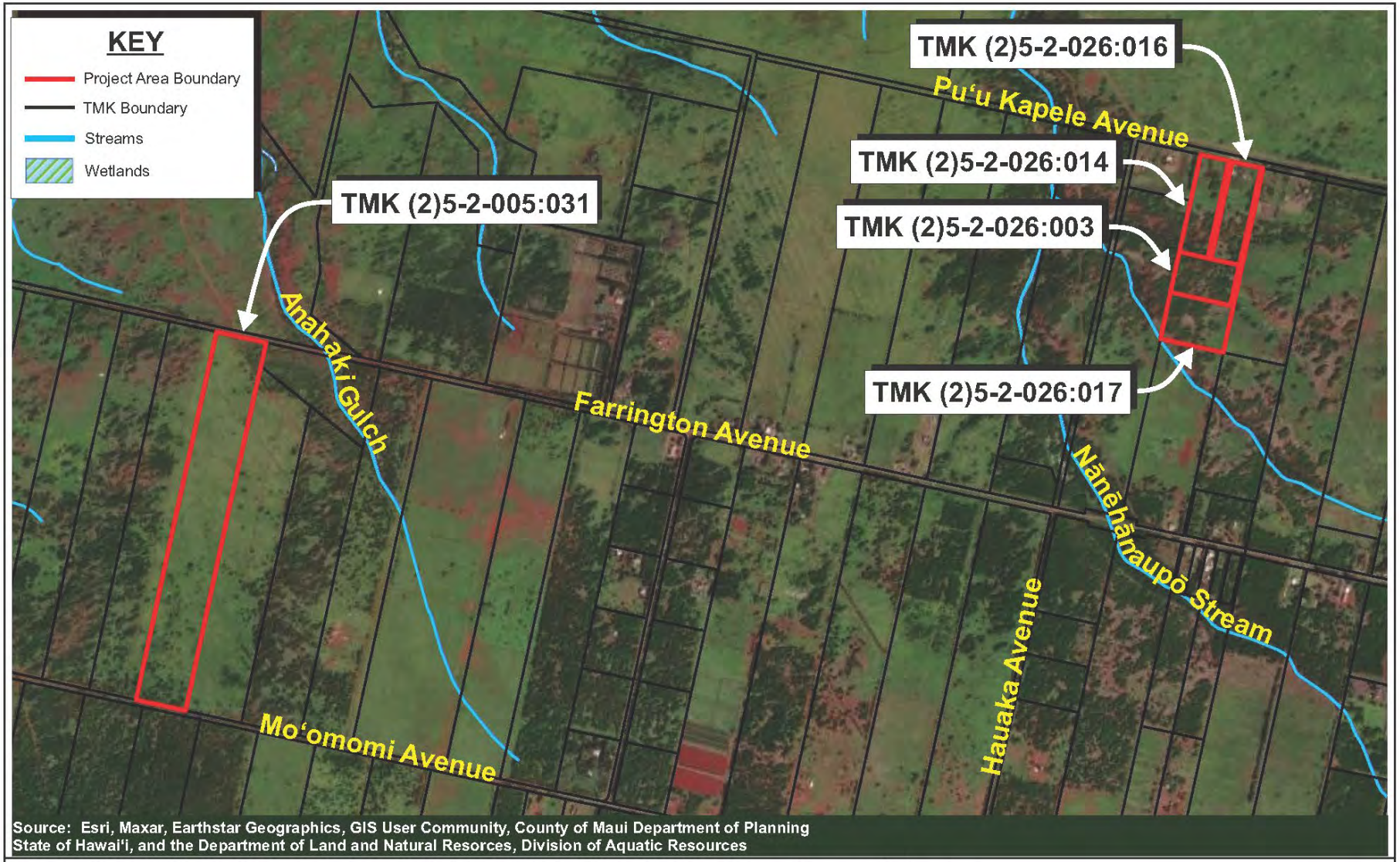


Figure 10

DHHL Ho'olehua Scattered Lots Subdivision and Improvements

Streams and Wetlands Map

0 600 Feet
300 1,200

MUNEKIYO HIRAGA

Prepared for: State of Hawai'i, Department of Hawaiian Home Lands

SOH DHHL\Hoolehua Scattered Lots\Applications\Figures\Streams_REV

brought by humans or other means to an environment. Native or indigenous species are native to a particular place, but may be found elsewhere in other locations. Endemic species are those that exist exclusively in a particular place.

Flora

Vegetation at the project area was dominated by non-native grasses, including Buffelgrass and Guinea grass. Trees recorded on the project parcels include the koa haole, Formosan Koa scrub and kiawe. A few scattered native shrubs and vines, including ʻuhaloa, ʻilima (*Sida fallax*) and koali ʻawa (*Ipomoea indica*) were also observed. However, all of the native species observed are commonly found throughout the Hawaiian islands and are not of conservation concern.

Fauna

In terms of avian fauna, a total of 17 birds were recorded during the survey. The Warbling White-eye (*Zosterops japonicus*) was the most commonly observed species. The Cattle egret (*Bulbulcus ibis*), Zebra Dove (*Geopelia striata*), and common myna (*Acridotheres tristis*) also accounted for the majority of all birds recorded during station counts. The only native bird observed was the kōlea or Pacific golden-plover. The kōlea is a migratory bird that is not considered to be a rare or threatened species.

In terms of mammalian species observed, direct observation or signs, including scat or tracks recorded the small Asian mongoose (*Herpestes javanicus*), domestic cat (*Felis catus*), pig (*Sus scrofa*), goat (*Capra hircus*), horse (*Equus ferus caballus*), dogs (*Canis lupusfamiliaris*) and axis deer (*Axis axis*) in the project vicinity. There were no insets or invertebrate fauna of conservation concern observed. A few of the native green darner dragonfly (*Anax junius*) were observed. However, these are also commonly occurring and not of conservation concern.

b. Potential Impacts and Mitigation Measures

As discussed above, the flora and fauna that has been observed within the project area is mostly represented by non-native species that are of no conservation concern. None of the threatened or endangered species on the USFWS species list were observed during the survey. In addition, the biological resources survey noted that the surveyed areas do not contain a suitable habitat for water birds such as the Hawaiian Duck, Hawaiian Coot, and Hawaiian Stilt. Furthermore, there is no suitable nesting habitat for the endangered seabirds such as the Hawaiian Petrel, Band-rumped Storm-

Petrel (*Hydrobates castro*), and the threatened Newell's Shearwater (*Puffinus newelli*).

Although no threatened or endangered species were observed in the project area, avoidance and mitigation measures will be implemented to prevent potential harm to threatened or endangered species that may traverse or be present within or near the project area. Construction will be conducted during the daytime. Outdoor lighting is not anticipated, however, should it be required, outdoor lighting will be shielded and downward facing to prevent disorientation of potential seabirds traversing the area. Additionally, the nēnē, or Hawaiian Goose, could be present near the project site. As such, the USFWS and State Division of Forestry and Wildlife (DOFAW) will be notified if nēnē are observed and construction will stop until chicks have hatched and fledged. Although not a listed species on Molokaʻi, it is noted that the endemic pueo or Hawaiian short-eared owl is known to occur in the grasslands of Molokaʻi. The biological resources survey indicates that the vegetation of Parcel 31 could be a suitable habitat for the pueo. Out of an abundance of caution, a survey for pueo nests will be conducted prior to initiation of clearing and grubbing.

The endangered ʻōpeʻapeʻa or Hawaiian Hoary bat roosts in woody vegetation and will leave their young unattended in trees and shrubs while foraging. Young ʻōpeʻapeʻa may be harmed or killed if trees or shrubs 15 feet or taller are cleared during the pup-rearing season. In addition, ʻōpeʻapeʻa will hunt for insects from as low as three (3) feet to over 500 feet above ground and may become entangled in barbed wire fencing. As such, woody plants greater than 15 feet tall will not be disturbed, removed, or trimmed during the pup-rearing season from June 1st through September 15th, as practicable, and barbed wire fencing will not be used.

With the aforementioned mitigation measures, the project is not expected to result in significant negative impacts on threatened or endangered flora and fauna species in this area of Molokaʻi.

8. Archaeological and Historical Resources

a. Existing Conditions

An archaeological Literature Review and Field Inspection (LRFI) was completed by Cultural Surveys Hawaiʻi (CSH) for Parcel 31 and Parcel 14 in November 2021. See **Appendix "E"**. Following the addition of Parcels 3, 16, and 17, a supplemental LRFI was prepared and submitted to the State Historic Preservation Division (SHPD). See **Appendix "E-1"**. Previous archaeological assessments and studies were reviewed to

identify potential historic properties and archaeological resources within and near the project sites. In addition, a pedestrian field inspection was completed in September of 2021 and December of 2023.

The project sites are located within the Pālāʻau ahupuaʻa of Molokaʻi. The cultivation of ʻulua or sweet potato was well documented, particularly in the Pālāʻau region. Early historical accounts describe Molokaʻi as having fertile land with abundant fish ponds. After conquering the island of Maui in 1790, Kamehameha I spent time on Molokaʻi after gaining the allegiance of the Molokaʻi chiefs. Here he trained with his warriors in preparation of his attack on Oʻahu.

Following the Māhele (division of Hawaiian lands) in 1848, most of the project lands were designated as Crown lands owned by the Hawaiian Government. During this time cattle were introduced to Molokaʻi and the cattle and hides trade was established. Other animals, such as sheep, goats and axis deer, were also brought to the island.

In 1897, Molokai Ranch was formed through the purchase of 70,000 acres of Crown lands from the Bishop Estate. The ranch was primarily used for cattle ranching but also included pineapple cultivation, forest reserves and honey production. Molokai Ranch was influential in the modern agriculture economy but has ceased operations since 2008.

Other than cattle ranching, there was a notable commercial pineapple industry on Molokaʻi. Specifically in the Pālāʻau-Hoʻolehua area, Hawaiian homesteaders harvested commercial pineapple for companies including Libby, McNeill and Libby, which was later incorporated by Dole Pineapple, and the California Packing Corporation (Calpac). Both Dole Pineapple and Calpac ceased pineapple production in 1975 and 1983, respectively. Subsistence agriculture has also continued through the establishment of the Hawaiian Homes Commission and homesteads in Pālāʻau-Hoʻolehua.

The 2021 and 2023 archaeological LRFIs note that previous archaeological studies conducted found no historic properties in the project area and only a few historic properties have been discovered in the vicinity of the project. Historic properties previously identified in the vicinity are limited to a few sites recorded, including the legendary Kapeʻelua Complex (SIHP # 50-60-03-11). There appears to have been a focus of traditional Hawaiian activity in Anahaki Gulch north of the western project area. No potential historic properties or cultural features were observed during the field study. Overall, most of the project area appeared to have been modified by varying levels of grading. An abandoned house was discovered on Parcel 14 and it is

predicted that it was constructed sometime in the 1970s. This parcel also contained two (2) terrace alignments made of small boulders on the southern portion of the parcel beneath a natural drainage swale. It is predicted that these terrace alignments were for agricultural purposes, but their origin is unknown. A modern, abandoned home and greenhouse were observed on Parcel 16. The remaining parcels were vacant aside from vegetation.

b. Potential Impacts and Mitigation Measures

Following review of the 2021 LRFI, the SHPD issued a determination on their review of Parcel 31 and Parcel 14, providing their concurrence with DHHL's determination of "No historic properties affected". The 2023 LRFI for Parcels 3, 16 and 17 was submitted to the SHPD in February 2024 and are still under review with the SHPD. As no historic properties have been identified within the project areas or within 500 meters of the project areas, the proposed action is not anticipated to result in significant adverse impacts to archaeological or historic resources. The project will comply with all mitigation measures as recommended by the SHPD.

9. Cultural Resources

a. Existing Conditions

A Cultural Impact Assessment (CIA) was prepared by Cultural Surveys Hawai'i (CSH) in September 2023 to identify the possibility of previous and/or currently conducted traditional cultural practices and traditional resources procured within the project area and the greater ahupua'a of Pālā'au, and to assess the potential for impacts to these cultural resources from the proposed action, alternatives to the proposed action, and to determine applicable mitigation measures to protect cultural resources, practices, and beliefs. See **Appendix "F-1"**. The CIA relied on archival and documentary research, as well as communication with organizations and individuals having knowledge of the project area, its cultural resources, and its practices and beliefs. Outreach efforts involved contact to individuals and groups including Native Hawaiian Organizations (NHO), agencies, community members and descendants of the area, in order to identify individuals with cultural expertise and/or knowledge of the project area or the ahupua'a of Pālā'au. CSH was able to conduct interviews with Kilia Purdy-Avelino and Justin Avelino, kama'āina of Ho'olehua, and Malia Lani Forbes Greaney, kama'āina of Pālā'au. A supplemental CIA was prepared in July 2024 to include additional adjacent parcels that were added to the project. See **Appendix "F-2"**.

Community consultation and background research conducted as part of the CIAs identified the following cultural practices within the greater Pālā‘au ahupua‘a:

1. Agricultural and gathering practices
2. Marine resources
3. *Mo‘olelo* (stories) and *wahi pana* (storied places)
4. Recreational activities
5. Healing practices
6. Religious activities
7. Burial practices

No ongoing cultural practices were identified within the project site during community consultation. However, the project is located in the general vicinity of ongoing cultural practices, as noted above.

b. <u>Potential Impacts and Mitigation Measures</u>

Four (4) impacts to ongoing cultural practices were identified within the project vicinity during community consultation for the CIAs. Consultation identified a number of concerns related to the environment and the broader community:

1. Availability of water
2. Soil quality
3. Impacts to *‘uhane* (spirits) and *‘iwi kūpuna* (ancestral remains)
4. Impacts to *wahi pana*

The CIAs propose mitigation measures and considerations to promote and preserve cultural beliefs, practices, and resources of Native Hawaiians and other ethnic groups. The CIA recommendations and responses, where appropriate, are provided:

1. *Mrs. Purdy-Avelino expressed concerns for sacred sites located in the vicinity of the project area. She supports the development of more homestead lots for homesteaders on the waitlist, however, she emphasized the need to make sure to continue to protect sacred sites.*

   DHHL acknowledges Mrs. Purdy-Avelino’s support for the development of DHHL homestead lots and will endeavor to protect known sacred sites.

2. *Mr. Avelino stated that it is vital that no work be done to the Makahiki Grounds.*

DHHL confirms that no work will be done on the Makahiki Grounds.

3. *Ms. Greaney expressed concern regarding the availability of water. She noted that Hoʻolehua, including Nāʻiwa, is historically known for its dry and barren land, with little to no water available. She stressed that it is also important to ensure access to the appropriate amount of water is available and at a reasonable cost.*

   Water service will be made available to each of the lots as part of the proposed improvements.

4. *Ms. Greaney strongly suggests the soil be tested well by third party professionals for any presence of harmful chemical residue possibly remaining in the soil. This is a good safety precaution for farmers.*

   DHHL will consider soil testing for presence of chemicals prior to leasing the lots.

5. *Ms. Greaney also suggested that future studies may also look at nearshore areas off of Pālāʻau to assess for the presence of chemicals from runoff and any impacts*.

   DHHL acknowledges the recommendation to review nearshore areas of Pālāʻau for the presence of hazardous chemicals in future studies.

6. *Ms. Greaney insists that the homestead community should be notified well in advance of any proposed developments that will occur on the Makahiki lands.*

   DHHL confirms that no work will be done on the Makahiki Grounds.

7. *Ms. Greaney also stated that if there are any future developments, it is important that in-depth archaeological inventory surveys be conducted as it is known that many artifacts still exist in the mauka (toward the mountains) and central regions of Nāʻiwa and Pālāʻau.*

   DHHL confirms that future developments in the region will consult with the SHPD to assess the potential for impacts to archaeological features and appropriate archaeological investigations.

8. *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.

9. *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.*

   Non-Native Hawaiian human remains will undergo the process laid out under State law (HAR 13-300), however, Native Hawaiian human remains and cultural items found on DHHL lands are subject to the Native American Graves Protection and Repatriation Act (NAGPRA), 25 U.S.C. 3001 et seq and its implementing regulations (43 CFR Part 10). As 43 CFR § 10.2 provides, tribal lands include "All lands administered by the Department of Hawaiian Home Lands (DHHL) under the Hawaiian Homes Commission Act of 1920 (HHCA, 42 Stat. 108) and Section 4 of the Act to Provide for the Admission of the State of Hawai'i into the Union (73 Stat. 4), including "available lands" and "Hawaiian home lands."" Under NAGPRA, DHHL must prepare a plan of action (POA) prior to any planned activity that is likely to result in a discovery or excavation of human remains or cultural items. If not part of a planned activity, a POA is required after a discovery of human remains or cultural items. In developing a POA, DHHL will initiate consultation with lineal and cultural descendants, consult on the POA, and approve and sign the POA and provide a copy to all consulting parties. The 3-step process for drafting a POA pursuant to NAGPRA can be found in 43 CFR § 10.4(b).

With consideration of the aforementioned recommendations and implementation of appropriate mitigation measures, the proposed project is not anticipated to have a significant adverse impact on cultural resources.

10. Wildfire Hazards

a. Existing Conditions

In the State of Hawai'i, although wildfires can occur year-round, the fire season typically runs from the dry months of April through October. Dry periods or periods of drought can extend the fire season. With drought and dry seasons, there is an increased likelihood of wildland fires. Wildfires in Hawai'i destroy native forests, alter soil composition, and threaten human

safety and infrastructure. Although the term “wildfire” may indicate that they are naturally occurring, over 98 percent of wildfires are human-caused. Each year, approximately 0.5 percent of the State of Hawai‘i’s total land area burns, which is equal to or greater than the proportion burned of any other state. The potential for significant damage to life and property exists in areas designated as “wildland urban interface (WUI) areas,” where development is adjacent to densely vegetated areas. Across the continental United States, the WUI is roughly defined as the zone where natural areas and development meet. In Hawai‘i, this definition has been expanded. Steep slopes create linkages between upland wildland fires and downslope impacts on communities, coastal areas, and municipal resources. Conversely, wildfires ignited near developed areas quickly spread into forested areas because of invasive grasses, putting threatened and endangered plant and animal species at risk. Hawai‘i is also unique in that the vegetation surrounding communities is rapidly undergoing changes that yield higher wildfire risk, in large part due to increased invasion by fire-prone species from changes in land uses, such as active agriculture becoming unmanaged fallow land (Hawai‘i Emergency Management Agency, 2023). In 2020, the U.S. Department of Agriculture has mapped wildfire risk to communities throughout the country with a risk level ranging from very low to very high. Wildfire risk was evaluated based on the likelihood and intensity of potential wildfires through fire behavioral modeling which simulates factors such as weather, topography, and ignitions in recent decades along with the presence of vegetative fuel. Other factors that contribute to wildfire risk is interface of urban development adjacent to wildland vegetation. The proposed project is classified as having a very low to medium wildfire risk. See **Figure 11**.

Agencies and organizations such as the DOFAW and the Hawai‘i Wildfire Management Organization (HWMO) have identified wildfires as an increasingly common hazard to communities and native ecosystems due to dry climatic conditions, non-native invasive species and increased commercial residential development and more people living in close proximity to wildland areas. In Hawai‘i, wildfires have also been correlated to drought conditions. Wildfire history data show an increase in ignition and the areas burned during the warmer drier months of summer. The State’s Fire Management Program is part of the Watershed Protection and Management Section of DOFAW. DOFAW’s Fire Management Program continues to be at the forefront of wildfire and all other risk-management

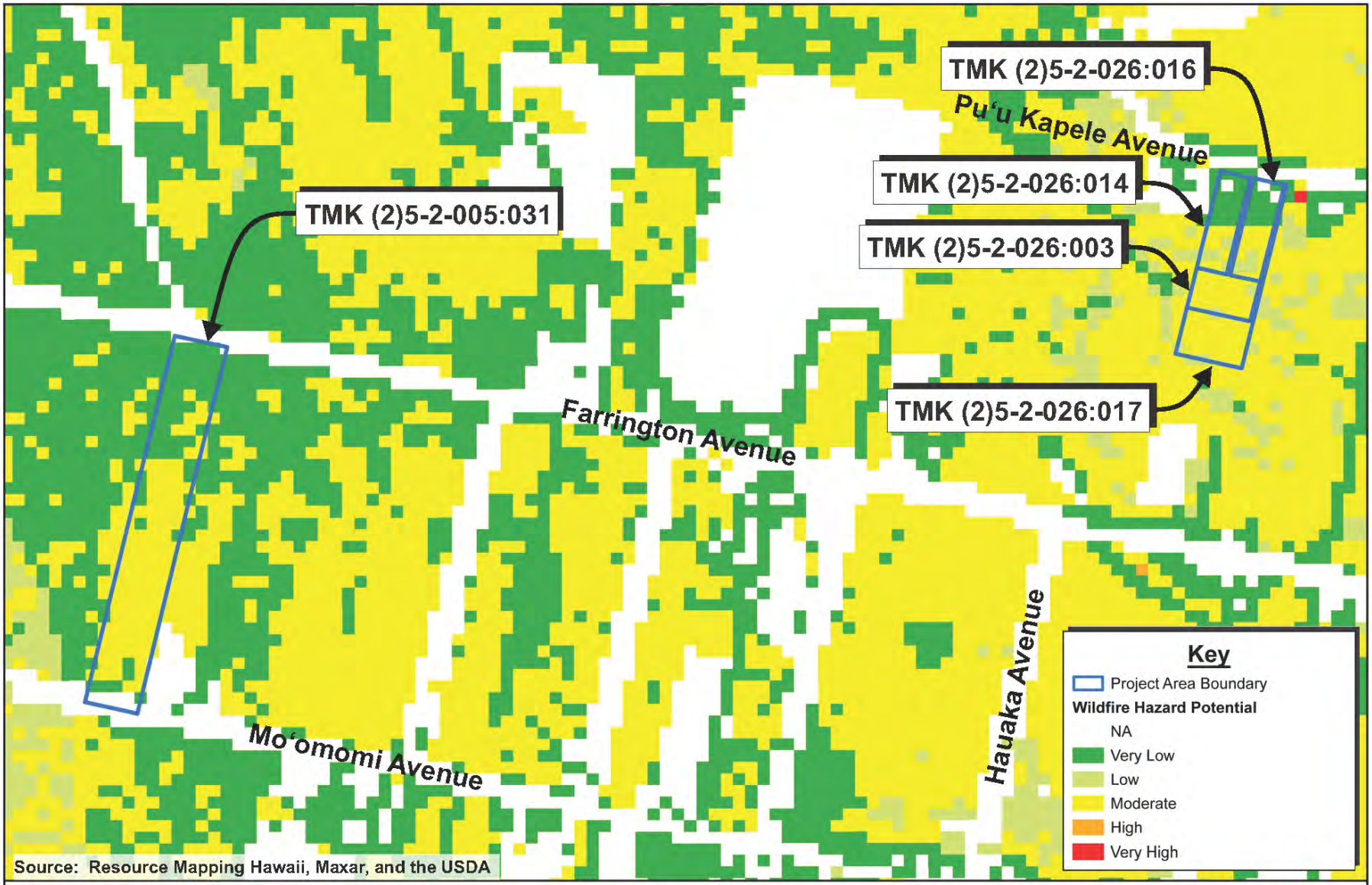


Figure 11

DHHL Ho'olehua Scattered Lots Subdivision and Improvements

Wildfire Hazard Map

0 600 Feet
300 1,200

MUNEKIYO HIRAGA

Prepared for: State of Hawai'i, Department of Hawaiian Home Lands

SOH DHHL\Hoolehua Scattered Lots\Applications\Figures\Wildfire

training throughout the state, despite the fact that DOFAW personnel are primarily natural resource managers and not full-time wildland firefighters.

DOFAW has worked in partnership with the HWMO to address wildfire hazards, mitigation and response efforts. HWMO has worked on developing Community Wildfire Protection Plans across the State. The proposed project is located within The *Molokaʻi Community Wildfire Protection Plan* (CWPP), which was finalized in 2016 covers the entire island. The *Molokaʻi* CWPP comprehensively defines the entire island of Molokaʻi as a WUI at-risk area. The landscape of Molokaʻi is characterized by steep slopes, rough terrain, strong winds, and a large percentage of highly ignitable invasive grasses. The region is generally dominated by non-native vegetation such as Christmas berry, Kiawe, and several fire-promoting shrubs and grasses These factors, combined with drought conditions and a history of human-caused fires puts the area at increased risk of wildfire. The proximity of development to fire-prone wildlands present hazardous conditions that now threaten communities and natural resources. Conditions such as overgrown vegetation close to homes, pockets of open space within subdivisions, and an increase of non-native high fire-intensity plants around developed areas pose increasing threats to commercial, community, environmental, and residential resources. Together, these factors create the fire environment that puts Molokaʻi at risk of wildfires.

b. Potential Impacts and Mitigation Measures

In recognition of the wildfire risk in the project area, hazard mitigation measures will be incorporated into the proposed improvements to reduce risk of damage to life, property and natural resources. These wildfire hazard mitigation measures include, but are not limited to, vegetation control, removal of leaf litter, planting of drought-tolerant, fire resistant plants away from powerlines, and removal of highly flammable materials such as scrap wood, firewood, and combustible furniture. In addition, beneficiaries will be advised of construction materials and methods that may be utilized to reduce wildfire-caused ignitions of residences and structures is to harden the home or structure with noncombustible building materials and ignition-reducing strategies.

11. Air Quality

a. Existing Conditions

The State of Hawaiʻi conducts air quality monitoring on the islands of Hawaiʻi, Kauaʻi, Oʻahu, and Maui to ensure Federal and State air quality

standards are met. Although the State does not measure air quality on the island of Molokaʻi, the air quality is considered to be good due to consistent tradewinds and limited development that results in limited sources of pollution. Airborne pollutants can be attributable to vehicular traffic on the nearby roadways and from the Molokaʻi Airport. Windblown dust from surrounding fallow agricultural lands is another source of indirect emissions in the region. These sources, however, are intermittent and prevailing winds quickly disperse the particulates generated by these temporary sources. Overall, the air quality in the region is considered good.

b. Potential Impacts and Mitigation Measures

In the short term, construction-related activities for the proposed project will be the primary source of airborne pollutants affecting the surrounding area. Site work involving clearing, grubbing, and grading operations will generate fugitive dust. Appropriate BMPs, such as periodic watering of exposed surfaces, installation of dust screens, and regular maintenance of construction equipment will be utilized to minimize air quality impacts associated with project construction.

The proposed project is not an action which will generate adverse long-term air quality impacts. In the long term, the proposed project will provide agricultural homesteading opportunities for DHHL beneficiaries. The proposed subdivided subsistence agricultural lots and improvements are not anticipated to have an adverse effect upon air quality.

12. Greenhouse Gas Considerations

a. Existing Conditions

Greenhouse gases (GHG) (carbon dioxide, methane, nitrous oxide and fluorinated gases) trap heat in the earth's atmosphere. In the context of climate and ocean warming, increases in levels of atmospheric GHG have been attributed to human activity (IPCC, 2021). Within the State of Hawaiʻi, the energy sector (including fossil fuel burning to produce electricity, transportation, waste incineration, and natural gas systems) is identified as the source of 89.7 percent of GHG emissions (Hawaiʻi Department of Health, 2019). Other sources of GHG emissions include industrial facilities, agriculture and forestry, and waste treatment such as landfills, composting, and wastewater treatment.

The Federal Greenhouse Gas Reporting Program (40 CFR Part 98) requires mandatory reporting of GHG emissions from sources that emit 25,000 metric tons or more of carbon dioxide equivalent (CO2 EQ) per year

in the United States. Categories of use which are generally associated with this level of reporting include power plants, petroleum and natural gas systems, refineries, and other heavy manufacturing processes. On Molokaʻi, the Maui Electric Company's Pālāʻau Generating Station is the only facility operating near the 25,000 metric ton level. 2022 data show that Pālāʻau Generating Station produced 23,724 metric tons of CO2 EQ emissions, however, the last time emission levels exceeded 25,000 metric tons was in 2011 when 25,078 metric tons of CO2 EQ was reported (U.S. EPA) 2022).

b. Potential Impacts and Mitigation Measures

The proposed action will involve short-term consumption of fuel for construction equipment, vehicles, and machinery during the construction period. This usage is not anticipated to be substantial or excessive within the context of the action's benefits over the lifetime of the project. After the project is completed, use of the homestead lots and driveways may result in increased motor vehicle traffic in the project area. Statewide, vehicle-related fuel consumption for commercial, industrial, and residential sectors is a less significant contributor to total GHG emissions than emissions attributable to electricity consumption (Hawaiʻi Department of Health, 2019), and this contribution is anticipated to continue to decrease due to ongoing reduction in vehicle emission standards as well as increased utilization of hybrid and electric vehicles.

Furthermore, the State of Hawaiʻi has set a renewable energy portfolio standard of 100 percent (100%) by the year 2045 (Section 269-92, HRS) to minimize dependence on fossil fuel combustion, Hawaiian Electric supplies power to all of Maui County. Their total sales of renewable energy on Maui County accounted for 40.80 percent of energy sales in 2019 which is higher than the state-wide consumption of renewable energy, which averaged 29.79% in 2019 (Hawaiʻi State Energy Office, 2020).

The proposed action is not anticipated to create significant direct and indirect foreseeable GHG emissions. This action does not fall within the threshold of mandatory GHG reporting.

13. Noise Quality

a. Existing Conditions

There are no fixed noise generators in the vicinity of the project site. The limited noise generated in the area is primarily attributed to vehicular traffic

along the surrounding roadways and aircraft noise from the Molokaʻi Airport in Hoʻolehua. Overall, the noise level in the region is low.

b. Potential Impacts and Mitigation Measures

Ambient noise conditions may be temporarily affected by construction activities. Heavy construction machinery, such as backhoes, dump trucks, front-end loaders, and material-transport vehicles are anticipated to be the dominant noise-generating sources during the construction period of the proposed project.

In order to mitigate noise impacts, construction activities are anticipated to be limited to daylight work hours. Project-related noise will be minimized through use of applicable BMPs, such as regular maintenance of construction equipment and use of properly muffled equipment. In the long term, the proposed project is not anticipated to have adverse noise quality impacts.

14. Hazardous Materials

a. Existing Conditions

The project has primarily been used for pineapple cultivation and ranching. Due to its former agricultural use, there may be the limited potential for residual hazardous materials, such as pesticides or fertilizer. A Limited Hazardous Materials Survey was conducted for the dilapidated and abandoned house on Parcel 14, and the abandoned septic tank and greenhouse on Parcel 16. See **Appendix "G"**. Sampling and testing was conducted to identify potential presence of asbestos-containing materials (ACM), arsenic and lead paint. A visual inventory for polychlorinated biphenyls (PCBs) and mercury in fluorescent light fixtures was also conducted.

The limited asbestos survey was conducted in general accordance with U.S. Environmental Protection Agency (EPA) 40 Code of Federal Regulations (CFR) 763 Asbestos and the State of Hawaiʻi, Department of Health (DOH), Chapter 11, Hawaiʻi Administrative Rules (HAR) Asbestos Requirements. The asbestos survey consisted of the collection of bulk samples from observed accessible suspect building components samples of the floors, walls, and roofing were tested, in addition to the concrete cover on the septic tank. No asbestos was detected in the samples collected. A limited paint survey was conducted in general accordance with U.S. Department of Housing and Urban Development (HUD) Guidelines for

the Evaluation and Control of lead-based paint (LBP) Hazards in Housing and Chapter 11, HAR.

The limited lead paint survey consisted of the collection of paint samples of building components with paint in poor condition only. Five (5) paint chip samples were collected and tested for lead-based paint (LBP) and lead-containing paint (LCP). The paint samples, collected from paint in poor condition, contained detectable concentrations of lead ranging from 0.009 to 2 mg/kg and are considered LCP.

Canec is the common name for a fiberboard building material that was made from sugar cane bagasse, the residual fiber that remains after the juice has been extracted from the sugar cane. Canec contains arsenic in the range of 1,000 to 4,000 mg/kg. Canec was not observed at the surveyed sites. Inaccessible and/or hidden suspect arsenic-containing materials not sampled during this field effort should be presumed arsenic-containing until sampled and proven otherwise.

b. <u>Potential Impacts and Mitigation Measures</u>

The project sites have been vacant and the soils in the project area are not anticipated to contain significant amounts of hazardous materials. No ACM was identified through the survey and testing. However, the report notes that inaccessible and hidden suspect materials not tested during the survey should be assumed to be ACM unless proven otherwise. Should there be ACM encountered or generated during future demolition at the project site, the ACM will be removed and disposed of by trained workers in accordance with the Occupational Safety and Health Administration (OSHA) Asbestos Standard 29 CFR 1926.1101, Hawai'i Occupational Safety and Health (HIOSH) rules and regulations, EPA National Emission Standard for Asbestos 40 CFR 61-Subpart M, and 40 CFR 763 Asbestos.

Lead paint or debris that will be encountered at the project site will be properly handled, removed and disposed of in accordance with OSHA Lead in Construction Standard 29 CFR 1926.62 and HIOSH rules and regulations. Appropriate worker protection measures will be taken during the demolition work to limit lead exposure of personnel and releases to the environment.

Canec building materials are exempt from State laws requiring a hazardous waste determination to be made prior to disposal. As a result of this exemption, testing canec for arsenic content or leaching characteristics is not required by the State for disposal. The exemption applies whenever

canec building materials are segregated from other building materials and disposed of separately.

When canec is mixed with other building demolition waste, the combined waste could be subject to hazardous waste determination before disposal.

The Toxic Substances Control Act (TSCA) banned the production of PCBs in 1976 in the U.S. In fluorescent light fixtures, PCBs are usually found in ballasts either within small capacitors or in the form of a black tar-like compound. E2 conducted a visual inventory for suspect PCBs in fluorescent light fixture ballasts and the accompanying mercury-containing fluorescent tubes or compact fluorescent light (CFL) bulbs. Only one fluorescent light fixture was observed in the greenhouse; it contained a ballast that was labeled "No PCBs" and one green-banded lamp, which has lower amounts of mercury than regular fluorescent lamps. If a ballast is not labeled "No PCBs", it is assumed to contain PCBs. If PCB debris is encountered and/or generated at the project site, the PCB will be properly disposed of in accordance with OSHA PCB Standards 29 CFR 1910.1000 and 40 CFR 761.

15. Scenic and Open Space Resources

a. Existing Conditions

Mauna Loa to the west, Wailau to the east, and Moʻomomi Bay and the Pacific Ocean to the north define the scenic resources in Central Molokaʻi.

The project site is surrounded by similar agricultural lands and homesteads.

b. Potential Impacts and Mitigations Measures

The proposed project will subdivide lands for subsistence agricultural use and will be similar in use to agricultural homesteads in the vicinity. The subdivided lots will be improved to include driveway access and water utility connections. Although not developed as part of the proposed action, individual lessees of the lots may opt to construct homes on the lots. These homes, however, are expected to be of similar scale to neighboring homes. It is not anticipated that the project will have an adverse impact on scenic and open space resources.

B. SOCIO-ECONOMIC ENVIRONMENT

1. Land Use and Community Character

a. Existing Conditions

Molokaʻi is considered to be one of the most rural and undeveloped Hawaiian islands. Molokaʻi is also referred to as the "most Hawaiian" of the Hawaiian islands due to having the highest percentage of Native Hawaiian residents in the State, excluding the island of Niʻihau. Additionally, many Molokaʻi residents practice a more traditional, subsistence-based lifestyle through farming, fishing, hunting and bartering and are protective of the island's rural character.

From a regional perspective, the project sites are located in central Molokaʻi and are surrounded by agricultural lands and residential homesteads.

b. Potential Impacts and Proposed Mitigation Measures

The project is compatible with the adjacent land uses and rural community character. As such, the proposed project is in consonance with the current land use and community character of the area.

2. Population

a. Existing Conditions

The population of the island of Molokaʻi has exhibited little growth over the past several decades. According to the 2020 U.S. Census, the population of Molokaʻi is 7,369, which is a slight increase from the 2010 census population of 7,345.

b. Potential Impacts and Proposed Mitigation Measures

The proposed project involves developing needed homesteads for DHHL beneficiaries in Molokaʻi. Although there has been little change in the island's population, there is a total of 2,149 DHHL beneficiaries on the waitlist for homesteads in Molokaʻi as of December 2022. There are 1,134 beneficiaries waitlisted for agricultural homestead lease awards in Molokaʻi and 17 beneficiaries on the waitlist for agricultural homesteads in Hoʻolehua, specifically. As such, the proposed project is expected to help meet the demand for homesteading opportunities in Molokaʻi and is not anticipated to significantly alter population trends. The proposed project is

not anticipated to result in adverse impacts on the region's or island's population parameters.

3. Economy

a. Existing Conditions

Molokaʻi is known for its subsistence economy, largely influenced by aquaculture and agriculture due to its natural fishponds and superior soil and agricultural conditions. The tourism industry of Molokaʻi is much less significant than the industry on the island of Maui. In 2019, there were 3,059,905 visitor arrivals on Maui Island compared to 63,035 visitor arrivals on Molokaʻi. Traditionally, Molokaʻi has a higher than average level of unemployment compared to the rest of the State (State of Hawaiʻi Data Book, 2023).

b. Potential Impacts and Mitigation Measures

The proposed project supports the economy of Molokaʻi by providing homestead opportunities to DHHL beneficiaries and through encouraging sustainable agricultural activity. In addition, the project will generate positive economic impacts associated with construction-related activity and is not anticipated to have adverse impacts on Molokaʻi's economy.

4. Housing

a. Existing Conditions

DHHL homesteads in Hoʻolehua consist of a mix of pastoral, agricultural, and residential homesteads. As of November 2019, there were a total of 155 residential homestead lots leased to beneficiaries in Hoʻolehua (DHHL Molokaʻi Regional Plan, 2019).

b. Potential Impacts

The proposed project does not involve the construction of housing; however, subsistence agricultural lessees are allowed to construct homes on their homesteads. The project will not increase the need for housing on Molokaʻi and is not expected to have adverse negative impacts on housing in Molokaʻi.

C. PUBLIC SERVICES

1. Solid Waste Collection and Disposal

a. Existing Conditions

The County of Maui Solid Waste Division operates the Molokaʻi-Nāʻiwa Landfill and Recycling Center, which is located off of Maunaloa Highway in Maunaloa. The landfill and recycling center accepts commercial and residential waste and recycling items. The County also operates the Molokaʻi Metals Facility in Maunaloa, which accepts items such as scrap metal, motor vehicles, appliances, batteries, engine parts, and propane tanks.

b. Potential Impacts and Mitigation Measures

Construction-related waste will be properly disposed of in accordance with policy and practices established by the Solid Waste Division to ensure that there are no adverse impacts to the County's Landfill.

As the homestead lots will be located in an area currently serviced by the County, there are no adverse impacts anticipated to the County's collection system or disposal capacities attributed to the proposed project.

2. Police, Fire, and Medical Facilities

a. Existing Conditions

Police protection for Molokaʻi is provided by the Maui County Police Department located at the Molokaʻi Police Station in Kaunakakai. The Maui Police Department provides investigative services, uniform patrol services, technical support, and traffic services as stated in its mission to protect the residents of Maui County.

Fire prevention, protection, rescue, and emergency services for Molokaʻi are provided by the Maui County Department of Fire and Public Safety. The department has two (2) stations to service Molokaʻi, which include the Hoʻolehua Fire Station and the Kaunakakai Fire Station. In addition, there are fire hydrants located on Farrington Avenue, Moʻomomi Avenue and Puʻu Kapele Avenue fronting the project sites. Refer to **Appendix B**.

The Queen's Health System operates the Molokaʻi General Hospital, which is the only hospital on Molokaʻi. Located in Kaunakakai, the Molokaʻi General Hospital offers 24/7 service and is equipped with 15 beds.

Services offered include digital x-rays, outpatient chemotherapy, acute care, physical therapy, and a midwifery program.

In addition, the Molokaʻi Community Health Center in Kaunakakai offers primary care, behavioral health services and dental care for adults and children. Other independent medical services are offered and are primarily located in Kaunakakai. The project sites are located in Central Molokaʻi in relative proximity to the main town of Kaunakakai.

b. Potential Impacts and Mitigations Measures

The proposed project involves the subdivision of homestead lots and construction of access driveways and waterlines. The proposed project is located within service areas for existing police, fire, and medical facilities and is not anticipated to adversely impact these services. A new 8-inch waterline will be constructed on Puʻu Kapele Avenue to provide adequate water flow for fire protection purposes. Refer to **Appendix B**. Based on consultation with the Maui Fire Prevention Bureau, it is acknowledged that one (1) and 2 (two) family dwelling units are required to be within 600 feet of a fire hydrant.

3. Educational Facilities

a. Existing Conditions

The State Department of Education (DOE) operates several schools on Molokaʻi. Public school facilities include one (1) high school and one (1) middle school, Molokaʻi High (grades 9-12) and Molokaʻi Middle (grades 7-8), both located in Hoʻolehua. There are a total of four (4) K-6 elementary schools on Molokaʻi, which are Kaunakakai Elementary and Kilohana Elementary in Kaunakakai, Maunaloa Elementary in Maunaloa, and Kualapuʻu Elementary Charter School in Kualapuʻu.

b. Potential Impacts and Mitigation Measures

The proposed project entails the subdivision of agricultural lots and related improvements and is not anticipated to have adverse negative impacts on educational facilities. The proposed project is not considered a significant population generator that would require the provision of additional educational facilities.

4. Recreational Facilities

a. Existing Conditions

There are multiple public parks and facilities on Molokaʻi. Parks and facilities near the project sites in the Central Molokaʻi region include the Mitchell Pauʻole Center, Palaʻau State Park, Duke Mailu Regional Park, Kakahaia Park, Kualapuʻu Park and Community Center, and Lanikeha Community Center.

b. Potential Impacts and Mitigation Measures

The proposed project will subdivide agricultural lots and construct related improvements to provide homestead opportunities to DHHL beneficiaries on Molokaʻi and is not anticipated to have an adverse impact on recreational resources or require the provision of additional resources as the project is not considered to be a significant population generator.

D. INFRASTRUCTURE

1. Roadways

a. Existing Conditions

There are several major roadways in the vicinity of the project sites. State highways that run through or near the project area include Maunaloa Highway (Route 460) and Airport Loop (Route 465) off of Maunaloa Highway, which provide access to the Molokaʻi Airport. Puʻupeʻelua Avenue (480) is another State highway that runs from Maunaloa Highway to Farrington Avenue. Parcel 31 is situated between Farrington Avenue and Moʻomomi Avenue, with the remaining parcels being located below Puʻu Kapele Avenue. However, the portion of Puʻu Kapele Avenue fronting the project parcels is undeveloped and overgrown with trees and vegetation.

b. Potential Impacts and Proposed Mitigation Measures

The proposed action involves the extension of existing roads to provide driveway access to the subdivided lots. Minimal road improvements are proposed consisting of a paved road and swale. DHHL will be responsible for maintenance of the proposed driveways. Paved roads will improve access for lessees and emergency vehicles. The proposed road cross sections will consist of twenty-foot wide asphaltic cement pavement in the center of the ROW. Runoff will be collected at the low point in a grassed swale. Proposed road right-of-way widths are 40 and 50 feet. Road profiles

will follow the existing terrain as much as possible to reduce earthwork, maintain existing drainage patterns, and to preserve the existing water and irrigation lines that are already in place. This may temporarily impact the affected roadways through the construction period, however, there are no significant adverse effects anticipated as a result of the project. The project contractor will be required to secure necessary permits and approvals prior to the start of construction. In addition, it is not anticipated that implementation of the proposed project would significantly increase traffic in the area such that improvements to area roadway would be required.

2. Potable Water

a. Existing Conditions

The proposed lots will be serviced by the Molokaʻi Water System, which is operated by DHHL. The Kualapuʻu Aquifer supplies water to the DHHL wells in the Molokaʻi Water System, which operates two (2) wells pumping water from the Kualapuʻu Aquifer. Existing water mains and fire hydrants are located within the existing unimproved roads. At Parcel 31, there is a 6-inch waterline within Farrington Avenue and a 6-inch waterline within Moʻomomi Avenue. At the eastern project parcels, there is an existing 1.5-inch lateral providing service to the existing houses on Puʻu Kapele Avenue.

b. Potential Impacts and Mitigation Measures

The existing low-pressure water system will provide water service to the proposed lots. Potable water demand is based on the 600 gallons per day, per the Department of Water Supply's Water System Standards for a single-family house. Irrigation usage is not included in this calculation since there is an existing non-potable irrigation system available.

The existing water system was modeled to determine residual pressures for domestic and fire protection uses. The results of the model indicate that the existing water system is adequate to support the proposed subdivision. The hydraulic analysis results indicate that there is ample residual pressure available in the existing water system to support the proposed subdivisions. No improvements to the existing water system are recommended, except a proposed 8-inch water line on Puʻu Kapele Avenue, which will provide fire protection for the project's eastern lots. Water laterals will need to be extended along the flag stems to provide service to the interior lots. On Puʻu Kapele Avenue, a new water lateral will need to be extended along the flag stem to service the rear lot. The availability of water to support the proposed subdivision is pending approval from DLNR. A water use permit

application (WUPA) was submitted to the DLNR Commission on Water Resource Management (CWRM) in October 2020 to increase pumping rates. New water service and meters will not be issued until CWRM approval is received.

3. Non- Potable Water

a. Existing Conditions

The State Department of Agriculture (DOA) operates the Molokaʻi Irrigation System (MIS) consisting of the existing irrigation mains located within existing roads adjacent to the proposed project sites. There is an existing 12-inch irrigation line in Moʻomomi Avenue and 8-inch lines on Farrington Avenue and Puʻu Kapele Avenue.

The MIS source is Waikolu Valley. Water from the valley is collected and pumped through a five (5) mile long tunnel and pipe line to the Kualapuʻu reservoir, where water is stored. The water surface elevation in the reservoir fluctuates based on rainfall, evaporation, demand, and other factors. Reservoir water depth data provided by DOA was used to determine the average water surface elevation to use for this analysis. Over the past five (5) years, the reservoir depth varied between 28.5 and 48 feet, resulting in an average depth of 38.25 feet. This depth equates to a water surface elevation of 843 feet, which provides a minimum static pressure of 173 psi at Puʻu Kapela Ave. The approximate reservoir volume at this depth is 974 million gallons. Prior issues regarding the quality of the MIS water include turbidity, trash, and fish. MIS usage data provided by DOA for the past year showed that the usage for 3,382 acres in Hoʻolehua varied from a low of 40 million gallons in March to a high of 98 million gallons in August. The average daily usage ranges from 383 gallons per acre to 936 gallons per acre.

b. Potential Impacts and Mitigation Measures

Proposed irrigation demands were determined by comparing the demand from the Department of Water Supply's Water System Standards (WSS) and actual MIS usage. The WSS water demand for agricultural lots is 5000 gallons per acre. The monthly MIS usage per acre for the highest month is 29,024 gallons per acre or 936 gallons per acre per day. Since the WSS demand is more conservative, 5000 gallons per acre was used to calculate irrigation water demand. The area for each proposed lot was used to calculate its demand.

According to the Preliminary Engineering and Drainage Report (PEDR) prepared for the project, the existing MIS and new 8-inch irrigation line will be adequate to provide irrigation to the proposed lots. See **Appendix "B"**. On Farrington Avenue the existing 8-inch main will be extended to Parcel 31. Irrigation laterals will be extended along the flag stems to provide service to the interior lots. On Pu'u Kapele Avenue, a new irrigation lateral will need to be extended along the flag stem to service the rear lot. The DHHL will coordinate with the DOA to obtain irrigation service and meters. The irrigation system model only represents a portion of the existing MIS and does not include the impacts of existing demands on the irrigation network, which may affect pressures at common nodes where the existing lines and flows are split.

4. Wastewater

a. Existing Conditions

There is currently no County wastewater service. An existing septic tank on Parcel 16 is no longer operational.

b. Potential Impacts and Mitigation Measures

Should lessees decide to construct a home on the awarded lots, Installation and construction of appropriate wastewater facilities would be the responsibility of the lessee. Lots that have a residence would need to install an individual wastewater system (IWS) that meet State of Hawai'i Department of Health (DOH) standards. The existing septic tank will be closed in accordance with Department of Health regulations.

5. Drainage

a. Existing Conditions

Drainage affecting the project sites are categorized into offsite and onsite runoff. Runoff calculations were prepared in accordance with the County of Maui's Storm Drainage Standards. Refer to **Appendix "B"**. Runoff for drainage areas larger than 100 acres is calculated for a 100-year storm event. Runoff for drainage areas less than 100-areas is calculated for a 10-year storm event. Offsite drainage does not directly impact either of the proposed sites. However, Anahaki gulch is located near Parcel 31 and crosses Farrington Avenue where the road will be extended. The drainage area for this portion of Anahaki gulch is 260 acres, which generates 1560 cubic feet per second (cfs) of runoff for a 100-year storm event. Onsite drainage consists of the existing road and lot area. The existing roads are

unimproved dirt roads and lots are primarily undeveloped and covered with vegetation. The existing unimproved segments of Mo‘omomi Avenue, Farrington Avenue, and Pu‘u Kapele Avenue roads do not have a drainage system. The total existing runoff of the roadway portions fronting the lot is 120.0 cfs, with 28.2 cfs for the roads and 91.8 cfs for the lots. Minimal grading is anticipated for the construction of these improvements and existing drainage patterns will be maintained.

b. Potential Impacts and Mitigation Measures

Proposed subdivision improvements that affect drainage are grading and installation of impervious surfaces.

The total runoff increase is 15.7 cfs, with 13.0 cfs for the roads and 1.7 cfs for the lots. All of the drainage areas are less than 100 acres, so runoff is calculated for a 10-year storm event. The volume of runoff increase for the lots are approximately 500 cubic feet per lot. Mitigation for this increase can be accommodated by using a small basin on each lot with dimensions of 25 feet wide x 25 feet long x 1 feet deep. The basin should be located downstream of proposed improvements and swales used to direct flow into the basin. Overflow from the basin should follow the natural drainage path. Maintenance activities for a detention basin include:

- Inspection of basin including inlets/outlets and pipes after storm event
- Trim vegetation to maintain access into the basin.
- Inspect and remove sediment at inlets/outlets to maintain flow and basin capacity.
- Remove litter and debris

The drainage system for the proposed roads will consist of a road swale on the low side of the road. Drain inlets and piping will not be used. The conceptual drainage improvements in this study were designed in accordance with the County of Maui drainage standards. Runoff on the roads will be collected by the road swale. The volume of additional runoff generated from the roadway improvements varies from 10,000 to 20,000 cubic feet. Mitigation options for the additional roadway runoff can be accommodated by discharging runoff into an existing drainage way, storing runoff in a drainage basin, or storing runoff in infiltration trenches located beneath the road swale. Infiltration trenches are recommended for use beneath road swales to provide storage of the increase in runoff generated by the new roads. The trenches will be 6-feet deep by 3-feet wide and will be filled with drain rock. Runoff will be stored in the voids in the rock. Since the roads are sloped, dams will need to be used to prevent collected runoff

from flowing downstream and allow runoff collected in each section of trench to percolate into the existing soils.

Onsite drainage areas will be maintained in the proposed condition. It is assumed that existing drainage patterns will not change and grading will be minimal. The proposed lot improvements are not anticipated to significantly increase the peak flow runoff since the increase in impervious area relative to the overall project site is small. Existing drainage runoff patterns will be maintained onsite and drainage areas will continue to discharge into the existing locations onsite.

Offsite drainage is not anticipated to have a direct impact on the proposed lot areas. Mitigation measures to divert offsite runoff are not recommended. Offsite flows from adjacent areas will continue to flow through the site. However, offsite drainage is expected to impact the design of the Farrington Avenue extension at the Anahaki gulch crossing. A culvert is recommended at this location to accommodate offsite drainage flowing across the road at this location.

6. Electric, Telephone, and Cable

a. Existing Conditions

The Hoʻolehua Scattered Lots are serviced by Hawaiian Electric Company (HECO) via overhead primary conductors from the Palaʻau Substation #81. Proposed lots on Puʻu Kapele Avenue are located along a 7200 volt, single-phase circuit while Parcel 31 between Farrington Avenue and Moʻomomi Avenue is outside the area currently served by HECO. Existing overhead infrastructure along Farrington Avenue is a 7200 volt, single-phase circuit. This design allows more capacity as the load can be split between the two different overhead phase conductors. Unlike the infrastructure along Farrington Avenue, Moʻomomi Avenue is serviced overhead with a 7200 volt, single-phase circuit. As in all cases, a primary line extension will be required to service all parcels within the proposed lots. Telephone, cable, and internet service is also available via overhead lines along existing roads.

b. Potential Impacts and Mitigation Measures

The eastern project parcels are located at the end of a single phase medium voltage circuit run along Puʻu Kapele Avenue. To service each subdivided parcel, a new buck pole is to be installed along the existing overhead line across an access driveway. A new 450 foot primary line extension will incorporate two (2) new poles spaced approximately 225 feet

apart from the new buck pole. The western parcel, Parcel 31, which will be subdivided into eight (8) separate lots, is located approximately 3,000-3,250 feet west of the last existing HECO power poles. To extend overhead primary power to the lot, an estimated 13 poles will be installed along Farrington Avenue and an estimated 11 poles will be installed along Mo‘omomi Avenue. Spacing between poles is estimated at 275 feet. Overhead lines will be bucked off the last proposed poles on Farrington and Mo‘omomi Avenues and extend two (2) poles along the access driveways. These poles are spaced approximately 200 feet apart. An additional pole is to be installed across the access driveway at the first pole to service on of the lots. As there is existing telephone, cable, and internet service available, these services can be extended to the planned lots, as may be needed.

E. CUMULATIVE AND SECONDARY IMPACTS

Pursuant to the Hawai‘i Administrative Rules, Chapter 200, Section 11-200.1-2, entitled Environmental Impact Statement Rules, a cumulative impact means:

> *…the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.*

“Secondary impacts” or “indirect impacts” are defined as:

> *…effects that are caused by the action or are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density, or growth rate, and related effects on air and water and other natural systems including ecosystems.*

Cumulative and secondary impacts can be viewed as actions of others that are taken because of the presence of the project. Secondary impacts from highway projects, for example, can occur because they can induce development by removing one (1) of the impediments to growth.

The project is proposed to be implemented in an area developed with agricultural lots and homesteads of a similar nature. The proposed project is not a phase of a larger action, nor does it represent a commitment to such actions. Given the surrounding homesteads and vacant agricultural land, significant environmental impacts are not anticipated as a result of the project. Although the proposed project requires the provision of basic infrastructure such as water service and access driveways, these requirements are not

considered significant, as the project will be developed within the existing service limits for these services.

Secondary impacts are those, which have the potential to occur late in time or farther in distance, but are still reasonably foreseeable. They can be viewed as actions of others that are taken because of the presence of a project. The proposed project involves the subdivision of five (5) lots to create two (2) subsistence agricultural lots and the demolition/removal of existing abandoned structures. Related improvements to the lots include waterlines for access to irrigation and potable water sources and the construction of driveways to provide access to adjacent roadways. However, as previously discussed, the lots are being provided for DHHL beneficiaries who are anticipated to already be residing on Molokaʻi. As such, secondary impacts related to population increase in the region are not anticipated. The proposed project will be located in the midst of similar agricultural lands and homesteads. As previously discussed, the project will help to address the increasingly long beneficiary waitlist for homestead opportunities on Molokaʻi. Although the proposed project will benefit native Hawaiian beneficiaries of the DHHL specifically, the provision of subsistence agricultural lots will encourage agricultural activity and promote self-sufficiency, which will benefit the community as a whole. As such, given the surrounding environment, significant environmental impacts are not anticipated as a result of the project. Therefore, with the proposed mitigation measures, the project is not anticipated to result in significant adverse secondary impacts.

RELATIONSHIP TO GOVERNMENTAL PLANS, POLICIES, AND CONTROLS

III

III. RELATIONSHIP TO GOVERNMENTAL PLANS, POLICIES, AND CONTROLS

A. STATE LAND USE DISTRICTS

Pursuant to Chapter 205, Hawai'i Revised Statutes (HRS), all lands in the State have been placed into one (1) of four (4) major land use districts by the State Land Use Commission. These land use districts are designated "Urban", "Rural", "Agricultural", and "Conservation". The project site is located within the "Agricultural" district. See **Figure 12**. Pursuant to Chapter 205, HRS, the "Agricultural" districts shall include uses or activities provided by ordinances or regulations of the County in which the "Agricultural" district is located. Section G below, outlines the County of Maui's zoning regulations that are applicable to the proposed project. The proposed project is consistent with the "Agricultural" district designation.

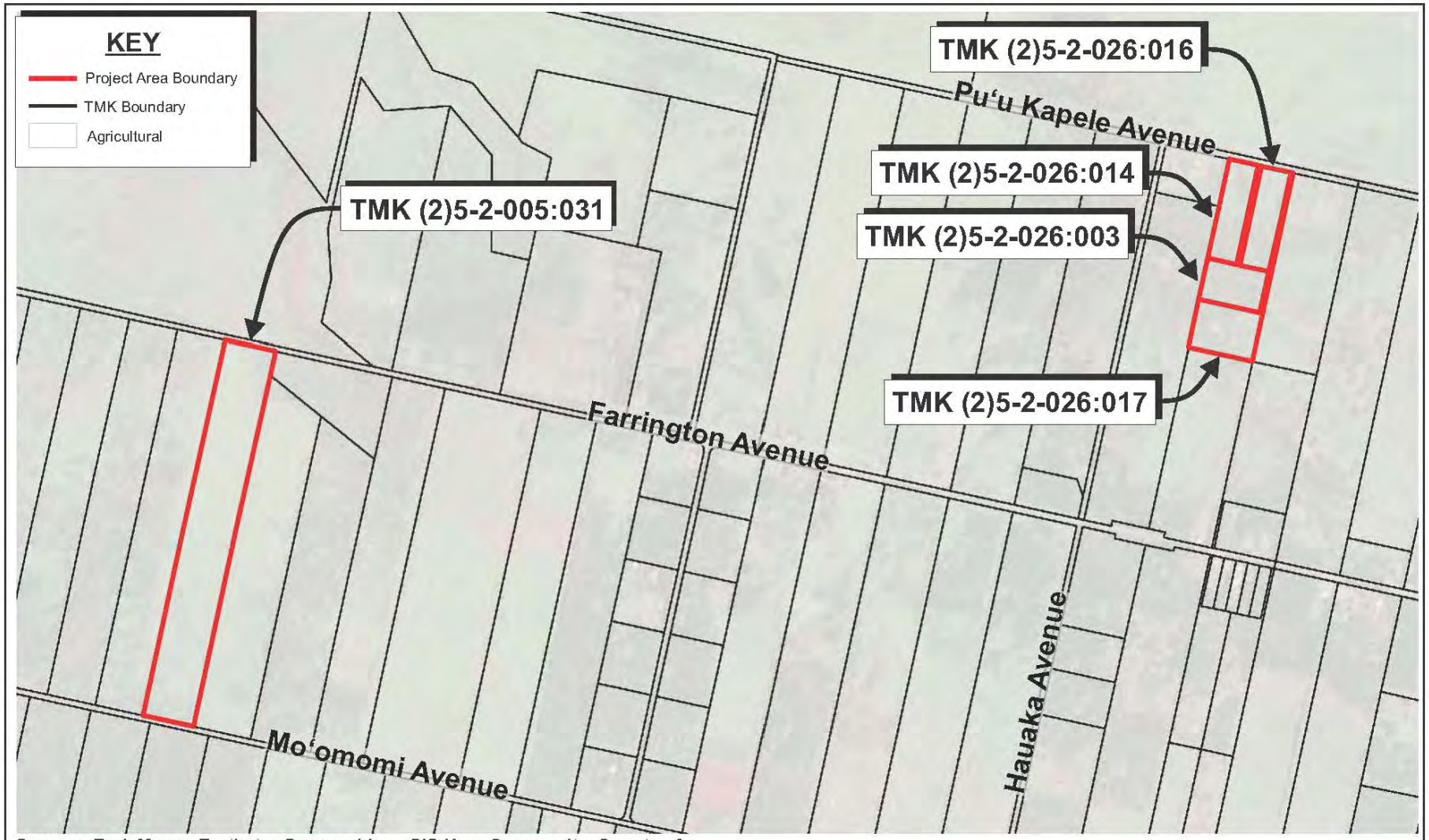
B. DEPARTMENT OF HAWAIIAN HOME LANDS PLANNING SYSTEM

The mission of the Department of Hawaiian Home Lands (DHHL) is to effectively manage the Hawaiian home lands trust and to develop and deliver land to Native Hawaiians. The Hawaiian Homes Commission Act (HHCA), codified within the constitution of the State of Hawai'i, vests onto the DHHL the authority to use its lands at its discretion. Specifically, HHCA Section 204 states, "*all available lands shall immediately assume the status of hawaiian home lands and be under the control of the department to be used and disposed of in accordance with the provisions of this Act*".

As such, the DHHL has implemented its own planning system consisting of a general plan, island plans, community-specific regional plans, project-specific program plans, and special area plans to guide its development of its lands. Below is a discussion of the project's consistency with the DHHL planning system.

1. General Plan

The DHHL General Plan was adopted by the Hawaiian Homes Commission (HHC) in November 2022. The General Plan sets the vision and establishes goals and policies to guide the discussions and decision-making of the HHC. The General Plan guides DHHL plans, programs, and policies through year 2040. The Vision was developed through extensive consultation with beneficiaries, DHHL staff, the HHC Investigative Committee, and administration to identify the words and ideas that capture shared aspirations and ideals for the future of the Hawaiian Home Lands Trust. The resulting Vision for 2040 is below.



Source: Esri, Maxar, Earthstar Geographics, GIS User Community, County of Maui Department of Planning, and the State of Hawai'i Land Use Commission

Figure 12

DHHL Ho'olehua Scattered Lots Subdivision and Improvements

State Land Use District Map

0 600 Feet
300 1,200

MUNEKIYO HIRAGA

Prepared for: State of Hawai'i, Department of Hawaiian Home Lands

SOH DHHL\Hoolehua Scattered Lots\Applications\Figures\SLUD_REV

By 2040, the Hawaiian Home Lands Trust and its beneficiaries will be thriving, self-sufficient, and connected to one another and the ʻāina.

TRUST LANDS

will nurture and sustain beneficiary communities through an array of uses and activities on homestead and non-homestead lands.

BENEFICIARY COMMUNITIES

will be self-sufficient, healthy, prosperous, and grounded in cultural knowledge and traditions. Values of mālama ʻāina will be passed on from kūpuna to ʻōpio to nourish the land and future generations.

BENEFICIARIES

will be thriving on the land and engaged in activities that support the rehabilitation and self-determination of all Hawaiians. Education, resources, and technical support will be available to promote greater economic opportunity, choice, and control.

DHHL

will be sufficiently funded by the State Legislature to support the continued advancement of native Hawaiians. Beneficiaries, DHHL, and the Hawaiian Homes Commission will communicate transparently with aloha as they collaborate toward achieving a shared Vision. Beneficiary voices will remain vital to advocate for funding and resources and guide decision-making by DHHL and HHC.

ALL OF HAWAIʻI

will support the continued implementation of the Hawaiian Homes Commission Act and the rehabilitation of native Hawaiians as provided by Article XII Section 2 of the State Constitution.

Guiding principles were also developed based on beneficiary consultation and input. The guiding principles are broad themes that articulate the key values important to beneficiaries, DHHL, and the Hawaiian Home Lands Trust. The proposed project is in consonance with the following guiding principles, goals, and policies.

GUIDING PRINCIPLES

- *ʻAuamo Kuleana: Acknowledge the shared kuleana of the Department, beneficiaries, State, federal and county agencies, Hawaiian serving organizations, and all of Hawaiʻi toward fulfilling the mission of the Hawaiian Home Lands Trust. Foster trust,*

communication, and transparency among all parties to work toward the Vision.

- *Returning Hawaiians to the Land: Actively facilitate returning native Hawaiians to their lands to support self sufficiency and self-determination. Maintain a primary focus on using and acquiring lands suitable for development of homesteads. Explore and expand opportunities for beneficiaries to restore their relationship with and use Trust lands and resources.*
- *Homestead Choice and Diversity: Offer a variety of homesteading opportunities to meet diverse beneficiary needs and desires. Explore creative models and innovative ideas for getting Hawaiians onto the land and cultivating healthy, thriving beneficiary communities.*

Response: The proposed project will make necessary improvements to DHHL lands in order to award subsistence agricultural lots to native Hawaiian beneficiaries in Ho'olehua. The DHHL has coordinated with State and County agencies on roadway improvements. Opportunities for agency and public review of the proposed action are provided pursuant to Chapter 343, HRS. In addition, DHHL actively engages with its beneficiaries on projects it intends to develop.

LAND USE PLANNING

Goals

- *Utilize Hawaiian Home Land for uses more appropriate to meet the needs and desires of the beneficiary population.*

Policies

- *Provide space for and designate a balanced mixture of appropriate land uses, economic opportunities, and community services in a Native Hawaiian-friendly environment.*
- *Incorporate Native Hawaiian mana'o, traditional place names, historical uses, and cultural knowledge in land use planning to identify appropriate uses in appropriate places*

Response: The proposed project advances the goals and policies for land use planning. The proposed subsistence agriculture lots are an appropriate use among the surrounding community and is in line with beneficiary preferences. The subsistence agriculture designation allows lessees to construct homes on their homestead and promotes beneficiary self-sufficiency through subsistence agriculture.

WATER RESOURCES

Goal:

- *Implement water planning and management strategies that meet current needs and protect water resources for the future.*

Policy:

- *Implement water conservation and efficiency measures, such as water catchment, greywater reuse, and xeriscaping for Residential and Agricultural homesteads.*

Response: The proposed subsistence agriculture lots will use non-potable water for irrigation, which helps to conserve the use of potable water resources.

INFRASTRUCTURE

The DHHL General Plan does not have specific goals and policies for infrastructure. However, the General Plan identifies recommended level of service standards for each of the land use designations. For Subsistence Agriculture uses, the recommended level of service for water, wastewater, stormwater, roads, electricity and telecom/broadband is that the infrastructure is built to County standards.

Response: Potable and non-potable water demand calculations were prepared based on County DWS WSS, and runoff calculations were prepared in accordance with the County Storm Drainage Standards. However, the potable and non-potable water systems are operated by the DHHL and State DOA, respectively. County of Maui standard roads were not considered since they are extensions of existing roads.

FOOD PRODUCTION

Goal:

- *Provide agriculture and pastoral homestead lots for subsistence and supplemental purposes.*

Policies:

- *Increase the number of subsistence agricultural leases awarded.*
- *Align agricultural homestead offerings with beneficiary needs and preferences.*

Response: The proposed action will result in the creation of 12 subsistence agriculture homesteads, which allows lessees to farm for subsistence purposes with the option to reside on their homestead.

2. Molokaʻi Island Plan

The DHHL Molokaʻi Island Plan (MIP) was adopted in 2005 and serves as a comprehensive resource for planning and managing the Molokaʻi Island lands and establishes land use designations to encourage orderly social, physical, and economic development in a Native Hawaiian-friendly environment. The MIP designates the subject properties for Subsistence and Supplemental Agriculture uses. See **Figure 13**.

The MIP discusses the General Plan's goals of increasing the delivery of agricultural homesteads to beneficiaries each year. The proposed project is in support of these goals. The MIP also provides data from a beneficiary survey conducted in 2004 to assess the preferences of DHHL beneficiaries on Molokaʻi. The results of the survey show that most beneficiaries applying for agricultural and pastoral homesteads indicated a desire to reside on their homesteads. Additionally, the survey indicated a preference for smaller agricultural lots between three (3) to five (5) acres for subsistence or supplemental agricultural use. The proposed project is in line with these beneficiary preferences as discussed in the MIP.

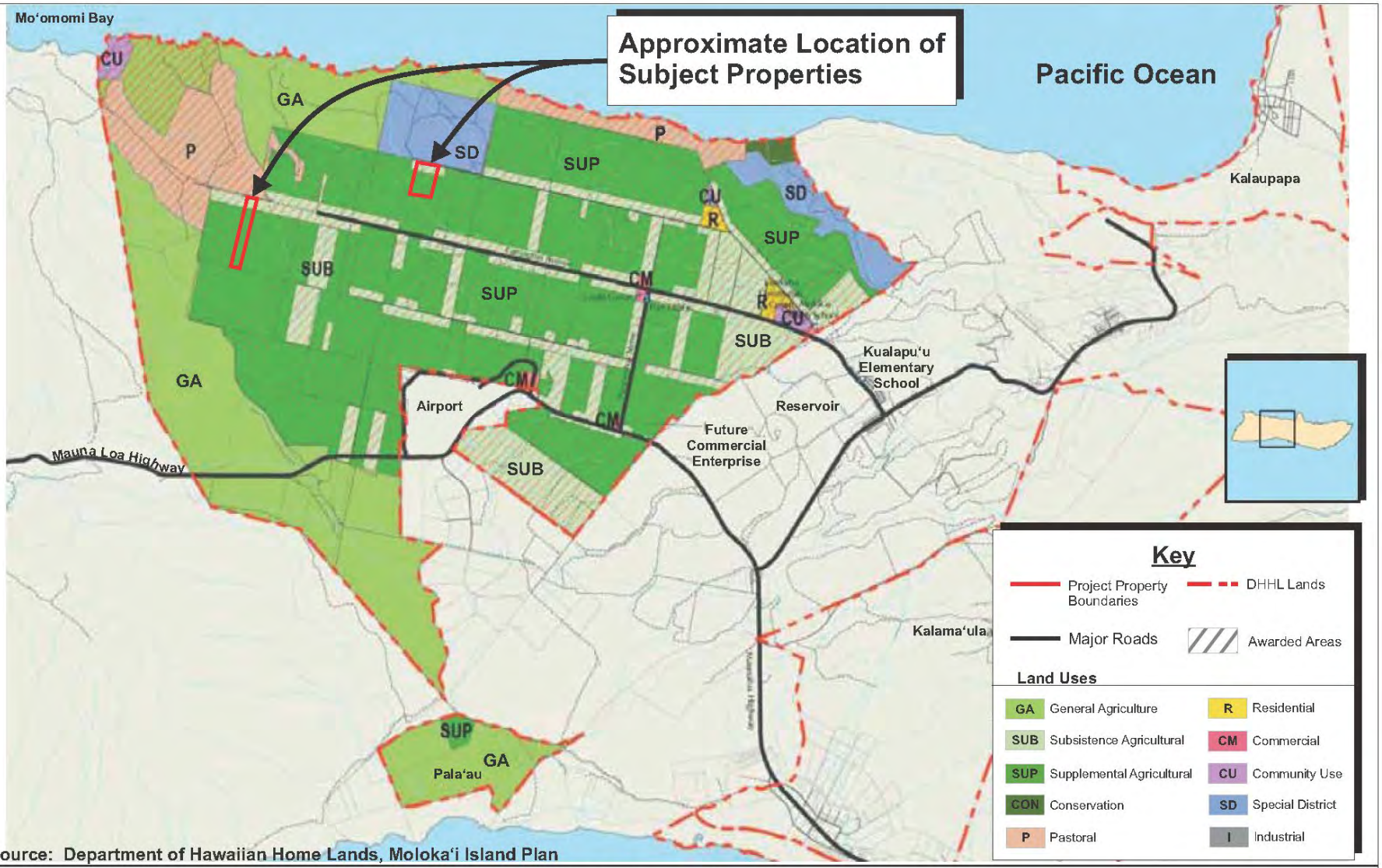
3. Molokaʻi Regional Plan

The 2019 Molokaʻi Regional Plan is one (1) of 22 DHHL regional plans. The regional plan focuses at a regional/community level to reflect Molokaʻi's Native Hawaiian beneficiary community's vision for a successful homestead community.

The vision statement of the Molokaʻi Regional Plan is as follows:

> *Molokaʻi beneficiaries are thriving on the land where the way of life and sense of community continue to hold strong. Acknowledging the diversity of each homestead on Molokaʻi, we envision a unified community grounded in Hawaiian values and cultural traditions passed to us from our kupūna. Core values are preserved while embracing modern pathways to a sustainable future.*

Through the planning process, priority projects are identified with the goal of being implemented within five (5) years based on land use development factors, issues and opportunities, and input and collaboration from Native Hawaiian beneficiaries and community groups. The Hoʻolehua Scattered Lots project is consistent with the priorities of the DHHL and the Molokaʻi Regional Plan through improving subsistence agricultural lots for lease to Molokaʻi beneficiaries.



Source: Department of Hawaiian Home Lands, Moloka'i Island Plan

Figure 13

DHHL Ho'olehua Scattered Lots Subdivision and Improvements

DHHL Moloka'i Island Plan Map

NOT TO SCALE

MUNEKIYO HIRAGA

Prepared for: State of Hawai'i, Department of Hawaiian Home Lands

SOH DHHL\Hoolehua Scattered Lots\Applications\Figures\DHHL MIP

C. HAWAIʻI STATE PLAN

Chapter 226, HRS, also known as the Hawaiʻi State Plan, is a long-range comprehensive plan which serves as a guide for the future long-term development of the State by identifying goals, objectives, policies, and priorities, as well as implementation mechanisms. The Plan consists of three (3) parts. Part I includes the Overall Theme, Goals, Objectives, and Policies; Part II includes Planning, Coordination, and Implementation; and Part III establishes Priority Guidelines. Part II of the State Plan covers its administrative structure and implementation process.

The overall theme of the Hawaiʻi State Plan is governed by the following general principles.

1. Individual and family self-sufficiency

2. Social and economic mobility

3. Community or social well-being

In consonance with the foregoing principles, the Hawaiʻi State Plan identifies three (3) clarifying goals:

1. A strong, viable economy, characterized by stability, diversity, and growth, that enables the fulfillment of the needs and expectations of Hawaiʻi's present and future generations.

2. A desired physical environment, characterized by beauty, cleanliness, quiet, stable natural systems, and uniqueness, that enhances the mental and physical well-being of the people.

3. Physical, social, and economic well-being, for individuals and families in Hawaiʻi, that nourishes a sense of community responsibility, of caring, and of participation in community life.

This section of the environmental assessment examines the applicability of the proposed action as it relates to the objectives, policies, and priority guidelines of the Hawaiʻi State Plan, as set forth in HRS Sections 226-5 through 226-27.

Table 2 below summarizes the relationship between the proposed action and the goals of the Hawaiʻi State Plan. The relationship between the action and the goals are categorized into the following groups. More detailed analysis and discussion, including the methodology used, is presented in **Appendix "H-1"**.

1. **Directly applicable**: the action and its potential effects directly advances or promotes the objective, policy or priority guideline.

2. **Indirectly applicable**: the action and its potential effects indirectly supports or advances the objective, policy or priority guideline.

3. **Not applicable**: the action and its potential effects have no direct or indirect relationship to the objectives and policies of the Hawai'i State Plan.

In general, a proposed action's applicability to the objectives, policies and priority guidelines of the Hawai'i State Plan is judged on the basis of the action's direct or indirect relationship to the respective objectives, policies and priority directions. It is recognized that the categorization of "applicability" is subject to interpretation and should be appropriately considered in the context of local and regional conditions. The analysis presented in **Table 2** and summarized below focuses on key elements of the proposed action's relationship to the Hawai'i State Plan. Detailed discussion on the applicability of the proposed action to each goal and related objectives, policies, and implementing actions of the Hawai`i State Plan is provided in **Appendix "H-1"**.

Table 2. Hawai'i State Plan, Chapter 226, HRS Part I. Overall Themes, Goals, Objectives, and Policies (HRS 226-1 to 226-27)

Hawai'i State Plan, Chapter 226, HRS Part I. Overall Themes, Goals, Objectives and Policies **Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable**	**DA**	**IA**	**NA**
HRS 226-1: Findings and Purpose			
HRS 226-2: Definitions			
HRS 226-3: Overall Theme			
HRS 226-4: State Goals. In order to ensure, for the present and future generations, those elements of choice and mobility that ensure that individuals and groups may approach their desired levels of self-reliance and self-determination, it shall be the goal of the State to achieve: (1) A strong, viable economy, characterized by stability, diversity, and growth, that enables the fulfillment of the needs and expectations of Hawaii's present and future generations. (2) A desired physical environment, characterized by beauty, cleanliness, quiet, stable natural systems, and uniqueness, that enhances the mental and physical well-being of the people. (3) Physical, social, and economic well-being, for individuals and families in Hawaii, that nourishes a sense of community responsibility, of caring, and of participation in community life.			
Chapter 226-5 Objective and Policies for Population			
Objective:			
(a) It shall be the objective in planning for the State's population to guide population growth to be consistent with the achievement of physical, economic and social objectives contained in this chapter.	✓		
Chapter 226-6 Objectives and policies for the economy – – in general			
Objectives:			
(a) Planning for the State's economy in general shall be directed toward achievement of the following objectives:			
(1) Increased and diversified employment opportunities to achieve full employment, increased income and job choice, and improved living standards for Hawaii's people, while at the same time stimulating the development and expansion of economic activities capitalizing on defense, dual-use, and science and technology assets, particularly on the neighbor islands where employment opportunities may be limited.	✓		
(2) A steadily growing and diversified economic base that is not overly dependent on a few industries, and includes the development and expansion of industries on the neighbor islands.			✓
Chapter 226-7 Objectives and policies for the economy – – agriculture.			
Objectives:			
(a) Planning for the State's economy with regard to agriculture shall be directed towards achievement of the following objectives:			
(1) Viability of Hawaii's sugar and pineapple industries.			✓
(2) Growth and development of diversified agriculture throughout the State.	✓		
(3) An agriculture industry that continues to constitute a dynamic and essential component of Hawaii's strategic, economic, and social well-being.	✓		

Hawai'i State Plan, Chapter 226, HRS Part I. Overall Themes, Goals, Objectives and Policies Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable	DA	IA	NA
Chapter 226-8 Objective and policies for the economy – – visitor industry.			
Objective:			
(a) Planning for the State's economy with regard to the visitor industry shall be directed towards the achievement of the objective of a visitor industry that constitutes a major component of steady growth for Hawaii's economy.			✓
Chapter 226-9 Objective and policies for the economy – – federal expenditures.			
Objective:			
(a) Planning for the State's economy with regard to federal expenditures shall be directed towards achievement of the objective of a stable federal investment base as an integral component of Hawaii's economy.			✓
Chapter 226-10 Objective and policies for the economy – – potential growth and innovative activities.			
Objective:			
(a) Planning for the State's economy with regard to potential growth and innovative activities shall be directed towards achievement of the objective of development and expansion of potential growth and innovative activities that serve to increase and diversify Hawaii's economic base.	✓		
Chapter 226-10.5 Objectives and policies for the economy – – information industry.			
Objective:			
(a) Planning for the State's economy with regard to telecommunications and information technology shall be directed toward recognizing that broadband and wireless communication capability and infrastructure are foundations for an innovative economy and positioning Hawaii as a leader in broadband and wireless communications and applications in the Pacific Region.			✓
Chapter 226-11 Objectives and policies for the physical environment – – land based, shoreline, and marine resources.			
Objectives:			
(a) Planning for the State's physical environment with regard to land-based, shoreline, and marine resources shall be directed towards achievement of the following objectives:			
(1) Prudent use of Hawaii's land-based, shoreline, and marine resources.		✓	
(2) Effective protection of Hawaii's unique and fragile environmental resources.			✓
Chapter 226-12 Objective and policies for the physical environment – – scenic, natural beauty, and historic resources.			
Objective:			
(a) Planning for the State's physical environment shall be directed towards achievement of the objective of enhancement of Hawaii's scenic assets, natural beauty, and multi-cultural/historical resources.		✓	

Hawai'i State Plan, Chapter 226, HRS Part I. Overall Themes, Goals, Objectives and Policies Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable	DA	IA	NA
Chapter 226-13 Objectives and policies for the physical environment – – land, air, and water quality.			
Objectives:			
(a) Planning for the State's physical environment with regard to land, air, and water quality shall be directed towards achievement of the following objectives.		✓	
(1) Maintenance and pursuit of improved quality in Hawaii's land, air, and water resources.		✓	
(2) Greater public awareness and appreciation of Hawaii's environmental resources.			✓
Chapter 226-14 Objective and policies for facility systems – – in general.			
Objective:			
(a) Planning for the State's facility systems in general shall be directed towards achievement of the objective of water, transportation, sustainable development, climate change adaptation, sea level rise adaptation, waste disposal, and energy and telecommunication systems that support statewide social, economic, and physical objectives.	✓		
Chapter 226-15 Objectives and policies for facility systems – – solid and liquid waste.			
Objectives:			
(a) Planning for the State's facility systems with regard to solid and liquid wastes shall be directed towards the achievement of the following objectives:			✓
(1) Maintenance of basic public health and sanitation standards relating to treatment and disposal of solid and liquid wastes.			✓
(2) Provision of adequate sewerage facilities for physical and economic activities that alleviate problems in housing, employment, mobility, and other areas.			✓
Chapter 226-16 Objective and policies for facility systems – – water.			
Objective:			
(a) Planning for the State's facility systems with regard to water shall be directed towards achievement of the objective of the provision of water to adequately accommodate domestic, agricultural, commercial, industrial, recreational, and other needs within resource capacities.	✓		
Chapter 226-17 Objectives and policies for facility systems – – transportation.			
Objectives:			
(a) Planning for the State's facility systems with regard to transportation shall be directed towards the achievement of the following objectives:			✓
(1) An integrated multi-modal transportation system that services statewide needs and promotes the efficient, economical, safe, and convenient movement of people and goods.			✓
(2) A statewide transportation system that is consistent with and will accommodate planned growth objectives throughout the State.			✓

Hawai'i State Plan, Chapter 226, HRS Part I. Overall Themes, Goals, Objectives and Policies Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable	DA	IA	NA
Chapter 226-18 Objectives and policies for facility systems – – energy.			
Objectives:			
(a) Planning for the State's facility systems with regard to energy shall be directed toward the achievement of the following objectives, giving due consideration to all:			
(1) Dependable, efficient, and economical statewide energy systems capable of supporting the needs of the people;			✓
(2) Increased energy security and self-sufficiency through the reduction and ultimate elimination of Hawaii's dependence on imported fuels for electrical generation and ground transportation.			✓
(3) Greater diversification of energy generation in the face of threats to Hawaii's energy supplies and systems;			✓
(4) Reduction, avoidance, or sequestration of greenhouse gas emissions from energy supply and use; and			✓
(5) Utility models that make the social and financial interests of Hawaii's utility customers a priority.			✓
Chapter 226-18.5 Objectives and policies for facility systems – – telecommunications.			
Objective:			
(a) Planning for the State's telecommunications facility systems shall be directed towards the achievement of dependable, efficient, and economical statewide telecommunications systems capable of supporting the needs of the people.			
Chapter 226-19 Objectives and policies for socio-cultural advancement – – housing.			
Objectives:			
(a) Planning for the State's socio-cultural advancement with regard to housing shall be directed toward the achievement of the following objectives:			✓
(1) Greater opportunities for Hawaii's people to secure reasonably priced, safe, sanitary, and livable homes, located in suitable environments that satisfactorily accommodate the needs and desires of families and individuals, through collaboration and cooperation between government and nonprofit and for-profit developers to ensure that more affordable housing is made available to very low-, low- and moderate-income segments of Hawaii's population.	✓		
(2) The orderly development of residential areas sensitive to community needs and other land uses.			✓
(3) The development and provision of affordable rental housing by the State to meet the housing needs of Hawaii's people.			✓
Chapter 226-20 Objectives and policies for socio-cultural advancement – – health.			
Objectives:			
(a) Planning for the State's socio-cultural advancement with regard to health shall be directed towards achievement of the following objectives:			
(1) Fulfillment of basic individual health needs of the general public.			✓

Hawai'i State Plan, Chapter 226, HRS Part I. Overall Themes, Goals, Objectives and Policies Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable	DA	IA	NA
(2) Maintenance of sanitary and environmentally healthful conditions in Hawaii's communities.			✓
(3) Elimination of health disparities by identifying and addressing social determinants of health.			✓
Chapter 226-21 Objectives and policies for Socio-cultural advancement – – education.			
Objective:			
(a) Planning for the State's socio-cultural advancement with regard to education shall be directed towards achievement of the objective of the provision of a variety of educational opportunities to enable individuals to fulfill their needs, responsibilities, and aspirations.			✓
Chapter 226-22 Objective and policies for socio-cultural advancement – – social services.			
Objective:			
(a) Planning for the State's socio-cultural advancement with regard to social services shall be directed towards the achievement of the objective of improved public and private social services and activities that enable individuals, families, and groups to become more self-reliant and confident to improve their well-being.			✓
Chapter 226-23 Objective and policies for socio-cultural advancement – – leisure.			
Objective:			
(a) Planning for the State's socio-cultural advancement with regard to leisure shall be directed towards the achievement of the objective of the adequate provision of resources to accommodate diverse cultural, artistic, and recreational needs for present and future generations.			✓
Chapter 226-24 Objective and policies for socio-cultural advancement – – individual rights and personal well-being.			
Objective:			
(a) Planning for the State's socio-cultural advancement with regard to individual rights and personal well-being shall be directed towards achievement of the objective of increased opportunities and protection of individual rights to enable individuals to fulfill their socio-economic needs and aspirations.			✓
Chapter 226-25 Objective and policies for socio-cultural advancement – – culture.			
Objective:			
(a) Planning for the State's socio-cultural advancement with regard to culture shall be directed toward the achievement of the objective of enhancement of cultural identities, traditions, values, customs, and arts of Hawaii's people.		✓	
Chapter 226-26 Objectives and policies for socio-cultural advancement – – public safety.			
Objectives:			
(a) Planning for the State's socio-cultural advancement with regard to public safety shall be directed towards the achievement of the following objectives:			

Hawai'i State Plan, Chapter 226, HRS Part I. Overall Themes, Goals, Objectives and Policies Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable	DA	IA	NA
(1) Assurance of public safety and adequate protection of life and property for all people.			✓
(2) Optimum organizational readiness and capability in all phases of emergency management to maintain the strength, resources, and social and economic well-being of the community in the event of civil disruptions, wars, natural disasters, and other major disturbances.			✓
(3) Promotion of a sense of community responsibility for the welfare and safety of Hawaii's people.			✓
Chapter 226-27 Objectives and policies for socio-cultural advancement – – government.			
Objectives:			
(a) Planning the State's socio-cultural advancement with regard to government shall be directed towards the achievement of the following objectives:			
(1) Efficient, effective, and responsive government services at all levels in the State.	✓		
(2) Fiscal integrity, responsibility, and efficiency in the state government and county governments.	✓		

The proposed action is directly supportive of the objectives and policies for the agricultural economy, water facility systems, and the socio-cultural advancement of Hawaiian culture and traditions. The DHHL proposes increasing the number of subsistence agricultural lots and infrastructure improvements for lease to DHHL beneficiaries. Investment in small scale agricultural production is directly applicable to the objectives and policies for the economy and diversifying Hawai'i's economic base. The proposed action will have short-term and long-term impacts on the economy through construction-related activity and through encouraging agricultural activity. In addition, the Cultural Impact Assessment (CIA) prepared for the proposed project fosters increased knowledge of Native Hawaiian cultural practices, as well as the history of the project area, directly supporting the objective and policies for socio-cultural advancement. Furthermore, the proposed project involves infrastructure improvements to connect the subdivided lots to existing water sources and allows for lessees to reside on homestead properties, thereby providing Native Hawaiians opportunities for socio-cultural advancement related to housing.

The Environmental Assessment (EA) being prepared represents the Applicant's commitment to ensure that natural resources such as the coastal environment are not impacted by construction activities. The commitment to utilizing Best Management Practices (BMPs) also ensures compatibility between land-based and water-based functions, resources, and ecological systems during the construction phase. The EA process involves analyzing the project's impact on a number of natural and socio-economic resource parameters and forwarding measures aimed at mitigating any potential impacts.

As an action aimed at providing homestead opportunities to DHHL beneficiaries, the proposed action does not directly or indirectly impact objectives and policies related to areas such as the visitor industry, the information industry, telecommunication and energy systems, health, leisure, or public safety.

Priority Guidelines

"Priority guidelines" means those guidelines which shall take precedence when addressing areas of statewide concern. This section addresses applicability criteria to the priority guidelines set forth in HRS 226-103.

Priority guidelines of the Hawai'i State Plan covers the economy, population growth and land resources, crime and criminal justice, affordable housing, quality education, sustainability, and climate change adaptation.

The **Table 3** below summarizes the relationship between the proposed action and the priority guidelines of the Hawai'i State Plan. More detailed discussion is presented in **Appendix "H-1"**.

Table 3. Hawai'i State Plan, Chapter 226, HRS Part III. Priority Guidelines (Chapters 226-101 to 226-109)

Hawai'i State Plan, Chapter 226, HRS Part III. Priority Guidelines **Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable**	**DA**	**IA**	**N/A**
Chapter 226-101: Purpose. The purpose of this part is to establish overall priority guidelines to address areas of statewide concern.			
Chapter 226-102: Overall direction. The State shall strive to improve the quality of life for Hawaii's present and future population through the pursuit of desirable courses of action in seven major areas of statewide concern which merit priority attention: economic development, population growth and land resource management, affordable housing, crime and criminal justice, quality education, principles of sustainability, and climate change adaptation.			
Chapter 226-103: Economic priority guidelines.			
(a) Priority guidelines to stimulate economic growth and encourage business expansion and development to provide needed jobs for Hawaii's people and achieve a stable and diversified economy	✓		
(b) Priority guidelines to promote the economic health and quality of the visitor industry			✓
(c) Priority guidelines to promote the continued viability of the sugar and pineapple industries			✓
(d) Priority guidelines to promote the growth and development of diversified agriculture and aquaculture	✓		
(e) Priority guidelines for water use and development	✓		
(f) Priority guidelines for energy use and development			✓
(g) Priority guidelines to promote the development of the information industry			✓

Hawai'i State Plan, Chapter 226, HRS Part III. Priority Guidelines Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable	DA	IA	N/A
Chapter 226-104: Population growth and land resources priority guidelines.			
(a) Priority guidelines to effect desired statewide growth and distribution			✓
(b) Priority guidelines for regional growth distribution and land resource utilization	✓		
Chapter 226-105: Crime and criminal justice.			
Priority guidelines in the area of crime and criminal justice			✓
Chapter 226-106: Affordable housing.			
Priority guidelines for the provision of affordable housing			✓
Chapter 226-107: Quality education.			
Priority guidelines to promote quality education			✓
CHAPTER 226-108: Sustainability			
Priority guidelines and principles to promote sustainability			✓
CHAPTER 226-109: Climate change adaptation priority guidelines			
Priority guidelines to prepare the State to address the impacts of climate change, including impacts to the areas of agriculture; conservation lands; coastal and nearshore marine areas; natural and cultural resources; education; energy; higher education; health; historic preservation; water resources; the built environment, such as housing, recreation, transportation; and the economy shall:			✓

The proposed project is most directly supportive of the State's priority guidelines for the growth and development of diversified agriculture and priority guidelines for land resource utilization by maintaining prime and productive agricultural land for agricultural use. As previously mentioned, the project also involves water infrastructure improvements to provide domestic water and irrigation water to the homestead lots, allowing for agricultural activity.

D. STATE FUNCTIONAL PLANS

A key element of the Statewide Planning System is the Functional Plans which set forth the policies, statewide guidelines, and priorities within a specific field of activity. There are 13 Functional Plans which have been developed by the State agency primarily responsible for a given functional area. Together with the County General Plans, the State Functional Plans establishes more specific strategies for implementation. In particular, State Functional Plans provide for the following:

- Identify major Statewide priority concerns
- Define current strategies for each functional area
- Identify major relationships among functional areas

- Provide direction and strategies for departmental policies, programs, and priorities
- Provide a guide for the allocation of resources
- Coordinate State and County roles and responsibilities in the implementation of the Hawai‘i State Plan

Thirteen (13) Functional Plans have been prepared by State agencies. **Table 4** provides an assessment of the relationship between the proposed action and each of the 13 Functional Plans.

Table 4. Relationship Between the Proposed Hoʻolehua Scattered Lots and the State Functional Plans

	State Functional Plan	State Coordinating Agency	Purpose	Analysis
1	Agriculture Functional Plan (1991)	Department of Agriculture	Continued viability of agriculture throughout the State	The proposed project will be implemented on prime and productive agricultural land and is directly supportive of the Agriculture Functional Plan by providing suitable land and water to native Hawaiian beneficiaries for agricultural use. Furthermore, the DHHL assists in providing education and training for agricultural lessees so they may be better equipped to farm the land.
2	Conservation Lands State Functional Plan (1991)	Department of Land and Natural Resources	Addresses issues of population and economic growth and its strain on current natural resources; broadening public use of natural resources while protecting lands and shorelines from overuse; additionally, promotes the aquaculture industry	The proposed project will not utilize any State Conservation lands. Similarly, the project is located inland, and not near the coastline. BMPs will be implemented to minimize adverse impacts to downstream properties and the shoreline. The proposed action is not anticipated to contravene the objectives and policies of this functional plan.
3	Education State Functional Plan (1989)	Department of Education	Improvements to Hawaiʻi's educational curriculum, quality of educational staff, and access to adequate facilities	The proposed action is not anticipated to contravene the objectives and policies of this functional plan.
4	Employment State Functional Plan (1990)	Department of Labor and Industrial Relations	Improve the qualifications, productivity, and effectiveness of the State's workforce through better education and training of workers as well as efficient planning of economic development, employment opportunities, and training activities	The proposed action will result in the creation of construction jobs throughout the construction period. This will provide local residents with opportunities to successfully compete in the workforce. The proposed action is not anticipated to contravene the objectives and policies of this functional plan.

	State Functional Plan	State Coordinating Agency	Purpose	Analysis
5	Energy State Functional Plan (1991)	Department of Business, Economic Development and Tourism	Lessen the reliance on petroleum and other fossil fuels in favor of alternative sources of energy so as to keep up with the State's increasing energy demands while also becoming a more sustainable island state; achieving dependable, efficient, and economical statewide energy systems	The proposed action is not anticipated to contravene the objectives and policies of this functional plan.
6	Health State Functional Plan (1989)	Department of Health	Improve health care system by providing for those who don't have access to private health care providers; increasing preventative health measures; addressing 'quality of care' elements in private and public sectors to cut increasing costs	The proposed action is not anticipated to contravene the objectives and policies of this functional plan.
7	Higher Education Functional Plan (1984)	University of Hawai'i	Prepare Hawai'i's citizens for the demands of an increasingly complex world through providing technical and intellectual tools	The proposed action is not anticipated to contravene the objectives and policies of this functional plan.
8	Historic Preservation State Functional Plan (1991)	Department of Land and Natural Resources	Preservation of historic properties, records, artifacts and oral histories; provide public with information/education on the ethnic and cultural heritages and history of Hawai'i	A CIA conducted as part of the environmental review process for the proposed project demonstrates an effort to preserve Hawai'i's natural and historical resources and protect Hawai'i's ethnic and cultural heritage. The State Historic Preservation Division (SHPD) has been consulted and the proposed project will comply with SHPD's recommendations for mitigation.

	State Functional Plan	State Coordinating Agency	Purpose	Analysis
9	Affordable Housing State Functional Plan (2017)	Hawai'i Housing Finance and Development Corporation	Based largely on joint public/private efforts to finance, build, and maintain an adequate supply of affordable housing. It will be a working tool to guide the State, the counties, as well as the private sector in meeting the overall goal that every Hawaii resident will have the opportunity to live in a safe, decent and affordable home.	The proposed action is not anticipated to contravene the objectives and policies of this functional plan.
10	Human Services State Functional Plan (1989)	Department of Human Services	Refining support systems for families and individuals by improving elderly care, increasing preventative measures to combat child/spousal abuse and neglect; providing means for 'self-sufficiency'	The proposed action is not anticipated to contravene the objectives and policies of this functional plan.
11	Recreation State Functional Plan (1991)	Department of Land and Natural Resources	Manage the use of recreational resources via addressing issues: (1) ocean and shoreline recreation, (2) mauka, urban, and other recreation opportunities, (3) public access to shoreline and upland recreation areas, (4) resource conservation and management, (5) management of recreation programs/facilities/areas, and (6) wetlands protection and management	The proposed action is not anticipated to contravene the objectives and policies of this functional plan.
12	Tourism State Functional Plan (1991)	Department of Business, Economic Development and Tourism	Balance tourism/economic growth with environmental and community concerns; development that is cognizant of the limited land and water resources of the islands; maintaining friendly relations between tourists and community members; development of a productive workforce and enhancement of career and	The proposed action is not anticipated to contravene the objectives and policies of this functional plan.

	State Functional Plan	State Coordinating Agency	Purpose	Analysis
			employment opportunities in the visitor industry	
13	Transportation State Functional Plan (1991)	Department of Transportation	Development of a safer, more efficient transportation system that also is consistent with planned physical and economic growth of the state; construction of facility and infrastructure improvements; develop a transportation system balanced with new alternatives; pursue land use initiatives which help reduce travel demand	The proposed action is not anticipated to contravene the objectives and policies of this functional plan.

E. GENERAL PLAN OF THE COUNTY OF MAUI

As indicated by the Maui County Charter, the purpose of the general plan shall be to:

> *... indicate desired population and physical development patterns for each island and region within the county; shall address the unique problems and needs of each island and region; shall explain opportunities and the social, economic, and environmental consequences related to potential developments; and shall set forth the desired sequence, patterns and characteristics of future developments. The general plan shall identify objectives to be achieved, and priorities, policies, and implementing actions to be pursued with respect to population density, land use maps, land use regulations, transportation systems, public and community facility locations, water and sewage systems, visitor destinations, urban design, and other matters related to development.*

Chapter 2.80B of the Maui County Code, relating to the General Plan and Community Plans, implements the foregoing Charter provision through enabling legislation which calls for a Countywide Policy Plan.

1. Countywide Policy Plan

The Countywide Policy Plan was adopted in March 2010 and is a comprehensive policy document for the islands of Maui County to the year 2030. The plan replaces the General Plan of the County of Maui 1990 Update and provides the policy framework for the development of the Maui Island Plan as well as for updating the nine (9) detailed Community Plans. The Countywide Policy Plan provides broad goals, objectives, policies and implementing actions that portray the desired direction of the County's future. Goals are intended to describe a desirable condition of the County by the year 2030 and are intentionally general. Objectives tend to be more specific and may be regarded as milestones to achieve the larger goals. Policies are not intended as regulations, but instead provide a general guideline for County decision makers, departments, and collaborating organizations toward the attainment of goals and objectives. Implementing actions are specific tasks, procedures, programs, or techniques that carry out policy.

Table 5 below summarizes the relationship between the proposed action and the 11 goals of the Countywide Policy Plan. The relationship between the action and the goals are categorized into the following groups. More detailed analysis and discussion, including the methodology used, is presented in **Appendix "H-2"**.

1. **Directly applicable:** the action and its potential effects directly advances, promotes or affects the relevant goal, objective, or policy.

2. **Indirectly applicable:** the action and its potential effects indirectly supports, advances or affects the objective, policy, or priority guideline.

3. **Not applicable:** the action and its potential effects have no direct or indirect relationship to the objectives and policies of the Countywide Policy Plan.

In general, a proposed action's applicability to the goals, objectives, policies, and implementing actions of the Countywide Policy Plan is judged on the basis of the action's direct or indirect relationship to the respective objectives, policies, and priority directions. It is recognized that the categorization of "applicability" is subject to interpretation and should be appropriately considered in the context of local and regional conditions. The analysis presented in **Table 5** and summarized below focuses on key elements of the proposed action's relationship to the Countywide Policy Plan. Detailed discussion on the applicability of the proposed action to each goal and related objectives, policies, and implementing actions of the Countywide Policy Plan is provided in **Appendix "H-2"**.

Table 5. Analysis of the Project's Conformance to the Countywide Policy Plan

COUNTYWIDE POLICY PLAN (Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable)	DA	IA	NA
A. PROTECT THE NATURAL ENVIRONMENT			
Goal: Maui County's natural environment and distinctive open spaces will be preserved, managed, and cared for in perpetuity.	✓		
B. PRESERVE LOCAL CULTURES AND TRADITIONS			
Goal: Maui County will foster a spirit of pono and protect, perpetuate, and reinvigorate its residents" multi-cultural values and traditions to ensure that current and future generations will enjoy the benefits of their rich island heritage.	✓		
C. IMPROVE EDUCATION			
Goal: Residents will have access to lifelong formal and informal educational options enabling them to realize their ambitions.			✓
D. STRENGTHEN SOCIAL AND HEALTHCARE SERVICES			
Goal: Health and social services in Maui County will fully and comprehensively serve all segments of the population.		✓	
E. EXPAND HOUSING OPPORTUNITIES FOR RESIDENTS			
Goal: Quality, island-appropriate housing will be available to all residents.	✓		
F. STRENGTHEN THE LOCAL ECONOMY			
Goal: Maui County's economy will be diverse, sustainable, and supportive of community values.	✓		
G. IMPROVE PARKS AND PUBLIC FACILITIES			
Goal: A full range of island-appropriate public facilities and recreational opportunities will be provided to improve the quality of life for residents and visitors.			✓

COUNTYWIDE POLICY PLAN (Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable)	DA	IA	NA
H. DIVERSIFY TRANSPORTATION OPTIONS			
Goal: Maui County will have an efficient, economical, and environmentally sensitive means of moving people and goods.			✓
I. IMPROVE PHYSICAL INFRASTRUCTURE			
Goal: Maui County's physical infrastructure will be maintained in optimum condition and will provide for and effectively serve the needs of the County through clean and sustainable technologies.	✓		
J. PROMOTE SUSTAINABLE LAND USE AND GROWTH MANAGEMENT			
Goal: Community character, lifestyles, economies, and natural assets will be preserved by managing growth and using land in a sustainable manner.	✓		
K. STRIVE FOR GOOD GOVERNANCE			
Goal: Government services will be transparent, effective, efficient, and responsive to the needs of residents.	✓		
L. MITIGATE CLIMATE CHANGE AND WORK TOWARD RESILIENCE			
Goal: Minimize the causes and negative effects of climate change.			✓

The proposed project is directly supportive of the County's goals for protecting the natural environment and preserving local cultures and traditions. The EA prepared for this project thoroughly evaluated the proposed action's potential impacts on the environment, and, where applicable, advances measures aimed at reducing impacts to the environment. The EA is subject to agency and public review and promotes transparency in government decision-making. The proposed action will also benefit native Hawaiian beneficiaries for generations and will provide homestead opportunities, thereby increasing opportunities to experience the natural environment and supports the perpetuation of Hawaiian culture. In addition, the CIA prepared as part of the environmental review process fosters increased knowledge of Native Hawaiian cultural practices, as well as the history of the project area.

Additionally, the proposed action is directly supportive of the County's goal, objective, and policies for a diversified and sustainable economy through the promotion of agriculture, indigenous agricultural practices, and the provision of land to native Hawaiians that is suitable for agricultural use. Furthermore, the DHHL partners with the University of Hawai'i's College of Tropical Agriculture and Human Resources (CTAHR) to provide technical assistance and training to DHHL agricultural lessees, which supports the County's goal for improving informal educational opportunities, enabling DHHL beneficiaries to realize their ambitions.

F. MOLOKA‘I ISLAND COMMUNITY PLAN

The project site is located within the Moloka‘i Island Community Plan region, one (1) of nine (9) community plan regions established in the County of Maui. Each region’s growth and development is guided by a Community Plan. The County’s Community Plan reflects current and anticipated conditions in the region and advances planning goals, objectives, policies, and implementation considerations to guide decision-making in the region. The primary purpose of the Community Plan is to outline a detailed agenda for carrying out these policies and objectives. The Community Plan was adopted by the County of Maui through Ordinance Number 4920, and became effective on October 29, 2018. The Community Plan land use map designates the project sites as “Agriculture”. However, as previously discussed, the lands on which the proposed project will be developed are under the jurisdiction of the DHHL, which has vested authority to develop its lands at its discretion.

The proposed project is consistent with the following goals, policies, and actions of the Moloka‘i Island Community Plan as outline below.

NATURAL RESOURCES

Goal:

Preserve, protect, and manage Moloka‘i’s exceptional natural land and water resources to ensure that future generations may continue to enjoy and protect the island environment.

Objective and Policies:

- *Require all grading and grubbing permits on Molokai to comply with Title 20, Chapter 20.08 MCC.*

- *Ensure the design and construction of new development protect surface water, groundwater, and coastal water quality from nonpoint and point source pollution.*

Discussion and Response: All grading and grubbing permits for the proposed project will comply with Title 20, Chapter 20.08, Maui County Code and all other County regulations. In addition, mitigation measures, such as the use of swales and infiltration trenches will be implemented to prevent runoff or pollution from affecting natural land and water resources for the benefit of future generations.

HERITAGE RESOURCES

Goal:

Moloka‘i’s cultural, historic and archaeological sites, and cultural practices will be protected and perpetuated for their cultural and historical value, and for enjoyment of and sustainable use by future generations.

Policies:

- *Encourage proper management of and appropriate interpretation of significant cultural resources and sites.*
- *Ensure that permits for any project that may affect historic property are provided to SHPD for review, and that SHP’s recommendations are issued as permit conditions.*

Discussion and Response: The CIAs conducted as part of the environmental review process for the proposed project encourages proper management of significant cultural resources and sites, and demonstrates an effort to protect Hawai‘i’s ethnic and cultural heritage. In addition, SHPD has been consulted and the DHHL will comply with SHPD’s recommendations for mitigation.

ECONOMIC DEVELOPMENT

Goal:

- *A stable, balanced, diversified, and sustainable economy, respecting cultural and natural resources, that is compatible with Moloka‘i’s rural island lifestyle.*

Policies:

- *Support the development of agriculture and value-added agricultural products and support traditional systems.*
- *Support subsistence as a sector of Moloka‘i’s economy.*

Discussion and Response: The proposed project will support a more sustainable economy that is compatible with Moloka‘i’s rural island lifestyle. The provision of subsistence agricultural homesteads to DHHL beneficiaries encourages agricultural activity and the subsistence economic sector of Moloka‘i.

LAND USE

Goal:

- *Moloka'i's land use pattern will protect agricultural lands, open space, and natural and cultural resources, and support livable small towns and rural communities.*

- *Consult with and solicit input from community members with generational knowledge, early and often about how to minimize the impact of proposed changes to the use of land on cultural practices, cultural sites, and culturally significant areas, including burials.*

Discussion and Response: The CIAs conducted for this project evaluated the impact of the proposed project on cultural resources and cultural practices. Through the CIA process, community members with generational knowledge of historical and traditional practices of the project area were consulted to assess the cultural impacts of the project. As previously mentioned, SHPD has been consulted to determine impacts on cultural sites, culturally significant areas and burials. The project will comply with all recommended mitigation measures.

GOVERNMENT

Goal:

Government that demonstrates the highest standards of fairness; responsiveness to the needs of the community; fiscal integrity; effectiveness in planning and implementation of programs and projects; a fair and equitable approach to taxation and regulation; and efficient, results-oriented management.

Objective and Policy:

- *Ensure that adequate infrastructure is or will be available to accommodate planned development.*

Discussion and Response: The proposed project will be implemented in an area of Moloka'i serviced by basic infrastructure. The project also involves the building of waterlines to connect the subdivided lots to water infrastructure.

G. COUNTY ZONING

The land underlying the proposed project site is zoned "Agriculture" by the Maui County Zoning Ordinance. Refer to **Figure 4**. The proposed action is consistent with this designation. However, as previously discussed, the lands on which the proposed project

will be developed are under the jurisdiction of the DHHL, which has vested authority to develop its lands at its discretion. The subdivided lots from the proposed project will be maintained for agricultural use.

H. HAWAIʻI COASTAL ZONE MANAGEMENT PROGRAM

The Hawaiʻi Coastal Zone Management Program (HCZMP), as formalized in Chapter 205A, HRS, establishes objectives and policies for the preservation, protection, and restoration of natural resources of Hawaiʻi's coastal zone. Although the subject properties are not within the County of Maui's Special Management Area, the applicability of coastal zone management considerations applies to all lands in the State of Hawaiʻi and, as such, has been reviewed and assessed as follows.

1. Recreational Resources

Objective:

Provide coastal recreational opportunities accessible to the public.

Policies:

a. Improve coordination and funding of coastal recreational planning and management; and

b. Provide adequate, accessible, and diverse recreational opportunities in the coastal zone management area by

i. Protecting coastal resources uniquely suited for recreational activities that cannot be provided in other areas;

ii. Requiring restoration of coastal resources that have significant recreational and ecosystem value, including but not limited to coral reefs, surfing sites, fishponds, sand beaches, and coastal dunes, when these resources will be unavoidably damaged by development; or requiring monetary compensation to the State for recreation when restoration is not feasible or desirable;

iii. Providing and managing adequate public access, consistent with conservation of natural resources, to and along shorelines with recreational value;

iv. Providing an adequate supply of shoreline parks and other recreational facilities suitable for public recreation;

v. Ensuring public recreational uses of county, state, and federally owned or controlled shoreline lands and waters having recreational value consistent with public safety standards and conservation of natural resources;

vi. Adopting water quality standards and regulating point and nonpoint sources of pollution to protect, and where feasible, restore the recreational value of coastal waters;

vii. Developing new shoreline recreational opportunities, where appropriate, such as artificial lagoons, artificial beaches, and artificial reefs for surfing and fishing; and

viii. Encouraging reasonable dedication of shoreline areas with recreational value for public use as part of discretionary approvals or permits by the land use commission, board of land and natural resources, and county authorities; and crediting that dedication against the requirements of section 46-6.

Response: The project sites are located inland and away from the coastline. The proposed action is not anticipated to impact coastal recreational opportunities or affect existing public access to and along the shoreline.

2. Historic Resources

Objective:

Protect, preserve, and, where desirable, restore those natural and manmade historic and prehistoric resources in the coastal zone management area that are significant in Hawaiian and American history and culture.

Policies:

a. Identify and analyze significant archaeological resources;

b. Maximize information retention through preservation of remains and artifacts or salvage operations; and

c. Support state goals for protection, restoration, interpretation, and display of historic resources.

Response: The project sites are not located within the coastal zone management area. However, investigations were conducted to identify and suggest measures to protect archaeological and historic resources. As previously noted, the DHHL will comply with recommended mitigation measures from SHPD.

3. Scenic and Open Space Resources

Objective:

Protect, preserve, and, where desirable, restore or improve the quality of coastal scenic and open space resources.

Policies:

a. Identify valued scenic resources in the coastal zone management area;

b. Ensure that new developments are compatible with their visual environment by designing and locating those developments to minimize the alteration of natural landforms and existing public views to and along the shoreline;

c. Preserve, maintain, and, where desirable, improve and restore shoreline open space and scenic resources; and

d. Encourage those developments that are not coastal dependent to locate in inland areas.

Response: As indicated previously, the project is located inland and not on or near the shoreline. The proposed project will be implemented at the ground-level and will not impede lines of sight to scenic and open space resources. It is not anticipated to adversely impact coastal scenic and open space resources.

4. Coastal Ecosystems

Objective:

Protect valuable coastal ecosystems, including reefs, beaches, and coastal dunes from disruption and minimize adverse impacts on all coastal ecosystems.

Policies:

a. Exercise an overall conservation ethic, and practice stewardship in the protection, use, and development of marine and coastal resources;

b. Improve the technical basis for natural resource management;

c. Preserve valuable coastal ecosystems of significant biological or economic importance, including reefs, beaches, and dunes;

d. Minimize disruption or degradation of coastal water ecosystems by effective regulation of stream diversions, channelization, and similar land and water uses, recognizing competing water needs; and

e. Promote water quantity and quality planning and management practices that reflect the tolerance of fresh water and marine ecosystems and maintain and enhance water quality through the development and implementation of point and nonpoint source water pollution control measures.

Response: The proposed project is located inland, away from coastal ecosystems and is, therefore, not anticipated to have adverse impacts on coastal/shoreline resources, including reefs and marine resources. Appropriate BMPs will be utilized to ensure that construction runoff is appropriately detained, minimizing any impact on coastal waters.

5. Economic Uses

Objective:

Provide public or private facilities and improvements important to the State's economy in suitable locations.

Policies:

a. Concentrate coastal dependent development in appropriate areas;

b. Ensure that coastal dependent development and coastal related development are located, designed, and constructed to minimize exposure to coastal hazards and adverse social, visual, and environmental impacts in the coastal zone management area; and

c. Direct the location and expansion of coastal development to areas designated and used for that development and permit reasonable long-term growth at those areas, and permit coastal development outside of designated areas when:

i. Use of designated locations is not feasible;

ii. Adverse environmental effects and risks from coastal hazards are minimized; and

iii. The development is important to the State's economy.

Response: The proposed project is not a coastal dependent development. The project site is located inland from the shoreline. The proposed project can stimulate economic activity through construction activity and the promotion of agricultural activity. The proposed project does not contravene the objective and policies for economic use.

6. Coastal Hazards

Objective:

Reduce hazard to life and property from coastal hazards.

Policies:

a. Develop and communicate adequate information about the risks of coastal hazards;

b. Control development, including planning and zoning control, in areas subject to coastal hazards;

c. Ensure that developments comply with requirements of the National Flood Insurance Program; and

d. Prevent coastal flooding from inland projects.

Response: According to the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map for the area, the project sites fall within Zone X (shaded), an area of minimal flooding. In addition, the project sites are not located within the tsunami evacuation zone or projected 3.2-foot sea level rise exposure area. Drainage improvements will be designed to ensure that the project will not adversely affect downstream properties from the effects of flooding and erosion. Adverse impacts to hazard-sensitive areas are not anticipated.

7. Managing Development

Objective:

Improve the development review process, communication, and public participation in the management of coastal resources and hazards.

Policies:

a. Use, implement, and enforce existing law effectively to the maximum extent possible in managing present and future coastal zone development;

b. Facilitate timely processing of applications for development permits and resolve overlapping or conflicting permit requirements; and

c. Communicate the potential short and long-term impacts of proposed significant coastal developments early in their life cycle and in terms understandable to the public to facilitate public participation in the planning and review process.

Response: Opportunities for agency and public review of the proposed action are provided pursuant to Chapter 343, HRS. In addition, the DHHL actively engages with its beneficiaries on projects it intends to develop. The public will also have an opportunity to provide comments on the EA during the HHC's review of the document.

8. Public Participation

Objective:

Stimulate public awareness, education, and participation in coastal management.

Policies:

a. Locate new structures inland from the shoreline setback to conserve open space, minimize interference with natural shoreline processes, and minimize loss of improvements due to erosion;

b. Prohibit construction of private erosion-protection structures seaward of the shoreline, except when they result in improved aesthetic and engineering solutions to erosion at the sites and do not interfere with existing recreational and waterline activities;

c. Minimize the construction of public erosion-protection structures seaward of the shoreline;

d. Prohibit private property owners from creating a public nuisance by inducing or cultivating the private property owner's vegetation in a beach transit corridor; and

e. Prohibit private property owners from creating a public nuisance by allowing the private property owner's unmaintained vegetation to interfere or encroach upon a beach transit corridor.

Response: Opportunities for public participation will be provided through the Chapter 343, HRS EA process, as well as during the HHC's review of the EA document.

9. Beach and Coastal Dune Protection

Objectives:

a. Protect beaches and coastal dunes for:

i. Public use and recreation;

ii. The benefit of coastal ecosystems; and

iii. Use as natural buffers against coastal hazards; and

b. Coordinate and fund beach management and protection.

Policies:

a. Locate new structures inland from the shoreline setback to conserve open space, minimize interference with natural shoreline processes, and minimize loss of improvements due to erosion;

b. Prohibit construction of private shoreline hardening structures, including seawalls and revetments, at sites having sand beaches and at sites where shoreline hardening structures interfere with existing recreational and waterline activities;

c. Minimize the construction of public shoreline hardening structures, including seawalls and revetments, at sites having sand beaches and at sites where shoreline hardening structures interfere with existing recreational and waterline activities;

d. Minimize grading of and damage to coastal dunes;

e. Prohibit private property owners from creating a public nuisance by inducing or cultivating the private property owner's vegetation in a beach transit corridor; and

f. Prohibit private property owners from creating a public nuisance by allowing the private property owner's unmaintained vegetation to interfere or encroach upon a beach transit corridor.

Response: The project sites are located inland, away from the shoreline and is not anticipated to impact coastal and shoreline processes.

10. Marine and Coastal Resources

Objective:

Promote the protection, use, and development of marine and coastal resources to assure their sustainability.

Policies:

a. Ensure that the use and development of marine and coastal resources are ecologically and environmentally sound and economically beneficial;

b. Coordinate the management of marine and coastal resources and activities to improve effectiveness and efficiency;

c. Assert and articulate the interests of the State as a partner with federal agencies in the sound management of ocean resources within the United States exclusive economic zone;

d. Promote research, study, and understanding of ocean and coastal processes, impacts of climate change and sea level rise, marine life, and other ocean resources to acquire and inventory information necessary to understand how coastal development activities relate to and impact ocean and coastal resources; and

e. Encourage research and development of new, innovative technologies for exploring, using, or protecting marine and coastal resources.

Response: The project sites are located inland, away from the ocean and is, therefore, not anticipated to have an impact on marine or coastal resources.

IV ALTERNATIVES TO THE PROPOSED ACTION

IV. ALTERNATIVES TO THE PROPOSED ACTION

A. PREFERRED ALTERNATIVE

The preferred alternative is the proposed subdivision of five (5) parcels within the Hoʻolehua area on Molokaʻi into twelve (12) smaller lots, including related improvements described in Chapter I of this document. A contemplated alternative involved the subdivision of two (2) parcels into ten (10) lots. The preferred alternative represents a use which will serve to advance the DHHL efforts to provide additional needed homestead opportunities for their beneficiaries.

The mission of the DHHL is to effectively manage the Hawaiian Home Lands trust and to develop and deliver land to Native Hawaiians. The HHHCA, codified within the constitution of the State of Hawaiʻi, states as its purpose:

> *(a) The Congress of the United States and the State of Hawaii declare that the policy of this Act is to enable native Hawaiians to return to their lands in order to fully support self-sufficiency for native Hawaiians and the self-determination of native Hawaiians in the administration of this Act, and the preservation of the values, traditions, and culture of native Hawaiians.*
>
> *(b) The principal purposes of this Act include but are not limited to:*
>
> *(1) Establishing a permanent land base for the benefit and use of native Hawaiians, upon which they may live, farm, ranch, and otherwise engage in commercial or industrial or any other activities as authorized in this Act;*
>
> *(2) Placing native Hawaiians on the lands set aside under this Act in a prompt and efficient manner and assuring long-term tenancy to beneficiaries of this Act and their successors;*
>
> *(3) Preventing alienation of the fee title to the lands set aside under this Act so that these lands will always be held in trust for continued use by native Hawaiians in perpetuity;*

The proposed project directly supports these stated purposes.

Also as previously discussed, the DHHL Molokaʻi Island Plan (MIP), adopted in 2005 as the comprehensive resource for planning and managing Molokaʻi lands and establishes land use designations to encourage orderly social, physical, and economic development on the island, also provides data from a beneficiary survey conducted in 2004 to assess the preferences of DHHL beneficiaries on Molokaʻi. The results of the survey show that most beneficiaries applying for agricultural and pastoral homesteads indicated a desire to reside on their homesteads. Lessees are allowed to reside on their subsistence

agricultural lots so long as the lands are in active agricultural cultivation. Additionally, the survey indicated a preference for smaller agricultural lots between three (3) to five (5) acres for subsistence or supplemental agricultural use. The proposed project is in line with beneficiary preferences as discussed in the MIP.

Furthermore, the location of the proposed project is in an area of Moloka‘i with agricultural lands of a similar nature and a handful of residential homesteads within a rural agricultural community.

For these reasons, the preferred alternative is considered to be the most viable alternative which meets the stated purposes of DHHL and the HHCA, meets stated preferences of DHHL beneficiaries and which will be developed with adequate infrastructure to complement surrounding land uses.

B. ALTERNATIVE CONFIGURATIONS

In addition to the proposed action, alternative lot configuration options were considered by DHHL. These included configurations consisting of lots of different sizes and locations in the Ho‘olehua area. The preferred alternative represents the most feasible mix of lot sizes and use of developable properties, accommodates the DHHL beneficiary preferences, and is consistent with adjacent agricultural lots. In addition, the locations of the access roads off of Farrington Avenue were reviewed by the State Department of Transportation and provides for safe ingress and egress points given the topography of the land, locations of horizontal and vertical sight distance constraints in the roadway. After reviewing alternative design concepts and costs of development, the lot configuration and product mix selected as the preferred alternative proved to be the optimal option in meeting the goals of the DHHL.

C. NO ACTION ALTERNATIVE

Under the “no action” alternative, the project site would remain “as is”. The “no action” alternative is not considered to be in the best interest of DHHL beneficiaries as the “no action” alternative would not provide new homestead opportunities. The “no action” alternative is in direct conflict with the stated purposes of the DHHL and HHCA. In this context, the proposed project is considered the most appropriate alternative.

D. DEFERRED ACTION ALTERNATIVE

A deferral of the proposed action means that the development proposal would be pursued at a later point in time. The deferral alternative is not considered viable from a project implementation standpoint. The DHHL’s current commitment to planning, design, and construction allows for the project to proceed at this time. Delays in project implementation will likely result in higher development costs and greater uncertainty with respect to

infrastructure systems adequacy. In addition, economic impacts resulting from delays in the project may also result in a longer waiting time for those of the DHHL homestead waiting list thereby not allowing the DHHL to fulfill its mission of providing homestead opportunities for its beneficiaries. The DHHL believes that the project can be viably developed under current market and financing conditions. With this in mind, the “deferred action alternative” is not considered appropriate.

V

SUMMARY OF ADVERSE ENVIRONMENTAL EFFECTS WHICH CANNOT BE AVOIDED

V. SUMMARY OF ADVERSE ENVIRONMENTAL EFFECTS WHICH CANNOT BE AVOIDED

An assessment of construction-related and post construction-related impacts on the physical and socio-economic environment were carried out as part of the environmental assessment documentation process. The proposed development may result in limited, unavoidable construction-related impacts on the environment, as described in Chapter II.

In the short term, construction associated with the proposed project will have a temporary impact on air quality from dust generation and discharge of exhaust from construction equipment during ground altering activities and site grading. Appropriate Best Management Practices will be incorporated to mitigate adverse construction-related impacts including, but not limited to, watering of exposed surfaces, installing dust screens, and regular maintenance of construction equipment.

Construction of the proposed project will also generate unavoidable short-term noise impacts. The use of properly maintained construction equipment will mitigate noise impacts caused by equipment. The incorporation of State Department of Health construction noise limits and curfew times are measures to mitigate noise impacts caused by construction activities.

Furthermore, the State Historic Preservation Division has been consulted for the project and DHHL will implement mitigation measures, as applicable, from SHPD.

In summary, the proposed action is not anticipated to create any significant, long-term adverse environmental effects.

VI

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

VI. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

The proposed action will not entail a substantial commitment of public services or facilities. Existing offsite infrastructure systems have been determined to have adequate capacity to address additional demands generated by the proposed project. Development of the proposed project will involve a commitment of energy, labor, fiscal, and material resources by the DHHL. The use of these resources, when weighed against the expected benefit to be derived from the subsistence agricultural lots to be created and made available for DHHL beneficiaries and the construction-related employment and agricultural activity that will be generated through implementation of the project, is not considered an adverse commitment.

LIST OF PERMITS AND APPROVALS

VII

VII. LIST OF PERMITS AND APPROVALS

The following permits and approvals may be required prior to the implementation of the project:

State of Hawai‘i

1. Chapter 343, Hawai‘i Revised Statutes, Environmental Assessment
2. Chapter 6E, Hawai‘i Revised Statutes, Historic Preservation Compliance
3. Chapter 11-46, Community Noise Control, as applicable
4. Chapter 11-60.1-33, Fugitive Dust, as applicable
5. National Pollutant Discharge Elimination System (NPDES) Permit

County of Maui

1. Construction permits (i.e., grading permits)
2. Lot consolidation and subdivision approval

SIGNIFICANCE CRITERIA ASSESSMENT

VIII

VIII. SIGNIFICANCE CRITERIA ASSESSMENT

The "Significance Criteria", defined in Chapter 11-200.1-13 of the Hawai'i Administrative Rules, were reviewed and analyzed to determine whether the proposed project will have significant impacts to the environment. As defined under Chapter 343, Hawai'i Revised Statutes "significant effect" means the sum of effects on the quality of the environment, including actions that irrevocably commit a natural resource, curtail the range of beneficial uses of the environment, are contrary to the State's environmental policies or long-term environmental goals as established by law, or adversely affect the economic welfare, social welfare, or cultural practices of the community and State. The analysis required to determine whether a proposed action may have a significant effect requires that every aspect of the proposed action, expected primary and secondary consequences, and the cumulative as well as the short-term and long-term effects are evaluated in accordance with the Significance Criteria of Section 11-200.1-13 of the Administrative Rules. The following criteria and analyses are provided.

1. <u>Irrevocably commit a natural, cultural, or historic resource.</u>

There are no known rare, threatened, or endangered species of flora, fauna, avifauna, or important habitats located within the project site. As mentioned previously, an archaeological literature review and field inspection (LRFI) report was conducted in September 2021 and was submitted to the State Historic Preservation Division (SHPD) for review. A supplemental field survey was done in December 2023 and a second archaeological LRFI and field inspection was carried out for the project and submitted in February 2023.

The reports concluded that no historic properties have been previously identified in the project areas or within 500 meters of either project area. The field inspections did not find evidence of historic properties in or near Parcel 31. However, two (2) terrace alignments were identified on the eastern parcel, Parcel 14. Due to the lack of historic properties and previous pineapple cultivation, it was determined that there is no potential for archaeological historical properties on this parcel. The potential archaeological historic properties in or near Parcel 14 is limited to the two (2) terrace alignments. The 2021 LRFI report recommended that mitigation measures, including avoidance and protection of terrace alignments for their passive preservation are implemented. The SHPD concurred with the assessment and mitigation measures for Parcels 14 and 31. The DHHL will continue consultation with the SHPD for parcels 3, 16 and 17. In addition, Cultural Impact Assessments (CIA) for the project was also prepared and did not identify ongoing cultural practices in the project area, specifically. Furthermore, recommendations and mitigation from the CIA will be implemented, such as avoidance of significant cultural sites and establishment of protocol for addressing potential inadvertent cultural finds or burials.

With the implementation of recommended mitigation measures identified through cultural and archaeological consultation and investigations, the proposed project is not anticipated to involve an irrevocable commitment to loss or destruction of any natural, cultural, or historic resources.

2. Curtail the range of beneficial uses of the environment.

The proposed action will be implemented on lands designated for agriculture, adjacent to existing agricultural lots and homesteads of a similar nature, and the commitment of land resources for the proposed action will not curtail the range of beneficial uses of the environment. The proposed use of the sites for subsistence agricultural lots is compatible with surrounding uses.

3. Conflict with the State's environmental policies or long-term environmental goals established by law.

The proposed action does not conflict with the policies and guidelines of Chapter 343, HRS. An environmental assessment (EA) has been carried out to ensure the proposed project will not have adverse impacts on the environmental resources. While this project may cause temporary adverse impacts related to construction activities, based on the analysis conducted and mitigation measures presented in this EA, the adverse impacts are not anticipated to be significant.

Where mitigation measures are required due to potential impacts attributed to the project, DHHL will implement those applicable measures to further reduce adverse impacts.

4. Have a substantial adverse effect on the economic welfare, social welfare, or cultural practices of the community and State.

The proposed action will have a beneficial effect on the local economy during the short and long term. As previously discussed, positive economic and social impacts are anticipated as a result of the project, including construction-related jobs and by encouraging sustainable agricultural activity. In addition, CIAs were prepared for the project and noted that based on historical research and consultation, there is evidence of cultural practices for Hawaiian rights for agricultural pursuits, access to resources, and other customary activities presently occurring in the vicinity of the proposed project. As previously mentioned, mitigation measures will be implemented to protect and preserve cultural beliefs, practices, and resources of Native Hawaiians and other ethnic groups.

5. Have a substantial adverse effect on public health.

The project is not anticipated to result in long-term air or noise impacts. Furthermore, the proposed action is not anticipated to create significant direct or

indirect foreseeable greenhouse gas (GHG) emissions, and does not fall within the threshold of mandatory GHG reporting. As such, no adverse impact to public health or welfare is anticipated as a result of the proposed action.

6. Involve adverse secondary impacts, such as population changes or effect on public facilities.

The proposed project will provide needed additional homestead lots on Molokaʻi for DHHL beneficiaries. Beneficiaries of these subsistence agricultural homesteads are expected to relocate from other areas on Molokaʻi. As such, the project is not anticipated to involve substantial secondary impacts due to population change. Secondary impacts on public facilities are not anticipated.

The DHHL will provide the necessary onsite and offsite infrastructure to support the proposed project. No substantial changes or effects on public facilities are expected with project implementation.

While DHHL is not subject to State or County land use plans and regulations, it is noted that this development is in line with County long-range development and population growth projections.

7. Involve a substantial degradation of environmental quality.

No substantial degradation of environmental quality resulting from the action is anticipated. Best Management Practices (BMPs) and appropriate erosion control measures will be utilized during the construction period. Drainage system improvements will be constructed in accordance with applicable regulatory design standards to ensure that surface runoff will not have an adverse effect on adjacent or downstream properties.

Any potential short-term impacts to air and noise quality during the construction phase of the project, will be mitigated through employing BMPs. In the long term, the project will not adversely impact air quality and ambient noise.

8. Be individually limited but cumulatively have substantial adverse effect upon the environment or involves a commitment for larger actions.

The proposed action is limited to the subdivision of the proposed ten (10) subsistence agricultural lots, and development of access driveways and waterline improvements. The project is not a phase or increment of a larger total undertaking; a necessary precedent for a larger project; or a commitment to some larger project. The proposed project will stand on its own and is not reliant upon or a trigger for any other development. The cumulative impacts of the proposed project, together with other reasonably foreseeable actions, will include infrastructural demands, but this will not have a considerable effect on the

environment. The DHHL will provide the necessary infrastructure to serve the proposed project. Drainage, water, and roadway improvements will be designed to meet applicable local, State, and Federal regulations. The engineering report prepared for the proposed project has assessed potential impacts and designed infrastructure systems in the context of future planned regional growth. Given the foregoing, the proposed project is not anticipated to cumulatively have considerable effect upon the environment, nor does it involve a commitment for larger actions.

9. Have a substantial adverse effect on a rare, threatened, or endangered species, or its habitat.

No rare, threatened, or endangered species of flora, fauna, avifauna, or important habitats are anticipated to be present in the vicinity of the project area. Nonetheless, BMPs will be implemented to minimize harm to potential rare, threatened or endangered species which may be present in the project area. The project site is located adjacent to disturbed agricultural lots of a similar nature. The project is not anticipated to substantially affect rare, threatened, or endangered species, or its habitat.

10. Have a substantial adverse effect on air or water quality or ambient noise levels.

Construction activities will result in short-term air quality and noise impacts. BMPs, including erosion control and dust control measures (such as regular watering and sprinkling and installation of dust screens and timely revegetation of graded areas), will be implemented to minimize wind-blown emissions. In the short term, noise impacts will occur primarily from construction equipment. Equipment mufflers or other noise attenuating equipment, as well as proper vehicle maintenance and limiting construction to daylight hours, will be used during construction activities. Construction noise impacts will be mitigated through compliance with the provisions of the State of Hawai‘i, DOH Administrative Rules Title 11, Chapter 46, “Community Noise Control.” These rules require a noise permit if the noise levels from construction activities are expected to exceed the allowable levels set forth in Chapter 46. In the long term, the proposed subsistence agricultural lots are not anticipated to significantly impact ambient noise levels.

As such, with implementation of foregoing mitigation measures, the proposed project is not anticipated to detrimentally affect air or water quality or ambient noise levels.

11. Have a substantial adverse effect on or be likely to suffer damage by being located in an environmentally sensitive area such as a flood plain, tsunami zone, sea level rise exposure area, beach, erosion-prone area, geologically hazardous land, estuary, fresh water, or coastal waters.

The project site is situated inland and is not anticipated to have any adverse impact upon coastal waters or resources, beaches, estuaries, or other fresh water bodies.

According to the Federal Emergency Management Agency's Flood Insurance Rate Maps currently in effect, the project site falls within Zone X (unshaded), an area of minimal flooding. The project site is located outside of the tsunami inundation zone. In addition, the project site is located outside of the 3.2-foot projected sea level rise exposure area.

Drainage improvements will be designed to mitigate runoff in accordance with County drainage and stormwater rules and regulations. During construction, recommended BMPs will be implemented for erosion and sedimentation control to minimize potential impacts to water quality.

12. Have a substantial adverse effect on scenic vistas and viewplanes, day or night, identified in county or state plans or studies.

The proposed project has been designed to complement the surrounding rural agricultural community of Hoʻolehua. Careful consideration has been given during the planning process to formulate a site plan that is both sensitive and appropriate to Hoʻolehua by maintaining the lands for agricultural use.

13. Require substantial energy consumption or emit substantial greenhouse gasses.

The proposed action will involve the short-term commitment of fuel for equipment, vehicles, and machinery during construction activities. However, this use is not anticipated to result in a substantial consumption of energy resources or substantial emission of greenhouse gasses. In the long term, the project will create an additional demand for electricity. However, this demand will not be substantially or excessively more than the energy consumed by similar homesteads throughout the region.

The project's technical characteristics and related impact considerations were thoroughly evaluated by the DHHL and the HHC. In accordance with HAR, Section 11-200.1-13, "Significance Criteria" every phase of the proposed action, the anticipated impacts, both primary and secondary, and the cumulative as well as the short-term and long-term effects of the action were considered. The analysis contained in this EA was supported through in-depth technical studies that were prepared by qualified professionals, and which were then reviewed by agencies having jurisdiction and expertise in their respective fields of authority.

Each section of the EA included a discussion and analysis of the impacts related to the respective environmental, infrastructural, public services and socio-economic parameters. While this project may cause impacts, based on the analysis conducted in the EA, the impacts are not anticipated to be significant. Where mitigation measures are required due to potential impacts attributed to the project, DHHL will implement those applicable measures to further reduce adverse impacts. Furthermore, the project will also result in positive impacts for DHHL beneficiaries, many of whom are long-time Molokaʻi residents seeking homestead opportunities for themselves and their families.

In summary, the project site is situated amongst agricultural lands and homesteads. This project will be developed in an area with existing infrastructure systems, and will not extend County service areas. The proposed project is not anticipated to have a significant adverse impact on the physical, cultural and socio-economic environments. Based on the preceding analysis in this EA document, and in accordance with the significance criteria set forth in 11-200.1-13, HAR, the proposed project is anticipated to qualify for a finding of no significant impact (AFNSI).

IX

PARTIES CONSULTED DURING THE PREPARATION OF THE DRAFT ENVIRONMENTAL ASSESSMENT; LETTERS RECEIVED AND RESPONSES TO SUBSTANTIVE COMMENTS

IX. PARTIES CONSULTED DURING THE PREPARATION OF THE DRAFT ENVIRONMENTAL ASSESSMENT; LETTERS RECEIVED AND RESPONSES TO SUBSTANTIVE COMMENTS

The following agencies were consulted during preparation of the Draft Environmental Assessment (EA). It is noted that initial consultation proposed improvements to TMKs (2)5-2-005:031 and (2)5-2-026:014. Additional consultation was conducted to include TMKs (2)5-2-026:003, 016, and 017. Agency comments and responses to substantive comments are included herein.

2021 AGENCIES CONSULTED

Federal Agencies

1. Ms. Linda Speerstra, Chief
U.S. Department of the Army
U.S. Army Engineer District
Regulatory Branch, Bldg. 230
Fort Shafter, HI 96858-5440
(CEPOH-RO@usace.army.mil)

2. Mr. Larry Yamamoto, State Conservationist
Natural Resources Conservation Service
U.S. Department of Agriculture
P.O. Box 50004
Honolulu, HI 96850-0001

3. Ms. Chelsie Javar-Salas, Acting Island Team Leader
U.S. Fish and Wildlife Service
300 Ala Moana Blvd., Rm. 3-122
Honolulu, HI 96850

State Agencies

4. Ms. Patti Kitkowski, District Environmental Health Program Chief
State of Hawai‘i
Department of Health
Maui Sanitation Branch
54 South High Street, Room 300
Wailuku, HI 96793

5. Mr. Jade Butay, Director
State of Hawai‘i
Department of Transportation
869 Punchbowl Street
Honolulu, HI 96813

6. Dr. Sylvia Hussey, Chief Executive Officer State of Hawai'i
Office of Hawaiian Affairs
560 N. Nimitz Highway, Suite 200
Honolulu, HI 96817

7. Dr. Elizabeth Char, PhD., Director
State of Hawai‘i
Department of Health
1250 Punchbowl St., Room 325
Honolulu, HI 96813

8. Mr. Curt Otaguro, Comptroller
State of Hawai‘i
Dept. of Accounting and General Services
1151 Punchbowl Street, #426
Honolulu, HI 96813

9. Ms. Phyllis Shimabukuro-Geiser, Chair
State of Hawai‘i
Department of Agriculture
1428 South King Street
Honolulu, HI 96814-2512

10. Ms. Suzanne Case, Chairperson
State of Hawai‘i
Dept. of Land and Natural Resources
P. O. Box 621
Honolulu, HI 96809

11. Ms. Mary Alice Evans, Director
State of Hawai‘i
Office of Planning and Sustainable Development
P. O. Box 2359
Honolulu, HI 96804

Maui County Agencies

12. Mr. Eric Nakagawa, Director
County of Maui
Department of Environmental Management
2050 Main Street, Suite 2B
Wailuku, HI 96793

13. Brad Ventura, Chief
County of Maui
Department of Fire and Public Safety
200 Dairy Road
Kahului, HI 96732

14. Ms. Lori Tsuhako, Director
County of Maui
Dept. of Housing and Human Concerns
2200 Main Street, Suite 546
Wailuku, HI 96793

15. Ms. Karla Peters, Director
County of Maui
Department of Parks and Recreation
700 Halia Nakoa Street, Unit 2F
Wailuku, HI 96793

16. Mr. Dean Rickard, Acting Chief
County of Maui
Maui Police Department
55 Mahalani Street
Wailuku, HI 96793

17. Ms. Michele Chouteau McLean, Director
County of Maui
Department of Planning
2200 Main Street, Suite 315
Wailuku, HI 96793

18. Ms. Rowena Dagdag-Andaya, Director
County of Maui
Department of Public Works
200 South High Street
Wailuku, HI 96793

19. Mr. Marc Takamori, Director
County of Maui
Department of Transportation
110 Ala‘ihi Street, Suite 210
Kahului, HI 96732

20. Mr. Jeffrey Pearson, Director
County of Maui
Department of Water Supply
200 South High Street, 5th Floor
Wailuku, HI 96793

21. Honorable Keani Rawlins-Fernandez
Maui County Council
200 South High Street
Wailuku, HI 96793

Maui County Organizations

22. Mr. Marc Prince, Supervisor
Hawaiian Electric
P.O. Box 398
Kahului, HI 96733

23. Mr. Ke‘eaumoku Kapu, Po‘o
Aha Moku o Maui Inc.
(kapukapuakea@gmail.com)

24. Ms. Blossom Feiteira
Maui Mokupuni Council
(blossom96708@yahoo.com)

25. Ms. Lily Napoleon, President
Nā‘iwa Homestead Association
(mkk.naiwa.ha@gmail.com)

26. Ms. Cora Schnackenberg, President
Ahonui Homestead Association
P.O. Box 417
Hoʻolehua, HI 96729

27. Mr. Robert “Bob” Danner, President
Hoʻolehua Homestead Agriculture
Association
P.O. Box 60
Hoʻolehua, HI 96729

28. Ms. Rosie Davis
Molokaʻi Homestead Farmers Alliance
P.O. Box 290613
Hoʻolehua, HI 96729

29. Ms. Beverly Pauʻole-Moore
Molokaʻi Hawaiian Home Lands
Kupuna Committee
P.O. Box 290613
Hoʻolehua, HI 96729

2023 AGENCIES CONSULTED

Federal Agencies

1. Gerald Gregory, District Conservationist
U.S. Department of Agriculture
Natural Resources Conservation Service
77 Hoʻokele Street, Suite 202
Kahului, Hawaiʻi 96732

2. U.S. Department of the Army
U.S. Army Engineer District Regulatory Branch, Bldg. 230
Fort Shafter, Hawaiʻi 96858-5440
(CEPOH-RO@usace.army.mil)

3. U.S. Department of the Interior
Fish and Wildlife Service
Pacific Islands Fish and Wildlife Office
300 Ala Moana Boulevard, Room 3-122
Honolulu, Hawaiʻi 96850
(pifwo_admin@fws.gov)

State of Hawaiʻi Agencies

4. Keith Regan, Comptroller
State of Hawaiʻi
Dept. of Accounting and General Services
1151 Punchbowl Street, #426
Honolulu, Hawaiʻi 96813

5. Sharon Hurd, Chair
State of Hawaiʻi
Department of Agriculture
1428 South King Street
Honolulu, Hawaiʻi 96814-2512

6. Kenneth S. Fink, Director
State of Hawaiʻi
Department of Health
1250 Punchbowl St., Room 325
Honolulu, Hawaiʻi 96813

7. Dawn N.S. Chang, Chairperson
State of Hawaiʻi
Dept. of Land and Natural Resources
P. O. Box 621
Honolulu, Hawaiʻi 96809
(dlnr@hawaii.gov and dlnr.land@hawaii.gov)

8. Edwin H. Sniffen, Director
State of Hawaiʻi
Department of Transportation
869 Punchbowl Street
Honolulu, HawaiʻI 96813-5097

9. Colin Kippen, Interim Chief Executive Officer
State of Hawai'i
Office of Hawaiian Affairs
560 N. Nimitz Highway, Suite 200
Honolulu, Hawaiʻi 96817

10. Mary Alice Evans, Acting Director
State of Hawaiʻi
Office of Planning and Sustainable Development
P. O. Box 2359
Honolulu, Hawaiʻi 96804

Maui County Agencies

11. Rogerine “Kali” Arce, Director
County of Maui
Department of Agriculture
200 S. High Street
Wailuku, Hawaiʻi 96793

12. Shayne Agawa, P.E., Director
County of Maui
Department of Environmental Management
2145 Kaohu Street, Suite 102
Wailuku, Hawaiʻi 96793

13. Brad Ventura, Chief
County of Maui
Department of Fire and Public Safety
200 Dairy Road
Kahului, Hawai'i 96732

14. Lori Tsuhako, Director
County of Maui
Department of Housing and Human Concerns
2200 Main Street, Suite 546
Wailuku, Hawai'i 96793

15. Patrick McCall, Director
County of Maui
Department of Parks and Recreation
700 Halia Nakoa Street, Unit 2F
Wailuku, Hawai'i 96793

16. Kathleen Ross Aoki, Director
County of Maui
Department of Planning
2200 Main Street, Suite 315
Wailuku, Hawai'i 96793

17. Jordan Molina, Director
County of Maui
Department of Public Works
200 South High Street, 4th Floor
Wailuku, Hawai'i 96793

18. Marc Takamori, Director
County of Maui
Department of Transportation
110 Ala'ihi Street, Suite 210
Kahului, Hawai'i 96732

19. John Stufflebean, Director
County of Maui
Department of Water Supply
200 S. High Street, 5th Floor Wailuku,
Hawai'i 96793

20. Darryl Oliveira, Interim Director County of Maui
Maui Emergency Management Agency
200 S. High Street, 1st Floor
Wailuku, Hawai'i 96793

21. Keani Rawlins-Fernandez, Council Vice Chair
Maui County Council
200 S. High Street, 8th Floor Wailuku,
Hawai'i 96793

22. John Pelletier, Chief
County of Maui
Maui Police Department
55 Mahalani Street
Wailuku, Hawai'i 96793

Maui County Organizations

23. Ke'eaumoku Kapu, CEO
'Aha Moku O Maui
(kapukapuakea@gmail.com)

24. Cora Schnackenberg, President
Ahonui Homestead Association
P.O. Box 417
Ho'olehua, Hawai'i 96729

25. Marc Grider, Manager, Engineering
Hawaiian Electric Company, Inc.
P.O. Box 398
Kahului, Hawai'i 96733

26. Robert "Bob" Danner, President
Ho'olehua Homestead Agriculture Association
P.O. Box 60
Ho'olehua, Hawai'i 96729

27. Blossom Feiteira
Maui Mokupuni Council
(blossom96708@yahoo.com)

28. Beverly Pau'ole-Moore
Moloka'i Hawaiian Home Lands Kupuna Committee
P.O. Box 290613
Ho'olehua, Hawai'i 96729

29. Rosie Davis
Moloka'i Homestead Farmers Alliance
P.O. Box 290613
Ho'olehua, Hawai'i 96729

30. Molokaʻi Nāʻiwa Homestead Association
P.O. Box 482152
Kaunakakai, Hawaiʻi 96748
(mkk.naiwa.ha@gmail.com)

From: Morgan, Jeremy K CIV USARMY CEPOH (USA) <Jeremy.K.Morgan@usace.army.mil>
Sent: Tuesday, September 19, 2023 4:26 PM
To: General eMail
Subject: Early consultation comments on the proposed Department of Hawaiian Home Lands' Hoʻolehua Scattered Lots Subdivision and Related Improvements

Aloha Emily Murai,

The US Army Corps of Engineers (Corps) received your request for comments on the proposed Hoʻolehua Scattered Lots Subdivision and Related Improvements project located in Hoʻolehua, Island of Molokaʻi, Hawaii. After review of the provided information, it appears that a Corps permit may not be required for the proposed work. However, there appears to be a streambed present on the Southwest corner of parcel (2)5-2-026:017 (Parcel 17). If this streambed or potential wetlands would be affected, you should reach out to us because a Corps permit may be required.

The Corps' regulatory authorities are based on Section 10 of the Rivers and Harbors Act (RHA) of 1899 and Section 404 of the Clean Water Act. Section 10 of the RHA of 1899 prohibits the obstruction or alteration of any navigable water of the U.S. (WOTUS) without a Department of the Army (DA) permit. Section 404 of the Clean Water Act prohibits the discharge of dredged or fill material into WOTUS without a DA permit. For projects that are being developed, we ask that you identify areas that may fall within the Corps jurisdiction as WOTUS such as streams, rivers, and wetlands.

If you determine that the proposed project would involve a discharge of fill into WOTUS and a permit is needed from the Corps, then we would require an application to be provided. We must also evaluate the project for any impacts to resources such as threatened or endangered species, historic properties, and/or essential fish habitat, and consult if necessary. If applying for a permit, include detailed plans/drawings of the proposed project where streams or wetlands are present. Include a clear line indicating the ordinary high water mark (OHWM) in your plans and also include the amount and type of fill that would be placed below the OHWM.

A permit is not required if all work being done is located in uplands.

Please visit https://www.poh.usace.army.mil/Missions/Regulatory/Permits/Nationwide-Permits/ to find more information about our program and to apply for a permit. Email permit applications to CEPOH-RO@usace.army.mil, as we have gone paperless.

Feel free to contact me with any further questions.

Mahalo,

Jeremy Morgan
Biologist
Regulatory Office
U.S. Army Corps of Engineers
Honolulu District
Building 252 Fort Shafter, HI 96858-5440
Phone: (808) 835-4308
Jeremy.K.Morgan@usace.army.mil

MUNEKIYO HIRAGA
Planning. Project Management. Sustainable Solutions.

Karlynn K. Fukuda
PRESIDENT
Mark Alexander Roy AICP, LEED AP
VICE PRESIDENT
Tessa Munekiyo Ng AICP
VICE PRESIDENT

Michael T. Munekiyo AICP
FOUNDER

September 20, 2024

Via email: jeremy.k.morgan@usace.army.mil

Jeremy Morgan, Biologist
U.S. Army Corps of Engineers
Honolulu District
Building 252
Fort Shafter, Hawai'i 96858

SUBJECT: Response to Comments Regarding the State of Hawai'i, Department of Hawaiian Home Lands Proposed Ho'olehua Scattered Lots Project, Ho'olehua, Moloka'i

Dear Mr. Morgan:

Thank you for your email dated September 19, 2023, regarding the Proposed Ho'olehua Scattered Lots Project. On behalf of the Department of Hawaiian Home Lands (DHHL), we offer the following information in response to the comments received.

- We acknowledge that there is a streambed present at the southwest corner of Tax Map Key (TMK) (2)5-2-026:01 (Parcel 17). However, the proposed project is not anticipated to affect the streambed or wetlands. DHHL will inform the beneficiaries who are awarded lots within Parcel 17, that no work may occur within the unnamed riverine or streambed. It is also noted that the terrain in the area of the stream bed and riverine are steep, and as such, would not be suitable for farming activities.

- We acknowledge that a DA permit is required should there be any obstruction or alteration of any navigable water of the United States. As previously mentioned, the stream bed is located at the southwest corner of Parcel 17, however, no work is proposed within the stream.

- Thank you for the information related to the need for a permit from the Corps. As previously noted, no work is proposed in the vicinity of the stream bed on Parcel 17. In addition, a stream setback will be notated on the subdivision map to discourage lessees from working in that area.

Thank you again for your participation in the Chapter 343, Hawai‘i Revised Statutes environmental review process. A copy of your email and this response will be included in the Draft Environmental Assessment being prepared for this project. Should you have any questions or need additional information, please feel free to contact me at (808) 983-1233.

Very truly yours,

Emily Y.K. Murai
Associate

EYKM:ab
cc: Neil Nugent, Department of Hawaiian Home Lands
Gordon Ring, R.M. Towill Corporation
\\MH03\Drive_F\DATA\SOH DHHL\Hoolehua Scattered Lots\Apps\0ECL\2023-Resp Ltrs\USACE.docx

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Pacific Islands Fish and Wildlife Office
300 Ala Moana Boulevard, Room 3-122
Honolulu, Hawai‘i 96850

In Reply Refer To:
01EPIF00-2022-TA-0062

November 5, 2021

Bryan Esmeralda
Munekiyo Hiraga
305 High Street, Suite 104
Wailuku, Hawai‘i 96793

Subject: Response to Request for Technical Assistance on the Department of Hawaiian Homelands' Proposed Ho‘olehua Scattered Lots Subdivision, Moloka‘i

Thank you for your recent correspondence requesting technical assistance on species biology, habitat, or life requisite requirements. The Pacific Islands Fish and Wildlife Office (PIFWO) of the U.S. Fish and Wildlife Service (Service) appreciates your efforts to avoid or minimize effects to protected species associated with your proposed actions. We provide the following information for your consideration under the authorities of the Endangered Species Act (ESA) of 1973 (16 U.S.C. 1531 *et seq*.), as amended.

Due to significant workload constraints, PIFWO is currently unable to specifically address your information request. The table below lists the protected species most likely to be encountered by projects implemented within the Hawaiian Islands. Based on your project location and description, we have noted the species most likely to occur within the vicinity of the project area, in the '**Occurs In or Near Project Area'** column. Please note this list is not comprehensive and should only be used for general guidance. We have added to the PIFWO website, located at https://www.fws.gov/pacificislands/promo.cfm?id=177175840 recommended conservation measures intended to avoid or minimize adverse effects to these federally protected species and best management practices to minimize and avoid sedimentation and erosion impacts to water quality. If your project occurs on the island of Hawai‘i, we have also enclosed our biosecurity protocol for activities in or near natural areas.

If you are representing a federal action agency, please request an official species list following the instructions at our PIFWO https://www.fws.gov/pacificislands/articles.cfm?id=149489558. You can find out if your project occurs in or near designated critical habitat here: https://ecos.fws.gov/ipac/.

Under the ESA, it is the Federal agency's (or their non-Federal designee) responsibility to make the determination of whether or not the proposed project "may affect" federally listed species or designated critical habitat. A "may affect, not likely to adversely affect" determination is appropriate when effects to federally listed species are expected to be discountable (i.e., unlikely to occur), insignificant (minimal in size), or completely beneficial. This conclusion requires written concurrence from the Service. If a "may affect, likely to adversely affect" determination is made, then the Federal agency must initiate formal consultation with the Service. Projects that are determined to have "no effect" on federally listed species and/or critical habitat do not require additional coordination or consultation.

Implementing the avoidance, minimization, or conservation measures for the species that may occur in your project area will normally enable you to make a "may affect, not likely to adversely affect" determination for your project. If it is determined that the proposed project may affect federally listed species, we recommend you contact our office early in the planning process so that we may assist you with the ESA compliance. If the proposed project is funded, authorized, or permitted by a Federal agency, then that agency should consult with us pursuant to section 7(a)(2) of the ESA. If no Federal agency is involved with the proposed project, the applicant should apply for an incidental take permit under section 10(a)(1)(B) of the ESA. A section 10 permit application must include a habitat conservation plan that identifies the effects of the action on listed species and their habitats and defines measures to minimize and mitigate those adverse effects.

We appreciate your efforts to conserve endangered species. We regret that we cannot provide you with more specific protected species information for your project site. If you have questions that are not answered by the information on our website, you can contact PIFWO at (808) 792-9400 and ask to speak to the lead biologist for the island where your project is located.

Sincerely,

CADE LONDON

Digitally signed by CADE LONDON
Date: 2021.11.05 21:01:44 -04'00'

Acting Island Team Manager
Pacific Islands Fish and Wildlife Office

Enclosures (3): Federal Status of Animal Species
Federal Status of Plant Species
Aquatic Best Management Practices

The table below lists the protected species most likely to be encountered by projects implemented within the Hawaiian Islands. For your guidance, we have marked species that may occur in the vicinity of your project, this list is not comprehensive and should only be used for general guidance.

Enclosure 1. Federal Status of Animal Species

Scientific Name	Common Name / Hawaiian Name	Federal Status	May Occur In Project Area
Mammals			
Lasiurus cinereus semotus	Hawaiian hoary bat/‘ōpe‘ape‘a	E	☒
Reptiles			
Chelonia mydas	green sea turtle/honu - Central North Pacific distinct population segment (DPS)	T	☐
Eretmochelys imbricata	hawksbill sea turtle/ honu ‘ea or ‘ea	E	☐
Birds			
Anas wyvilliana	Hawaiian duck/koloa	E	☐
Branta sandvicensis	Hawaiian goose/nēnē	T	☐
Fulica alai	Hawaiian coot/‘alae ke‘oke‘o	E	☒
Gallinula galeata sandvicensis	Hawaiian gallinule/‘alae ‘ula	E	☐
Himantopus mexicanus knudseni	Hawaiian stilt/ae‘o	E	☒
Oceanodroma castro	band-rumped storm-petrel Hawai‘i DPS/‘akē‘akē	E	☒
Pterodroma sandwichensis	Hawaiian petrel/‘ua‘u	E	☒
Puffinus auricularis newelli	Newell’s shearwater/‘a‘o	T	☒
Ardenna pacificus	wedge-tailed shearwater/‘ua‘u kani	MBTA	☐
Buteo solitarius	Hawaiian hawk/‘io	MBTA	☐
Gygis alba	white tern/manu-o-kū	MBTA	☐
Insects			
Manduca blackburni	Blackburn’s sphinx moth	E	☒
Megalagrion pacificum	Pacific Hawaiian damselfly	E	☐
Megalagrion xanthomelas	orangeblack Hawaiian damselfly	E	☐
Megalagrion nigrohamatum nigrolineatum	blackline Hawaiian damselfly	E	☐

Enclosure 2. Federal Status of Plant Species

Plants				
Scientific Name	**Common Name or Hawaiian Name**	**Federal Status**	**Locations**	**May Occur In Project Area**
Abutilon menziesii	koʻoloaʻula	E	O, L, M, H	☐
Achyranthes splendens var. *rotundata*	ʻewa hinahina	E	O	☐
Bonamia menziesii	no common name	E	K, O, L, M, H	☐
Canavalia pubescens	ʻāwikiwiki	E	Ni, K, L, M	☐
Colubrina oppositifolia	kauila	E	O, M, H	☐
Cyperus trachysanthos	puʻukaʻa	E	K, O	☐
Gouania hillebrandii	no common name	E	Mo, M	☐
Hibiscus brackenridgei	maʻo hau hele	E	O, Mo, L, M, H	☐
Ischaemum byrone	Hilo ischaemum	E	K, O, Mo, M, H	☐
Isodendrion pyrifolium	wahine noho kula	E	O, H	☐
Marsilea villosa	ʻihiʻihi	E	Ni, O, Mo	☐
Mezoneuron kavaiense	uhiuhi	E	O, H	☐
Nothocestrum breviflorum	ʻaiea	E	H	☐
Panicum fauriei var. *carteri*	Carter's panicgrass	E	Molokini Islet (O), Mo	☐
Panicum niihauense	lauʻehu	E	K	☐
Peucedanum sandwicense	makou	E	K, O, Mo, M	☐
Pleomele (Chrysodracon) hawaiiensis	halapepe	E	H	☐
Portulaca sclerocarpa	ʻihi	E	L, H	☐
Portulaca villosa	ʻihi	E	Le, Ka, Ni, O, Mo, M, L, H, Nihoa	☐
Pritchardia affinis (maideniana)	loulu	E	H	☐
Pseudognaphalium sandwicensium var. *molokaiense*	ʻenaʻena	E	Mo, M	☐
Scaevola coriacea	dwarf naupaka	E	Mo, M	☐
Schenkia (*Centaurium*) *sebaeoides*	ʻāwiwi	E	K, O, Mo, L, M	☐
Sesbania tomentosa	ʻōhai	E	Ni, Ka, K, O, Mo, M, L, H, Necker, Nihoa	☐
Tetramolopium rockii	no common name	T	Mo	☐
Vigna o-wahuensis	no common name	E	Mo, M, L, H, Ka	☐

Location key: O=Oʻahu, K=Kauaʻi, M=Maui, H=island of Hawaiʻi, L=Lānaʻi, Mo=Molokaʻi, Ka=Kahoʻolawe, Ni=Niʻihau, Le=Lehua

Enclosure 3.

U.S. Fish and Wildlife Service
Recommended Standard Best Management Practices

The U.S. Fish and Wildlife Service (USFWS) recommends the following measures to be incorporated into project planning to avoid or minimize impacts to fish and wildlife resources. Best Management Practices (BMPs) include the incorporation of procedures or materials that may be used to reduce either direct or indirect negative impacts to aquatic habitats that result from project construction-related activities. These BMPs are recommended in addition to, and do not over-ride any terms, conditions, or other recommendations prepared by the USFWS, other federal, state or local agencies. If you have questions concerning these BMPs, please contact the USFWS Aquatic Ecosystems Conservation Program at 808-792-9400.

1. Authorized dredging and filling-related activities that may result in the temporary or permanent loss of aquatic habitats should be designed to avoid indirect, negative impacts to aquatic habitats beyond the planned project area.

2. Dredging/filling in the marine environment should be scheduled to avoid coral spawning and recruitment periods, and sea turtle nesting and hatching periods. Because these periods are variable throughout the Pacific islands, we recommend contacting the relevant local, state, or federal fish and wildlife resource agency for site specific guidance.

3. Turbidity and siltation from project-related work should be minimized and contained within the project area by silt containment devices and curtailing work during flooding or adverse tidal and weather conditions. BMPs should be maintained for the life of the construction period until turbidity and siltation within the project area is stabilized. All project construction-related debris and sediment containment devices should be removed and disposed of at an approved site.

4. All project construction-related materials and equipment (dredges, vessels, backhoes, silt curtains, etc.) to be placed in an aquatic environment should be inspected for pollutants including, but not limited to; marine fouling organisms, grease, oil, etc., and cleaned to remove pollutants prior to use. Project related activities should not result in any debris disposal, non-native species introductions, or attraction of non-native pests to the affected or adjacent aquatic or terrestrial habitats. Implementing both a litter-control plan and a Hazard Analysis and Critical Control Point plan (HACCP – see https://www.fws.gov/policy/A1750fw1.html) can help to prevent attraction and introduction of non-native species.

5. Project construction-related materials (fill, revetment rock, pipe, etc.) should not be stockpiled in, or in close proximity to aquatic habitats and should be protected from erosion (*e.g.*, with filter fabric, etc.), to prevent materials from being carried into waters by wind, rain, or high surf.

6. Fueling of project-related vehicles and equipment should take place away from the aquatic environment and a contingency plan to control petroleum products accidentally spilled during the project should be developed. The plan should be retained on site with the person

responsible for compliance with the plan. Absorbent pads and containment booms should be stored on-site to facilitate the clean-up of accidental petroleum releases.

7. All deliberately exposed soil or under-layer materials used in the project near water should be protected from erosion and stabilized as soon as possible with geotextile, filter fabric or native or non-invasive vegetation matting, hydro-seeding, etc.

From: Javar-Salas, Chelsie <chelsie_javar-salas@fws.gov>
Sent: Monday, September 11, 2023 9:13 AM
To: General eMail
Subject: Early Consultation Request for the Proposed Department of Hawaiian Home Lands' Hoʻolehua Scattered Lots Subdivision and Related Improvements
Attachments: IPaC Info Letter_Species List Instructions_PIFWO_20Apr2022_Final.pdf

Aloha,

Thank you for reaching out to us. Please obtain an Official Species List from our Information for Planning and Consultation (IPaC) online tool (https://ipac.ecosphere.fws.gov/). Species lists are available online through our IPaC system. I have attached instructions on how to acquire a species list and avoidance and minimization measures to avoid adverse effects to federally listed species.

We highly recommend paying particular attention to the avoidance and minimization measures called "General project design guidelines" in the species list produced. Implementing these avoidance and minimization measures will avoid adverse effects for listed species likely to be present within the action area.

A few IPAC tips:

- If you are uploading a polygon and have more than one TMK in the project area, make sure all TMKs are in one polygon. Otherwise, you will get a project code for every TMK. Drawing on the map works best if there is one continuous project site vs distinct, separate project areas for the same reason.
- You can ignore any requests or links regarding additional document uploads or continuing your consultation in IPaC (e.g., Dkeys or Consultation Builder). The only thing you need to do is enter your basic project information and submit for an Official Species List.
- While the attached pdf of instructions will direct you to **https://ipac.ecosphere.fws.gov/**, several partners have gotten stuck at "create a Login.gov account." Our IT suggested accessing IPAC through ECOS may help reduce this issue by accessing IPaC by first visiting **https://ecos.fws.gov/ecp/**.
    - Your official IPaC species list is based on species' ranges. IPaC generates a list of all federally listed species and other trust resources that could potentially be in the project area.
    - If the IPaC species list includes a species you do not think occur in the project area, explain why not in your consultation letter.
    - Implementing surveys is a good way to determine if a species present or not.
    - We recommend our partners incorporate all the species and their associated avoidance and minimization measures in their impacts analysis.

Please feel free to contact me if you need additional assistance.

Mahalo,
Chelsie Javar-Salas

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Pacific Islands Fish and Wildlife Office
300 Ala Moana Boulevard, Room 3-122
Honolulu, Hawai‘i 96850

Subject: IPaC generated official species list for the Pacific Islands Fish and Wildlife Office

Dear Action Agency or Applicant:

The Pacific Islands Fish and Wildlife Office (PIFWO) is transitioning to the Information for Planning and Consultation (IPaC) online portal, https://ipac.ecosphere.fws.gov/ for federal action agencies and non-federal agencies or individuals to obtain official species lists, including threatened and endangered species, designated critical habitat, and avoidance and minimization measures to consider in your general project design. IPaC has been used by continental USFWS offices to provide official species lists and avoidance and minimization guidance since 2017. Using IPaC expedites the process for species list distribution. Obtaining a species list in IPaC is relatively straightforward and takes minimal time to complete. Step by step instructions are included below.

Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of your species list should be verified after 90 days. New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change the species list. Verification can be completed by visiting the IPaC website at regular intervals during project planning and implementation. An updated list may be requested through the IPaC system by completing the same process used to obtain the initial species list.

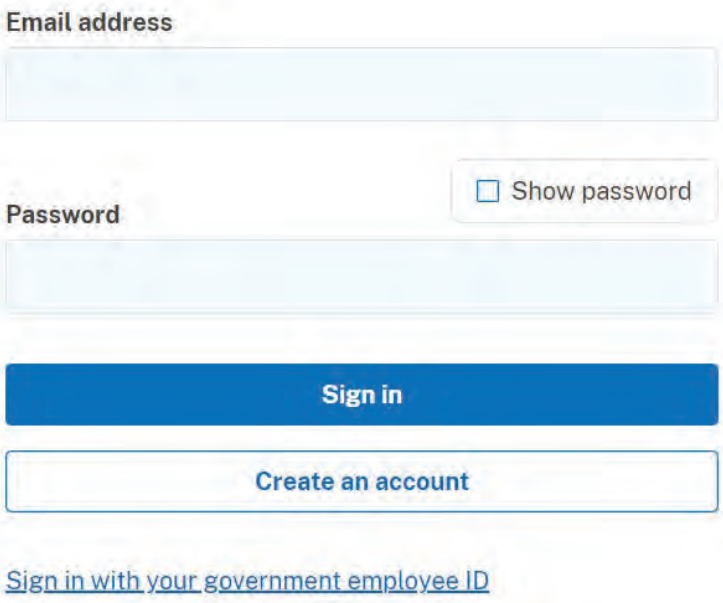
We hope this process provides efficiencies to our partners in obtaining a species list. For federal action agencies, it also opens additional IPaC functionality that the PIFWO office is still working on, such as the use of Determination Keys for informal section 7 programmatic consultations. We will let our agency partners know when that functionality becomes available.

If you have questions about a species list obtained through the IPaC system or need assistance in completing an IPaC species list request, please contact the Service at 808-792-9400 or via email at pifwo_admin@fws.gov. We appreciate your efforts to conserve listed species across the Pacific Islands.

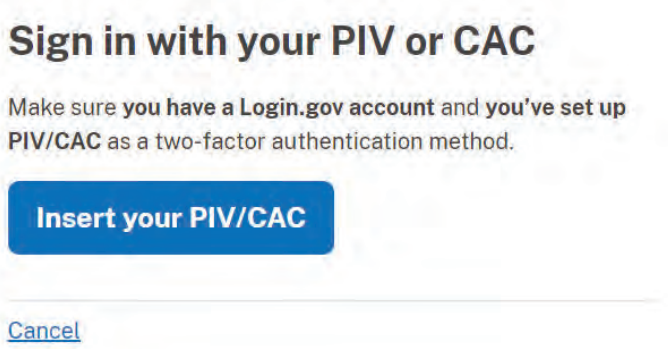
Instructions for Action Agencies and partners to obtain an official species list in IPaC

- Navigate to https://ipac.ecosphere.fws.gov/
- You can get an unofficial species list without logging in. However, if you want an official species list you will need to log in first using your Login.gov account. If you don't have an IPaC account, they are easy to create.

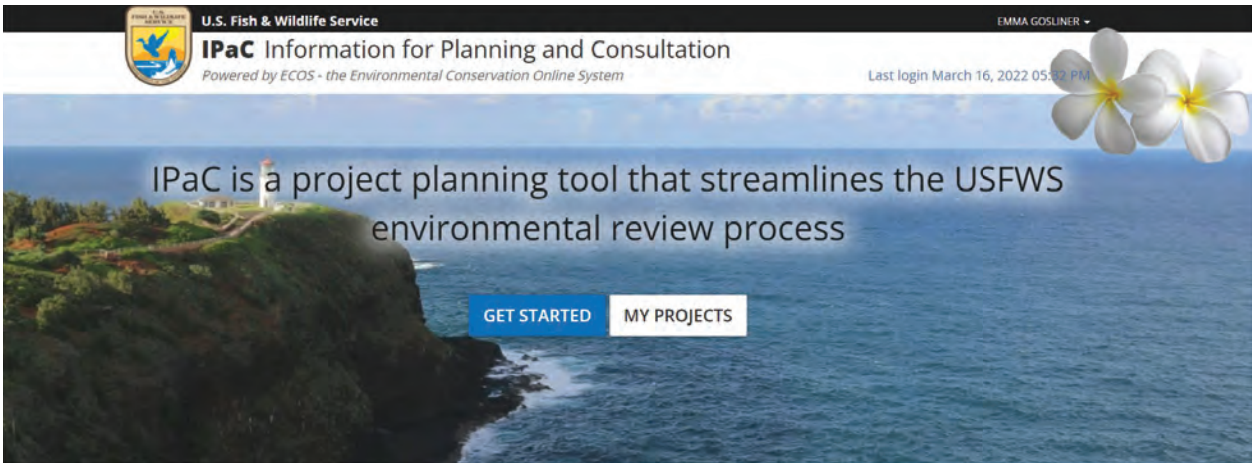
Select Log in with Login.gov and sign in using your email and password.



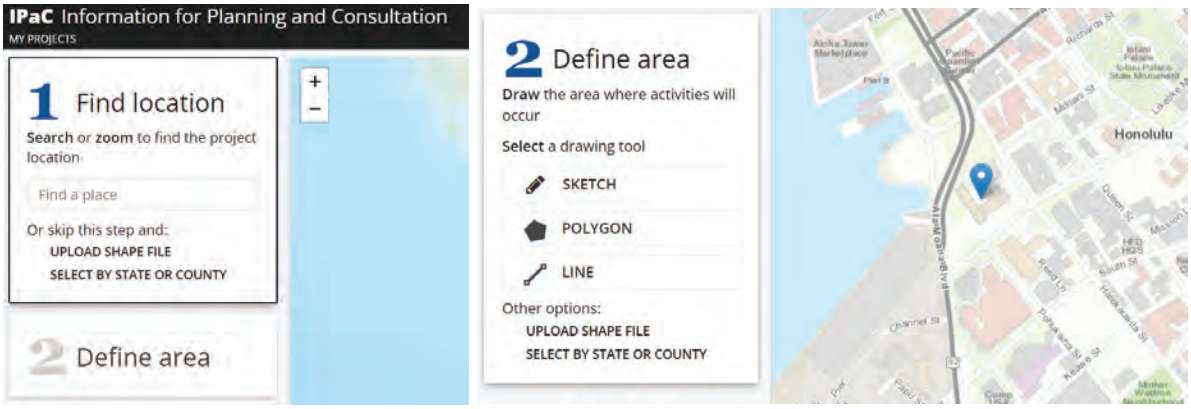
If you have a PIV or CAC card, you can sign in using that method as well.

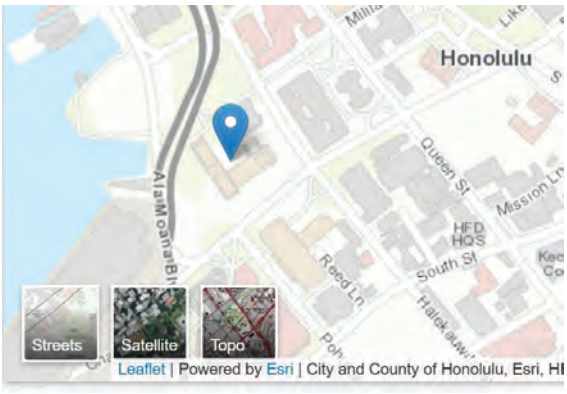


- Once you log in, select "Get Started".

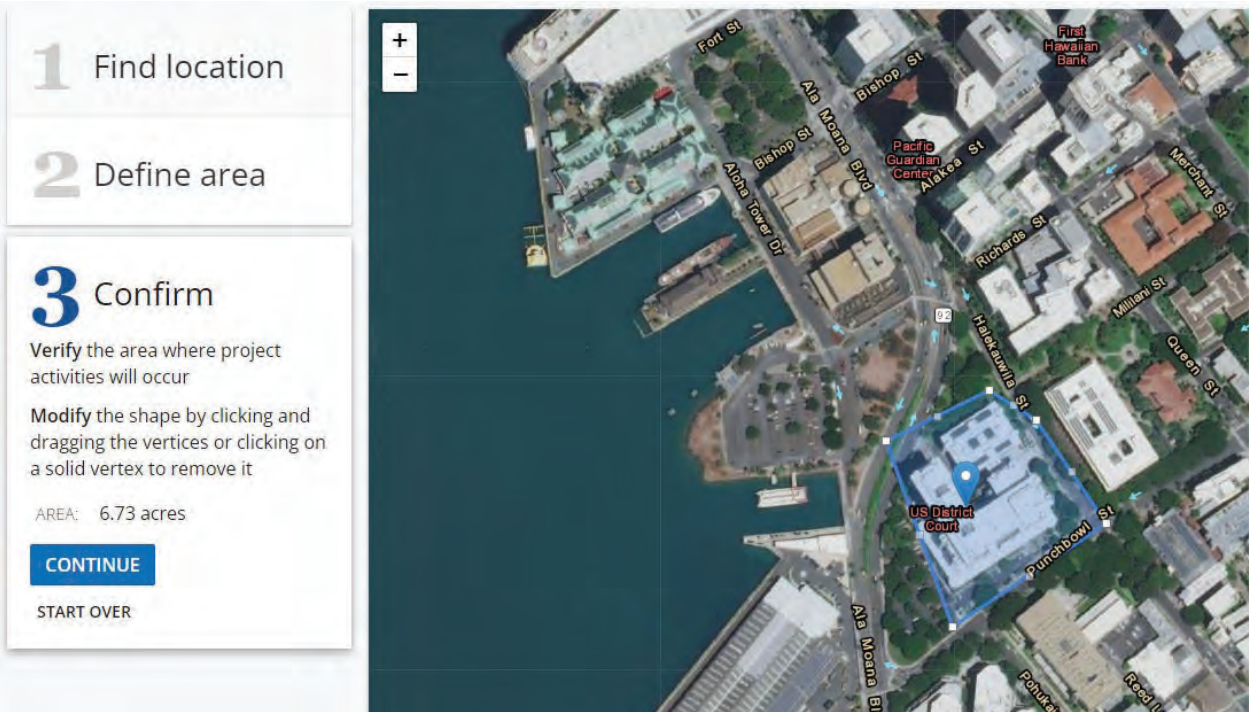


- Define the action area: Identify the location of the proposed action by uploading an existing shapefile or by entering an address or coordinates of the action area. Once identified on the map, you can manually draw the action area using the drawing tools.



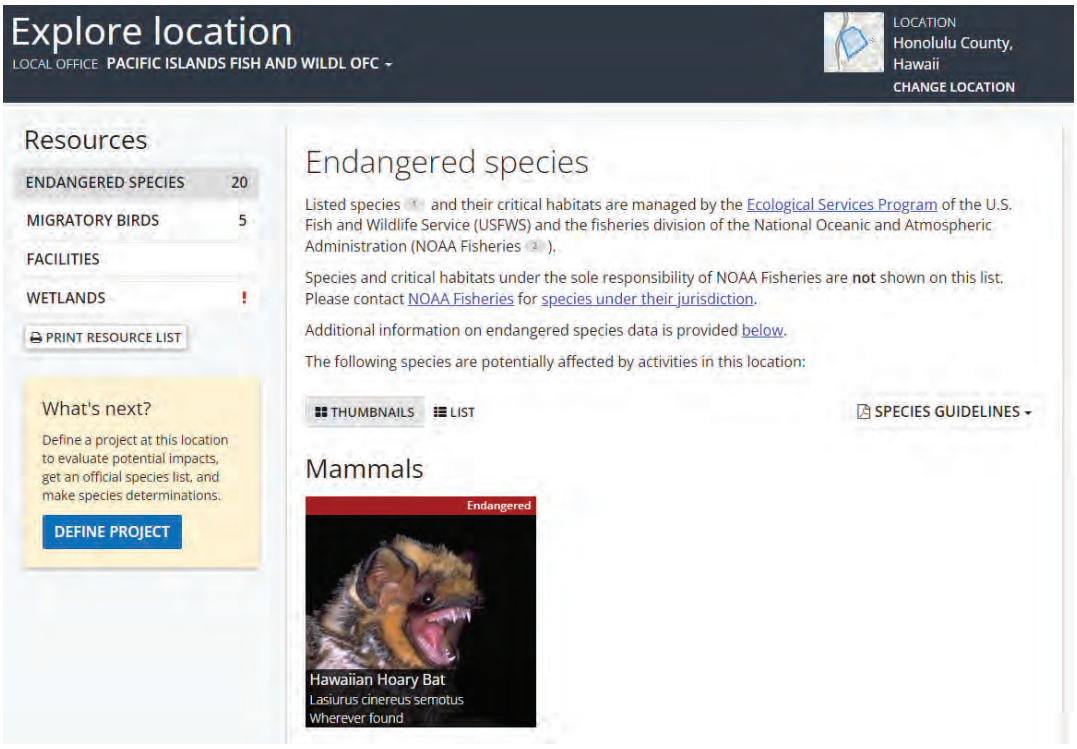


To help identify your action area you can choose between multiple base maps available.

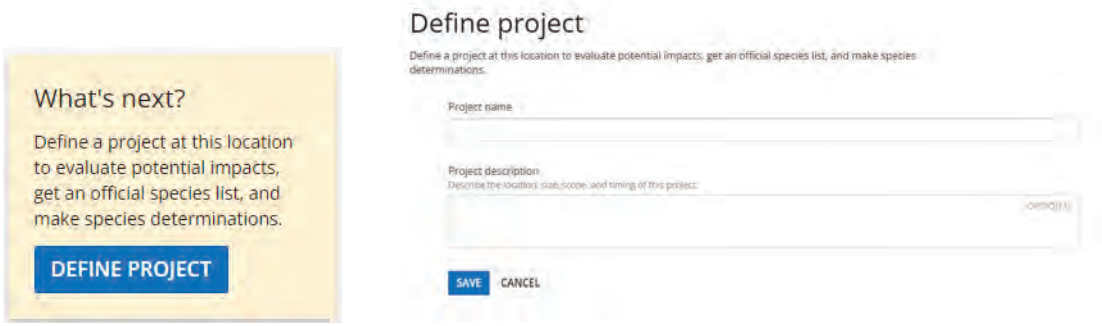


Press continue when you have finished drawing or uploading the action area location.

- The species information on the page that follows is not official. However, it identifies the project County, local Fish and Wildlife Field Office, species covered under NOAA Fisheries as well as Migratory Bird Treaty Act species. The list can be viewed in Thumbnail or List format.
- Once the species list populates you will see images of the species that may occur on, near, or transgress across your project. Click on SPECIES GUIDELINES on your top right to see Avoidance and Minimization measures to incorporate into your General Project Design Guidelines.

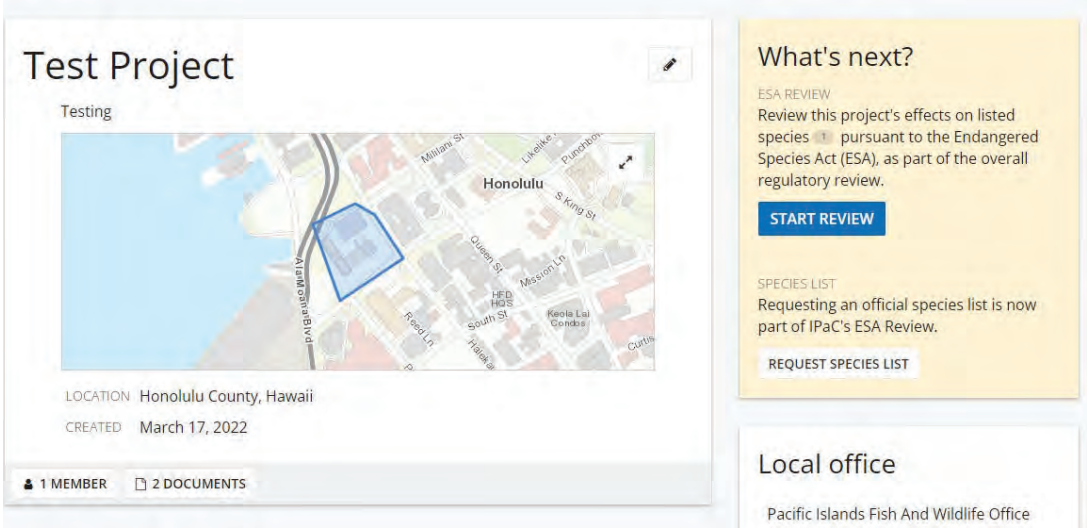


- Continue with the following steps to comply with the requirements of ESA section 7 to obtain an **official species list**.
- Select Define Project

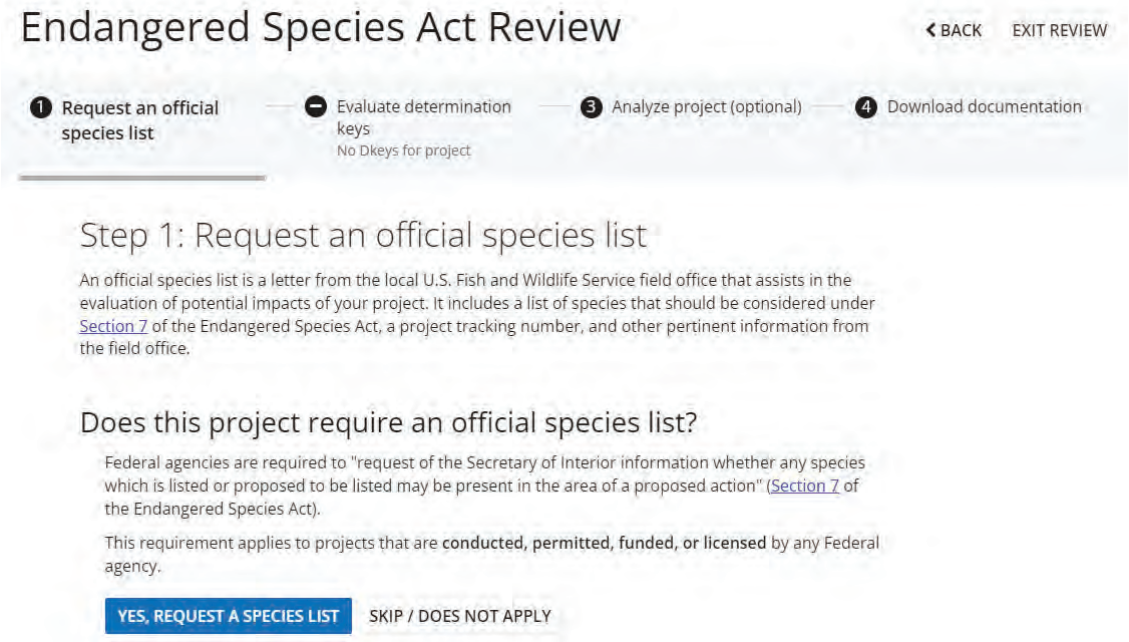


Enter the Project Name and a brief description of the project (a description is not mandatory, but recommended for future coordination with the Service). Click SAVE at bottom of page.

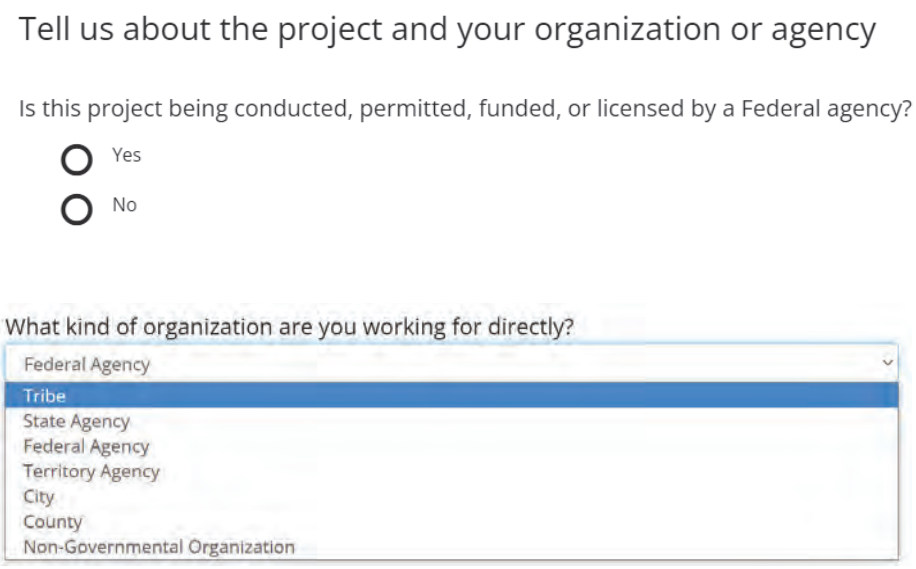
- At the bottom of the What's next box on the right, click Request Species List



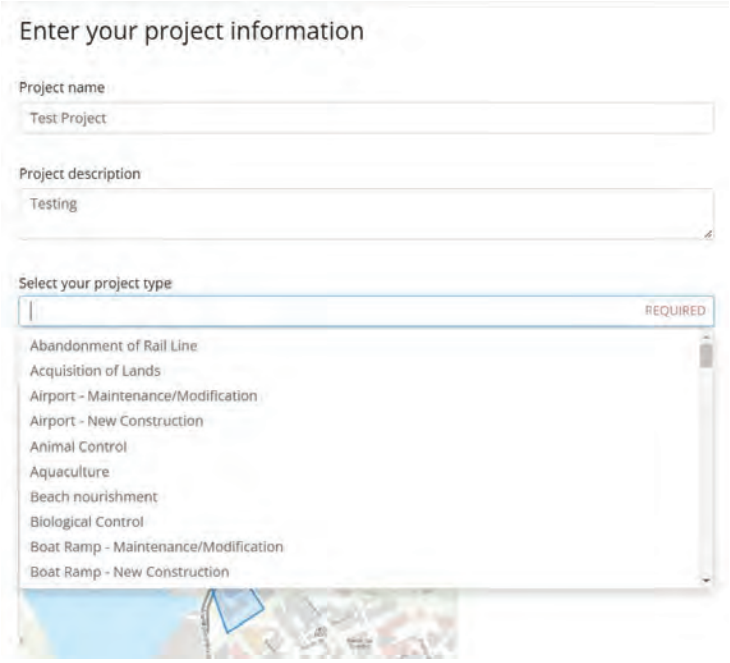
- on the following screen, click Yes, Request Species List



- Fill out the contact information for yourself or your agency. Contractors, state partners, and any other project proponents may request a species list and should be covered using the dropdown menus.



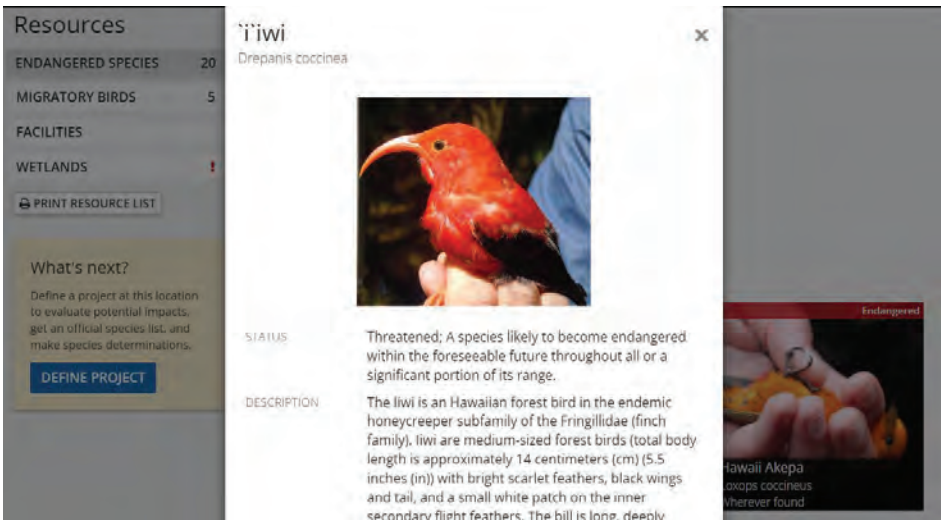
- From the pull-down menu for Classify Type of Project, select the project type that best fits the proposed action.



- Once all required sections are filled out, press SUBMIT OFFICIAL SPECIES LIST REQUEST

- An Official Species List should be generated and available for download in a couple of seconds.

- If you need additional information on a species, click on their name that is hot-linked to their species information page. A brief overview of the species' status, description and critical habitat will appear as well as a link to their ECOS species profile.



MUNEKIYO HIRAGA
Planning. Project Management. Sustainable Solutions.

Karlynn K. Fukuda
PRESIDENT
Mark Alexander Roy AICP, LEED AP
VICE PRESIDENT
Tessa Munekiyo Ng AICP
VICE PRESIDENT

Michael T. Munekiyo AICP
FOUNDER

September 20, 2024

Via email: pifwo_admin@fws.gov

U.S. Fish and Wildlife Service
Pacific Island Fish and Wildlife Office
300 Ala Moana Boulevard, Room 3-122
Honolulu, Hawai'i 96850

SUBJECT: Response to Comments Regarding the State of Hawai'i, Department of Hawaiian Home Lands Proposed Ho'olehua Scattered Lots Project, Ho'olehua, Moloka'i 01EPIF00-2022-TA-0062

Dear Sir/Madame:

Thank you for your comments, dated November 5, 2021 and September 11, 2023, regarding the Proposed Ho'olehua Scattered Lots Project. On behalf of the Department of Hawaiian Home Lands (DHHL), we offer the following information in response to the comments received.

Response to November 5, 2021 Comments:

We thank you for the information provided on protected species most likely to occur within the project vicinity. We have consulted the Pacific Islands Fish and Wildlife Office (PIFWO) website regarding recommended conservation measures to avoid or minimize adverse effects to federally protected species and Best Management Practices (BMPs) to minimize and avoid sedimentation and erosion impacts to water quality. As such, the following conservation measures and BMPs will be forwarded to the project team for incorporation into the project, as practicable, to avoid or minimize adverse effects to protected species most likely to occur in the project area:

Hawaiian hoary bat or 'Ōpe'ape'a (Lasiurus cinereus semotus)

- Do not disturb, remove or trim woody plants greater than 15 feet tall during the bat birthing and pup rearing season (June 1 through September 15)
- Do not use barbed wire for fencing
- Have a biological monitor that is familiar with the species' biology conduct Hawaiian waterbird nest surveys where appropriate habitat occurs within the vicinity of the proposed project site prior to project initiation. Repeat surveys again within three (3) days of project initiation and after any subsequent delay of work of three (3) or more days (during which the birds may attempt to nest).

Hawaiian coot or ʻalae (Fulica alai) and the Hawaiian stilt or aeʻo (Himantopus mexicanus knuseni)

- In areas where waterbirds are known to be present, post and implement reduced speed limits, and inform project personnel and contractors about the presence of endangered species on-site or nearby

- If water resources are located within or adjacent to the project site, incorporate the applicable BMPs regarding work in aquatic environments into the project design.

- Have a biological monitor that is familiar with the species' biology conduct Hawaiian waterbird nest surveys where appropriate habitat occurs within the vicinity of the proposed project site prior to project initiation. Repeat surveys again within three (3) days of project initiation and after any subsequent delay of work of three (3) or more days (during which the birds may attempt to nest).

- If a nest or active brood is found:

  - Contact the Service within 24 hours for further guidance.

  - Establish and maintain a 100-foot buffer around all active nests and/or broods until the chicks/ducklings have fledged. Do not conduct potentially disruptive activities or habitat alteration within this buffer.

  - Have a biological monitor that is familiar with the species' biology present on the project site during all construction or earth moving activities until the chicks/ducklings fledge to ensure that Hawaiian waterbirds and nests are not adversely impacted.

Hawaiian petrel or ʻuaʻu (Pterodroma sandwichensis), Band-Rumped Storm-Petrel (Oceanodroma castro), and the threatened Newell's shearwater or ʻaʻo (Puffinus auricularis newelli)

- *Fully shield all outdoor lights so the bulb can only be seen from below bulb height and only use when necessary.*

- *Install automatic motion sensor switches and timer controls on all outdoor lights or turn off lights when human activity is not occurring in the lighted area.*

- *Avoid nighttime construction during the seabird fledging period, September 15 through December 15.*

- *It is noted that the proposed project does not involve the construction of a tower or antennae and is not located near a known seabird colony.*

Blackburn's sphinx moth (Manduca blackburni)

- o *A biologist familiar with the species should survey areas of proposed activities for Blackburn's sphinx moth and its larval host plants prior to work initiation.*
- o *Surveys should include searches for eggs, larvae, and signs of larval feeding (chewed stems, frass, or leaf damage).*
- o *If moths or the native aiea or tree tobacco over three (3) feet tall are found during the survey, please contact the Service for additional guidance to avoid take.*

In addition, we offer the following in response to comments in your letter.

- We note that the project is located on Molokaʻi and not on the island of Hawaiʻi.
- The applicant for the project is the DHHL, which is not a federal agency.
- Should it be determined that the proposed project may affect federally listed species, the U.S. Fish and Wildlife Service will be contacted for assistance with Endangered Species Act compliance as soon as possible.

Response to September 11, 2023 Comments:

- An official species list has been generated through the IPaC online tool. This species list will be included in the Draft Environmental Assessment (EA) being prepared for this project.
- The "*General project design guidelines*" from the species list have been reviewed for guidance. Applicable avoidance and minimization measures will be discussed in the Draft EA.

Thank you again for your participation in the Chapter 343, Hawaiʻi Revised Statutes environmental review process. Copies of the emails and this response will be included in the Draft Environmental Assessment being prepared for this project. Should you have any questions or need additional information, please feel free to contact me at (808) 983-1233.

Very truly yours,

Emily Y.K. Murai
Associate

EYKM:ab
cc: Neil Nugent, Department of Hawaiian Home Lands
Gordon Ring, R.M. Towill Corporation
\\MH03\Drive_F\DATA\SOH DHHL\Hoolehua Scattered Lots\Apps\0ECL\2023-Resp Ltrs\USFWS.docx

OCT 27 2021

DAVID Y. IGE
GOVERNOR OF HAWAII

ELIZABETH A. CHAR, M.D.
DIRECTOR OF HEALTH

STATE OF HAWAII
DEPARTMENT OF HEALTH
Maui District Health Office
54 South High St. Rm. #301
Wailuku, HI 96793

Lorrin W. Pang, M.D., M.P.H.
District Health Officer

October 20, 2021

Mr. Bryan K. Esmeralda, AICP
Senior Associate
Munekiyo Hiraga
305 High Street, Suite 104
Wailuku, Hawaii 96793

Dear Mr. Esmeralda:

Subject: **Chapter 343, Hawaii Revised Statutes Early Consultation Request for the Proposed Department of Hawaiian Homes Lands Ho'olehua Scattered Lots Subdivision and Related Improvements**
TMK: (2) 5-2-005:031 & (2) 5-2-026:014

Thank you for the opportunity to review this project. We have the following comments to offer:

We were not able to make comments because the wastewater disposal system was not satisfactorily addressed for our review. Please provide wastewater disposal method site plan for the proposed subdivision for review. If you have any questions, please contact Roland Tejano, Environmental Engineer, at 808 984-8232.

It is strongly recommended that you review the department's website at https://health.hawaii.gov/epo/landuse/ and contact the appropriate program that concerns your project.

Should you have any questions, please contact me at 808 984-8230 or email me at patricia.kitkowski@doh.hawaii.gov.

Sincerely,

Patti Kitkowski

Patti Kitkowski
District Environmental Health Program Chief

c Joanna L. Seto, EMD Chief

MUNEKIYO HIRAGA
Planning. Project Management. Sustainable Solutions.

Karlynn K. Fukuda
PRESIDENT
Mark Alexander Roy AICP, LEED AP
VICE PRESIDENT
Tessa Munekiyo Ng AICP
VICE PRESIDENT

Michael T. Munekiyo AICP
FOUNDER

September 20, 2024

Patti Kitkowski, District Environmental Health Program Chief
State of Hawai'i
Department of Health
Maui District Health Office
54 South High Street, Room 301
Wailuku, Hawai'i 96793

SUBJECT: Response to Early Consultation Comments Regarding Proposed Department of Hawaiian Home Lands' Ho'olehua Scattered Lots Subdivision and Related Improvements

Dear Ms. Kitkowski:

On behalf of the Department of Hawaiian Home Lands (DHHL), thank you for your letter dated October 20, 2021, regarding the proposed Ho'olehua Scattered Lots Subdivision and Related Improvements project. We offer the following information in response to the comments received.

- The proposed project will not involve wastewater system improvements. We note that the installation of a wastewater system on the subject lots will be the responsibility of individual lessees.

- Thank you for providing information regarding the DOH Land Use Contact List. The contact list has been reviewed and the appropriate branch will be contacted for additional guidance should it concern the project.

Thank you for your participation in the Chapter 343, Hawai'i Revised Statutes environmental review process. A copy of your letter and this response will be included in the Draft Environmental Assessment being prepared for this project. Should you have any questions or require additional information, please feel free to contact me at (808) 983-1233.

Very truly yours,

Emily Y.K. Murai
Associate

EYKM:ab
cc: Neil Nugent, Department of Hawaiian Home Lands
Gordon Ring, R.M. Towill Corporation
\\MH03\Drive_F\DATA\SOH DHHL\Hoolehua Scattered Lots\Apps\0ECL\2023-Resp Ltrs\DOH.docx

DAVID Y. IGE
GOVERNOR

JADE T. BUTAY
DIRECTOR

Deputy Directors
DEREK J. CHOW
ROSS M. HIGASHI
EDWIN H. SNIFFEN

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

IN REPLY REFER TO:
DIR 0984
STP 8.3286

October 26, 2021

VIA EMAIL: planning@munekiyohiraga.com

Mr. Bryan K. Esmeralda, AICP
Senior Associate
Munekiyo Hiraga
305 High Street, Suite 104
Wailuku, Hawaii 96793

Dear Mr. Esmeralda:

Subject: Chapter 343, Hawaii Revised Statutes Early Consultation
Department of Hawaiian Home Lands' (DHHL) Ho'olehua Scattered Lots Subdivision and Related Improvements
Ho'olehua, Molokai, Hawaii
Tax Map Key: (2) 5-2-005:031 and (2) 5-2-026:014

Thank you for your letter dated October 6, 2021 requesting the State of Hawaii Department of Transportation's (HDOT) review and comments on the Ho'olehua Scattered Lots Subdivision and Related Improvements project. HDOT understands DHHL is proposing to subdivide two (2) noncontiguous lots into ten (10) smaller lots within Ho'olehua area on Molokai. The lots will be designated for subsistence agriculture use and made available to beneficiaries to construct homes. Improvements will include new access driveways to each of the lots with connections for domestic and irrigation water from neighboring roadways.

HDOT has the following comments:

Airports Division (HDOT-A)

1. The Hoolehua Scattered Lots Subdivision and Related Improvements Project is approximately 1.63 miles from the airport boundary of the Molokai Airport (MKK). All projects within 5 miles from Hawaii State airports are advised to read the Technical Assistance Memorandum (TAM) for guidance with development and activities that may require further review and permits. The TAM can be viewed at this link: http://files.hawaii.gov/dbedt/op/docs/TAM-FAA-DOT-Airports_08-01-2016.pdf.

2. The proposed project is approximately 8,465 feet from the end of Runway 17 at MKK. The Federal Aviation Administration (FAA) regulation requires the submittal of the FAA Form 7460-1 Notice of Proposed Construction or alteration pursuant to the Code of Federal Regulations, Title 14, Part 77.9, if the construction or alteration is within 20,000 feet of a public use or military airport which exceeds a 100:1 surface from any point on the runway of each airport with its longest runway more than 3,200 feet. Construction equipment and staging area heights, including heights of temporary construction cranes, shall be included in the submittal. The form and criteria for submittal can be found at the following website: https://oeaaa.faa.gov/oeaaa/external/portal.jsp.

3. Due to the project's proximity to MKK, the developer and future residents should be aware of potential single event noise from aircraft operations. There is also a potential for fumes, smoke, vibrations, odors, etc., resulting from occasional aircraft flight operations over or near the development. These impacts may increase or decrease over time depending on airport operations.

4. The HDOT-A requires that the proposed development does not provide landscape and vegetation that will create a wildlife attractant. Please review the FAA Advisory Circular 150/5200-33C, Hazardous Wildlife Attractants On Or Near Airports for guidance. If the development creates a wildlife attractant that can potentially become a hazard to aircraft operations, the developer shall immediately mitigate the hazard upon notification by the HDOT-A and/or FAA.

5. If a photovoltaic (PV) system is going to be installed, be aware that PV systems located in or near the approach path of aircrafts can create a hazardous condition for pilots due to possible glint and glare reflected form the PV array. If glint or glare from the PV array creates a hazardous condition for pilots, the owner of the PV system shall be prepared to immediately mitigate the hazard upon notification by the HDOT-A and/or FAA.

   PV systems have also been known to emit radio frequency interference (RFI) to aviation-dedicated radio signals, thereby disrupting the reliability of air-to-ground communications. Again, the owner of the PV system shall be prepared to immediately mitigate the RFI hazard upon notification by the HDOT-A and/or FAA.

   The HDOT-A recommends that the developer submit a separate FAA Form 7460-1 for the site of the proposed PV system. Note that you will need latitude, longitude, ground elevation and the above ground elevation data for the installation site to fully complete this form.

   A glint and glare analysis must be attached to your submittal of FAA Form 7460-1. The following website may assist you with the preparation of a glint and glare analysis: www.sandia.gov/glare. When you have received the FAA determination from your submittal of FAA Form 7460-1, please provide a copy for our files.

The HDOT-A may have more comments when the Draft EA is published for public review.

Highways Division (HDOT-HWY)

Based on the project description and location, HDOT does not anticipate direct or indirect impact to the State highway system, therefore we have no comments or objections on the Subdivision.

If there are any questions, please contact Mr. Blayne Nikaido of the HDOT Statewide Transportation Planning Office at (808) 831-7979 or via email at blayne.h.nikaido@hawaii.gov.

Sincerely,

JADE T. BUTAY
Director of Transportation

JOSH GREEN, M.D.
GOVERNOR

EDWIN H. SNIFFEN
DIRECTOR

Deputy Directors
FORD N. FUCHIGAMI
DREANALEE K. KALILI
TAMMY L. LEE
ROBIN K. SHISHIDO

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

IN REPLY REFER TO:

STP00303.23
STP 8.3664

September 29, 2023

VIA EMAIL: planning@munekiyohiraga.com

Ms. Emily Y.K. Murai, Associate
Munekiyo Hiraga
305 High Street, Suite 104
Wailuku, Hawaii 96793

Dear Ms. Murai:

Subject: Chapter 343, Hawaii Revised Statutes Early Consultation
Department of Hawaiian Home Lands' Hoolehua Scattered Lots Subdivision and Related Improvements
Hoolehua, Molokai, Hawaii
Tax Map Key: (2) 5-2-005: 031; 5-2-026: 003, 014, 016, 017

Thank you for your letter dated September 8, 2023, requesting the Hawaii Department of Transportation's (HDOT) review and comments on the subject project. HDOT understands the Department of Hawaiian Home Lands (DHHL) is proposing to revise the original project scope, which HDOT had previously reviewed, from the subdivision of 2 lots to 5 lots in the Hoolehua area on Molokai. The project entails subdividing into 12 lots to be designated for subsistence agriculture use and made available to DHHL beneficiaries to construct homes.

HDOT has the following comments:

1. The proposed development is approximately 1.45 miles from the property boundary of Molokai Airport (MKK). All projects within 5 miles from Hawaii State airports are advised to read the Technical Assistance Memorandum (TAM) for guidance with development and activities that may require further review and permits. The TAM can be viewed at this link: http://files.hawaii.gov/dbedt/op/docs/TAM-FAA-DOT-Airports_08-01-2016.pdf.

2. The project site is approximately 7,759 feet from the end of Runway 17 at MKK. Federal Aviation Administration (FAA) regulation requires the submittal of FAA

Form 7460-1 Notice of Proposed Construction or Alteration pursuant to the Code of Federal Regulations, Title 14, Part 77.9, if the construction or alteration is within 20,000 feet of a public use or military airport that exceeds a 100:1 surface from any point on the runway of each airport with its longest runway more than 3,200 feet. Construction equipment and staging area heights, including heights of temporary construction cranes, shall be included in the submittal. The form and criteria for submittal can be found at the following website: https://oeaaa.faa.gov/oeaaa/external/portal.jsp. Please provide a copy of the FAA response to the Part 77 analysis to the HDOT Airport Planning Section.

3. Due to the project's proximity to MKK, the applicant and future residents should be aware of potential single-event noise from aircraft operations. There is also a potential for fumes, smoke, vibrations, odors, etc., resulting from occasional aircraft flight operations over or near the project. These incidences may increase or decrease over time and are dependent on airport operations.

4. The proposed project shall not provide landscape and vegetation that will create a wildlife attractant, which can potentially become a hazard to aircraft operations. Please review the FAA Advisory Circular 150/5200-33C, Hazardous Wildlife Attractants On Or Near Airports for guidance. If the project's landscaping creates a wildlife attractant, the developer shall immediately mitigate the hazard upon notification by the HDOT and/or FAA.

5. If a solar energy photovoltaic (PV) system is going to be installed, be aware that PV systems located in or near the approach path of aircrafts can create hazardous conditions for pilots due to possible glint and glare reflected from the PV panel array. If glint or glare from the PV array creates a hazardous condition for pilots, the owner of the PV system shall be prepared to immediately mitigate the hazard upon notification by the HDOT and/or FAA.

   The FAA requires a glint and glare analysis for all solar energy PV systems near airports. The www.sandia.gov/glare website has information and guidance with the preparation of a glint and glare analysis. A separate FAA Form 7460-1 will be necessary for the solar energy PV system. A copy of the FAA response to the glint and glare analysis shall be provided to the HDOT Planning Section by the owner of the solar energy PV system.

   Solar energy PV systems have also been known to emit radio frequency interference (RFI) to aviation-dedicated radio signals, thereby disrupting the reliability of air-to-ground communications. Again, the owner of the solar energy PV system shall be prepared to immediately mitigate the RFI hazard upon notification by the HDOT and/or FAA.

6. Based on the project description and location, HDOT does not anticipate a direct or indirect impact to the State highway system, therefore we have no comments or objections on the Subdivision.

Please submit any subsequent land use entitlement-related requests for review or correspondence to the HDOT Land Use Intake email address at DOT.LandUse@hawaii.gov.

If there are any questions, please contact Mr. Blayne Nikaido, Planner, Land Use Section of the HDOT Statewide Transportation Planning Office at (808) 831-7979 or via email at blayne.h.nikaido@hawaii.gov.

Sincerely,

EDWIN H. SNIFFEN
Director of Transportation

MUNEKIYO HIRAGA
Planning. Project Management. Sustainable Solutions.

Karlynn K. Fukuda
PRESIDENT
Mark Alexander Roy AICP, LEED AP
VICE PRESIDENT
Tessa Munekiyo Ng AICP
VICE PRESIDENT

Michael T. Munekiyo AICP
FOUNDER

September 20, 2024

Via email: DOT.LandUse@hawaii.gov

Edwin H. Sniffen, Director
State of Hawai'i
Department of Transportation
869 Punchbowl Street
Honolulu, Hawai'i 96813-5097

SUBJECT: Response to Comments Regarding the State of Hawai'i Department of Hawaiian Home Lands Proposed Ho'olehua Scattered Lots Project, Ho'olehua, Moloka'i (DIR 0984 STP 8.3286) and (STP00303.23 STP 8.3664)

Dear Mr. Sniffen:

Thank you for your comment letters, dated October 26, 2021 and September 29, 2023, regarding the Proposed Ho'olehua Scattered Lots Project. On behalf of the Department of Hawaiian Home Lands (DHHL), we offer the following information in response to the comments received.

Response to Comment No. 1:

We acknowledge that the proposed proejct is within five (5) miles from the Molokai Airport. As such, the TAM will be reviewed for guidance. It is noted that no vertical structures are proposed at this time. The proposed project involves the subdivision of property for use by DHHL Homesteaders.

Response to Comment No. 2:

We confirm that due to the proximity of the proposed project to the Molokai Airport runway, a Federal Aviation Administration (FAA) Form 7460-1 Notice of Proposed Construction or Alteration will be submitted pursuant to the Code of Federal Regulations, Title 14, Part 77, if required.

Response to Comment No. 3

We acknowledge that the project's proximity to the Moloka'i Airport may result in single event noise from aircraft operations and that there is potential for fumes, smoke, vibrations and odors from fluctuating aircraft operations. DHHL will inform potential beneficiaries for the project of these potential events.

Response to Comment No. 4

We acknowledge the HDOT-A comment regarding the proposed project and the potential for landscape vegetation that will create a wildlife attractant. As such, the FAA Advisory Circular 150/5200-33C, Hazardous Wildlife Attractants On it Or Near Airports will be reviewed by DHHL for guidance. The proposed project will provide for subsistence lots for use by DHHL beneficiaries. It is anticipated that future activities may involve farming activities by the beneficiaries.

Response to Comment No. 5

The proposed project will not involve the installation of a photovoltaic (PV) system, however, we thank you for the information regarding requirements for PV systems in or near the approach path of aircrafts and the potential hazards associated with PV systems. We do note, however, that individual lessees would have the option to install PV panels in their individual homes.

Response to Comment No. 6

Thank you for confirming that impacts to the State highway system are not anticipated.

Thank you again for your participation in the Chapter 343, Hawai'i Revised Statutes environmental review process. Copies of the letters and this response will be included in the Draft Environmental Assessment being prepared for this project. Should you have any questions or need additional information, please feel free to contact me at (808) 983-1233.

Very truly yours,

Emily Y.K. Murai
Associate

EYKM:ab
cc: Neil Nugent, Department of Hawaiian Home Lands
Blayne Nikaido, Department of Transportation
Gordon Ring, R.M. Towill Corporation
\\MH03\Drive_F\DATA\SOH DHHL\Hoolehua Scattered Lots\Apps\0ECL\2023-Resp Ltrs\SDOT.docx

OCT 22 2021

DAVID Y. IGE
GOVERNOR

CURT T. OTAGURO
COMPTROLLER

AUDREY HIDANO
DEPUTY COMPTROLLER

STATE OF HAWAII
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
P.O. BOX 119, HONOLULU, HAWAII 96810-0119

(P)21.166

OCT 14 2021

Bryan K. Esmeralda, AICP, Senior Associate
Munekiyo Hiraga
305 High Street, Suite 104
Wailuku, Hawaii 96703

Dear Mr. Esmeralda:

Subject: Chapter 343, Hawaii Revised Statutes Early Consultation Request for the Proposed Department of Hawaiian Home Lands' Hoolehua Scattered Lots Subdivision and Related Improvements
Hoolehua, Molokai, Hawaii
TMKs: (2) 5-2-005:031 and 5-2-026:014

Thank you for the opportunity to comment on the subject project. We have no comments to offer at this time as the proposed project does not impact any of the Department of Accounting and General Services' projects or existing facilities.

If you have any questions, your staff may call Ms. Gayle Takasaki of the Planning Branch at (808) 586-0584.

Sincerely,

CHRISTINE L. KINIMAKA
Public Works Administrator

GT:mo
c: DAGS MDO

MUNEKIYO HIRAGA
Planning. Project Management. Sustainable Solutions.

Karlynn K. Fukuda
PRESIDENT
Mark Alexander Roy AICP, LEED AP
VICE PRESIDENT
Tessa Munekiyo Ng AICP
VICE PRESIDENT

Michael T. Munekiyo AICP
FOUNDER

September 20, 2024

Christine L. Kinimaka, Public Works Administrator
State of Hawai'i
Department of Accounting and General Services
P.O. Box 119
Honolulu, Hawai'i 96810-0119

SUBJECT: Response to Early Consultation Comments Regarding Proposed Department of Hawaiian Home Lands' Ho'olehua Scattered Lots Subdivision and Related Improvements.

Dear Ms. Kinimaka:

On behalf of the Department of Hawaiian Home Lands, thank you for your letter dated October 14, 2021, regarding the proposed Ho'olehua Scattered Lots Subdivision and Related Improvements project. We acknowledge that the Department of Accounting and General Services (DAGS) has no comments to provide at this time as the project does not impact any DAGS projects or existing facilities.

Thank you for your participation in the Chapter 343, Hawai'i Revised Statutes environmental review process. A copy of your letter and this response will be included in the Draft Environmental Assessment being prepared for this project. Should you have any questions or require additional information, please feel free to contact me at (808) 983-1233.

Very truly yours,

Emily Y.K. Murai
Associate

EYKM:ab
cc: Neil Nugent, Department of Hawaiian Home Lands
\\MH03\Drive_F\DATA\SOH DHHL\Hoolehua Scattered Lots\Apps\0ECL\2023-Resp Ltrs\DAGS.docx

DAVID Y. IGE
GOVERNOR OF HAWAII

SUZANNE D. CASE
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE
MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

October 27, 2021

Munekiyo Hiraga
Attn: Mr. Bryan Esmeralda
Senior Associate
305 High Street, Suite 104
Wailuku, Hawaii 96793

via email: planning@munekiyohiraga.com

Dear Mr. Esmeralda:

SUBJECT: Early Consultation Request for the Proposed DHHL's **Ho'olehua Scattered Lots Subdivision and Related Improvements** located at Ho'olehua, Island of Molokai; TMK: (2) 5-2-005:031 and (2) 5-2-026:014 on behalf of Department of Hawaiian Home Lands

Thank you for the opportunity to review and comment on the subject matter. The Land Division of the Department of Land and Natural Resources (DLNR) distributed or made available a copy of your request pertaining to the subject matter to DLNR's Divisions for their review and comments.

At this time, enclosed are comments from the (a) Engineering Division and (b) Land Division-Maui District on the subject matter. Should you have any questions, please feel free to contact Darlene Nakamura at (808) 587-0417 or email: darlene.k.nakamura@hawaii.gov. Thank you.

Sincerely,

Russell Tsuji

Russell Y. Tsuji
Land Administrator

Enclosures
cc: Central Files

DAVID Y. IGE
GOVERNOR OF HAWAII

SUZANNE D. CASE
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

October 14, 2021

MEMORANDUM

FROM:

TO:

~~TO:~~ **DLNR Agencies:**
___Div. of Aquatic Resources
___Div. of Boating & Ocean Recreation
_X_ Engineering Division (DLNR.ENGR@hawaii.gov)
_X_ Div. of Forestry & Wildlife (rubyrosa.t.terrago@hawaii.gov)
___Div. of State Parks
_X_ Commission on Water Resource Management (DLNR.CWRM@hawaii.gov)
_X_ Office of Conservation & Coastal Lands (sharleen.k.kuba@hawaii.gov)
_X_ Land Division – Maui District (daniel.l.ornellas@hawaii.gov)

~~FROM:~~ Russell Y. Tsuji, Land Administrator *Russell Tsuji*

SUBJECT: Early Consultation Request for the Proposed DHHL's **Ho'olehua Scattered Lots Subdivision and Related Improvements**

LOCATION: Ho'olehua, Island of Molokai; TMK: (2) 5-2-005:031 and (2) 5-2-026:014

APPLICANT: Munekiyo Hiraga on behalf of Department of Hawaiian Home Lands

Transmitted for your review and comment is information on the above-referenced subject matter. Please submit any comments by **October 26, 2021.**

If no response is received by the above date, we will assume your agency has no comments. Should you have any questions about this request, please contact Darlene Nakamura at darlene.k.nakamura@hawaii.gov. Thank you.

BRIEF COMMENTS:

( ) We have no objections.
( ) We have no comments.
( ) We have no additional comments.
(✓) Comments are included/attached.

Signed: *[signature]*
Print Name: Carty S. Chang, Chief Engineer
Division: Engineering Division
Date: Oct 22, 2021

Attachments
cc: Central Files

DEPARTMENT OF LAND AND NATURAL RESOURCES
ENGINEERING DIVISION

LD/Russell Y. Tsuji

Ref: Early Consultation Request for the Proposed DHHL's Ho'olehua Scattered Lots Subdivision and Related Improvements
Location: Ho'olehua, Island of Molokai
TMK(s): (2) 5-2-005:031 and (2) 5-2-026:014
Applicant: Munekiyo Hiraga on behalf of Department of Hawaiian Home Lands

COMMENTS

The rules and regulations of the National Flood Insurance Program (NFIP), Title 44 of the Code of Federal Regulations (44CFR), are in effect when development falls within a Special Flood Hazard Area (high-risk areas). State projects are required to comply with 44CFR regulations as stipulated in Section 60.12. Be advised that 44CFR, Chapter 1, Subchapter B, part 60 reflects the minimum standards as set forth by the NFIP. Local community flood ordinances may stipulate higher standards that can be more restrictive and would take precedence over the minimum NFIP standards.

The owner of the project property and/or their representative is responsible to research the Flood Hazard Zone designation for the project. Flood Hazard Zones are designated on FEMA's Flood Insurance Rate Maps (FIRM). The official FIRMs can be accessed through FEMA's Map Service Center (msc.fema.gov). Our Flood Hazard Assessment Tool (FHAT) (http://gis.hawaiinfip.org/FHAT) could also be used to research flood hazard information.

If there are questions regarding the local flood ordinances, please contact the applicable County NFIP coordinating agency below:

- Oahu: City and County of Honolulu, Department of Planning and Permitting (808) 768-8098.
- Hawaii Island: County of Hawaii, Department of Public Works (808) 961-8327.
- Maui/Molokai/Lanai County of Maui, Department of Planning (808) 270-7139.
- Kauai: County of Kauai, Department of Public Works (808) 241-4896.

The applicant should include water demands and infrastructure required to meet project needs. Please note that all State projects requiring water service from their local Department/Board of Water Supply system will be required to pay a resource development charge, in addition to Water Facilities Charges for transmission and daily storage.

The applicant is required to provide water demands and calculations to the Engineering Division so it can be included in the State Water Projects Plan Update projections.

Signed: _____
CARTY S. CHANG, CHIEF ENGINEER

Date: Oct 22, 2021

DAVID Y. IGE
GOVERNOR OF HAWAII

SUZANNE D. CASE
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

October 14, 2021

MEMORANDUM

TO: **DLNR Agencies:**
___Div. of Aquatic Resources
___Div. of Boating & Ocean Recreation
_X_ Engineering Division (DLNR.ENGR@hawaii.gov)
_X_ Div. of Forestry & Wildlife (rubyrosa.t.terrago@hawaii.gov)
___Div. of State Parks
_X_ Commission on Water Resource Management (DLNR.CWRM@hawaii.gov)
_X_ Office of Conservation & Coastal Lands (sharleen.k.kuba@hawaii.gov)
_X_ Land Division – Maui District (daniel.l.ornellas@hawaii.gov)

FROM: Russell Y. Tsuji, Land Administrator *Russell Tsuji*
SUBJECT: Early Consultation Request for the Proposed DHHL's **Ho'olehua Scattered Lots Subdivision and Related Improvements**
LOCATION: Ho'olehua, Island of Molokai; TMK: (2) 5-2-005:031 and (2) 5-2-026:014
APPLICANT: Munekiyo Hiraga on behalf of Department of Hawaiian Home Lands

Transmitted for your review and comment is information on the above-referenced subject matter. Please submit any comments by **October 26, 2021.**

If no response is received by the above date, we will assume your agency has no comments. Should you have any questions about this request, please contact Darlene Nakamura at darlene.k.nakamura@hawaii.gov. Thank you.

BRIEF COMMENTS:

( ) We have no objections.
(X) We have no comments.
( ) We have no additional comments.
( ) Comments are included/attached.

Signed: _____
Print Name: Daniel Ornellas
Division: Land Div. MDLO
Date: 10/21/21

Attachments
cc: Central Files

MUNEKIYO HIRAGA
Planning. Project Management. Sustainable Solutions.

Karlynn K. Fukuda
PRESIDENT
Mark Alexander Roy AICP, LEED AP
VICE PRESIDENT
Tessa Munekiyo Ng AICP
VICE PRESIDENT

Michael T. Munekiyo AICP
FOUNDER

September 20, 2024

Via email: dlnr@hawaii.gov and dlnr.land@hawaii.gov

Russell Tsuji, Land Administrator
State of Hawai'i
Department of Land and Natural Resources
P.O. Box 621
Honolulu, Hawai'i 96809

SUBJECT: Response to Early Consultation Comments Regarding Proposed Department of Hawaiian Home Lands' Ho'olehua Scattered Lots Subdivision and Related Improvements

Dear Mr. Tsuji:

On behalf of the Department of Hawaiian Home Lands (DHHL), thank you for your letter dated October 27, 2021, regarding the proposed Ho'olehua Scattered Lots Subdivision and Related Improvements project. We offer the following information in response to the comments received.

Engineering Division:

- Thank you for the confirmation that according to FEMA's Flood Insurance Rate Maps (FIRM), the project is located within Flood Zone X, in an area of minimal flooding outside of the Special Flood Hazard Area.

- We note that the Draft Environmental Assessment (EA) will include a Preliminary Engineering and Drainage Report (PEDR) which will address water demands, calculations and infrastructure needed for the project. The PEDR will be appended to and discussed in the Draft EA. A copy of the Draft EA, including the PEDR, will be provided to the Engineering Division.

Land Division - Maui District

- We acknowledge that the Land Division - Maui District has no comments to provide at this time.

Thank you for your participation in the Chapter 343, Hawai‘i Revised Statutes environmental review process. A copy of your letter and this response will be included in the Draft EA being prepared for this project. Should you have any questions or require additional information, please feel free to contact me at (808) 983-1233.

Very truly yours,

Emily Y.K. Murai
Associate

EYKM:ab
cc: Neil Nugent, Department of Hawaiian Home Lands
Gordon Ring, R. M. Towill Corporation
\\MH03\Drive_F\DATA\SOH DHHL\Hoolehua Scattered Lots\Apps\0ECL\2023-Resp Ltrs\DLNR.docx

MICHAEL P. VICTORINO
Mayor

BRADFORD K. VENTURA
Fire Chief

GAVIN L.M. FUJIOKA
Deputy Fire Chief

DEPARTMENT OF FIRE & PUBLIC SAFETY
FIRE PREVENTION BUREAU
COUNTY OF MAUI
313 MANEA PLACE
WAILUKU, HI 96793

October 20, 2021

Munekiyo Hiraga
Attn: Bryan K. Esmeralda, AICP
305 High Street, Suite 104
Wailuku, HI 96793

SUBJECT: Chapter 343, Hawai'i Revised Statues Early Consultation Request for the Proposed Department of Hawaiian Home Lands' Ho'olehua Scattered Lots Subdivision and Related Improvements

Dear Bryan K. Esmeralda,

Thank you for the opportunity to review your project. At this time Fire Prevention Bureau would recommend a minimum of 500 GPM water supply for fire protection in alignment with the land use requirements.

Our office does reserve the right to comment on the proposed project during the building permit review process when detailed plans for this project are routed to our office for review. At that time, fire apparatus access, water supply for the fire protection, and fire and life safety requirements associated with the subject project will be formally reviewed.

Note: All one and two family dwelling building permits that may come under fire department review will be required to be within 500ft of a fire hydrant along an approved route, other building may be subject to additional fire protection requirements.

Should you have any specific fire related public safety concerns please identify those to us on this or any future projects you would like us to review.

If there are any questions or comments, please feel free to contact Plans Review at (808) 876-4690 or by email at fire.prevention@mauicounty.gov.

Thank you,
Plans Review – Fire Prevention Bureau

RICHARD T. BISSEN, JR.
Mayor

KEKUHAUPIO R. AKANA
Acting Managing Director

BRADFORD K. VENTURA
Fire Chief

GAVIN L.M. FUJIOKA
Deputy Fire Chief

DEPARTMENT OF FIRE & PUBLIC SAFETY
COUNTY OF MAUI
313 Manea Place
Wailuku, Maui, Hawai'i 96732
www.mauicounty.gov

October 10, 2023

Munekiyo Hiraga
Attn: Emily Y.K. Murai
305 High Street, Suite 104
Wailuku, HI 96793

SUBJECT: Chapter 343, Hawai'i Revised Statues Early Consultation Request for the Proposed Department of Hawaiian Home Lands' Ho'olehua Scattered Lots Subdivision and Related Improvements

Dear Emily Y.K. Murai,

Thank you for the opportunity to review your project. At this time Fire Prevention Bureau would recommend a minimum of 500 GPM water supply for fire protection in alignment with the land use requirements.

Our office does reserve the right to comment on the proposed project during the building permit review process when detailed plans for this project are routed to our office for review. At that time, fire apparatus access, water supply for the fire protection, and fire and life safety requirements associated with the subject project will be formally reviewed.

Note: All one- and two-family dwelling building permits that may come under fire department review will be required to be within 600ft of a fire hydrant along an approved route, other buildings may be subject to additional fire protection requirements.

Should you have any specific fire related public safety concerns please identify those to us on this or any future projects you would like us to review.

If there are any questions or comments, please feel free to contact Plans Review at (808) 876-4690 or by email at fire.prevention@mauicounty.gov.

Thank you,
Plans Review – Fire Prevention Bureau

MUNEKIYO HIRAGA
Planning. Project Management. Sustainable Solutions.

Karlynn K. Fukuda
PRESIDENT
Mark Alexander Roy AICP, LEED AP
VICE PRESIDENT
Tessa Munekiyo Ng AICP
VICE PRESIDENT

Michael T. Munekiyo AICP
FOUNDER

September 20, 2024

Via email: fire.prevention@mauicounty.gov

Fire Prevention Bureau- Plans Review
County of Maui
Department of Fire and Public Safety
313 Manea Place
Wailuku, Hawai'i 96732

SUBJECT: Response to Comments Regarding the State of Hawai'i, Department of Hawaiian Home Lands Proposed Ho'olehua Scattered Lots Project, Ho'olehua, Moloka'i

Dear Sir or Madame:

Thank you for your comment letters dated October 20, 2021 and October 10, 2023, regarding the Proposed Ho'olehua Scattered Lots Project. On behalf of the Department of Hawaiian Home Lands (DHHL), we offer the following information in response to the comments received.

Response to Comment No 1:

We confirm that the minimum 500 gallons per minute of water supply will be provided for fire protection.

Response to Comment No 2:

We acknowledge that the Department of Fire and Public Safety may comment on the project during the building permit review process. It is noted that building permits are not anticipated in the near future. The proposed project would subdivide the properties for future use by DHHL beneficiaries.

Response to Comment No. 3:

We acknowledge that during the review of building permits for one (1) and two (2) family dwellings will be required to be located within 600 feet of a fire hydrant along an approved route. We note that dwelling units are not proposed as part of the project. However, DHHL lessees will be made aware of these requirements should they choose to construct dwellings on the subject properties. Additionally, DHHL will be installing a fire hydrant on Pu'u Kapele Road as part of the project improvements.

Thank you again for your participation in the Chapter 343, Hawai‘i Revised Statutes environmental review process. Copies of the letters and this response will be included in the Draft Environmental Assessment being prepared for this project. Should you have any questions or need additional information, please feel free to contact me at (808) 983-1233.

Very truly yours,

Emily Y.K. Murai
Associate

EYKM:ab
cc: Neil Nugent, Department of Hawaiian Home Lands
Gordon Ring, R.M. Towill Corporation
K:\DATA\SOH DHHL\Hoolehua Scattered Lots\Apps\0DEA\EC resp ltrs\2023\MFD.docx

MICHAEL P. VICTORINO
Mayor

LORI TSUHAKO
Director

LINDA R. MUNSELL
Deputy Director

DEPARTMENT OF HOUSING
& HUMAN CONCERNS
COUNTY OF MAUI
2200 MAIN STREET, SUITE 546
WAILUKU, MAUI, HAWAI'I 96793
PHONE: (808) 270-7805

October 11, 2021

Bryan K. Esmeralda, AICP, Senior Associate
Munekiyo Hiraga
305 High Street, Suite 104
Wailuku, Hawaii 96793

Dear Mr. Esmeralda:

SUBJECT: CHAPTER 343, HAWAII REVISED STATUTES EARLY CONSULTATION REQUEST FOR THE PROPOSED DEPARTMENT OF HAWAIIAN HOME LANDS' HO`OLEHUA SCATTERED LOTS SUBDIVISION AND RELATED IMPROVEMENTS

The Department has reviewed the information submitted for the above subject project. Based on our review, we have determined that the project is not subject to Chapter 2.96, Maui County Code. At the present time, the Department has no additional comments to offer.

Please contact Mr. Buddy Almeida, Housing Administrator at (808) 270-7351 if you have any questions.

Sincerely,

LORI TSUHAKO, LSW, ACSW
Director of Housing and Human Concerns

xc: Buddy Almeida, Housing Administrator

RICHARD T. BISSEN, JR.
Mayor

LORI TSUHAKO
Director

SAUMALU MATA'AFA
Deputy Director

DEPARTMENT OF HOUSING
& HUMAN CONCERNS
COUNTY OF MAUI
2200 MAIN STREET, SUITE 546
WAILUKU, MAUI, HAWAI'I 96793
PHONE: (808) 270-7805

September 12, 2023

Emily Y. K. Murai, Associate
Munekiyo Hiraga
305 High Street, Suite 104
Wailuku, Hawaii 96793

Dear Ms. Murai:

SUBJECT: CHAPTER 343, HAWAII REVISED STATUTES EARLY CONSULTATION REQUEST FOR THE PROPOSED DEPARTMENT OF HAWAIIAN HOME LANDS' HOOLEHUA SCATTERED LOTS SUBDIVISION AND RELATED IMPROVEMENTS

The Department has reviewed the information submitted for the above subject project. Based on our review, we have determined that the project is not subject to Chapter 2.96, Maui County Code, and does not require a residential workforce housing agreement. At the present time, the Department has no additional comments to offer.

Please contact Mr. Buddy Almeida, Housing Administrator, at (808) 270-7351 if you have any questions.

Sincerely,

LORI TSUHAKO, LSW, ACSW
Director of Housing and Human Concerns

cc: Buddy Almeida, Housing Administrator

MUNEKIYO HIRAGA
Planning. Project Management. Sustainable Solutions.

Karlynn K. Fukuda
PRESIDENT
Mark Alexander Roy AICP, LEED AP
VICE PRESIDENT
Tessa Munekiyo Ng AICP
VICE PRESIDENT

Michael T. Munekiyo AICP
FOUNDER

September 20, 2024

Lori Tsuhako, LSW, ACSW, Director
County of Maui
Department of Human Concerns
2200 Main Street, Suite 546
Wailuku, Hawai‘i 96793

SUBJECT: Response to Comments Regarding the State of Hawai‘i, Department of Hawaiian Home Lands Proposed Ho‘olehua Scattered Lots Project, Ho‘olehua, Moloka‘i

Dear Ms. Tsuhako:

Thank you for your comment letters, dated October 11, 2021 and September 12, 2023**,** regarding the Proposed Ho‘olehua Scattered Lots Project. On behalf of the Department of Hawaiian Home Lands, thank you for confirming that the project is not subject to Chapter 2.96, Maui County Code, and does not require a residential workforce housing agreement.

Thank you again for your participation in the Chapter 343, Hawai‘i Revised Statutes environmental review process. Copies of the letters and this response will be included in the Draft Environmental Assessment being prepared for this project. Should you have any questions or need additional information, please feel free to contact me at (808) 983-1233.

Very truly yours,

Emily Y.K. Murai
Associate

EYKM:ab
cc: Neil Nugent, Department of Hawaiian Home Lands
Buddy Almeida, Housing Administrator
K:\DATA\SOH DHHL\Hoolehua Scattered Lots\Apps\0DEA\EC resp ltrs\2023\DOHC.docx

MICHAEL P. VICTORINO
Mayor

KARLA H. PETERS
Director

MARCI M. SATO
Deputy Director

DEPARTMENT OF PARKS AND RECREATION

700 Hali'a Nakoa Street, Unit 2, Wailuku, Hawai'i 96793
Main Line (808) 270-7230 / Facsimile (808) 270-7942

October 15, 2021

Bryan K. Esmeralda, AICP, Senior Associate
Munekiyo Hiraga
305 High Street, Suite 104
Wailuku, Hawaii 96793

Dear Mr. Esmeralda:

SUBJECT: CHAPTER 343, HAWAII REVISED STATUTES EARLY CONSULTATION REQUEST FOR THE PROPOSED DEPARTMENT OF HAWAIIAN HOME LANDS' HO'OLEHUA SCATTERED LOTS SUBDIVISION AND RELATED IMPROVEMENTS, LOCATED IN HO'OLEHUA, MOLOKA'I, HAWAI'I, TMK (2) 5-2-005:031 AND (2) 5-2-026:014

Thank you for the opportunity to review and comment on the subject project. In accordance with Maui County Code 18.16.320 Parks and Playgrounds, this project is exempt from park assessment fees. The Department of Parks and Recreation has no further comments at this time.

Should you have any questions, please feel free to contact me or Samual Marvel, Chief of Planning and Development, at samual.marvel@co.maui.hi.us or (808) 270-6173.

Sincerely,

KARLA H. PETERS
Director of Parks and Recreation

c: Samual Marvel, Chief of Planning and Development

KHP:SM:as

RICHARD T. BISSEN, JR.
Mayor

KEKUHAUPIO R. AKANA
Managing Director

PATRICK S. MCCALL
Director

SHANE T. DUDOIT
Deputy Director

DEPARTMENT OF PARKS AND RECREATION
COUNTY OF MAUI
700 HALI'A NAKOA STREET, UNIT 2
WAILUKU, MAUI, HAWAI'I 96793
www.mauicounty.gov

September 19, 2023

Emily Y.K. Murai, Associate
Munekiyo Hiraga
305 High Street, Suite 104
Wailuku, HI 96793

Dear Ms. Murai:

SUBJECT: CHAPTER 343, HAWAII REVISED STATUTES EARLY CONSULTATION REQUEST FOR THE PROPOSED DEPARTMENT OF HAWAIIAN HOME LANDS' HO'OLEHUA SCATTERED LOTS SUBDIVISION AND RELATED IMPROVEMENTS, LOCATED IN HO'OLEHUA, MOLOKA'I, HAWAI'I, TMK (2) 5-2-005:031 AND (2) 5-2-026:014

Thank you for the opportunity to review and comment on the revised subject project. In accordance with Maui County Code 18.16.320 Parks and Playgrounds, this project is exempt from park assessment fees. The Department of Parks and Recreation is in support of the increased number of agricultural homestead lots proposed and has no further comments at this time.

Should you have any questions, please feel free to contact me or Samual Marvel, Chief of Planning and Development, at samual.marvel@co.maui.hi.us or (808) 270-6173.

Sincerely,

PATRICK S. MCCALL
Director of Parks and Recreation

c: Samual A. Marvel, Chief of Planning and Development

PSM:SAM:as

MUNEKIYO HIRAGA
Planning. Project Management. Sustainable Solutions.

Karlynn K. Fukuda
PRESIDENT
Mark Alexander Roy AICP, LEED AP
VICE PRESIDENT
Tessa Munekiyo Ng AICP
VICE PRESIDENT

Michael T. Munekiyo AICP
FOUNDER

September 20, 2024

Patrick S. McCall, Director
County of Maui
Department of Parks and Recreation
700 Hali'a Nakoa Street, Unit 2
Wailuku, Hawai'i 96793

SUBJECT: Response to Comments Regarding the State of Hawai'i, Department of Hawaiian Home Lands Proposed Ho'olehua Scattered Lots Project, Ho'olehua, Moloka'i

Dear Mr. McCall:

Thank you for your comment letters, dated October 15, 2021 and September 19, 2023, regarding the Proposed Ho'olehua Scattered Lots Project. On behalf of the Department of Hawaiian Home Lands, thank you for confirming that the project is exempt from park assessment fees. We appreciate the Department of Parks and Recreation's support of the project.

Thank you again for your participation in the Chapter 343, Hawai'i Revised Statutes environmental review process. Copies of the letters and this response will be included in the Draft Environmental Assessment being prepared for this project. Should you have any questions or need additional information, please feel free to contact me at (808) 983-1233.

Very truly yours,

Emily Y.K. Murai
Associate

EYKM:ab
cc: Neil Nugent, Department of Hawaiian Home Lands
Samual Marvel, Department of Parks and Recreation
\\MH03\Drive_F\DATA\SOH DHHL\Hoolehua Scattered Lots\Apps\0ECL\2023-Resp Ltrs\DPR.docx

OCT 30 2021

POLICE DEPARTMENT
COUNTY OF MAUI

MICHAEL P. VICTORINO
MAYOR

OUR REFERENCE

YOUR REFERENCE

55 MAHALANI STREET
WAILUKU, HAWAII 96793
(808) 244-6400
FAX (808) 244-6411

CHIEF OF POLICE

DEAN M. RICKARD
DEPUTY CHIEF OF POLICE

October 25, 2021

Mr. Bryan K. Esmeralda, AICP
Senior Associate
Munekiyo Hiraga
305 High Street, Suite 104
Wailuku, Hawaii 96793

Re: Chapter 343, Hawaii Revised Statutes Early Consultation Request for the Proposed Department of Hawaiian Home Lands' Hoolehua Scattered Lots Subdivision and Related Improvements

Dear Mr. Esmeralda:

This is in response to your letter dated October 6, 2021 requesting early consultation comments on the proposed Department of Hawaiian Home Lands' Hoolehua Scattered Lots Subdivision project.

In review of the submitted documents, we have no objections to the upcoming construction project if efforts are made to minimize noise, dust and debris so not to inhibit those whose health and well-being may be affected. We also request proper precautions be taken to address the ingress and egress of any construction materials or equipment onto public roadways.

Thank you for giving us the opportunity to comment on this project.

Sincerely,

Assistant John Jakubczak
for: DEAN M. RICKARD
Acting Chief of Police

OCT 02 2023

POLICE DEPARTMENT
COUNTY OF MAUI
55 MAHALANI STREET
WAILUKU, MAUI, HAWAII 96793
TELEPHONE: (808) 244-6400
FAX: (808) 244-6411

RICHARD T. BISSEN, JR.
MAYOR

OUR REFERENCE

YOUR REFERENCE

JOHN PELLETIER
CHIEF OF POLICE

WADE M. MAEDA
DEPUTY CHIEF OF POLICE

September 25, 2023

Ms. Emily Y.K. Murai
Associate
Munekiyo Hiraga
305 High Street, Suite 104
Wailuku, Hawaii 96793

Re: Chapter 343, Hawaii Revised Statutes Early Consultation Request for the Proposed Department of Hawaiian Home Lands' Hoolehua Scattered Lots Subdivision and Related Improvements

Dear Ms. Murai:

This is in response to your letter dated September 8, 2023 requesting early consultation comments on the proposed Department of Hawaiian Home Lands' Hoolehua Scattered Lots Subdivision project.

In review of the submitted documents, we have no objections to the upcoming construction project if efforts are made to minimize noise, dust and debris so not to inhibit those whose health and well-being may be affected. We also request proper precautions be taken to address the ingress and egress of any construction materials or equipment onto public roadways.

Thank you for giving us the opportunity to comment on this project.

Sincerely,

Assistant Chief Keola Tom
for: JOHN PELLETIER
Chief of Police

MUNEKIYO HIRAGA
Planning. Project Management. Sustainable Solutions.

Karlynn K. Fukuda
PRESIDENT
Mark Alexander Roy AICP, LEED AP
VICE PRESIDENT
Tessa Munekiyo Ng AICP
VICE PRESIDENT

Michael T. Munekiyo AICP
FOUNDER

September 20, 2024

John Pelletier, Chief
County of Maui
Police Department
55 Mahalani Street
Wailuku, Hawai'i 96793

SUBJECT: Response to Comments Regarding the State of Hawai'i, Department of Hawaiian Home Lands Proposed Ho'olehua Scattered Lots Project, Ho'olehua, Moloka'i

Dear Chief Pelletier:

Thank you for your comment letters, dated October 25, 2021 and September 25, 2023, regarding the Proposed Ho'olehua Scattered Lots Project. On behalf of the Department of Hawaiian Home Lands, we offer the following information in response to the comment received.

- Appropriate construction Best Management Practices (BMPs) will be implemented in order to minimize construction-generated noise, dust and debris. In addition, all State and County regulations will be followed and coordination efforts with the appropriate agencies will be made to address ingress and egress of construction materials and equipment onto public roadways. Lastly, thank you for confirming that with the above mentioned precautions, the County of Maui Police Department has no objections to the project.

Thank you again for your participation in the Chapter 343, Hawai'i Revised Statutes environmental review process. Copies of the letters and this response will be included in the Draft Environmental Assessment being prepared for this project. Should you have any questions or need additional information, please feel free to contact me at (808) 983-1233.

Very truly yours,

Emily Y.K. Murai
Associate

EYKM:ab
cc: Neil Nugent, Department of Hawaiian Home Lands
\\MH03\Drive_F\DATA\SOH DHHL\Hoolehua Scattered Lots\Apps\0ECL\2023-Resp Ltrs\MPD.docx

MICHAEL P. VICTORINO
Mayor

MARC I. TAKAMORI
Director

MICHAEL B. DU PONT
Deputy Director

DEPARTMENT OF TRANSPORTATION
COUNTY OF MAUI
200 SOUTH HIGH STREET
WAILUKU, MAUI, HAWAI'I 96793

TELEPHONE: (808) 270-7511
FAX: (808) 270-7505

October 28, 2021

Mr. Bryan K. Esmeralda, AICP, Senior Associate
Munekiyo Hiraga
305 High Street, Suite 104
Wailuku, HI 96793
Email: planning@munekiyohiraga.com

SUBJECT: **Chapter 343, Hawaii Revised Statutes Early Consultation Request for the Proposed Department of Hawaiian Home Lands Ho'olehua Scattered Lots Subdivision and Related Improvements**

Dear Mr. Esmeralda,

Thank you for the opportunity to review and comment on this project. We have no comments to make at this time.

Please feel free to contact me if you have any questions.

Sincerely,

Marc Takamori
Director

MUNEKIYO HIRAGA
Planning. Project Management. Sustainable Solutions.

Karlynn K. Fukuda
PRESIDENT
Mark Alexander Roy AICP, LEED AP
VICE PRESIDENT
Tessa Munekiyo Ng AICP
VICE PRESIDENT

Michael T. Munekiyo AICP
FOUNDER

September 20, 2024

Marc Takamori, Director
County of Maui
Department of Transportation
200 South High Street
Wailuku, Hawai'i 96793

SUBJECT: Response to Comments Regarding the State of Hawai'i, Department of Hawaiian Home Lands Proposed Ho'olehua Scattered Lots Project, Ho'olehua, Moloka'i

Dear Mr. Takamori:

Thank you for your comment letter, dated October 28 2021**,** regarding the Proposed Ho'olehua Scattered Lots Project. On behalf of the Department of Hawaiian Home Lands, we acknowledge that the Department of Transportation has no comments to offer at this time.

Thank you again for your participation in the Chapter 343, Hawai'i Revised Statutes environmental review process. A copy of your letter and this response will be included in the Draft Environmental Assessment being prepared for this project. Should you have any questions or need additional information, please feel free to contact me at (808) 983-1233.

Very truly yours,

Emily Y.K. Murai
Associate

EYKM:ab
cc: Neil Nugent, Department of Hawaiian Home Lands
\\MH03\Drive_F\DATA\SOH DHHL\Hoolehua Scattered Lots\Apps\0ECL\2023-Cmt Resp Ltrs\MDOT.docx

MICHAEL P. VICTORINO
Mayor

JEFFREY T. PEARSON, P.E.
Director

HELENE KAU
Deputy Director

DEPARTMENT OF WATER SUPPLY
COUNTY OF MAUI
200 SOUTH HIGH STREET WAILUKU,
MAUI, HAWAI'I 96793
www.mauicounty.gov/water

October 27, 2021

Mr. Bryan K. Esmeralda, AICP, Sr. Associate
Munekiyo Hiraga
305 High St., Ste 104
Wailuku, Hawaii 96793

Dear Mr. Esmeralda,

Re: Early Consultation Request for the Proposed Department of Hawaiian Home Lands' Ho`olehua Scattered Lots Subdivision and Related Improvements
TMKs: (2) 5-2-005:031 and (2) 5-2-026:014
Island of Moloka`i, Hawai`i

The County of Maui Department of Water Supply's (MDWS) Water Resources and Planning Division appreciates the opportunity to comment on this early consultation request for this project.

Source and Availability

According to the Commission on Water Resource Management (CWRM), the project overlies the Ho`olehua Aquifer, which has a sustainable yield of 2 million gallons per day. The MDWS System does not service the area within which the project is located.

Water Quality Pollution Prevention

Septic System Best Management Practices (BMPs)

The MDWS highly recommends that the applicant inform future homeowners to utilize these BMPs for septic systems:

- Have the septic system inspected annually and pumped out regularly.
- No chemical or other additive can be a substitute for regular pumping. Septic System chemicals can prevent the septic system from functioning properly.

- Use caution about what you put into the system. Substances like coffee grounds, cigarette butts, sanitary items, or fats do not break down easily in septic systems.
- Prevent strong chemicals like paints, solvents, oil, and pesticides from entering the system and potentially entering the groundwater.
- Practice water conservation to increase septic system life span. Limit the amount of water entering the system by using water-saving fixtures and appliances.
- Keep roof drains and storm water runoff away from the drain field area.
- Keep the leaching area free of vehicles, buildings, trees and shrubs.
- Keep accurate records of on-site maintenance activities.
- Keep an accurate map of the location of all system components.
- Please see the attached Agricultural BMPs.

Construction BMPs for Pollution Prevention

To protect ground and surface water resources, we recommend that in addition to required BMPs, the following measures designed to conserve water and minimize infiltration and runoff be implemented during construction:

- Prevent cement products, oil, fuel and other toxic substances from falling or leaching into the ground. Remove all construction debris and toxic substances daily.
- Properly install and maintain erosion control barriers such as silt fencing or straw bales.
- Disturb the smallest area possible.
- Retain ground cover until the last possible date. Stabilize denuded areas by sodding or planting as soon as possible. Use high seeding rates to ensure rapid establishment of stands of plants.
- Apply biocides only during dry periods of low rainfall to minimize chemical run-off.
- Keep runoff on-site.
- Maintain vehicles and equipment to prevent oil or other fluids from leaking. Concrete trucks and tools used for construction should be rinsed off-site.

Indoor Water Conservation BMPs

- Use EPA WaterSense labeled plumbing fixtures.
- Install flow reducers and faucet aerators in all plumbing fixtures wherever possible.
- Install dual flush toilets with high-efficiency models that use 1.28 gallons per flush or less.
- Install showerheads with a flow rate of 1.5 gallons per minute at 60 pounds per square inch (psi).
- Install bathroom sink faucets with fixtures that do not exceed 1 gpm at 60 psi.
- Laundry facilities and/or individual unit machines should use Energy Star-labeled washers.

Outdoor Water Conservation BMPs

- Use Smart Approved WaterMark irrigation products. Examples include evapotranspiration drip irrigation, and water saving spray heads.
- Use native Hawaiian climate-adapted plants for landscaping. Native Hawaiian plants adapted to the area conserve water and protect the watershed from degradation due to invasive species. For more information, please see https://www.ctahr.hawaii.edu/rnre/native_plants_water_conservation.asp.
- After plants are established, in order to avoid stimulating excessive growth, avoid fertilizing and pruning. Time watering to occur in the early morning or evening to limit evaporation. Limit turf to as small an area as possible.

Should you have any questions or comments, please contact staff planner Marti Buckner at (808) 463-3104 ormarti.buckner@mauicounty.gov .

Sincerely,

Jeffrey T. Pearson, P.E.
Director
mlb

cc: MDWS Engineering
attachments: Agricultural BMPs

Agricultural BMPs

Contamination of ground water can occur when pesticides, herbicides, fertilizer, fungicides and/or other chemicals are spilled. Contamination can also happen when rinse water from containers or equipment cleaning is dumped on the ground or into surface waters such as streams or ponds. Improperly cleaned containers that are stockpiled or buried could also be potential sources of groundwater contamination.

- Locate operations as far as possible from groundwater wells and areas that may drain into surface water bodies such as streams, the ocean, or ponds.
- Know and comply with regulations governing the storage, handling and application, and disposal of hazardous substances.
- Adopt the "First in – First out" Principle. The "First in – First out" Principle directs you to use your oldest chemicals first, in order to ensure that they don't expire.
- Keep pesticides locked or inaccessible to the public in an area separate from areas used to store other materials, such as fertilizers, feed, and seed.
- Segregate and label herbicides, insecticides and fungicides to prevent cross-contamination.
- Keep a written pesticide inventory and Material Safety Data Sheet (MSDS) file for the chemicals used on-site of your operations.
- Arrange pesticide containers in the storage area, so that labels are clearly visible, and make sure the labels can be read.
- Place bags of DRY pesticides and other chemicals on raised, plastic pallets to ensure they do not get wet. Do not store any liquid materials above dry chemicals.
- Use shelving made of plastic or reinforced metal. Keep metal shelving painted or invest in and use stainless steel to avoid corrosion. NEVER use wood shelving! Wood shelving may absorb spilled pesticide and other chemical materials.
- Do not transport, handle, store, load, apply or dispose of any hazardous substance in a way that may pollute water supplies or cause damage or injury to land, including human, plants or animals.
- Isolate all potential contaminants from soil and water.
- Keep drip pans or containers under vehicles and/or equipment that may drip. Collect oil from drip pans and recycle.
- Do not discharge any waste material onto the ground.
- Clean up spills as soon as possible. The sooner you contain, absorb, and dispose of a spill, the less chance there is that it will contaminate our groundwater. Always use the appropriate personal protective equipment as indicated on the MSDS and chemical label.
- Always remember the 4 steps to preventing contamination:
    - CONTROL actively spilling or leaking materials by setting the container upright;
    - CONTAIN the spilled material using barriers and absorbent material;

    - COLLECT spilled material, absorbents, and leaking containers and place them in a secure and properly labeled container;
    - STORE the containers of spilled material until they can be applied as a pesticide or appropriately disposed.
- Report all spills to the Department of Health, Environmental Health Administration and/or Environmental Protection Agency as required by state and federal laws.
- Consider using Integrated Pest Management as an alternative to chemical use. Find more information and training at the State of Hawaii, Department of Health, Vector Control Branch's website http://health.hawaii.gov/vcb.

MUNEKIYO HIRAGA
Planning. Project Management. Sustainable Solutions.

Karlynn K. Fukuda
PRESIDENT
Mark Alexander Roy AICP, LEED AP
VICE PRESIDENT
Tessa Munekiyo Ng AICP
VICE PRESIDENT

Michael T. Munekiyo AICP
FOUNDER

September 20, 2024

John Stufflebean, P. E., Director
County of Maui
Department of Water Supply
200 South High Street
Wailuku, Hawai'i 96793

SUBJECT: Response to Early Consultation Comments Regarding Proposed Department of Hawaiian Home Lands' Ho'olehua Scattered Lots Subdivision and Related Improvements

Dear Mr. Stufflebean:

On behalf of the Department of Hawaiian Home Lands (DHHL), thank you for your Department's letter dated October 27, 2021, regarding the proposed Ho'olehua Scattered Lots Subdivision and Related Improvements project. We offer the following information in response to the comments received.

Source and Availability

- Thank you for confirming that the Maui Department of Water Supply (DWS) does not service the project area. We acknowledge that the project is within the Ho'olehua Aquifer, which has a two (2) million gallons per day sustainable yield according to the Commission on Water Resource Management (CWRM). We note that the Draft Environmental Assessment (EA) will include a Preliminary Engineering and Drainage Report (PEDR) which will address water demands, calculations and infrastructure needed for the project. The PEDR will be appended to and discussed in the Draft EA. A letter with a link to the Draft EA, inclusive of the PEDR will be provided to the DWS when the document is published.

Water Quality Pollution Prevention

- We acknowledge receipt of the Septic System Best Management Practices (BMPs) and Agricultural BMPs to prevent water pollution. These BMPs will be shared with the DHHL and future lessees for implementation, as may be applicable.

Construction BMPs for Pollution Prevention

- The Construction BMPs for Pollution Prevention have been forwarded to the engineering and design team for review and incorporation into the project, as may be practicable.

Water Conservation BMPs

- The indoor and outdoor Water Conservation BMPs have been forwarded to the engineering and design team for review and incorporation into the project, as may be practicable.

Thank you for your participation in the Chapter 343, Hawai'i Revised Statutes environmental review process. A copy of your letter and this response will be included in the Draft EA being prepared for this project. Should you have any questions or require additional information, please feel free to contact me at (808) 983-1233.

Very truly yours,

Emily Y.K. Murai
Associate

EYKM:ab
cc: Neil Nugent, Department of Hawaiian Home Lands
Gordon Ring, R. M. Towill Corporation
\\MH03\Drive_F\DATA\SOH DHHL\Hoolehua Scattered Lots\Apps\0ECL\2023-Resp Ltrs\DWS.docx

Moloka'i Na'iwa Homestead Association
PO Box 482152
Kaunakakai, Hawaii 96748
(808) 213-5180
mkk.naiwa.ha@gmail.com

7th October 2021

Munekiyo Hiraga
735 Bishop Street, Ste. 412
Honolulu, Hawaii 96813

Re: Early Consultation Request for Proposed DHHL Ho'olehua Scattered Lots Subdivision and Related Improvement.

On behalf of Moloka'i Na'iwa Homestead Association, serving as President and a lessee of the Na'iwa Agricultural Subdivision, my comments are expressed below.

The project entailing subdividing two (2) non contiguous lots within the Ho'olehua area on Moloka'i into ten (10) smaller lots to be designated for subsistence agriculture use and improving them for lease to DHHL beneficiaries is a prudent action item that supports agricultural sustainability and provides land to construct an adequate home for the chosen beneficiaries.

The Department of Hawaiian Home Lands (DHHL) and its constituents have the full support from Moloka'i Na'iwa Homestead Association to move forward on the project specified above with no objections.

Sincerely,

Liliana Napoleon

Liliana KI Napoleon, President

Moloka'i Na'iwa Homestead Association

Subject: FW: Early Consultation Request for the Proposed Department of Hawaiian Home Lands' Hoʻolehua Scattered Lots Subdivision and Related Improvements

From: Nāʻiwa Agricultural Subdivision Alliance <mkk.nas.alliance@gmail.com>
Sent: Saturday, September 23, 2023 10:55 AM
To: Tracy Nakamoto <tracy@munekiyohiraga.com>
Cc: Emily Murai <emily@munekiyohiraga.com>; Karlynn Fukuda <karlynn@munekiyohiraga.com>; cornelius.f.nugent@hawaii.gov
Subject: Re: Early Consultation Request for the Proposed Department of Hawaiian Home Lands' Hoʻolehua Scattered Lots Subdivision and Related Improvements

All looks great. NASA continues to support this movement snd efforts for the Hoolehua scattered lots.

Mahalo.

On Fri, Sep 15, 2023 at 2:38 PM Tracy Nakamoto <tracy@munekiyohiraga.com> wrote:

To: Liliana KI Napoleon, President
Naʻiwa Agricultural Subdivision Alliance

From: Emily Murai, Associate
Munekiyo Hiraga

Attachment:

Quantity	Date	Description
1	09/15/23	Early Consultation Request for Proposed Department of Hawaiian Home Lands' Hoʻolehua Scattered Lots Subdivision and Related Improvements

Message: We are providing the attached early consultation letter for your review. Thank you!

Tracy Nakamoto, Administrative Officer
Email: tracy@munekiyohiraga.com

MUNEKIYO HIRAGA

Maui: 305 High Street, Suite 104, Wailuku, Hawaii 96793 **T:** 808.244.2015 **F:** 808.244.8729
Oahu: 735 Bishop Street, Suite 412, Honolulu, Hawaii 96813 **T:** 808.983.1233
Planning. Project Management. Sustainable Solutions. www.munekiyohiraga.com

CONFIDENTIAL AND PRIVILEGED COMMUNICATION: This message (including attachments) is intended for the use of the designated recipient(s) named above. The contents of this correspondence are considered privileged and confidential. If you have received this message in error, kindly notify us immediately by email or telephone, and delete this email from your computer system. Thank you.

MUNEKIYO HIRAGA
Planning. Project Management. Sustainable Solutions.

Karlynn K. Fukuda
PRESIDENT
Mark Alexander Roy AICP, LEED AP
VICE PRESIDENT
Tessa Munekiyo Ng AICP
VICE PRESIDENT

Michael T. Munekiyo AICP
FOUNDER

September 20, 2024

Via email: mkk.nas.alliance@gmail.com

Liliana KI Napoleon, President
Nāʻiwa Agricultural Subdivision Alliance
Molokaʻi, Hawaiʻi

SUBJECT: Response to Comments Regarding the State of Hawaiʻi, Department of Hawaiian Home Lands Proposed Hoʻolehua Scattered Lots Project, Hoʻolehua, Molokaʻi

Dear Ms. Napoleon:

Thank you for your comments, dated October 7, 2021 and September 23, 2023, regarding the Proposed Hoʻolehua Scattered Lots Project. On behalf of the Department of Hawaiian Home Lands, thank you for expressing Nāʻiwa Agricultural Subdivision Alliance's support of the proposed project.

Thank you again for your participation in the Chapter 343, Hawaiʻi Revised Statutes environmental review process. A copy of your email and this response will be included in the Draft Environmental Assessment being prepared for this project. Should you have any questions or need additional information, please feel free to contact me at (808) 983-1233.

Very truly yours,

Emily Y.K. Murai
Associate

EYKM:ab
cc: Neil Nugent, Department of Hawaiian Home Lands
\\MH03\Drive_F\DATA\SOH DHHL\Hoolehua Scattered Lots\Apps\0ECL\2023-Resp Ltrs\Naiwa.docx

REFERENCES X

X. REFERENCES

County of Maui, 2030 General Plan, Countywide Policy Plan, March 2010.

County of Maui, Molokaʻi Island Community Plan, September 2018.

County of Maui, "Neighbor Island Parcels", [GIS Polygon Shapefile]. Created by Geographic Decision Systems International and County of Maui. 2021. Retrieved from http://hawaii.gov/dbedt/gis/download.htm.

County of Maui, Office of Economic Development, Maui County Data Book 2021-2022.

Foote etal, U.S. Department of Agriculture, Soil Conservation Service, Soil Survey of the Islands of Kauaʻi, Oʻahu, Maui, Molokaʻi, and Lānaʻi, State of Hawaiʻi. 1972.

G70, Final Environmental Assessment, Hoʻolehua Veterans and Homestead Residents' Community Center, November 2018.

Hawaiʻi Climate Change Mitigation and Adaptation Commission, Sea Level Rise Vulnerability and Adaptation Report, December 2017.

Hawaiʻi Department of Health, Clean Air Branch, Hawaii Greenhouse Gas Emissions Report for 2015, Final Report, January 2019.

Hawaiʻi Public Utilities Commission, Report to the 2019 Legislature on Hawaii's Renewable Portfolio Standards, December 2018.

Hawaiʻi State Energy Office, Hawaiʻi's Energy Facts and Figures 2020 Edition.

Hawaiʻi Wildfire Management Organization, Molokaʻi Wildfire Management Organization

IPCC, 2021: Summary for Policymakers. In: Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Masson Delmotte, V., P. Zhai, A. Pirani, S.L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M.I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J.B.R. Matthews, T.K. Maycock, T. Waterfield, O. Yelekçi, R. Yu, and B. Zhou (eds.)]. Cambridge University Press. In Press.

PBR Hawaii & Associates, Inc., Final Environmental Assessment, Improvements to the Department of Hawaiian Homelands Hoʻolehua Water System, May 2016.

State of Hawaiʻi, Coastal Zone Management, Chapter 205A Hawaiʻi Revised Statutes.

State of Hawaiʻi, Department of Agriculture, "Agricultural Lands of Important to the State of Hawaiʻi" (GIS Shapefile), Digitized by State Office of Planning using ArcInfo version 6 from State Department of Agriculture's 1:24,000 blueline maps, Retrieved from http://hawaii.gov/dbedt/gis/download.htm.

State of Hawai‘i, Department of Agriculture, Agriculture Functional Plan, 1991.

State of Hawai‘i, Department of Business, Economic Development, and Tourism, Energy State Functional Plan, 1991.

State of Hawai‘i, Department of Business, Economic Development, and Tourism, The State of Hawai‘i Data Book, 2023.

State of Hawai‘i, Department of Business, Economic Development, and Tourism, Tourism State Functional Plan, 1991.

State of Hawai‘i, Department of Education, Education State Functional Plan, 1989.

State of Hawai‘i, Department of Education, Maui District Directory, 2021.

State of Hawai‘i, Department of Hawaiian Home Lands, General Plan, November 2022.

State of Hawai‘i, Department of Hawaiian Home Lands, Moloka‘i Island Plan, June 2005.

State of Hawai‘i, Department of Hawaiian Home Lands, Moloka‘i Regional Plan, 2019.

State of Hawai‘i, Department of Hawaiian Home Lands Applicant Waiting List https://dhhl.hawaii.gov/wp-content/uploads/2024/03/DHHL-Molokai-Waitlist-6-30-2023-FINAL.pdf. Accessed March 17, 2024.

State of Hawai‘i, Department of Health, Health State Functional Plan, 1989.

State of Hawai‘i, Department of Labor and Industrial Relations, Employment State Functional Plan, 1990.

State of Hawai‘i, Department of Human Services, Human Services State Functional Plan, 1989.

State of Hawai‘i, Department of Land and Natural Resources, Conservation Lands State Functional Plan, 1991.

State of Hawai‘i, Department of Land and Natural Resources, Division of Forestry and Wildlife Hawai‘i Forest Action Plan, 2016.

State of Hawai‘i, Department of Land and Natural Resources, Historic Preservation Functional Plan, 1991.

State of Hawai‘i, Department of Land and Natural Resources, Recreation State Functional Plan,1991.

State of Hawai‘i, Department of Transportation, Transportation State Functional Plan, 1991.

State of Hawai‘i, Hawai‘i Housing Finance and Development Corporation, Affordable Housing State Functional Plan, 2017.

State of Hawai‘i, Hawai‘i State Planning Act, Chapter 226, Hawai‘i Revised Statutes.

State of Hawai‘i, Hawaiian Homes Commission Act, Volume 06, Hawai‘i Revised Statutes.

State of Hawai‘i, State Land Use Commission, “State Land Use District Boundaries”, (GIS shapefile), Digitized by State Office of Planning using Arclnfo 4, 5, and 6 from State Land Use Commission’s 1 :24,000 mylar maps. (2020), Retrieved from http://hawaii.gov/dbedt/gis/download.htm.

State of Hawai‘i, University of Hawai‘i, Higher Education Functional Plan, 1984.

U.S. Census Bureau, 2020 Census, https://data.census.gov, accessed October 2021.

U.S. Department of Agriculture, “Soil Survey Geographic database for Island of Moloka‘i, Hawai‘i”, (GIS Shapefile), Digitized by State Office of Planning using Arclnfo 7.1.2 from Department of Agriculture’s 7.5 minute quadrangles, Retrieved from http://hawaii.gov/dbedt/gis/download.htm.

U.S. Environmental Protection Agency, “GHG Reporting Program Data, 2019”, https://ghgdata.epa.gov/ghgp/main.do, Accessed September 2021.

U.S. Environmental Protection Agency, “Sources of Greenhouse Gas Emissions”, https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions, 2019, Accessed October 2021.

University of Hawai‘i, Land Study Bureau. “Land Study Bureau Detailed Land Classification” (GIS Shapefile), Digitized by State Office of Planning using Arclnfo 7.1.1 from Land Study Bureau’s 1:24,000 topographic and orthophoto quads, Retrieved from http://hawaii.gov/dbedt/gis/download.htm.

APPENDIX

A

PRELIMINARY DEVELOPMENT PLANS

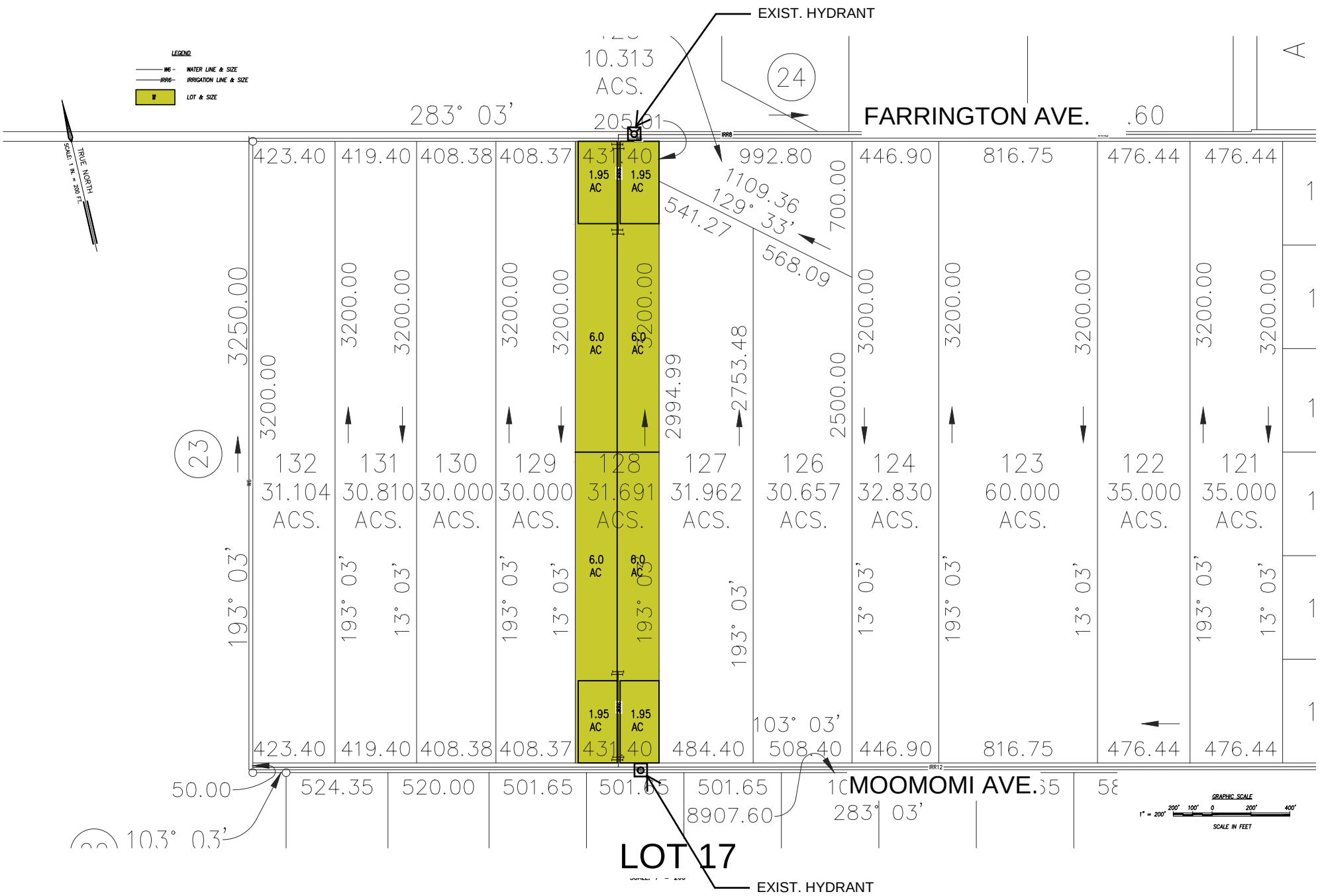

EXIST. HYDRANT
LEGEND
W6 – WATER LINE & SIZE
IRR6 – IRRIGATION LINE & SIZE
LOT & SIZE
10.313 ACS.
283° 03'
FARRINGTON AVE.
.60
TRUE NORTH
SCALE: 1 IN. = 200 FT.
423.40
419.40
408.38
408.37
431.40
992.80
446.90
816.75
476.44
476.44
1.95 AC
1.95 AC
1109.36
129° 33'
541.27
568.09
700.00
3250.00
3200.00
6.0 AC
6.0 AC
2994.99
2753.48
2500.00
23
24
132
31.104 ACS.
131
30.810 ACS.
130
30.000 ACS.
129
30.000 ACS.
128
31.691 ACS.
127
31.962 ACS.
126
30.657 ACS.
124
32.830 ACS.
123
60.000 ACS.
122
35.000 ACS.
121
35.000 ACS.
193° 03'
13° 03'
484.40
508.40
103° 03'
W6
IRR12
50.00
524.35
520.00
501.65
501.65
501.65
8907.60
MOOMOMI AVE.
GRAPHIC SCALE
1" = 200'
200' 100' 0 200' 400'
SCALE IN FEET
LOT 17
EXIST. HYDRANT

FIGURE 2

EXIST. HYDRANT
LEGEND
LOT & SIZE
TRUE NORTH
SCALE: 1 IN. = 80 FT.
PUU KAPELE AVENUE
IRR8
W8
1.0 AC
3.0 AC
3.2 AC
12.8 AC
LOT 26 (F.P. 2328)
LOT 27 (F.P. 2328)
LOT 33 (F.P. 2328)
LOT 31 (F.P. 2328)
LOT 36
LOT
GRAPHIC SCALE
1" = 80'
80' 40' 0 40' 80'
SCALE IN FEET
HOOLEHUA PUU KAPELE LOTS
SCALE: 1" = 60'
LOT 104D

FIGURE 3

HOOLEHUA

MOLOKAI, HAWAII

R. M. TOWILL CORPORATION

TRUE NORTH
1" = 500'

200

400

PUU KAPELE AVE.

EXISTING UNPAVED ROADWAY — 2722.5' (NEW PAVED ROADWAY) — EXISTING PAVED ROADWAY

LOT 104D

4 LOTS

ANAKAHI AVE.

HAUAKEA AVE.

NENEHANAUPO AVE.

EXISTING UNPAVED ROADWAY — 3443.86' (NEW PAVED ROADWAY) — EXISTING PAVED ROADWAY

FARRINGTON AVE.

PROPOSED FARRINGTON AVE.
CULVERT CROSSING
11'x8' BOX CULVERT (2-BARREL)

LOT 17

8 LOTS

MOOMOMI AVE.

EXISTING UNPAVED ROADWAY — 3629.15' (NEW PAVED ROADWAY) — EXISTING PAVED ROADWAY

OVERALL ROAD LAYOUT PLAN

SCALE: 1" = 500'

GRAPHIC SCALE:
500' 250' 0 500' 1000'
1" = 500'
SCALES IN FEET

REVISION	DATE	BRIEF	BY	APPROVED

APPROVED BY

ENGINEER

DRAFTSMAN

CHECKED BY

SCALE AS SHOWN

DATE

DPP FILE NO.

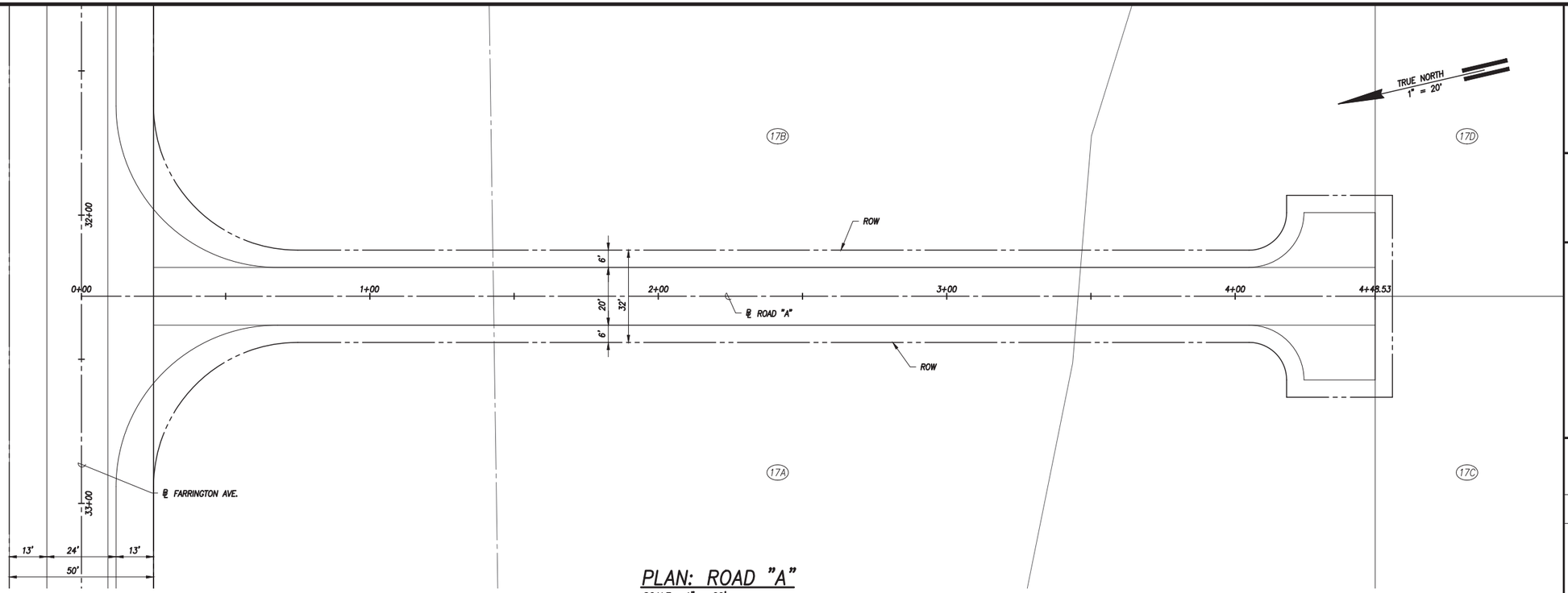
OVERALL
ROAD LAYOUT PLAN

RMTC JOB NO.: 1-23452-0E

K:\civil\23375 Hoolehua Naiwa\PER\Hoolehua\04 Roads\CAD files\C100_Overall Road Layout Plan.dwg October 26, 2023

C100 SHEET OF SHEETS

FILE	POCKET	FOLDER	NO.



PLAN: ROAD "A"
SCALE: 1" = 20'

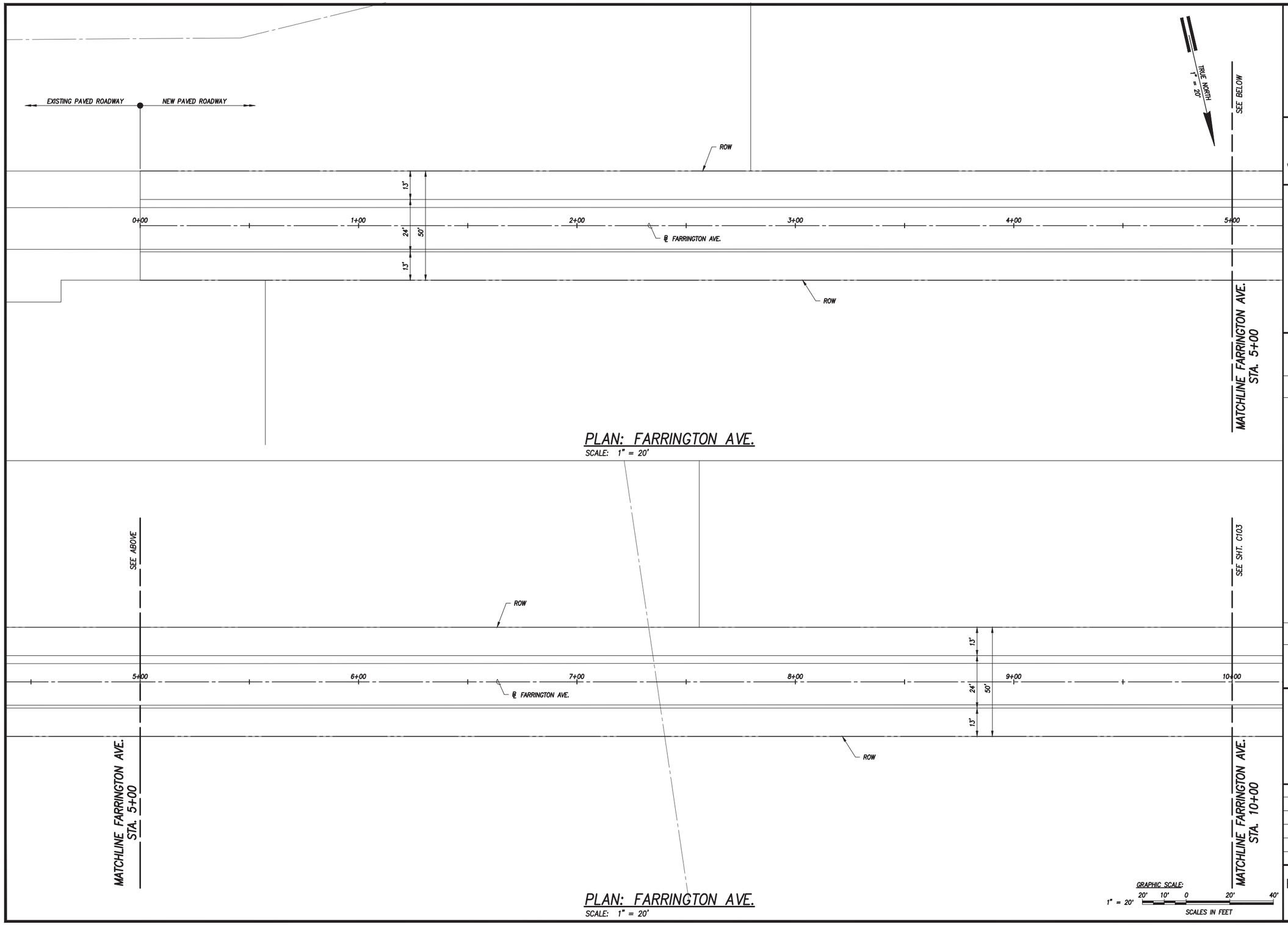
GRAPHIC SCALE:
1" = 20'
20' 10' 0 20' 40'
SCALES IN FEET

HOOLEHUA

MOLOKAI, HAWAII

R. M. TOWILL CORPORATION

	BY	APPROVED



PLAN: FARRINGTON AVE.
SCALE: 1" = 20'

PLAN: FARRINGTON AVE.
SCALE: 1" = 20'

HOOLEHUA

MOLOKAI, HAWAII

R. M. TOWILL CORPORATION

REVISION	DATE	BY	APPROVED

APPROVED BY

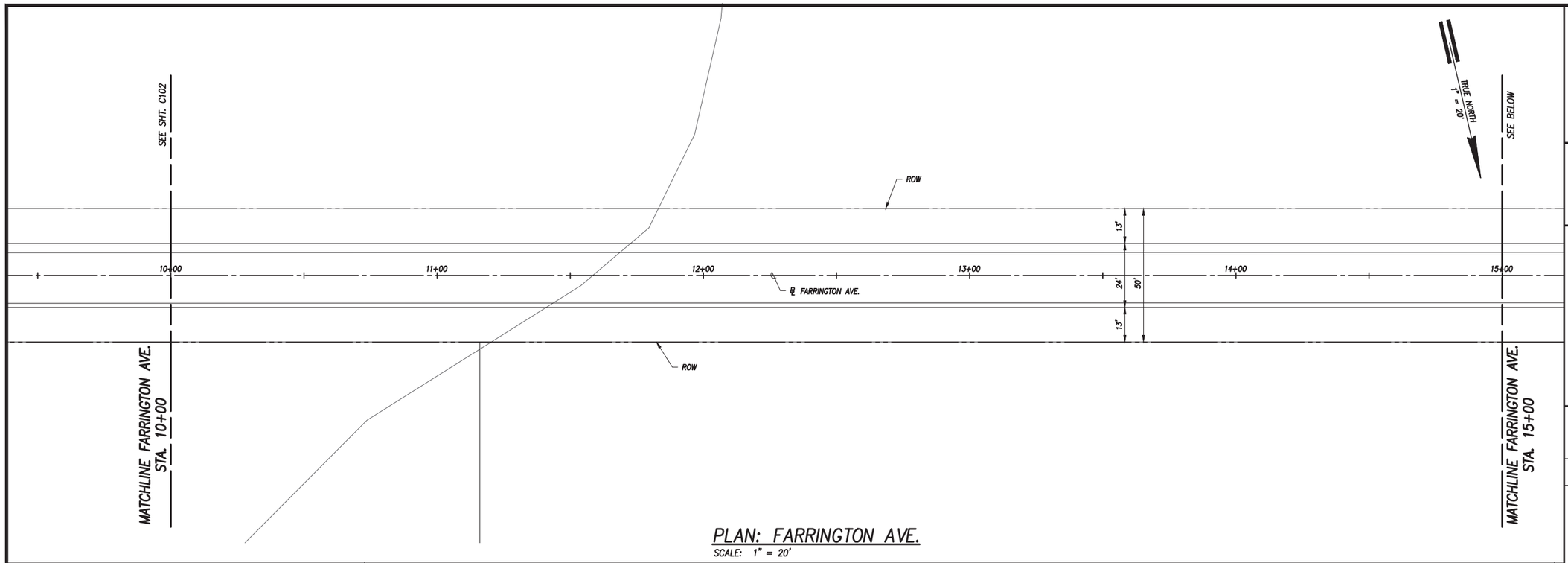
ENGINEER	
DRAFTSMAN	
CHECKED BY	
SCALE	AS SHOWN
DATE	
DPP FILE NO.	

FARRINGTON AVE. PLAN–1
(STA. 0+00 TO 10+00)

RMTC JOB NO.: 1–23452–0E

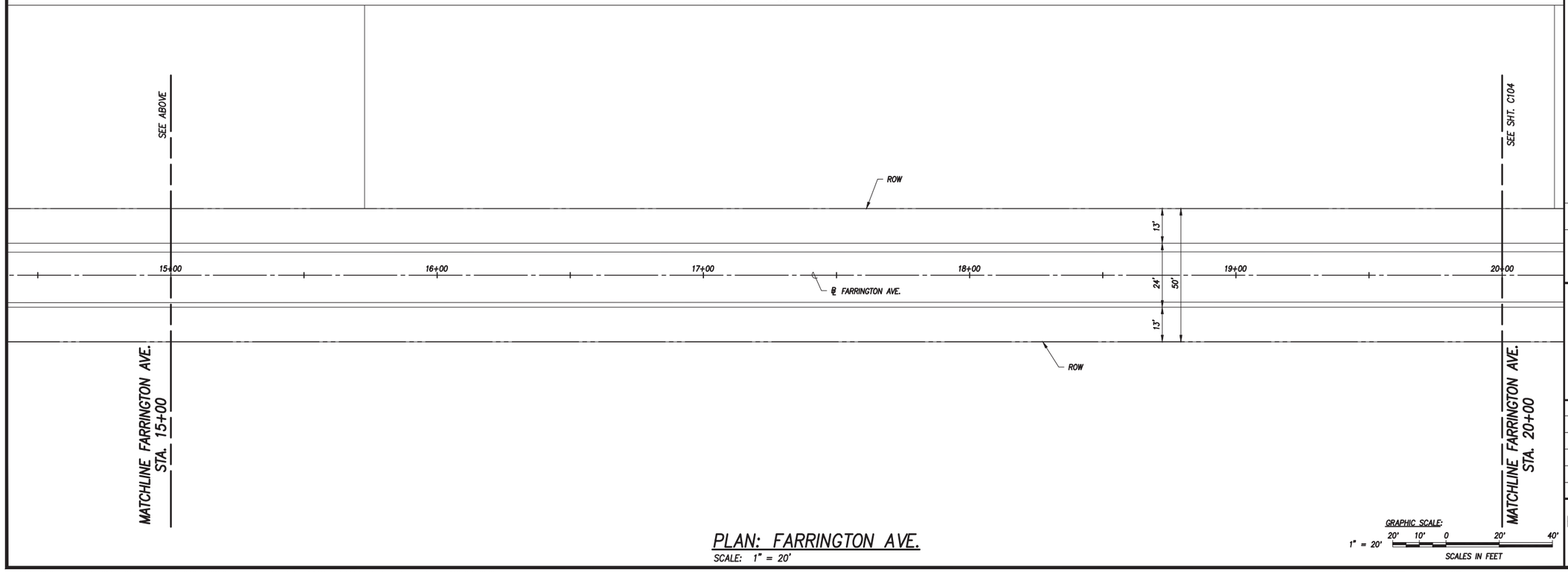
Z:\12. 2021 Project\JN–2143 RM–Hoolehua PER\01. 30%\Construction Dwgs\Road\C102_FARRINGTON AVE Plan – 1.dwg 11? 26, 2021

FILE	POCKET	FOLDER	NO.



PLAN: FARRINGTON AVE.

SCALE: 1" = 20'



PLAN: FARRINGTON AVE.

SCALE: 1" = 20'

GRAPHIC SCALE:
20' 10' 0 20' 40'
1" = 20'
SCALES IN FEET

RMTC JOB NO.: 1-23452-0E

Z:\12. 2021 Project\JN-2143 RM-Hoolehua PER\01. 30%\Construction Dwgs\Road\C103_FARRINGTON AVE Plan - 2.dwg 11? 26, 2021

C103 SHEET OF SHEETS

HOOLEHUA

MOLOKAI, HAWAII

R. M. TOWILL CORPORATION

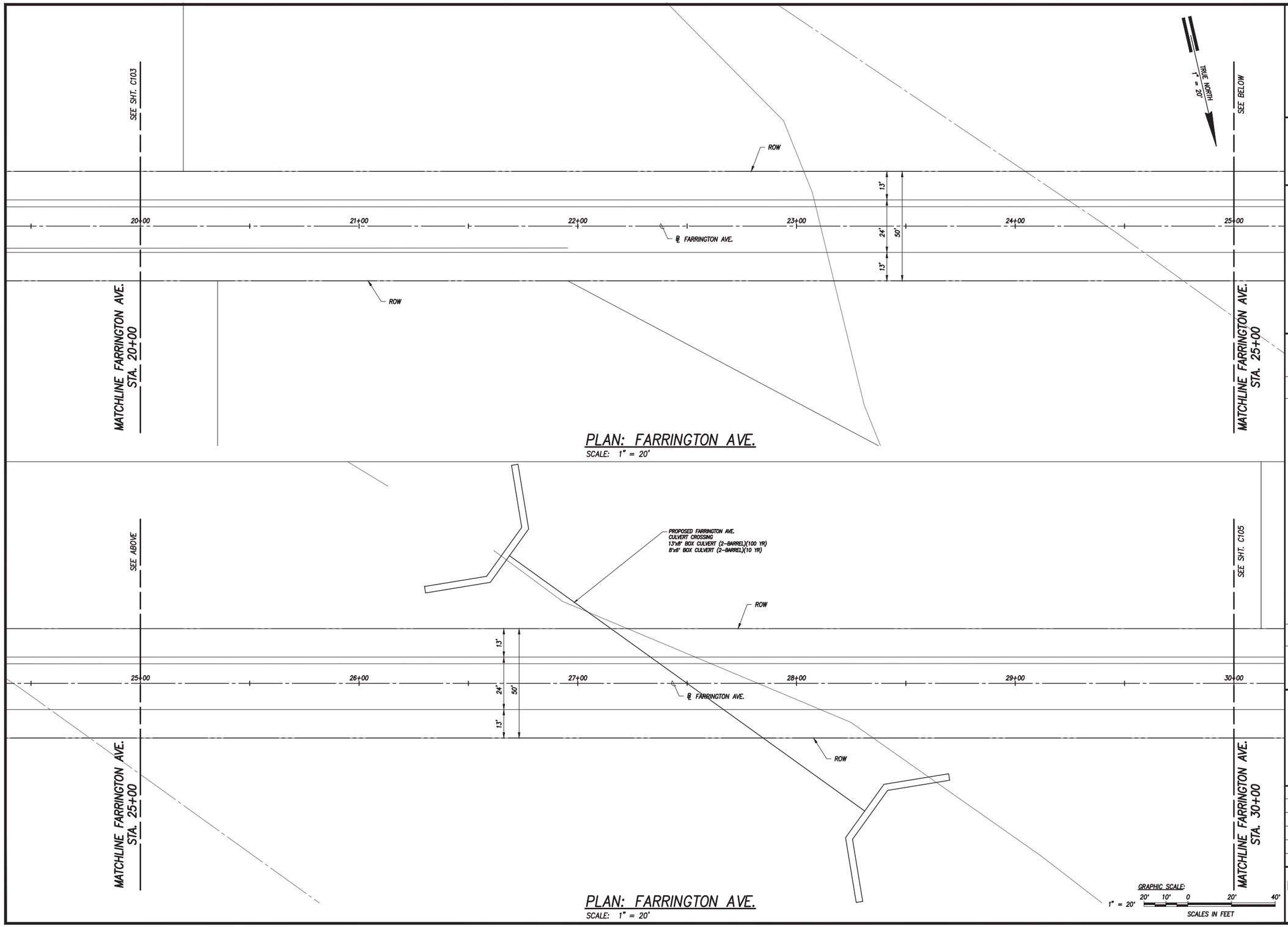
REVISION	DATE	BY	APPROVED

APPROVED BY

ENGINEER	
DRAFTSMAN	
CHECKED BY	
SCALE	AS SHOWN
DATE	
DPP FILE NO.	

FARRINGTON AVE. PLAN-2
(STA. 10+00 TO 20+00)

FILE	POCKET	FOLDER	NO.



PLAN: FARRINGTON AVE.
SCALE: 1" = 20'

PLAN: FARRINGTON AVE.
SCALE: 1" = 20'

HOOLEHUA

MOLOKAI, HAWAII

R. M. TOWILL CORPORATION

REVISION	DATE	BRIEF

BY	APPROVED

APPROVED BY

ENGINEER	
DRAFTSMAN	
CHECKED BY	
SCALE	AS SHOWN
DATE	
DPP FILE NO.	

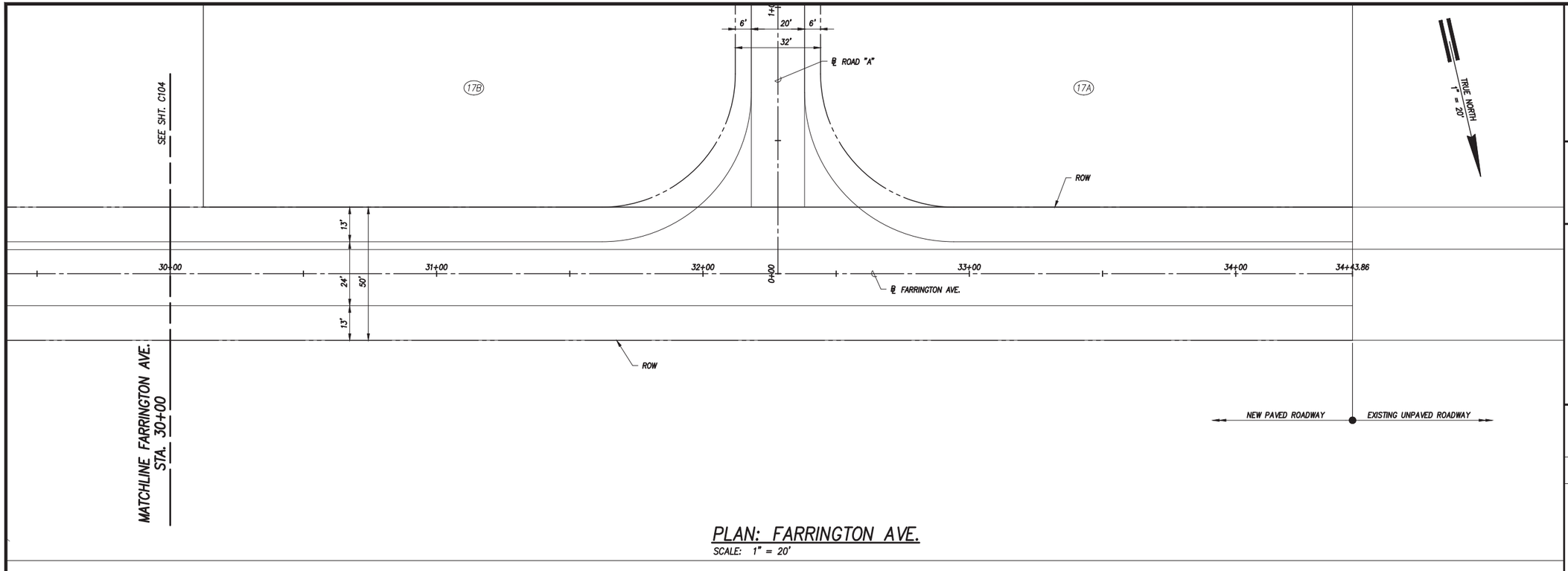
FARRINGTON AVE. PLAN-3 (STA. 20+00 TO 30+00)

FILE	POCKET	FOLDER	NO.

C104 SHEET OF SHEETS

RMTC JOB NO.: 1-23452-0E

Z:\12. 2021 Project\JN-2143 RM-Hoolehua PER\01. 30%\Construction Dwgs\Road\C104_FARRINGTON AVE Plan - 3.dwg December 3, 2021



PLAN: FARRINGTON AVE.

SCALE: 1" = 20'

GRAPHIC SCALE:
1" = 20'
20' 10' 0 20' 40'
SCALES IN FEET

HOOLEHUA

MOLOKAI, HAWAII

R. M. TOWILL CORPORATION

REVISION	DATE	BRIEF	BY	APPROVED

APPROVED BY

ENGINEER	
DRAFTSMAN	
CHECKED BY	
SCALE	AS SHOWN
DATE	
DPP FILE NO.	

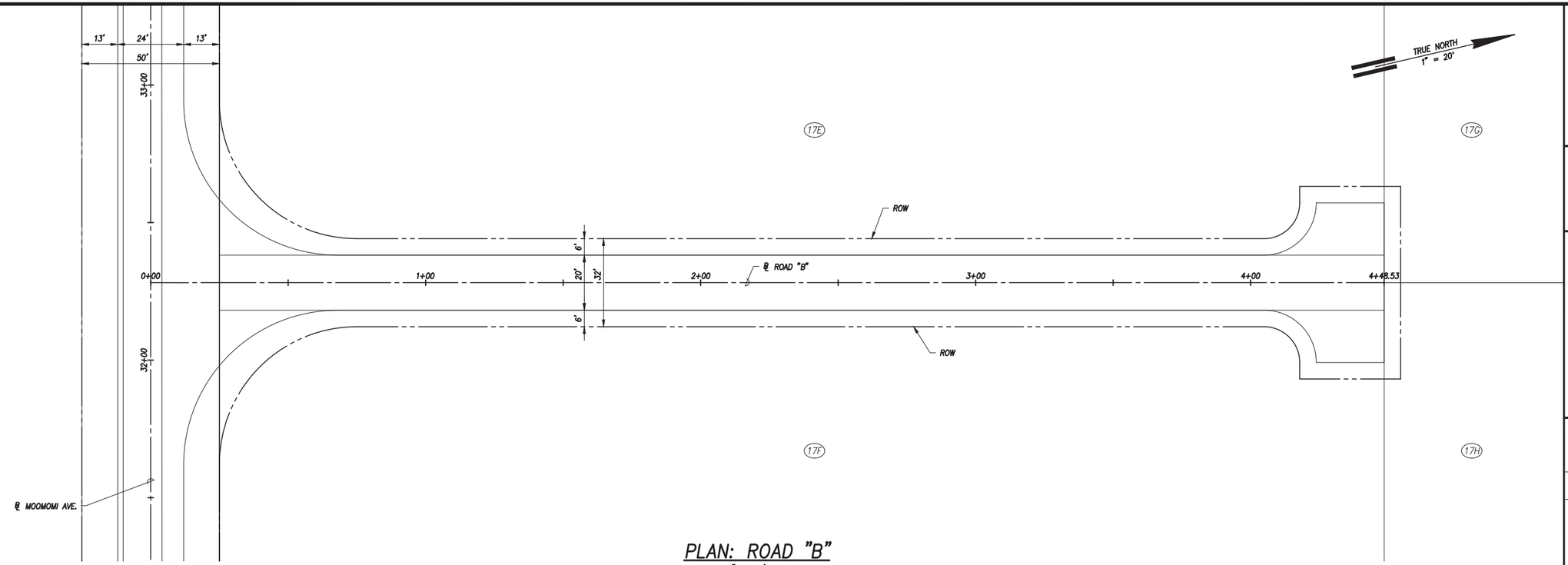
FARRINGTON AVE. PLAN-4
(STA.30+00 TO 34+43.86)

RMTC JOB NO.: 1-23452-0E

Z:\12. 2021 Project\JN-2143 RM-Hoolehua PER\01. 30%\Construction Dwgs\Road\C105_FARRINGTON AVE Plan - 4.dwg 11? 26, 2021

C105 SHEET OF SHEETS

FILE	POCKET	FOLDER	NO.



PLAN: ROAD "B"

SCALE: 1" = 20'

GRAPHIC SCALE:

1" = 20' — 20' 10' 0 20' 40'

SCALES IN FEET

HOOLEHUA

MOLOKAI, HAWAII

R. M. TOWILL CORPORATION

REVISION	DATE	BRIEF	BY	APPROVED

APPROVED BY

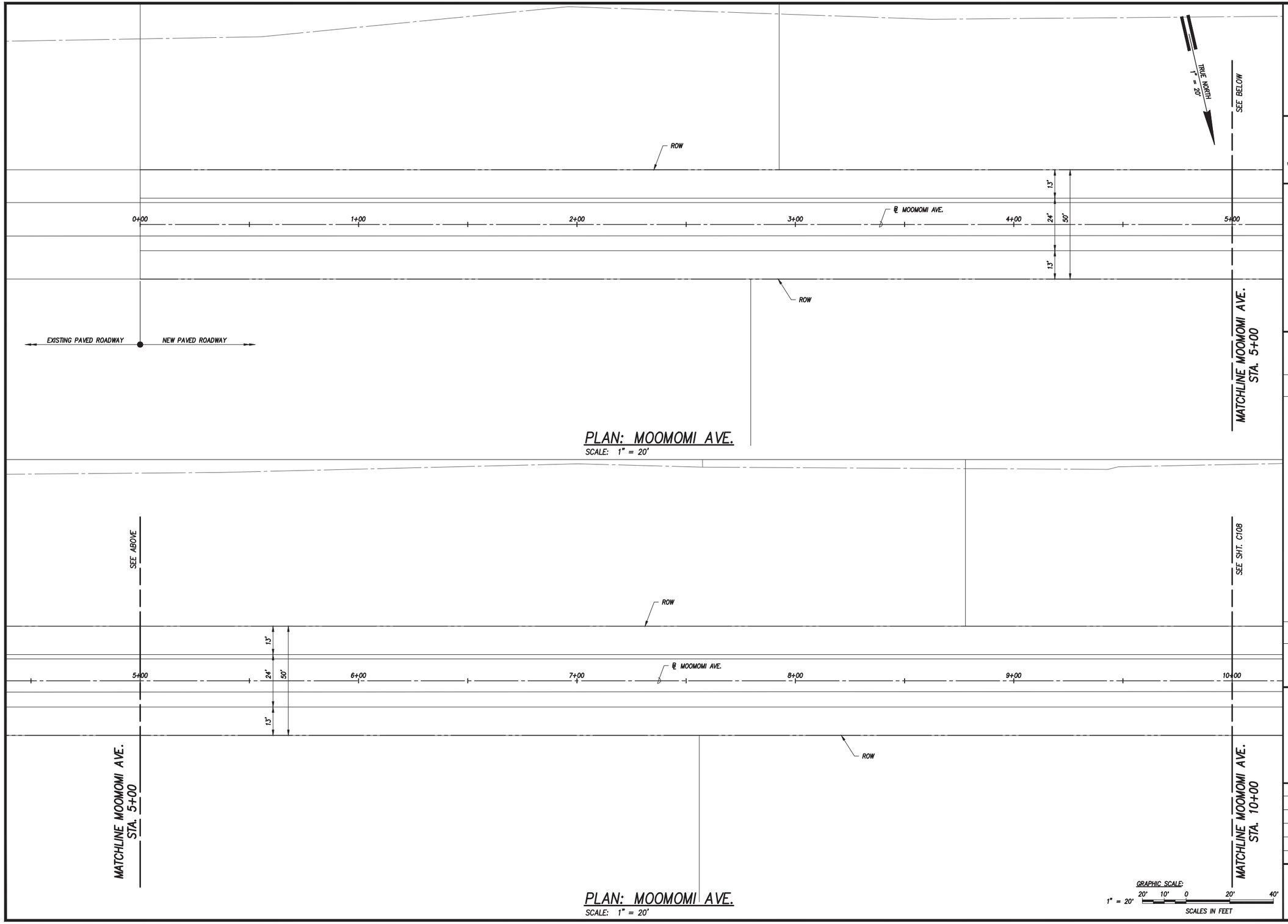
ENGINEER	
DRAFTSMAN	
CHECKED BY	
SCALE	AS SHOWN
DATE	
DPP FILE NO.	

ROAD "B" PLAN (STA. 0+00 TO 4+48.53)

RMTC JOB NO.: 1-23452-0E

Z:\12. 2021 Project\JN-2143 RM-Hoolehua PER\01. 30%\Construction Dwgs\Road\C106_Road B Plan - 1.dwg 11? 26, 2021

FILE	POCKET	FOLDER	NO.



PLAN: MOOMOMI AVE.
SCALE: 1" = 20'

PLAN: MOOMOMI AVE.
SCALE: 1" = 20'

GRAPHIC SCALE:
1" = 20' 20' 10' 0 20' 40'
SCALES IN FEET

HOOLEHUA

MOLOKAI, HAWAII

R. M. TOWILL CORPORATION

REVISION	DATE	BY
		APPROVED

APPROVED BY

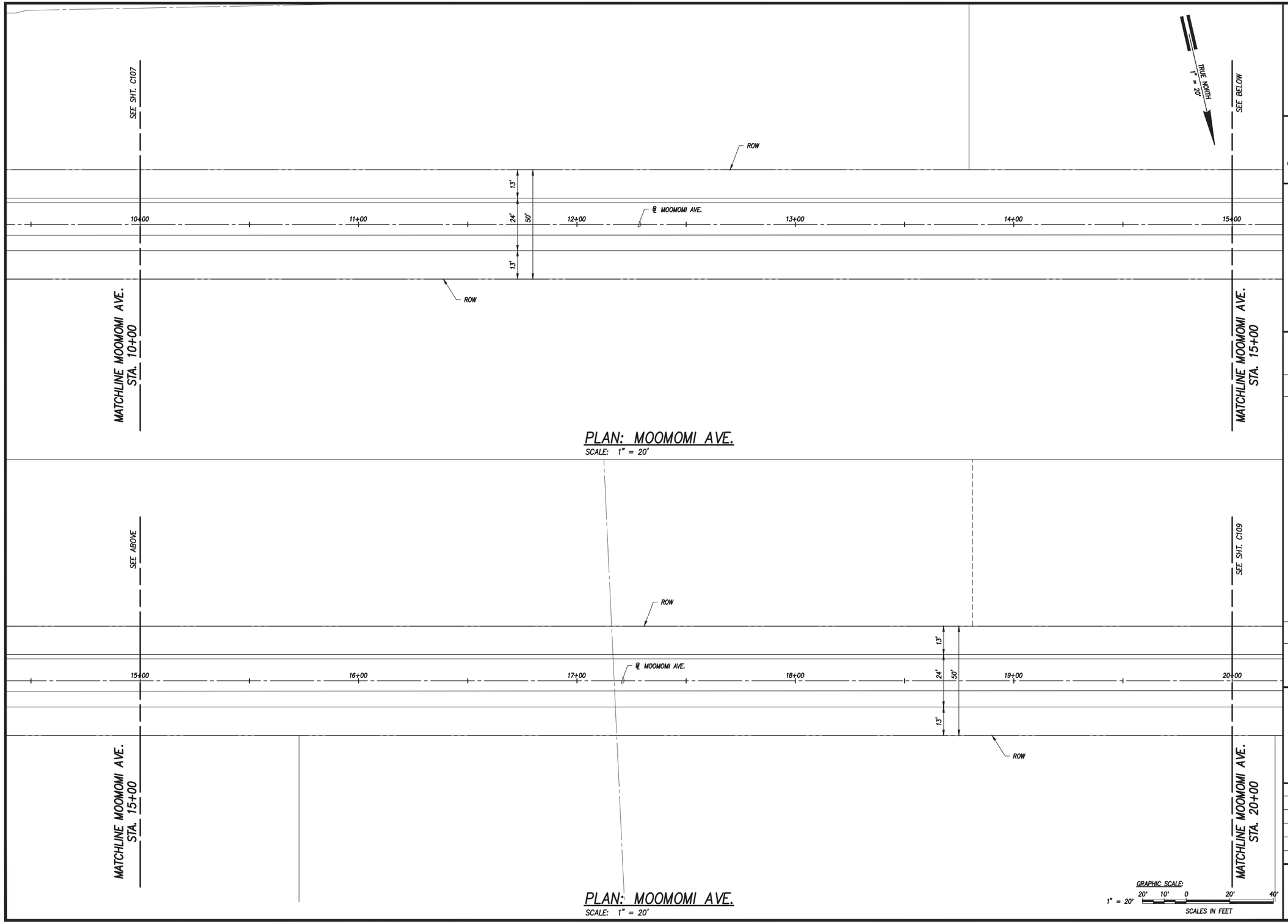
ENGINEER	
DRAFTSMAN	
CHECKED BY	
SCALE	AS SHOWN
DATE	
DPP FILE NO.	

MOOMOMI AVE. PLAN-1
(STA. 0+00 TO 10+00)

FILE	POCKET	FOLDER	NO.

RMTC JOB NO.: 1-23452-0E

Z:\12. 2021 Project\JN-2143 RM-Hoolehua PER\01. 30%\Construction Dwgs\Road\C107_MOOMOMI AVE Plan - 1.dwg 11? 26, 2021



PLAN: MOOMOMI AVE.

SCALE: 1" = 20'

PLAN: MOOMOMI AVE.

SCALE: 1" = 20'

GRAPHIC SCALE:
1" = 20'
20' 10' 0 20' 40'
SCALES IN FEET

HOOLEHUA

MOLOKAI, HAWAII

R. M. TOWILL CORPORATION

APPROVED BY	
ENGINEER	
DRAFTSMAN	
CHECKED BY	
SCALE	AS SHOWN
DATE	
DPP FILE NO.	

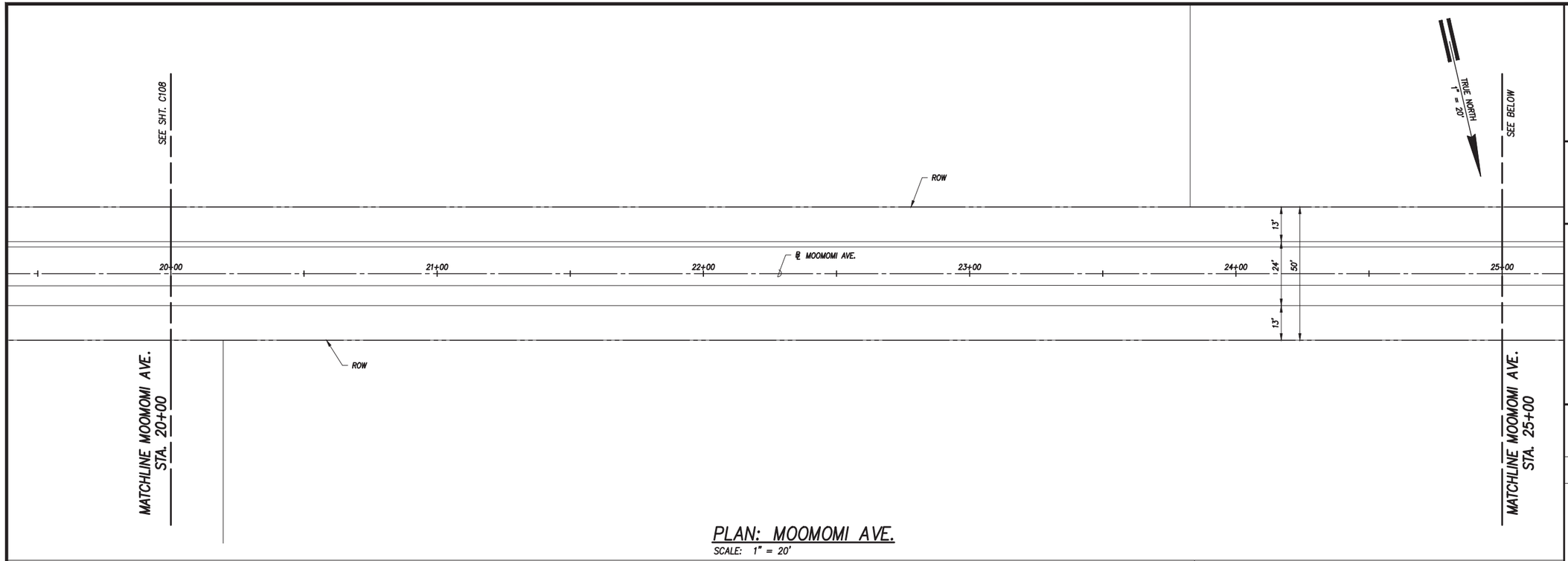
MOOMOMI AVE. PLAN–2
(STA. 10+00 TO 20+00)

NO.	REVISION	DATE	BY	APPROVED

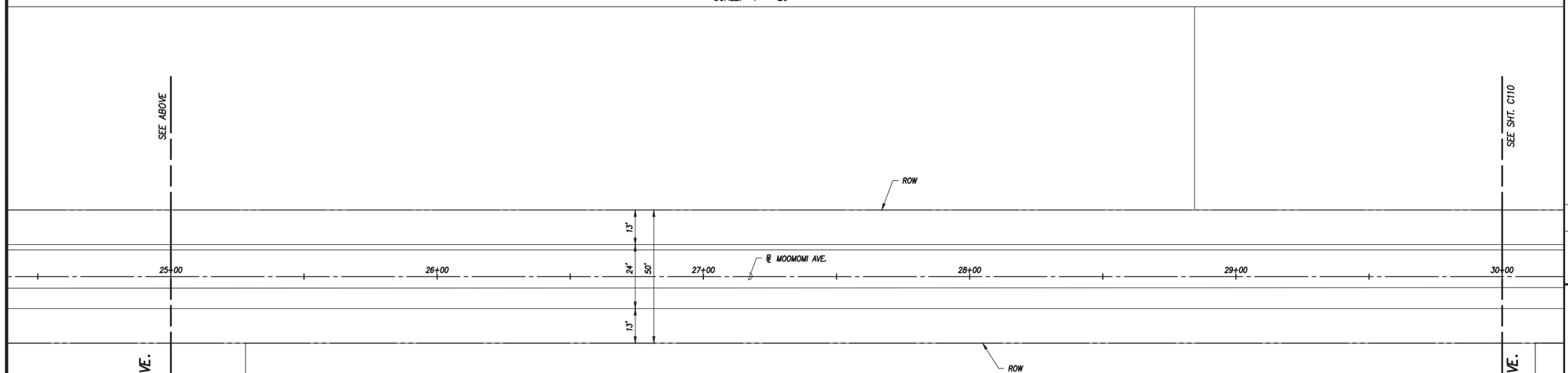
FILE	POCKET	FOLDER	NO.

RMTC JOB NO.: 1–23452–0E

Z:\12. 2021 Project\JN–2143 RM–Hoolehua PER\01. 30%\Construction Dwgs\Road\C108_MOOMOMI AVE Plan – 2.dwg 11? 26, 2021



PLAN: MOOMOMI AVE.
SCALE: 1" = 20'



PLAN: MOOMOMI AVE.
SCALE: 1" = 20'

GRAPHIC SCALE:
1" = 20'
20' 10' 0 20' 40'
SCALES IN FEET

HOOLEHUA

MOLOKAI, HAWAII

R. M. TOWILL CORPORATION

REVISION	DATE	BRIEF

BY	APPROVED

APPROVED BY

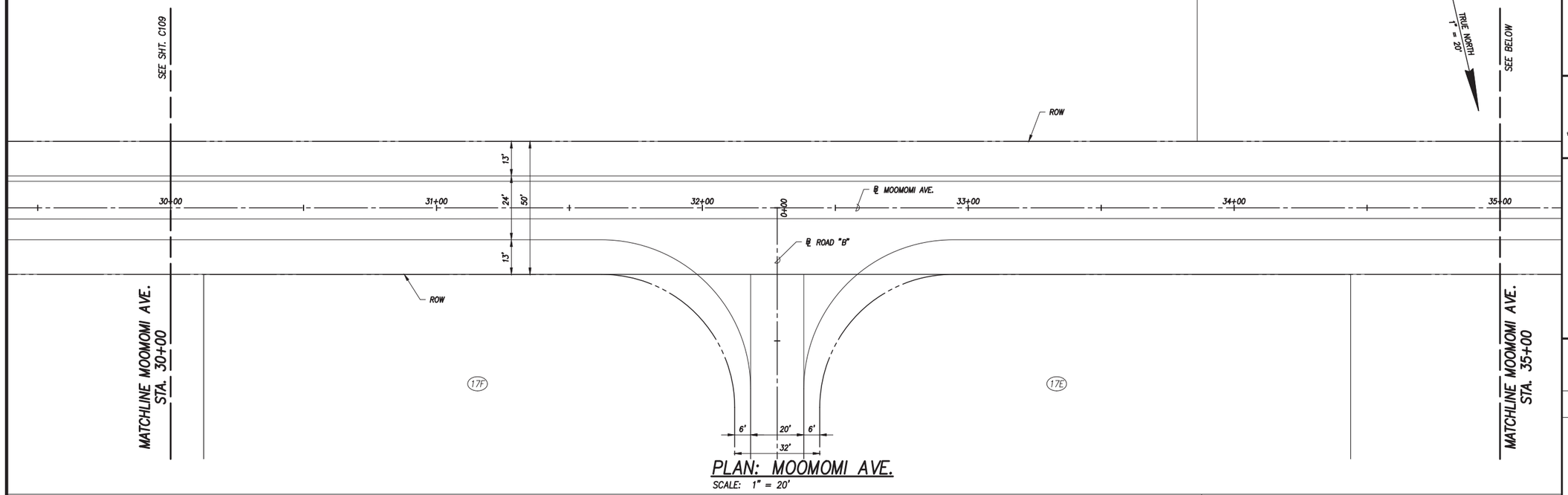
ENGINEER	
DRAFTSMAN	
CHECKED BY	
SCALE	AS SHOWN
DATE	
DPP FILE NO.	

MOOMOMI AVE. PLAN–3
(STA. 20+00 TO 30+00)

FILE	POCKET	FOLDER	NO.

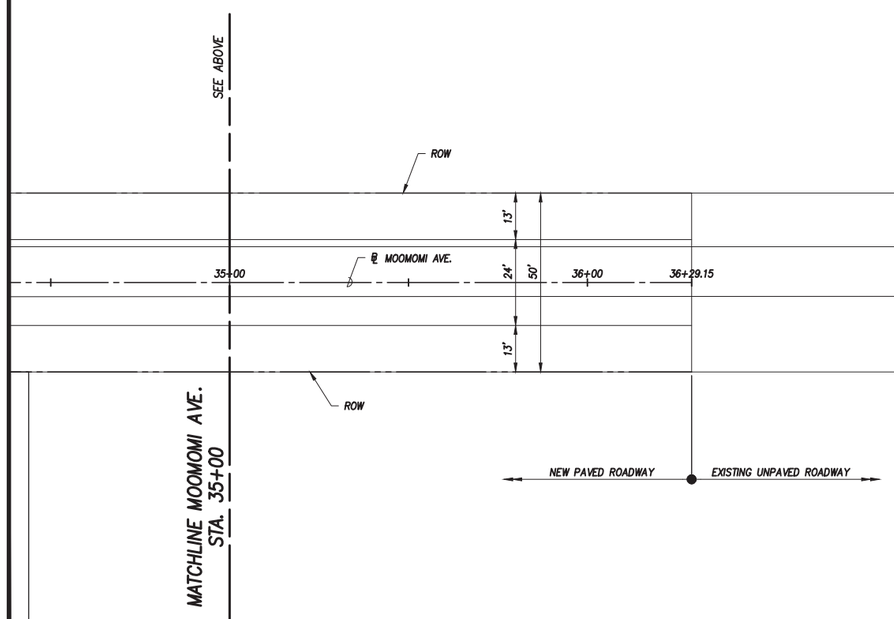
RMTC JOB NO.: 1–23452–0E

Z:\12. 2021 Project\JN–2143 RM–Hoolehua PER\01. 30%\Construction Dwgs\Road\C109_MOOMOMI AVE Plan – 3.dwg 11? 26, 2021



PLAN: MOOMOMI AVE.

SCALE: 1" = 20'



PLAN: MOOMOMI AVE.

SCALE: 1" = 20'

GRAPHIC SCALE:
1" = 20' 20' 10' 0 20' 40'
SCALES IN FEET

HOOLEHUA

MOLOKAI, HAWAII

R. M. TOWILL CORPORATION

REVISION	DATE	BY	APPROVED

APPROVED BY

ENGINEER

DRAFTSMAN

CHECKED BY

SCALE AS SHOWN

DATE

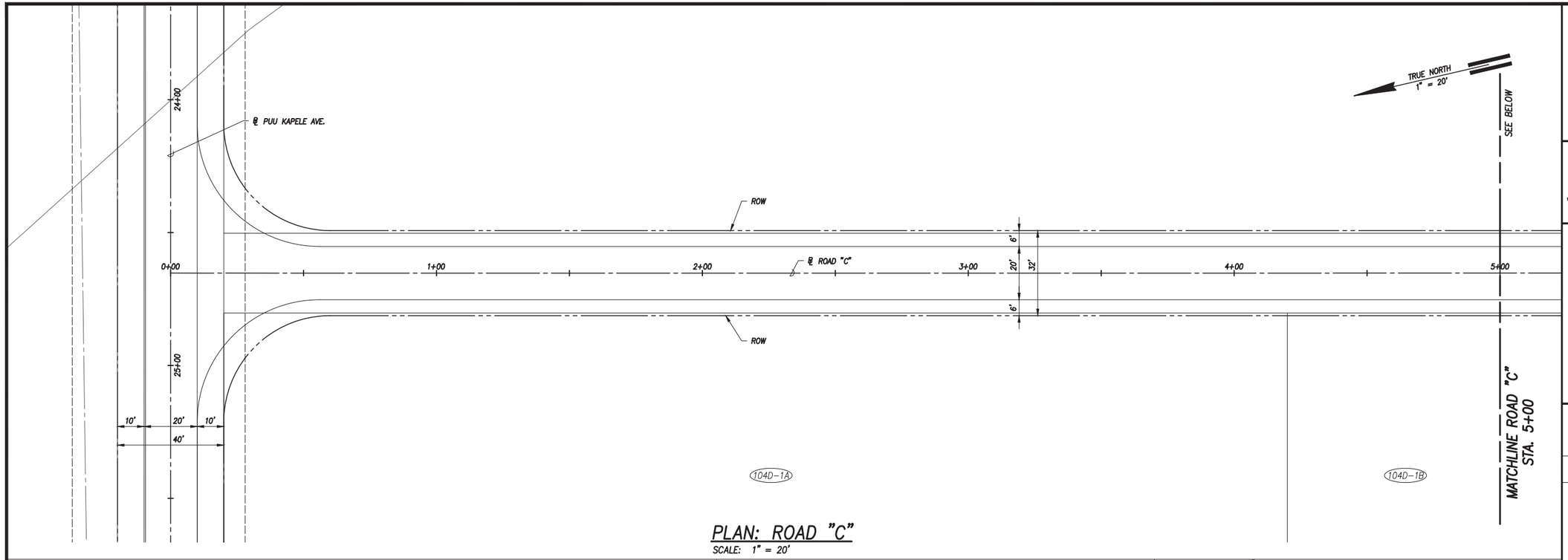
DPP FILE NO.

MOOMOMI AVE. PLAN–4
(STA.30+00 TO 36+29.15)

FILE	POCKET	FOLDER	NO.

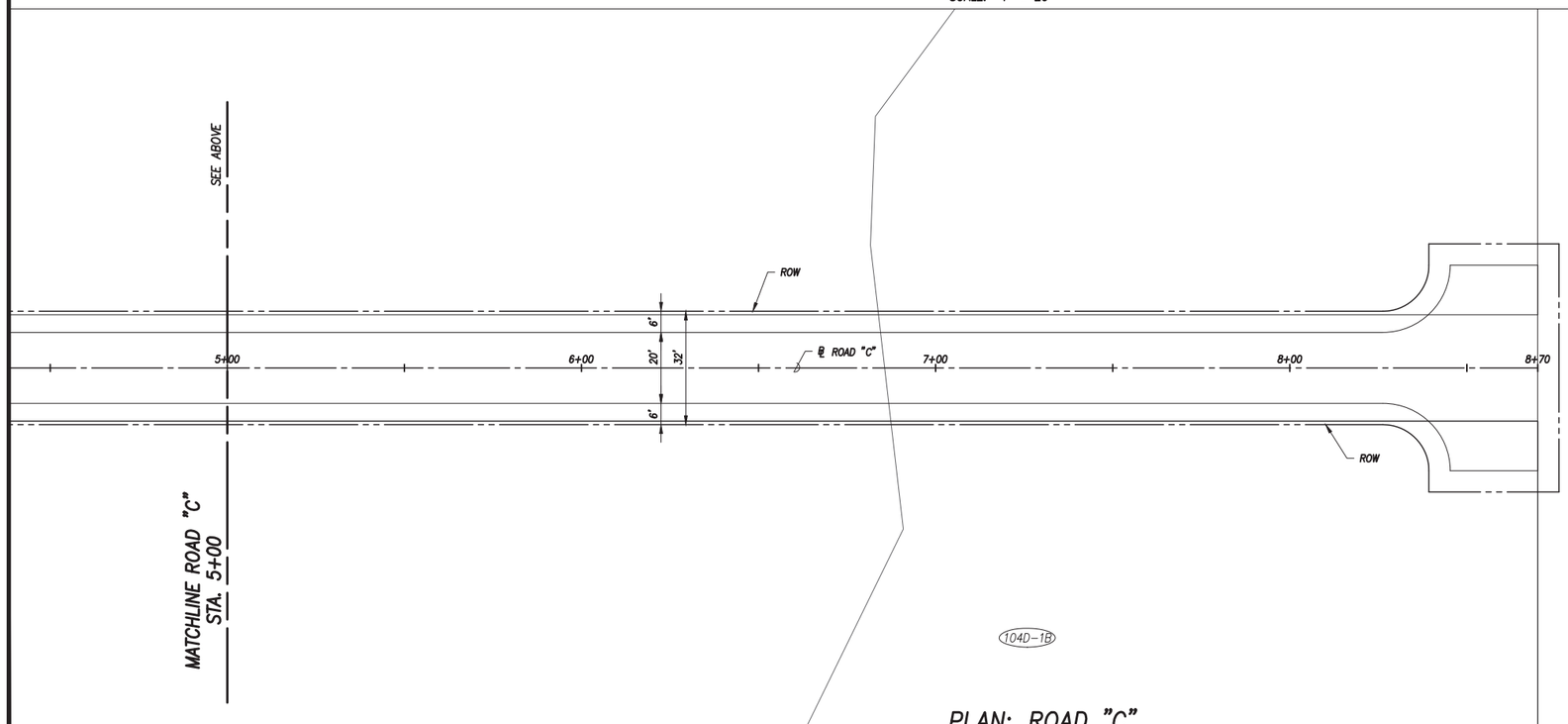
RMTC JOB NO.: 1-23452-0E

Z:\12. 2021 Project\JN-2143 RM-Hoolehua PER\01. 30%\Construction Dwgs\Road\C110_MOOMOMI AVE Plan - 4.dwg 11? 26, 2021



PLAN: ROAD "C"

SCALE: 1" = 20'



PLAN: ROAD "C"

SCALE: 1" = 20'

GRAPHIC SCALE:
1" = 20' 20' 10' 0 20' 40'
SCALES IN FEET

HOOLEHUA

MOLOKAI, HAWAII

R. M. TOWILL CORPORATION

REVISION	DATE	BRIEF

BY	APPROVED

APPROVED BY

ENGINEER	
DRAFTSMAN	
CHECKED BY	
SCALE	AS SHOWN
DATE	
DPP FILE NO.	

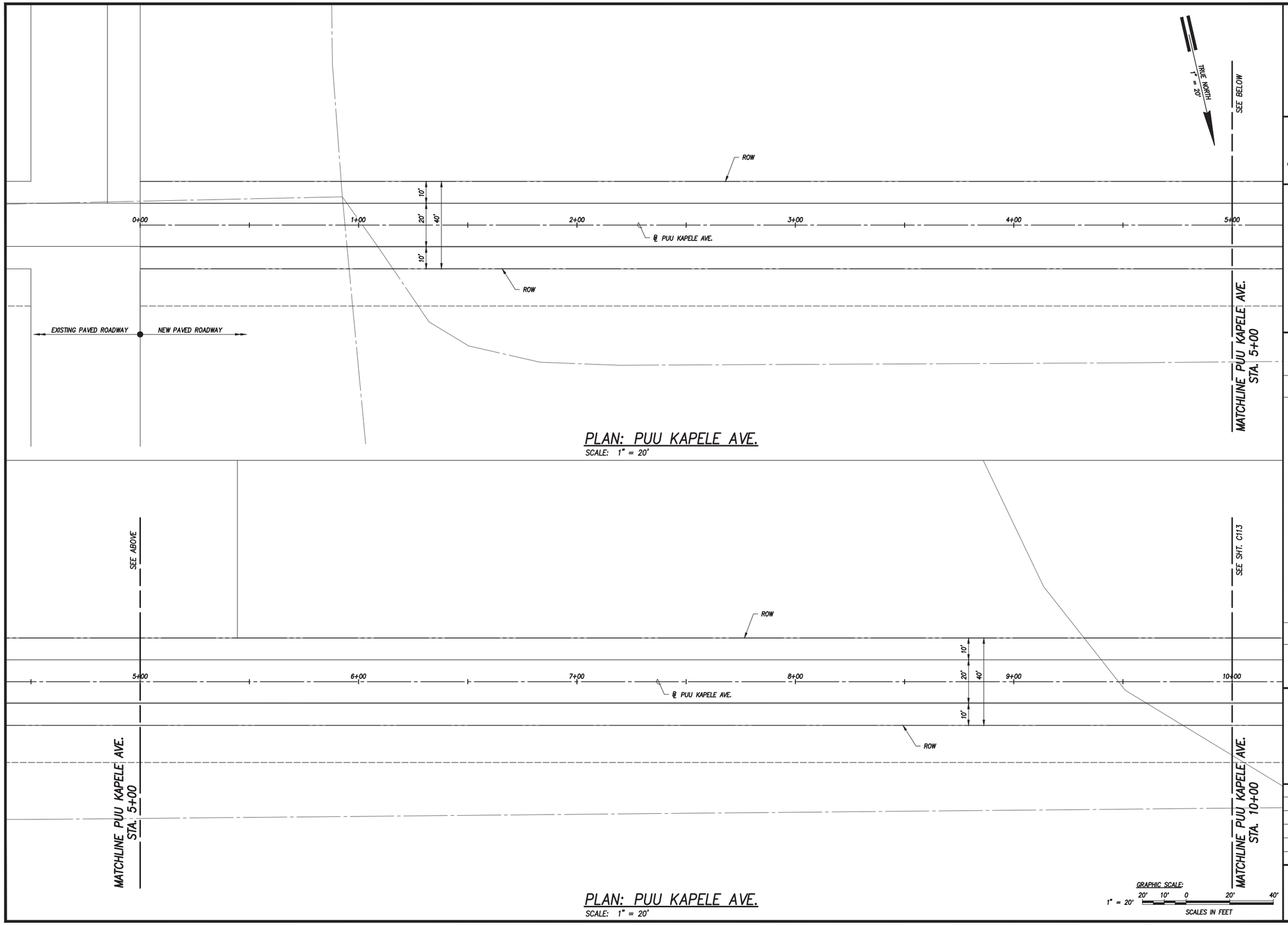
ROAD "C" PLAN (STA. 0+00 TO 8+70)

FILE	POCKET	FOLDER	NO.

C111 SHEET OF SHEETS

RMTC JOB NO.: 1-23452-0E

Z:\12. 2021 Project\JN-2143 RM-Hoolehua PER\01. 30%\Construction Dwgs\Road\C111_Road C Plan - 1.dwg 11? 26, 2021



HOOLEHUA

MOLOKAI, HAWAII

R. M. TOWILL CORPORATION

REVISION	DATE	BY	APPROVED

APPROVED BY

ENGINEER

DRAFTSMAN

CHECKED BY

SCALE AS SHOWN

DATE

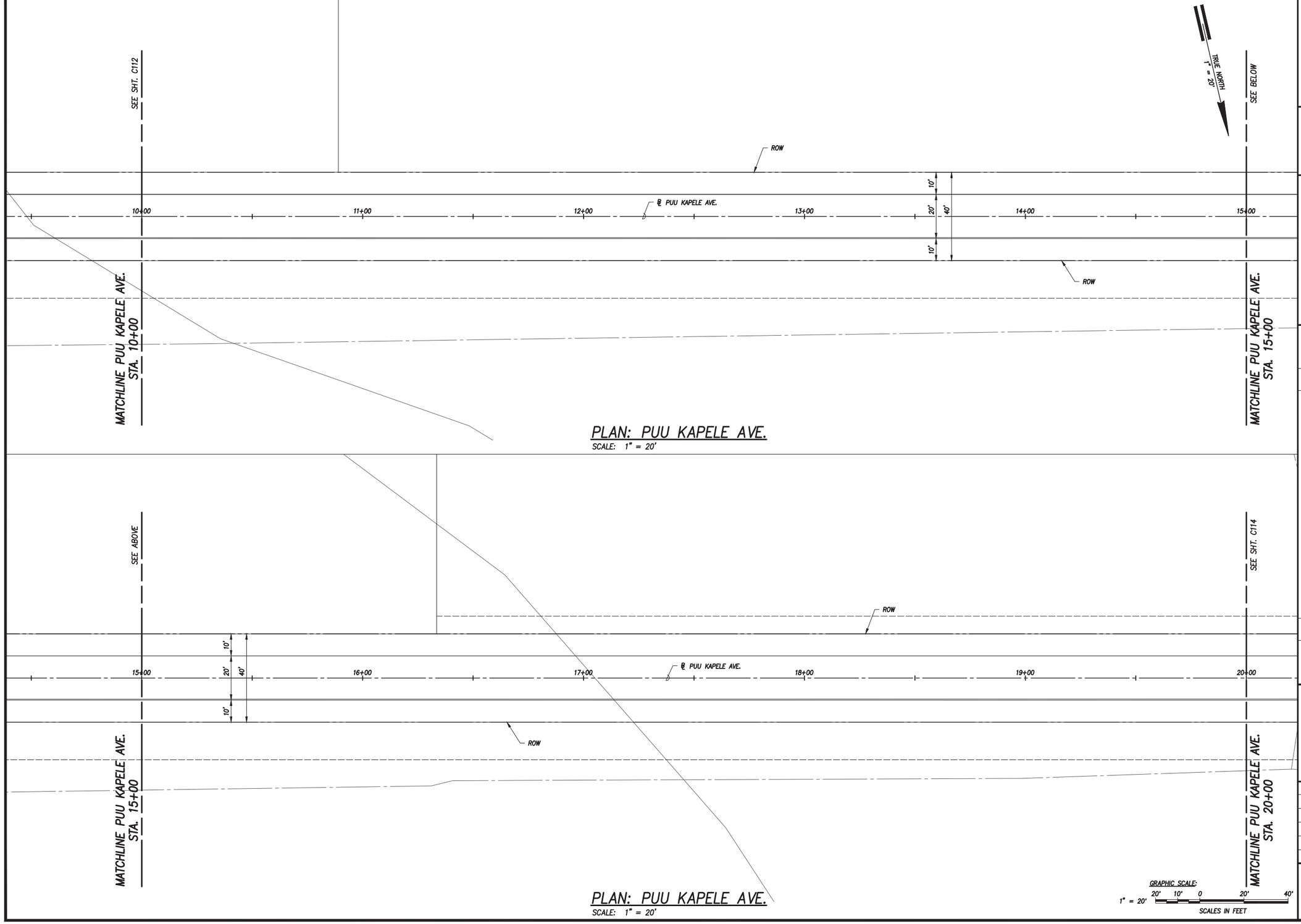
DPP FILE NO.

PUU KAPELE AVE. PLAN-1
(STA. 0+00 TO 10+00)

FILE	POCKET	FOLDER	NO.

RMTC JOB NO.: 1-23452-0E

Z:\12. 2021 Project\JN-2143 RM-Hoolehua PER\01. 30%\Construction Dwgs\Road\C112_PUU KAPELE AVE Plan - 1.dwg 11? 26, 2021



HOOLEHUA

MOLOKAI, HAWAII

R. M. TOWILL CORPORATION

REVISION	DATE	BY	APPROVED

APPROVED BY

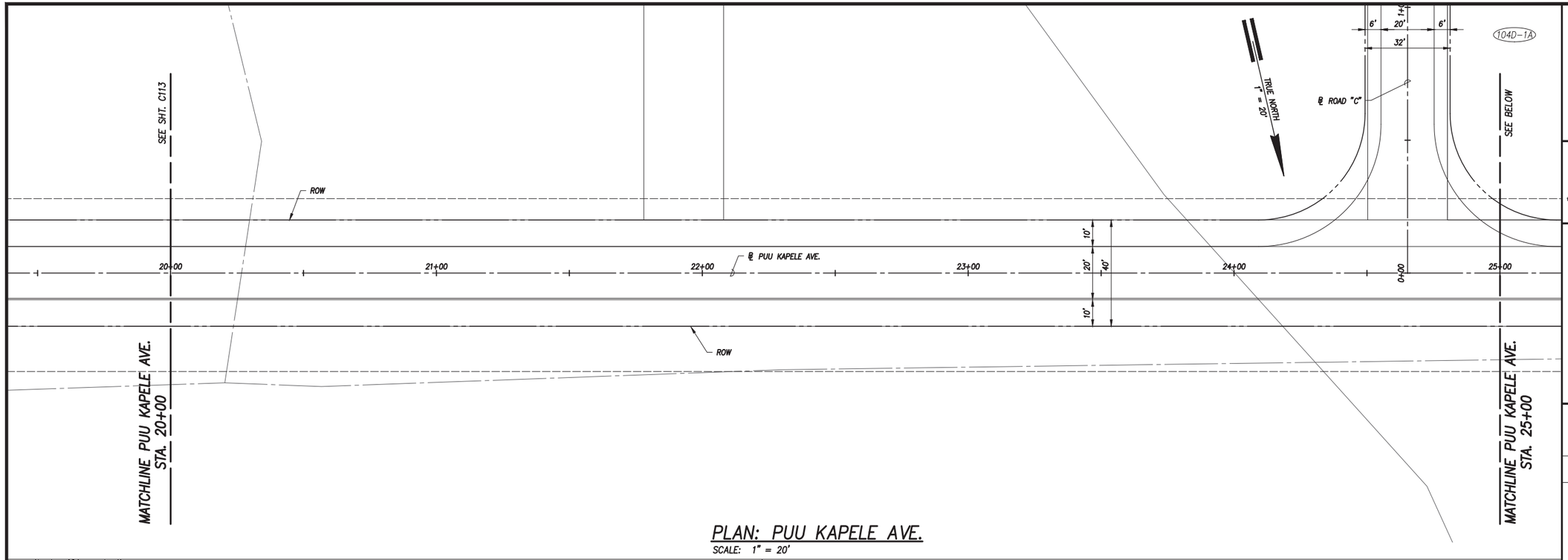
ENGINEER	
DRAFTSMAN	
CHECKED BY	
SCALE	AS SHOWN
DATE	
DPP FILE NO.	

PUU KAPELE AVE. PLAN–2
(STA. 10+00 TO 20+00)

FILE	POCKET	FOLDER	NO.

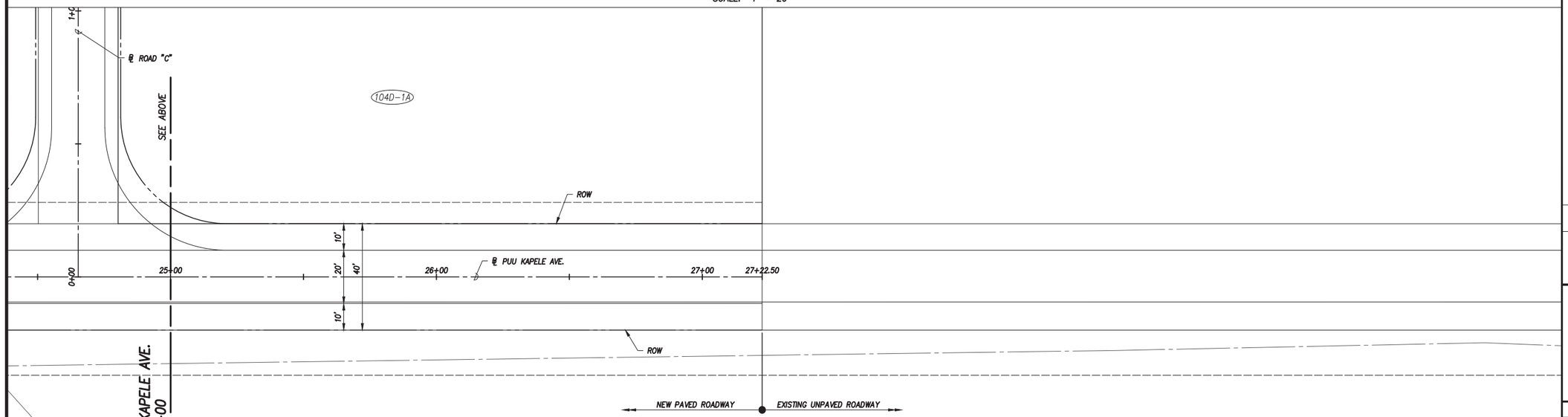
RMTC JOB NO.: 1–23452–0E

Z:\12. 2021 Project\JN–2143 RM–Hoolehua PER\01. 30%\Construction Dwgs\Road\C113_PUU KAPELE AVE Plan – 2.dwg 11? 26, 2021



PLAN: PUU KAPELE AVE.

SCALE: 1" = 20'



PLAN: PUU KAPELE AVE.

SCALE: 1" = 20'

GRAPHIC SCALE:
1" = 20' 20' 10' 0 20' 40'
SCALES IN FEET

HOOLEHUA

MOLOKAI, HAWAII

R. M. TOWILL CORPORATION

NO.	REVISION	DATE	BRIEF

APPROVED BY

ENGINEER

DRAFTSMAN

CHECKED BY

SCALE AS SHOWN

DATE

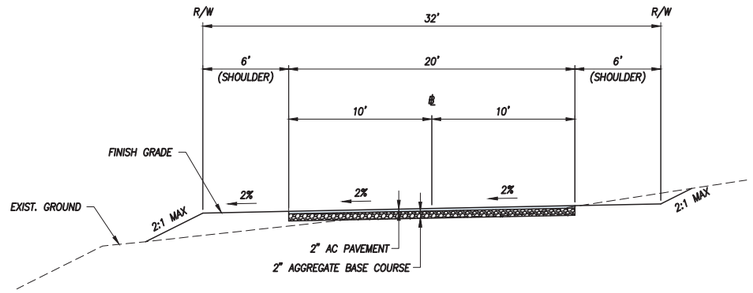
DPP FILE NO.

PUU KAPELE AVE. PLAN-3
(STA.20+00 TO 27+22.50)

RMTC JOB NO.: 1-23452-0E

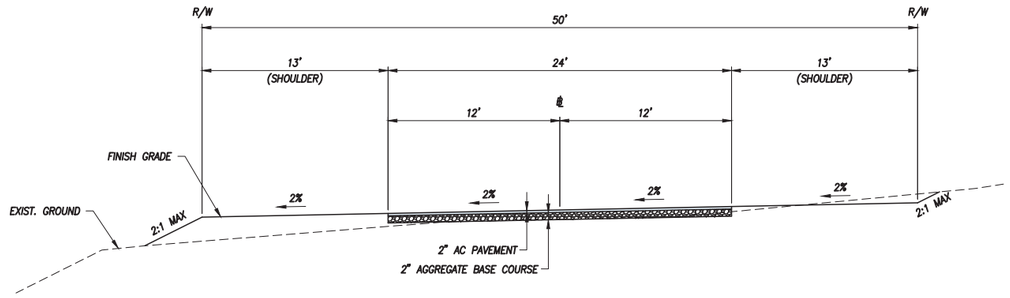
Z:\12. 2021 Project\JN-2143 RM-Hoolehua PER\01. 30%\Construction Dwgs\Road\C114_PUU KAPELE AVE Plan - 3.dwg 11? 26, 2021

FILE	POCKET	FOLDER	NO.



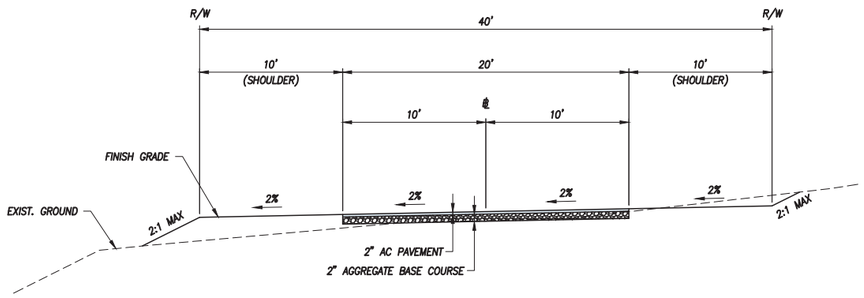
TYPICAL SECTION – ROAD "A", "B", "C"

SCALE: 1" = 5'



TYPICAL SECTION – "FARRINGTON" AVENUE AND "MOOMOMI" AVENUE

SCALE: 1" = 5'



TYPICAL SECTION – "PUU KAPELE" AVENUE

SCALE: 1" = 5'

GRAPHIC SCALE:
1" = 5'
5' 0 5' 10'
SCALES IN FEET

HOOLEHUA

MOLOKAI, HAWAII

R. M. TOWILL CORPORATION

REVISION	DATE	BY	APPROVED

APPROVED BY

ENGINEER

DRAFTSMAN

CHECKED BY

SCALE AS SHOWN

DATE

DPP FILE NO.

TYPICAL SECTIONS

C121 SHEET OF SHEETS

FILE	POCKET	FOLDER	NO.

RMTC JOB NO.: 1-23452-0E

Z:\12. 2021 Project\JN-2143 RM-Hoolehua PER\01. 30%\Construction Dwgs\Road\C121 Typical Road Sections.dwg 11? 29, 2021

PRELIMINARY ENGINEERING AND DRAINAGE REPORT

APPENDIX

B

DRAFT

HOOLEHUA SCATTERED LOTS

PRELIMINARY ENGINEERING REPORT

Hoolehua, Molokai, Hawaii

TMK: (2) 5-2-005: 031; 5-2-026: 014, 016, 017, 003

June 2024

PREPARED FOR:

Department of Hawaii Home Lands
P.O. Box 1879
Honolulu, Hawaii 96805

R. M. TOWILL CORPORATION
SINCE 1930

2024 North King Street., Suite 200
Honolulu, Hawaii 96819-3494
(808) 842-1133 Fax: (808) 842-1937
(RMTC Ref: 1-23375-00)

HOOLEHUA SCATTERED LOTS

PRELIMINARY ENGINEERING REPORT

June 2024

Prepared by:

R. M. Towill Corporation
2024 North King Street, Suite 200
Honolulu, Hawaii 96819
(Ref. No. 1-23375-00)

Prepared for:

Department of Hawaiian Home Lands
P.O. Box 1879
Honolulu, Hawaii 96805

TABLE OF CONTENTS

1. GENERAL 1-1
1.1 Background 1-1
1.2 Objectives and Scope 1-1

2. EXISTING CONDITIONS 2-1
2.1 Soils 2-1
2.2 Terrain 2-1
2.3 Roads 2-1
2.4 Drainage 2-2
2.4.1 Offsite Drainage 2-2
2.4.2 Onsite Drainage 2-2
2.4.3 Road Drainage 2-3
2.4.4 Flood Zone 2-3
2.5 Potable Water System 2-3
2.5.1 Existing Water Aquifer Conditions 2-3
2.5.2 Existing Water System Conditions 2-3
2.6 Non-Potable Irrigation System 2-4
2.6.1 Existing Conditions 2-4
2.6.2 Existing Demands 2-4
2.7 Electrical Power 2-4
2.8 Existing Lot Improvements 2-5

3. PROPOSED CONDITIONS 3-1
3.1 Roads 3-1
3.2 Drainage 3-1
3.2.1 Offsite Drainage 3-1
3.2.2 Onsite Drainage 3-2
3.2.3 Road Drainage 3-3
3.2.4 Road Drainage Alternatives 3-4
3.2.4.1 Low Impact Development 3-4
3.2.4.2 Porous Asphalt Pavement 3-5
3.2.4.3 Infiltration Trenches 3-5
3.2.4.4 Road Maintenance 3-6
3.2.4.4 Conclusion 3-6
3.3 Potable Water System 3-6
3.3.1 Potable Water Demands 3-6
3.3.2 Hydraulic Analysis 3-7
3.3.2 Conclusion 3-7
3.4 Non-Potable Irrigation System 3-8
3.4.1 Irrigation Demands 3-8
3.4.2 Hydraulic Analysis 3-8
3.4.3 Conclusion 3-9
3.5 Electrical Power 3-9
3.5.1 Proposed Electrical Power 3-9
3.6 Cost Estimate 3-10

4. REFERENCES 4-1

APPENDIX A - Drainage Calculations
APPENDIX B - Water Calculations
APPENDIX C – Irrigation Calculations
APPENDIX D – Miscellaneous Documents

1. GENERAL

1.1 Project Description

The Hoolehua Scattered Lots are located in Hoolehua, Molokai on five existing agricultural parcels ((2) 5-2-005: 031; 5-2-026: 014, 016, 017, 003) (See Figure 1). Lot 17 and Lot 104D will be subdivided to create a total of 12 lots. Lot 17 is located between Farrington Ave., and Moomomi Ave. Lot 17 will be subdivided into 8 lots ranging between 1.95 acres and 6 acres (See Figure 2). Lot 104D is located on Puu Kapele Ave. Lot 104D will be subdivided into 4 lots ranging between 1 and 12.8 acres (See Figure 3).

Existing infrastructure in the vicinity of the lots included paved roads, water lines, irrigation lines, overhead electrical lines. Proposed infrastructure improvements will include access and utility improvements for the proposed subdivisions and extension of paved roads and utilities where needed to service the proposed lots.

1.2 Objectives and Scope

This Preliminary Engineering Report provides an assessment of existing conditions and proposed improvements to facilitate agricultural and homesteading development at the proposed project sites.

2. EXISITING CONDITIONS

2.1 Soils

According to the Natural Resources Conservation Service, the predominant soil type for both project sites is Molokai silty clay loam. Type of soil has low permeability (0.20 to 0.60 in/hr) and is considered prime farmland.

2.2 Terrain

The existing elevation at Lot 104D is approximately 420 feet and is sloped toward Nenehanaupo stream, which lies southwest of the project site, at approximately 5%. Existing groundcover includes an existing house with vegetation on the exterior.

The existing elevation at Lot 17 is approximately 360 feet and is relatively level. The lot is undeveloped and covered with vegetation. Anahaki gulch is located to the east and crosses Farrington Ave. near the project site.

2.3 Roads

Existing roads onsite are unimproved dirt roads located within 40’ to 50’ wide right-of-ways (ROW). Farrington Ave. and Moomomi Ave. have 50-foot ROWs and Puu Kapele Ave. has a 40-foot ROW. The unimproved roads make it difficult to maintain and access the lots after rain events.

Lot 17 is accessed via Farrington Ave. and Moomomi Ave. The ends of the existing road improvements on Farrington Ave. and Moomomi Ave. are located near TMK (2)5-2-5: 024, approximately 3500 feet away from Lot 17. Existing utilities for Lot 17 within the road right-of-way include irrigation and water lines.

Lot 104D is currently accessed via an existing dirt road located north of Puu Kapele Ave., within an adjacent property (See Figure 4). The right-of-way for Puu Kapele Ave. is undeveloped and overgrown with heavy vegetation and trees. The end of the existing road improvements on Puu Kapele Ave. is at the intersection of Nenehanaupo Ave, approximately 2700 feet away from Lot 104D (See Figure 4). Existing utilities for Lot 104D within the road right-of-way include overhead electrical, irrigation, and water lines.

2.4 Drainage

Drainage affecting the project sites is categorized into offsite and onsite runoff. Runoff calculations were prepared in accordance with the County of Maui's Storm Drainage Standards. Runoff for drainage areas larger than 100 acres is calculated for a 100-yr storm event. Runoff for drainage areas less than 100-areas is calculated for 10-yr storm event.

2.4.1 Offsite Drainage

Offsite drainage does not directly impact either of the proposed sites. However, Anahaki gulch is located near Lot 17 and crosses Farrington Ave. where the road will be extended. (See Figure 5). The drainage area for this portion of Anahaki gulch is 260 acres, which generates 1560 cfs of runoff for a 100-year storm event.

2.4.2 Onsite Drainage Areas

Onsite drainage consists of the existing road and lot area. The existing roads are unimproved dirt and lots are primarily undeveloped and covered with vegetation.

The drainage areas for the lots are shown in Figure 6 and roads are shown in Figure 7. The existing runoff for the road and lot improvements was calculated for a 10-year storm event since the total drainage area is less than 100 acres. The total existing runoff is 120.0 cfs, with 28.2 cfs for the roads and 91.8 cfs for the lots. A summary of the onsite runoff is shown in the table below.

Table 2-1: Existing Onsite Runoff

Area Name	Onsite Area (ac)	Storm Event	Exist Runoff (cfs)
Farrington	4.3	10-yr	10.5
Moomomi	4.5	10-yr	9
Puu Kapele	3.2	10-yr	8.7
Lot 17	31.8	10-yr	55.0
Lot 104D	20.0	10-yr	36.8
Total	63.8		120.0

See Appendix A for runoff calculations, exhibits, and supporting documents.

2.4.3 Road Drainage

The existing unimproved segments of Moomomi Ave., Farrington Ave., and Puu Kapele roads do not have a drainage system.

2.4.4 Flood Zone

The project sites are located in flood zone "X" which is classified as an area determined to be outside the 0.2% annual chance floodplain according to the State of Hawaii Flood Hazard Assessment Report (see Appendix A). Additionally, there are no major drainage ways or streams crossing through the proposed project sites. Therefore, the project sites are not anticipated to be impacted by flood related hazards.

2.5 Potable Water System

The proposed lots will be serviced by the Molokai Water System, which is operated by DHHL. Existing water mains and fire hydrants are located within the existing unimproved roads (See Figure 8). At Lot 17, there is a 6-inch line in Farrington Ave. and 6-inch line in Moomomi Ave. At Lot 104D, there is an existing 1.5 inch lateral providing service to the existing houses on Puu Kapela Ave.

2.5.1 Existing Water Aquifer Conditions

The availability of water to support the proposed subdivision is pending approval from DLNR. A water use permit application (WUPA) has been submitted to DLNR in October 2020 to increase pumping rates. New water service and meters will not be issued until DLNR approval is received.

2.5.2 Existing Water System Conditions

The existing low-pressure water system will provide water service to the proposed lots. Pressure in the system is controlled by an existing pressure breaker tank near the intersection of Kulea Street and Moomomi Avenue. The water surface elevation at the tank is 764 ft, which is the starting elevation for this analysis. Pressure in the low-pressure system is further reduced by pressure reducing valves (PRVs) along water mains serving the proposed lots. The PRVs are assumed to have a pressure setting of 80 psi. Existing 6-inch water lines are located within the unimproved roads fronting Lot 17. An existing 8-inch water main provides service to Lot 104D and the existing lots along Puu Kapele Ave. (See Figure 8). Topographic survey

confirmed that existing fire hydrants front each project site on Farrington Ave., Moomomi Ave., and Puu Kapele Ave. Static pressures onsite are high, ranging from 150 psi to 174 psi.

2.6 Non-Potable Irrigation System

The State Department of Agriculture (DOA) operates the Molokai Irrigation System (MIS) consisting of the existing irrigation mains located within existing roads adjacent to the proposed project sites (See Figure 9). There is an existing 12-inch irrigation line in Moomomi Ave. and 8-inch lines on Farrington Ave. and Puu Kapela Ave.

2.6.1 Existing Conditions

The MIS source is Waikolu Valley. Water from the valley is collected and pumped through a 5 mile long tunnel and pipe line to the Kualapuu reservoir, where water is stored. The water surface elevation in the reservoir fluctuates based on rainfall, evaporation, demand, and other factors. Reservoir water depth data provided by DOA was used to determine the average water surface elevation to use for this analysis. Over the past 6 years, the reservoir depth varied between 18.75 and 48 feet, resulting in an average depth of 33.4 feet. This depth equates to a water surface elevation of 838 feet, which provides a minimum static pressure of 146 psi at the project site. The approximate reservoir volume at this depth is 968 million gallons. Prior issues regarding the quality of the MIS water include turbidity, trash, and fish.

2.6.2 Existing Demands

MIS usage data provided by DOA for the past year showed that the usage for 3382 acres in Hoolehua varied from a low of 40 million gallons in March to a high of 98 million gallons in August. The average daily usage ranges from 383 gallons per acre to 936 gallons per acre.

2.7 Electrical Power

The Hoolehua Subdivision is serviced by Hawaiian Electric Company - Maui County (HECO) via overhead primary conductors from the Palaau Substation #81 (See Figure 10). Proposed development of Lot 104D on Puu Kapele Avenue is located along a 7200V, single phase (phase-neutral) circuit while Lot 17 between Farrington Avenue and Moomomi Avenue is outside the area currently served by HECO. Existing overhead infrastructure along Farrington Avenue is a 7200V, single phase (phase-phase-neutral) circuit. This design allows more capacity as the load can be split between the two different overhead phase conductors. Unlike the infrastructure along Farrington Avenue, Moomomi Avenue is serviced overhead with a

7200V, single phase (phase-neutral) circuit. As in all cases, a primary line extension will be required to service all parcels within the proposed lots.

Telephone, CATV, and internet service is available via overhead lines along the existing roads.

2.8 Existing Lot Improvements

An existing house and greenhouse is located on Lot 104D. If the house will remain, the proposed subdivision will need to be configured around it. Topographic survey will be used to locate the existing improvements if they will remain.

There are no existing improvements on Lot 17.

3. PROPOSED CONDITIONS

3.1 Roads

Proposed roads will be extensions of existing roads to provide access to the project sites (See Figure 4). Minimal road improvements are proposed consisting of a paved road and swale.

County of Maui standard roads were not considered since they are extensions of existing roads. Therefore, DHHL will be responsible for maintenance. Paved roads will improve access for lessees and emergency vehicles. The proposed road cross sections will consist of 20-foot wide asphaltic cement pavement in the center of the ROW. Pavement will be sloped in one direction toward the low side of the road. Runoff will be collected at the low point in a grassed swale. Proposed road right-of-way widths are 40 and 50 feet. See Figure 11 for typical road sections.

Road profiles will follow the existing terrain as much as possible to reduce earthwork, maintain existing drainage patterns, and to preserve the existing water and irrigation lines that are already in place.

3.2 Drainage

Proposed subdivision improvements that affect drainage are grading and installation of impervious surfaces. Paved roads will be constructed in the right-of-ways. Within the lots, paved driveways within flag stems and houses will be built. A 5000 sf area for houses and driveways is assumed for each lot. Minimal grading is anticipated for the construction of these improvements and existing drainage patterns will be maintained.

3.2.1 Offsite Drainage

Offsite drainage is not anticipated to have a direct impact on the proposed lot areas. Mitigation measures to divert offsite runoff are not recommended. Offsite flows from adjacent areas will continue to flow through the site.

Offsite drainage is expected to impact the design of the Farrington Ave. extension at the Anahaki gulch crossing. A culvert is recommended at this location to accommodate offsite drainage flowing across the road at this location. These improvements are described in Section 3.2.3.

3.2.2 Onsite Drainage

Onsite drainage areas will be maintained in the proposed condition. It is assumed that existing drainage patterns will not change and grading will be minimal. The proposed lot improvements are not anticipated to significantly increase the peak flow runoff since the increase in impervious area relative to the overall project site is small. Existing drainage runoff patterns will be maintained onsite and drainage areas will continue to discharge into the existing locations onsite.

Onsite drainage consists of road and lot improvements. Road improvements include minimal grading and 20' wide paved road to provide access to the site. Lot improvements include paved driveways and an assumed development area of 5000 sf per lot.

The drainage areas for the lots are shown in Figure 6 and roads are shown in Figure 7. The proposed road and lot improvements will increase runoff. The total runoff increase is 15.7 cfs, with 13.0 cfs for the roads and 1.7 cfs for the lots. All of the drainage areas are less than 100 acres, so runoff is calculated for a 10-year storm event. A summary of the onsite runoff is shown in the table below. See Appendix A for runoff calculations, exhibits, and supporting documents.

Table 3-1: Onsite Runoff

Area Name	Onsite Area (ac)	Storm Event	Exist Runoff (cfs)	Proposed Runoff (cfs)	Increase Runoff (cfs)
Farrington	4.3	10-yr	10.5	14.7	4.2
Moomomi	4.5	10-yr	9	15.4	6.4
Puu Kapele	3.2	10-yr	8.7	12.1	2.4
Lot 17	31.8	10-yr	55.0	56.2	1.2
Lot 104D	20.0	10-yr	36.8	37.3	0.5
Total	63.8		120.0	135.7	15.7

The volume of runoff increase for the lot areas totals approximately 500 cubic feet per lot. Mitigation for this increase can be accommodated by using a small basin on each lot with dimensions of 25 ft wide x 25 ft long x 1 ft deep. The basin should be located downstream of proposed improvements and swales used to direct flow into the basin. Overflow from the basin should follow the natural drainage path.

Maintenance activities for a detention basin include:

- Inspection of basin including inlets/outlets and pipes after storm events.

- Trim vegetation to maintain access into the basin.
- Inspect and remove sediment at inlets/outlets to maintain flow and basin capacity.
- Remove litter and debris.

3.2.3 Road Drainage

The drainage system for the proposed roads will consist of a road swale on the low side of the road. Drain inlets and piping will not be used. The conceptual drainage improvements in this study were designed in accordance with the County of Maui drainage standards. Runoff on the roads will be collected by the road swale.

The volume of additional runoff generated from the roadway improvements varies from 10,000 to 20,000 cubic feet. Mitigation options for the additional roadway runoff can be accommodated by discharging runoff into an existing drainage way, storing runoff in a drainage basin, or storing runoff in infiltration trenches located beneath road swale (See Figure 11).

Options for runoff disposal on Farrington Ave. include discharging the road swale into Anahaki gulch, storing runoff in a drainage basin on the north side of the road, or installing infiltration trenches beneath the road swale (See Figure 7). Discharge of runoff into Anahaki gulch is feasible for a majority of Farrington Ave upstream of the gulch. The remaining portion of Farrington Ave. downstream of the gulch will be addressed by using a drainage basin or infiltration trench. The drainage basin dimensions would be 100-ft x 20-ft x 6-ft deep and will be located outside of the road ROW, in an existing lessee's lot. The infiltration trench will be 6-ft wide x 3-ft deep, filled with drain rock, along the length of the road. Since the infiltration trench can be installed within the ROW, this option is preferred for disposal of the increase in runoff for the roadway.

Options for runoff disposal on Moomomi Ave. include storing runoff in a drainage basin on the north side of the road, or installing infiltration trenches beneath the road swale (See Figure 7). The drainage basin dimensions would be 150-ft x 30-ft x 6-ft deep and will be located outside of the road ROW, in a proposed lessee's lot. The infiltration trench will be 6-ft wide x 3-ft deep, filled with drain rock, and installed along the length of the road. Since the infiltration trench can be installed within the ROW, this option is preferred for disposal of the increase in runoff for the roadway.

Options for runoff disposal on Puu Kapela Ave. include discharging the road swale into Nenehanaupo gulch, storing runoff in a drainage basin on the north side of the road, or installing infiltration trenches beneath the road swale (See Figure 7). Discharge of runoff into Nenehanaupo gulch would require extension of the road swale approximately 1600 feet beyond the project site. The drainage basin dimensions would be 110-ft x 20-ft x 6-ft deep and will be located outside of the road ROW, in a proposed lessee's lot. The infiltration trench will be 6-ft wide x 3-ft deep, filled with drain rock, along the length of the road. Since the infiltration trench can be installed within the ROW, this option is preferred for disposal of the increase in runoff for the roadway.

Anahaki gulch crosses Farrington Ave. near the project site, conveying a total of 1560 cfs from 256 acres for a 100-yr storm event. For this road to be used during storm events, a culvert under the road is needed. Two 13-ft wide x 8-ft high box culverts are needed to convey the 100-yr storm event. To reduce the cost of installing a large culvert and since the road will not be designed to County of Maui standards, a smaller culvert could be considered to convey runoff generated by a smaller storm event that will allow the road to be used for most small storm events. The 10-yr storm will generate 640 cfs, requiring two 8-ft wide x 6-ft high box culverts.

3.2.4 Road Drainage Alternatives

Low impact development (LID) alternatives to the road drainage system components described above were evaluated to determine their feasibility for implementation in this project. LID elements would reduce the amount of runoff entering the roadway drainage system.

3.2.4.1 Low Impact Development

Potential LID drainage alternatives for the proposed roads include porous pavement and infiltration trenches. Porous pavement would replace the asphalt pavement and allows runoff to percolate through the pavement surface, where it is stored in a subsurface rock reservoir. The collected runoff percolates into the existing subgrade below. Infiltration trenches would be installed within the unpaved road shoulder, at the low point of the roadway swale. Runoff collected in the infiltration trench will be stored and allowed to percolate into the existing subgrade. The collected runoff should completely percolate within 48 hours.

3.2.4.2 Porous Asphalt Pavement

Porous asphalt pavement is an alternative to traditional pavement, which is impermeable. A typical asphalt pavement cross section consists of AC pavement over a base course layer installed on a compacted subgrade, while a typical porous asphalt cross section consists of porous AC pavement over a choker layer and a rock reservoir layer below, installed on uncompacted subgrade. Characteristics of porous pavement include:

- Reduces runoff and pollutants but is not designed to accommodate design storm events.
- Higher initial cost.
- Larger runoff flows require installation of subdrain system with connections to the roadway drainage system.
- Underground runoff storage will not have significant reduction in size of road drainage system.
- Maintenance requires vacuuming or pressure washing every 3 months since the road is adjacent to agricultural areas.
- Ideal for flat installations. The proposed road extensions are sloped.
- Requires a minimum soil percolation rate of 0.5 in/hr. The assumed percolation rate of the existing soils is less than 0.5 in/hr based on the NRCS soil classification.
- Ideal for light traffic conditions such as parking lots. The pavement for this project will be used for roads.

3.2.4.3 Infiltration Trenches

Infiltration trenches are recommended for use beneath road swales to provide storage of the increase in runoff generated by the new roads. The trenches will be 6-ft deep by 3-ft wide and will be filled with drain rock that provides 40% voids. Runoff will be stored in the voids in the rock. Since the roads are sloped, dams will need to be used to prevent collected runoff from flowing downstream and allow runoff collected in each section of trench to percolate into the existing soils. Percolation tests will be needed to confirm the permeability of the existing soils and validate the use of infiltration trenches in this project.

3.2.4.4 Road Maintenance

Since the proposed roads will not be designed to County of Maui (COM) standards, DHHL will be responsible for maintenance of the roads and any LID features installed.

3.2.4.4 Conclusion

Porous asphalt pavement is not recommended for installation within the proposed road right-of-ways for this project because many of the porous pavement characteristics described above are infeasible or disadvantages for this project. Infiltration trenches are recommended for use in the road right-of-way to provide treatment and storage of the increase in runoff. Lessees could also implement LID measures in the design of their house and lot improvements.

3.3 Potable Water System

An analysis of the existing water mains providing service to Lots 17 and 104D was conducted to determine the adequacy of the system for the proposed use in accordance with the Water System Standards (WSS).

3.3.1 Potable Water Demands

Potable water demand is based on the 600 gallons per day per the Department of Water Supply's Water System Standards (WSS) for a single family house. Irrigation usage is not included since there is an existing non-potable irrigation system available. For domestic use, the peak hour flow is used to determine the residual pressures at all nodes. For fire protection, the required fire flow (500 gpm) is used to determine the residual pressure at each hydrant. Per the WSS, the residual pressure for the peak hour analysis is 40 psi and for the fire flow analysis, 20 psi.

3.3.2 Hydraulic Analysis

The existing water system was modeled using WaterCAD to determine residual pressures for domestic and fire protection uses. The results of the model indicate that the existing water system is adequate to support the proposed subdivision. The highest and lowest residual pressures for the peak hour and fire flow analyses are shown below.

Table 3-2: Peak Hour Analysis

Node	Residual Pressure (psi)
Lot 17D	80
Lot 104D-1B	150

Table 3-3: Fire Flow Analysis

Node	Residual Pressure (psi)
H-26	126
H-65	152

Since the residual pressures at the mains are generally high, there are no areas in the subdivision that have elevation restrictions for water use. However, to control high pressure, pressure reducing valves should be considered for lots with pressures greater than 125 psi. Details of the criteria used, assumptions, demands, and calculation results can be found in Appendix B.

3.3.3 Conclusion

The hydraulic analysis results indicate that there is ample residual pressure available in the existing water system to support the proposed subdivisions at Lots 17 and 104D. No improvements to the existing water system are recommended. Water laterals will need to be extended along the flag stems to provide service to the interior lots. On Puu Kapele Ave., a new water lateral will need to be extended along the flag stem to service the rear lot.

Field topographic survey data confirmed that existing fire hydrants front the project site along Puu Kapele Avenue, Farrington Avenue, and Moomomi Avenue.

3.4 Non-Potable Irrigation System

An analysis of the existing irrigation mains providing service to Lots 17 and 104D was conducted to determine the adequacy of the existing MIS system.

3.4.1 Irrigation Demands

Proposed irrigation demands were determined by comparing the demand from the Department of Water Suppy's Water System Standards (WSS) and actual MIS usage. The WSS water demand for agricultural lot is 5000 gallons per acre. The monthly MIS usage per acre for the highest month is 29,024 gallons per acre or 936 gallons per acre per day. Since the WSS demand is more conservative, 5000 gallons per acre will be used for this study. The area for each proposed lot was used to calculate its demand.

3.4.2 Hydraulic Analysis

To confirm the adequacy of the existing irrigation lines, a hydraulic model of the existing system and new pipes was prepared using WaterCAD to verify the existing pipe sizes, size new pipes, and determine residual pressures available at each lot.

Since the water surface elevation in the Kualapuu reservoir has varied by approximately 20 feet over the past 5 years, three starting water surface elevations were used in the model: 1-ft, 10-ft, and 38 ft. The average irrigation demand for each lot is 5000 gal/acre per 8-hour day. The minimum residual pressure at each lot is 30 psi, regardless of the water level in the reservoir. Using these parameters, the highest and lowest pressures onsite are shown in the table below.

Table 3-4: Irrigation Pressures

Node	Residual Pressure (psi)		
	1-ft	10-ft	38-ft
Lot 104	157	161	173
Lot 17	187	191	203

A new 8-inch irrigation line is proposed to service Lot 17 from Farrington Ave. (See Figure 10). No improvements to the existing MIS are recommended. The hydraulic model results indicate that residual pressures, even at the lowest reservoir level, will provide ample residual pressure to support the proposed subdivision. The high pressures are primarily due to the difference in elevation from the reservoir to the subdivision. The pressure at each lot may be too high for proposed irrigation systems and pressure reducing valves may be needed. The irrigation

system model does not include existing system demands or pressure reductions, such as at a breaker tank or pressure reducing valve. The hydraulic model results should be compared to actual flow data obtained in the field to confirm these results. Details of the criteria used, assumptions, demands, and calculation results can be found in Appendix C.

3.4.3 Conclusion

The existing MIS and new 8-inch irrigation line will be adequate to provide irrigation to the proposed lots. On Farrington Ave. the existing 8-inch main will be extended to Lot 17. Irrigation laterals will need to be extended along the flag stems to provide service to the interior lots. On Puu Kapele Ave., new irrigation laterals will be provided for each lot from the proposed 8-inch main.

Coordination with DOA is required to obtain irrigation service and meters. The irrigation system model only represents a portion of the existing MIS and does not include the impacts of existing demands on the irrigation network, which may affect pressures at common nodes where the existing lines/flows are split. If more detailed analysis is required, demand data and field flow tests are required.

3.5 Electrical Power

3.5.1 Proposed Electrical Power

Lot 104D is located at the end of a single phase medium voltage circuit run along Puu Kapele Ave (from the west). Lot 104D is comprised of four parcels. To service each individual parcel, a new buck pole is to be installed along the existing overhead line across the access driveway to the lot (See Figure 12). A new 450 foot primary line extension will incorporate two new poles spaced approximately 225 feet apart from the new buck pole. Estimated cost to service Lot 104D is $120,000.

Lot 17 is located approximately 3000-3250 feet west of the last existing HECO power poles. Lot 17 is comprised of 8 parcels and will be serviced from both Farrington Avenue and Moomomi Avenue. To extend overheat primary power to the lot, an estimated 13 poles will be installed along Farrington Avenue and an estimated 11 poles will be installed along Moomomi Avenue (See Figure 12). Spacing between poles is estimated at 275 feet. To service the 8 parcels, they will be split into (2) four parcel groups. Overhead lines will be bucked off the last proposed poles

on Farrington and Moomomi Avenues and extend two poles along the access driveways. These poles are spaced approximately 200 feet apart. An additional pole is to be installed across the access driveway at the first pole to service on of the lots. Estimated cost to service Lot 17 is $1,160,000.

3.6 Cost Estimate

The proposed infrastructure improvements to develop the Hoolehua Scattered Lots are estimated to cost $7.7 million. The cost breakdown in shown in the table below.

Item	Cost
Site Preparation	$1,200,000
Roads	$2,000,000
Drainage	$830,000
Water	$810,000
Irrigation	$340,000
Electrical	$1,280,000
Subtotal	$6,460,000
Contingency (20%)	$1,300,000
Total	$7,760,000

The highest cost is for the roads to access the proposed lots. The drainage system cost could be reduced if a smaller culvert is used at Farrington Ave.

DHHL's construction budget may not be able to fund construction of all the proposed improvements. Therefore, construction of the improvements may need to be phased based on availability of funds.

3. REFERENCES

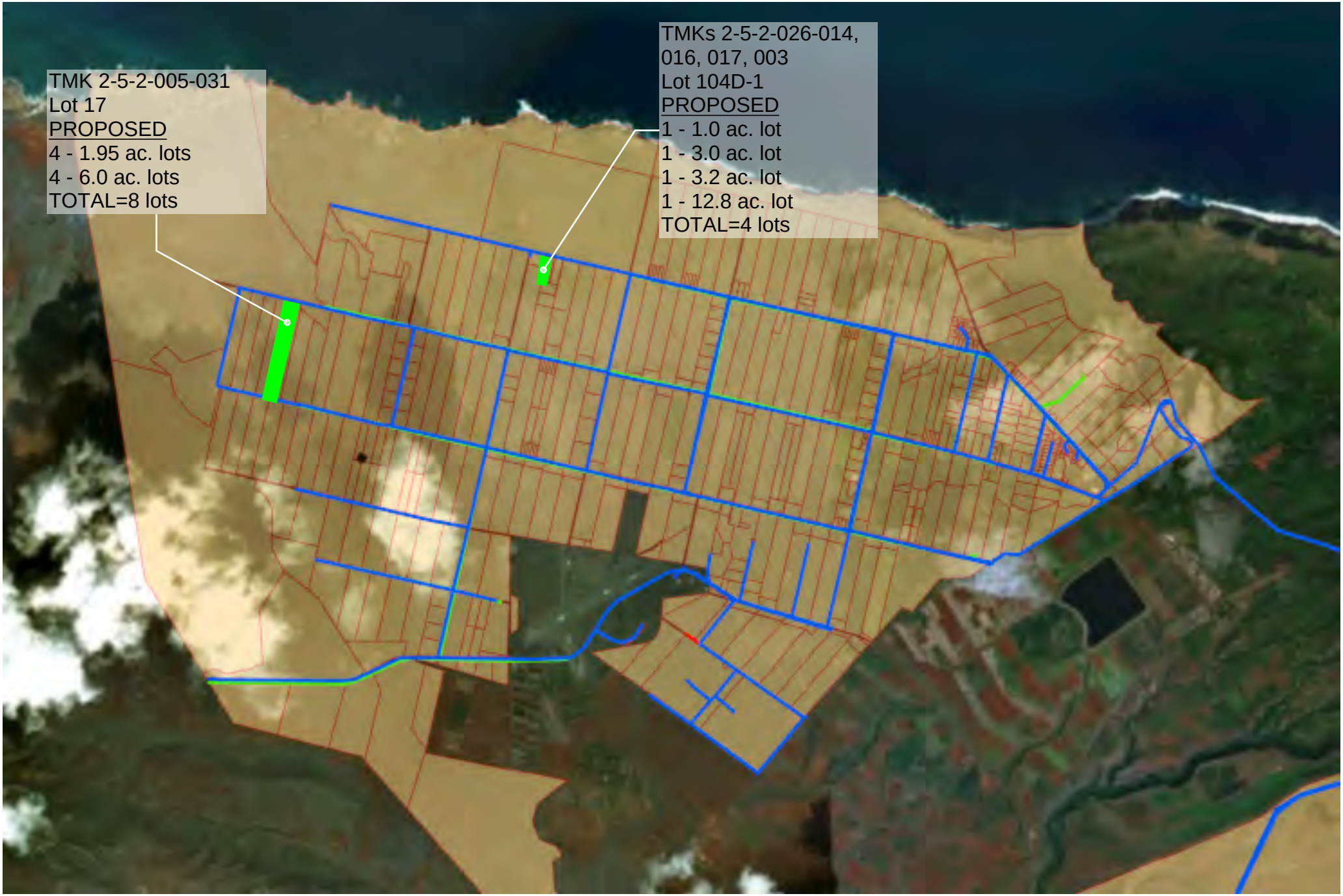
1. *Water System Standards*, 2002, Department of Water Supply – County of Maui.

2. *Custom Soil Resource Report for Island of Oahu, Hawaii,* United States Department of Agriculture, Natural Resources Conservation Service, March 2018.

3. *Wastewater System Design Standards,* Department of Environmental Services, City and County of Honolulu, July 2017.

4. *Repeal of Rules Relating to Soil Erosion Standards and Guidelines an 1.5 Section II of the Rules Relating to Storm Drainage Standards; and Adoption of Rules Relating to Water Quality*, Department of Planning and Permitting City and County of Honolulu, August 2017.

5. *Storm Drainage Standards*, Department of Planning and Permitting City and County of Honolulu, August 2017.



HO'OLEHUA VACANT LOTS

FIGURE 1

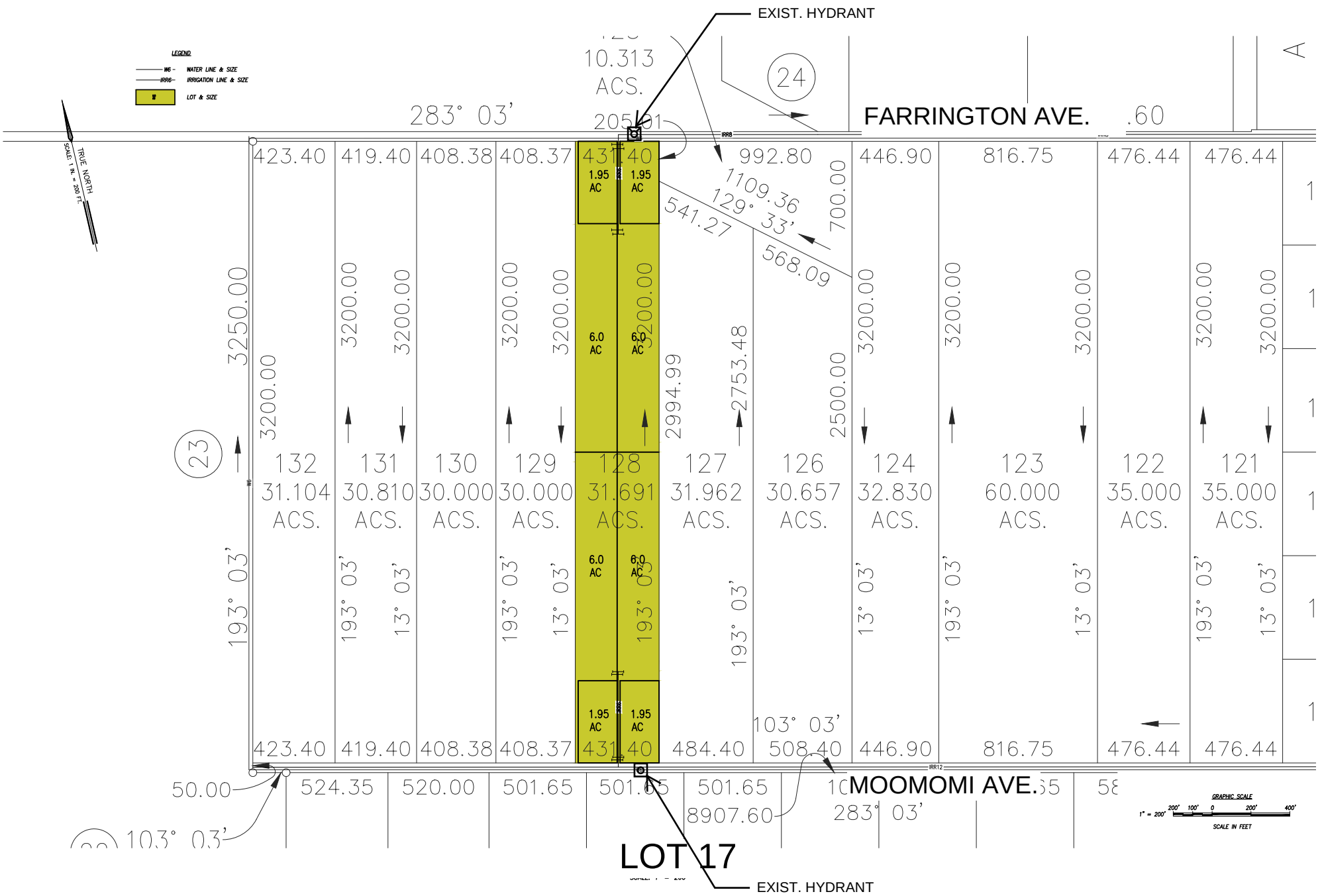

EXIST. HYDRANT
LEGEND
W6 – WATER LINE & SIZE
IRR6 – IRRIGATION LINE & SIZE
LOT & SIZE
10.313 ACS.
283° 03'
FARRINGTON AVE.
.60
TRUE NORTH
SCALE: 1 IN. = 200 FT.
423.40
419.40
408.38
408.37
431.40
992.80
446.90
816.75
476.44
476.44
1.95 AC
1.95 AC
1109.36
129° 33'
541.27
568.09
700.00
3250.00
3200.00
6.0 AC
6.0 AC
2994.99
2753.48
2500.00
23
24
132
31.104 ACS.
131
30.810 ACS.
130
30.000 ACS.
129
30.000 ACS.
128
31.691 ACS.
127
31.962 ACS.
126
30.657 ACS.
124
32.830 ACS.
123
60.000 ACS.
122
35.000 ACS.
121
35.000 ACS.
193° 03'
13° 03'
484.40
508.40
103° 03'
W6
IRR12
50.00
524.35
520.00
501.65
501.65
501.65
8907.60
MOOMOMI AVE.
GRAPHIC SCALE
1" = 200'
200' 100' 0 200' 400'
SCALE IN FEET
LOT 17
EXIST. HYDRANT

FIGURE 2

EXIST. HYDRANT
LEGEND
LOT & SIZE
TRUE NORTH
SCALE: 1 IN. = 80 FT.
PUU KAPELE AVENUE
IRR8
W8
1.0 AC
3.0 AC
3.2 AC
12.8 AC
LOT 26 (F.P. 2328)
LOT 27 (F.P. 2328)
LOT 33 (F.P. 2328)
LOT 31 (F.P. 2328)
LOT 36
LOT
GRAPHIC SCALE
1" = 80'
80' 40' 0 40' 80'
SCALE IN FEET
HOOLEHUA PUU KAPELE LOTS
SCALE: 1" = 60'
LOT 104D

FIGURE 3

HOOLEHUA

MOLOKAI, HAWAII

R. M. TOWILL CORPORATION

TRUE NORTH
1" = 500'

200

400

400

PUU KAPELE AVE.

EXISTING UNPAVED ROADWAY

2722.5'
(NEW PAVED ROADWAY)

EXISTING PAVED ROADWAY

PUU KAPELE AVE.

LOT 104D

4 LOTS

ANAKAHI AVE.

HAUAKEA AVE.

NENEHANAUPO AVE.

EXISTING UNPAVED ROADWAY

3443.86'
(NEW PAVED ROADWAY)

EXISTING PAVED ROADWAY

FARRINGTON AVE.

FARRINGTON AVE.

PROPOSED FARRINGTON AVE.
CULVERT CROSSING
11'x8' BOX CULVERT (2-BARREL)

LOT 17

8 LOTS

HAUAKEA AVE.

NENEHANAUPO AVE.

MOOMOMI AVE.

MOOMOMI AVE.

EXISTING UNPAVED ROADWAY

3629.15'
(NEW PAVED ROADWAY)

EXISTING PAVED ROADWAY

OVERALL ROAD LAYOUT PLAN

SCALE: 1" = 500'

GRAPHIC SCALE:
500' 250' 0 500' 1000'
1" = 500'
SCALES IN FEET

REVISION | DATE | BRIEF

BY | APPROVED

APPROVED BY

ENGINEER

DRAFTSMAN

CHECKED BY

SCALE AS SHOWN

DATE

DPP FILE NO.

OVERALL
ROAD LAYOUT PLAN

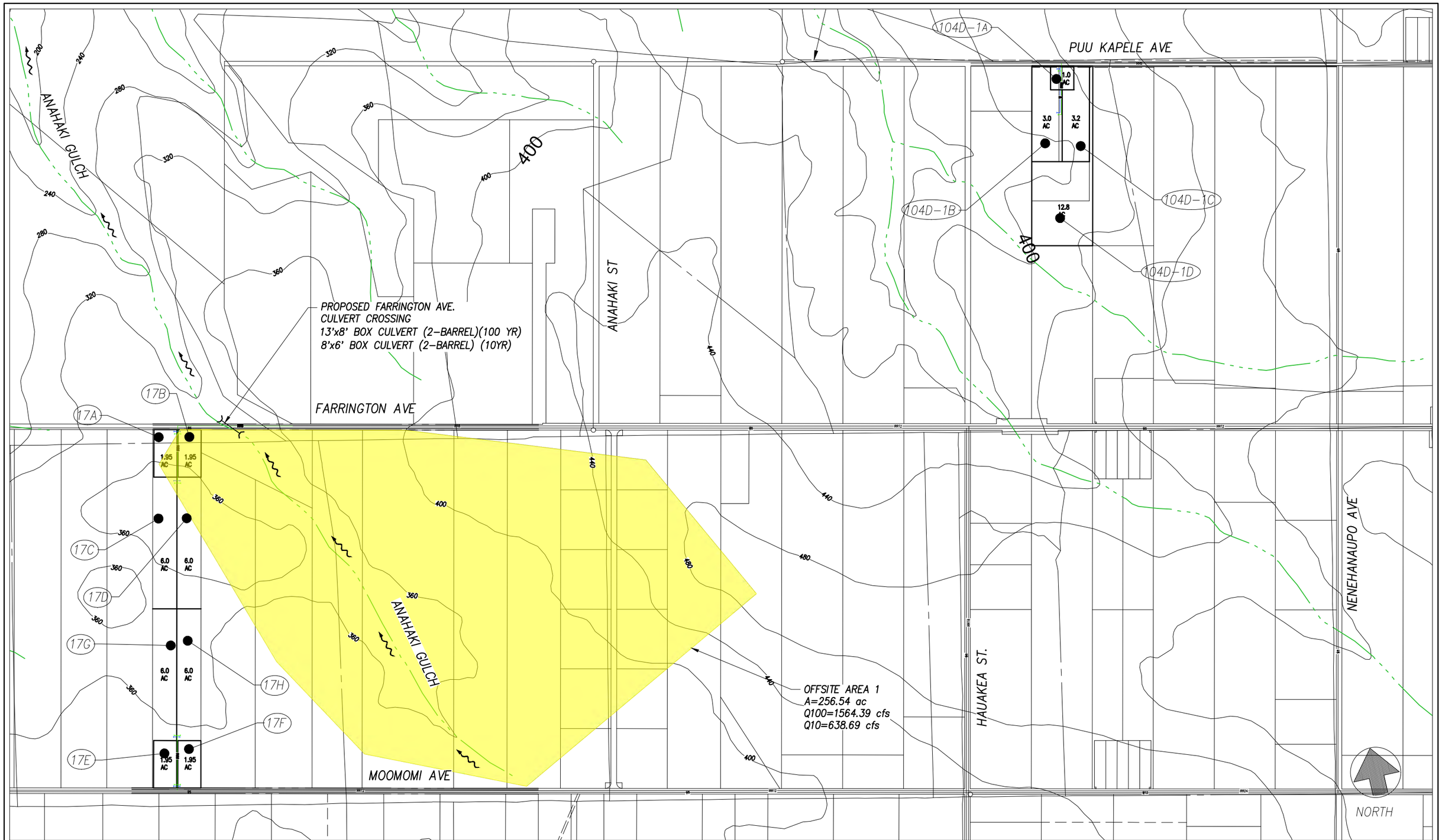
FILE	POCKET	FOLDER	NO.

C100 SHEET OF SHEETS

RMTC JOB NO.: 1-23452-0E

K:\civil\23375 Hoolehua Naiwa\PER\Hoolehua\04 Roads\CAD files\C100_Overall Road Layout Plan.dwg October 26, 2023

FIGURE 4



Planning – Engineering – Environmental Services – Photogrammetry – Surveying – Construction Management

R. M. TOWILL CORPORATION

808 842 1133 2024 North King Street, Suite 200 Honolulu Hawaii 96819-3494

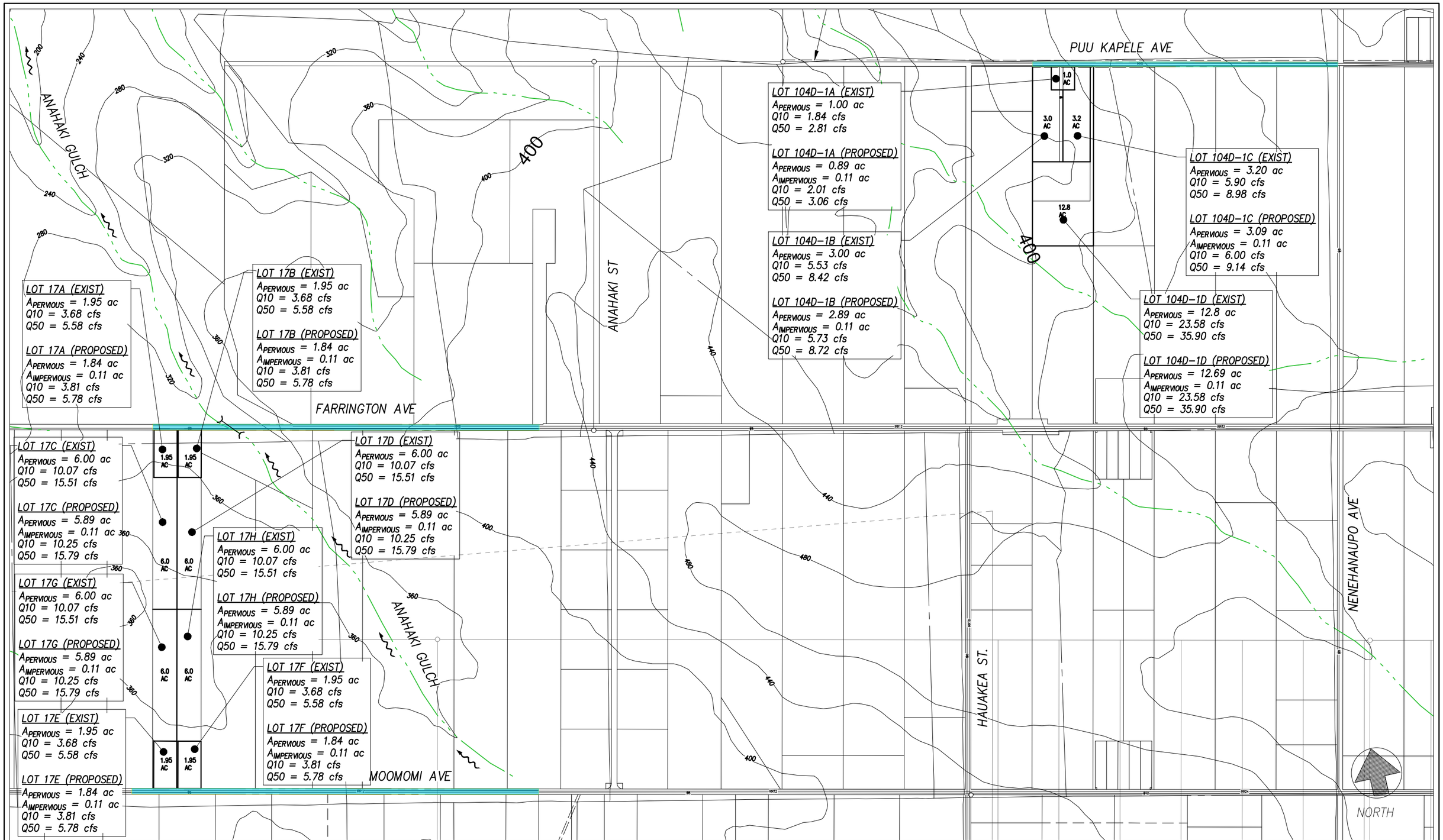
800' 400' 0 800' 1600'

1" = 800'

HOOLEHUA

DRAINAGE RUNOFF PLAN

FIGURE 5



Planning – Engineering – Environmental Services – Photogrammetry – Surveying – Construction Management

R. M. TOWILL CORPORATION

808 842 1133 2024 North King Street, Suite 200 Honolulu Hawaii 96819-3494

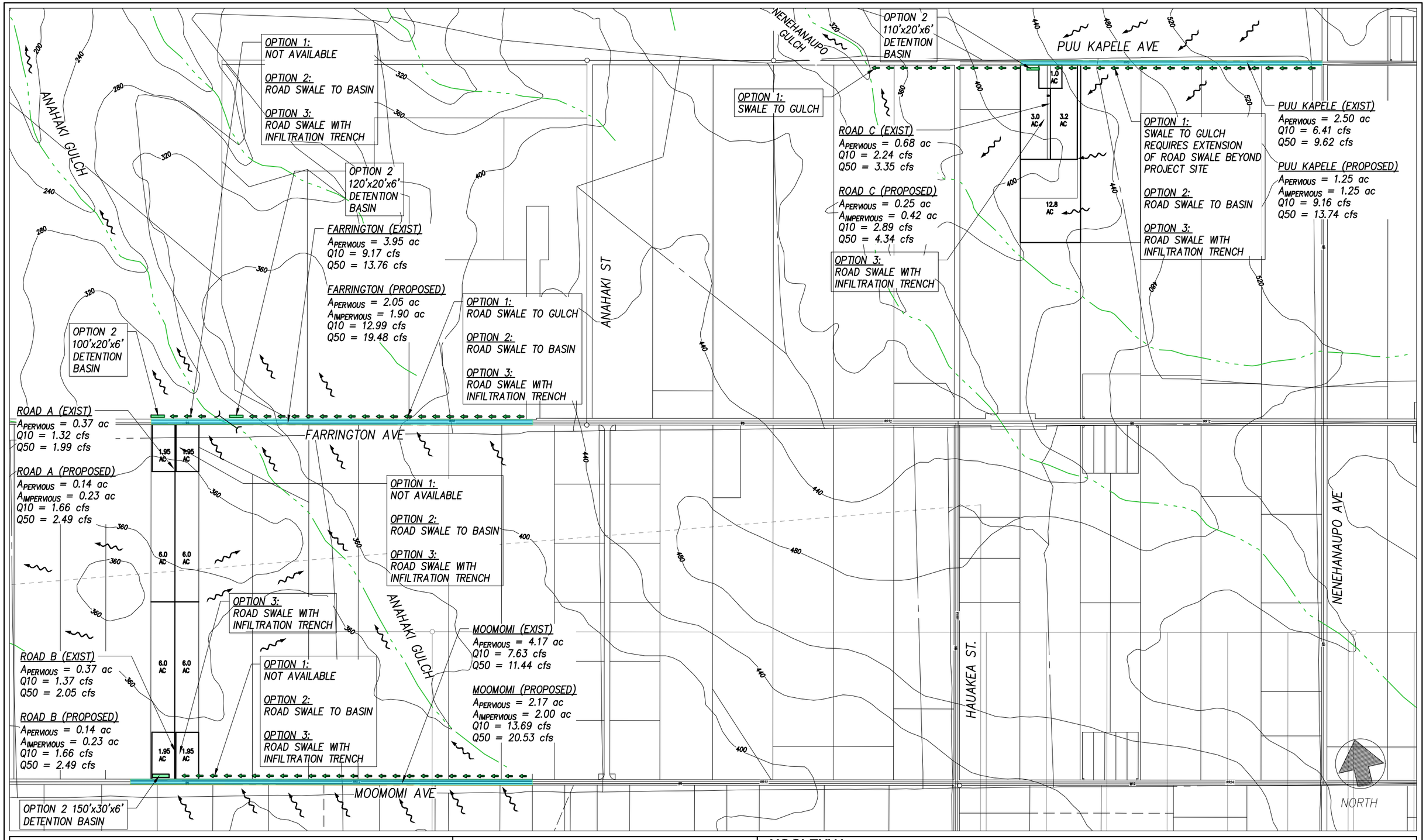
800' 400' 0 800' 1600'

1" = 800'

HOOLEHUA

DRAINAGE AREA MAP (LOTS)

FIGURE 6



Planning – Engineering – Environmental Services – Photogrammetry – Surveying – Construction Management

R. M. TOWILL CORPORATION

808 842 1133 2024 North King Street, Suite 200 Honolulu Hawaii 96819-3494

800' 400' 0 800' 1600'

1" = 800'

HOOLEHUA

DRAINAGE AREA MAP (ROADWAYS)

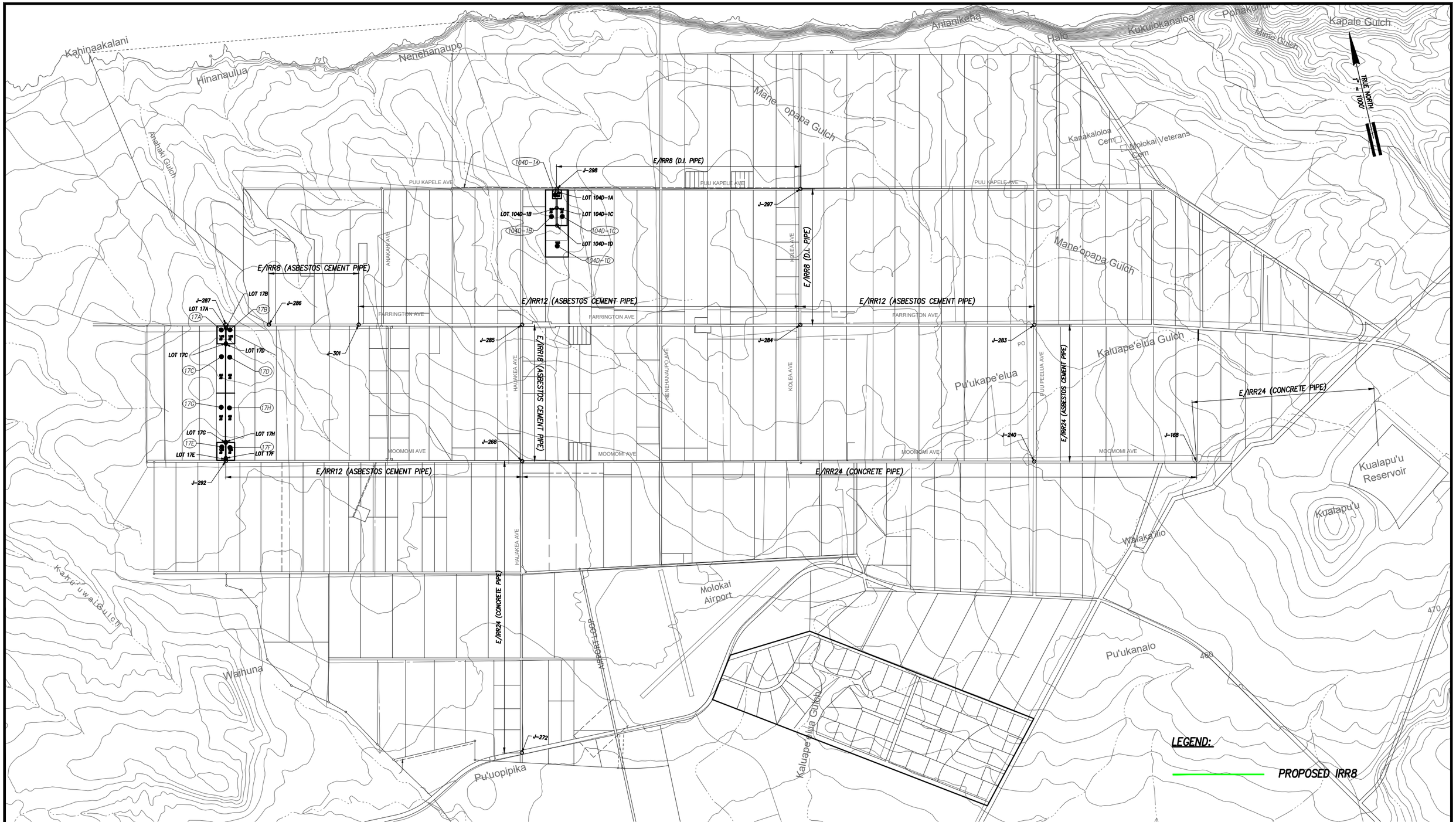
FIGURE 7

EXISTING WATER SYSTEM PLAN

SCALE: 1" = 800'

GRAPHIC SCALE:
800' 400' 0 800' 1600'
1" = 800'
SCALE IN FEET

FIGURE 8



IRRIGATION SYSTEM PLAN

SCALE: 1" = 1000'

GRAPHIC SCALE:
1" = 1000'
1000' 500' 0 1000' 2000'
SCALE IN FEET

FIGURE 9

IF BAR SCALE IS NOT EQUAL TO 2 INCHES, PRINT IS NOT TO SCALE - SCALE ACCORDINGLY

0 1/4" 1/2" 1" 2"

(NOT FOR CONSTRUCTION)

PUU KAPELE AVE.

PUU KAPELE AVE.

3
E2

ROAD "C"

ANAKAHI AVE.

HAUAKEA AVE.

NENEHANAUPO AVE.

1
E2

FARRINGTON AVE.

FARRINGTON AVE.

ROAD "A"

2
E2

HAUAKEA AVE.

ROAD "B"

MOOMOMI AVE.

MOOMOMI AVE.

N

OVERALL ELECTRICAL SITE PLAN

SCALE: 1" = 500'

MORIKAWA & ASSOCIATES LLC

Electrical Engineering Services
431 Aulii Drive
P.O. Box 880280
Pukalani, Hawaii 96788
Tel: (808) 572-1745
Fax: (808) 572-6323

Licensed in:
Alaska - Hawaii - Idaho-
Nevada - Oregon - Washington -
California - Michigan - Arizona - Guam
Wyoming

This work was prepared by me or under my supervision and construction of this project will be under my observation.

JOB NO.	DATE:
19-147	2021-12-17

DRAWN BY:	DESIGNED BY:
J.E.	D.S.

TMK: (2) #-##-##

HOOLEHUA SITE IMPROVEMENTS

ELECTRICAL PLANS FOR:

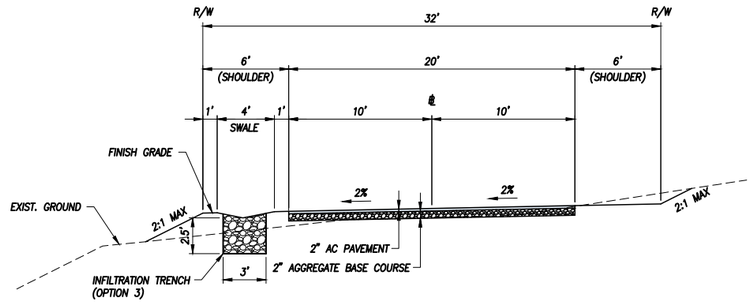
MAUI, HAWAII

REVISIONS:

SHEET NO.

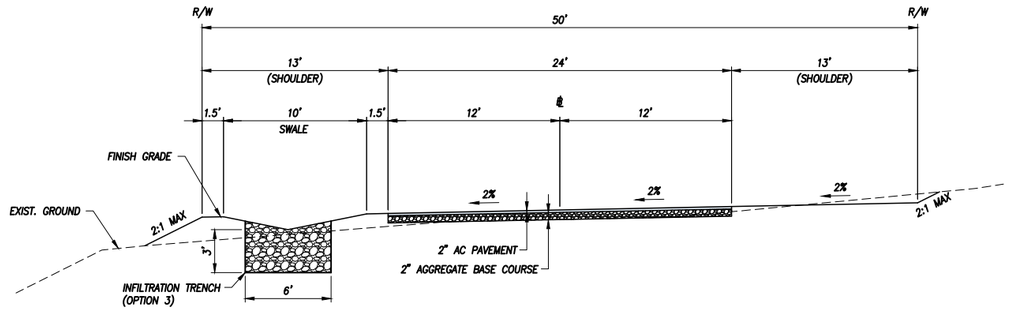
E1

FIGURE 10



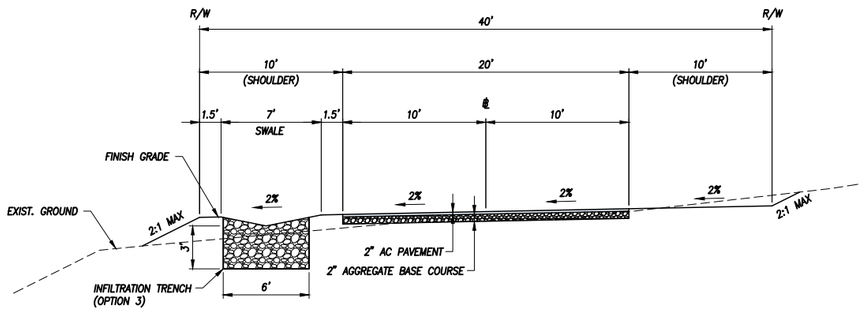
TYPICAL SECTION – ROAD "A", "B", "C"

SCALE: 1" = 5'



TYPICAL SECTION – "FARRINGTON" AVENUE AND "MOOMOMI" AVENUE

SCALE: 1" = 5'



TYPICAL SECTION – "PUU KAPELE" AVENUE

SCALE: 1" = 5'

GRAPHIC SCALE:
1" = 5'
5' 0 5' 10'
SCALES IN FEET

HOOLEHUA

MOLOKAI, HAWAII

R. M. TOWILL CORPORATION

REVISION	DATE	BY	APPROVED

APPROVED BY

ENGINEER

DRAFTSMAN

CHECKED BY

SCALE AS SHOWN

DATE

DPP FILE NO.

TYPICAL SECTIONS

C121 SHEET OF SHEETS

FILE	POCKET	FOLDER	NO.

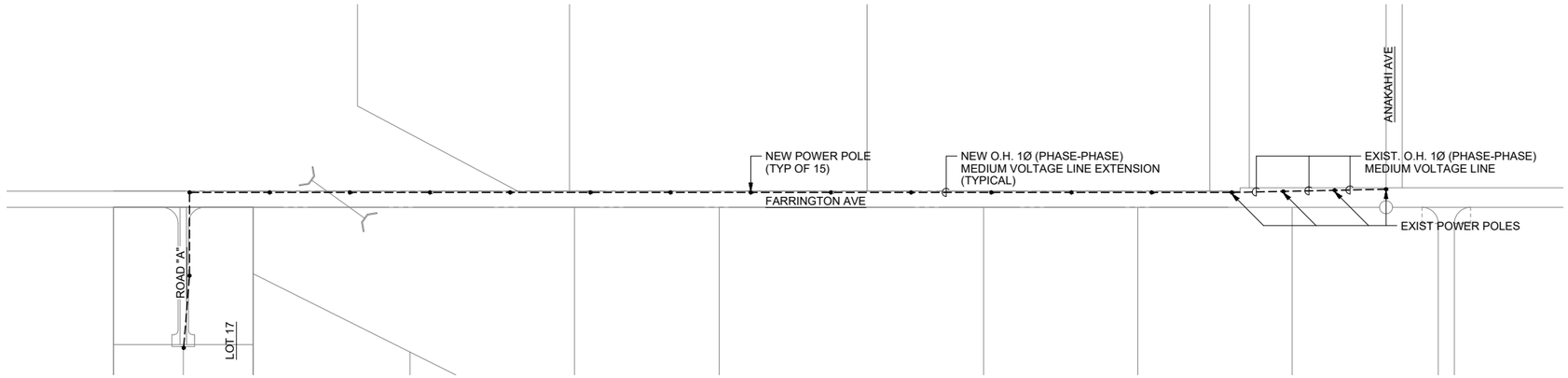
RMTC JOB NO.: 1-23452-0E

Z:\12. 2021 Project\JN-2143 RM-Hoolehua PER\01. 30%\Construction Dwgs\Road\C121 Typical Road Sections.dwg December 21, 2021

FIGURE 11

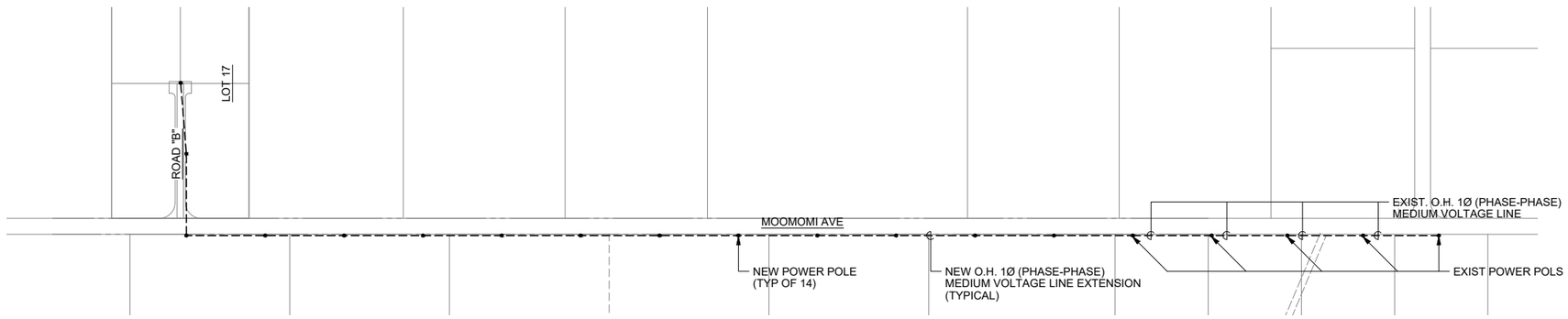
IF BAR SCALE IS NOT EQUAL TO 2 INCHES, PRINT IS NOT TO SCALE - SCALE ACCORDINGLY

0 1/4" 1/2" 1" 2"



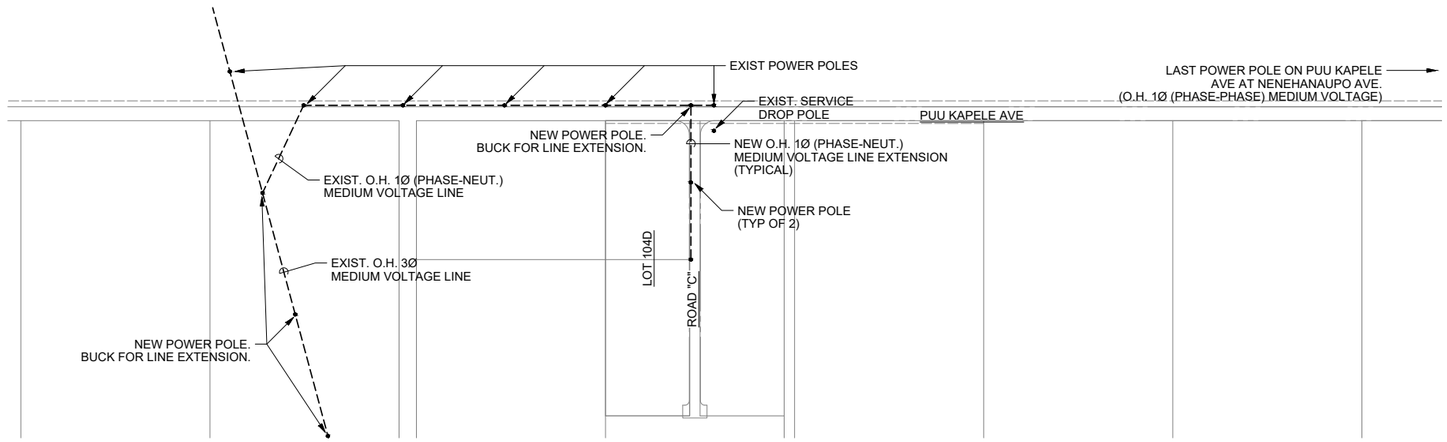
1/E2 PARTIAL ELECTRICAL SITE PLAN

SCALE: 1" = 200'



2/E2 PARTIAL ELECTRICAL SITE PLAN

SCALE: 1" = 200'



3/E2 PARTIAL ELECTRICAL SITE PLAN

SCALE: 1" = 200'

(NOT FOR CONSTRUCTION)

MORIKAWA & ASSOCIATES LLC
Electrical Engineering Services
431 Auli Drive
P.O. Box 880280
Pukalani, Hawaii 96788
Tel: (808) 572-1745
Fax: (808) 572-6323

Licensed in:
Alaska - Hawaii - Idaho-
Nevada - Oregon - Washington -
California - Michigan - Arizona - Guam
Wyoming

This work was prepared by me or under my supervision and construction of this project will be under my observation.

JOB NO.	DATE:
19-147	2021-12-17

DRAWN BY:	DESIGNED BY:
J.E.	D.S.

TMK: (2) #-##-## ##

HOOLEHUA SITE IMPROVEMENTS

ELECTRICAL PLANS FOR:

MAUI, HAWAII

REVISIONS:

SHEET NO.

E2

FIGURE 12

APPENDIX A

Drainage Calculations

HOOLEHUA LOTS (EXISTING)

TABLE 1: PEAK RUNOFF CALCULATION (10 YR Q)

Drainage Basin	Drain Area	IMPERVIOUS C	IMPERVIOUS area (acres)	PERVIOUS C	PERVIOUS area (acres)	Tc (min)	Weighted C	10 YR I (in/hr)	Total area, A (acres)	Q=CIA (cfs)
	Lot 17A	0.95	0.00	0.55	1.95	23.0	0.55	3.43	1.95	3.68
	Lot 17B	0.95	0.00	0.55	1.95	23.0	0.55	3.43	1.95	3.68
	Lot 17C	0.95	0.00	0.55	6.00	30.0	0.55	3.05	6.00	10.07
	Lot 17D	0.95	0.00	0.55	6.00	30.0	0.55	3.05	6.00	10.07
	Lot 17E	0.95	0.00	0.55	1.95	23.0	0.55	3.43	1.95	3.68
	Lot 17F	0.95	0.00	0.55	1.95	23.0	0.55	3.43	1.95	3.68
	Lot 17G	0.95	0.00	0.55	6.00	30.0	0.55	3.05	6.00	10.07
	Lot 17H	0.95	0.00	0.55	6.00	30.0	0.55	3.05	6.00	10.07
	Lot 104D-1A	0.95	0.00	0.55	1.00	24.5	0.55	3.35	1.00	1.84
	Lot 104D-1B	0.95	0.00	0.55	3.00	24.5	0.55	3.35	3.00	5.53
	Lot 104D-1C	0.95	0.00	0.55	3.20	24.5	0.55	3.35	3.20	5.90
	Lot 104D-1D	0.95	0.00	0.55	12.80	24.5	0.55	3.35	12.80	23.58
									51.80	**91.82**

TABLE 2: PEAK RUNOFF CALCULATION (50 YR Q)

Drainage Basin	Drain Area	IMPERVIOUS C	IMPERVIOUS area (acres)	PERVIOUS C	PERVIOUS area (acres)	Tc (min)	Weighted C	50 YR I (in/hr)	Total area, A (acres)	Q=CIA (cfs)
	Lot 17A	0.95	0.00	0.55	1.95	23.0	0.55	5.2	1.95	5.58
	Lot 17B	0.95	0.00	0.55	1.95	23.0	0.55	5.2	1.95	5.58
	Lot 17C	0.95	0.00	0.55	6.00	30.0	0.55	4.7	6.00	15.51
	Lot 17D	0.95	0.00	0.55	6.00	30.0	0.55	4.7	6.00	15.51
	Lot 17E	0.95	0.00	0.55	1.95	23.0	0.55	5.2	1.95	5.58
	Lot 17F	0.95	0.00	0.55	1.95	23.0	0.55	5.2	1.95	5.58
	Lot 17G	0.95	0.00	0.55	6.00	30.0	0.55	4.7	6.00	15.51
	Lot 17H	0.95	0.00	0.55	6.00	30.0	0.55	4.7	6.00	15.51
	Lot 104D-1A	0.95	0.00	0.55	1.00	24.5	0.55	5.1	1.00	2.81
	Lot 104D-1B	0.95	0.00	0.55	3.00	24.5	0.55	5.1	3.00	8.42
	Lot 104D-1C	0.95	0.00	0.55	3.20	24.5	0.55	5.1	3.20	8.98
	Lot 104D-1D	0.95	0.00	0.55	12.80	24.5	0.55	5.1	12.80	35.90
									51.80	**140.45**

HOOLEHUA LOTS (PROPOSED)

TABLE 1: PEAK RUNOFF CALCULATION (10 YR Q)

Drainage Basin	Drain Area	IMPERVIOUS C	IMPERVIOUS area (acres)	PERVIOUS C	PERVIOUS area (acres)	Tc (min)	Weighted C	10 YR I (in/hr)	Total area, A (acres)	Q=CIA (cfs)
	Lot 17A	0.95	0.11	0.55	1.84	23.0	0.57	3.43	1.95	3.81
	Lot 17B	0.95	0.11	0.55	1.84	23.0	0.57	3.43	1.95	3.81
	Lot 17C	0.95	0.11	0.55	5.89	30.0	0.56	3.05	6.00	10.25
	Lot 17D	0.95	0.11	0.55	5.89	30.0	0.56	3.05	6.00	10.25
	Lot 17E	0.95	0.11	0.55	1.84	23.0	0.57	3.43	1.95	3.81
	Lot 17F	0.95	0.11	0.55	1.84	23.0	0.57	3.43	1.95	3.81
	Lot 17G	0.95	0.11	0.55	5.89	30.0	0.56	3.05	6.00	10.25
	Lot 17H	0.95	0.11	0.55	5.89	30.0	0.56	3.05	6.00	10.25
	Lot 104D-1A	0.95	0.11	0.55	0.89	24.5	0.60	3.35	1.00	2.01
	Lot 104D-1B	0.95	0.11	0.55	2.89	24.5	0.57	3.35	3.00	5.73
	Lot 104D-1C	0.95	0.11	0.55	3.09	24.5	0.56	3.35	3.20	6.00
	Lot 104D-1D	0.95	0.11	0.55	12.69	24.5	0.55	3.35	12.80	23.58
									51.80	**93.57**

TABLE 2: PEAK RUNOFF CALCULATION (50 YR Q)

Drainage Basin	Drain Area	IMPERVIOUS C	IMPERVIOUS area (acres)	PERVIOUS C	PERVIOUS area (acres)	Tc (min)	Weighted C	50 YR I (in/hr)	Total area, A (acres)	Q=CIA (cfs)
	Lot 17A	0.95	0.11	0.55	1.84	23.0	0.57	5.2	1.95	5.78
	Lot 17B	0.95	0.11	0.55	1.84	23.0	0.57	5.2	1.95	5.78
	Lot 17C	0.95	0.11	0.55	5.89	30.0	0.56	4.7	6.00	15.79
	Lot 17D	0.95	0.11	0.55	5.89	30.0	0.56	4.7	6.00	15.79
	Lot 17E	0.95	0.11	0.55	1.84	23.0	0.57	5.2	1.95	5.78
	Lot 17F	0.95	0.11	0.55	1.84	23.0	0.57	5.2	1.95	5.78
	Lot 17G	0.95	0.11	0.55	5.89	30.0	0.56	4.7	6.00	15.79
	Lot 17H	0.95	0.11	0.55	5.89	30.0	0.56	4.7	6.00	15.79
	Lot 104D-1A	0.95	0.11	0.55	0.89	24.5	0.60	5.1	1.00	3.06
	Lot 104D-1B	0.95	0.11	0.55	2.89	25.5	0.57	5.1	3.00	8.72
	Lot 104D-1C	0.95	0.11	0.55	3.09	24.5	0.56	5.1	3.20	9.14
	Lot 104D-1D	0.95	0.11	0.55	12.69	24.5	0.55	5.1	12.80	35.90
									51.80	**143.11**

LOTS RUNOFF VOLUME

		PROPOSED		EXISTING		DIFFERENCE	PROPOSED		EXISTING		DIFFERENCE
DRAINAGE BASIN	AREA	Q10 HYD VOL (ACFT)	Q10 HYD VOL (CF)	Q10 HYD VOL (ACFT)	Q10 HYD VOL (CF)		Q50 HYD VOL	Q50 HYD VOL (CF)	Q50 HYD VOL (ACFT)	Q50 HYD VOL (CF)	
	Lot 17A	0.182	7,923.00	0.175	7,616.00	(307.00)	0.272	11,856.00	0.262	11,397.00	(459.00)
	Lot 17B	0.182	7,923.00	0.175	7,616.00	(307.00)	0.272	11,856.00	0.262	11,397.00	(459.00)
	Lot 17C	0.469	20,442.00	0.461	20,077.00	(365.00)	0.703	30,603.00	0.690	30,056.00	(547.00)
	Lot 17D	0.469	20,442.00	0.461	20,077.00	(365.00)	0.703	30,603.00	0.690	30,056.00	(547.00)
	Lot 17E	0.182	7,923.00	0.175	7,616.00	(307.00)	0.272	11,856.00	0.262	11,397.00	(459.00)
	Lot 17F	0.182	7,923.00	0.175	7,616.00	(307.00)	0.272	11,856.00	0.262	11,397.00	(459.00)
	Lot 17G	0.469	20,442.00	0.461	20,077.00	(365.00)	0.703	30,603.00	0.690	30,056.00	(547.00)
	Lot 17H	0.469	20,442.00	0.461	20,077.00	(365.00)	0.703	30,603.00	0.690	30,056.00	(547.00)
	Lot 104D-1A	0.090	3,936.00	0.087	3,798.00	(138.00)	0.135	5,891.00	0.130	5,684.00	(207.00)
	Lot 104D-1B	0.271	11,809.00	0.262	11,394.00	(415.00)	0.406	17,672.00	0.391	17,052.00	(620.00)
	Lot 104D-1C	0.289	12,596.00	0.279	12,154.00	(442.00)	0.433	18,850.00	0.418	18,189.00	(661.00)
	Lot 104D-1D	0.289	12,596.00	0.279	12,154.00	(442.00)	0.433	18,850.00	0.418	18,189.00	(661.00)
						-	TOTAL VOL	231,099.00		224,926.00	(6,173.00)

HOOLEHUA ROADWAYS (EXISTING)

TABLE 1: PEAK RUNOFF CALCULATION (10 YR Q)

Drainage Basin	Drain Area	IMPERVIOUS C	IMPERVIOUS area (acres)	PERVIOUS C	PERVIOUS area (acres)	Tc (min)	Weighted C	10 YR I (in/hr)	F	Total area, A (acres)	Q=CIFA (cfs)
	Farrington	0.95	0.00	0.55	3.95	15.9	0.55	2.22	1.9	3.95	9.17
	Road A	0.95	0.00	0.55	0.37	3.9	0.55	2.22	2.9	0.37	1.32
	Moomomi	0.95	0.00	0.55	4.17	28.0	0.55	2.22	1.5	4.17	7.63
	Road B	0.95	0.00	0.55	0.37	3.1	0.55	2.22	3	0.37	1.37
	Puu Kapele	0.95	0.00	0.55	2.50	11.8	0.55	2.22	2.1	2.50	6.41
	Road C	0.95	0.00	0.55	0.68	4.7	0.55	2.22	2.7	0.68	2.24
								SUBTOTAL		**12.04**	**28.14**

TABLE 2: PEAK RUNOFF CALCULATION (50 YR Q)

Drainage Basin	Drain Area	IMPERVIOUS C	IMPERVIOUS area (acres)	PERVIOUS C	PERVIOUS area (acres)	Tc (min)	Weighted C	50 YR I (in/hr)	F	Total area, A (acres)	Q=CIFA (cfs)
	Farrington	0.95	0.00	0.55	3.95	15.9	0.55	3.33	1.9	3.95	13.76
	Road A	0.95	0.00	0.55	0.37	3.9	0.55	3.33	2.9	0.37	1.99
	Moomomi	0.95	0.00	0.55	4.17	28.0	0.55	3.33	1.5	4.17	11.44
	Road B	0.95	0.00	0.55	0.37	3.1	0.55	3.33	3	0.37	2.05
	Puu Kapele	0.95	0.00	0.55	2.50	11.8	0.55	3.33	2.1	2.50	9.62
	Road C	0.95	0.00	0.55	0.68	4.7	0.55	3.33	2.7	0.68	3.35
								SUBTOTAL		**12.04**	**42.21**

HOOLEHUA ROADWAYS (PROPOSED)

TABLE 1: PEAK RUNOFF CALCULATION (10 YR Q)

Drainage Basin	Drain Area	IMPERVIOUS C	IMPERVIOUS area (acres)	PERVIOUS C	PERVIOUS area (acres)	Tc (min)	Weighted C	10 YR I (in/hr)	F	Total area, A (acres)	Q=CIFA (cfs)
	Farrington	0.95	1.90	0.55	2.06	14.0	0.74	2.22	2	3.95	12.99
	Road A	0.95	0.23	0.55	0.14	6.7	0.80	2.22	2.5	0.37	1.66
	Moomomi	0.95	2.00	0.55	2.17	14.0	0.74	2.22	2	4.17	13.69
	Road B	0.95	0.23	0.55	0.14	6.5	0.80	2.22	2.5	0.37	1.66
	Puu Kapele	0.95	1.25	0.55	1.25	10.0	0.75	2.22	2.2	2.50	9.16
	Road C	0.95	0.42	0.55	0.25	8.0	0.80	2.22	2.4	0.68	2.89
								SUBTOTAL		**12.04**	**42.04**

TABLE 2: PEAK RUNOFF CALCULATION (50 YR Q)

Drainage Basin	Drain Area	IMPERVIOUS C	IMPERVIOUS area (acres)	PERVIOUS C	PERVIOUS area (acres)	Tc (min)	Weighted C	50 YR I (in/hr)	F	Total area, A (acres)	Q=CIFA (cfs)
	Farrington	0.95	1.90	0.55	2.06	14.0	0.74	3.33	2	3.95	19.48
	Road A	0.95	0.23	0.55	0.14	6.7	0.80	3.33	2.5	0.37	2.49
	Moomomi	0.95	2.00	0.55	2.17	14.0	0.74	3.33	2	4.17	20.53
	Road B	0.95	0.23	0.55	0.14	6.5	0.80	3.33	2.5	0.37	2.49
	Puu Kapele	0.95	1.25	0.55	1.25	10.0	0.75	3.33	2.2	2.50	13.74
	Road C	0.95	0.42	0.55	0.25	8.0	0.80	3.33	2.4	0.68	4.34
								SUBTOTAL		**12.04**	**63.06**

ROADS RUNOFF VOLUME

		PROPOSED		EXISTING		PROPOSED		EXISTING		DIFFERENCE	Basin Volume (CF)	Basin Dimension (LxWxD) in ft
DRAINAGE BASIN	AREA	Q10 HYD VOL (ACFT)	Q10 HYD VOL (CF)	Q10 HYD VOL (ACFT)	Q10 HYD VOL (CF)	Q50 HYD VOL	Q50 HYD VOL (CF)	Q50 HYD VOL (ACFT)	Q50 HYD VOL (CF)			
	Farrington	0.618	26,920.08	0.427	18,600.12	0.925	40,293.00	0.639	27,834.84	**(12,458.16)**	14400	120X20X6
	Road A	0.084	3,659.04	0.070	3,049.20	0.126	5,488.56	0.104	4,530.24	**(958.32)**		
	Moomomi	0.651	28,357.56	0.334	14,549.04	0.974	42,427.44	0.501	21,823.56	**(20,603.88)**	27000	150X30X6
	Road B	0.089	3,876.84	0.075	3,267.00	0.133	5,793.48	0.113	4,922.28	**(871.20)**		
	Puu Kapele	0.461	20,081.16	0.311	13,547.16	0.690	30,056.40	0.466	20,298.96	**(9,757.44)**	13200	110X20X6
	Road C	0.145	6,316.20	0.120	5,227.20	0.217	9,452.52	0.179	7,797.24	**(1,655.28)**		
						TOTAL VOL	**133,511.40**		**87,207.12**	**(46,304.28)**		

Table 1

GUIDE FOR THE DETERMINATION OF RUNOFF COEFFICIENTS FOR BUILT-UP AREAS*

WATERSHED CHARACTERISTICS	EXTREME	HIGH	MODERATE	LOW
INFILTRATION	NEGLIGIBLE 0.20	SLOW 0.14	MEDIUM 0.07	HIGH 0.0
RELIEF	STEEP (> 25%) 0.08	HILLY (15-25%) 0.06	ROLLING (5-15%) 0.03	FLAT (0-5%) 0.0
VEGETAL COVER	NONE 0.07	POOR (< 10%) 0.05	GOOD (10-50%) 0.03	HIGH (50-90%) 0.0
DEVELOPMENT TYPE	INDUSTRIAL & BUSINESS 0.55	HOTEL-APARTMENT 0.45	RESIDENTIAL 0.40	AGRICULTURAL 0.15

NOTE: The design coefficient "c" must result from a total of the values for all four watershed characteristics of the site.

C=0.3

Table 2

RUNOFF COEFFICIENTS

Type of Drainage Area	Runoff Coefficient C
Business:	
Downtown areas	0.95
Neighborhood areas	0.70
Residential:	
Single-family areas	0.50
Multi-units, detached	0.60
Multi-units, attached	0.75
Suburban	0.40
Apartment dwelling areas	0.70
Industrial:	
Light areas	0.80
Heavy areas	0.90
Parks, cemeteries	0.25
Playgrounds	0.35
Railroad-yard areas	0.40
Unimproved areas	0.30
Streets:	
Asphaltic	0.95
Concrete	0.95
Brick	0.85
Drive and walks	0.85
Roofs	0.95
Lawns:	
Sandy, soil, flat, 2%	0.10
Sandy, soil, avg., 2-7%	0.15
Sandy, soil, steep, 7%	0.20
Heavy soil, flat, 2%	0.17
Heavy soil, avg., 2-7%	0.22
Heavy soil, steep, 7%	0.35

NOAA Atlas 14, Volume 4, Version 3
Location name: Hoolehua, Hawaii, USA*
Latitude: 21.1439°, Longitude: -157.0818°
Elevation: 445.39 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

S. Perica, D. Martin, B. Lin, T. Parzybok, D. Riley, M. Yekta, L. Hiner, L.-C. Chen, D. Brewer, F. Yan, K. Maitaria, C. Trypaluk, G. M. Bonnin

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches/hour)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**3.46** (3.13-4.06)	**4.60** (3.97-5.28)	**6.31** (5.38-7.24)	**7.74** (6.55-8.93)	**9.82** (8.21-11.4)	**11.6** (9.58-13.6)	**13.5** (11.0-16.0)	**15.6** (12.5-18.8)	**18.6** (14.5-22.9)	**21.2** (16.1-26.5)
10-min	**2.56** (2.32-3.01)	**3.41** (2.95-3.91)	**4.68** (3.99-5.36)	**5.74** (4.86-6.62)	**7.28** (6.08-8.49)	**8.59** (7.10-10.1)	**9.99** (8.12-11.9)	**11.6** (9.23-13.9)	**13.8** (10.8-17.0)	**15.7** (11.9-19.6)
15-min	**2.14** (1.94-2.52)	**2.85** (2.46-3.28)	**3.92** (3.34-4.49)	**4.80** (4.07-5.54)	**6.10** (5.09-7.11)	**7.19** (5.94-8.44)	**8.36** (6.80-9.96)	**9.67** (7.73-11.6)	**11.6** (9.02-14.2)	**13.2** (10.0-16.4)
30-min	**1.51** (1.37-1.77)	**2.01** (1.73-2.30)	**2.76** (2.35-3.16)	**3.38** (2.86-3.90)	**4.29** (3.58-5.00)	**5.06** (4.18-5.94)	**5.89** (4.78-7.01)	**6.81** (5.44-8.19)	**8.13** (6.34-10.00)	**9.26** (7.04-11.6)
60-min	**0.993** (0.900-1.17)	**1.32** (1.14-1.52)	**1.81** (1.55-2.08)	**2.22** (1.88-2.57)	**2.82** (2.36-3.29)	**3.33** (2.75-3.91)	**3.87** (3.15-4.61)	**4.48** (3.58-5.39)	**5.35** (4.17-6.58)	**6.09** (4.63-7.61)
2-hr	**0.688** (0.611-0.781)	**0.893** (0.768-1.02)	**1.22** (1.04-1.39)	**1.48** (1.26-1.71)	**1.87** (1.57-2.17)	**2.17** (1.81-2.55)	**2.50** (2.05-2.97)	**2.86** (2.30-3.44)	**3.37** (2.64-4.13)	**3.79** (2.89-4.72)
3-hr	**0.504** (0.448-0.577)	**0.684** (0.586-0.780)	**0.928** (0.794-1.07)	**1.13** (0.961-1.30)	**1.42** (1.19-1.65)	**1.65** (1.37-1.94)	**1.90** (1.55-2.25)	**2.16** (1.73-2.60)	**2.54** (1.98-3.11)	**2.84** (2.16-3.54)
6-hr	**0.313** (0.275-0.359)	**0.420** (0.361-0.482)	**0.574** (0.490-0.660)	**0.699** (0.593-0.809)	**0.876** (0.734-1.02)	**1.02** (0.843-1.20)	**1.17** (0.954-1.40)	**1.34** (1.07-1.61)	**1.57** (1.22-1.93)	**1.75** (1.33-2.19)
12-hr	**0.188** (0.165-0.216)	**0.252** (0.217-0.288)	**0.348** (0.298-0.398)	**0.426** (0.363-0.491)	**0.537** (0.452-0.625)	**0.629** (0.522-0.738)	**0.725** (0.592-0.860)	**0.829** (0.665-0.997)	**0.977** (0.761-1.20)	**1.10** (0.834-1.37)
24-hr	**0.111** (0.098-0.127)	**0.153** (0.134-0.175)	**0.214** (0.186-0.245)	**0.264** (0.229-0.304)	**0.337** (0.289-0.388)	**0.396** (0.336-0.460)	**0.460** (0.386-0.537)	**0.530** (0.439-0.623)	**0.630** (0.511-0.748)	**0.713** (0.567-0.854)
2-day	**0.071** (0.062-0.081)	**0.098** (0.086-0.112)	**0.138** (0.120-0.157)	**0.170** (0.149-0.195)	**0.218** (0.188-0.251)	**0.257** (0.220-0.298)	**0.300** (0.253-0.349)	**0.346** (0.288-0.406)	**0.413** (0.336-0.489)	**0.468** (0.375-0.560)
3-day	**0.051** (0.045-0.058)	**0.070** (0.062-0.080)	**0.098** (0.086-0.113)	**0.122** (0.106-0.139)	**0.155** (0.134-0.179)	**0.183** (0.156-0.212)	**0.212** (0.179-0.247)	**0.244** (0.203-0.287)	**0.290** (0.237-0.344)	**0.328** (0.263-0.393)
4-day	**0.041** (0.036-0.046)	**0.056** (0.050-0.064)	**0.079** (0.069-0.090)	**0.097** (0.085-0.112)	**0.124** (0.107-0.143)	**0.145** (0.124-0.168)	**0.168** (0.142-0.196)	**0.193** (0.161-0.227)	**0.229** (0.187-0.272)	**0.258** (0.207-0.309)
7-day	**0.026** (0.023-0.030)	**0.036** (0.032-0.041)	**0.051** (0.044-0.058)	**0.062** (0.054-0.071)	**0.079** (0.068-0.091)	**0.092** (0.079-0.106)	**0.106** (0.089-0.123)	**0.121** (0.101-0.142)	**0.142** (0.116-0.168)	**0.159** (0.127-0.191)
10-day	**0.020** (0.018-0.023)	**0.028** (0.025-0.032)	**0.039** (0.034-0.044)	**0.048** (0.041-0.055)	**0.060** (0.052-0.069)	**0.070** (0.059-0.081)	**0.080** (0.067-0.093)	**0.091** (0.076-0.106)	**0.106** (0.086-0.126)	**0.118** (0.094-0.141)
20-day	**0.013** (0.011-0.014)	**0.017** (0.015-0.020)	**0.024** (0.021-0.027)	**0.029** (0.025-0.033)	**0.036** (0.031-0.041)	**0.041** (0.035-0.048)	**0.047** (0.040-0.055)	**0.053** (0.044-0.062)	**0.061** (0.049-0.072)	**0.067** (0.054-0.080)
30-day	**0.010** (0.009-0.011)	**0.013** (0.012-0.015)	**0.018** (0.016-0.021)	**0.022** (0.019-0.025)	**0.027** (0.024-0.032)	**0.031** (0.027-0.036)	**0.035** (0.030-0.041)	**0.040** (0.033-0.046)	**0.045** (0.037-0.054)	**0.050** (0.040-0.059)
45-day	**0.008** (0.007-0.009)	**0.011** (0.010-0.013)	**0.015** (0.013-0.017)	**0.018** (0.016-0.021)	**0.022** (0.019-0.025)	**0.025** (0.021-0.029)	**0.028** (0.024-0.033)	**0.031** (0.026-0.037)	**0.035** (0.029-0.042)	**0.038** (0.031-0.046)
60-day	**0.007** (0.006-0.008)	**0.010** (0.008-0.011)	**0.013** (0.011-0.015)	**0.016** (0.014-0.018)	**0.019** (0.016-0.022)	**0.022** (0.018-0.025)	**0.024** (0.020-0.028)	**0.027** (0.022-0.031)	**0.030** (0.025-0.036)	**0.033** (0.026-0.039)

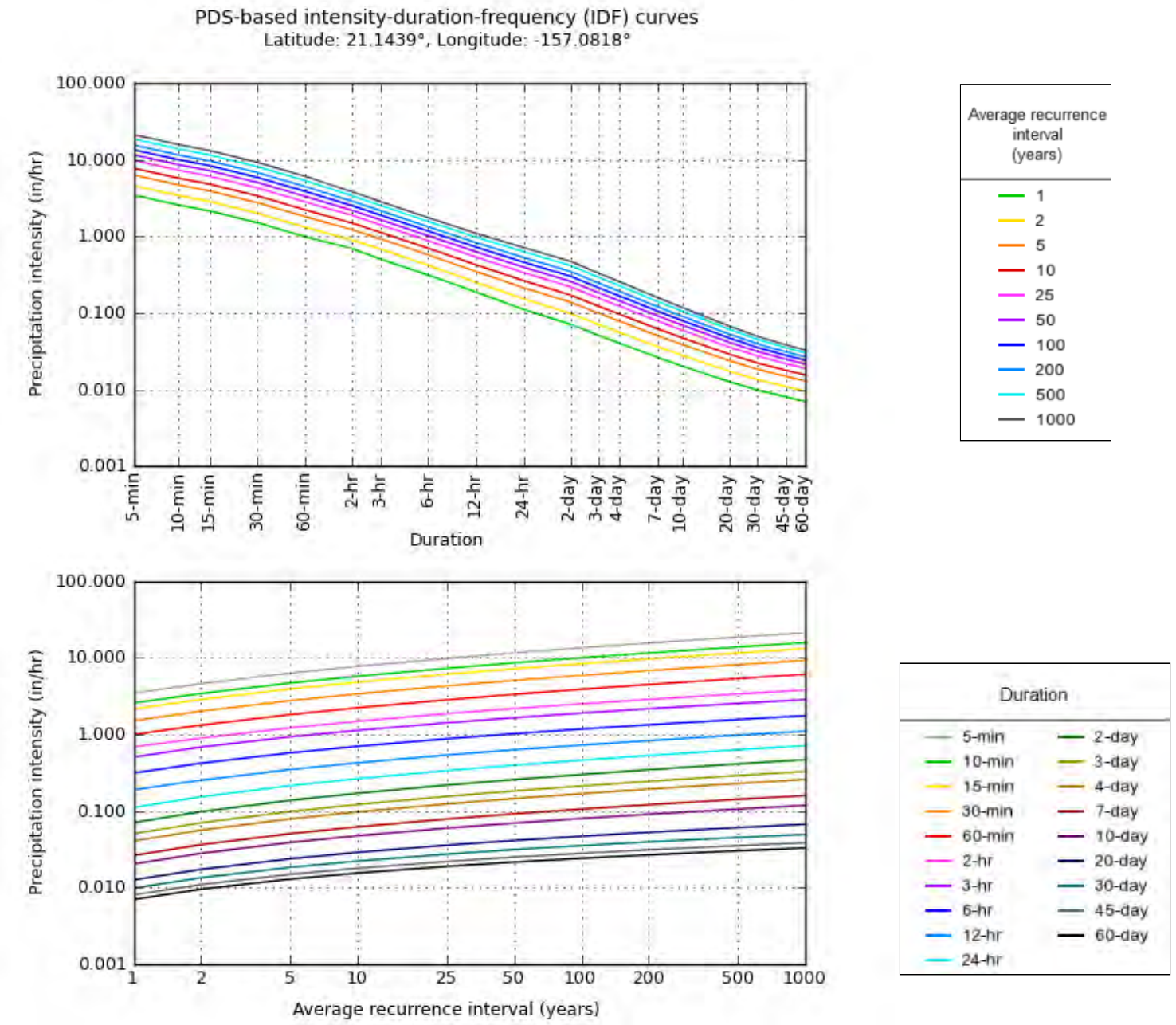
[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

Back to Top

PF graphical



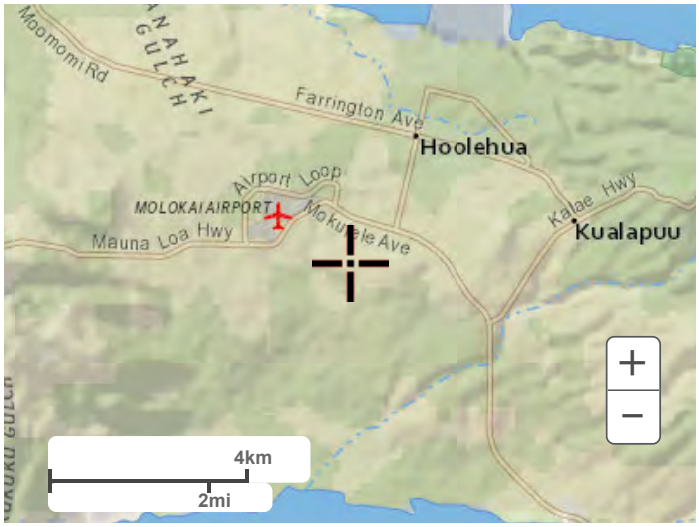
NOAA Atlas 14, Volume 4, Version 3

Created (GMT): Fri Feb 26 07:12:06 2021

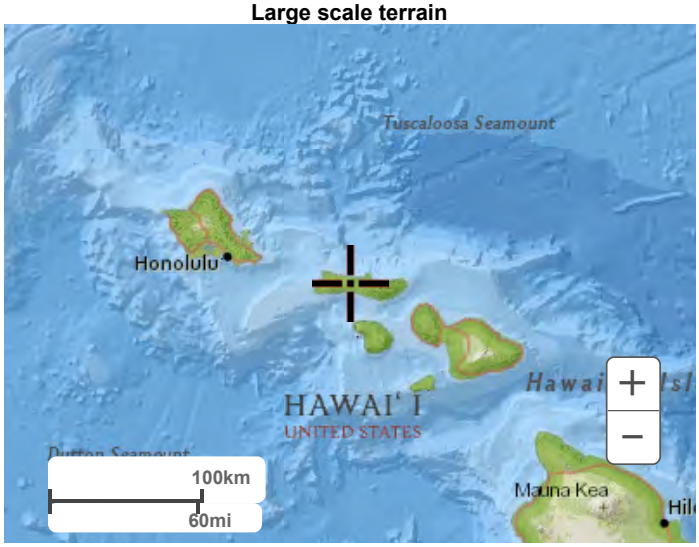
Back to Top

Maps & aerials

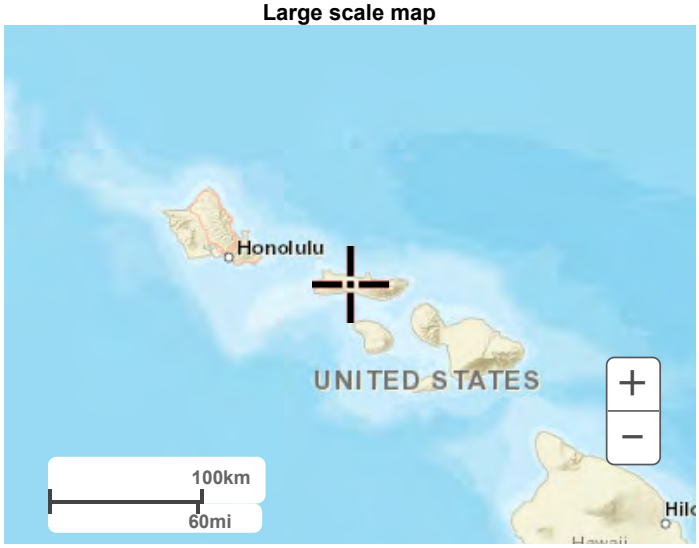
Small scale terrain



Large scale terrain



Large scale map



Large scale aerial

Back to Top

US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer

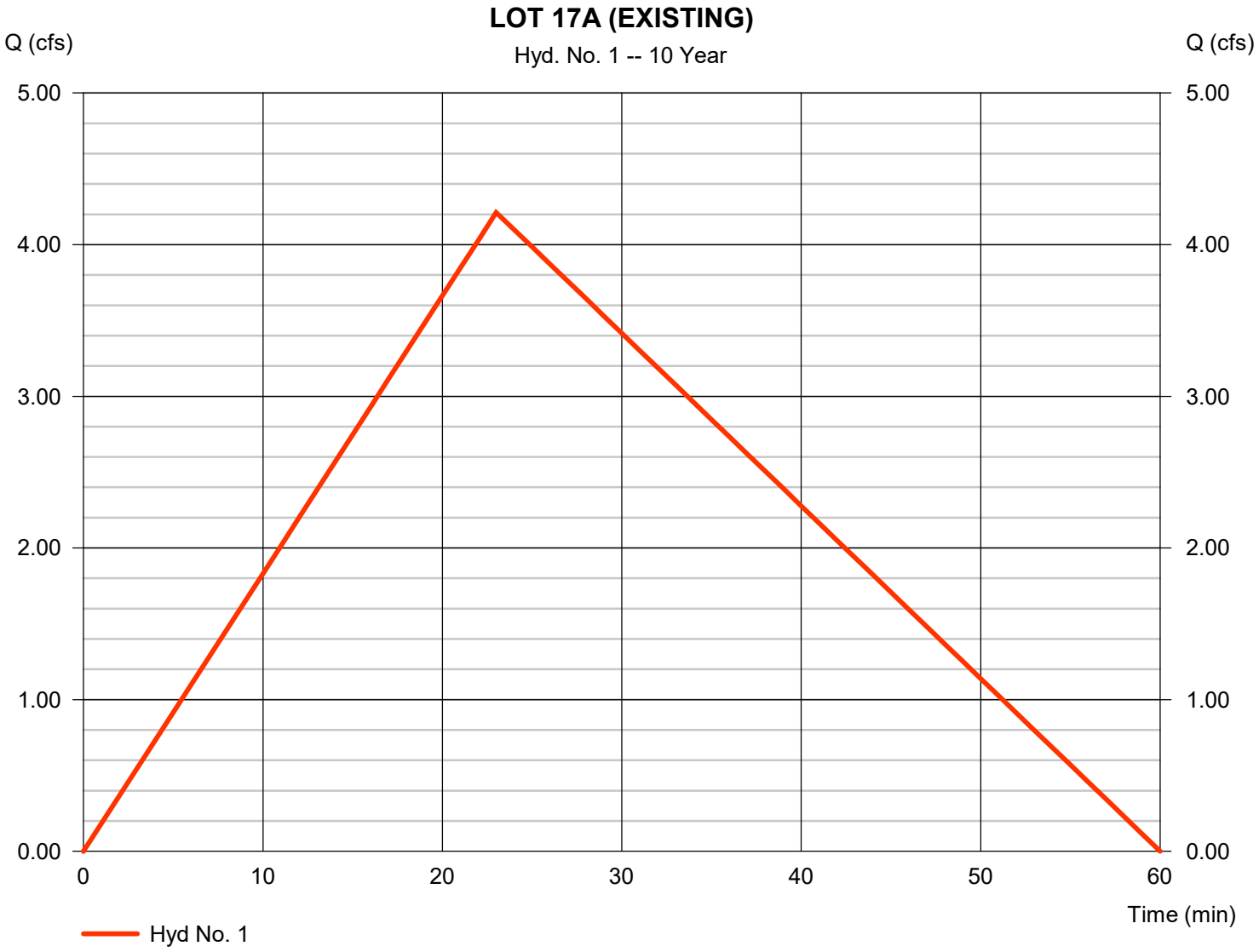
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022 Monday, 10 / 23 / 2023

Hyd. No. 1

LOT 17A (EXISTING)

Hydrograph type	= Rational	Peak discharge	= 4.213 cfs
Storm frequency	= 10 yrs	Time to peak	= 23 min
Time interval	= 1 min	Hyd. volume	= 7,616 cuft
Drainage area	= 1.950 ac	Runoff coeff.	= 0.55
Intensity	= 3.928 in/hr	Tc by User	= 23.00 min
IDF Curve	= NAIWA.IDF	Asc/Rec limb fact	= 1/1.62

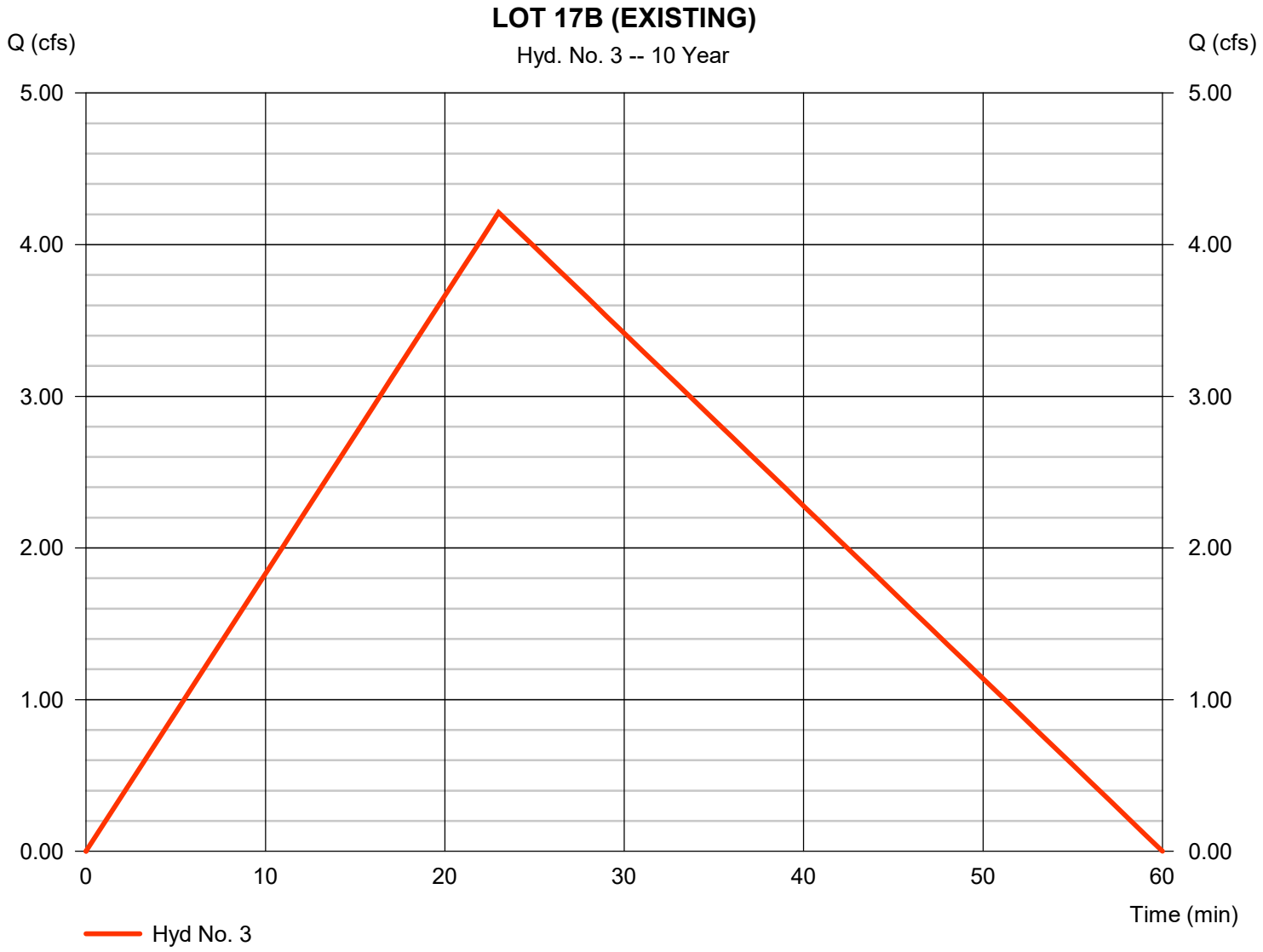


Hydrograph Report

Hyd. No. 3

LOT 17B (EXISTING)

Hydrograph type	=	Rational	Peak discharge	=	4.213 cfs
Storm frequency	=	10 yrs	Time to peak	=	23 min
Time interval	=	1 min	Hyd. volume	=	7,616 cuft
Drainage area	=	1.950 ac	Runoff coeff.	=	0.55
Intensity	=	3.928 in/hr	Tc by User	=	23.00 min
IDF Curve	=	NAIWA.IDF	Asc/Rec limb fact	=	1/1.62

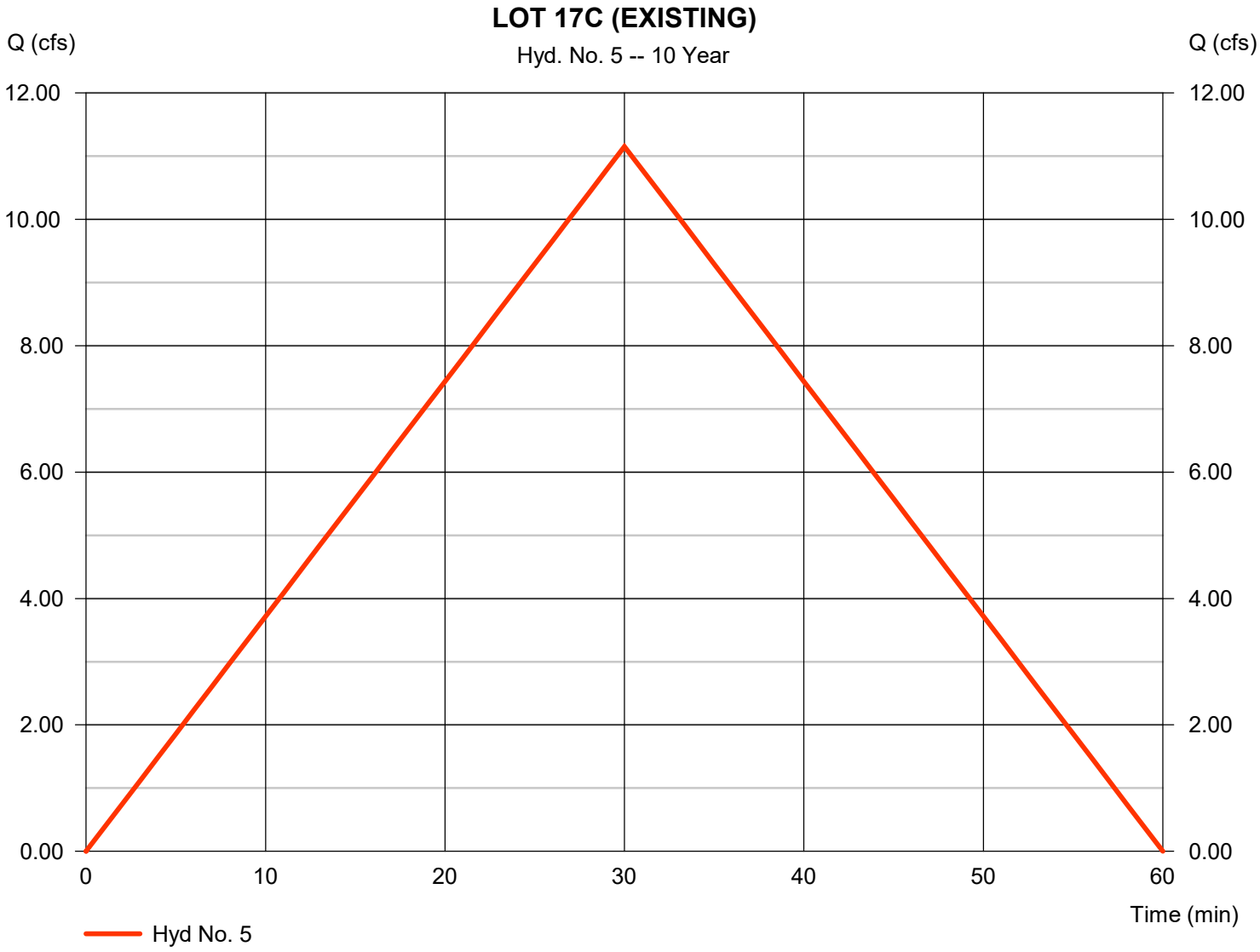


Hydrograph Report

Hyd. No. 5

LOT 17C (EXISTING)

Hydrograph type	= Rational	Peak discharge	= 11.15 cfs
Storm frequency	= 10 yrs	Time to peak	= 30 min
Time interval	= 1 min	Hyd. volume	= 20,077 cuft
Drainage area	= 6.000 ac	Runoff coeff.	= 0.55
Intensity	= 3.380 in/hr	Tc by User	= 30.00 min
IDF Curve	= NAIWA.IDF	Asc/Rec limb fact	= 1/1

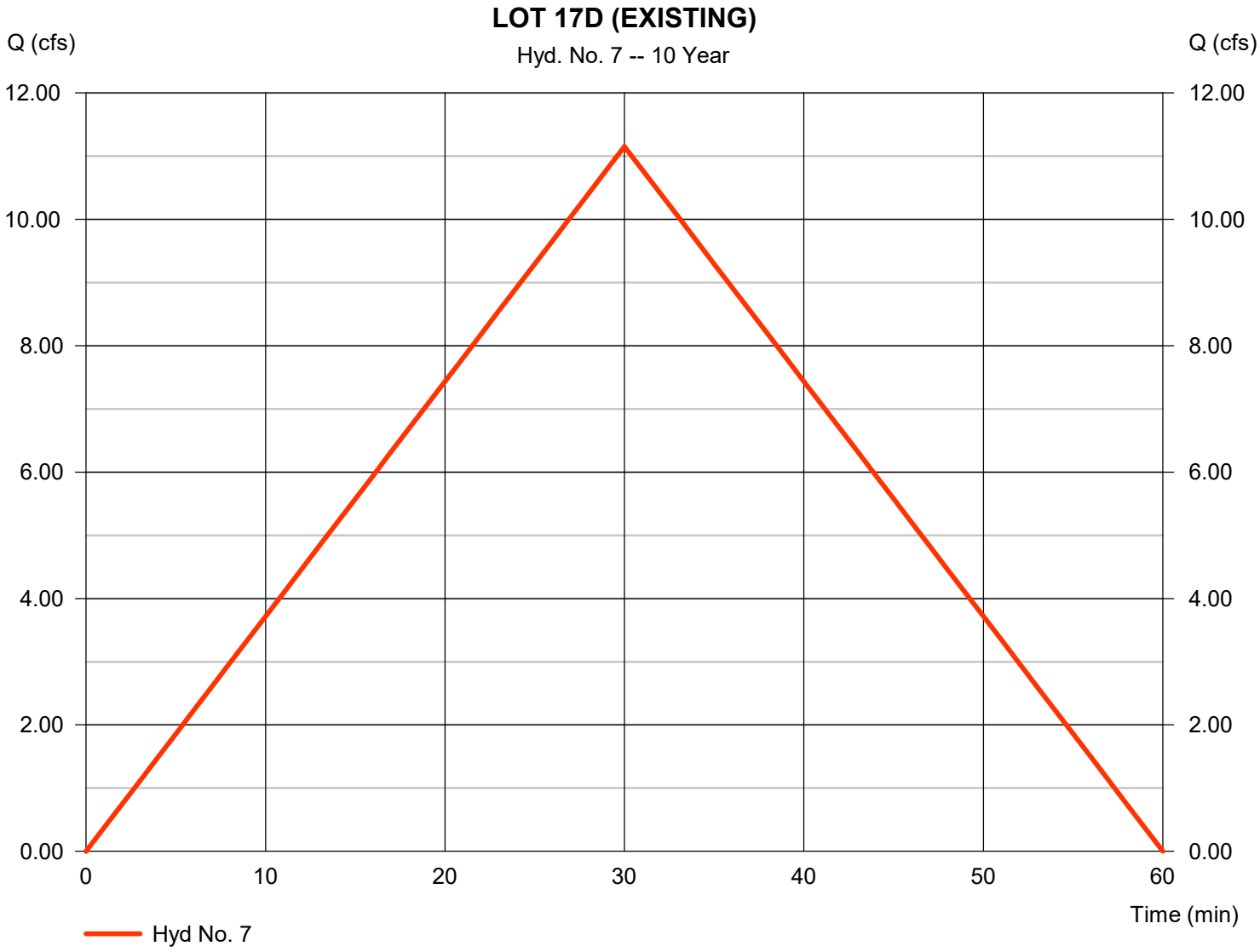


Hydrograph Report

Hyd. No. 7

LOT 17D (EXISTING)

Hydrograph type	= Rational	Peak discharge	= 11.15 cfs
Storm frequency	= 10 yrs	Time to peak	= 30 min
Time interval	= 1 min	Hyd. volume	= 20,077 cuft
Drainage area	= 6.000 ac	Runoff coeff.	= 0.55
Intensity	= 3.380 in/hr	Tc by User	= 30.00 min
IDF Curve	= NAIWA.IDF	Asc/Rec limb fact	= 1/1

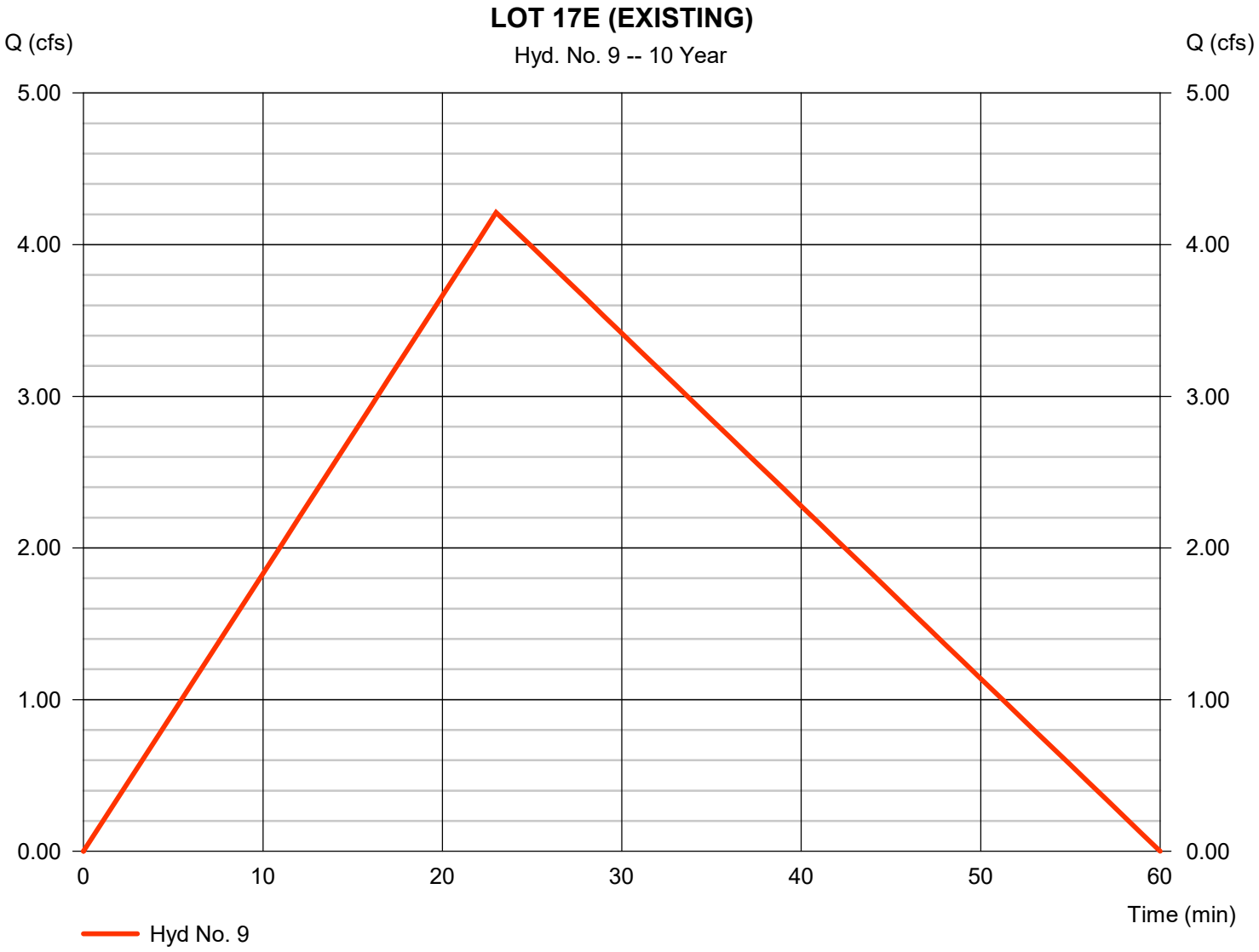


Hydrograph Report

Hyd. No. 9

LOT 17E (EXISTING)

Hydrograph type	= Rational	Peak discharge	= 4.213 cfs
Storm frequency	= 10 yrs	Time to peak	= 23 min
Time interval	= 1 min	Hyd. volume	= 7,616 cuft
Drainage area	= 1.950 ac	Runoff coeff.	= 0.55
Intensity	= 3.928 in/hr	Tc by User	= 23.00 min
IDF Curve	= NAIWA.IDF	Asc/Rec limb fact	= 1/1.62

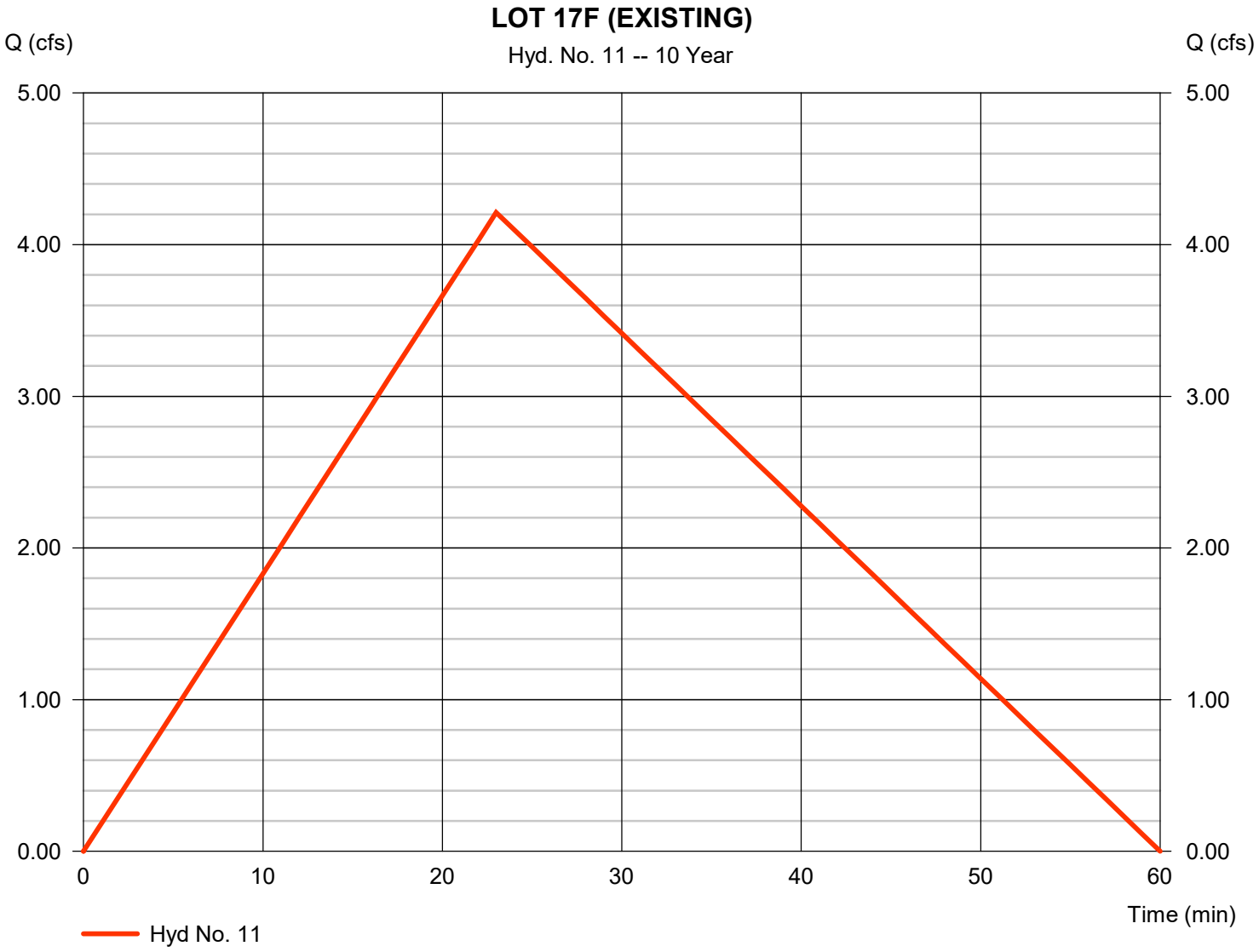


Hydrograph Report

Hyd. No. 11

LOT 17F (EXISTING)

Hydrograph type	= Rational	Peak discharge	= 4.213 cfs
Storm frequency	= 10 yrs	Time to peak	= 23 min
Time interval	= 1 min	Hyd. volume	= 7,616 cuft
Drainage area	= 1.950 ac	Runoff coeff.	= 0.55
Intensity	= 3.928 in/hr	Tc by User	= 23.00 min
IDF Curve	= NAIWA.IDF	Asc/Rec limb fact	= 1/1.62

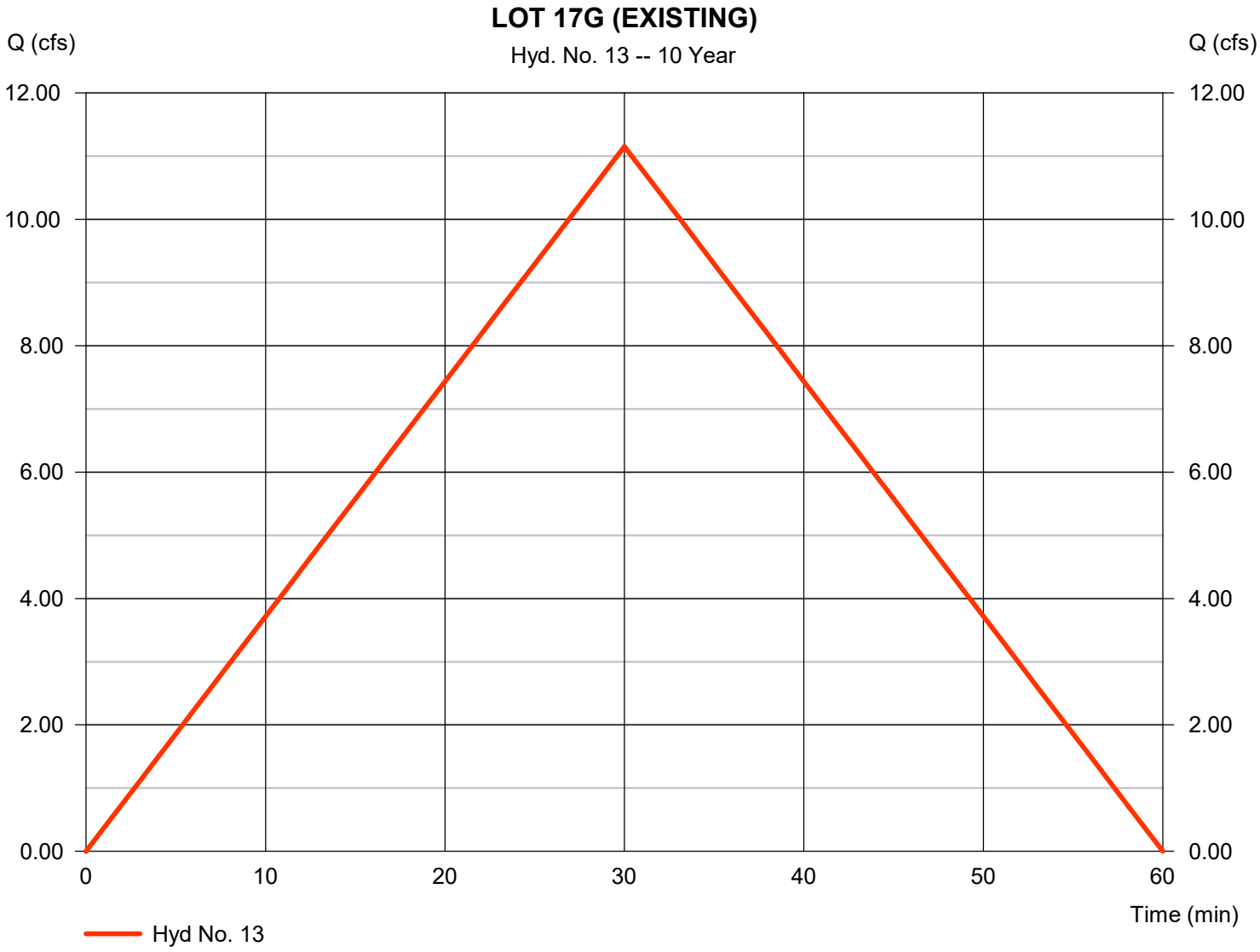


Hydrograph Report

Hyd. No. 13

LOT 17G (EXISTING)

Hydrograph type	= Rational	Peak discharge	= 11.15 cfs
Storm frequency	= 10 yrs	Time to peak	= 30 min
Time interval	= 1 min	Hyd. volume	= 20,077 cuft
Drainage area	= 6.000 ac	Runoff coeff.	= 0.55
Intensity	= 3.380 in/hr	Tc by User	= 30.00 min
IDF Curve	= NAIWA.IDF	Asc/Rec limb fact	= 1/1

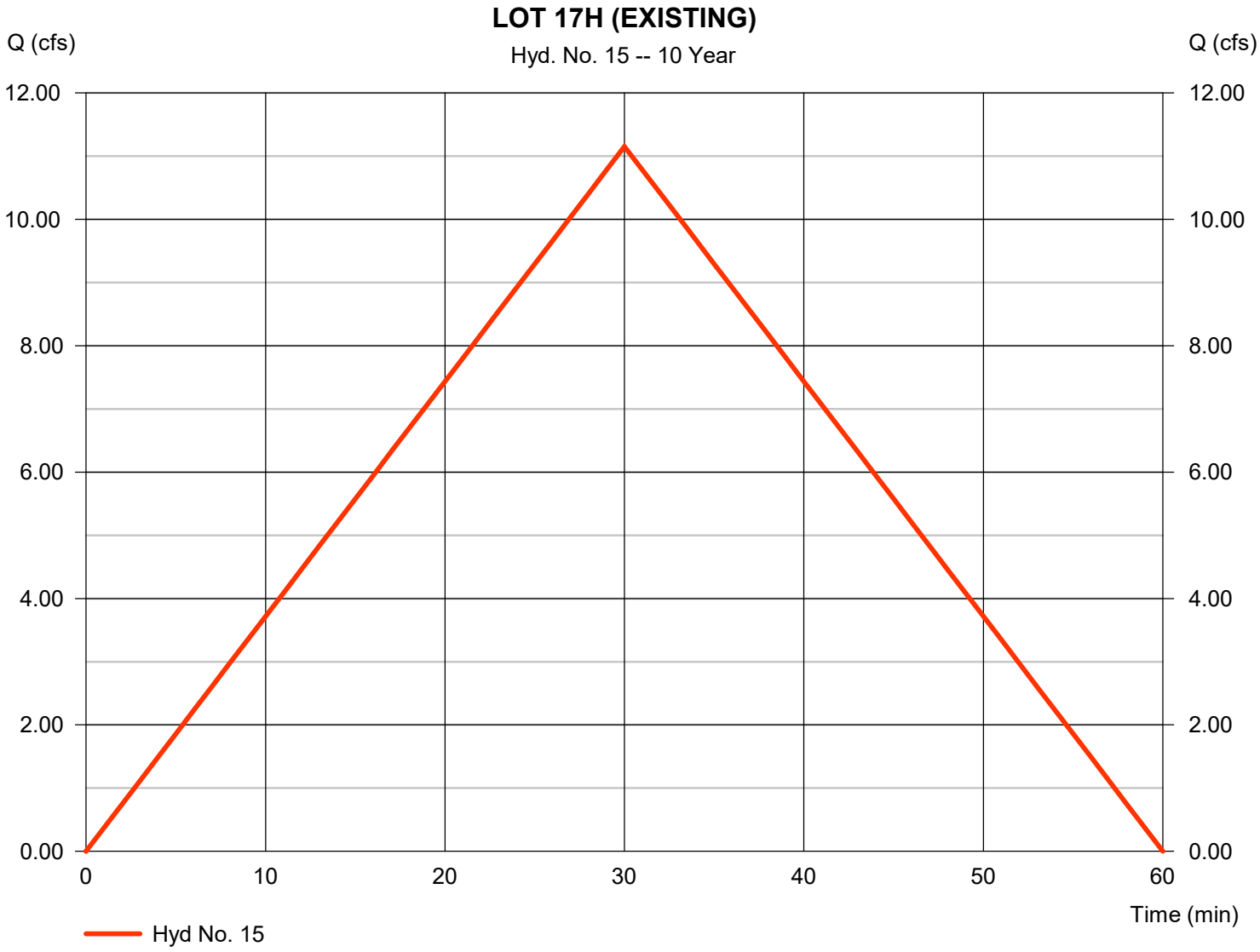


Hydrograph Report

Hyd. No. 15

LOT 17H (EXISTING)

Hydrograph type	= Rational	Peak discharge	= 11.15 cfs
Storm frequency	= 10 yrs	Time to peak	= 30 min
Time interval	= 1 min	Hyd. volume	= 20,077 cuft
Drainage area	= 6.000 ac	Runoff coeff.	= 0.55
Intensity	= 3.380 in/hr	Tc by User	= 30.00 min
IDF Curve	= NAIWA.IDF	Asc/Rec limb fact	= 1/1

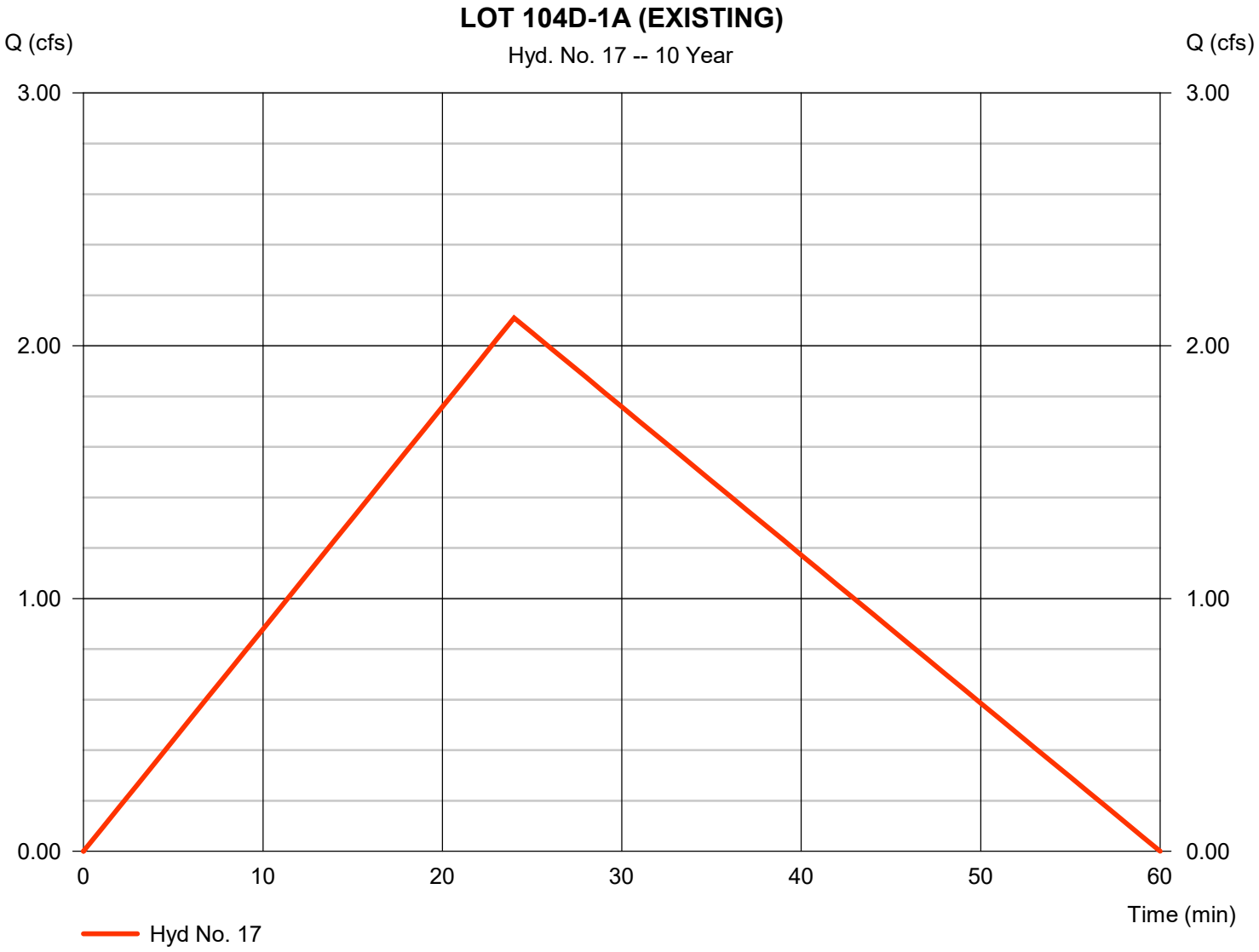


Hydrograph Report

Hyd. No. 17

LOT 104D-1A (EXISTING)

Hydrograph type	=	Rational	Peak discharge	=	2.110 cfs
Storm frequency	=	10 yrs	Time to peak	=	24 min
Time interval	=	1 min	Hyd. volume	=	3,798 cuft
Drainage area	=	1.000 ac	Runoff coeff.	=	0.55
Intensity	=	3.837 in/hr	Tc by User	=	24.00 min
IDF Curve	=	NAIWA.IDF	Asc/Rec limb fact	=	1/1.5

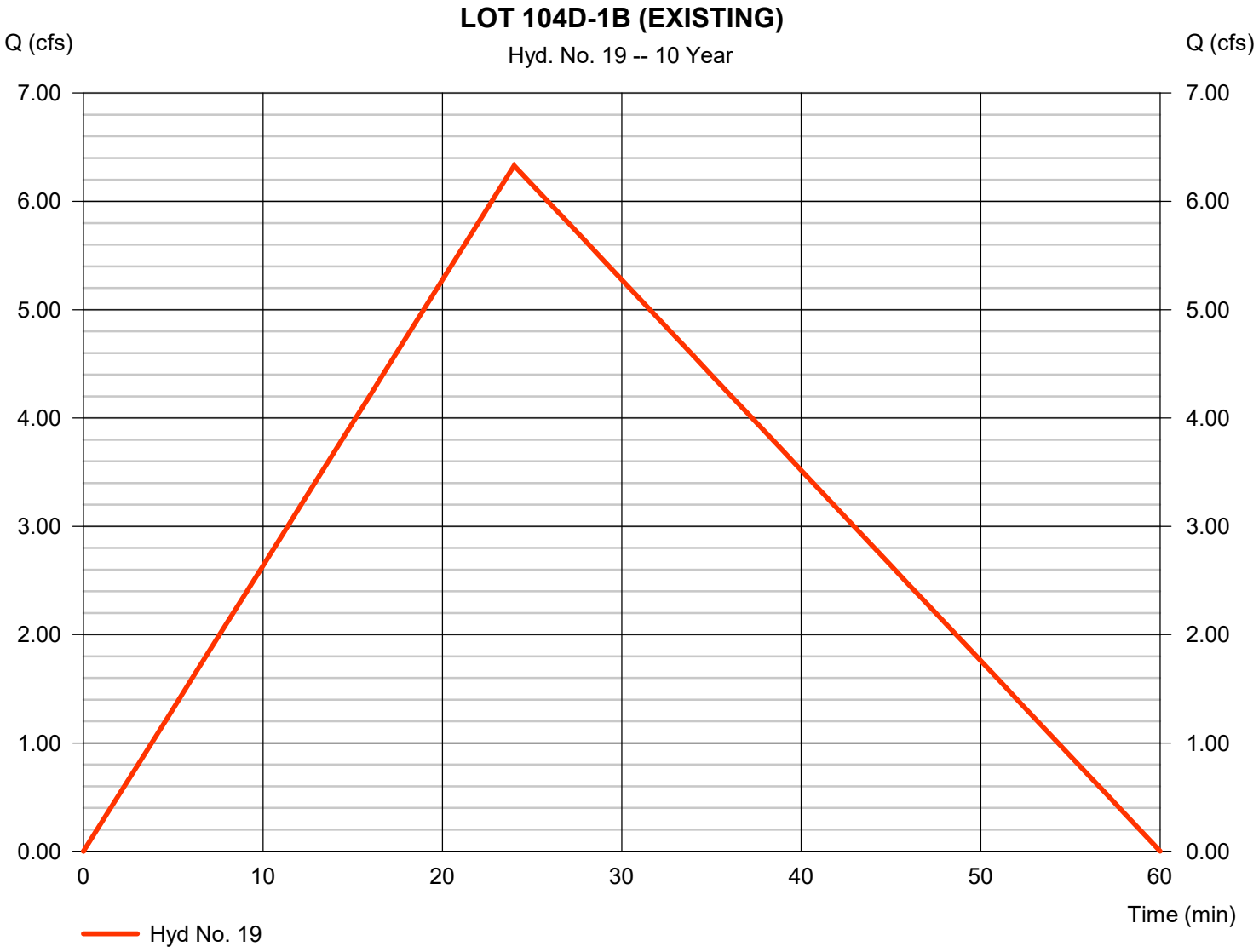


Hydrograph Report

Hyd. No. 19

LOT 104D-1B (EXISTING)

Hydrograph type	=	Rational	Peak discharge	=	6.330 cfs
Storm frequency	=	10 yrs	Time to peak	=	24 min
Time interval	=	1 min	Hyd. volume	=	11,394 cuft
Drainage area	=	3.000 ac	Runoff coeff.	=	0.55
Intensity	=	3.837 in/hr	Tc by User	=	24.00 min
IDF Curve	=	NAIWA.IDF	Asc/Rec limb fact	=	1/1.5

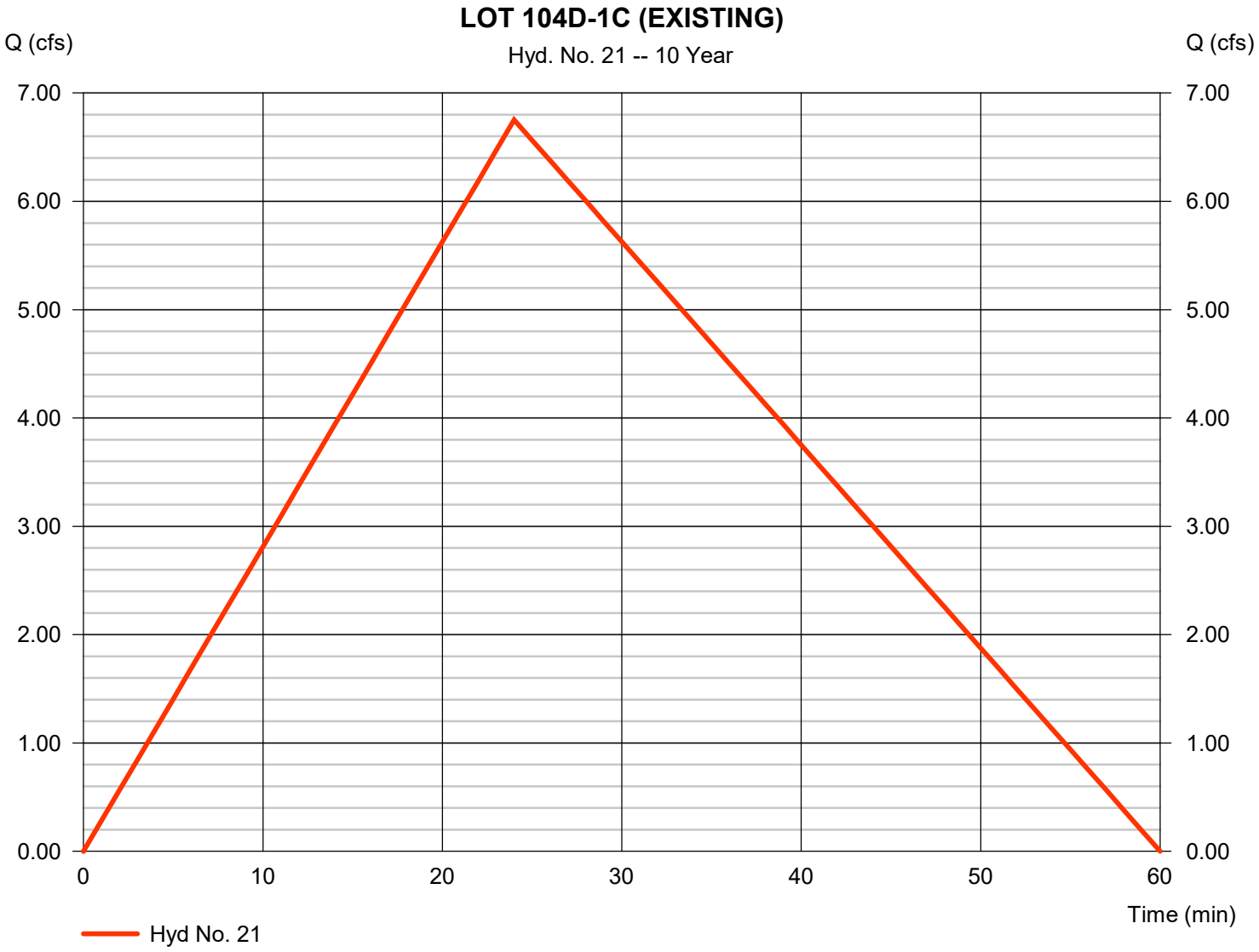


Hydrograph Report

Hyd. No. 21

LOT 104D-1C (EXISTING)

Hydrograph type	=	Rational	Peak discharge	=	6.752 cfs
Storm frequency	=	10 yrs	Time to peak	=	24 min
Time interval	=	1 min	Hyd. volume	=	12,154 cuft
Drainage area	=	3.200 ac	Runoff coeff.	=	0.55
Intensity	=	3.837 in/hr	Tc by User	=	24.00 min
IDF Curve	=	NAIWA.IDF	Asc/Rec limb fact	=	1/1.5

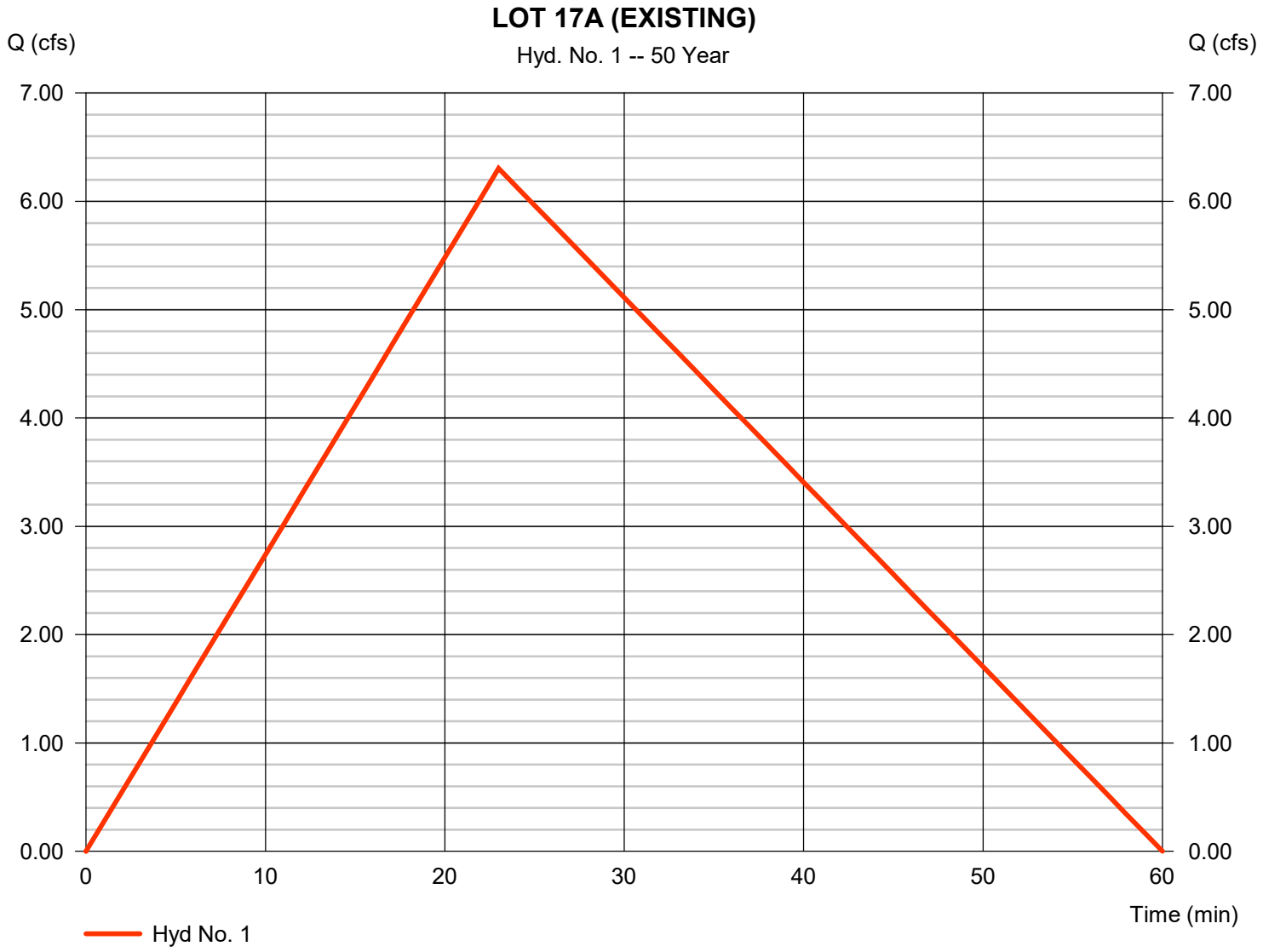


Hydrograph Report

Hyd. No. 1

LOT 17A (EXISTING)

Hydrograph type	=	Rational	Peak discharge	=	6.304 cfs
Storm frequency	=	50 yrs	Time to peak	=	23 min
Time interval	=	1 min	Hyd. volume	=	11,397 cuft
Drainage area	=	1.950 ac	Runoff coeff.	=	0.55
Intensity	=	5.878 in/hr	Tc by User	=	23.00 min
IDF Curve	=	NAIWA.IDF	Asc/Rec limb fact	=	1/1.62

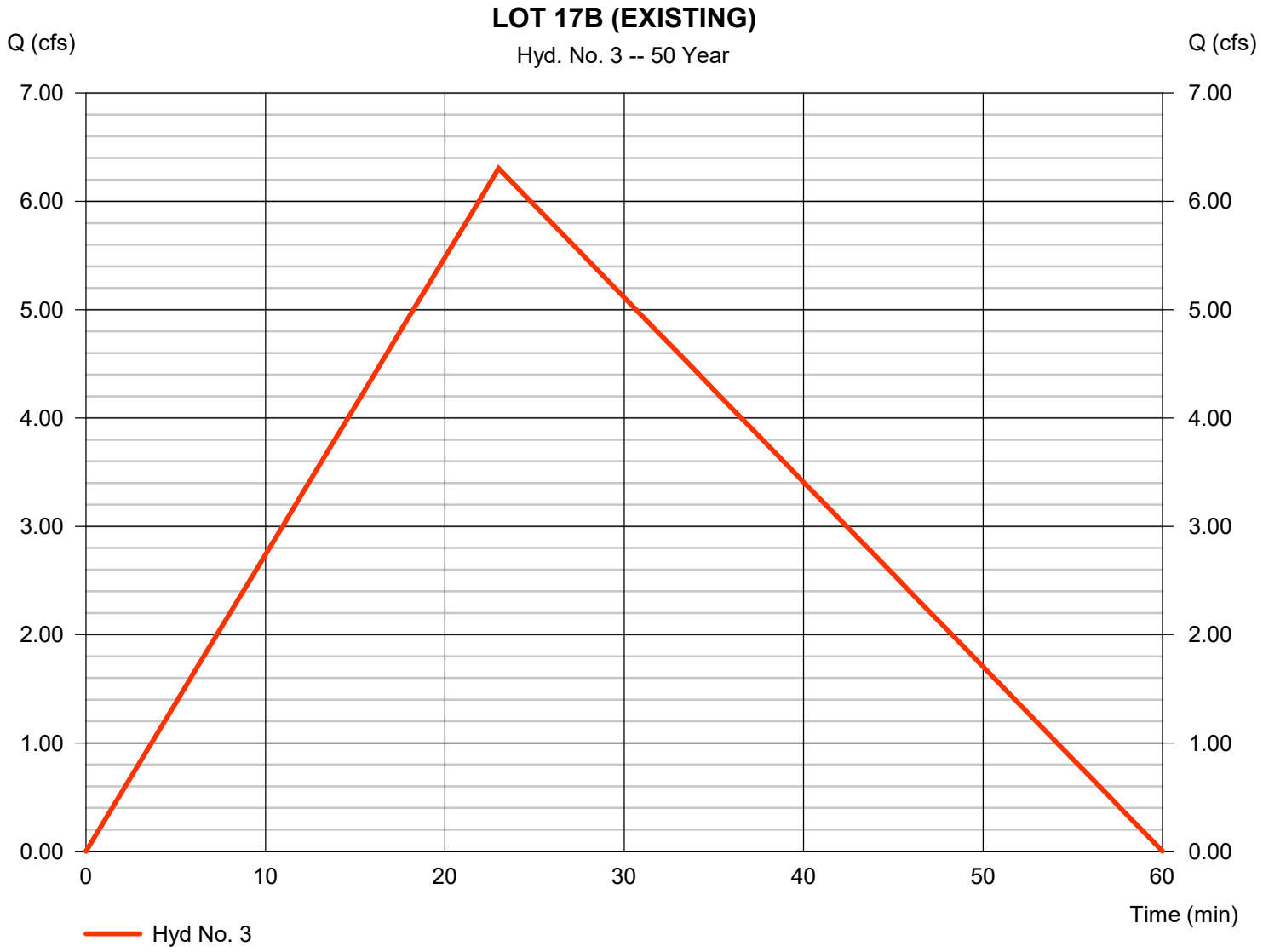


Hydrograph Report

Hyd. No. 3

LOT 17B (EXISTING)

Hydrograph type	=	Rational	Peak discharge	=	6.304 cfs
Storm frequency	=	50 yrs	Time to peak	=	23 min
Time interval	=	1 min	Hyd. volume	=	11,397 cuft
Drainage area	=	1.950 ac	Runoff coeff.	=	0.55
Intensity	=	5.878 in/hr	Tc by User	=	23.00 min
IDF Curve	=	NAIWA.IDF	Asc/Rec limb fact	=	1/1.62

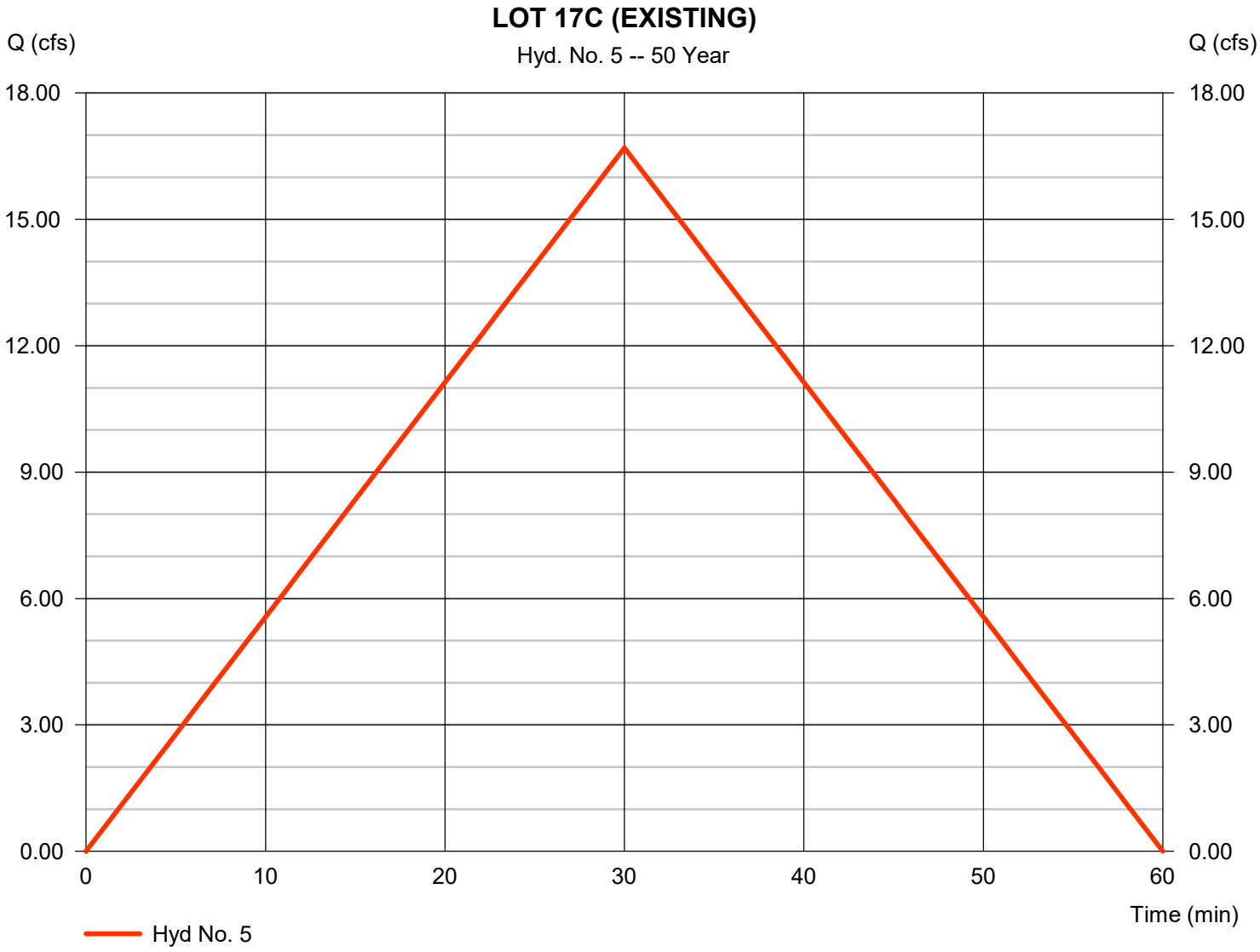


Hydrograph Report

Hyd. No. 5

LOT 17C (EXISTING)

Hydrograph type	= Rational	Peak discharge	= 16.70 cfs
Storm frequency	= 50 yrs	Time to peak	= 30 min
Time interval	= 1 min	Hyd. volume	= 30,056 cuft
Drainage area	= 6.000 ac	Runoff coeff.	= 0.55
Intensity	= 5.060 in/hr	Tc by User	= 30.00 min
IDF Curve	= NAIWA.IDF	Asc/Rec limb fact	= 1/1

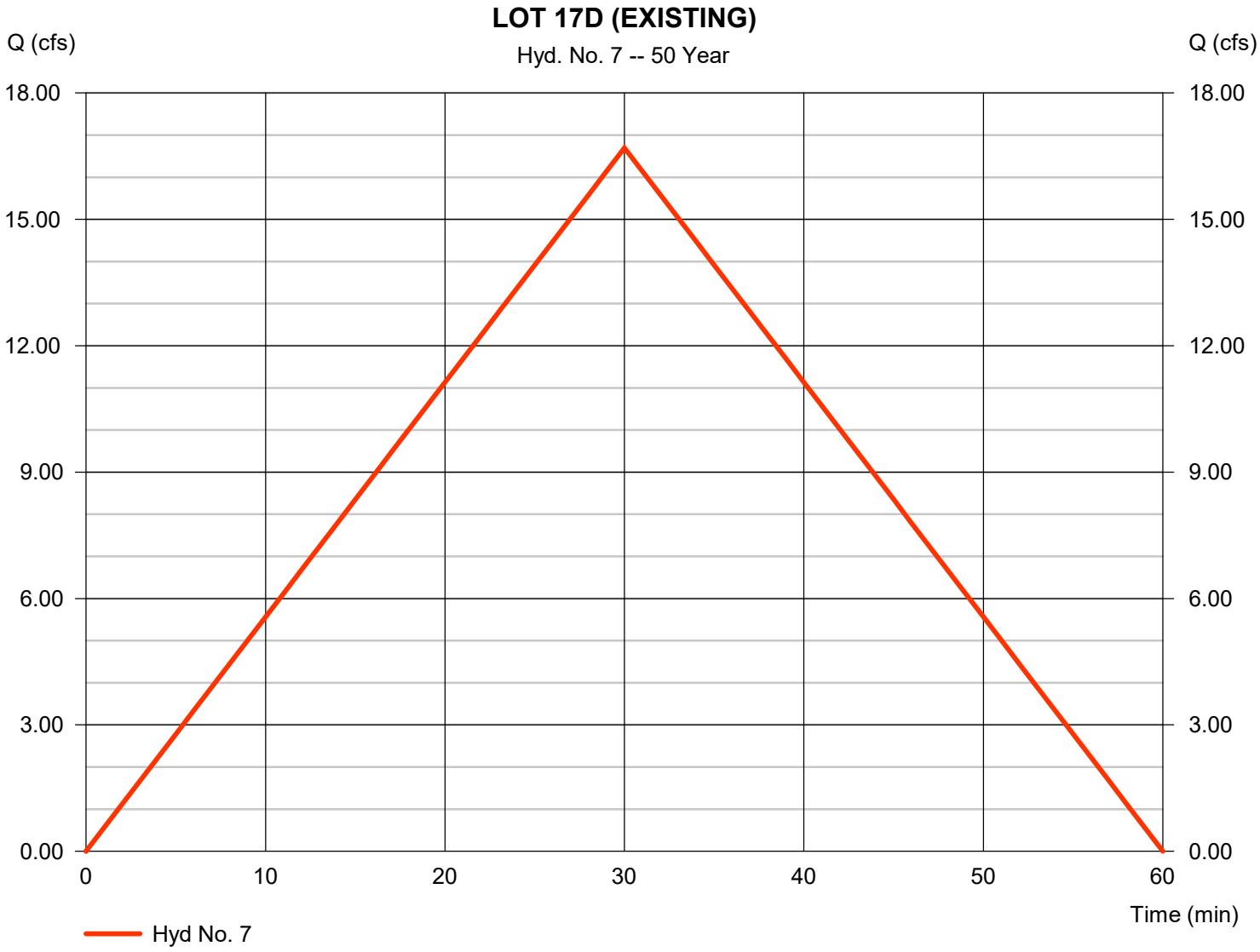


Hydrograph Report

Hyd. No. 7

LOT 17D (EXISTING)

Hydrograph type	=	Rational	Peak discharge	=	16.70 cfs
Storm frequency	=	50 yrs	Time to peak	=	30 min
Time interval	=	1 min	Hyd. volume	=	30,056 cuft
Drainage area	=	6.000 ac	Runoff coeff.	=	0.55
Intensity	=	5.060 in/hr	Tc by User	=	30.00 min
IDF Curve	=	NAIWA.IDF	Asc/Rec limb fact	=	1/1

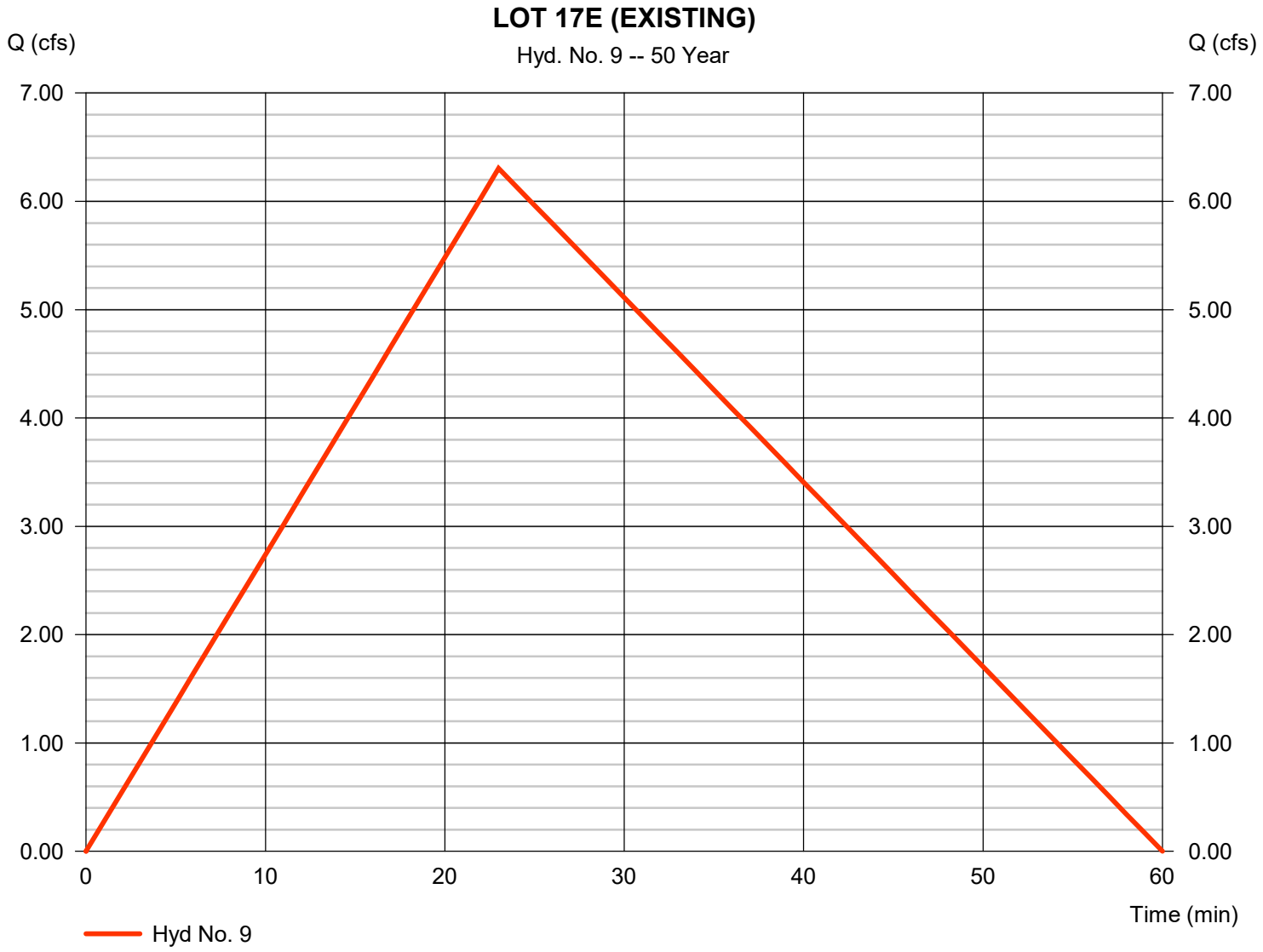


Hydrograph Report

Hyd. No. 9

LOT 17E (EXISTING)

Hydrograph type	=	Rational	Peak discharge	=	6.304 cfs
Storm frequency	=	50 yrs	Time to peak	=	23 min
Time interval	=	1 min	Hyd. volume	=	11,397 cuft
Drainage area	=	1.950 ac	Runoff coeff.	=	0.55
Intensity	=	5.878 in/hr	Tc by User	=	23.00 min
IDF Curve	=	NAIWA.IDF	Asc/Rec limb fact	=	1/1.62

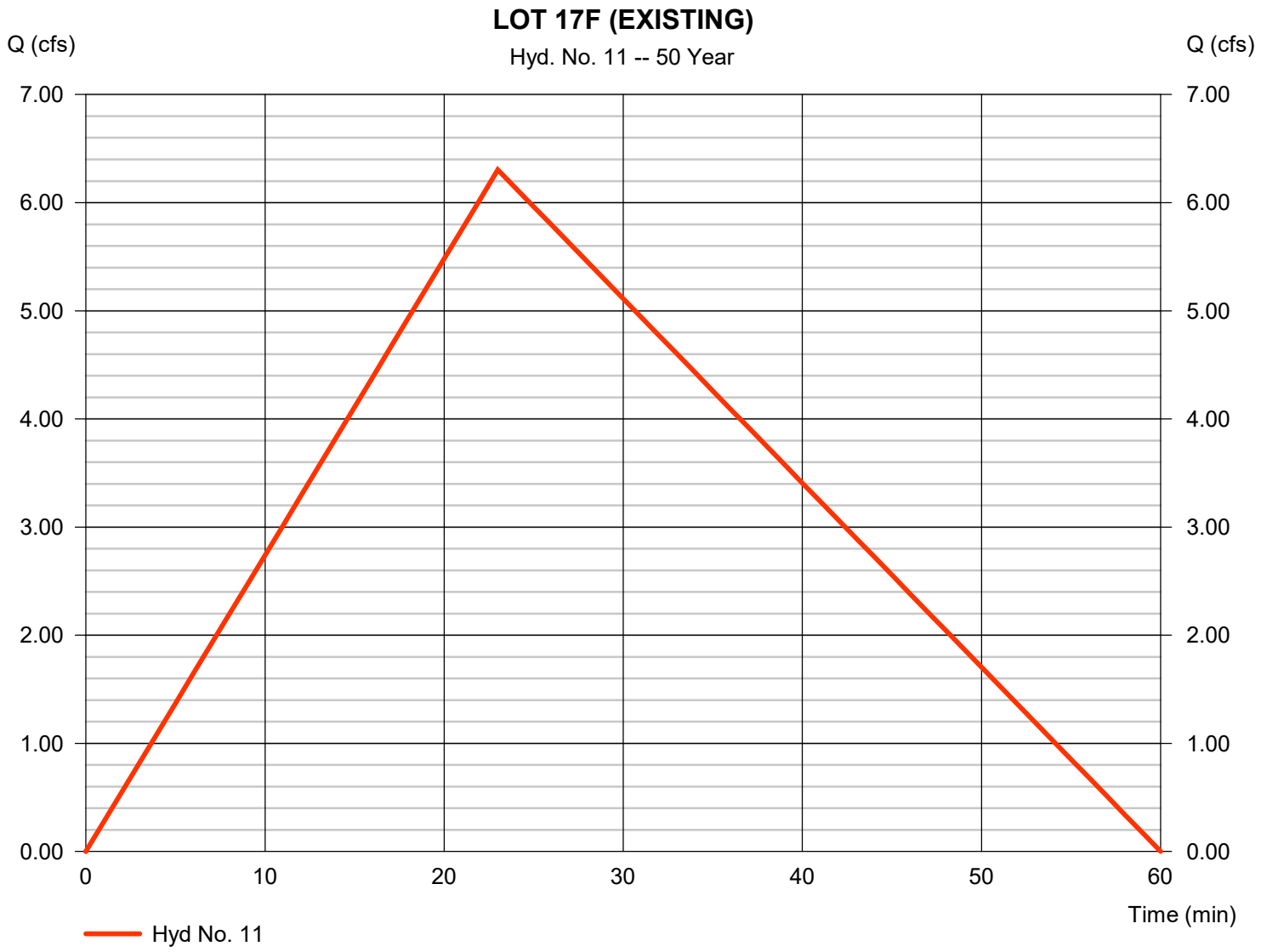


Hydrograph Report

Hyd. No. 11

LOT 17F (EXISTING)

Hydrograph type	=	Rational	Peak discharge	=	6.304 cfs
Storm frequency	=	50 yrs	Time to peak	=	23 min
Time interval	=	1 min	Hyd. volume	=	11,397 cuft
Drainage area	=	1.950 ac	Runoff coeff.	=	0.55
Intensity	=	5.878 in/hr	Tc by User	=	23.00 min
IDF Curve	=	NAIWA.IDF	Asc/Rec limb fact	=	1/1.62

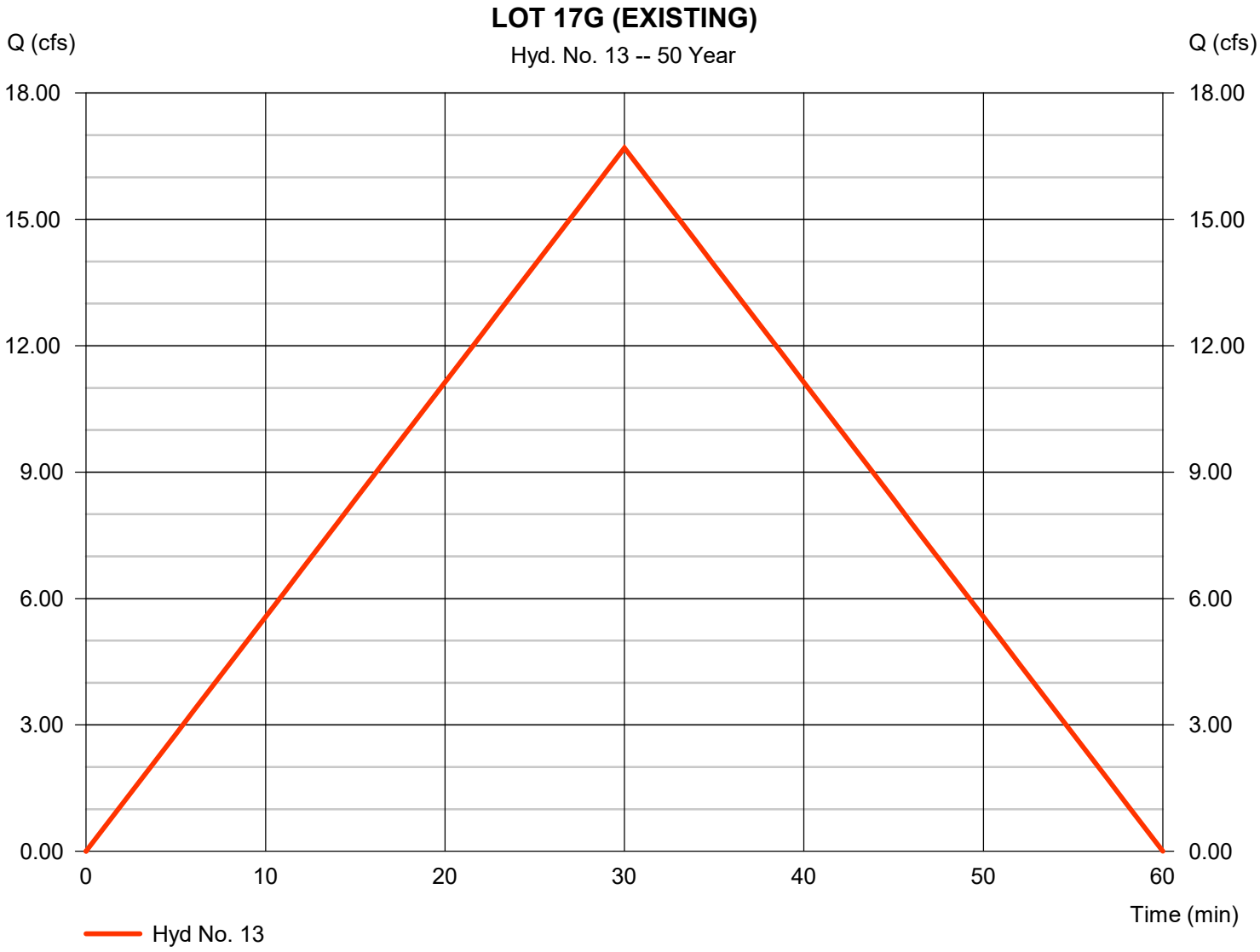


Hydrograph Report

Hyd. No. 13

LOT 17G (EXISTING)

Hydrograph type	=	Rational	Peak discharge	=	16.70 cfs
Storm frequency	=	50 yrs	Time to peak	=	30 min
Time interval	=	1 min	Hyd. volume	=	30,056 cuft
Drainage area	=	6.000 ac	Runoff coeff.	=	0.55
Intensity	=	5.060 in/hr	Tc by User	=	30.00 min
IDF Curve	=	NAIWA.IDF	Asc/Rec limb fact	=	1/1

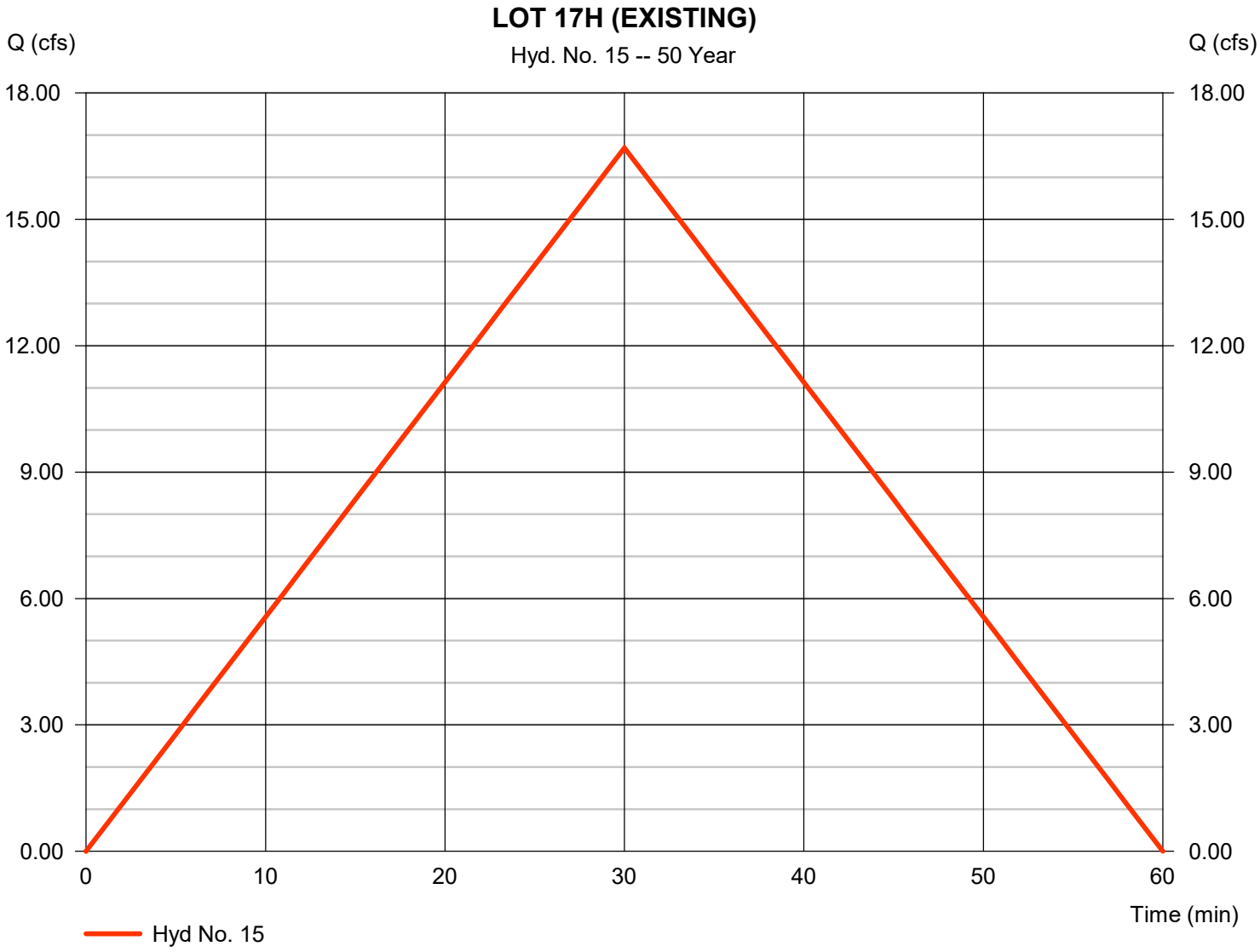


Hydrograph Report

Hyd. No. 15

LOT 17H (EXISTING)

Hydrograph type	=	Rational	Peak discharge	=	16.70 cfs
Storm frequency	=	50 yrs	Time to peak	=	30 min
Time interval	=	1 min	Hyd. volume	=	30,056 cuft
Drainage area	=	6.000 ac	Runoff coeff.	=	0.55
Intensity	=	5.060 in/hr	Tc by User	=	30.00 min
IDF Curve	=	NAIWA.IDF	Asc/Rec limb fact	=	1/1

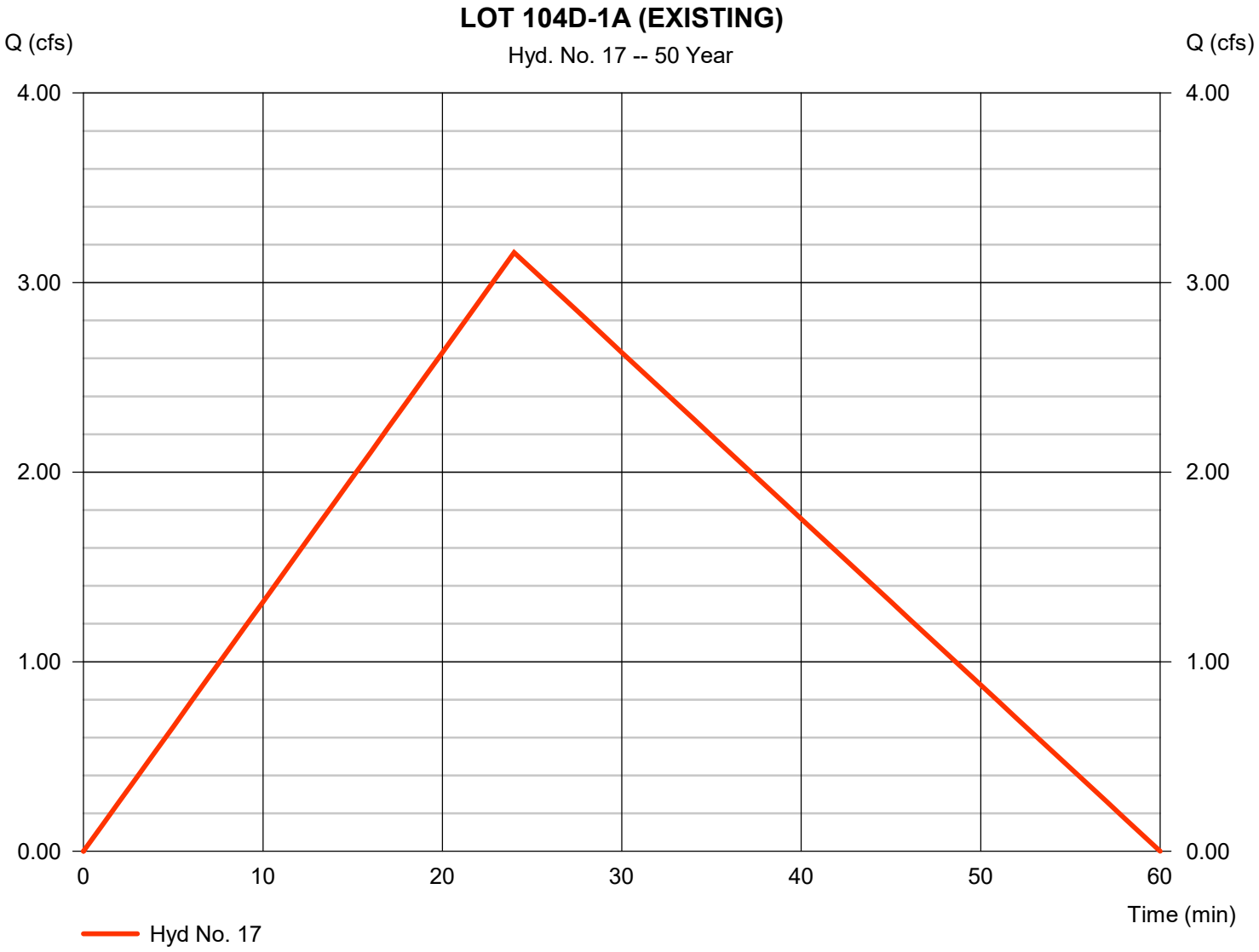


Hydrograph Report

Hyd. No. 17

LOT 104D-1A (EXISTING)

Hydrograph type	=	Rational	Peak discharge	=	3.158 cfs
Storm frequency	=	50 yrs	Time to peak	=	24 min
Time interval	=	1 min	Hyd. volume	=	5,684 cuft
Drainage area	=	1.000 ac	Runoff coeff.	=	0.55
Intensity	=	5.741 in/hr	Tc by User	=	24.00 min
IDF Curve	=	NAIWA.IDF	Asc/Rec limb fact	=	1/1.5

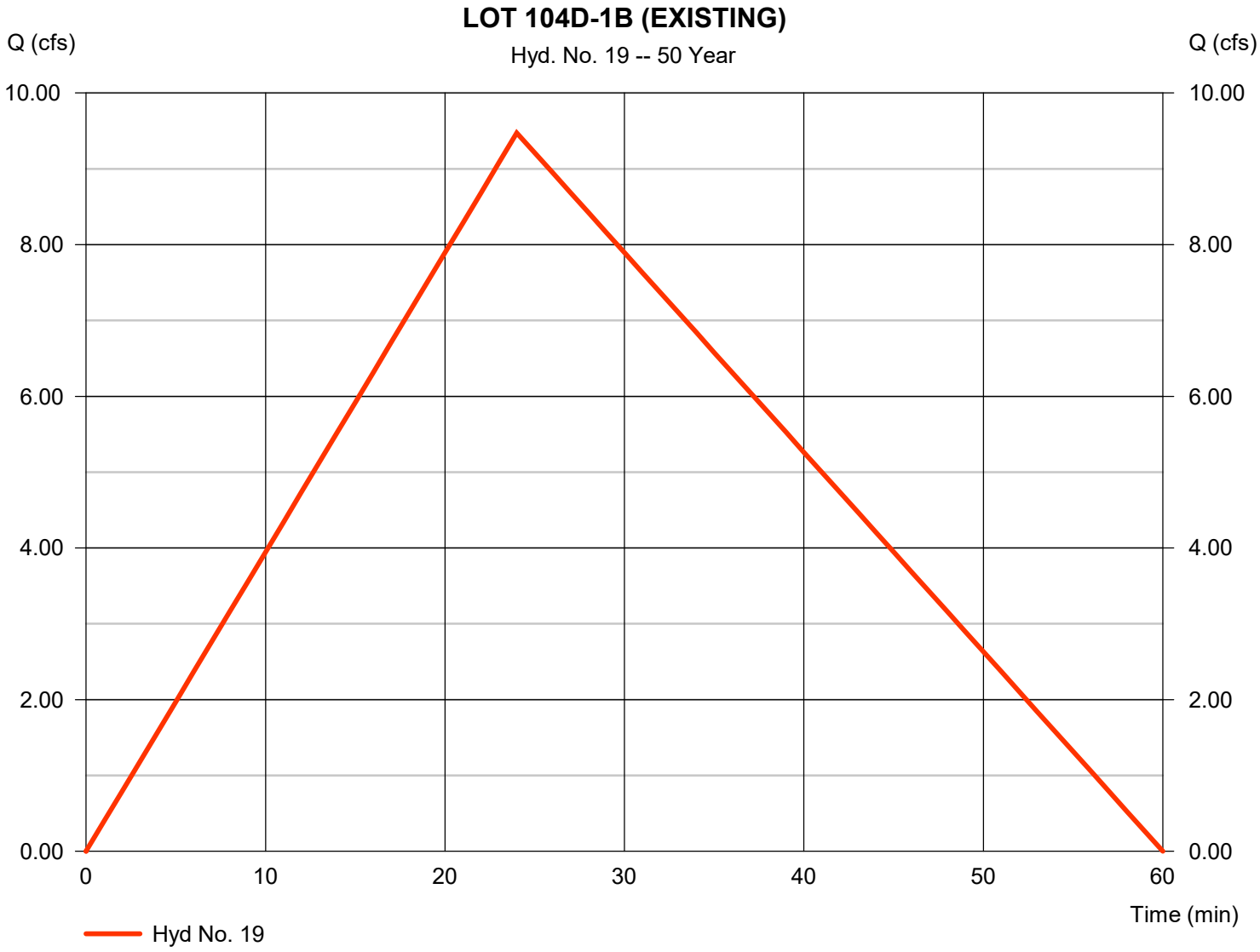


Hydrograph Report

Hyd. No. 19

LOT 104D-1B (EXISTING)

Hydrograph type	= Rational	Peak discharge	= 9.473 cfs
Storm frequency	= 50 yrs	Time to peak	= 24 min
Time interval	= 1 min	Hyd. volume	= 17,052 cuft
Drainage area	= 3.000 ac	Runoff coeff.	= 0.55
Intensity	= 5.741 in/hr	Tc by User	= 24.00 min
IDF Curve	= NAIWA.IDF	Asc/Rec limb fact	= 1/1.5

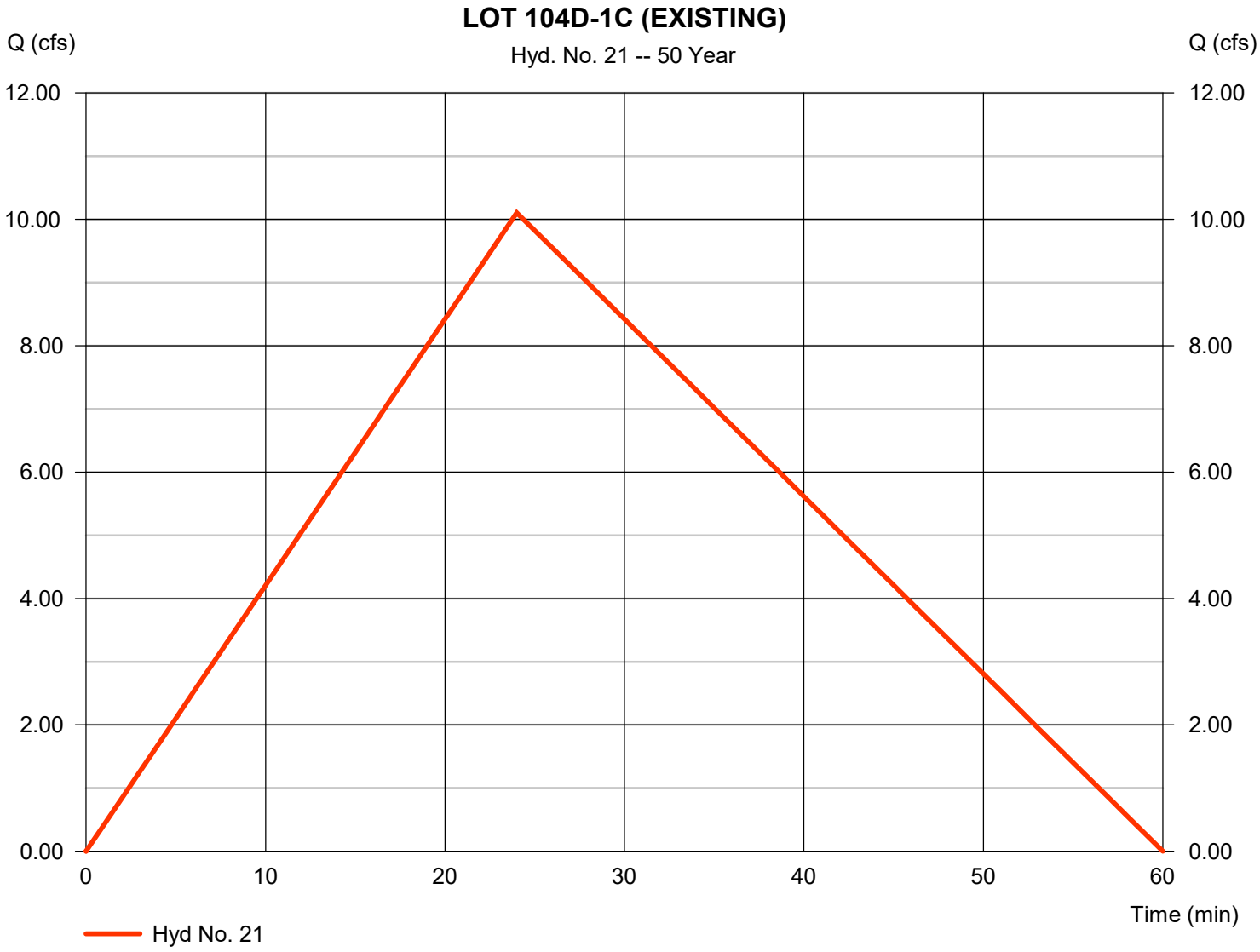


Hydrograph Report

Hyd. No. 21

LOT 104D-1C (EXISTING)

Hydrograph type	=	Rational	Peak discharge	=	10.10 cfs
Storm frequency	=	50 yrs	Time to peak	=	24 min
Time interval	=	1 min	Hyd. volume	=	18,189 cuft
Drainage area	=	3.200 ac	Runoff coeff.	=	0.55
Intensity	=	5.741 in/hr	Tc by User	=	24.00 min
IDF Curve	=	NAIWA.IDF	Asc/Rec limb fact	=	1/1.5



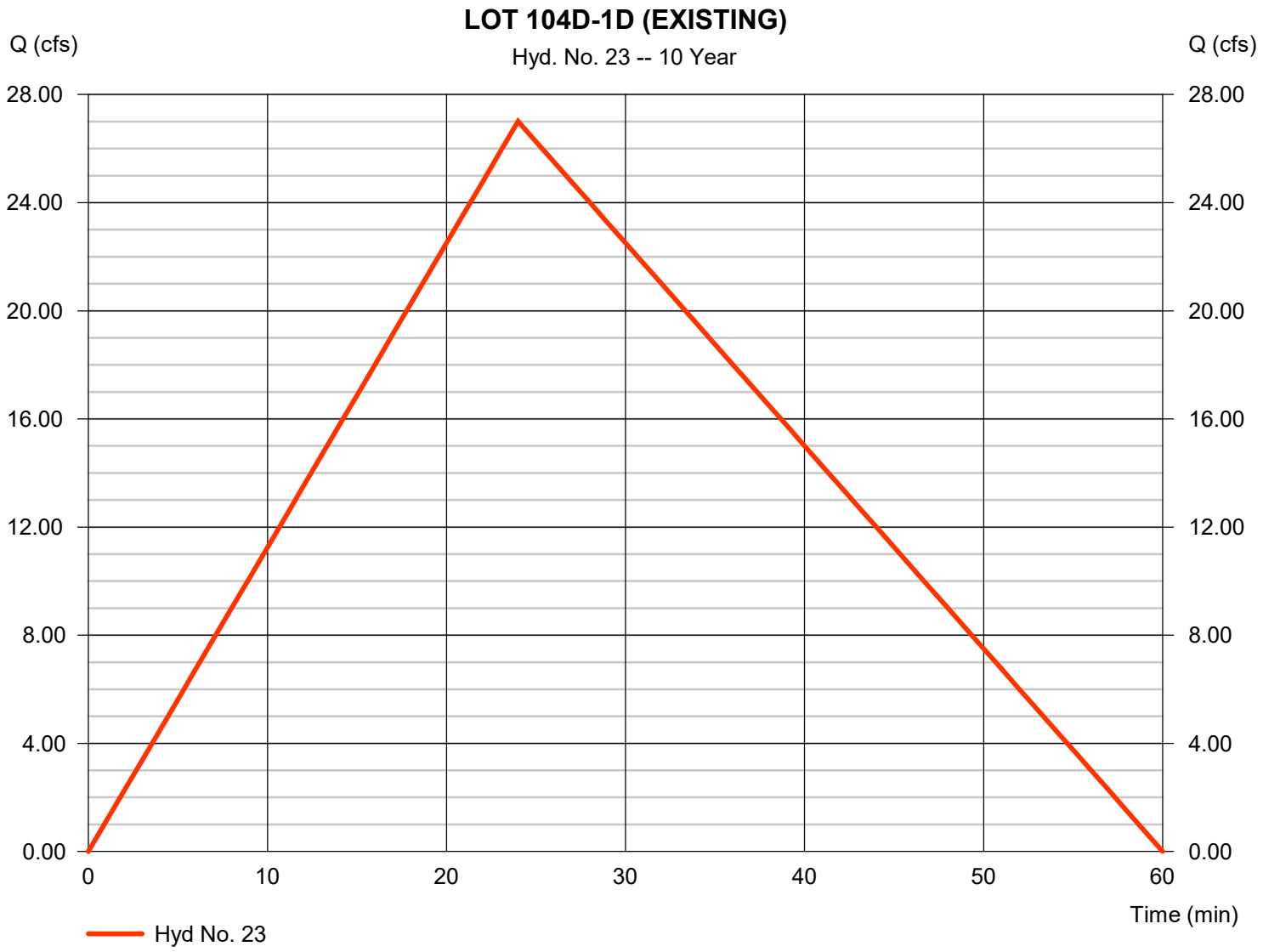
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Thursday, 12 / 21 / 2023

Hyd. No. 23

LOT 104D-1D (EXISTING)

Hydrograph type	= Rational	Peak discharge	= 27.01 cfs
Storm frequency	= 10 yrs	Time to peak	= 24 min
Time interval	= 1 min	Hyd. volume	= 48,616 cuft
Drainage area	= 12.800 ac	Runoff coeff.	= 0.55
Intensity	= 3.837 in/hr	Tc by User	= 24.00 min
IDF Curve	= NAIWA.IDF	Asc/Rec limb fact	= 1/1.5



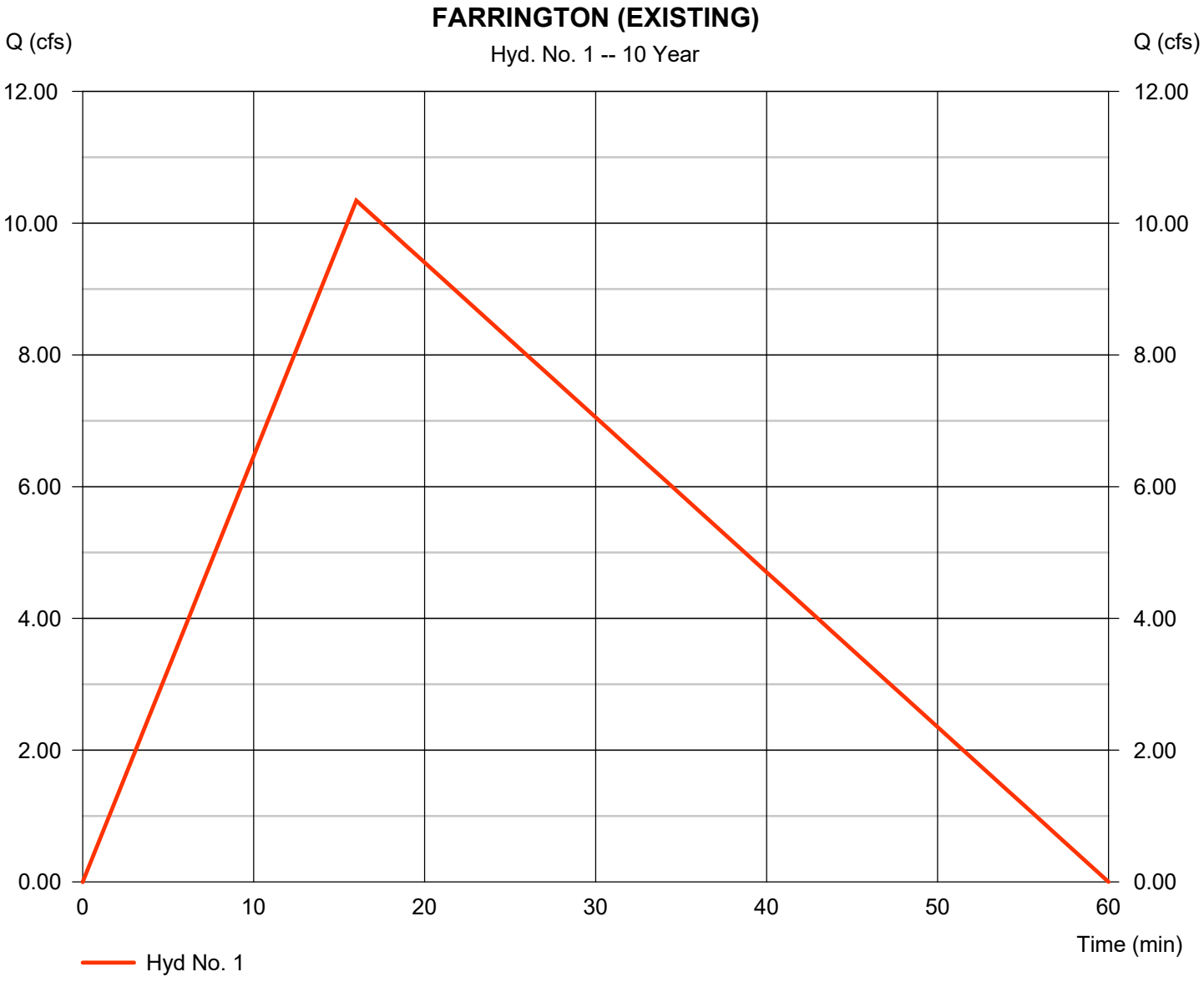
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Monday, 11 / 29 / 2021

Hyd. No. 1

FARRINGTON (EXISTING)

Hydrograph type	=	Rational	Peak discharge	=	10.34 cfs
Storm frequency	=	10 yrs	Time to peak	=	16 min
Time interval	=	1 min	Hyd. volume	=	0.427 acft
Drainage area	=	3.950 ac	Runoff coeff.	=	0.55
Intensity	=	4.761 in/hr	Tc by User	=	16.00 min
IDF Curve	=	NAIWA.IDF	Asc/Rec limb fact	=	1/2.75

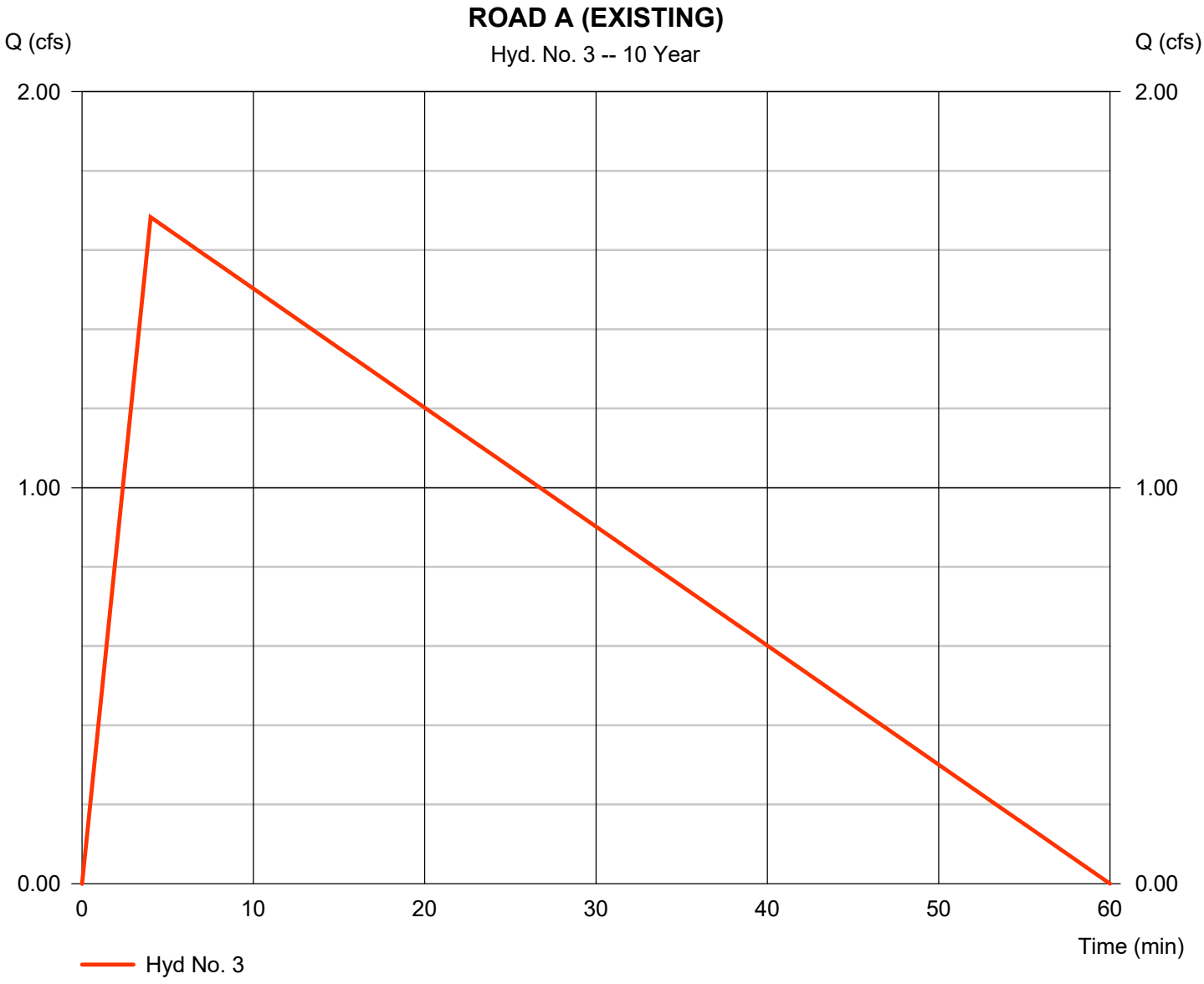


Hydrograph Report

Hyd. No. 3

ROAD A (EXISTING)

Hydrograph type	= Rational	Peak discharge	= 1.683 cfs
Storm frequency	= 10 yrs	Time to peak	= 4 min
Time interval	= 1 min	Hyd. volume	= 0.070 acft
Drainage area	= 0.370 ac	Runoff coeff.	= 0.55
Intensity	= 8.270 in/hr	Tc by User	= 4.00 min
IDF Curve	= NAIWA.IDF	Asc/Rec limb fact	= 1/14

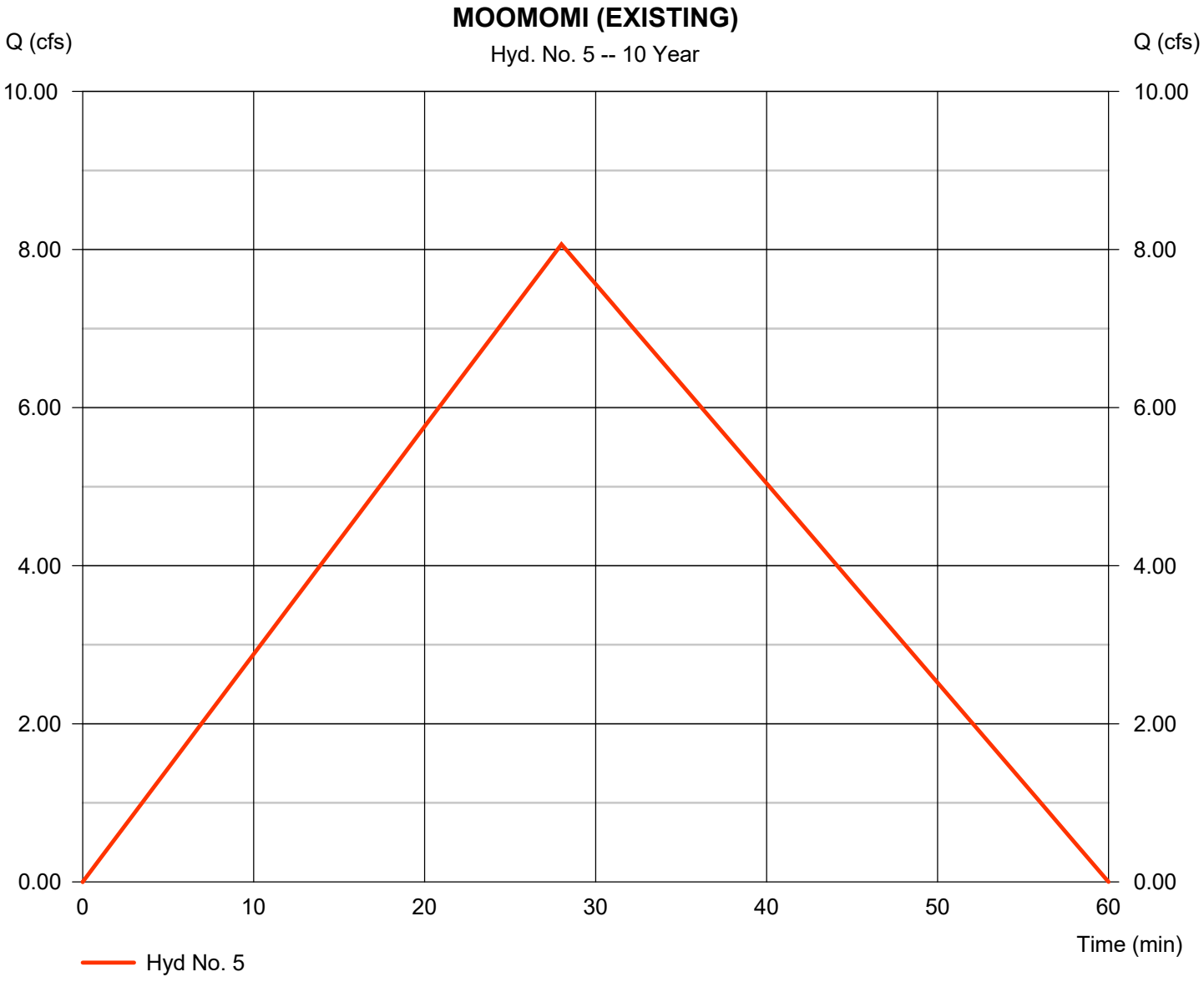


Hydrograph Report

Hyd. No. 5

MOOMOMI (EXISTING)

Hydrograph type	=	Rational	Peak discharge	=	8.066 cfs
Storm frequency	=	10 yrs	Time to peak	=	28 min
Time interval	=	1 min	Hyd. volume	=	0.334 acft
Drainage area	=	4.170 ac	Runoff coeff.	=	0.55
Intensity	=	3.517 in/hr	Tc by User	=	28.00 min
IDF Curve	=	NAIWA.IDF	Asc/Rec limb fact	=	1/1.15

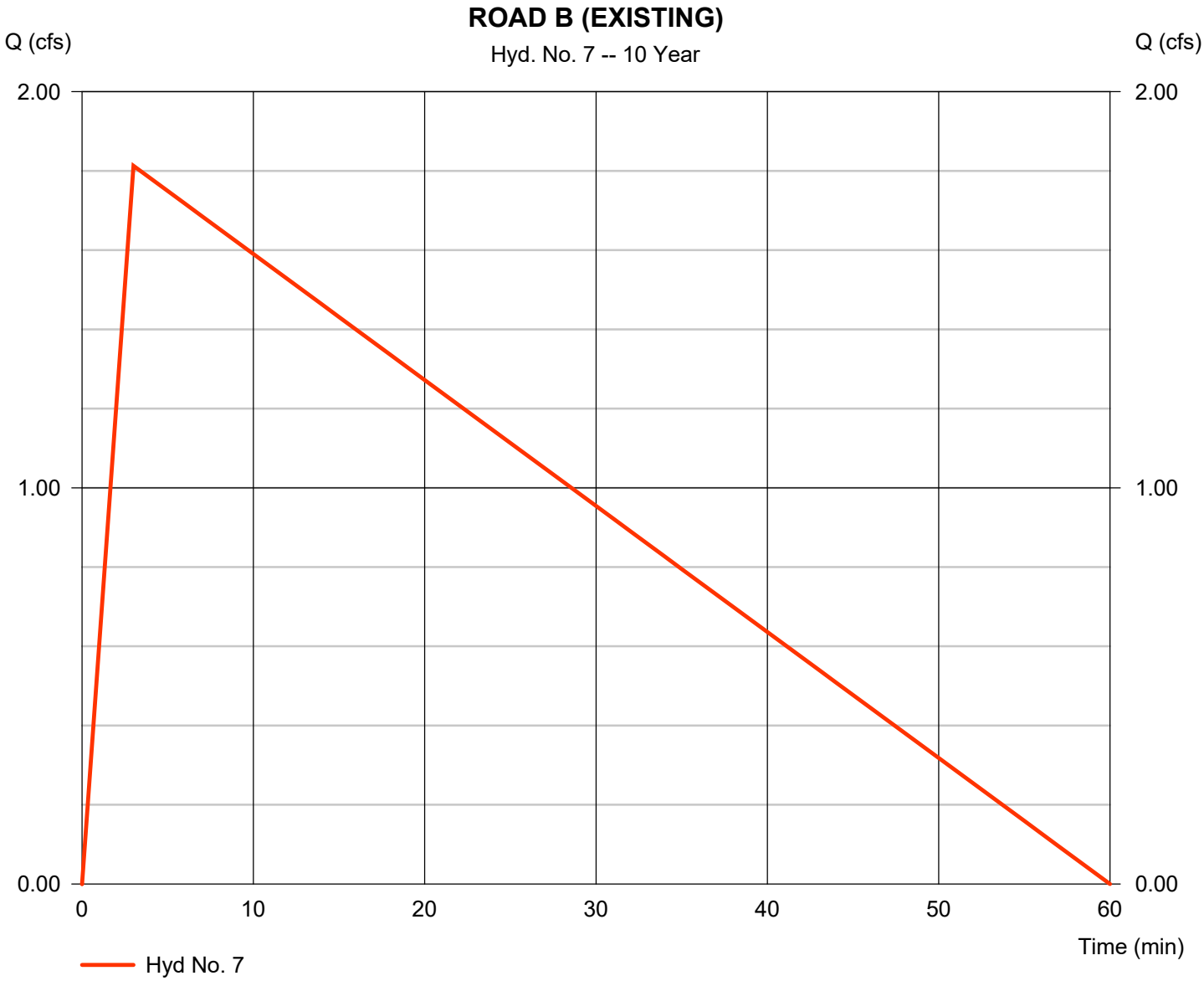


Hydrograph Report

Hyd. No. 7

ROAD B (EXISTING)

Hydrograph type	= Rational	Peak discharge	= 1.813 cfs
Storm frequency	= 10 yrs	Time to peak	= 3 min
Time interval	= 1 min	Hyd. volume	= 0.075 acft
Drainage area	= 0.370 ac	Runoff coeff.	= 0.55
Intensity	= 8.908 in/hr	Tc by User	= 3.00 min
IDF Curve	= NAIWA.IDF	Asc/Rec limb fact	= 1/19

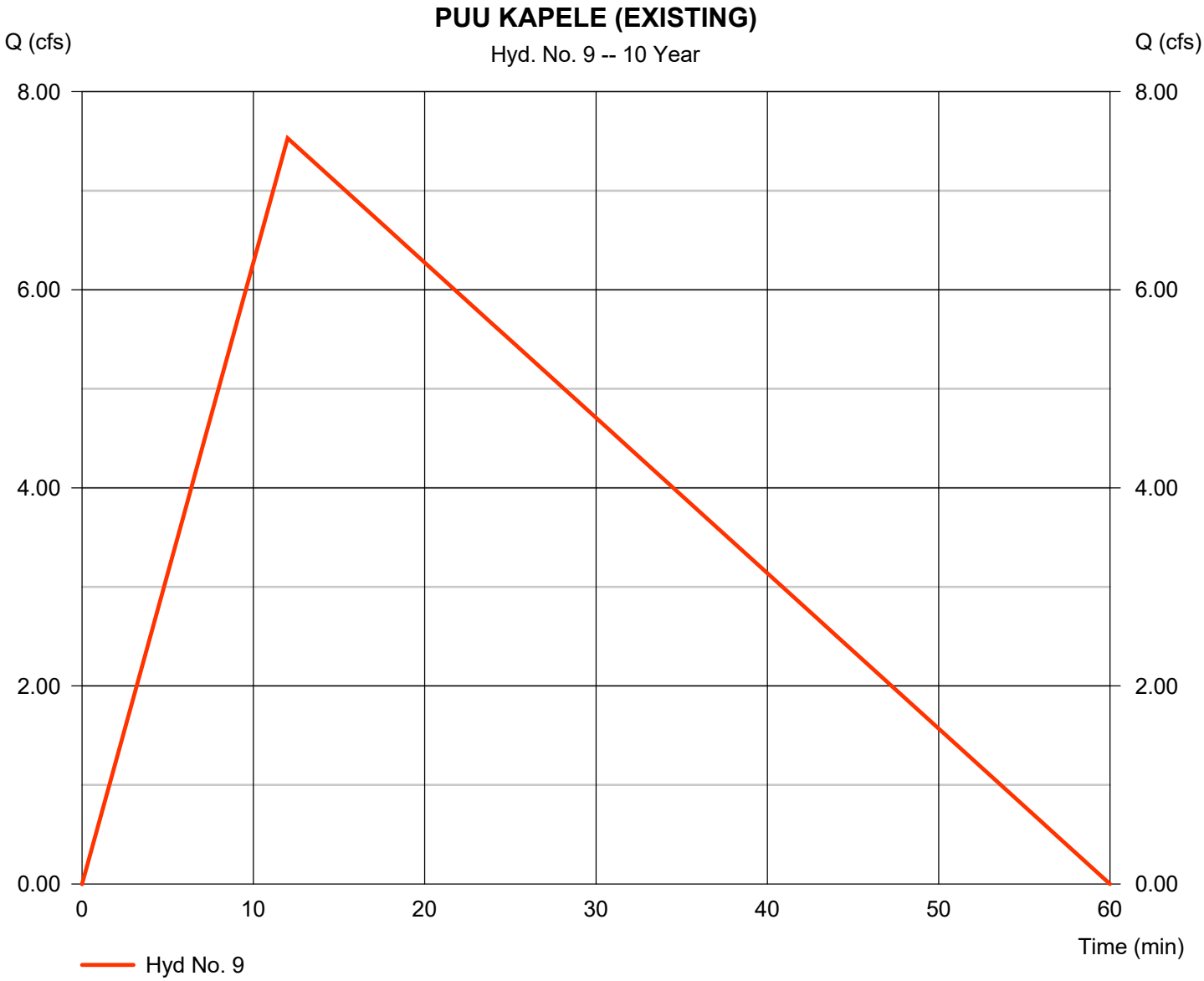


Hydrograph Report

Hyd. No. 9

PUU KAPELE (EXISTING)

Hydrograph type	=	Rational	Peak discharge	=	7.530 cfs
Storm frequency	=	10 yrs	Time to peak	=	12 min
Time interval	=	1 min	Hyd. volume	=	0.311 acft
Drainage area	=	2.500 ac	Runoff coeff.	=	0.55
Intensity	=	5.476 in/hr	Tc by User	=	12.00 min
IDF Curve	=	NAIWA.IDF	Asc/Rec limb fact	=	1/4

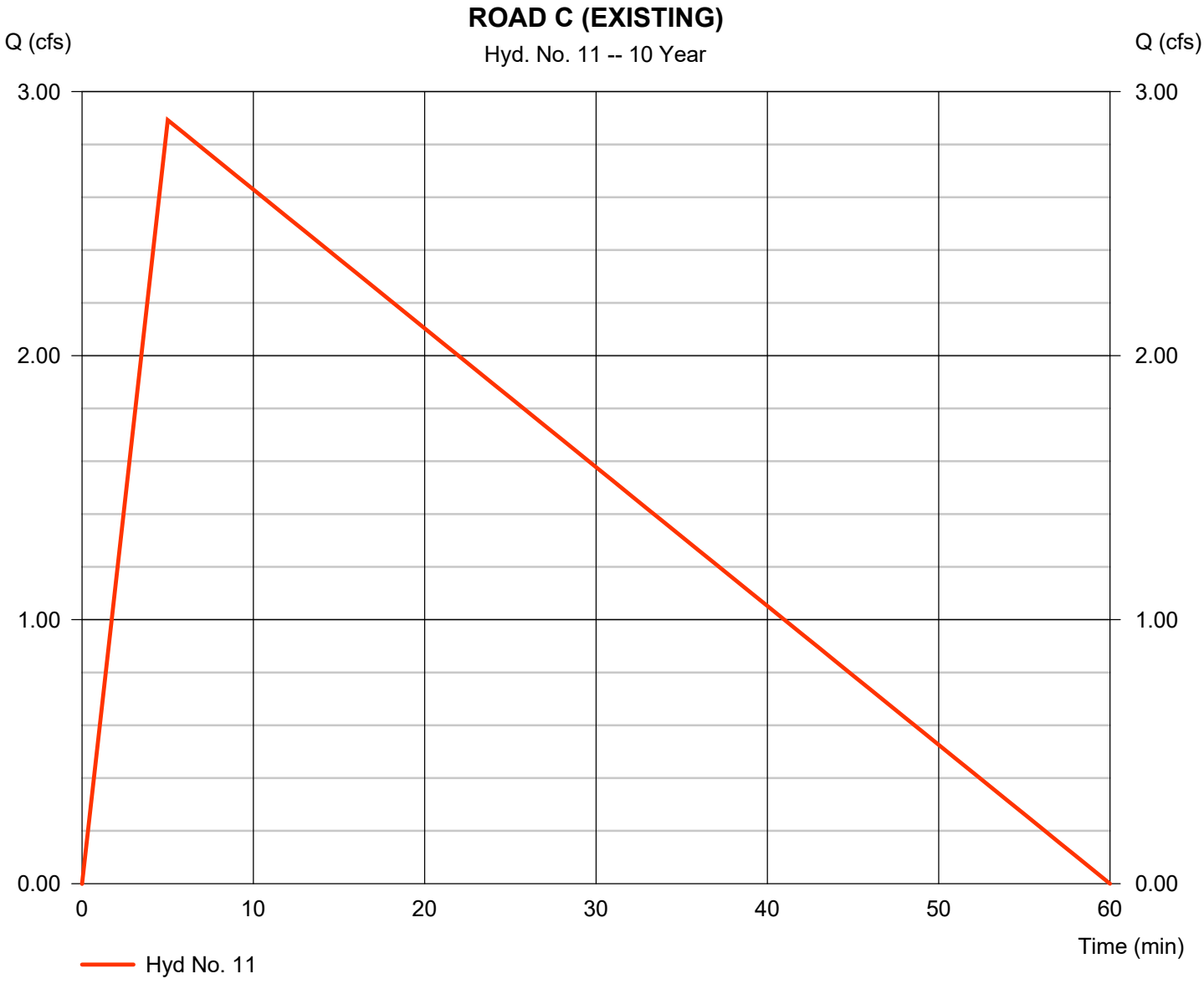


Hydrograph Report

Hyd. No. 11

ROAD C (EXISTING)

Hydrograph type	=	Rational	Peak discharge	=	2.892 cfs
Storm frequency	=	10 yrs	Time to peak	=	5 min
Time interval	=	1 min	Hyd. volume	=	0.120 acft
Drainage area	=	0.680 ac	Runoff coeff.	=	0.55
Intensity	=	7.733 in/hr	Tc by User	=	5.00 min
IDF Curve	=	NAIWA.IDF	Asc/Rec limb fact	=	1/11

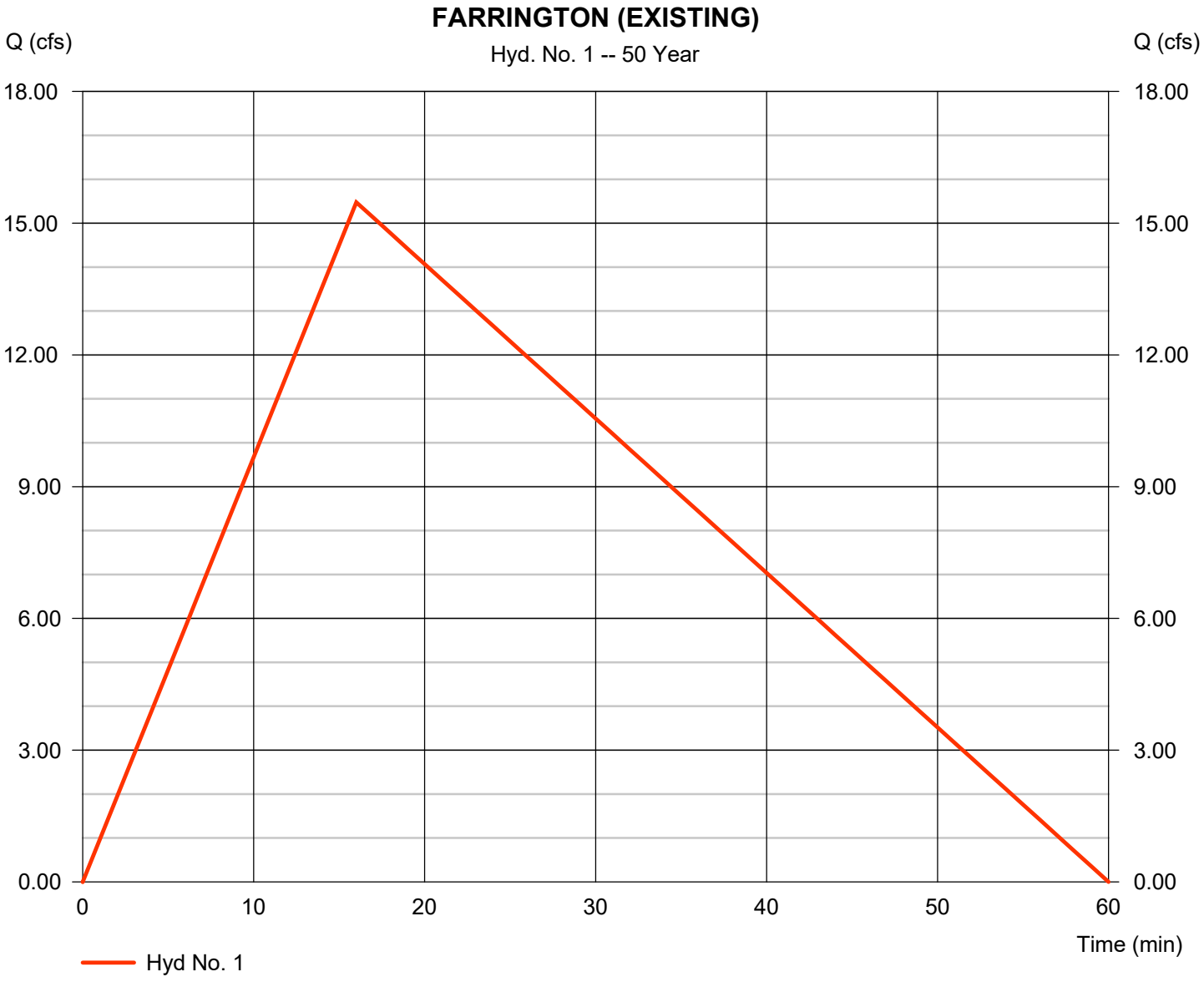


Hydrograph Report

Hyd. No. 1

FARRINGTON (EXISTING)

Hydrograph type	=	Rational	Peak discharge	=	15.48 cfs
Storm frequency	=	50 yrs	Time to peak	=	16 min
Time interval	=	1 min	Hyd. volume	=	0.639 acft
Drainage area	=	3.950 ac	Runoff coeff.	=	0.55
Intensity	=	7.123 in/hr	Tc by User	=	16.00 min
IDF Curve	=	NAIWA.IDF	Asc/Rec limb fact	=	1/2.75

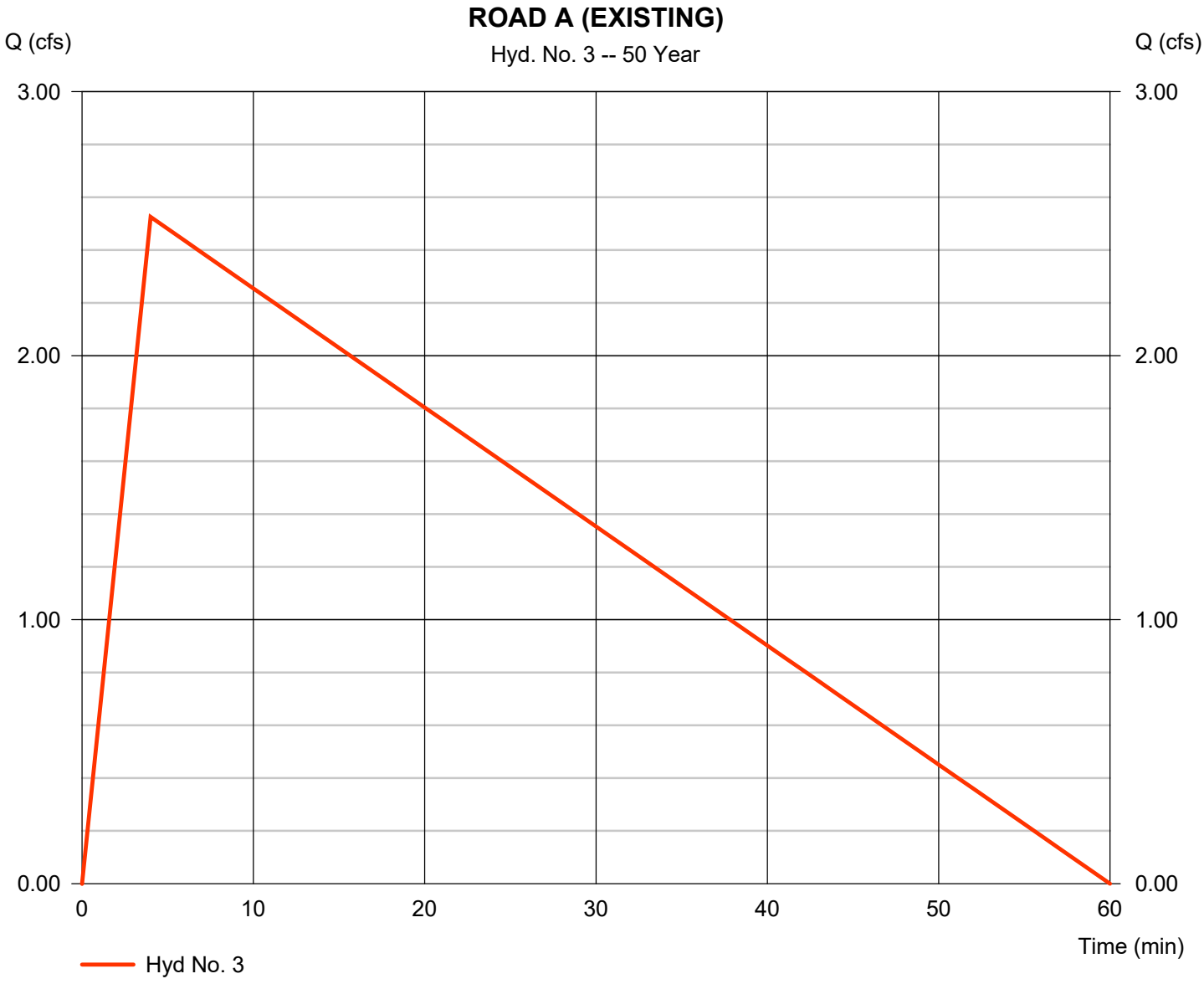


Hydrograph Report

Hyd. No. 3

ROAD A (EXISTING)

Hydrograph type	=	Rational	Peak discharge	=	2.525 cfs
Storm frequency	=	50 yrs	Time to peak	=	4 min
Time interval	=	1 min	Hyd. volume	=	0.104 acft
Drainage area	=	0.370 ac	Runoff coeff.	=	0.55
Intensity	=	12.410 in/hr	Tc by User	=	4.00 min
IDF Curve	=	NAIWA.IDF	Asc/Rec limb fact	=	1/14

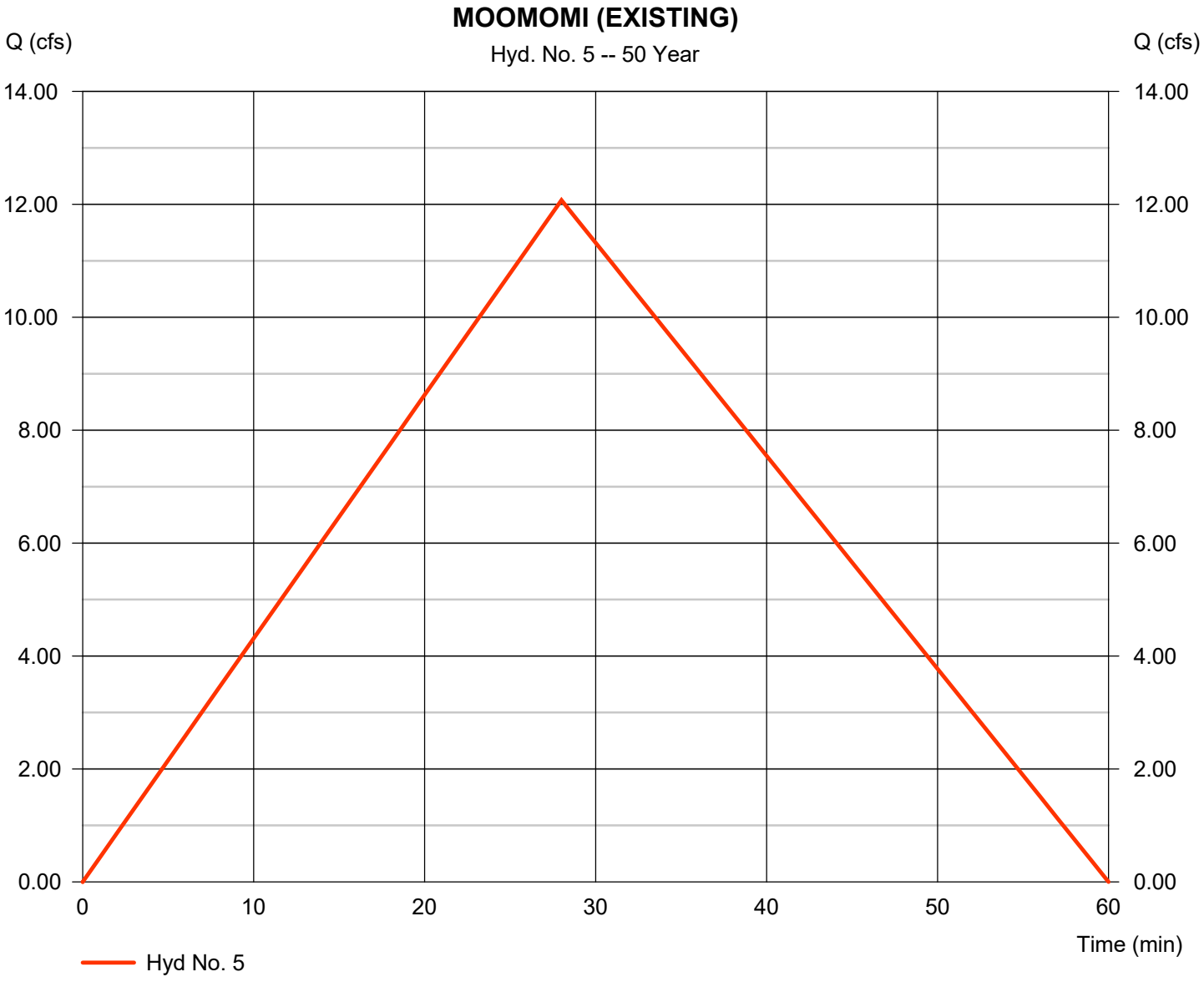


Hydrograph Report

Hyd. No. 5

MOOMOMI (EXISTING)

Hydrograph type	=	Rational	Peak discharge	=	12.07 cfs
Storm frequency	=	50 yrs	Time to peak	=	28 min
Time interval	=	1 min	Hyd. volume	=	0.501 acft
Drainage area	=	4.170 ac	Runoff coeff.	=	0.55
Intensity	=	5.264 in/hr	Tc by User	=	28.00 min
IDF Curve	=	NAIWA.IDF	Asc/Rec limb fact	=	1/1.15

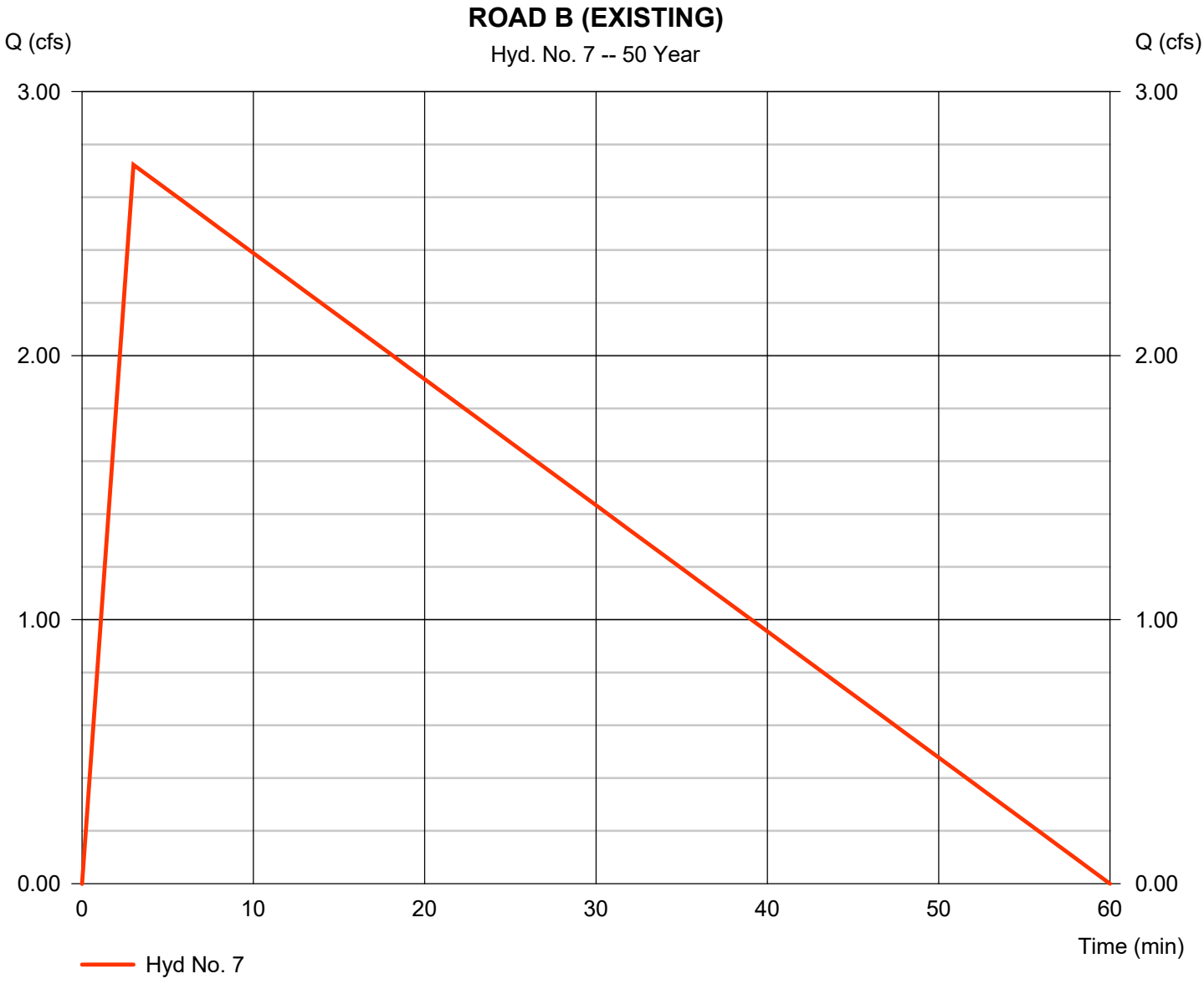


Hydrograph Report

Hyd. No. 7

ROAD B (EXISTING)

Hydrograph type	=	Rational	Peak discharge	=	2.723 cfs
Storm frequency	=	50 yrs	Time to peak	=	3 min
Time interval	=	1 min	Hyd. volume	=	0.113 acft
Drainage area	=	0.370 ac	Runoff coeff.	=	0.55
Intensity	=	13.380 in/hr	Tc by User	=	3.00 min
IDF Curve	=	NAIWA.IDF	Asc/Rec limb fact	=	1/19

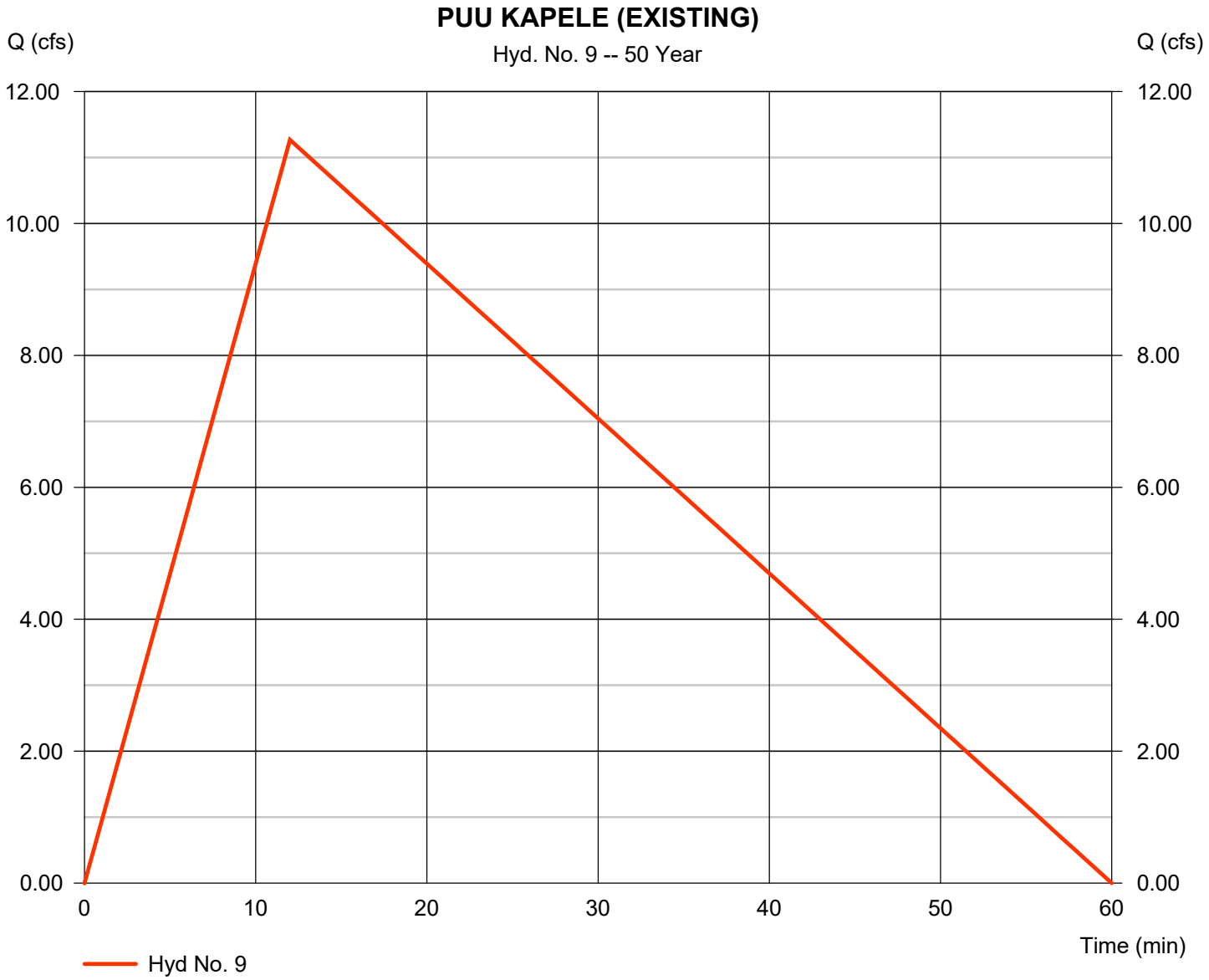


Hydrograph Report

Hyd. No. 9

PUU KAPELE (EXISTING)

Hydrograph type	=	Rational	Peak discharge	=	11.27 cfs
Storm frequency	=	50 yrs	Time to peak	=	12 min
Time interval	=	1 min	Hyd. volume	=	0.466 acft
Drainage area	=	2.500 ac	Runoff coeff.	=	0.55
Intensity	=	8.195 in/hr	Tc by User	=	12.00 min
IDF Curve	=	NAIWA.IDF	Asc/Rec limb fact	=	1/4

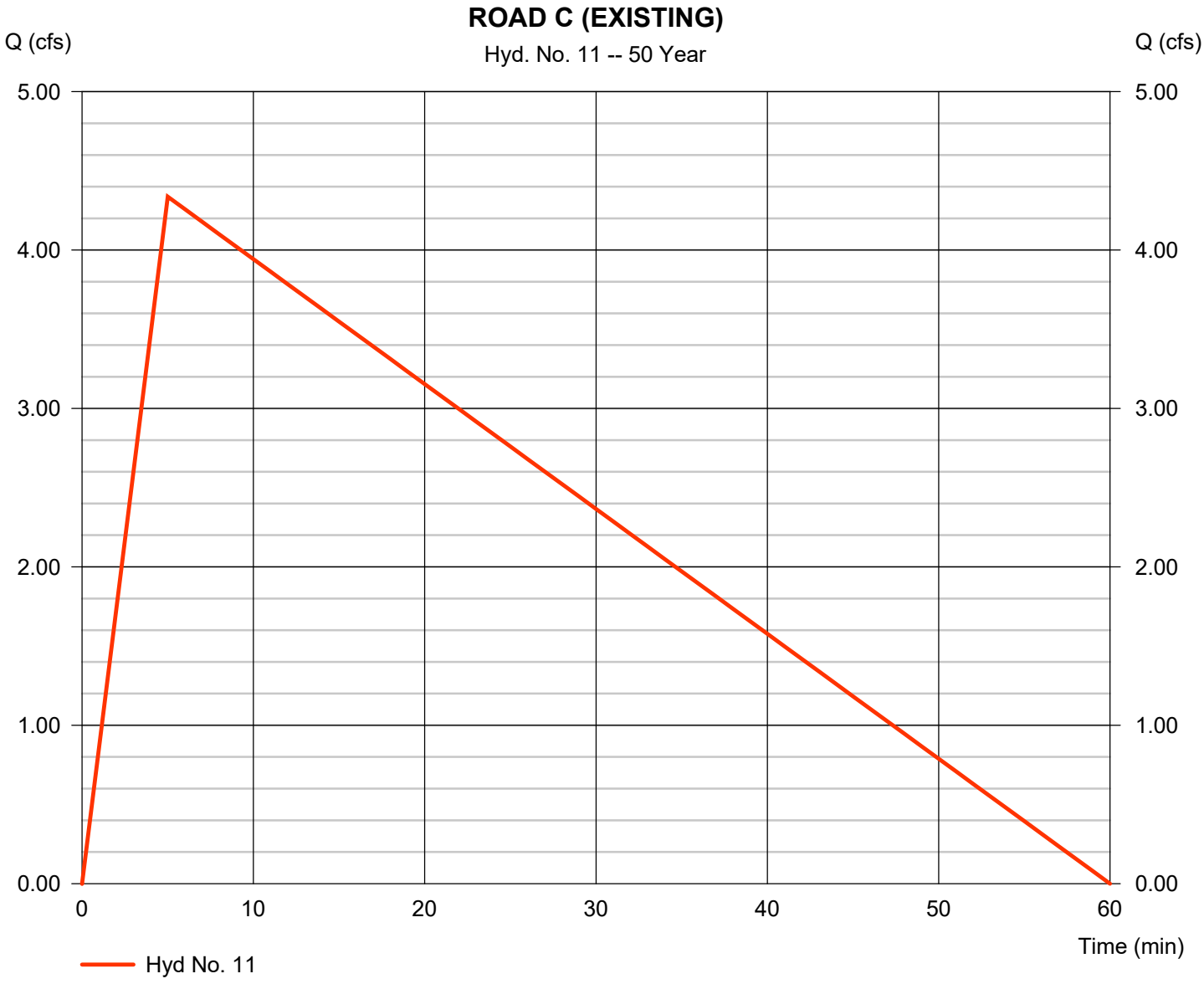


Hydrograph Report

Hyd. No. 11

ROAD C (EXISTING)

Hydrograph type	=	Rational	Peak discharge	=	4.337 cfs
Storm frequency	=	50 yrs	Time to peak	=	5 min
Time interval	=	1 min	Hyd. volume	=	0.179 acft
Drainage area	=	0.680 ac	Runoff coeff.	=	0.55
Intensity	=	11.596 in/hr	Tc by User	=	5.00 min
IDF Curve	=	NAIWA.IDF	Asc/Rec limb fact	=	1/11



Hydrograph Report

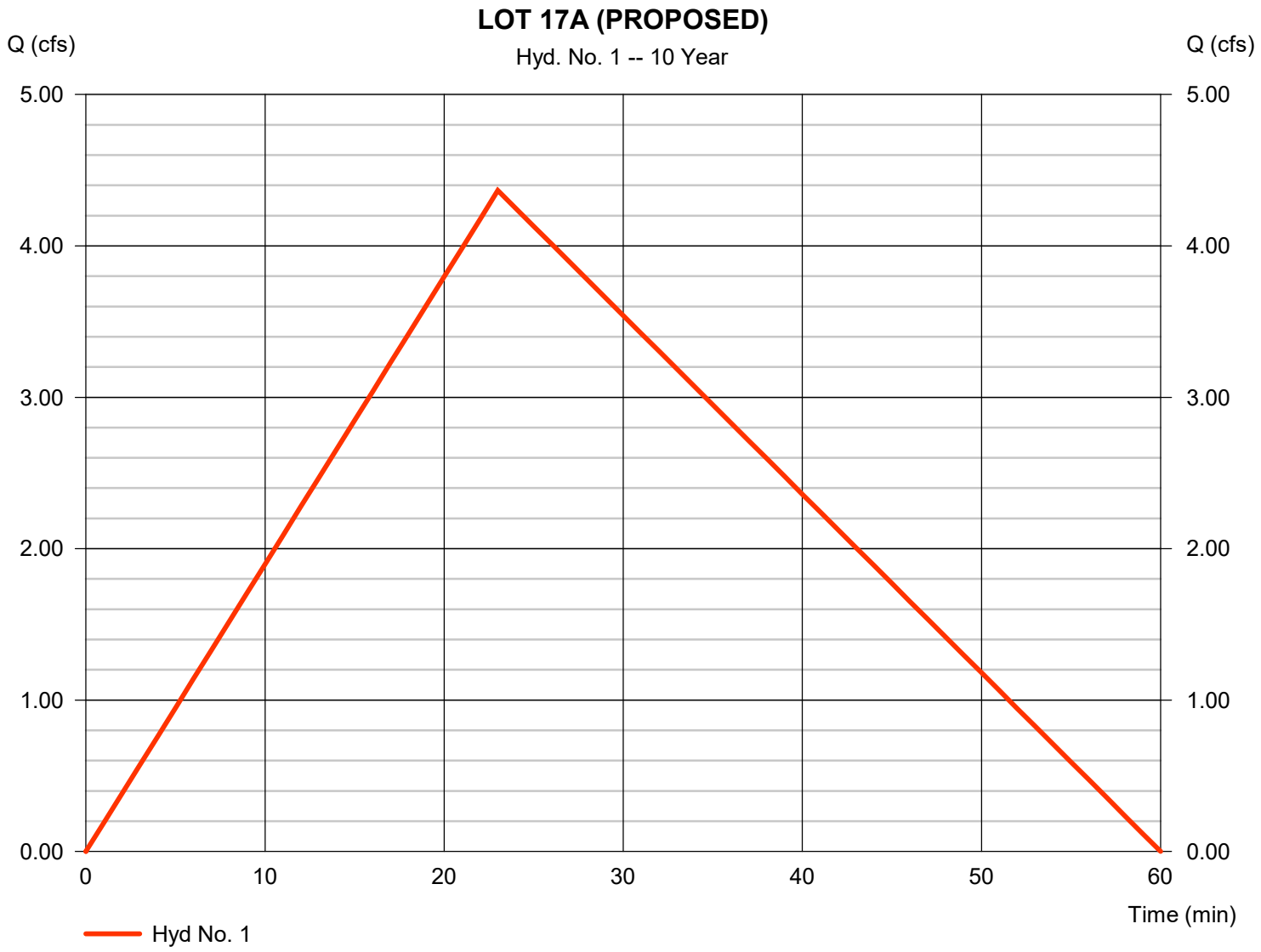
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022 Monday, 10 / 23 / 2023

Hyd. No. 1

LOT 17A (PROPOSED)

Hydrograph type	= Rational	Peak discharge	= 4.366 cfs
Storm frequency	= 10 yrs	Time to peak	= 23 min
Time interval	= 1 min	Hyd. volume	= 7,923 cuft
Drainage area	= 1.950 ac	Runoff coeff.	= 0.57*
Intensity	= 3.928 in/hr	Tc by User	= 23.00 min
IDF Curve	= NAIWA.IDF	Asc/Rec limb fact	= 1/1.63

* Composite (Area/C) = [(0.110 x 0.95) + (1.890 x 0.55)] / 1.950



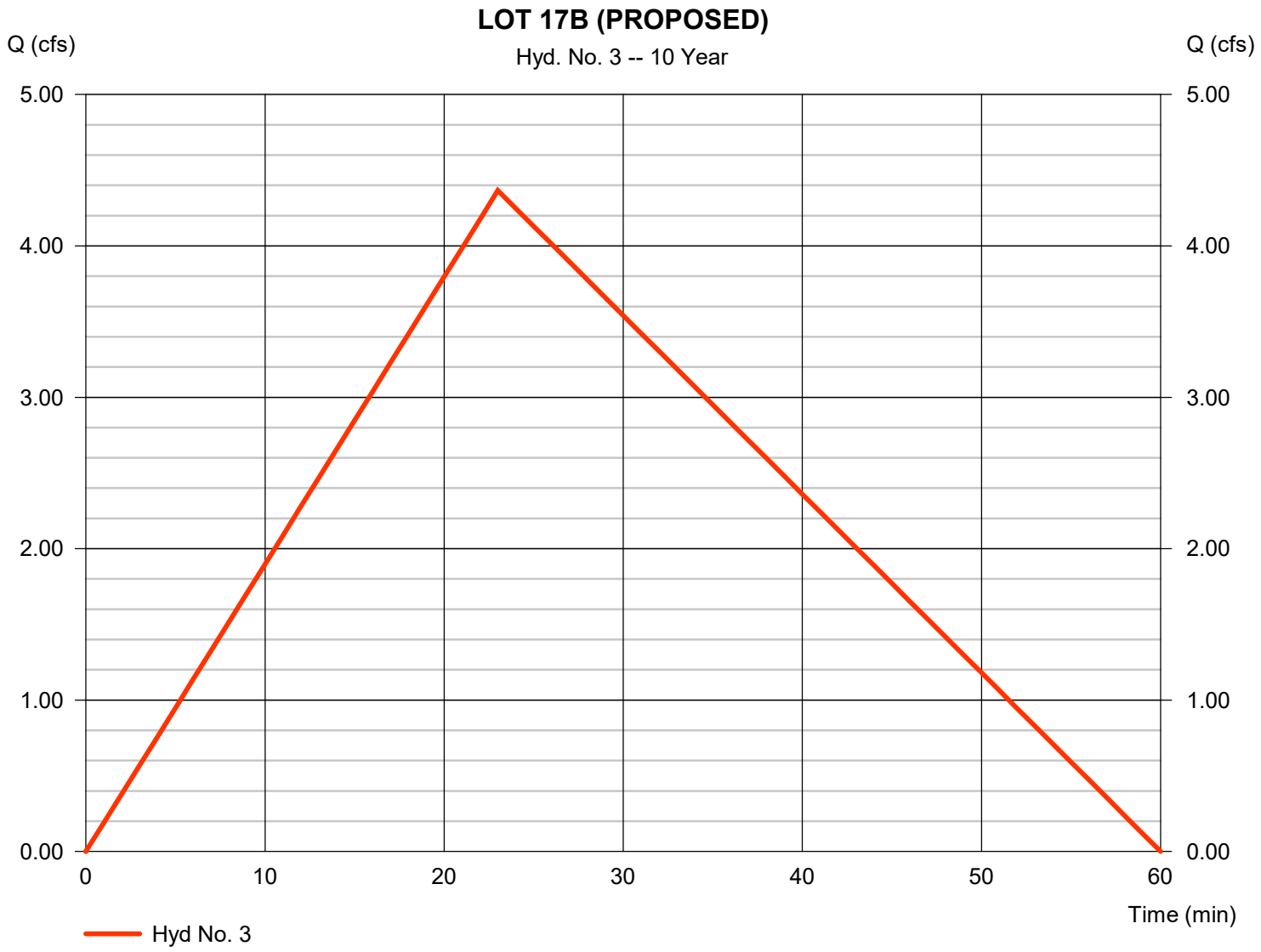
Hydrograph Report

Hyd. No. 3

LOT 17B (PROPOSED)

Hydrograph type	= Rational	Peak discharge	= 4.366 cfs
Storm frequency	= 10 yrs	Time to peak	= 23 min
Time interval	= 1 min	Hyd. volume	= 7,923 cuft
Drainage area	= 1.950 ac	Runoff coeff.	= 0.57*
Intensity	= 3.928 in/hr	Tc by User	= 23.00 min
IDF Curve	= NAIWA.IDF	Asc/Rec limb fact	= 1/1.63

* Composite (Area/C) = [(0.110 x 0.95) + (1.890 x 0.55)] / 1.950



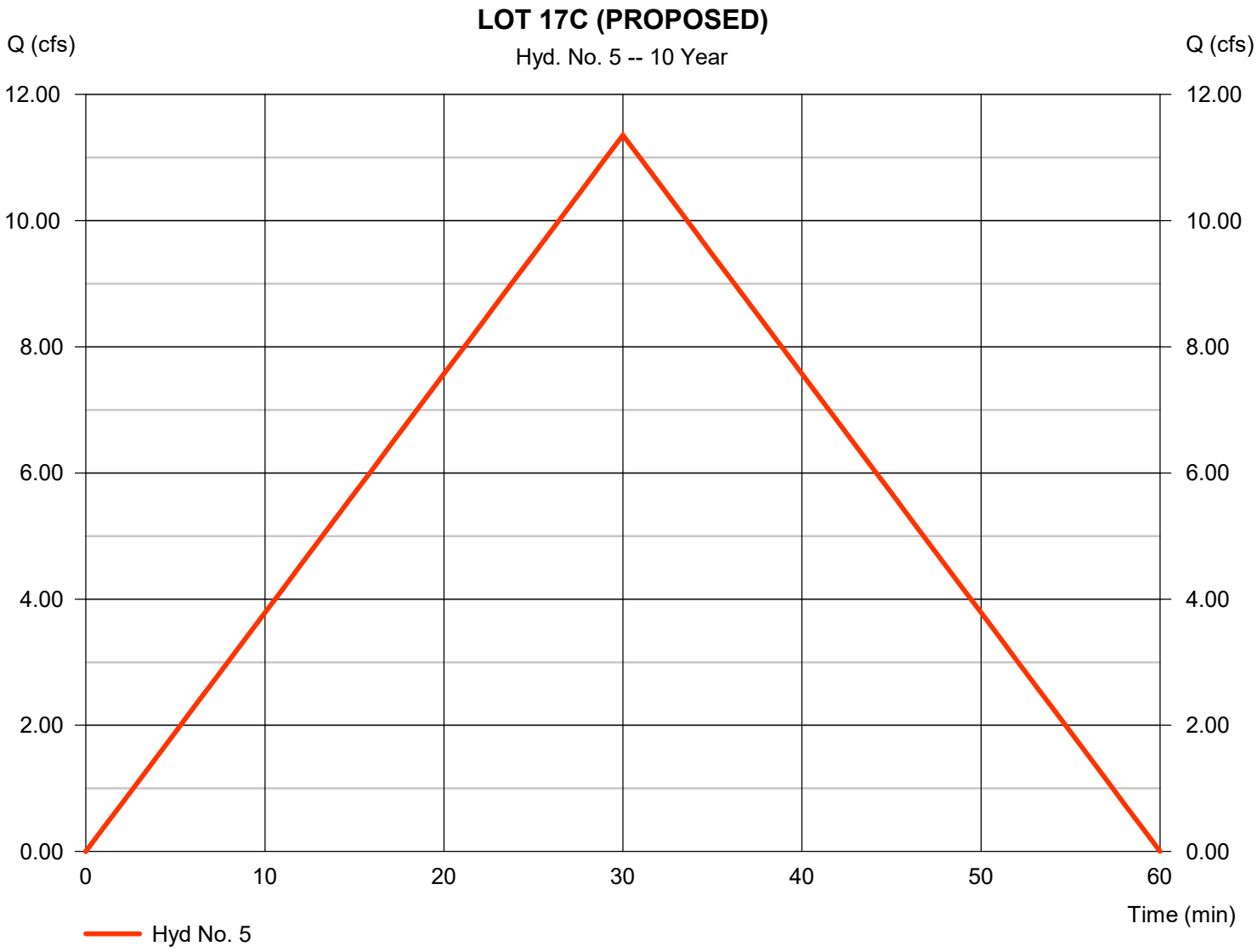
Hydrograph Report

Hyd. No. 5

LOT 17C (PROPOSED)

Hydrograph type	= Rational	Peak discharge	= 11.36 cfs
Storm frequency	= 10 yrs	Time to peak	= 30 min
Time interval	= 1 min	Hyd. volume	= 20,442 cuft
Drainage area	= 6.000 ac	Runoff coeff.	= 0.56*
Intensity	= 3.380 in/hr	Tc by User	= 30.00 min
IDF Curve	= NAIWA.IDF	Asc/Rec limb fact	= 1/1

* Composite (Area/C) = [(0.110 x 0.95) + (5.690 x 0.55)] / 6.000



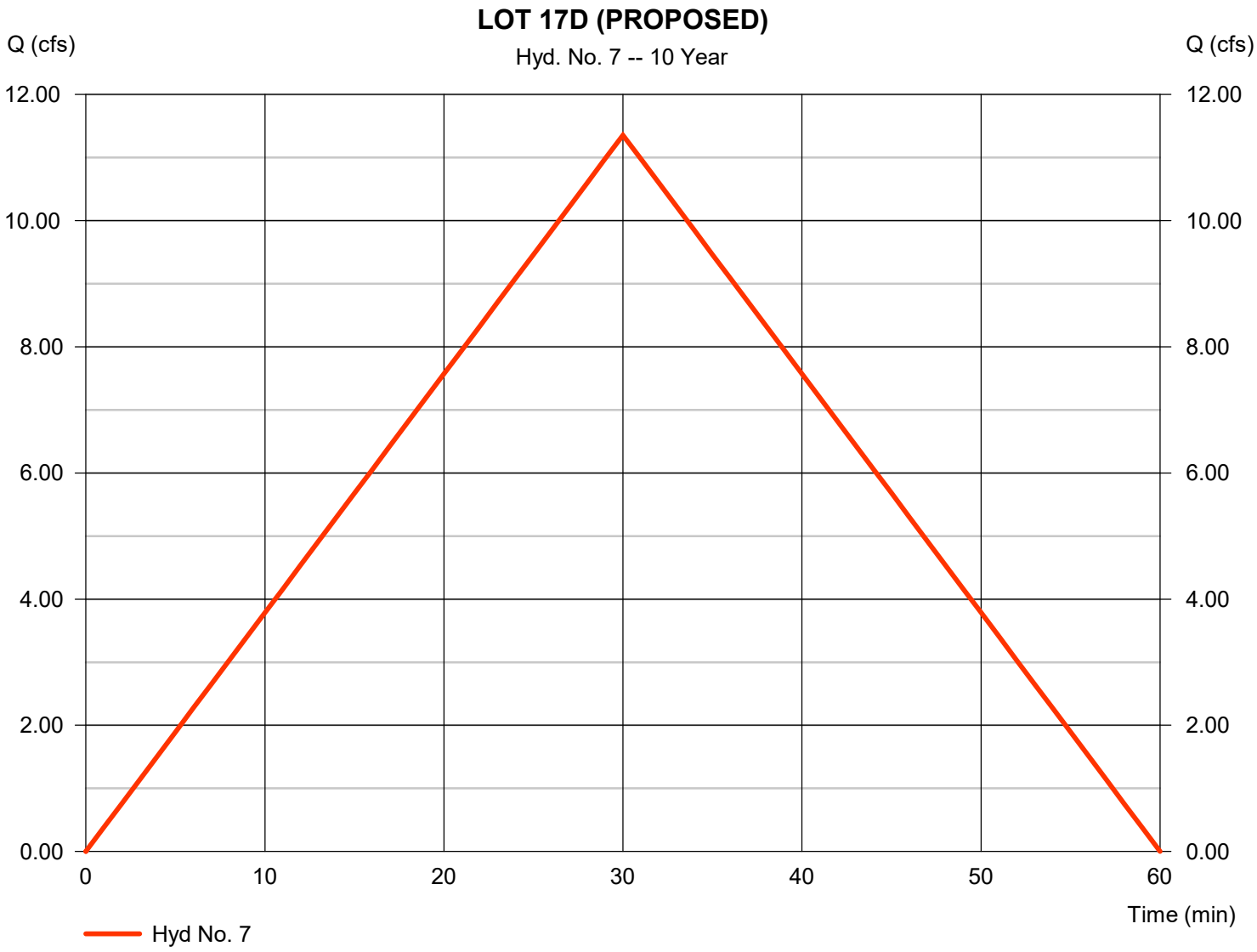
Hydrograph Report

Hyd. No. 7

LOT 17D (PROPOSED)

Hydrograph type	= Rational	Peak discharge	= 11.36 cfs
Storm frequency	= 10 yrs	Time to peak	= 30 min
Time interval	= 1 min	Hyd. volume	= 20,442 cuft
Drainage area	= 6.000 ac	Runoff coeff.	= 0.56*
Intensity	= 3.380 in/hr	Tc by User	= 30.00 min
IDF Curve	= NAIWA.IDF	Asc/Rec limb fact	= 1/1

* Composite (Area/C) = [(0.110 x 0.95) + (5.690 x 0.55)] / 6.000



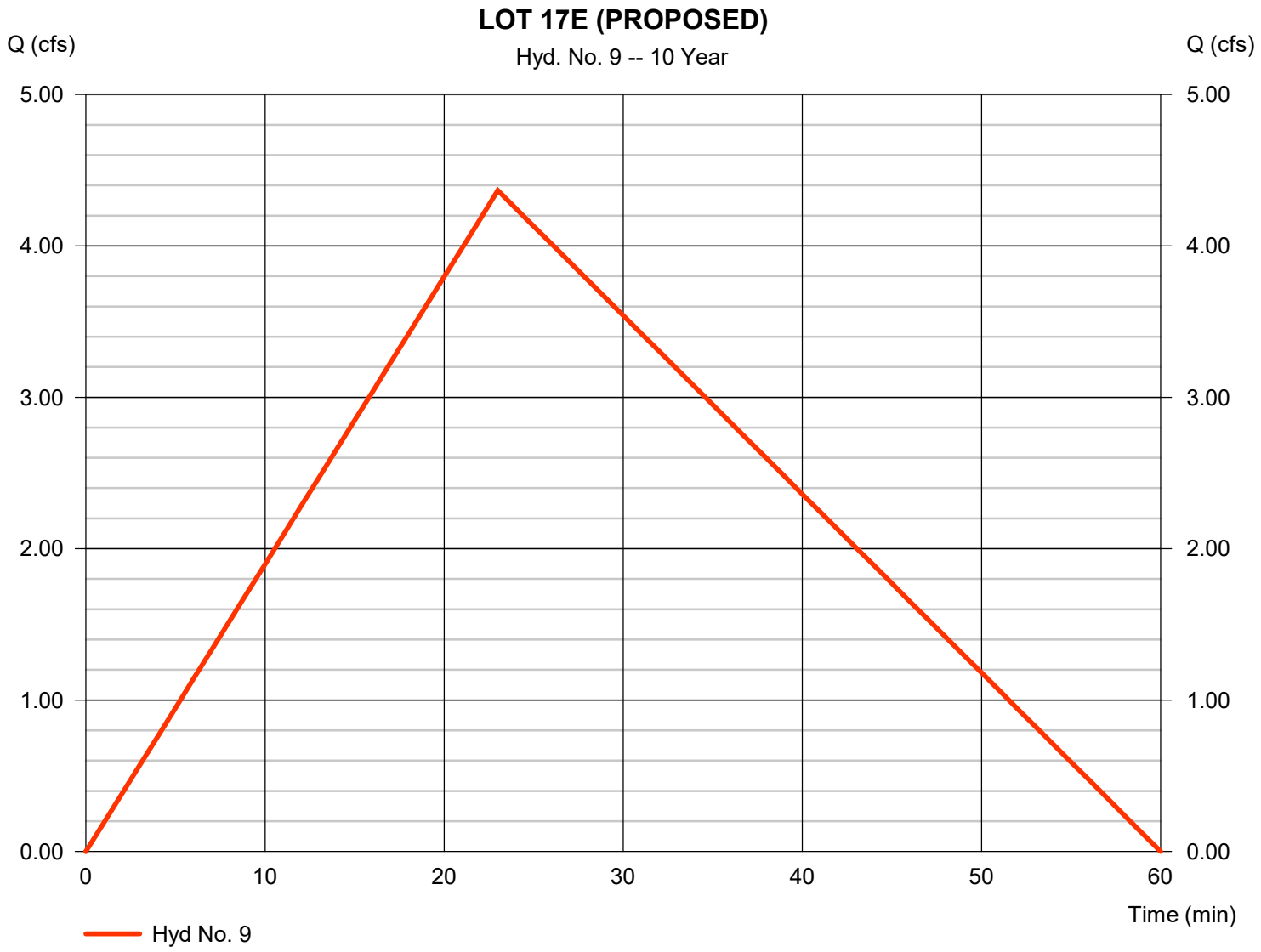
Hydrograph Report

Hyd. No. 9

LOT 17E (PROPOSED)

Hydrograph type	=	Rational	Peak discharge	=	4.366 cfs
Storm frequency	=	10 yrs	Time to peak	=	23 min
Time interval	=	1 min	Hyd. volume	=	7,923 cuft
Drainage area	=	1.950 ac	Runoff coeff.	=	0.57*
Intensity	=	3.928 in/hr	Tc by User	=	23.00 min
IDF Curve	=	NAIWA.IDF	Asc/Rec limb fact	=	1/1.63

* Composite (Area/C) = [(0.110 x 0.95) + (1.890 x 0.55)] / 1.950



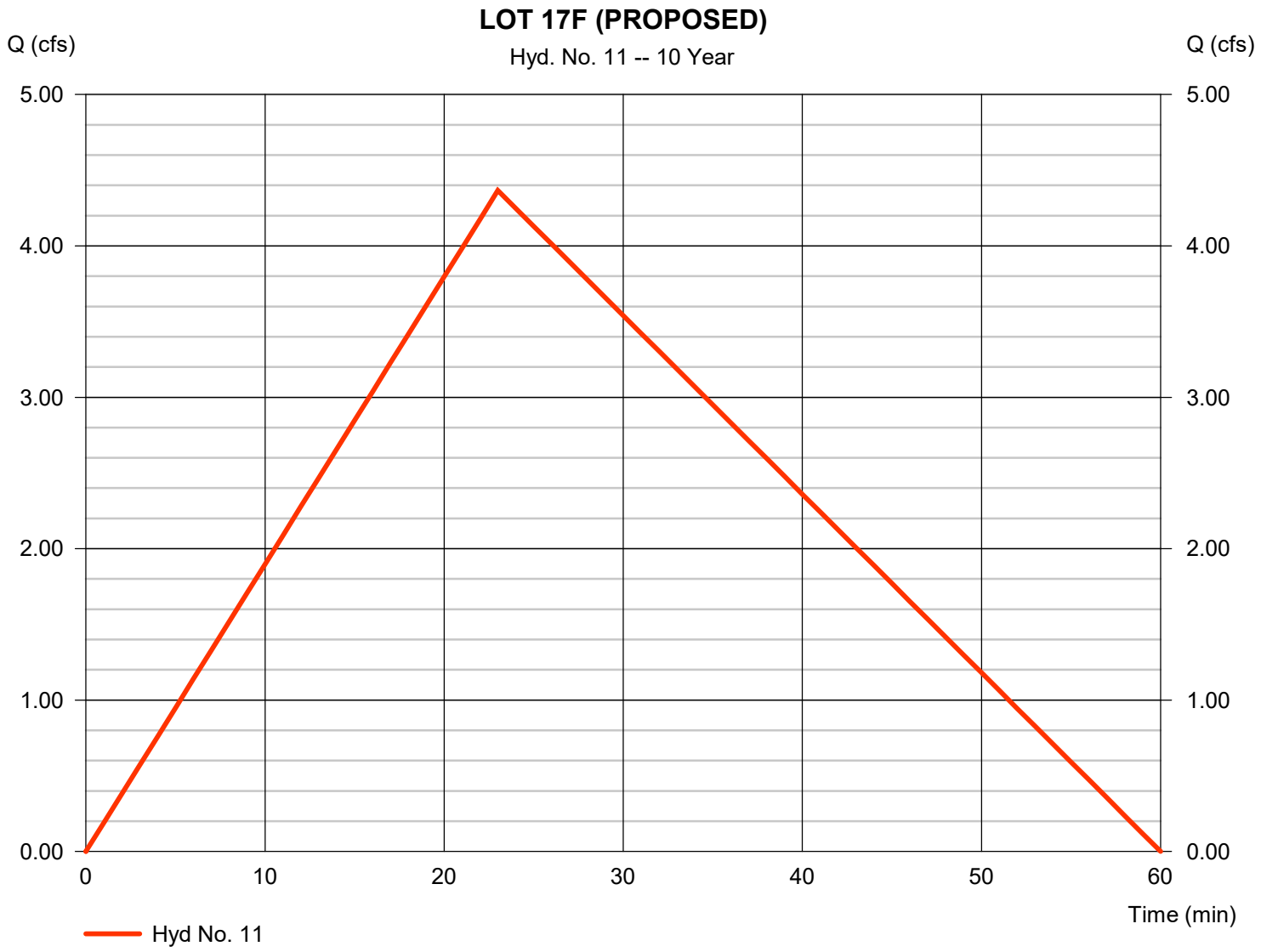
Hydrograph Report

Hyd. No. 11

LOT 17F (PROPOSED)

Hydrograph type	= Rational	Peak discharge	= 4.366 cfs
Storm frequency	= 10 yrs	Time to peak	= 23 min
Time interval	= 1 min	Hyd. volume	= 7,923 cuft
Drainage area	= 1.950 ac	Runoff coeff.	= 0.57*
Intensity	= 3.928 in/hr	Tc by User	= 23.00 min
IDF Curve	= NAIWA.IDF	Asc/Rec limb fact	= 1/1.63

* Composite (Area/C) = [(0.110 x 0.95) + (1.890 x 0.55)] / 1.950



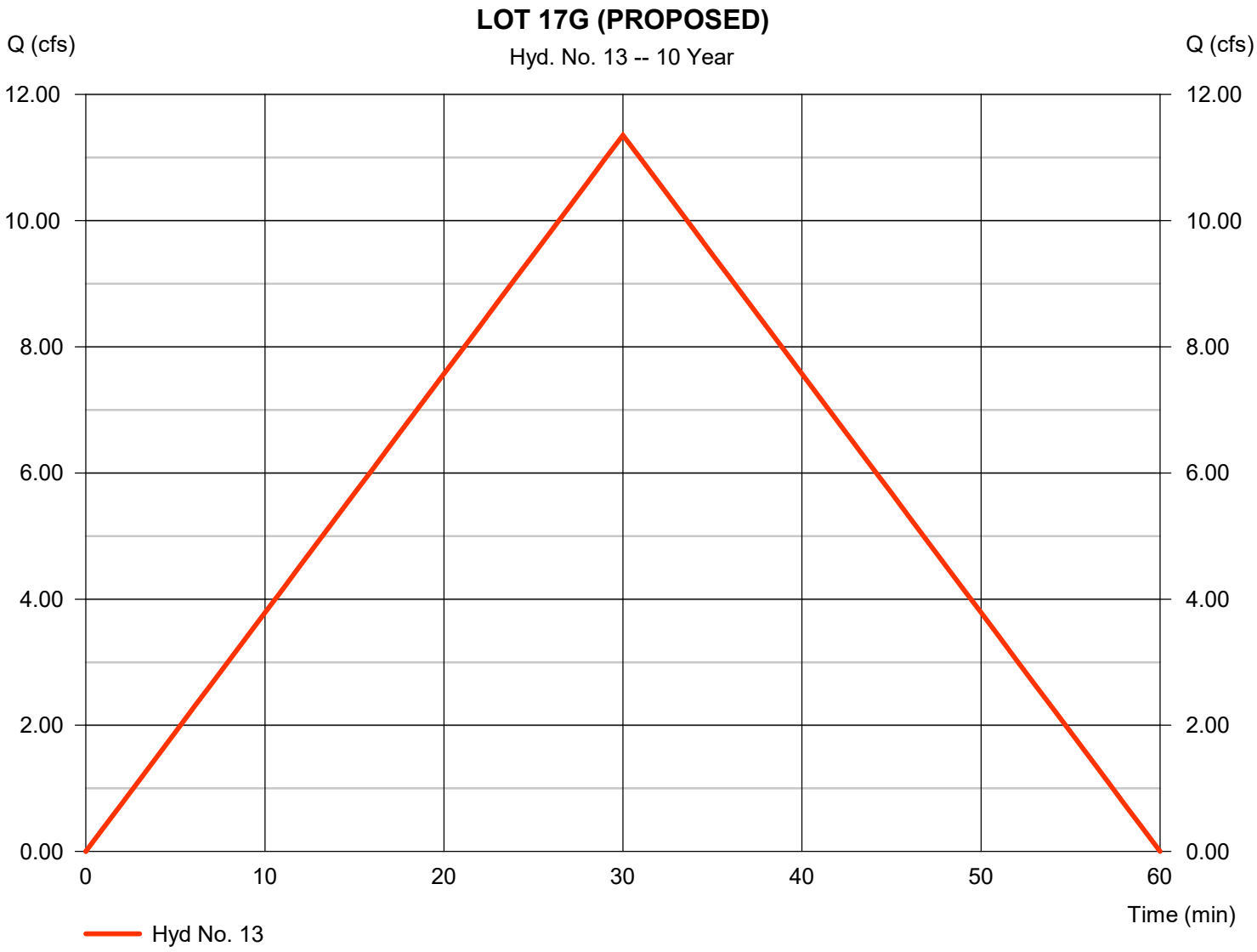
Hydrograph Report

Hyd. No. 13

LOT 17G (PROPOSED)

Hydrograph type	= Rational	Peak discharge	= 11.36 cfs
Storm frequency	= 10 yrs	Time to peak	= 30 min
Time interval	= 1 min	Hyd. volume	= 20,442 cuft
Drainage area	= 6.000 ac	Runoff coeff.	= 0.56*
Intensity	= 3.380 in/hr	Tc by User	= 30.00 min
IDF Curve	= NAIWA.IDF	Asc/Rec limb fact	= 1/1

* Composite (Area/C) = [(0.110 x 0.95) + (5.690 x 0.55)] / 6.000



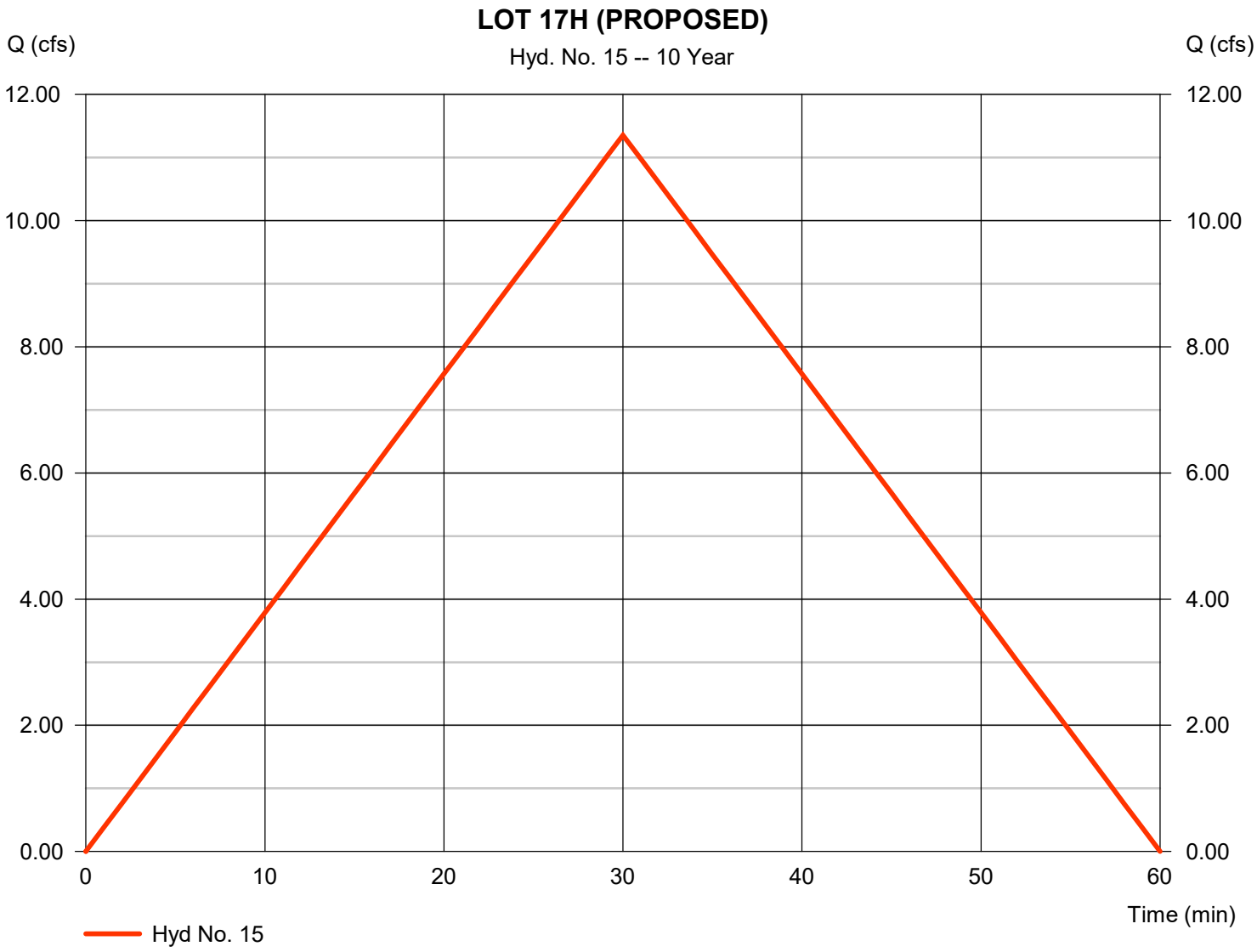
Hydrograph Report

Hyd. No. 15

LOT 17H (PROPOSED)

Hydrograph type	= Rational	Peak discharge	= 11.36 cfs
Storm frequency	= 10 yrs	Time to peak	= 30 min
Time interval	= 1 min	Hyd. volume	= 20,442 cuft
Drainage area	= 6.000 ac	Runoff coeff.	= 0.56*
Intensity	= 3.380 in/hr	Tc by User	= 30.00 min
IDF Curve	= NAIWA.IDF	Asc/Rec limb fact	= 1/1

* Composite (Area/C) = [(0.110 x 0.95) + (5.690 x 0.55)] / 6.000



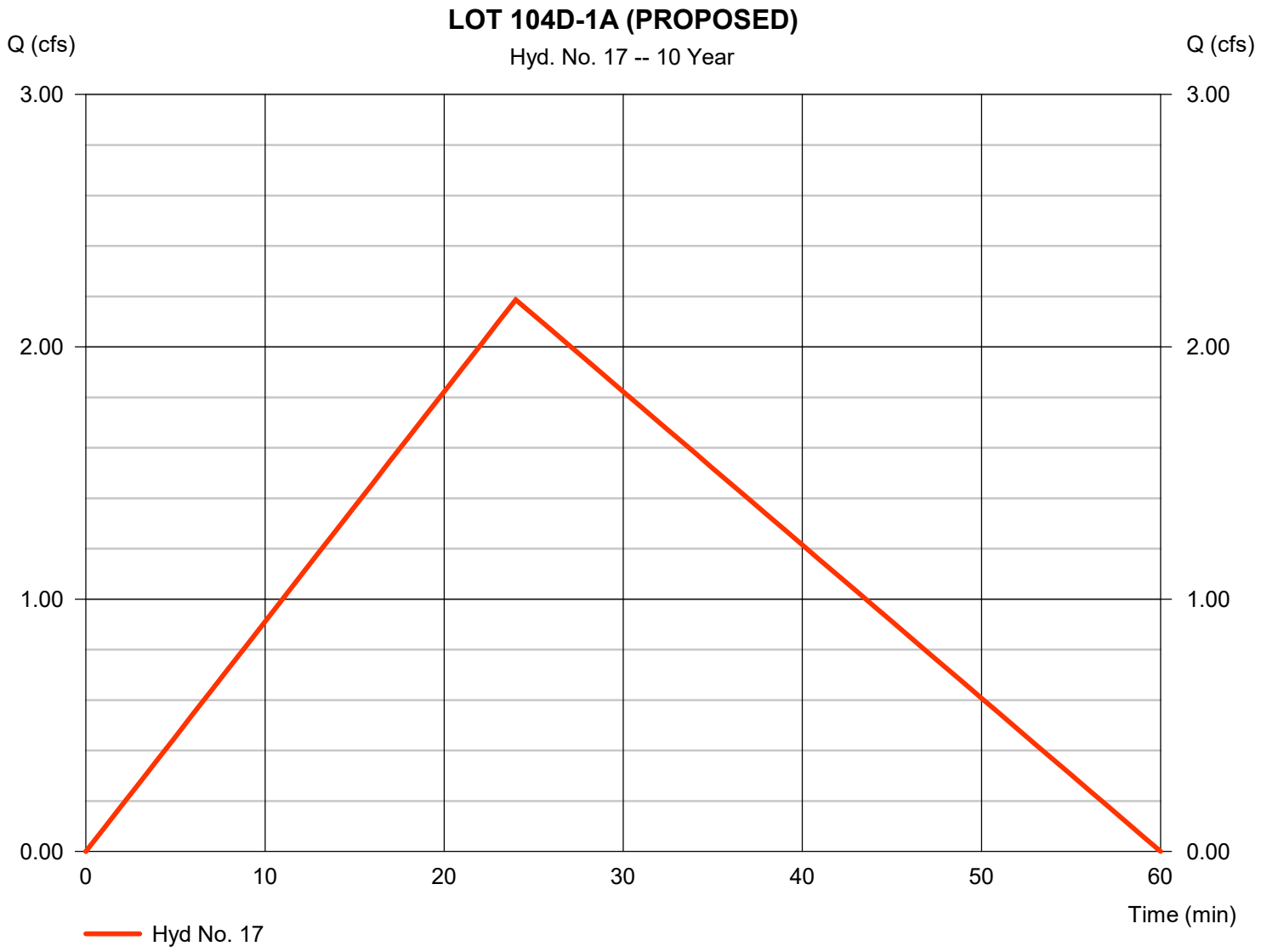
Hydrograph Report

Hyd. No. 17

LOT 104D-1A (PROPOSED)

Hydrograph type	=	Rational	Peak discharge	=	2.187 cfs
Storm frequency	=	10 yrs	Time to peak	=	24 min
Time interval	=	1 min	Hyd. volume	=	3,936 cuft
Drainage area	=	1.000 ac	Runoff coeff.	=	0.57*
Intensity	=	3.837 in/hr	Tc by User	=	24.00 min
IDF Curve	=	NAIWA.IDF	Asc/Rec limb fact	=	1/1.5

* Composite (Area/C) = [(0.110 x 0.95) + (2.090 x 0.55)] / 1.000



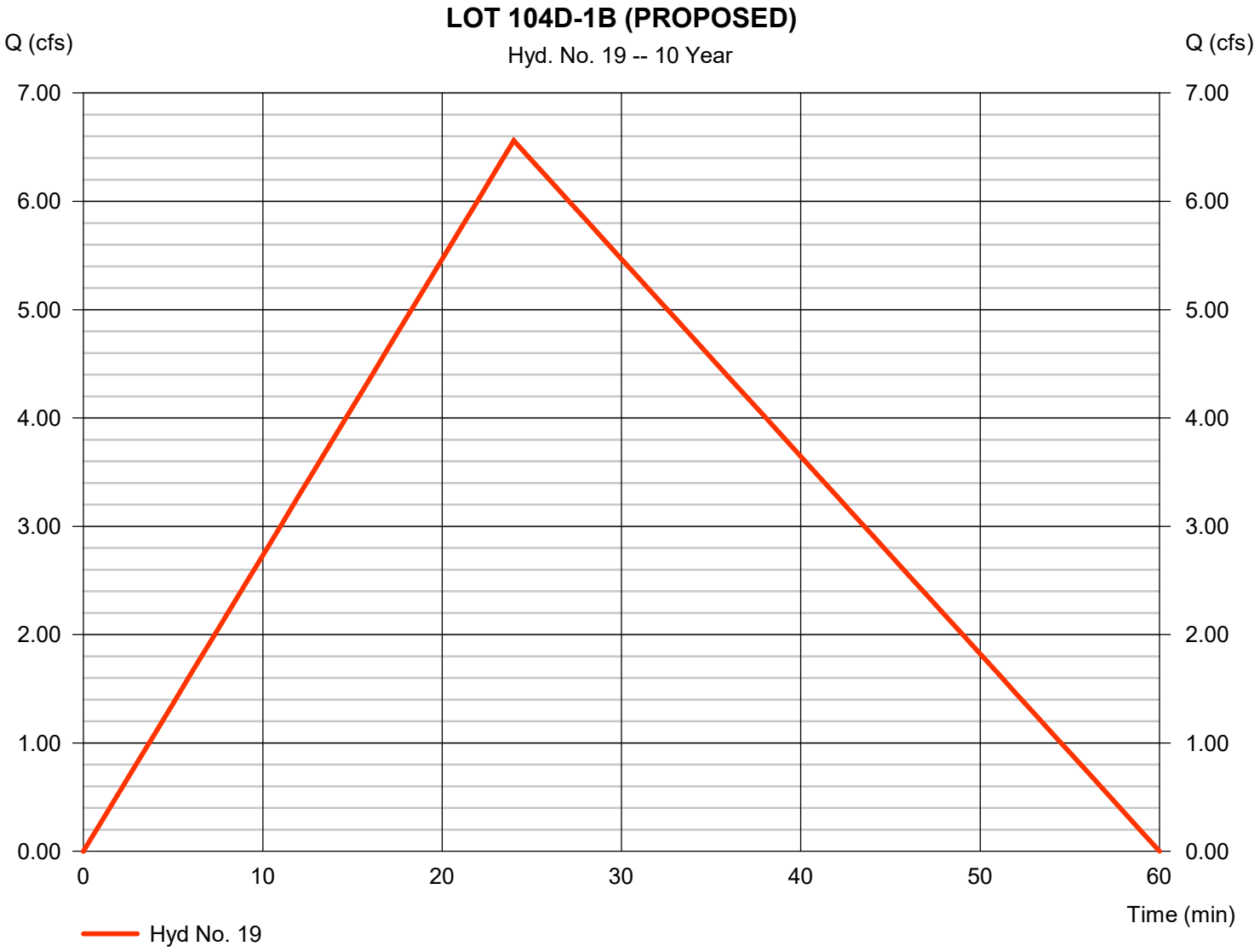
Hydrograph Report

Hyd. No. 19

LOT 104D-1B (PROPOSED)

Hydrograph type	=	Rational	Peak discharge	=	6.560 cfs
Storm frequency	=	10 yrs	Time to peak	=	24 min
Time interval	=	1 min	Hyd. volume	=	11,809 cuft
Drainage area	=	3.000 ac	Runoff coeff.	=	0.57*
Intensity	=	3.837 in/hr	Tc by User	=	24.00 min
IDF Curve	=	NAIWA.IDF	Asc/Rec limb fact	=	1/1.5

* Composite (Area/C) = [(0.110 x 0.95) + (2.390 x 0.55)] / 3.000



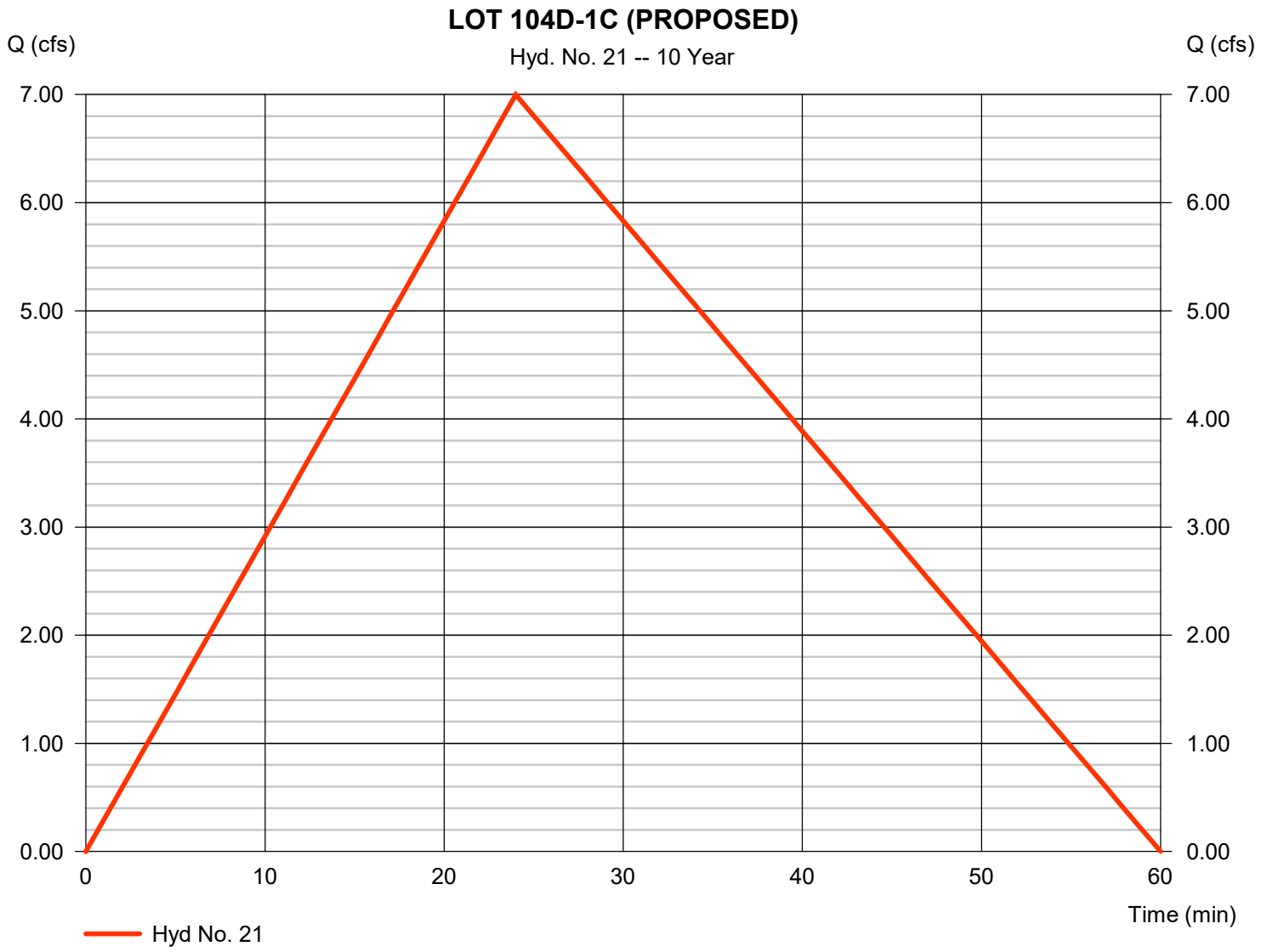
Hydrograph Report

Hyd. No. 21

LOT 104D-1C (PROPOSED)

Hydrograph type	=	Rational	Peak discharge	=	6.998 cfs
Storm frequency	=	10 yrs	Time to peak	=	24 min
Time interval	=	1 min	Hyd. volume	=	12,596 cuft
Drainage area	=	3.200 ac	Runoff coeff.	=	0.57*
Intensity	=	3.837 in/hr	Tc by User	=	24.00 min
IDF Curve	=	NAIWA.IDF	Asc/Rec limb fact	=	1/1.5

* Composite (Area/C) = [(0.110 x 0.95) + (2.390 x 0.55)] / 3.200



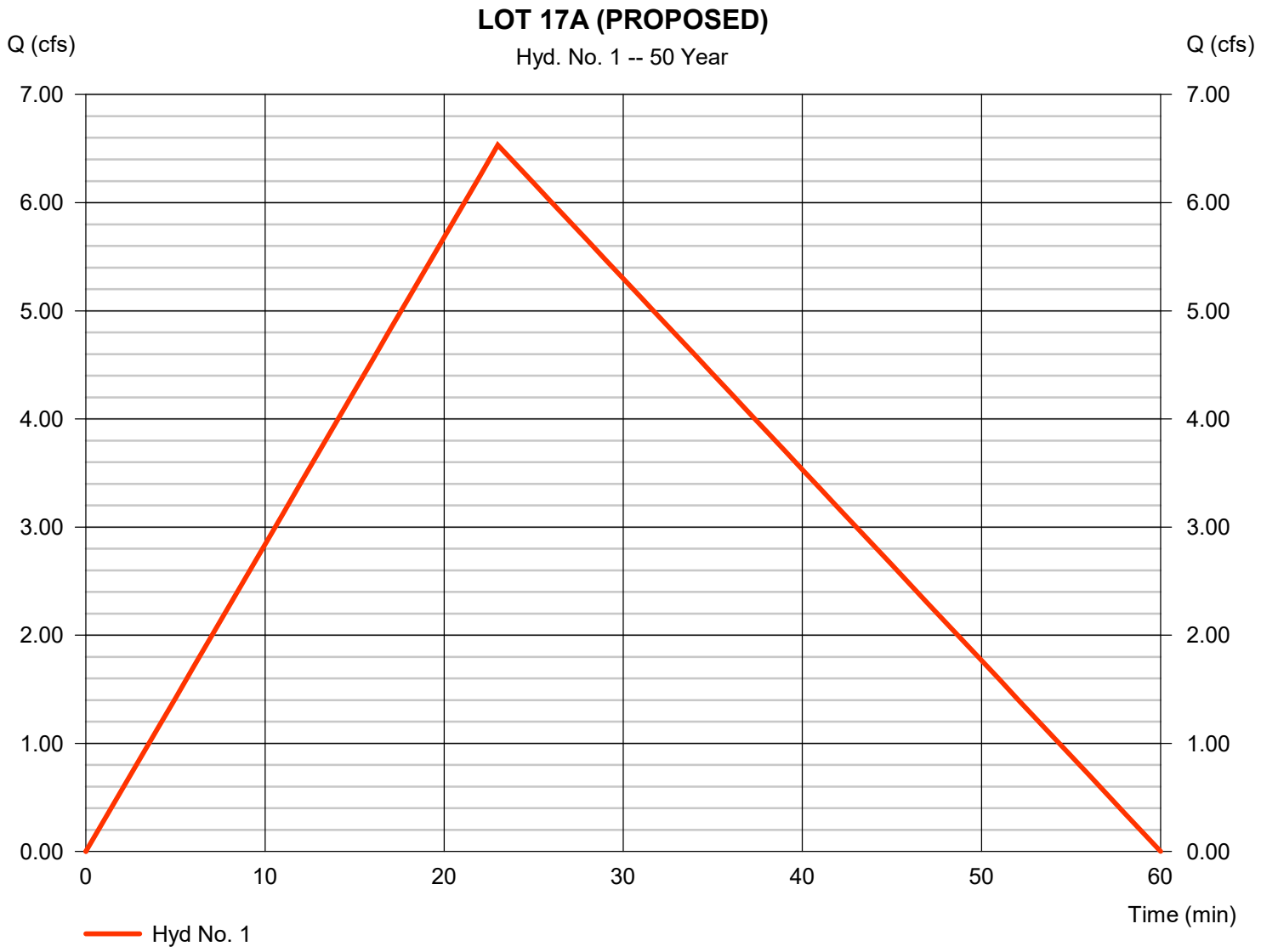
Hydrograph Report

Hyd. No. 1

LOT 17A (PROPOSED)

Hydrograph type	=	Rational	Peak discharge	=	6.534 cfs
Storm frequency	=	50 yrs	Time to peak	=	23 min
Time interval	=	1 min	Hyd. volume	=	11,856 cuft
Drainage area	=	1.950 ac	Runoff coeff.	=	0.57*
Intensity	=	5.878 in/hr	Tc by User	=	23.00 min
IDF Curve	=	NAIWA.IDF	Asc/Rec limb fact	=	1/1.63

* Composite (Area/C) = [(0.110 x 0.95) + (1.890 x 0.55)] / 1.950



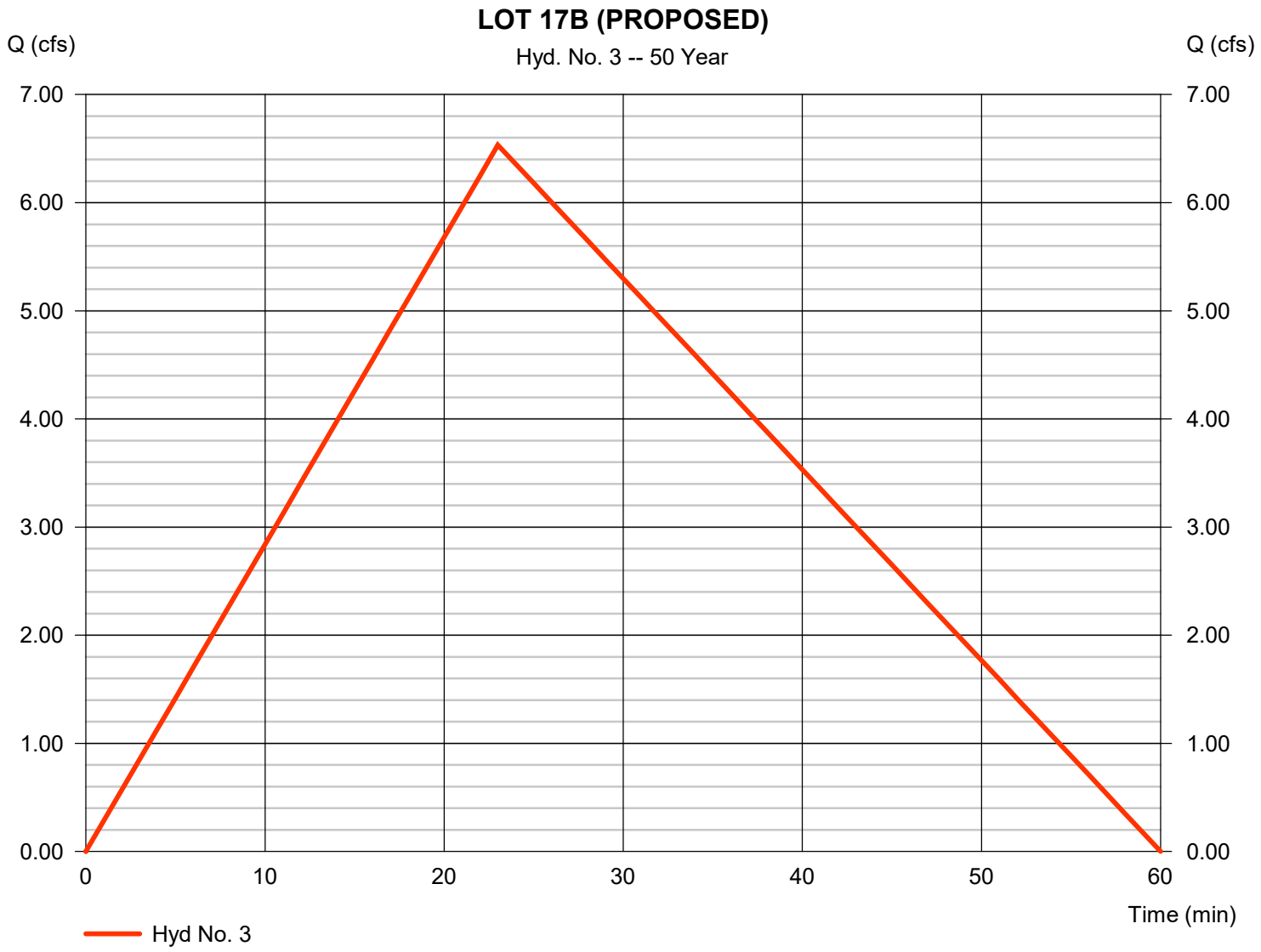
Hydrograph Report

Hyd. No. 3

LOT 17B (PROPOSED)

Hydrograph type	=	Rational	Peak discharge	=	6.534 cfs
Storm frequency	=	50 yrs	Time to peak	=	23 min
Time interval	=	1 min	Hyd. volume	=	11,856 cuft
Drainage area	=	1.950 ac	Runoff coeff.	=	0.57*
Intensity	=	5.878 in/hr	Tc by User	=	23.00 min
IDF Curve	=	NAIWA.IDF	Asc/Rec limb fact	=	1/1.63

* Composite (Area/C) = [(0.110 x 0.95) + (1.890 x 0.55)] / 1.950



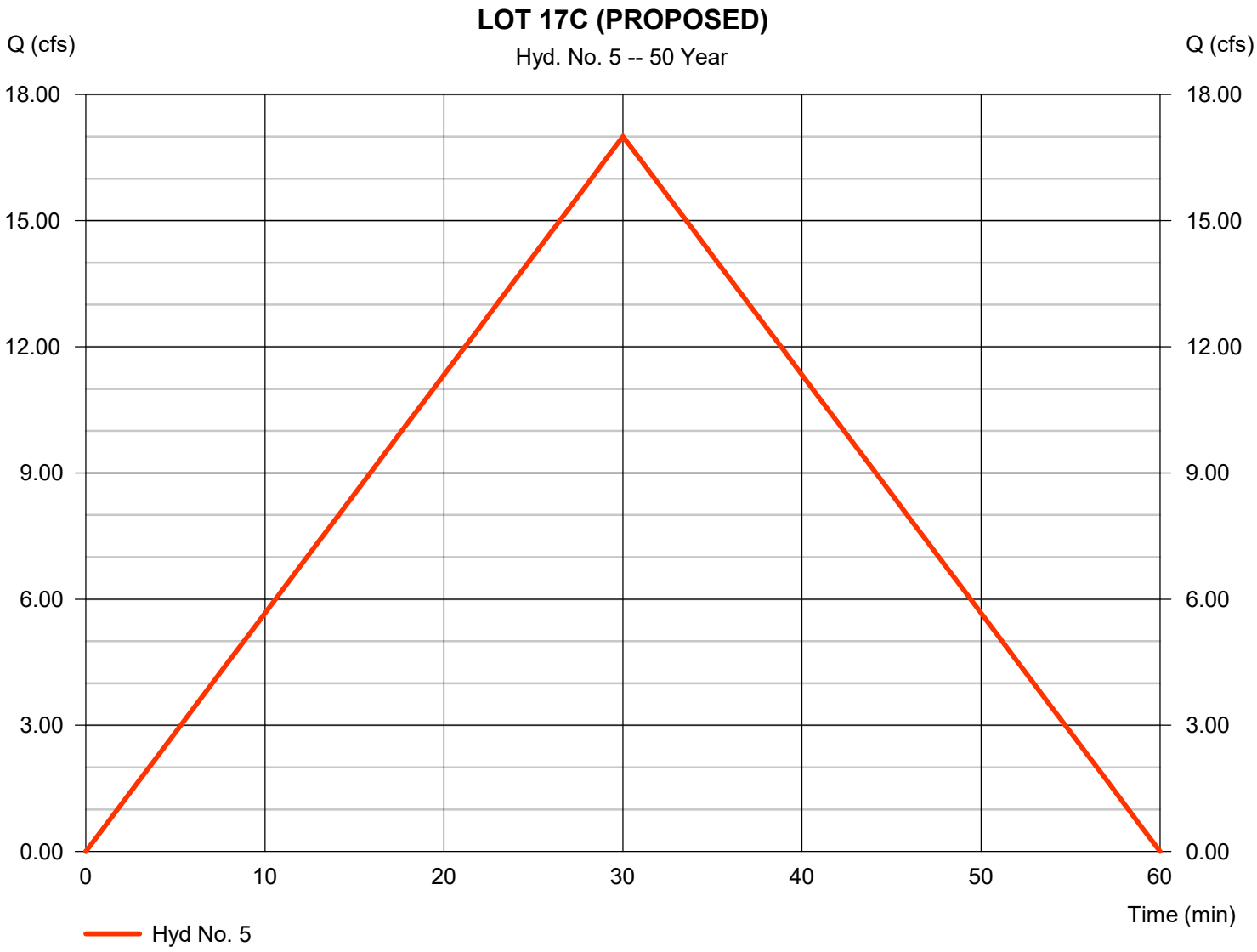
Hydrograph Report

Hyd. No. 5

LOT 17C (PROPOSED)

Hydrograph type	= Rational	Peak discharge	= 17.00 cfs
Storm frequency	= 50 yrs	Time to peak	= 30 min
Time interval	= 1 min	Hyd. volume	= 30,603 cuft
Drainage area	= 6.000 ac	Runoff coeff.	= 0.56*
Intensity	= 5.060 in/hr	Tc by User	= 30.00 min
IDF Curve	= NAIWA.IDF	Asc/Rec limb fact	= 1/1

* Composite (Area/C) = [(0.110 x 0.95) + (5.690 x 0.55)] / 6.000



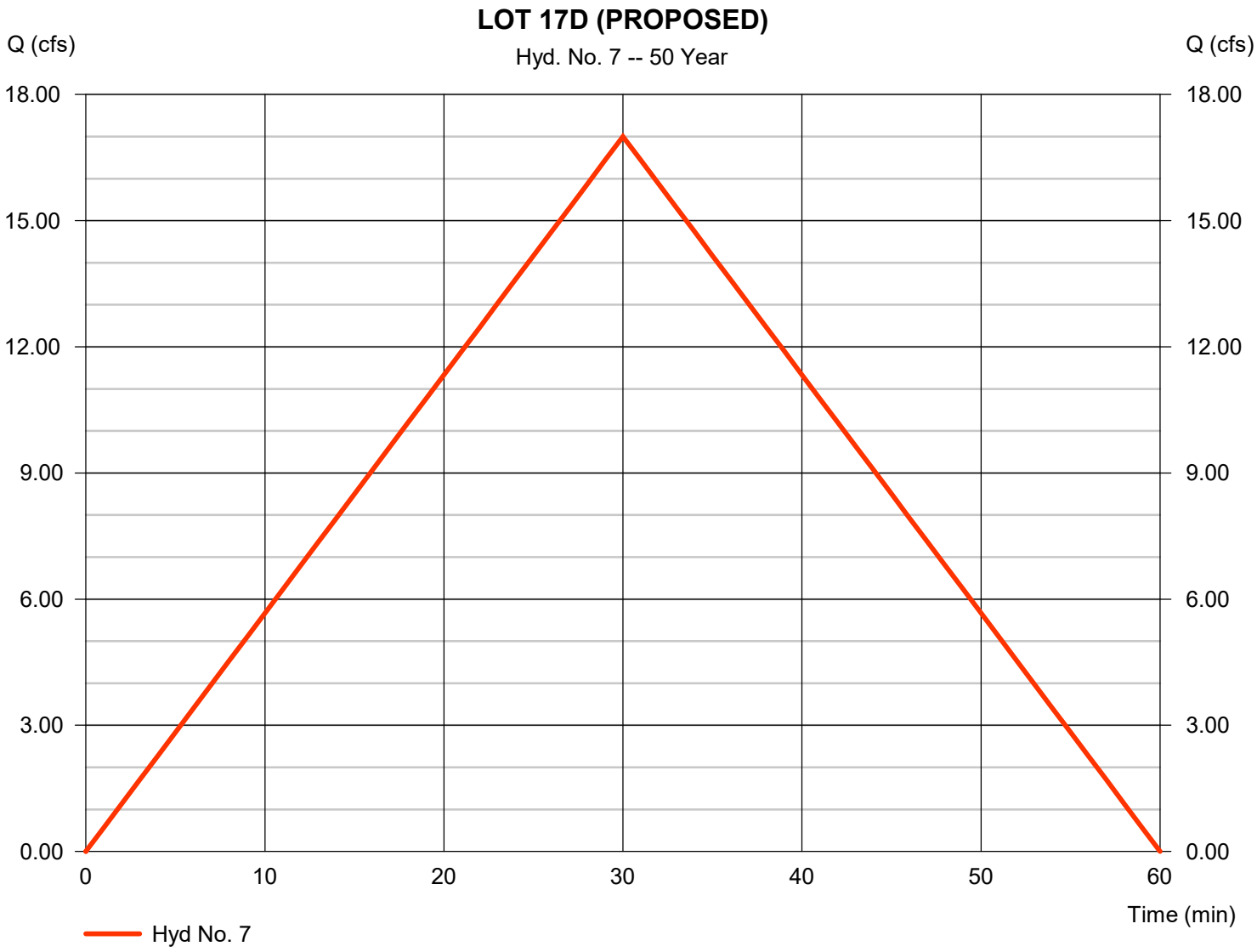
Hydrograph Report

Hyd. No. 7

LOT 17D (PROPOSED)

Hydrograph type	=	Rational	Peak discharge	=	17.00 cfs
Storm frequency	=	50 yrs	Time to peak	=	30 min
Time interval	=	1 min	Hyd. volume	=	30,603 cuft
Drainage area	=	6.000 ac	Runoff coeff.	=	0.56*
Intensity	=	5.060 in/hr	Tc by User	=	30.00 min
IDF Curve	=	NAIWA.IDF	Asc/Rec limb fact	=	1/1

* Composite (Area/C) = [(0.110 x 0.95) + (5.690 x 0.55)] / 6.000



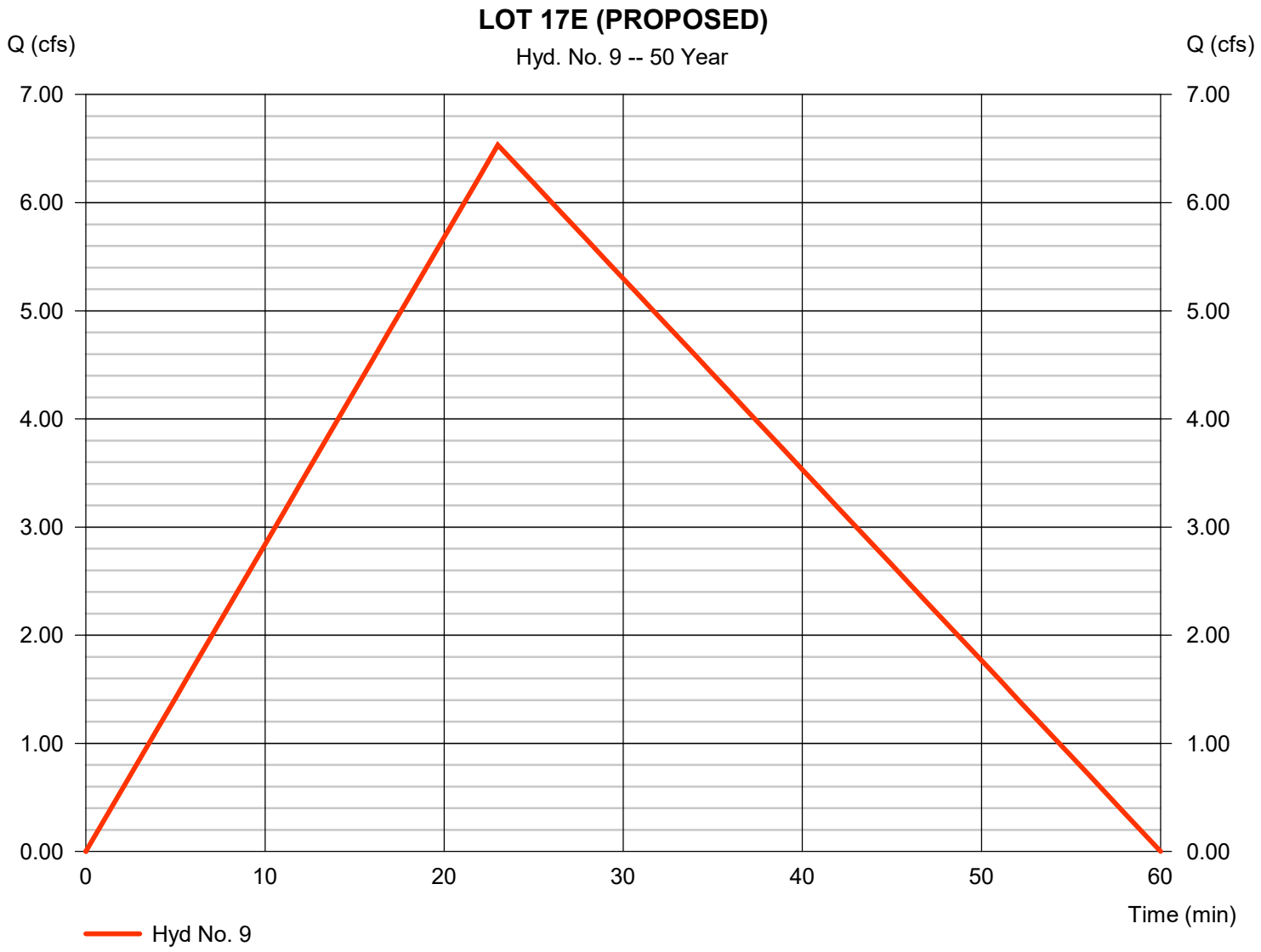
Hydrograph Report

Hyd. No. 9

LOT 17E (PROPOSED)

Hydrograph type	=	Rational	Peak discharge	=	6.534 cfs
Storm frequency	=	50 yrs	Time to peak	=	23 min
Time interval	=	1 min	Hyd. volume	=	11,856 cuft
Drainage area	=	1.950 ac	Runoff coeff.	=	0.57*
Intensity	=	5.878 in/hr	Tc by User	=	23.00 min
IDF Curve	=	NAIWA.IDF	Asc/Rec limb fact	=	1/1.63

* Composite (Area/C) = [(0.110 x 0.95) + (1.890 x 0.55)] / 1.950



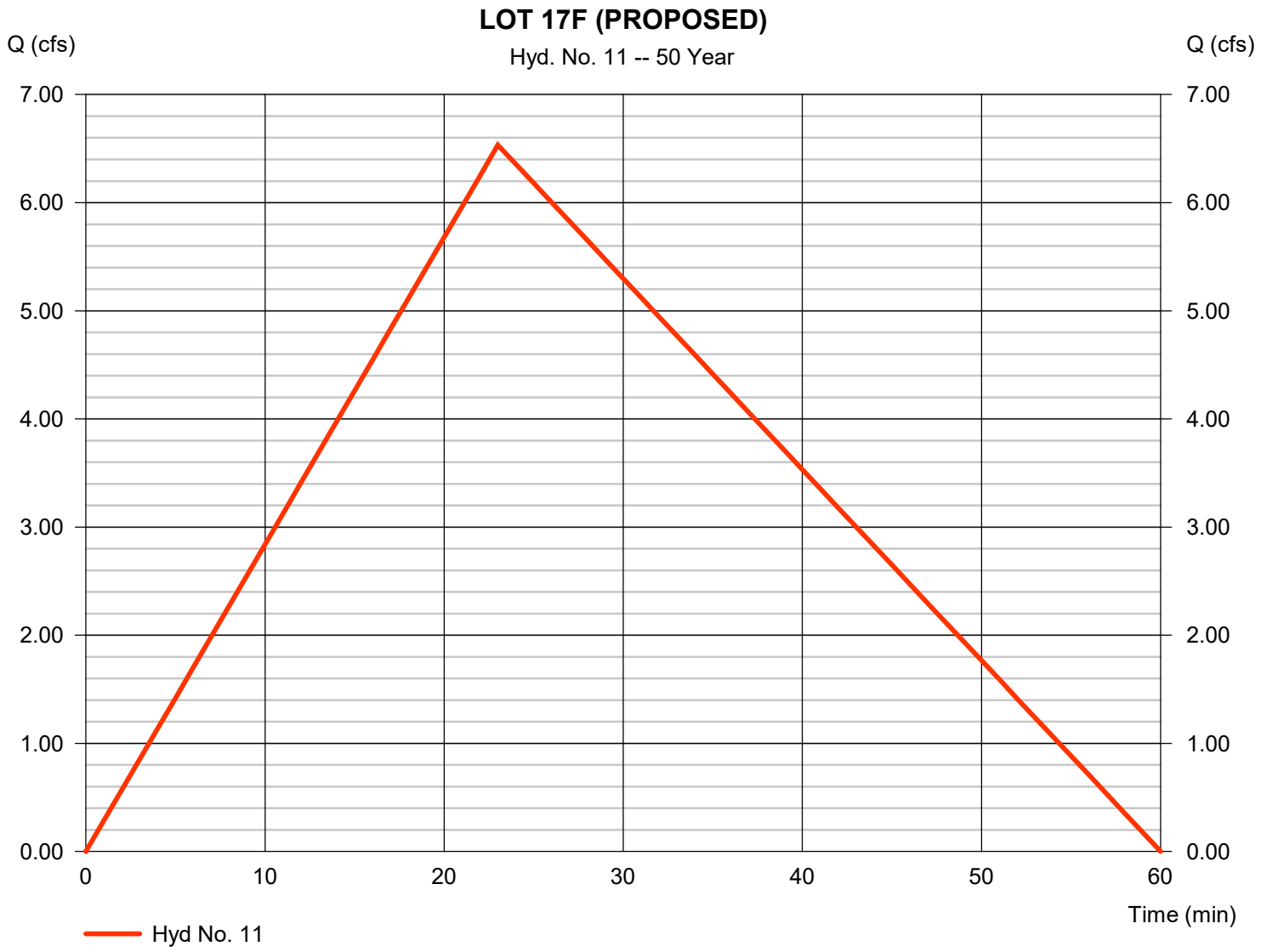
Hydrograph Report

Hyd. No. 11

LOT 17F (PROPOSED)

Hydrograph type	=	Rational	Peak discharge	=	6.534 cfs
Storm frequency	=	50 yrs	Time to peak	=	23 min
Time interval	=	1 min	Hyd. volume	=	11,856 cuft
Drainage area	=	1.950 ac	Runoff coeff.	=	0.57*
Intensity	=	5.878 in/hr	Tc by User	=	23.00 min
IDF Curve	=	NAIWA.IDF	Asc/Rec limb fact	=	1/1.63

* Composite (Area/C) = [(0.110 x 0.95) + (1.890 x 0.55)] / 1.950



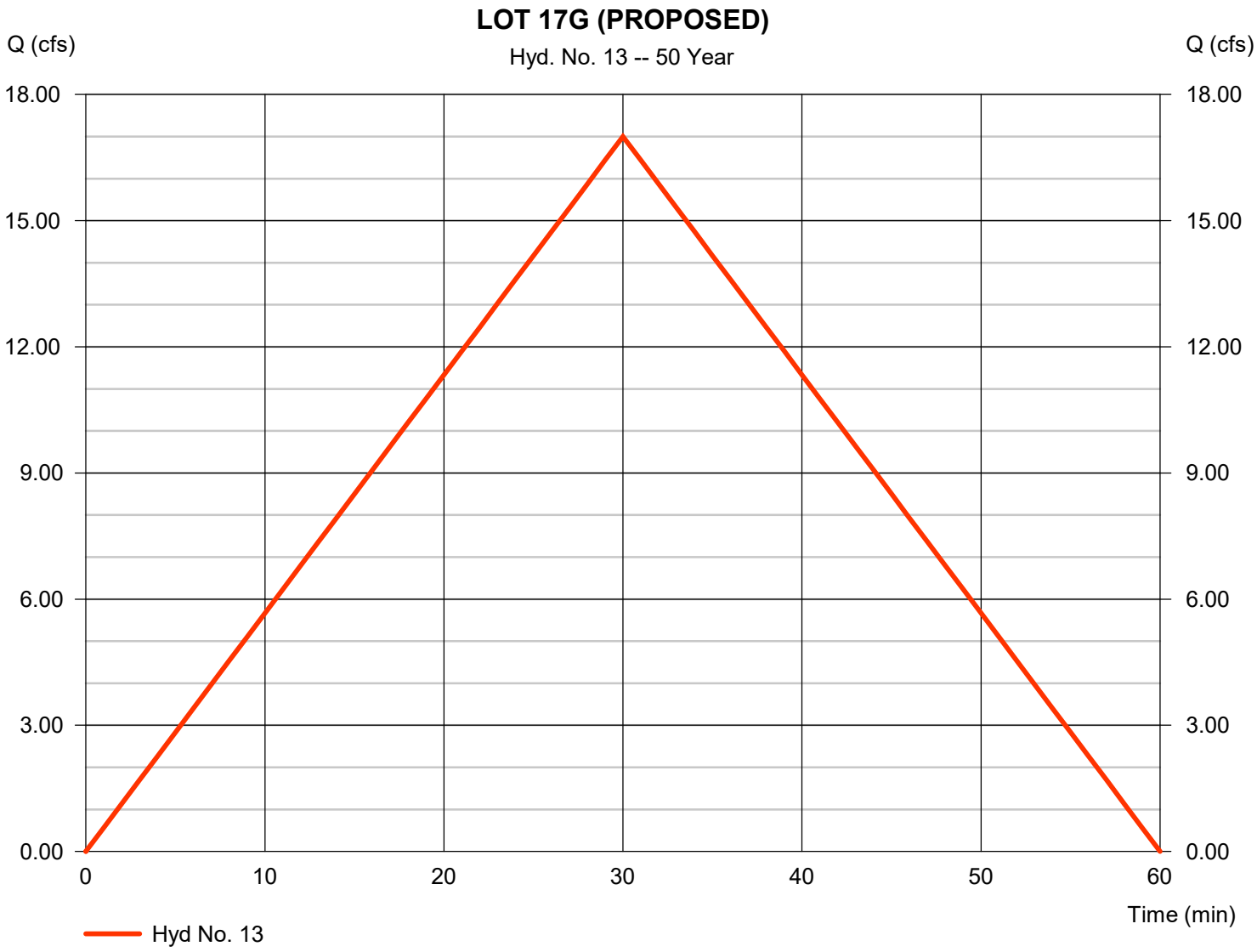
Hydrograph Report

Hyd. No. 13

LOT 17G (PROPOSED)

Hydrograph type	=	Rational	Peak discharge	=	17.00 cfs
Storm frequency	=	50 yrs	Time to peak	=	30 min
Time interval	=	1 min	Hyd. volume	=	30,603 cuft
Drainage area	=	6.000 ac	Runoff coeff.	=	0.56*
Intensity	=	5.060 in/hr	Tc by User	=	30.00 min
IDF Curve	=	NAIWA.IDF	Asc/Rec limb fact	=	1/1

* Composite (Area/C) = [(0.110 x 0.95) + (5.690 x 0.55)] / 6.000



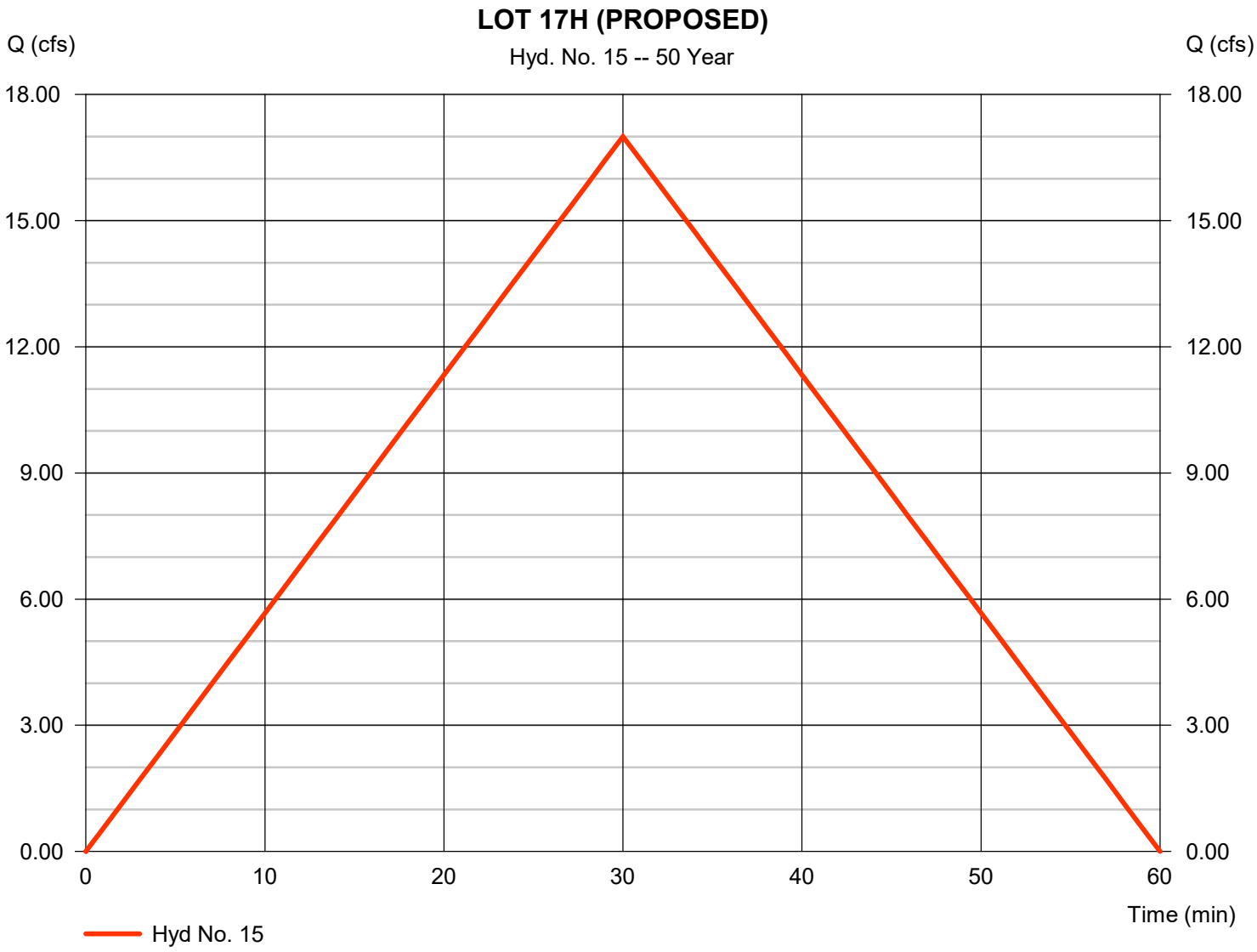
Hydrograph Report

Hyd. No. 15

LOT 17H (PROPOSED)

Hydrograph type	=	Rational	Peak discharge	=	17.00 cfs
Storm frequency	=	50 yrs	Time to peak	=	30 min
Time interval	=	1 min	Hyd. volume	=	30,603 cuft
Drainage area	=	6.000 ac	Runoff coeff.	=	0.56*
Intensity	=	5.060 in/hr	Tc by User	=	30.00 min
IDF Curve	=	NAIWA.IDF	Asc/Rec limb fact	=	1/1

* Composite (Area/C) = [(0.110 x 0.95) + (5.690 x 0.55)] / 6.000



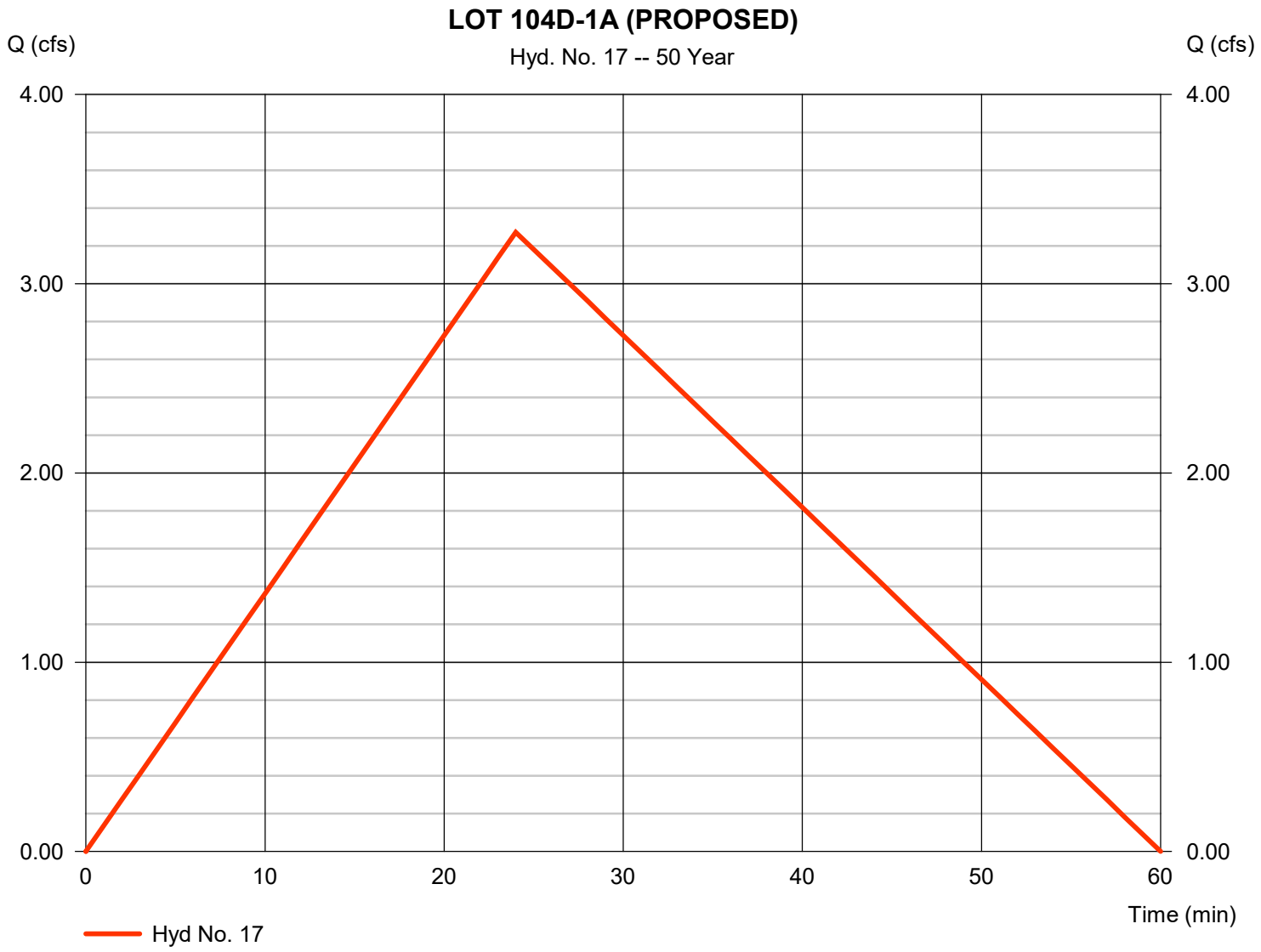
Hydrograph Report

Hyd. No. 17

LOT 104D-1A (PROPOSED)

Hydrograph type	=	Rational	Peak discharge	=	3.273 cfs
Storm frequency	=	50 yrs	Time to peak	=	24 min
Time interval	=	1 min	Hyd. volume	=	5,891 cuft
Drainage area	=	1.000 ac	Runoff coeff.	=	0.57*
Intensity	=	5.741 in/hr	Tc by User	=	24.00 min
IDF Curve	=	NAIWA.IDF	Asc/Rec limb fact	=	1/1.5

* Composite (Area/C) = [(0.110 x 0.95) + (2.090 x 0.55)] / 1.000



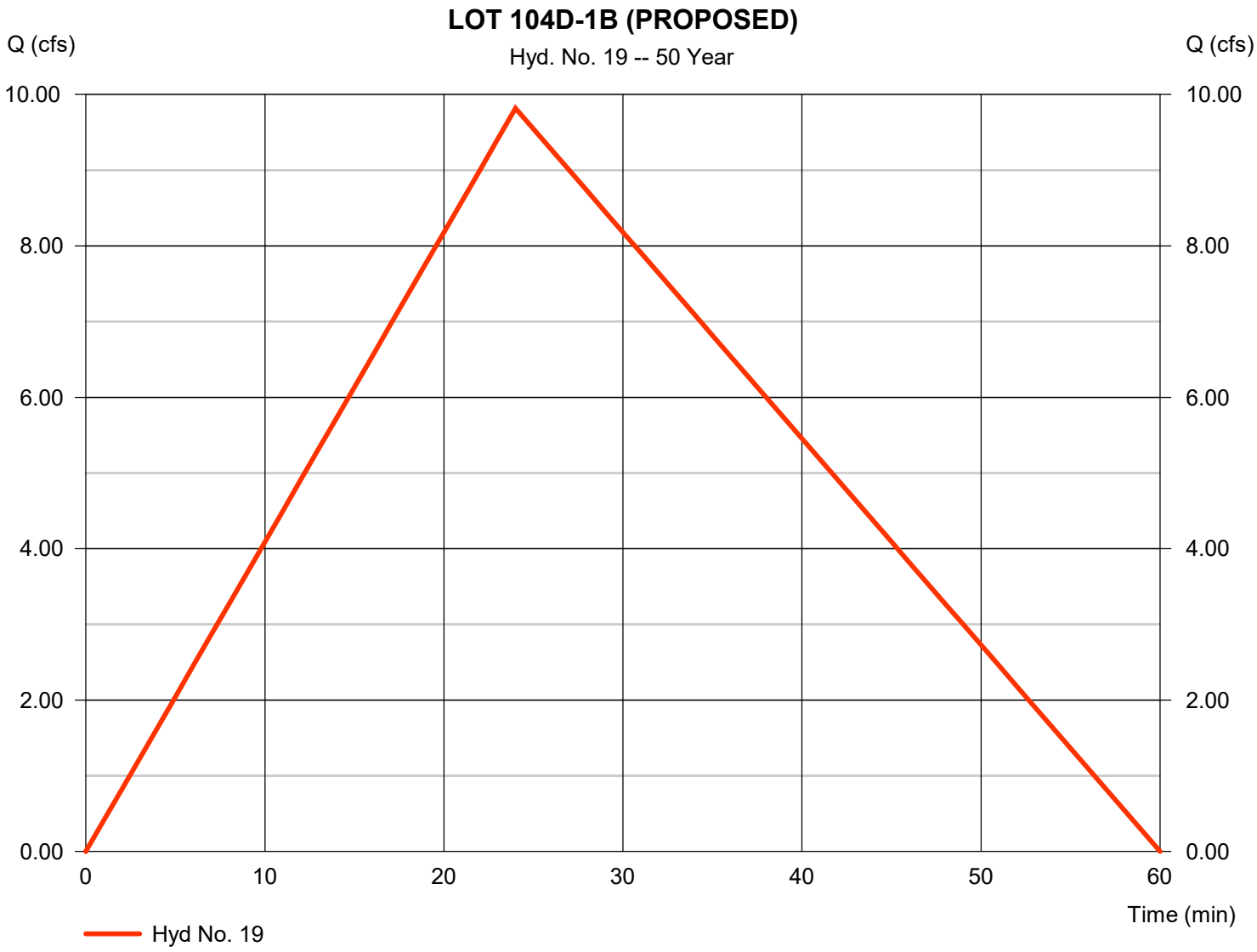
Hydrograph Report

Hyd. No. 19

LOT 104D-1B (PROPOSED)

Hydrograph type	= Rational	Peak discharge	= 9.818 cfs
Storm frequency	= 50 yrs	Time to peak	= 24 min
Time interval	= 1 min	Hyd. volume	= 17,672 cuft
Drainage area	= 3.000 ac	Runoff coeff.	= 0.57*
Intensity	= 5.741 in/hr	Tc by User	= 24.00 min
IDF Curve	= NAIWA.IDF	Asc/Rec limb fact	= 1/1.5

* Composite (Area/C) = [(0.110 x 0.95) + (2.390 x 0.55)] / 3.000



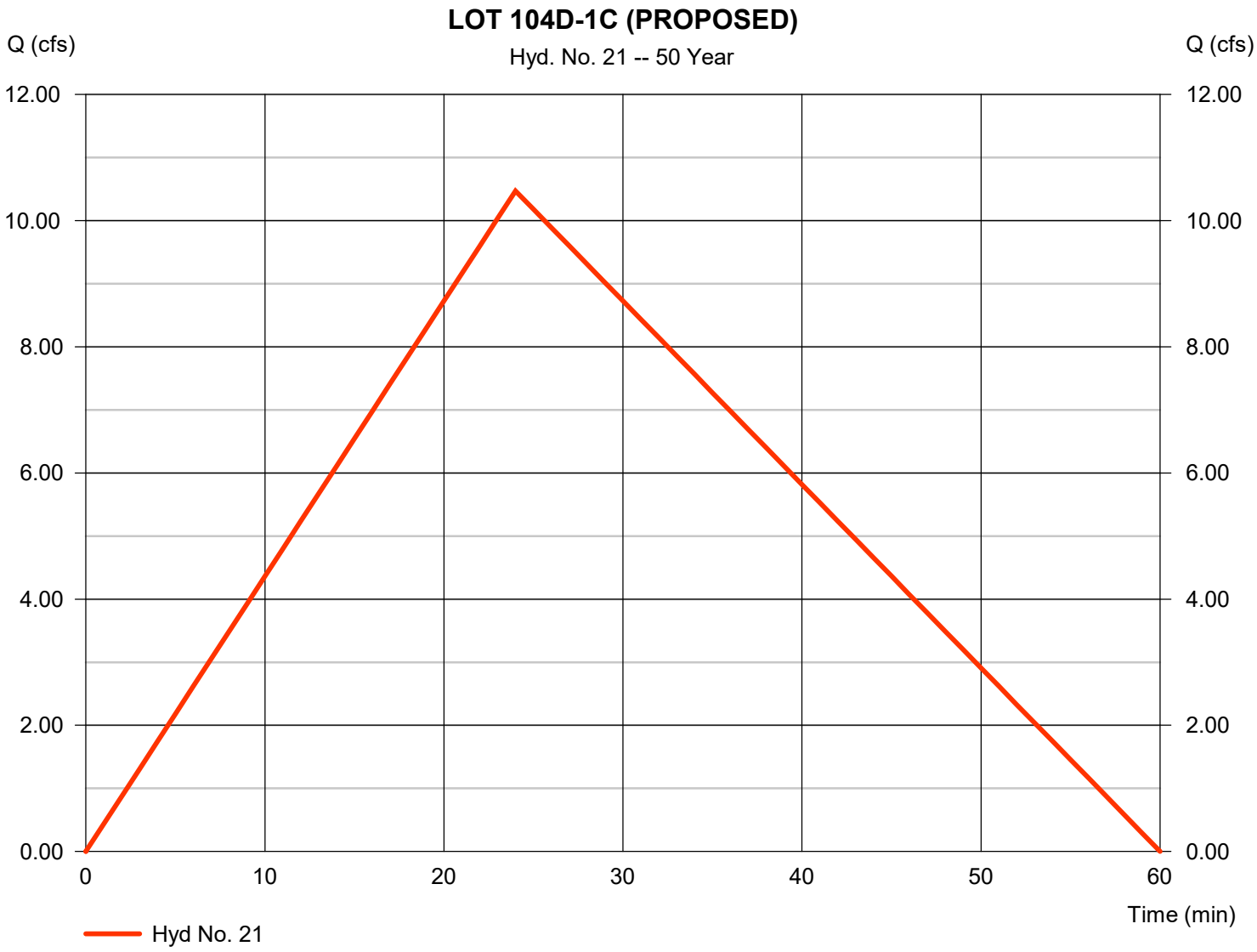
Hydrograph Report

Hyd. No. 21

LOT 104D-1C (PROPOSED)

Hydrograph type	= Rational	Peak discharge	= 10.47 cfs
Storm frequency	= 50 yrs	Time to peak	= 24 min
Time interval	= 1 min	Hyd. volume	= 18,850 cuft
Drainage area	= 3.200 ac	Runoff coeff.	= 0.57*
Intensity	= 5.741 in/hr	Tc by User	= 24.00 min
IDF Curve	= NAIWA.IDF	Asc/Rec limb fact	= 1/1.5

* Composite (Area/C) = [(0.110 x 0.95) + (2.390 x 0.55)] / 3.200



Hydrograph Report

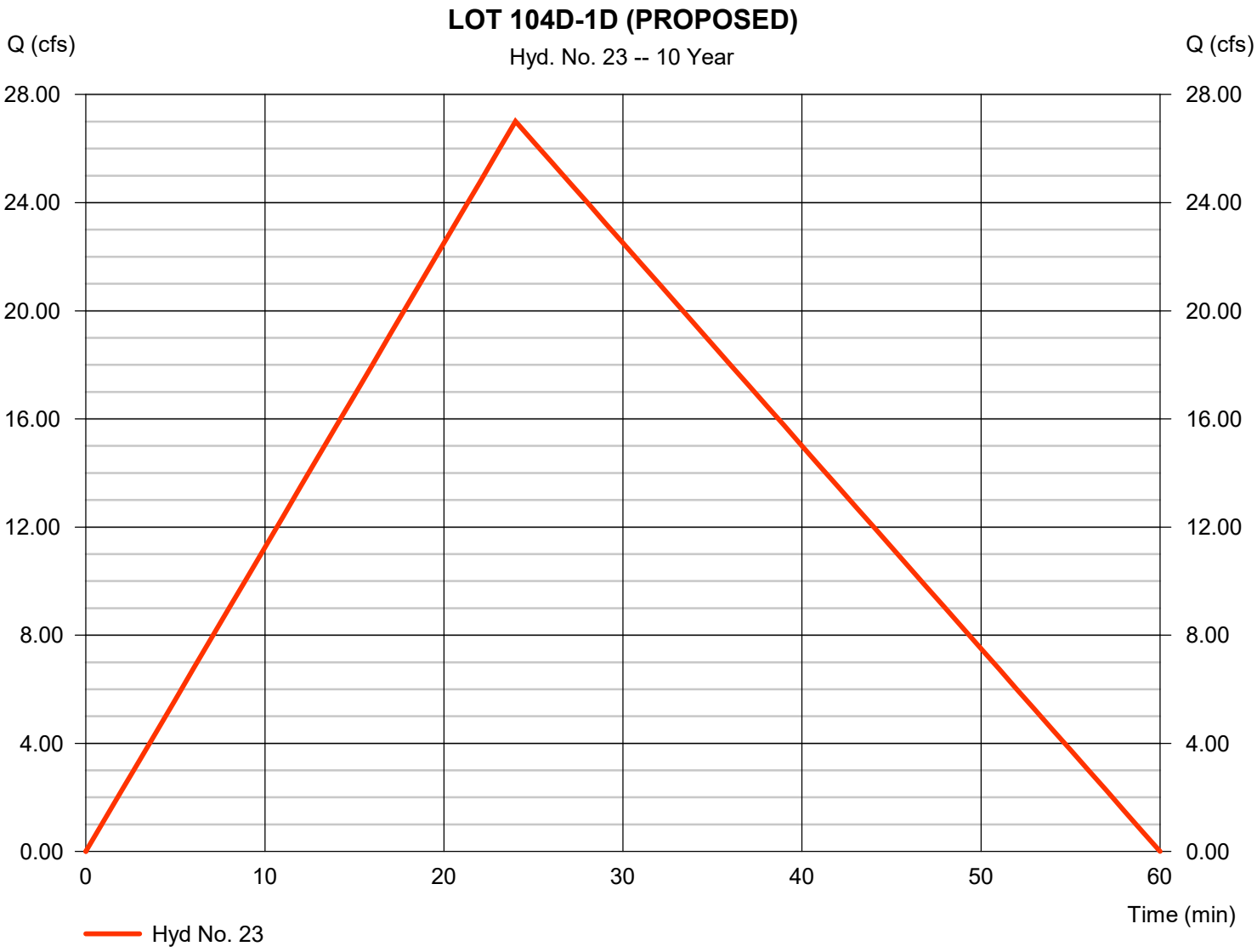
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Thursday, 12 / 21 / 2023

Hyd. No. 23

LOT 104D-1D (PROPOSED)

Hydrograph type	= Rational	Peak discharge	= 27.01 cfs
Storm frequency	= 10 yrs	Time to peak	= 24 min
Time interval	= 1 min	Hyd. volume	= 48,616 cuft
Drainage area	= 12.800 ac	Runoff coeff.	= 0.55*
Intensity	= 3.837 in/hr	Tc by User	= 24.00 min
IDF Curve	= NAIWA.IDF	Asc/Rec limb fact	= 1/1.5

* Composite (Area/C) = [(0.110 x 0.95) + (2.390 x 0.55)] / 12.800



Hydrograph Report

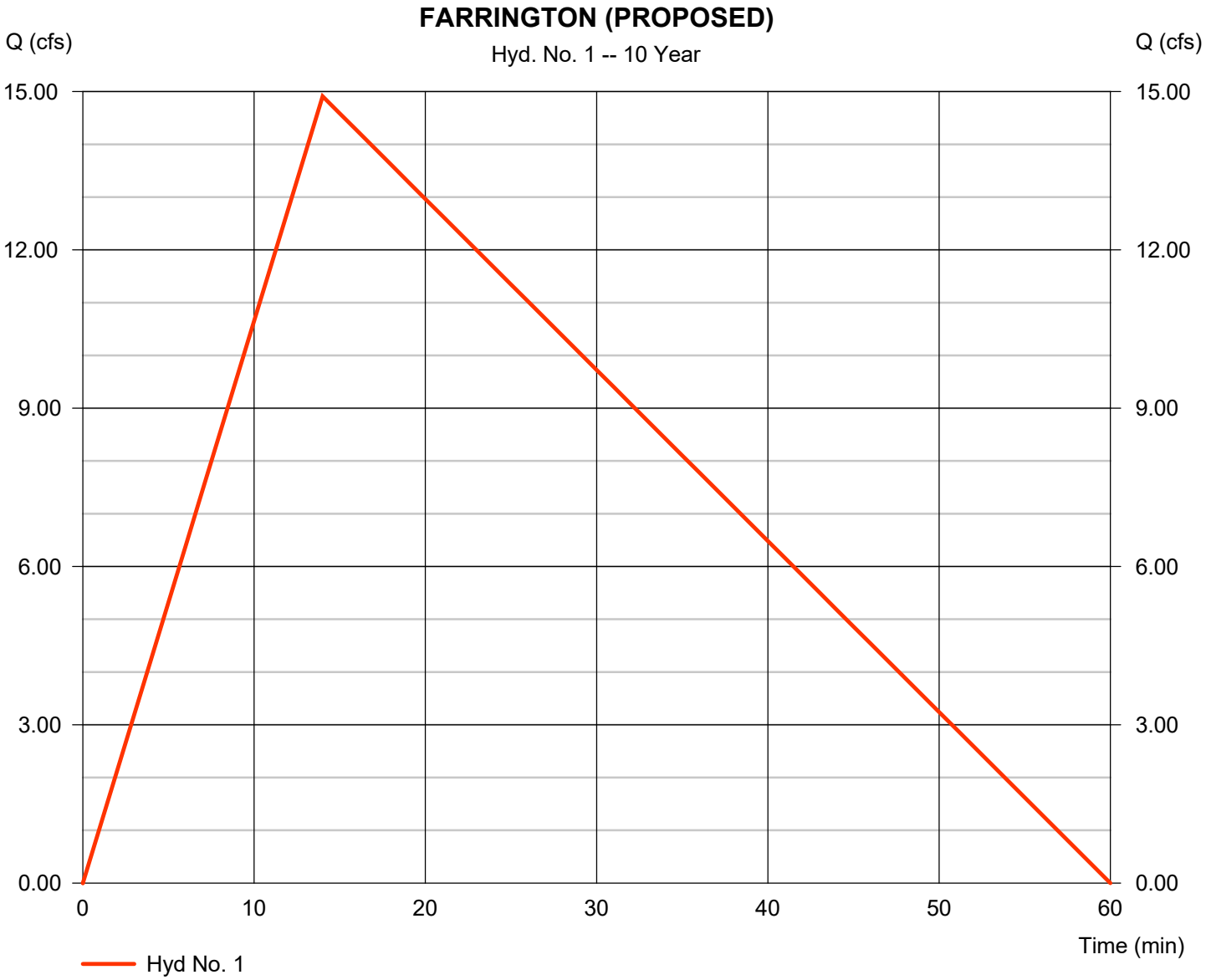
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Monday, 11 / 29 / 2021

Hyd. No. 1

FARRINGTON (PROPOSED)

Hydrograph type	= Rational	Peak discharge	= 14.91 cfs
Storm frequency	= 10 yrs	Time to peak	= 14 min
Time interval	= 1 min	Hyd. volume	= 0.618 acft
Drainage area	= 3.960 ac	Runoff coeff.	= 0.74*
Intensity	= 5.088 in/hr	Tc by User	= 14.00 min
IDF Curve	= NAIWA.IDF	Asc/Rec limb fact	= 1/3.3

* Composite (Area/C) = [(1.900 x 0.95) + (2.060 x 0.55)] / 3.960



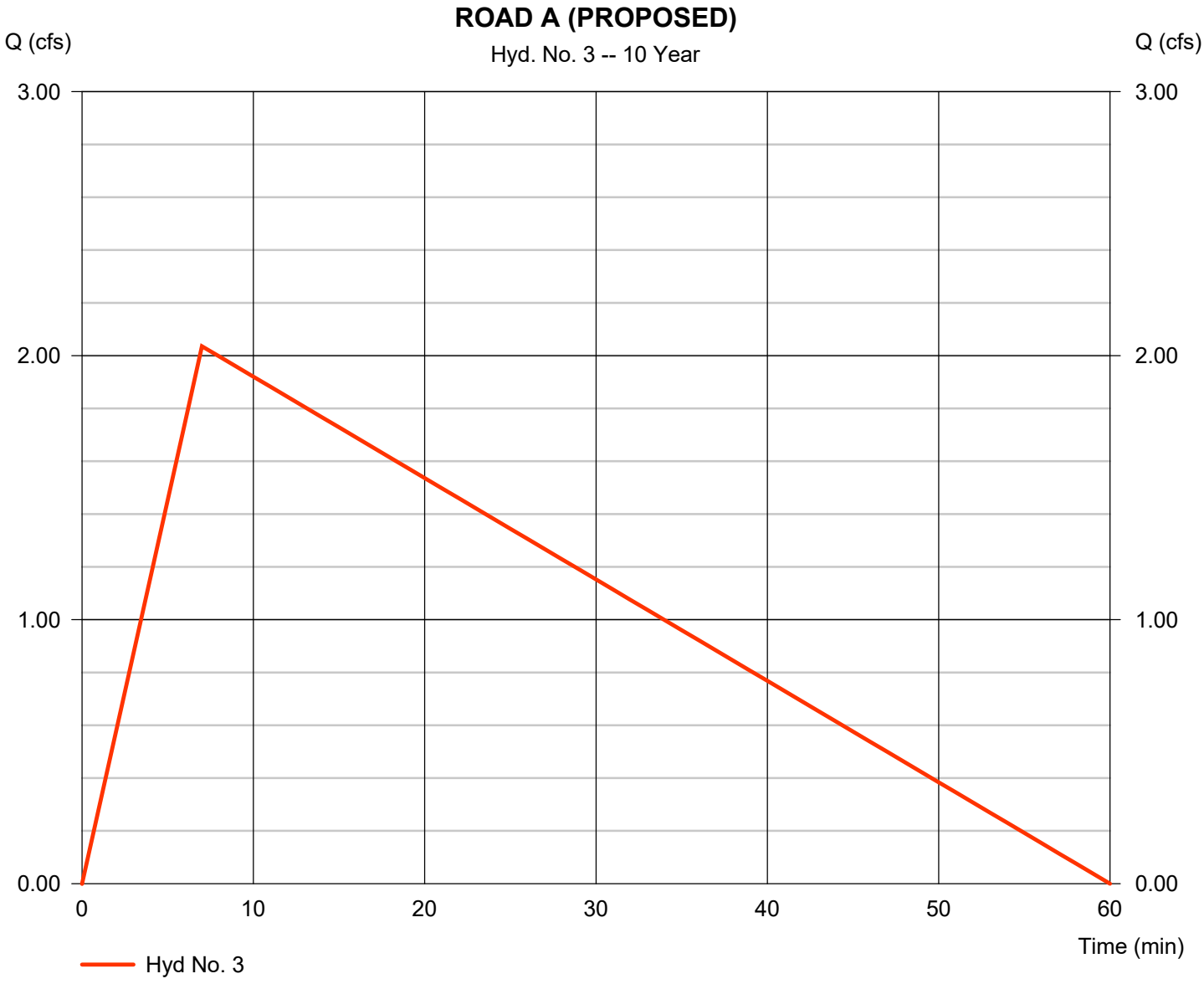
Hydrograph Report

Hyd. No. 3

ROAD A (PROPOSED)

Hydrograph type	=	Rational	Peak discharge	=	2.036 cfs
Storm frequency	=	10 yrs	Time to peak	=	7 min
Time interval	=	1 min	Hyd. volume	=	0.084 acft
Drainage area	=	0.370 ac	Runoff coeff.	=	0.8*
Intensity	=	6.877 in/hr	Tc by User	=	7.00 min
IDF Curve	=	NAIWA.IDF	Asc/Rec limb fact	=	1/7.6

* Composite (Area/C) = [(0.230 x 0.95) + (0.140 x 0.55)] / 0.370



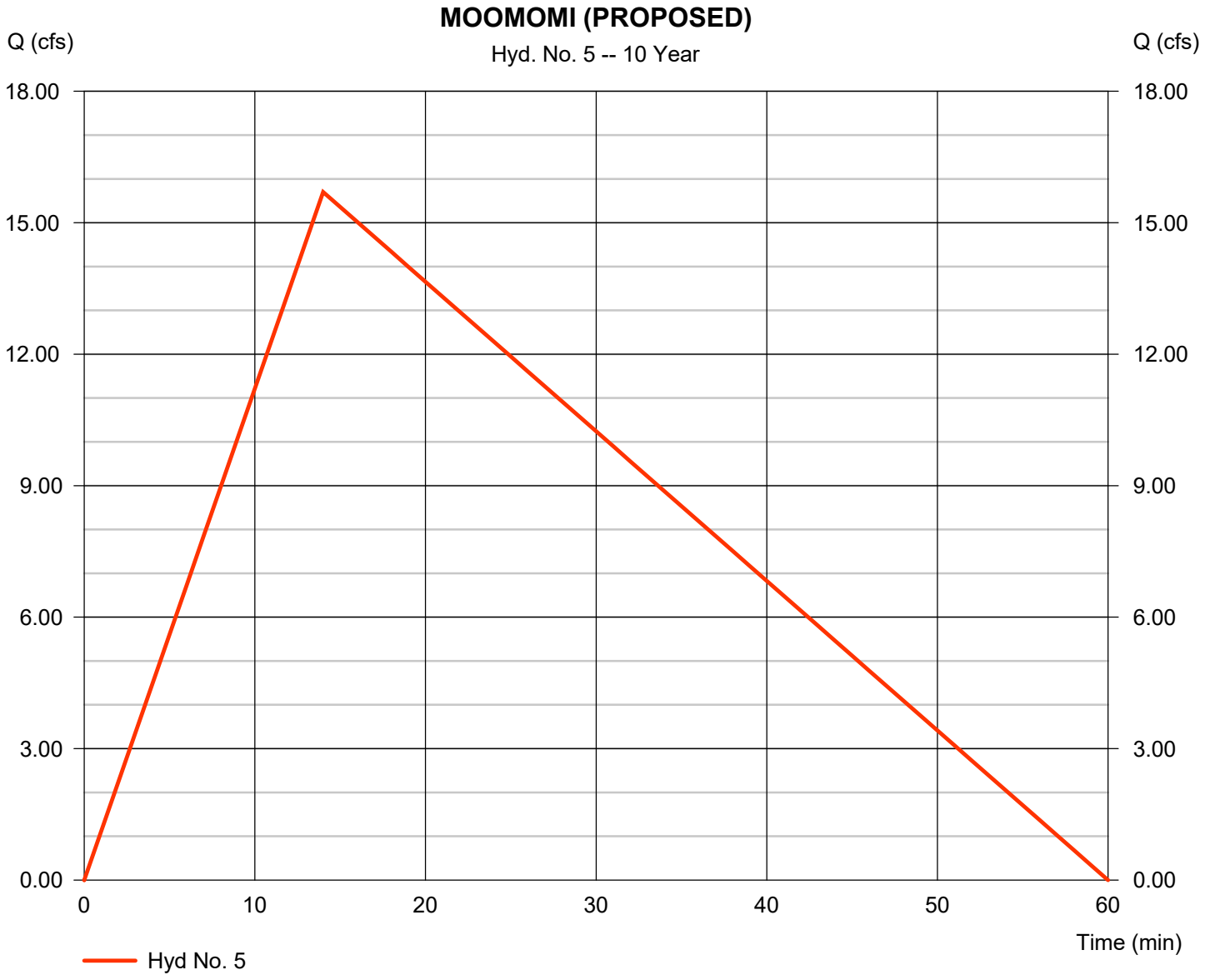
Hydrograph Report

Hyd. No. 5

MOOMOMI (PROPOSED)

Hydrograph type	=	Rational	Peak discharge	=	15.70 cfs
Storm frequency	=	10 yrs	Time to peak	=	14 min
Time interval	=	1 min	Hyd. volume	=	0.651 acft
Drainage area	=	4.170 ac	Runoff coeff.	=	0.74*
Intensity	=	5.088 in/hr	Tc by User	=	14.00 min
IDF Curve	=	NAIWA.IDF	Asc/Rec limb fact	=	1/3.3

* Composite (Area/C) = [(2.000 x 0.95) + (2.170 x 0.55)] / 4.170



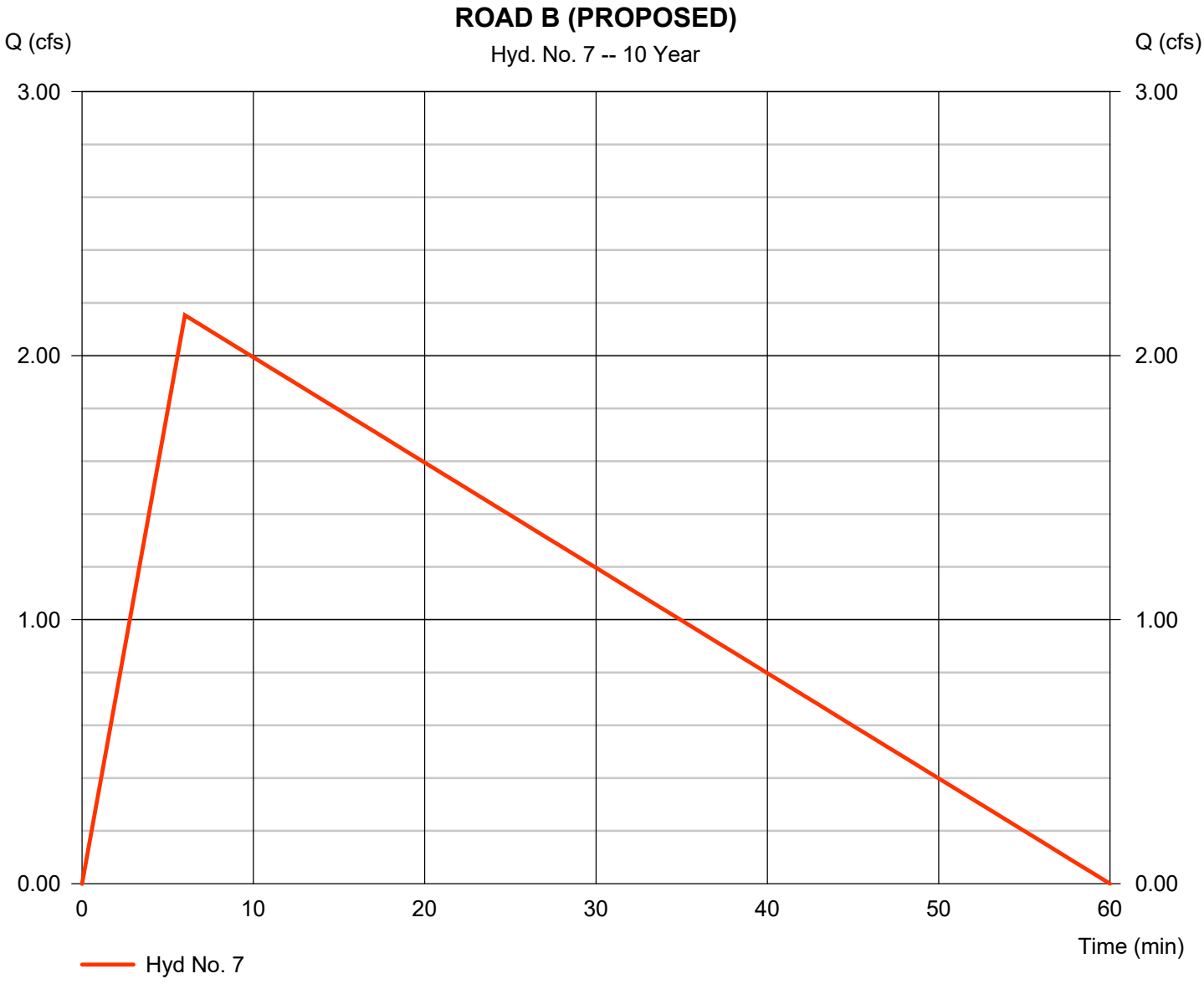
Hydrograph Report

Hyd. No. 7

ROAD B (PROPOSED)

Hydrograph type	=	Rational	Peak discharge	=	2.153 cfs
Storm frequency	=	10 yrs	Time to peak	=	6 min
Time interval	=	1 min	Hyd. volume	=	0.089 acft
Drainage area	=	0.370 ac	Runoff coeff.	=	0.8*
Intensity	=	7.274 in/hr	Tc by User	=	6.00 min
IDF Curve	=	NAIWA.IDF	Asc/Rec limb fact	=	1/9

* Composite (Area/C) = [(0.230 x 0.95) + (0.140 x 0.55)] / 0.370



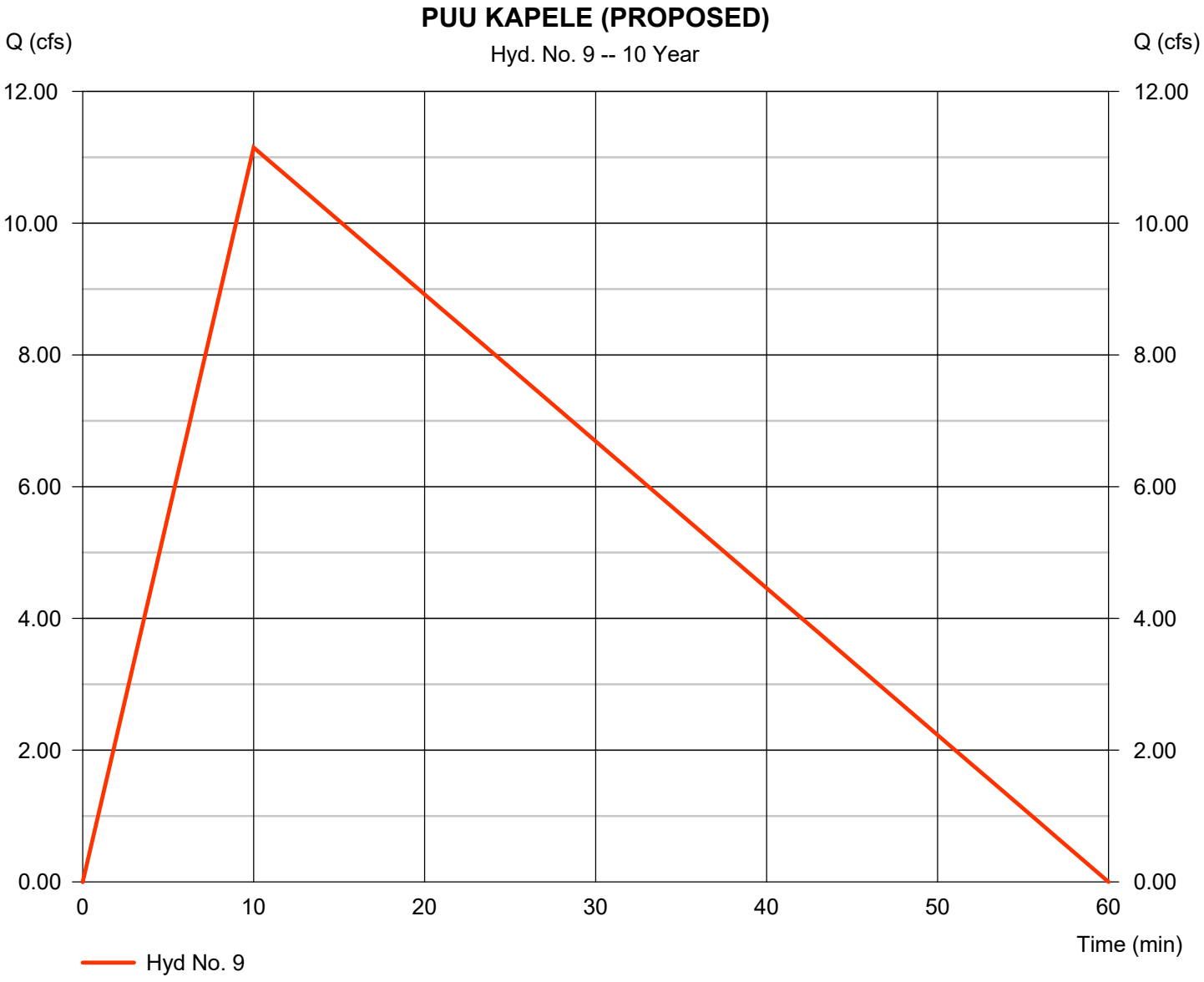
Hydrograph Report

Hyd. No. 9

PUU KAPELE (PROPOSED)

Hydrograph type	=	Rational	Peak discharge	=	11.15 cfs
Storm frequency	=	10 yrs	Time to peak	=	10 min
Time interval	=	1 min	Hyd. volume	=	0.461 acft
Drainage area	=	2.500 ac	Runoff coeff.	=	0.75*
Intensity	=	5.946 in/hr	Tc by User	=	10.00 min
IDF Curve	=	NAIWA.IDF	Asc/Rec limb fact	=	1/5

* Composite (Area/C) = [(1.250 x 0.95) + (1.250 x 0.55)] / 2.500



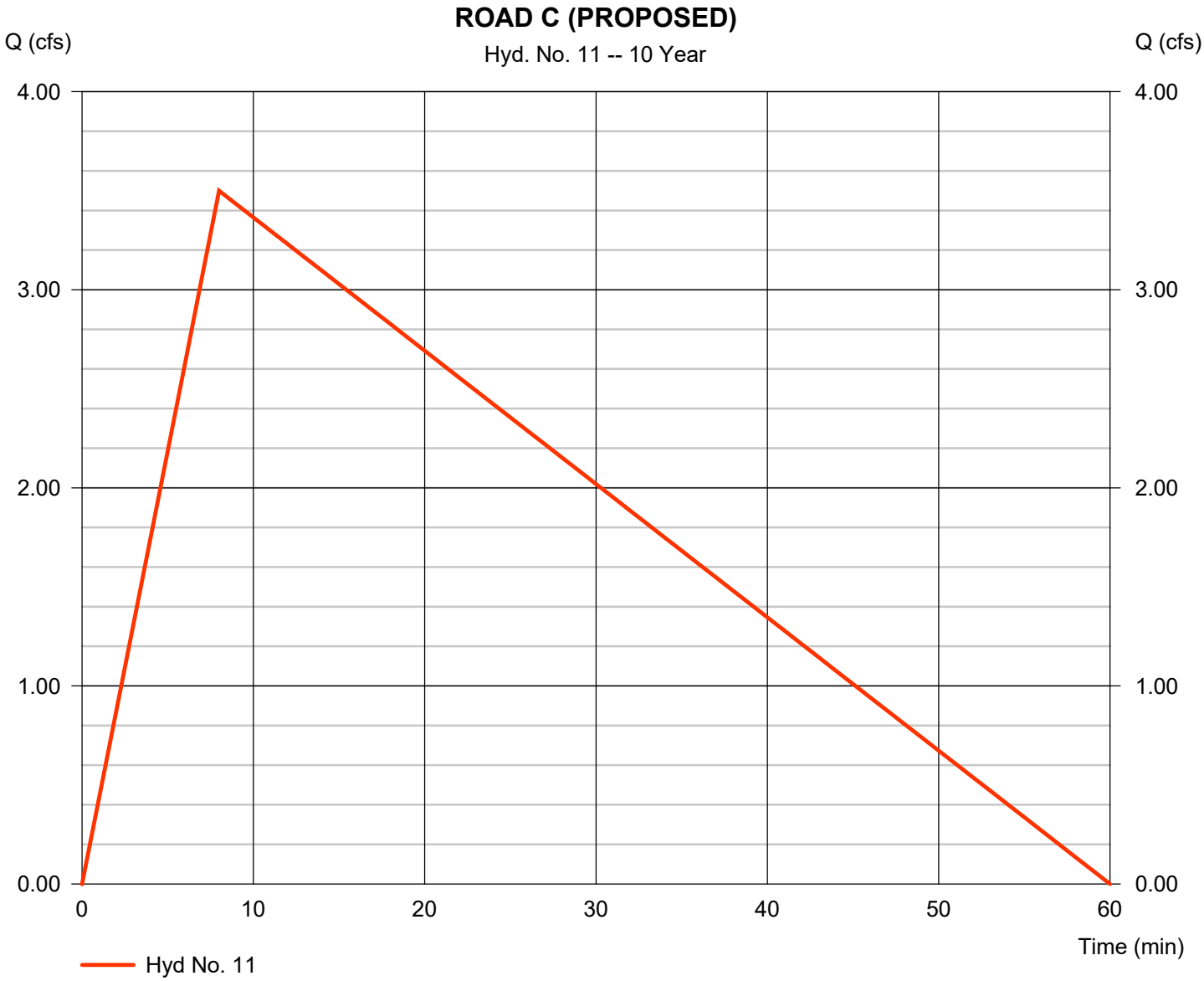
Hydrograph Report

Hyd. No. 11

ROAD C (PROPOSED)

Hydrograph type	=	Rational	Peak discharge	=	3.500 cfs
Storm frequency	=	10 yrs	Time to peak	=	8 min
Time interval	=	1 min	Hyd. volume	=	0.145 acft
Drainage area	=	0.670 ac	Runoff coeff.	=	0.8*
Intensity	=	6.529 in/hr	Tc by User	=	8.00 min
IDF Curve	=	NAIWA.IDF	Asc/Rec limb fact	=	1/6.5

* Composite (Area/C) = [(0.420 x 0.95) + (0.250 x 0.55)] / 0.670



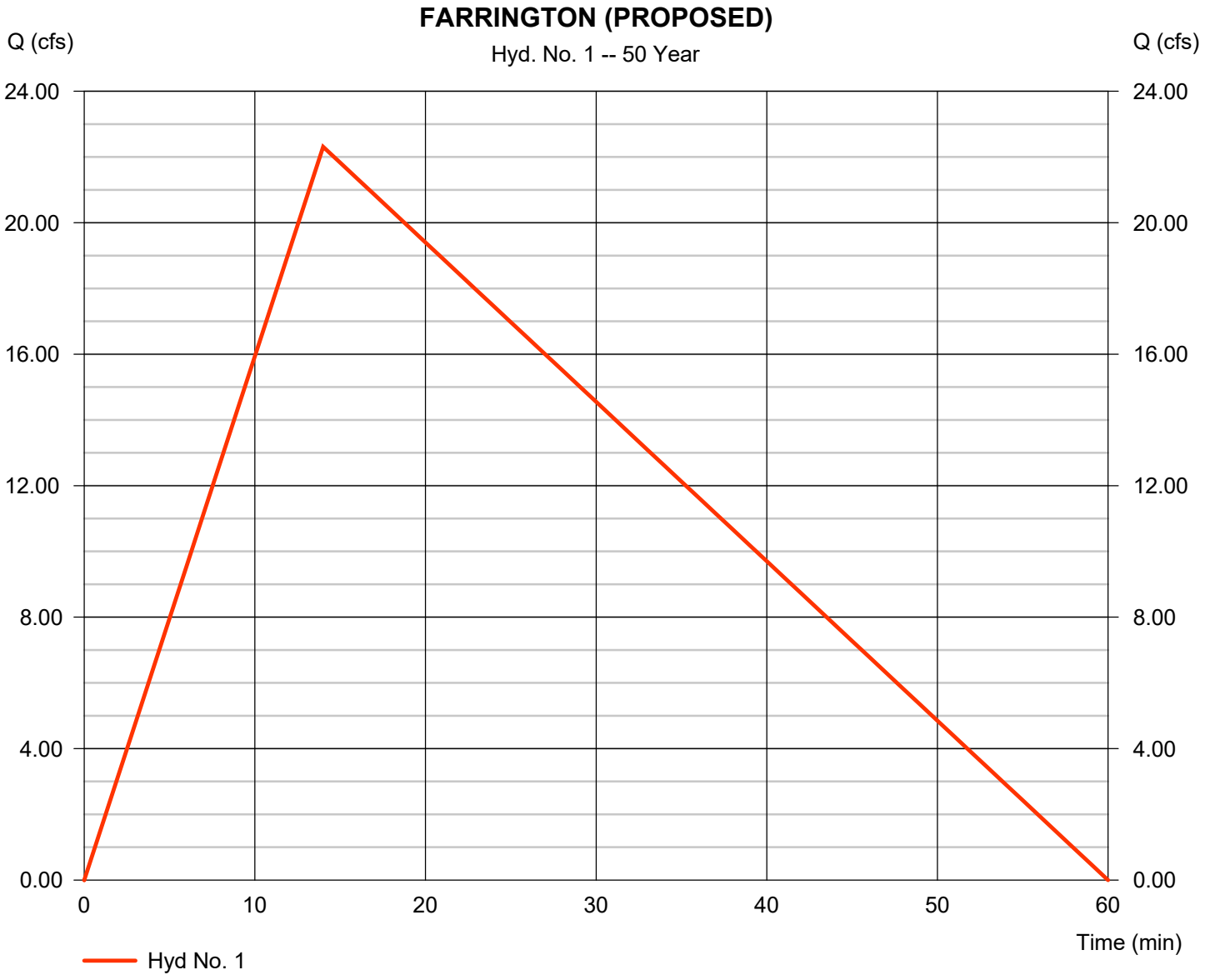
Hydrograph Report

Hyd. No. 1

FARRINGTON (PROPOSED)

Hydrograph type	=	Rational	Peak discharge	=	22.31 cfs
Storm frequency	=	50 yrs	Time to peak	=	14 min
Time interval	=	1 min	Hyd. volume	=	0.925 acft
Drainage area	=	3.960 ac	Runoff coeff.	=	0.74*
Intensity	=	7.613 in/hr	Tc by User	=	14.00 min
IDF Curve	=	NAIWA.IDF	Asc/Rec limb fact	=	1/3.3

* Composite (Area/C) = [(1.900 x 0.95) + (2.060 x 0.55)] / 3.960



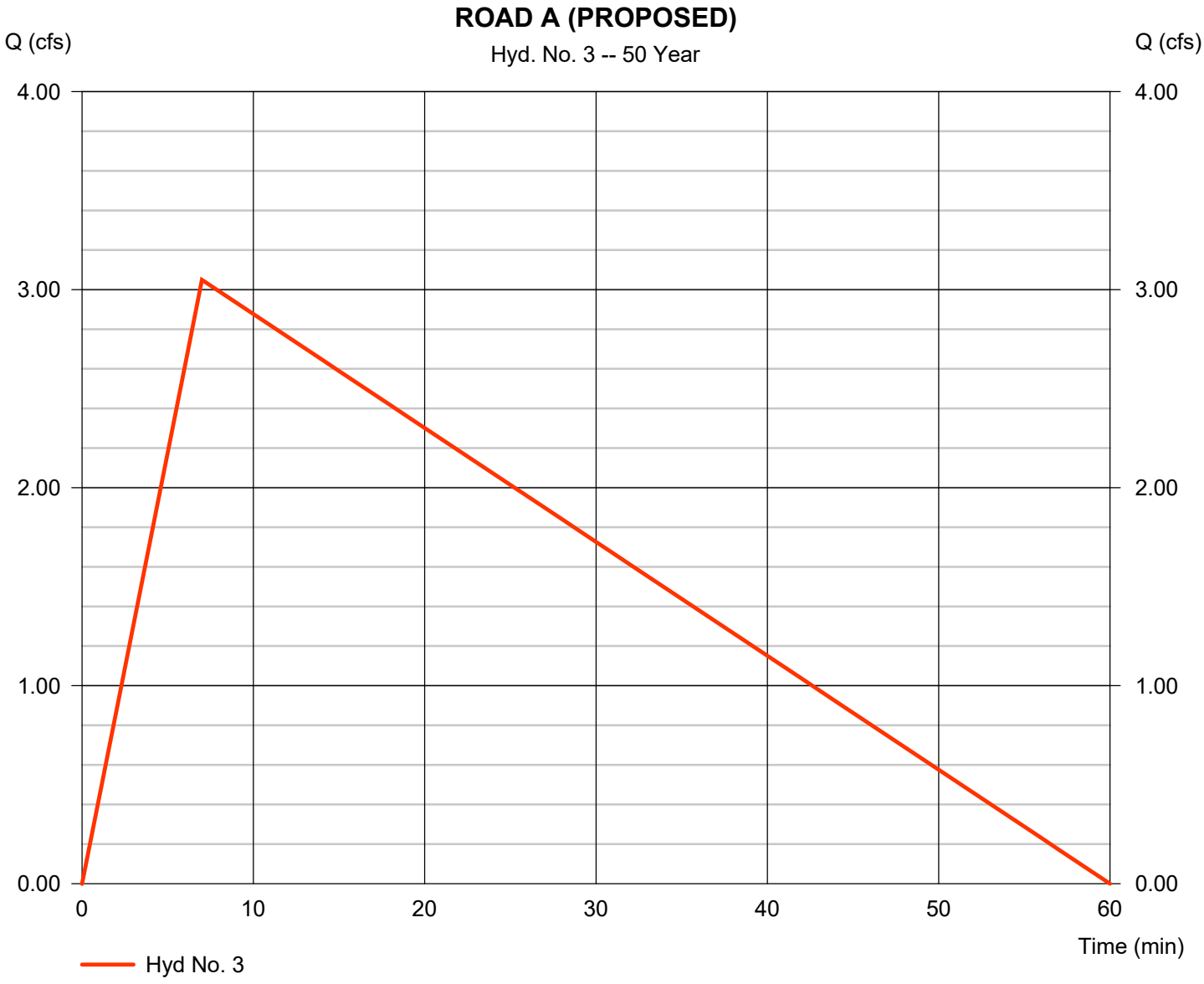
Hydrograph Report

Hyd. No. 3

ROAD A (PROPOSED)

Hydrograph type	=	Rational	Peak discharge	=	3.049 cfs
Storm frequency	=	50 yrs	Time to peak	=	7 min
Time interval	=	1 min	Hyd. volume	=	0.126 acft
Drainage area	=	0.370 ac	Runoff coeff.	=	0.8*
Intensity	=	10.302 in/hr	Tc by User	=	7.00 min
IDF Curve	=	NAIWA.IDF	Asc/Rec limb fact	=	1/7.6

* Composite (Area/C) = [(0.230 x 0.95) + (0.140 x 0.55)] / 0.370



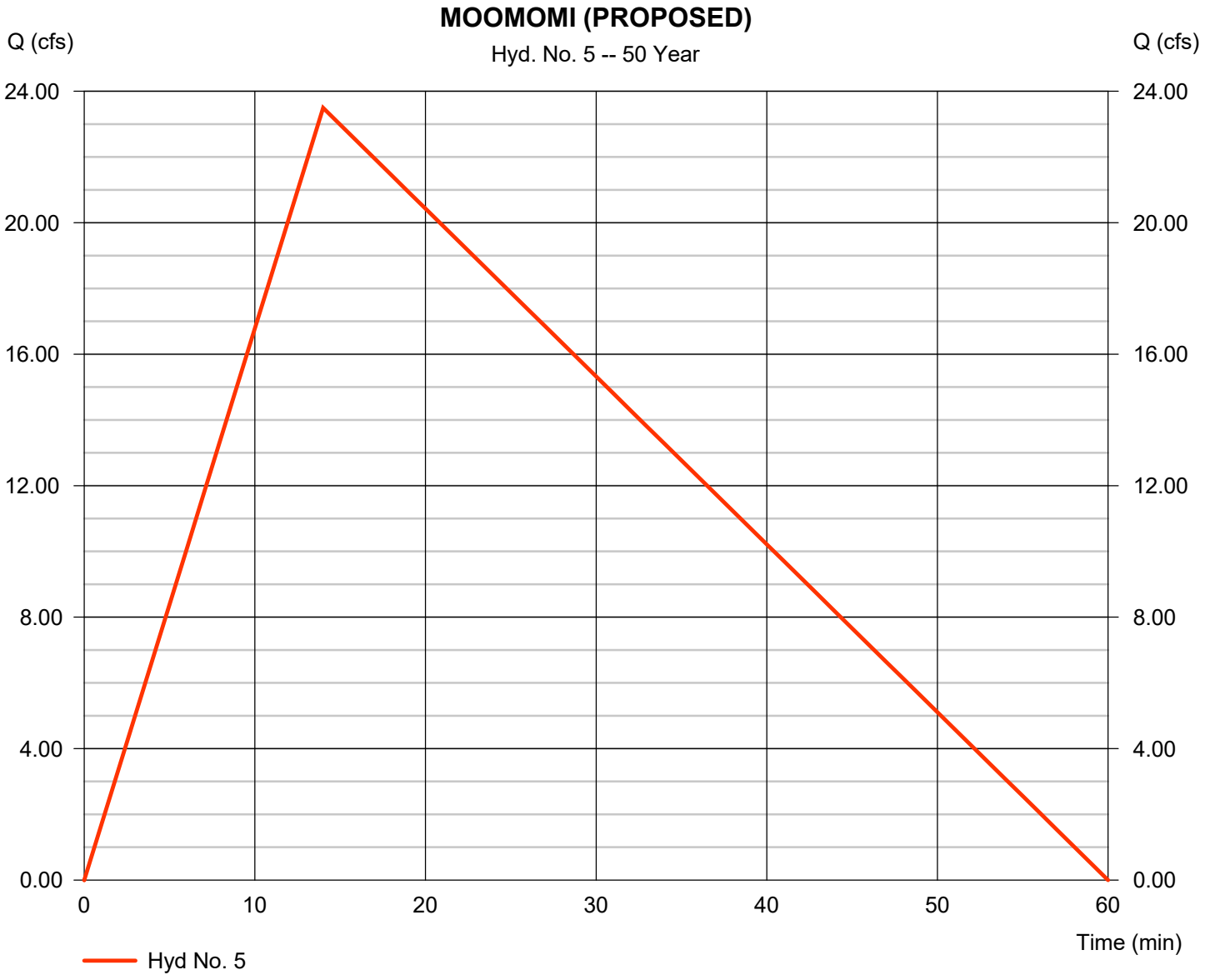
Hydrograph Report

Hyd. No. 5

MOOMOMI (PROPOSED)

Hydrograph type	=	Rational	Peak discharge	=	23.49 cfs
Storm frequency	=	50 yrs	Time to peak	=	14 min
Time interval	=	1 min	Hyd. volume	=	0.974 acft
Drainage area	=	4.170 ac	Runoff coeff.	=	0.74*
Intensity	=	7.613 in/hr	Tc by User	=	14.00 min
IDF Curve	=	NAIWA.IDF	Asc/Rec limb fact	=	1/3.3

* Composite (Area/C) = [(2.000 x 0.95) + (2.170 x 0.55)] / 4.170



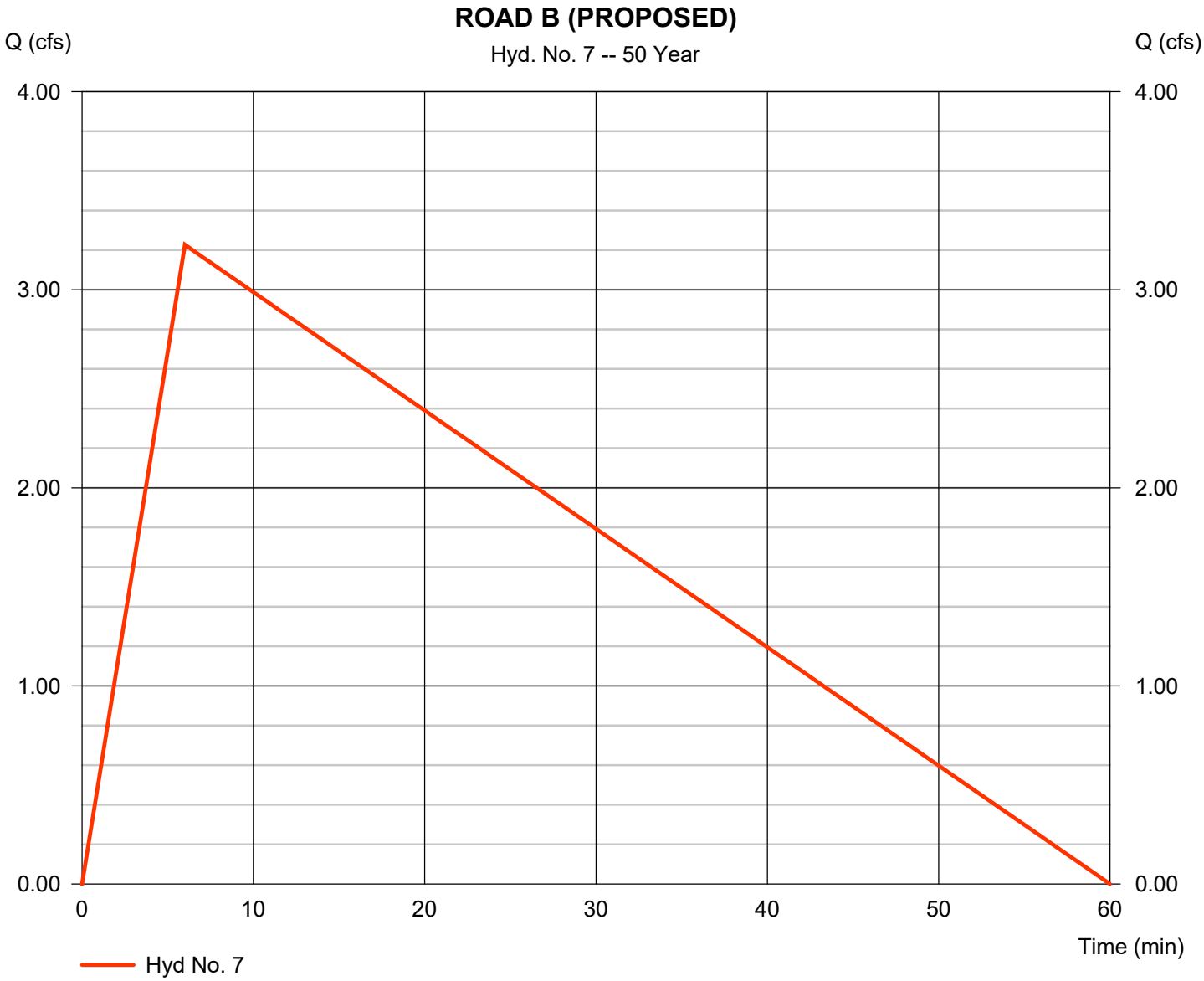
Hydrograph Report

Hyd. No. 7

ROAD B (PROPOSED)

Hydrograph type	=	Rational	Peak discharge	=	3.227 cfs
Storm frequency	=	50 yrs	Time to peak	=	6 min
Time interval	=	1 min	Hyd. volume	=	0.133 acft
Drainage area	=	0.370 ac	Runoff coeff.	=	0.8*
Intensity	=	10.902 in/hr	Tc by User	=	6.00 min
IDF Curve	=	NAIWA.IDF	Asc/Rec limb fact	=	1/9

* Composite (Area/C) = [(0.230 x 0.95) + (0.140 x 0.55)] / 0.370



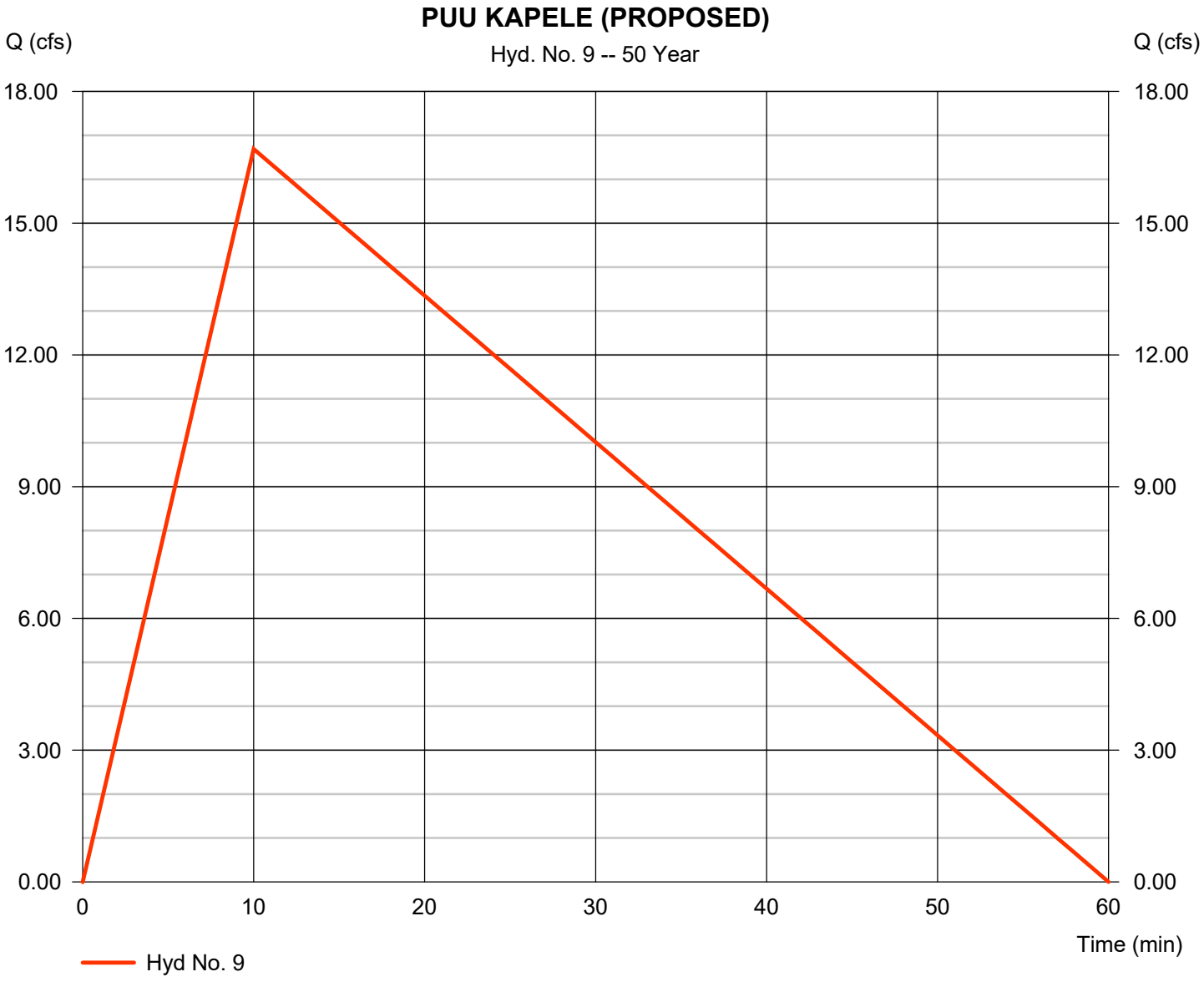
Hydrograph Report

Hyd. No. 9

PUU KAPELE (PROPOSED)

Hydrograph type	=	Rational	Peak discharge	=	16.69 cfs
Storm frequency	=	50 yrs	Time to peak	=	10 min
Time interval	=	1 min	Hyd. volume	=	0.690 acft
Drainage area	=	2.500 ac	Runoff coeff.	=	0.75*
Intensity	=	8.901 in/hr	Tc by User	=	10.00 min
IDF Curve	=	NAIWA.IDF	Asc/Rec limb fact	=	1/5

* Composite (Area/C) = [(1.250 x 0.95) + (1.250 x 0.55)] / 2.500



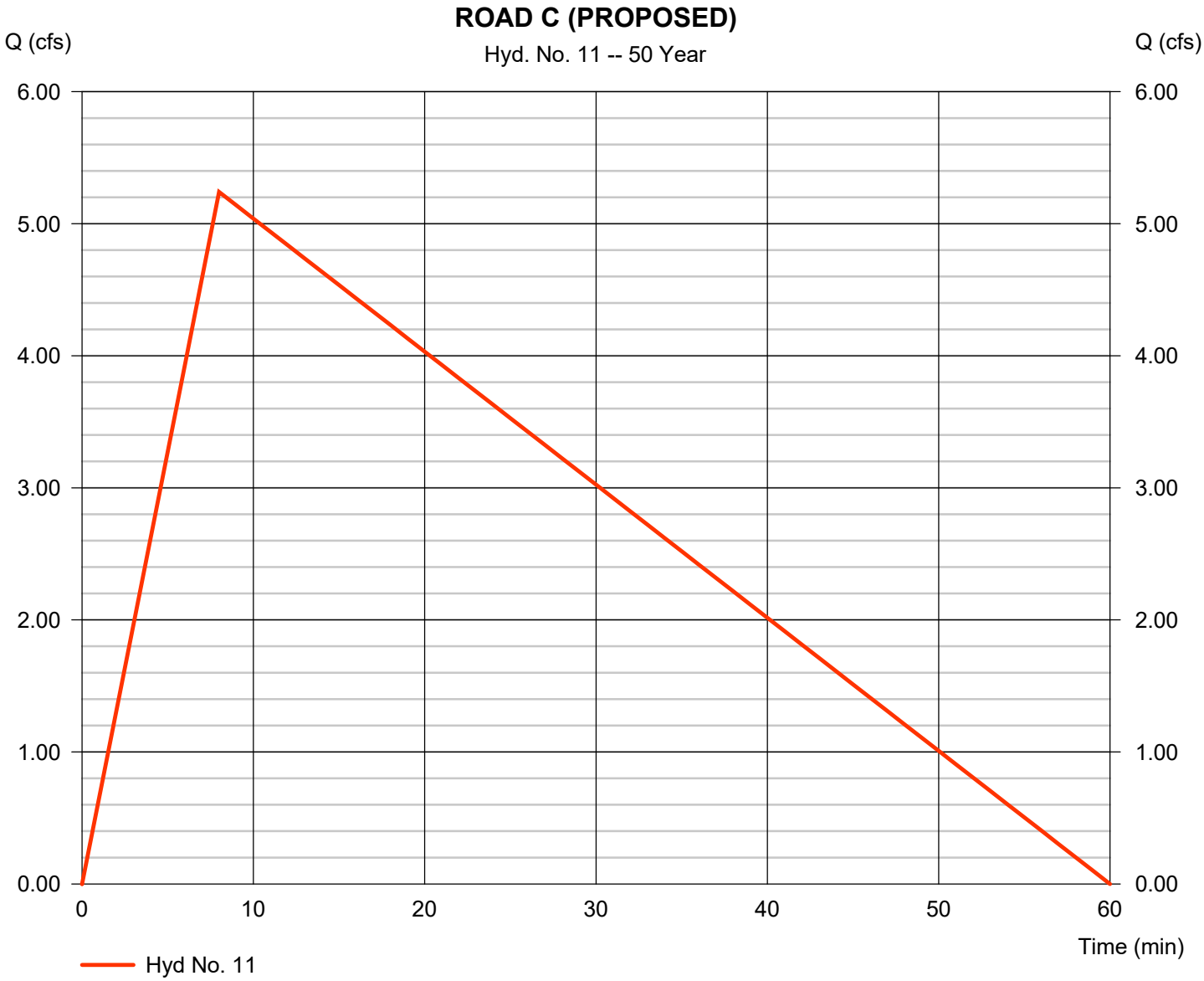
Hydrograph Report

Hyd. No. 11

ROAD C (PROPOSED)

Hydrograph type	=	Rational	Peak discharge	=	5.241 cfs
Storm frequency	=	50 yrs	Time to peak	=	8 min
Time interval	=	1 min	Hyd. volume	=	0.217 acft
Drainage area	=	0.670 ac	Runoff coeff.	=	0.8*
Intensity	=	9.777 in/hr	Tc by User	=	8.00 min
IDF Curve	=	NAIWA.IDF	Asc/Rec limb fact	=	1/6.5

* Composite (Area/C) = [(0.420 x 0.95) + (0.250 x 0.55)] / 0.670



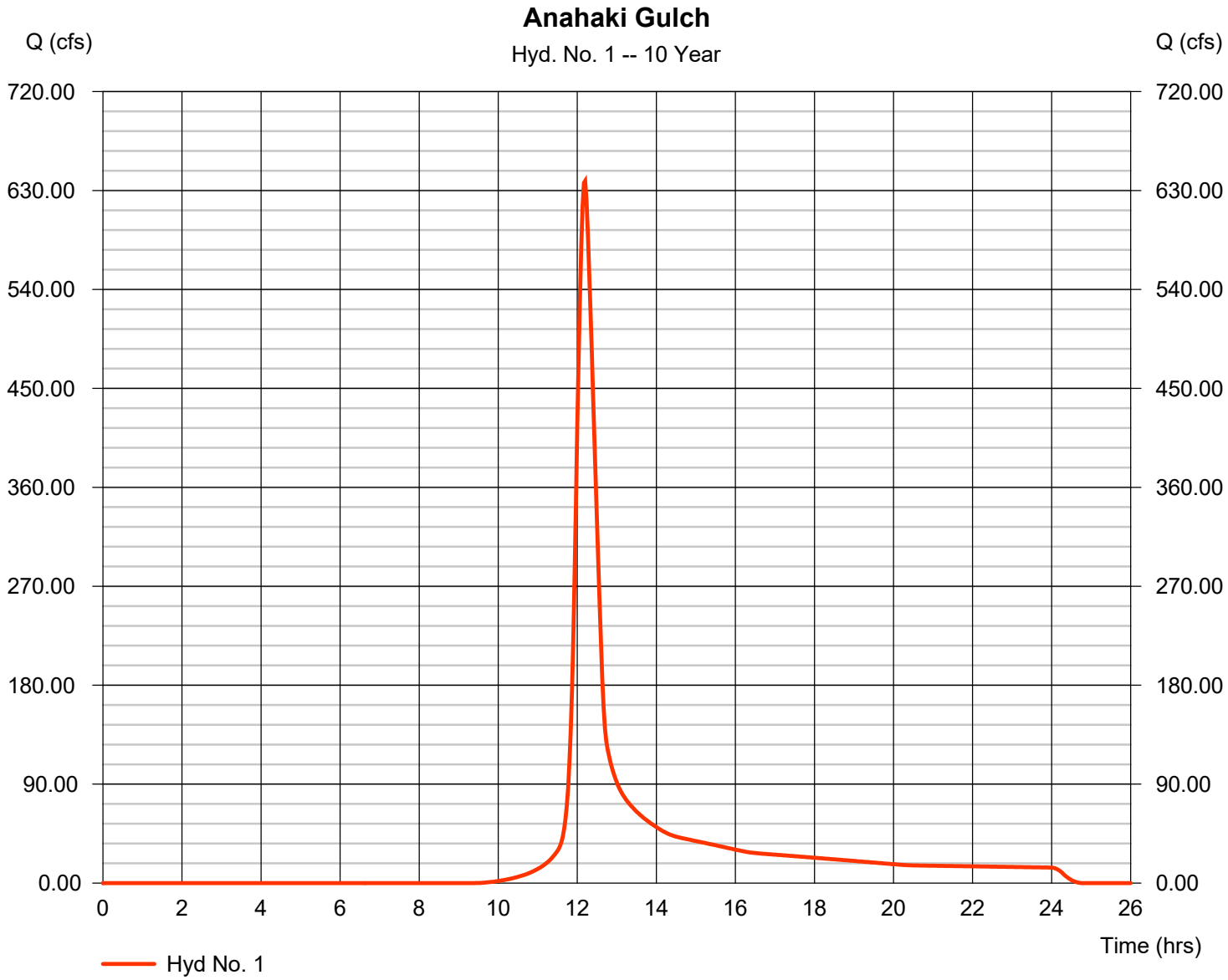
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Friday, 12 / 10 / 2021

Hyd. No. 1

Anahaki Gulch

Hydrograph type	=	SCS Runoff	Peak discharge	=	638.69 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.20 hrs
Time interval	=	2 min	Hyd. volume	=	59.631 acft
Drainage area	=	256.540 ac	Curve number	=	67
Basin Slope	=	0.8 %	Hydraulic length	=	4004 ft
Tc method	=	TR55	Time of conc. (Tc)	=	27.20 min
Total precip.	=	6.34 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



TR55 Tc Worksheet

Hyd. No. 1

Anahaki Gulch

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.011		0.011		0.011		
Flow length (ft)	= 0.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 0.00		0.00		0.00		
Land slope (%)	= 0.00		0.00		0.00		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Shallow Concentrated Flow							
Flow length (ft)	= 3040.00		0.00		0.00		
Watercourse slope (%)	= 4.00		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	=3.23		0.00		0.00		
Travel Time (min)	**= 15.70**	**+**	**0.00**	**+**	**0.00**	**=**	**15.70**
Channel Flow							
X sectional flow area (sqft)	= 350.63		0.00		0.00		
Wetted perimeter (ft)	= 297.16		0.00		0.00		
Channel slope (%)	= 0.82		0.00		0.00		
Manning's n-value	= 0.026		0.015		0.015		
Velocity (ft/s)	=5.80						
			0.00				
					0.00		
Flow length (ft)	({0})4004.0		0.0		0.0		
Travel Time (min)	**= 11.51**	**+**	**0.00**	**+**	**0.00**	**=**	**11.51**

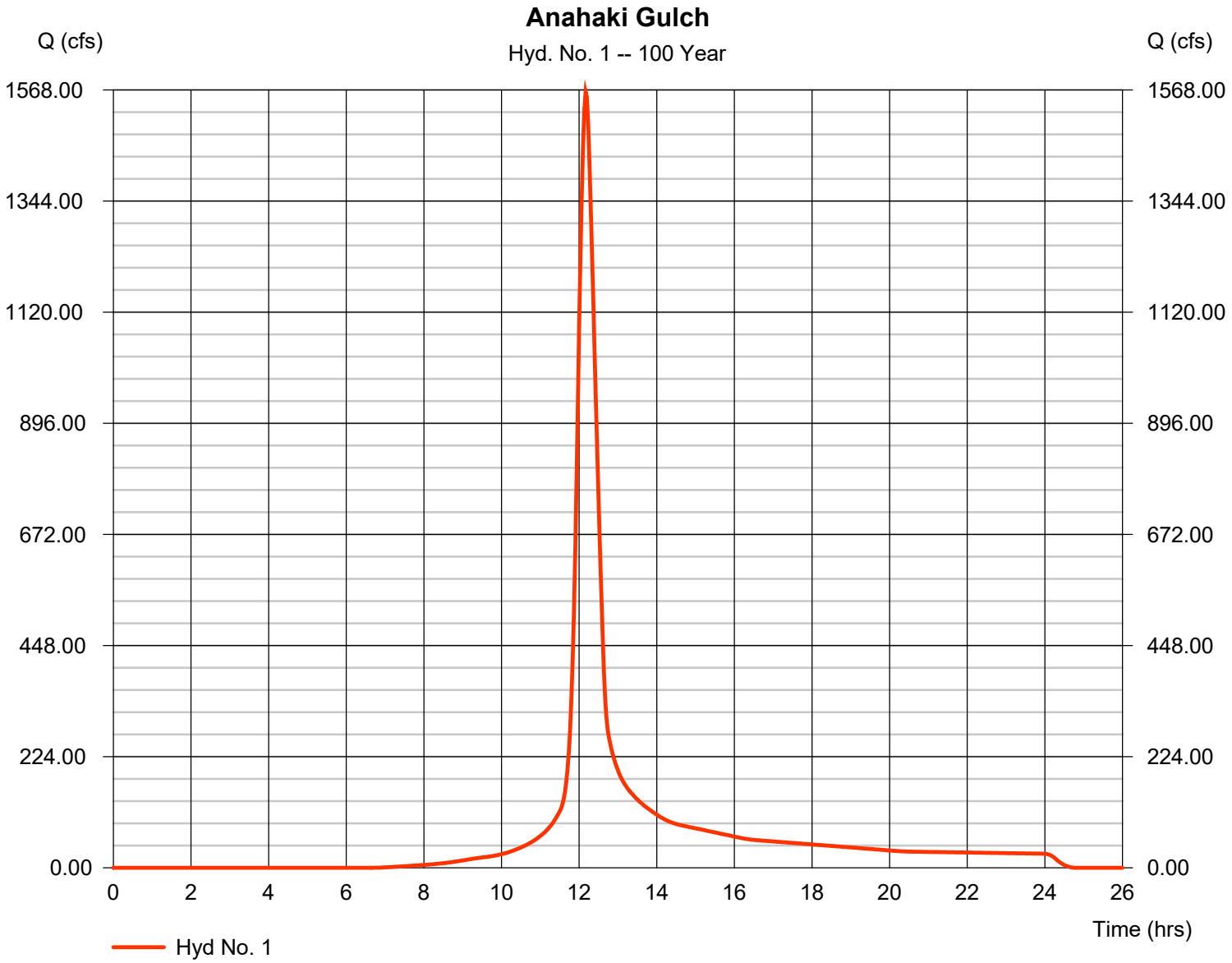
Total Travel Time, Tc ..... 27.20 min

Hydrograph Report

Hyd. No. 1

Anahaki Gulch

Hydrograph type	=	SCS Runoff	Peak discharge	=	1564.39 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.17 hrs
Time interval	=	2 min	Hyd. volume	=	143.519 acft
Drainage area	=	256.540 ac	Curve number	=	67
Basin Slope	=	0.8 %	Hydraulic length	=	4004 ft
Tc method	=	TR55	Time of conc. (Tc)	=	27.20 min
Total precip.	=	11.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



Hydraflow Rainfall Report

Return Period (Yrs)	Intensity-Duration-Frequency Equation Coefficients (FHA)			
	B	D	E	(N/A)
1	17.6163	5.7000	0.6872	--------
2	23.8068	5.8000	0.6909	--------
3	0.0000	0.0000	0.0000	--------
5	33.4334	6.0000	0.6961	--------
10	40.0017	5.8000	0.6906	--------
25	50.5276	5.8000	0.6893	--------
50	58.3628	5.6000	0.6845	--------
100	69.5569	5.8000	0.6900	--------

File name: NAIWA.IDF

Intensity = B / (Tc + D)^E

Return Period (Yrs)	Intensity Values (in/hr)											
	5 min	10	15	20	25	30	35	40	45	50	55	60
1	3.46	2.66	2.20	1.89	1.67	1.51	1.38	1.27	1.19	1.11	1.05	0.99
2	4.60	3.54	2.92	2.52	2.23	2.01	1.84	1.70	1.58	1.48	1.39	1.32
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	6.30	4.85	4.02	3.46	3.06	2.76	2.52	2.33	2.17	2.03	1.91	1.81
10	7.73	5.95	4.92	4.24	3.75	3.38	3.09	2.85	2.65	2.49	2.34	2.22
25	9.80	7.54	6.24	5.38	4.76	4.29	3.92	3.62	3.37	3.16	2.98	2.82
50	11.60	8.90	7.36	6.34	5.61	5.06	4.62	4.27	3.98	3.73	3.52	3.33
100	13.47	10.36	8.57	7.38	6.53	5.89	5.38	4.97	4.63	4.34	4.09	3.87

Tc = time in minutes. Values may exceed 60.

Precip. file name: Sample.pcp

Storm Distribution	Rainfall Precipitation Table (in)							
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
SCS 24-hour	0.00	0.00	0.00	0.00	6.34	0.00	0.00	11.00
SCS 6-Hr	0.00	0.00	0.00	0.00	4.18	0.00	0.00	7.02
Huff-1st	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-2nd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-3rd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-4th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-Indy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Custom	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

NOAA Atlas 14, Volume 4, Version 3
Location name: Hoolehua, Hawaii, USA*
Latitude: 21.1439°, Longitude: -157.0818°
Elevation: 445.39 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

S. Perica, D. Martin, B. Lin, T. Parzybok, D. Riley, M. Yekta, L. Hiner, L.-C. Chen, D. Brewer, F. Yan, K. Maitaria, C. Trypaluk, G. M. Bonnin

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.288** (0.261-0.338)	**0.383** (0.331-0.440)	**0.526** (0.448-0.603)	**0.645** (0.546-0.744)	**0.818** (0.684-0.954)	**0.966** (0.798-1.13)	**1.12** (0.913-1.34)	**1.30** (1.04-1.56)	**1.55** (1.21-1.91)	**1.77** (1.34-2.21)
10-min	**0.427** (0.387-0.501)	**0.568** (0.491-0.652)	**0.780** (0.665-0.894)	**0.956** (0.810-1.10)	**1.21** (1.01-1.42)	**1.43** (1.18-1.68)	**1.67** (1.35-1.98)	**1.93** (1.54-2.32)	**2.30** (1.80-2.83)	**2.62** (1.99-3.27)
15-min	**0.536** (0.486-0.629)	**0.713** (0.616-0.819)	**0.979** (0.835-1.12)	**1.20** (1.02-1.39)	**1.52** (1.27-1.78)	**1.80** (1.49-2.11)	**2.09** (1.70-2.49)	**2.42** (1.93-2.91)	**2.89** (2.25-3.55)	**3.29** (2.50-4.11)
30-min	**0.755** (0.684-0.885)	**1.00** (0.867-1.15)	**1.38** (1.18-1.58)	**1.69** (1.43-1.95)	**2.15** (1.79-2.50)	**2.53** (2.09-2.97)	**2.94** (2.39-3.50)	**3.40** (2.72-4.10)	**4.07** (3.17-5.00)	**4.63** (3.52-5.79)
60-min	**0.993** (0.900-1.17)	**1.32** (1.14-1.52)	**1.81** (1.55-2.08)	**2.22** (1.88-2.57)	**2.82** (2.36-3.29)	**3.33** (2.75-3.91)	**3.87** (3.15-4.61)	**4.48** (3.58-5.39)	**5.35** (4.17-6.58)	**6.09** (4.63-7.61)
2-hr	**1.38** (1.22-1.56)	**1.79** (1.54-2.04)	**2.43** (2.08-2.79)	**2.97** (2.53-3.42)	**3.73** (3.14-4.33)	**4.35** (3.61-5.11)	**5.01** (4.10-5.94)	**5.72** (4.60-6.87)	**6.74** (5.27-8.26)	**7.58** (5.79-9.44)
3-hr	**1.52** (1.35-1.73)	**2.05** (1.76-2.34)	**2.79** (2.38-3.20)	**3.39** (2.89-3.92)	**4.25** (3.57-4.95)	**4.95** (4.11-5.82)	**5.69** (4.65-6.77)	**6.49** (5.21-7.81)	**7.61** (5.94-9.34)	**8.53** (6.49-10.6)
6-hr	**1.88** (1.65-2.15)	**2.52** (2.16-2.88)	**3.44** (2.93-3.95)	**4.18** (3.55-4.84)	**5.25** (4.40-6.13)	**6.11** (5.05-7.19)	**7.02** (5.71-8.36)	**8.00** (6.39-9.64)	**9.37** (7.29-11.5)	**10.5** (7.95-13.1)
12-hr	**2.27** (1.98-2.61)	**3.04** (2.62-3.47)	**4.19** (3.59-4.80)	**5.14** (4.38-5.91)	**6.47** (5.44-7.53)	**7.58** (6.28-8.89)	**8.73** (7.14-10.4)	**9.99** (8.01-12.0)	**11.8** (9.17-14.4)	**13.2** (10.0-16.5)
24-hr	**2.67** (2.34-3.05)	**3.68** (3.21-4.20)	**5.14** (4.47-5.89)	**6.34** (5.50-7.29)	**8.08** (6.92-9.32)	**9.51** (8.07-11.0)	**11.0** (9.27-12.9)	**12.7** (10.5-14.9)	**15.1** (12.3-18.0)	**17.1** (13.6-20.5)
2-day	**3.39** (2.99-3.87)	**4.70** (4.14-5.36)	**6.61** (5.78-7.55)	**8.18** (7.13-9.37)	**10.5** (9.03-12.0)	**12.3** (10.5-14.3)	**14.4** (12.1-16.8)	**16.6** (13.8-19.5)	**19.8** (16.2-23.5)	**22.5** (18.0-26.9)
3-day	**3.65** (3.21-4.16)	**5.05** (4.44-5.76)	**7.08** (6.20-8.11)	**8.76** (7.64-10.0)	**11.2** (9.64-12.9)	**13.1** (11.2-15.2)	**15.3** (12.9-17.8)	**17.6** (14.7-20.6)	**20.9** (17.0-24.8)	**23.6** (18.9-28.3)
4-day	**3.90** (3.44-4.45)	**5.40** (4.75-6.17)	**7.56** (6.62-8.66)	**9.34** (8.14-10.7)	**11.9** (10.3-13.7)	**13.9** (11.9-16.2)	**16.2** (13.7-18.9)	**18.6** (15.5-21.8)	**22.0** (17.9-26.1)	**24.8** (19.8-29.7)
7-day	**4.42** (3.90-5.05)	**6.11** (5.37-6.97)	**8.51** (7.45-9.74)	**10.4** (9.10-12.0)	**13.2** (11.4-15.2)	**15.4** (13.2-17.9)	**17.8** (15.0-20.7)	**20.3** (16.9-23.8)	**23.9** (19.4-28.3)	**26.7** (21.4-32.0)
10-day	**4.88** (4.30-5.57)	**6.72** (5.91-7.66)	**9.33** (8.17-10.7)	**11.4** (9.95-13.1)	**14.3** (12.4-16.5)	**16.7** (14.3-19.3)	**19.1** (16.2-22.3)	**21.8** (18.1-25.5)	**25.4** (20.7-30.2)	**28.4** (22.7-33.9)
20-day	**6.07** (5.35-6.92)	**8.31** (7.30-9.48)	**11.4** (9.99-13.1)	**13.8** (12.0-15.9)	**17.2** (14.8-19.8)	**19.8** (16.9-23.0)	**22.5** (19.0-26.2)	**25.3** (21.1-29.7)	**29.2** (23.7-34.6)	**32.2** (25.7-38.5)
30-day	**7.10** (6.25-8.09)	**9.71** (8.55-11.1)	**13.3** (11.6-15.1)	**16.0** (13.9-18.3)	**19.7** (17.0-22.7)	**22.6** (19.3-26.2)	**25.5** (21.5-29.7)	**28.5** (23.7-33.4)	**32.5** (26.5-38.6)	**35.7** (28.5-42.7)
45-day	**8.71** (7.67-9.93)	**11.9** (10.4-13.5)	**16.1** (14.1-18.4)	**19.3** (16.9-22.2)	**23.7** (20.4-27.3)	**27.0** (23.0-31.2)	**30.3** (25.6-35.3)	**33.7** (28.0-39.5)	**38.2** (31.1-45.2)	**41.6** (33.2-49.7)
60-day	**10.1** (8.89-11.5)	**13.8** (12.1-15.7)	**18.6** (16.3-21.3)	**22.3** (19.5-25.6)	**27.3** (23.5-31.4)	**31.0** (26.5-35.9)	**34.7** (29.3-40.4)	**38.5** (32.1-45.1)	**43.5** (35.5-51.6)	**47.4** (37.8-56.6)

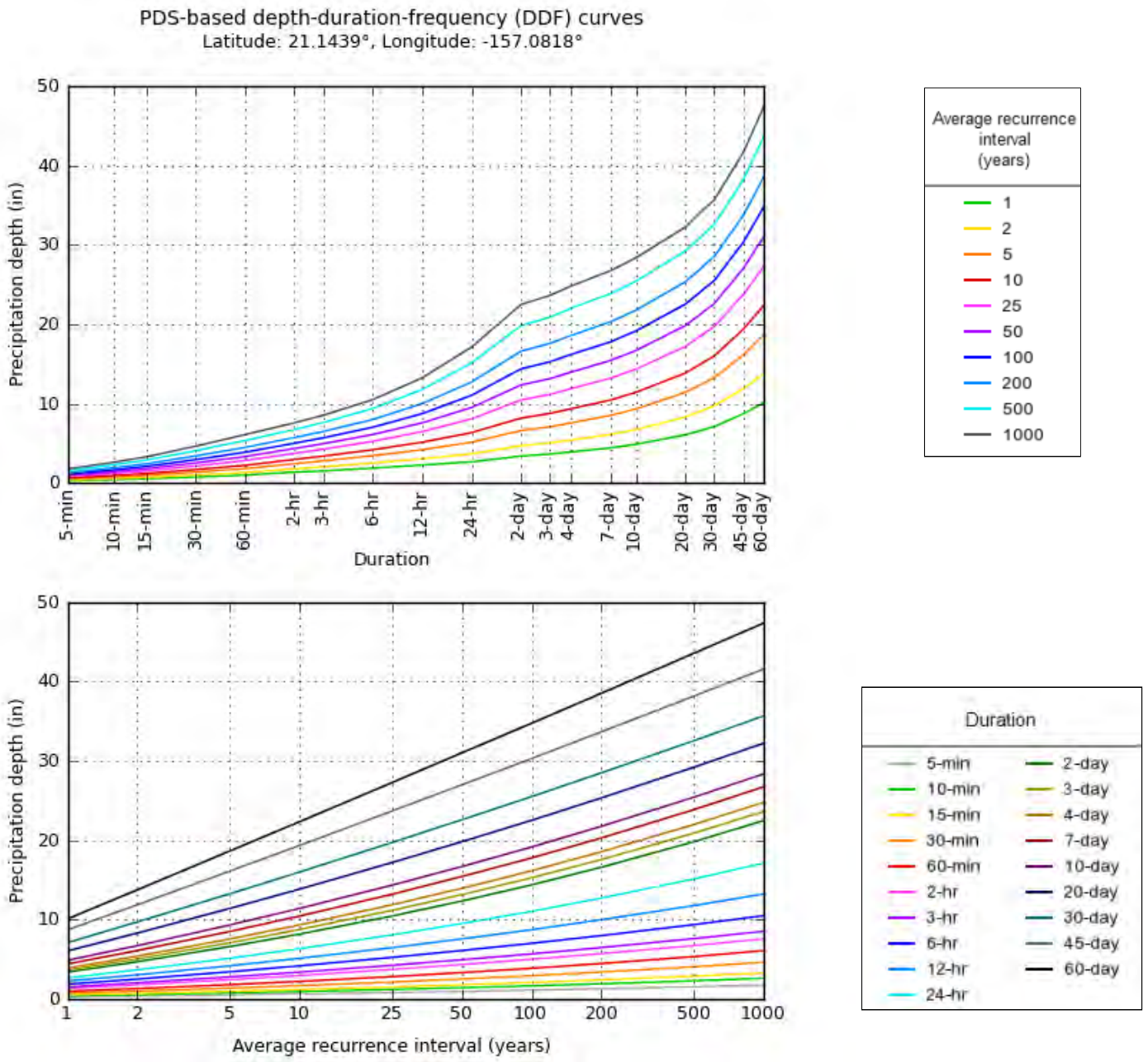
[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

Back to Top

PF graphical



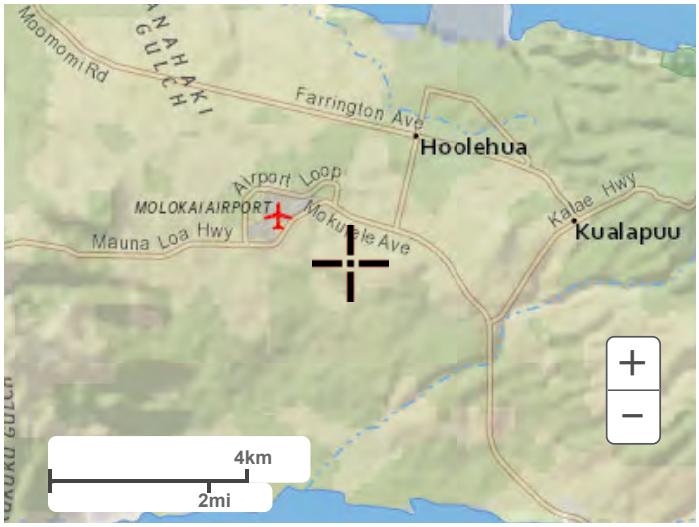
NOAA Atlas 14, Volume 4, Version 3

Created (GMT): Tue Feb 2 08:36:41 2021

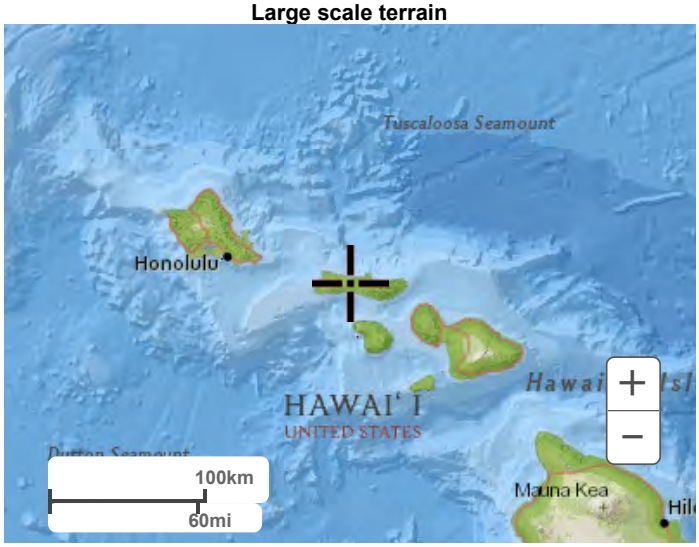
Back to Top

Maps & aerials

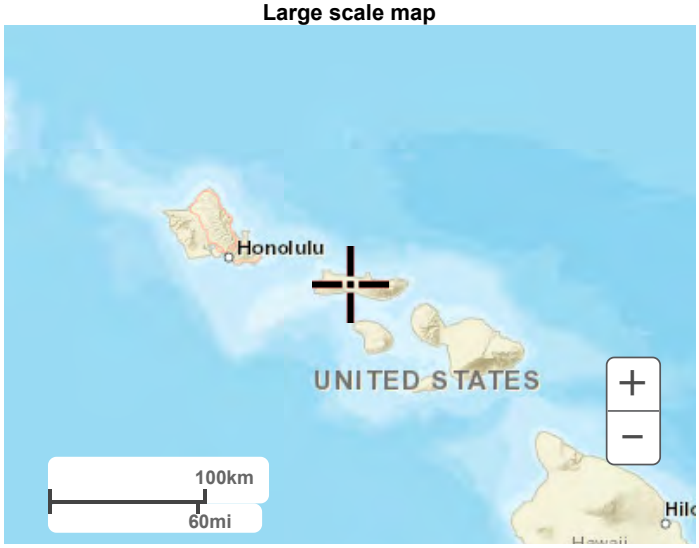
Small scale terrain



Large scale terrain



Large scale map



Large scale aerial

Back to Top

US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer

Culvert Report

8x6 BC (2-BARREL) (Farrington Culvert 10 YR)

Invert Elev Dn (ft)	=	327.00
Pipe Length (ft)	=	70.00
Slope (%)	=	1.00
Invert Elev Up (ft)	=	327.70
Rise (in)	=	72.0
Shape	=	Box
Span (in)	=	96.0
No. Barrels	=	2
n-Value	=	0.013
Culvert Type	=	Flared Wingwalls
Culvert Entrance	=	30D to 75D wingwall flares
Coeff. K,M,c,Y,k	=	0.026, 1, 0.0347, 0.81, 0.4

Embankment

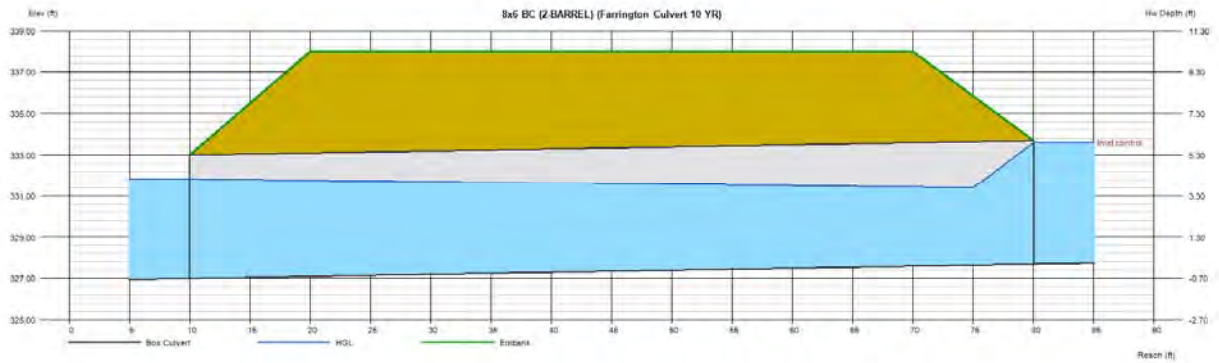
Top Elevation (ft)	=	338.00
Top Width (ft)	=	50.00
Crest Width (ft)	=	10.00

Calculations

Qmin (cfs)	=	638.69
Qmax (cfs)	=	638.69
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	638.69
Qpipe (cfs)	=	638.69
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	8.26
Veloc Up (ft/s)	=	10.88
HGL Dn (ft)	=	331.83
HGL Up (ft)	=	331.37
Hw Elev (ft)	=	333.60
Hw/D (ft)	=	0.98
Flow Regime	=	Inlet Control



Culvert Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Friday, Dec 10 2021

13x8 BC (2-BARREL) (Farrington Culvert 100 YR)

Invert Elev Dn (ft)	=	327.00
Pipe Length (ft)	=	70.00
Slope (%)	=	1.00
Invert Elev Up (ft)	=	327.70
Rise (in)	=	96.0
Shape	=	Box
Span (in)	=	156.0
No. Barrels	=	2
n-Value	=	0.013
Culvert Type	=	Flared Wingwalls
Culvert Entrance	=	30D to 75D wingwall flares
Coeff. K,M,c,Y,k	=	0.026, 1, 0.0347, 0.81, 0.4

Embankment

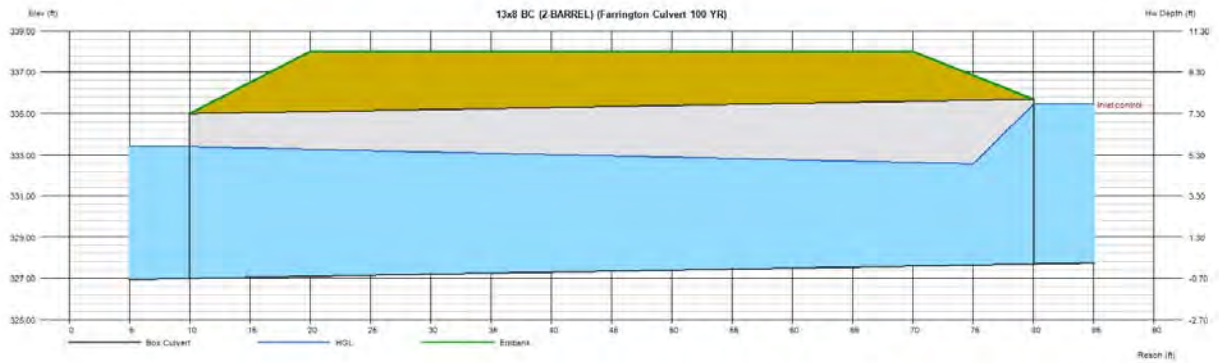
Top Elevation (ft)	=	338.00
Top Width (ft)	=	50.00
Crest Width (ft)	=	10.00

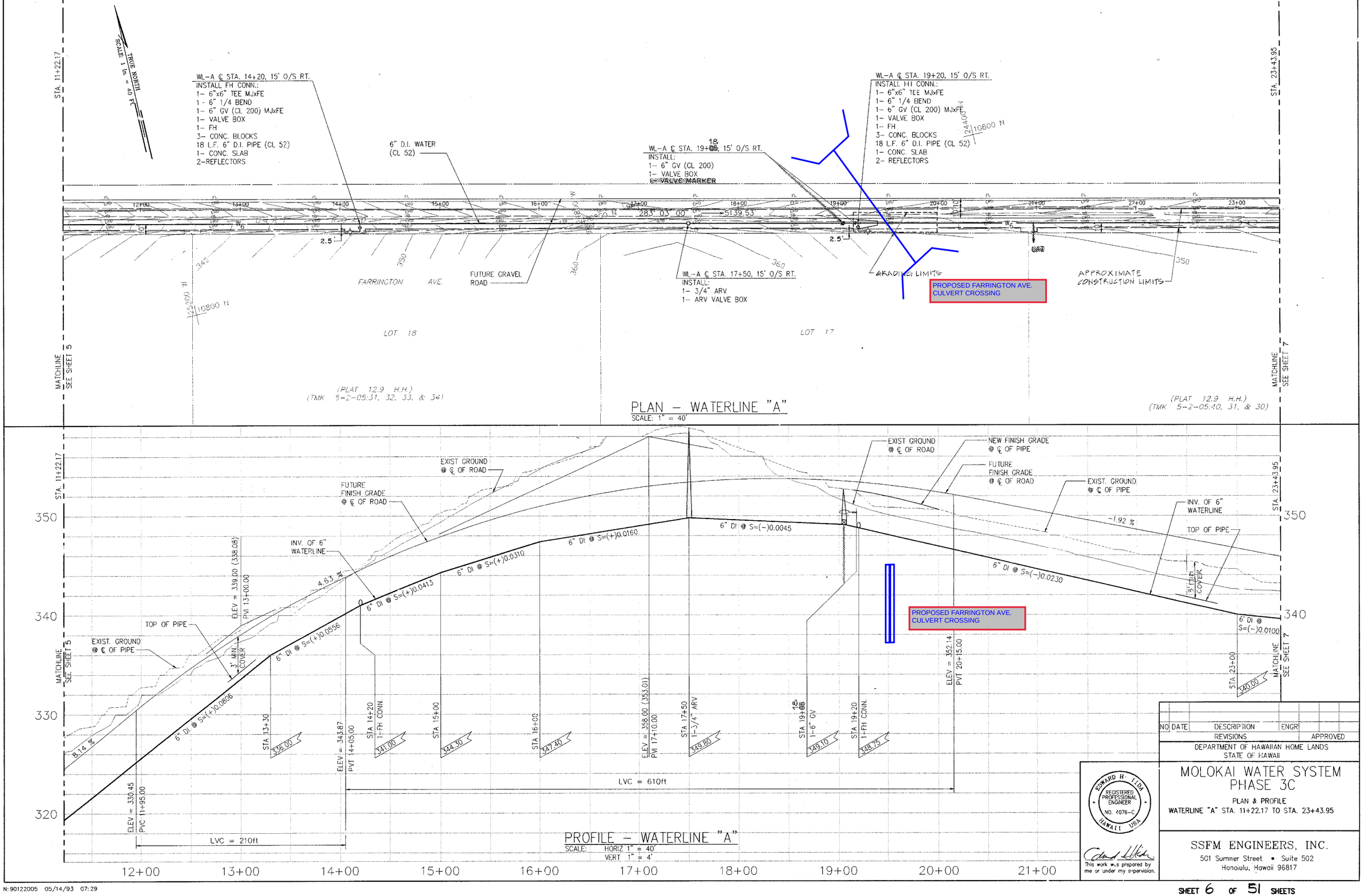
Calculations

Qmin (cfs)	=	1564.39
Qmax (cfs)	=	1564.39
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	1564.39
Qpipe (cfs)	=	1564.39
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	9.39
Veloc Up (ft/s)	=	12.48
HGL Dn (ft)	=	333.41
HGL Up (ft)	=	332.52
Hw Elev (ft)	=	335.46
Hw/D (ft)	=	0.97
Flow Regime	=	Inlet Control





NO	DATE	DESCRIPTION	ENGR
		REVISIONS	APPROVED

DEPARTMENT OF HAWAIIAN HOME LANDS
STATE OF HAWAII

MOLOKAI WATER SYSTEM PHASE 3C

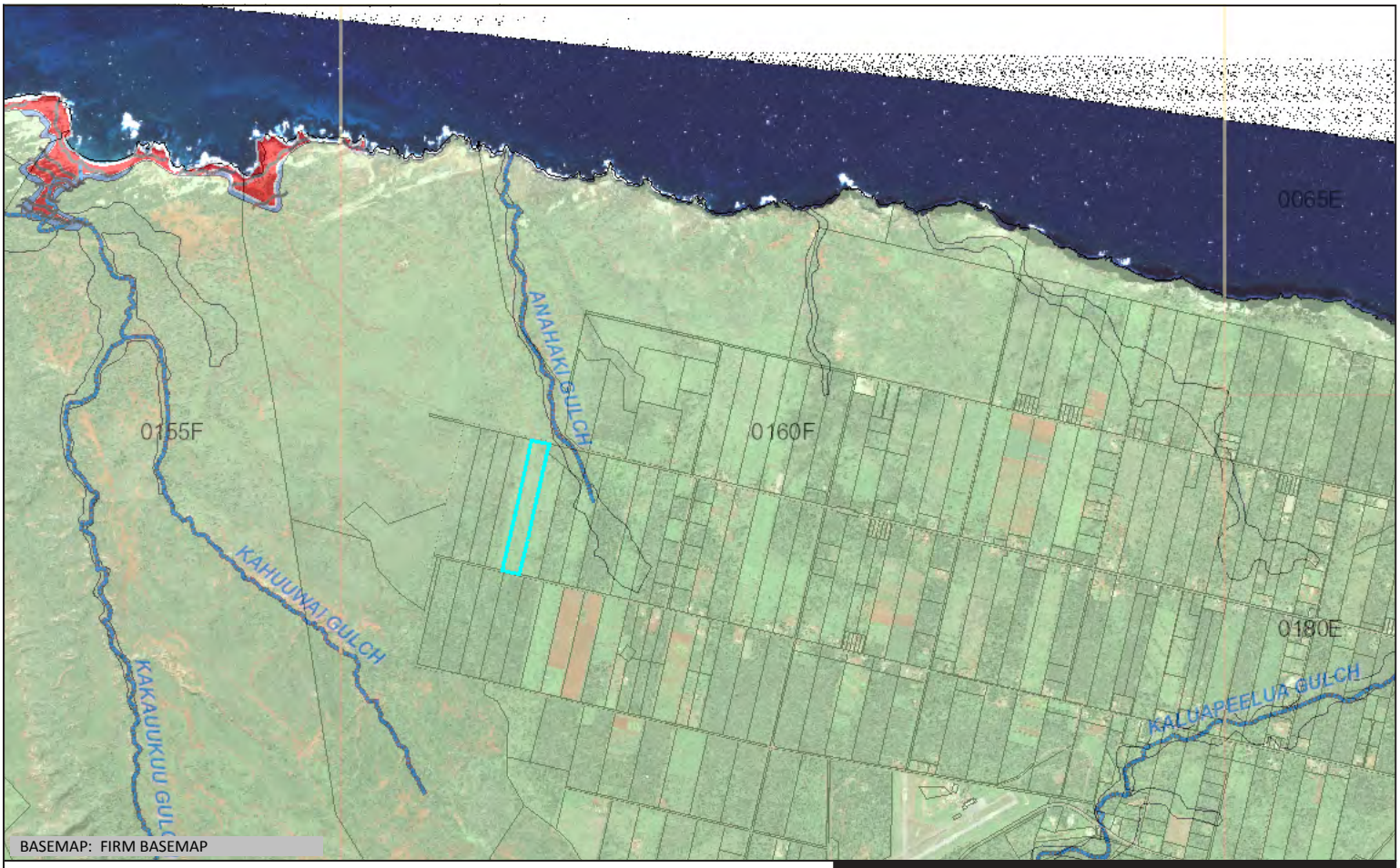
PLAN & PROFILE
WATERLINE "A" STA. 11+22.17 TO STA. 23+43.95

EDWARD H. LIDA
REGISTERED PROFESSIONAL ENGINEER
NO. 4076-C
HAWAII, USA

This work was prepared by me or under my supervision.

SSFM ENGINEERS, INC.
501 Sumner Street • Suite 502
Honolulu, Hawaii 96817

N:90122005 05/14/93 07:29



Flood Hazard Assessment Report

www.hawaiinfip.org

Property Information

COUNTY:	MAUI
TMK NO:	(2) 5-2-005:031
WATERSHED:	MANEOPAPA; MOOMOMI
PARCEL ADDRESS:	ADDRESS NOT DETERMINED HOOLEHUA, HI 96729

Notes:

Flood Hazard Information

FIRM INDEX DATE:	NOVEMBER 04, 2015
LETTER OF MAP CHANGE(S):	NONE
FEMA FIRM PANEL:	1500030160F
PANEL EFFECTIVE DATE:	NOVEMBER 04, 2015

THIS PROPERTY IS WITHIN A TSUNAMI EVACUTION ZONE: NO
FOR MORE INFO, VISIT: http://www.scd.hawaii.gov/

THIS PROPERTY IS WITHIN A DAM EVACUATION ZONE: NO
FOR MORE INFO, VISIT: http://dlnreng.hawaii.gov/dam/

0 0.60 1.20 mi

Disclaimer: The Hawaii Department of Land and Natural Resources (DLNR) assumes no responsibility arising from the use, accuracy, completeness, and timeliness of any information contained in this report. Viewers/Users are responsible for verifying the accuracy of the information and agree to indemnify the DLNR, its officers, and employees from any liability which may arise from its use of its data or information.

If this map has been identified as 'PRELIMINARY', please note that it is being provided for informational purposes and is not to be used for flood insurance rating. Contact your county floodplain manager for flood zone determinations to be used for compliance with local floodplain management regulations.

FLOOD HAZARD ASSESSMENT TOOL LAYER LEGEND
(*Note: legend does not correspond with NFHL)*

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD - The 1% annual chance flood (100-year), also know as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. SFHAs include Zone A, AE, AH, AO, V, and VE. The Base Flood Elevation (BFE) is the water surface elevation of the 1% annual chance flood. Mandatory flood insurance purchase applies in these zones:

	Zone A: No BFE determined.
	Zone AE: BFE determined.
	Zone AH: Flood depths of 1 to 3 feet (usually areas of ponding); BFE determined.
	Zone AO: Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined.
	Zone V: Coastal flood zone with velocity hazard (wave action); no BFE determined.
	Zone VE: Coastal flood zone with velocity hazard (wave action); BFE determined.
	Zone AEF: Floodway areas in Zone AE. The floodway is the channel of stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without increasing the BFE.

NON-SPECIAL FLOOD HAZARD AREA - An area in a low-to-moderate risk flood zone. No mandatory flood insurance purchase requirements apply, but coverage is available in participating communities.

	Zone XS (X shaded): Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.
	Zone X: Areas determined to be outside the 0.2% annual chance floodplain.

OTHER FLOOD AREAS

	Zone D: Unstudied areas where flood hazards are undetermined, but flooding is possible. No mandatory flood insurance purchase apply, but coverage is available in participating communities.

APPENDIX B

Water Calculations

EXISTING HOOLEHUA
DESIGN CRITERIA for Water System

1. Design Average Flow = 600 Gals/lot

2. C Values:

    4", 6" dia pipe (ductile iron) = 100
    8", 12" dia pipe (ductile iron) = 110
    16", 20" dia pipe (ductile iron)=120

3. Fire Flow = 500 GPM

4. Demand Factors

    Maximum Daily Demand = 1.5 x Average Day
    Peak Hour Demand = 3.0 x Average Day

5. Starting HGL of 764' was used based on data from an existing Pressure Breaker Tank near the intersection of Kulea Street and Moomomi Avenue.

6. The Capacity of the distribution system shall deliver the maximum daily demand simultaneously with the required fire flow.

7. The distribution system shall deliver the peak hour flow (without fire flow).

8. Peak Hour flow shall have a minimum residual pressure of 40 psi. The WaterCAD model computes system pressures at all lot connections at the same time during Peak Flow (Peak Hour Demand).

9. Maximum daily flow + fire flow will have a minimum residual pressure of 20 psi at critical fire hydrant. The WaterCAD model computes system pressures at each hydrant location individually at the required 500 GPM Fire Flow while applying the Max Daily Flow demand at the lots within the project site.

10. Water System data was based on DHHL ArcGIS Webmap (Revised 02_01_15) and as-built plans provided by DHHL.

11. PRV pressure assumed to be 80 psi.

		Alternative		
Scenario #	Scenario Name	Demand	Fire Flow	Steady State / EPS Solver Calculation Options
1	Existing Peak Hour Demand_600Gal per Lot	Peak Hour_600Gal per Lot	No Fire Flow	Base Calculation Options
2	Existing Fire Flow Max Daily_600Gal per Lot	Max Daily_600Gal per Lot	Fire Flow	Base Fire Flow

Scenario #1 (Existing Peak Hour Demand_600Gal per Lot)

This WaterCAD model scenario using the alternative parameters listed in the table above, calculates system pressures at relevant nodes/junctions (in this case, the existing nodes/junctions at Naiwa Subdivision and Hoolehua Lots). Using the Design Criteria for Design Average Flow of 600 Gal / lot, Peak Hour Demands were calculated and assigned for each lot (please refer to the column "DESIGN PEAK HOUR FLOW" under the "EXISTING DEMANDS" tab of this spreadsheet). In accordance with section 111.04 (System Capacity) of the Water System Standards 2002, only Peak Hour Demands (without Fire Flows) were used to calculate pressures at each lot node/junction. This model scenario resulted in residual pressures higher than the required minimum 40 psi residual pressures (as per section 111.06 item #2 of the Water System Standards), with the lowest pressure being 71 psi located at node/junction designated as "*J-8* " (please refer to "EXISTING PEAK HOUR JUNCTIONS" tab of this spreadsheet).

Scenario #2 (Existing Fire Flow Max Daily_600Gal per Lot)

This WaterCAD model scenario using the alternative parameters listed in the table above, calculates system pressures at designated existing Fire Hydrant nodes/junctions. Using the design criteria of 500gpm for fire flow, each existing hydrant pressure is calculated individually (one hydrant at a time) by the model to ensure that the Fire Flow system constraints are met (Fire Flow = 500 gpm, Min Residual Pressure = 20 psi). Along with the discussed Fire Flow system constraints, Max Daily Demands to the relevant lot nodes/junctions (please refer to column "DESIGN MAX DAILY FLOW" under the "EXISTING DEMANDS" tab of this spreadsheet) are applied at the same time. This model scenario resulted in residual pressures higher than the required minimum 20 psi residual pressures (as per section 111.06 item #1 of the Water System Standards), with the lowest pressure being 49 psi located at node/junction designated as "*H-1* " (please refer to "EXISTING FIRE FLOW - JUNCTIONS" tab of this spreadsheet).

EXISTING HOOLEHUA SUBDIVISION DEMANDS

NODE	LOT	AREA (ac)	DESIGN AVG. FLOW (GPM)	MAX DAILY FLOW FACTOR	DESIGN MAX DAILY FLOW (GPM)	PEAK FLOW FACTOR	DESIGN PEAK HOUR FLOW (GPM)	ELEV (FT)	STATIC PRESSURE (PSI)
lot1	lot1	5	0.42	1.5	0.62	3	1.25	366.02	172.29
lot2	lot2	5	0.42	1.5	0.62	3	1.25	361.58	174.21
lot3	lot3	5.4	0.42	1.5	0.62	3	1.25	352.13	178.30
lot4	lot4	5.7	0.42	1.5	0.62	3	1.25	352.90	177.97
lot5	lot5	5.4	0.42	1.5	0.62	3	1.25	354.77	177.16
lot6	lot6	5.4	0.42	1.5	0.62	3	1.25	404.40	155.67
lot7	lot7	5.5	0.42	1.5	0.62	3	1.25	420.02	148.91
lot8	lot8	5.5	0.42	1.5	0.62	3	1.25	421.33	148.34
lot9_10_11_12	lot9_10_11_12	4	0.42	1.5	0.62	3	1.25	439.35	140.54
		6.7	0.42	1.5	0.62	3	1.25	439.35	140.54
		8.5	0.42	1.5	0.62	3	1.25	439.35	140.54
		5	0.42	1.5	0.62	3	1.25	439.35	140.54
lot13	lot13	5	0.42	1.5	0.62	3	1.25	426.96	145.90
lot14	lot14	5	0.42	1.5	0.62	3	1.25	431.34	144.01
lot15	lot15	4	0.42	1.5	0.62	3	1.25	457.02	132.89
lot16	lot16	4	0.42	1.5	0.62	3	1.25	459.63	131.76
lot17	lot17	4	0.42	1.5	0.62	3	1.25	488.52	119.26
lot18	lot18	4	0.42	1.5	0.62	3	1.25	490.27	118.50
lot19	lot19	4	0.42	1.5	0.62	3	1.25	496.41	115.84
lot20	lot20	4.2	0.42	1.5	0.62	3	1.25	501.64	113.58
lot21	lot21	7.3	0.42	1.5	0.62	3	1.25	480.71	122.64
lot22	lot22	5	0.42	1.5	0.62	3	1.25	502.20	113.33
lot23	lot23	4	0.42	1.5	0.62	3	1.25	465.13	129.38
lot24	lot24	4	0.42	1.5	0.62	3	1.25	451.86	135.13
lot25_26	lot25_26	6.9	0.42	1.5	0.62	3	1.25	425.79	146.41
		6.8	0.42	1.5	0.62	3	1.25	425.79	146.41
lot27	lot27	4	0.42	1.5	0.62	3	1.25	419.08	149.32
lot28	lot28	5.3	0.42	1.5	0.62	3	1.25	373.10	169.22
lot29	lot29	5.3	0.42	1.5	0.62	3	1.25	369.05	170.97
lot30	lot30	5.3	0.42	1.5	0.62	3	1.25	351.53	178.56
lot31	lot31	5.3	0.42	1.5	0.62	3	1.25	351.26	178.68
lot32	lot32	5	0.42	1.5	0.62	3	1.25	409.95	153.27
lot33_34_35_36	lot33_34_35_36	5	0.42	1.5	0.62	3	1.25	400.35	157.42
		6	0.42	1.5	0.62	3	1.25	400.35	157.42
		5.8	0.42	1.5	0.62	3	1.25	400.35	157.42
		5.1	0.42	1.5	0.62	3	1.25	400.35	157.42
lot37	lot37	5.1	0.42	1.5	0.62	3	1.25	404.87	155.47
lot38	lot38	6.3	0.42	1.5	0.62	3	1.25	428.79	145.11
lot39	lot39	5	0.42	1.5	0.62	3	1.25	439.48	140.48
lot40	lot40	5.1	0.42	1.5	0.62	3	1.25	435.12	142.37
lot41	lot41	5.9	0.42	1.5	0.62	3	1.25	429.59	144.77
lot42	lot42	4.7	0.42	1.5	0.62	3	1.25	427.28	145.77
lot43	lot43	5.1	0.42	1.5	0.62	3	1.25	436.88	141.61
lot44	lot44	5.1	0.42	1.5	0.62	3	1.25	440.07	140.23
lot45	lot45	4.5	0.42	1.5	0.62	3	1.25	395.05	159.72
lot46	lot46	8	0.42	1.5	0.62	3	1.25	394.31	160.04
lot47	lot47	5.2	0.42	1.5	0.62	3	1.25	392.70	160.74
lot48	lot48	5.2	0.42	1.5	0.62	3	1.25	395.94	159.33
lot49	lot49	5.2	0.42	1.5	0.62	3	1.25	400.11	157.53
lot50	lot50	5.4	0.42	1.5	0.62	3	1.25	400.09	157.54
lot51	lot51	5.4	0.42	1.5	0.62	3	1.25	400.07	157.55
lot52	lot52	5.2	0.42	1.5	0.62	3	1.25	399.42	157.83
lot53	lot53	5.8	0.42	1.5	0.62	3	1.25	392.34	160.89
lot54	lot54	6	0.42	1.5	0.62	3	1.25	389.74	162.02
lot55	lot55	5.3	0.42	1.5	0.62	3	1.25	389.66	162.05
lot56	lot56	5.3	0.42	1.5	0.62	3	1.25	391.82	161.12
lot57	lot57	5.3	0.42	1.5	0.62	3	1.25	394.01	160.17
lot58	lot58	4.3	0.42	1.5	0.62	3	1.25	394.62	159.90
LOT 17A	LOT 17A	1.95	0.42	1.5	0.62	3	1.25	362.99	173.60
LOT 17B	LOT 17B	1.95	0.42	1.5	0.62	3	1.25	364.26	173.05
LOT 17C	LOT 17C	6	0.42	1.5	0.62	3	1.25	400.00	157.58
LOT 17D	LOT 17D	6	0.42	1.5	0.62	3	1.25	400.00	157.58
LOT 17E	LOT 17E	1.95	0.42	1.5	0.62	3	1.25	378.59	166.84
LOT 17F	LOT 17F	1.95	0.42	1.5	0.62	3	1.25	378.00	167.10
LOT 17G	LOT 17G	6	0.42	1.5	0.62	3	1.25	366.53	172.06
LOT 17H	LOT 17H	6	0.42	1.5	0.62	3	1.25	365.09	172.69
LOT 104D-1A	LOT 104D-1A	1	0.42	1.5	0.62	3	1.25	435.49	142.21
LOT 104D-1B	LOT 104D-1B	3	0.42	1.5	0.62	3	1.25	418.36	149.63
LOT 104D-1C	LOT 104D-1C	3.2	0.42	1.5	0.62	3	1.25	418.36	149.63
LOT 104D-1D	LOT 104D-1D	12.8	0.42	1.5	0.62	3	1.25	410.00	153.25

EXISTING HOOLEHUA SUBDIVISION
EXISTING PEAK HOUR TEST - EXISTING DEMANDS (SORTED BY PRESSURE)

FlexTable: Junction Table

Label	Elevation (ft)	Demand Collection	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
H-1	649.53	<Collection: 0 items>	0	763.99	50
J-8	600.05	<Collection: 0 items>	0	763.99	71
J-188	600.04	<Collection: 0 items>	0	763.99	71
FH 39+20 FARRINGTON	400.88	<Collection: 0 items>	0	585.97	80
FH 25+10 MOOMOMI	403.52	<Collection: 0 items>	0	588.72	80
J-195	566.49	<Collection: 0 items>	0	763.98	85
FH 34+20 FARRINGTON	388.1	<Collection: 0 items>	0	585.97	86
J-206	518.17	<Collection: 0 items>	0	724.97	89
FH 20+10 MOOMOMI	381.5	<Collection: 0 items>	0	588.72	90
J-190	380.74	<Collection: 0 items>	0	588.72	90
LOT 17F	379.04	<Collection: 1 item>	1.25	588.72	91
LOT 17E	379.04	<Collection: 1 item>	1.25	588.72	91
J-189	545.83	<Collection: 0 items>	0	763.99	94
LOT 17G	366.66	<Collection: 1 item>	1.25	588.72	96
LOT 17B	363.67	<Collection: 1 item>	1.25	585.96	96
H-240	365.58	<Collection: 0 items>	0	588.72	97
LOT 17H	364.2	<Collection: 1 item>	1.25	588.72	97
LOT 17A	361.32	<Collection: 1 item>	1.25	585.96	97
J-7	538.69	<Collection: 0 items>	0	763.9	97
LOT 17D	360	<Collection: 1 item>	1.25	585.96	98
H-241	360	<Collection: 0 items>	0	585.96	98
LOT 17C	360	<Collection: 1 item>	1.25	585.96	98
J-200	359.05	<Collection: 0 items>	0	585.96	98
FH 29+18 FARRINGTON	354.14	<Collection: 0 items>	0	585.97	100
J-196	531.95	<Collection: 0 items>	0	763.98	100
FH 19+20 FARRINGTON	348.75	<Collection: 0 items>	0	585.96	103
J-208	520.12	<Collection: 0 items>	0	763.98	106
H-247	518.27	<Collection: 0 items>	0	763.98	106
FH 24+20 FARRINGTON	338.8	<Collection: 0 items>	0	585.96	107
FH 64+20 FARRINGTON	478.11	<Collection: 0 items>	0	726.96	108
FH 59+22 FARRINGTON	466.26	<Collection: 0 items>	0	726.96	113
H-246	496.95	<Collection: 0 items>	0	763.98	116
FH 69+10 FARRINGTON	459.53	<Collection: 0 items>	0	726.96	116
H-245	474.85	<Collection: 0 items>	0	763.98	125
FH 74+10 FARRINGTON	436.52	<Collection: 0 items>	0	726.96	126
FH 84+10 FARRINGTON	434.2	<Collection: 0 items>	0	726.97	127
FH 88+90 FARRINGTON	430.62	<Collection: 0 items>	0	726.97	128
FH 79+10 FARRINGTON	430.2	<Collection: 0 items>	0	726.96	128
FH 54+20 FARRINGTON	430.07	<Collection: 0 items>	0	726.96	128
FH 85+10 MOOMOMI	420.98	<Collection: 0 items>	0	724.97	132
H-244	456.05	<Collection: 0 items>	0	763.98	133
FH 49+18 FARRINGTON	411.69	<Collection: 0 items>	0	726.96	136
FH 44+20 FARRINGTON	411.35	<Collection: 0 items>	0	726.96	137
FH 80+08 MOOMOMI	408.7	<Collection: 0 items>	0	724.97	137
FH 30+10 MOOMOMI	400.9	<Collection: 0 items>	0	724.96	140
FH 75+10 MOOMOMI	400.12	<Collection: 0 items>	0	724.97	141
FH 70+08 MOOMOMI	399.8	<Collection: 0 items>	0	724.97	141
H-243	438.65	<Collection: 0 items>	0	763.98	141
J-197	436.82	<Collection: 0 items>	0	763.98	142
LOT 104D-1A	435.69	<Collection: 1 item>	1.25	763.98	142
FH 65+10 MOOMOMI	396.5	<Collection: 0 items>	0	724.96	142
FH 60+10 MOOMOMI	382.4	<Collection: 0 items>	0	724.96	148

FH 40+08 MOOMOMI	381.9	<Collection: 0 items>	0	724.96	148
FH 45+10 MOOMOMI	381.63	<Collection: 0 items>	0	724.96	149
H-242	419.46	<Collection: 0 items>	0	763.98	149
FH 35+10 MOOMOMI	379.5	<Collection: 0 items>	0	724.96	149
LOT 104D-1B	417.97	<Collection: 1 item>	1.25	763.98	150
FH 55+10 MOOMOMI	371.55	<Collection: 0 items>	0	724.96	153
FH 50+08 MOOMOMI	369.7	<Collection: 0 items>	0	724.96	154

EXISTING NAIWA SUBDIVISION
EXISTING PEAK HOUR TEST - EXISTING DEMANDS (SORTED BY VELOCITY)

FlexTable: Pipe Table

Label	ID	Length (Scaled) (ft)	Start Node	Stop Node	Diameter (in)	Material	Hazen-Williams C	Minor Loss Coefficient (Local)	Flow (gpm)	Velocity (ft/s)	Headloss Gradient (ft/ft)	Has User Defined Length?	Headloss (ft)
P-260	467	84	J-1	H-45	6	Ductile Iron	100	0	0	0	0	FALSE	0
P-261	468	262	H-45	lot28	6	Ductile Iron	100	0	0	0	0	FALSE	0
P-127	249	61	lot44	J-4	6	Ductile Iron	100	0	0	0	0	FALSE	0
P-220	399	97	lot4	lot3	8	Ductile Iron	110	0	0.27	0	0	FALSE	0
P-229	413	409	lot3	H-38	8	Ductile Iron	110	0	-0.98	0.01	0	FALSE	0
P-230	414	381	H-38	lot2	8	Ductile Iron	110	0	-0.98	0.01	0	FALSE	0
P-368	703	3240	J-195	J-196	12	Ductile Iron	110	0	2.5	0.01	0	FALSE	0
P-354	632	70	lot50	lot49	8	Ductile Iron	110	0	1.25	0.01	0	FALSE	0
P-386	737	2192	J-189	PRV-PR B2	16	Ductile Iron	120	0	5	0.01	0	FALSE	0
P-387	738	1125	PRV-PR B2	J-206	16	Ductile Iron	120	0	5	0.01	0	FALSE	0
P-233	422	97	H-39	lot4	8	Ductile Iron	110	0	1.52	0.01	0	FALSE	0
P-236	428	392	lot5	H-40	8	Ductile Iron	110	0	1.52	0.01	0	FALSE	0
P-237	429	356	H-40	H-39	8	Ductile Iron	110	0	1.52	0.01	0	FALSE	0
P-130	255	55	lot43	H-22	6	Ductile Iron	100	0	1.25	0.01	0	FALSE	0
P-131	256	53	H-22	lot44	6	Ductile Iron	100	0	1.25	0.01	0	FALSE	0
P-450	833	34	LOT 17G	H-240	6	Ductile Iron	100	0	1.25	0.01	0	FALSE	0
P-451	834	44	H-240	LOT 17H	6	Ductile Iron	100	0	1.25	0.01	0	FALSE	0
P-452	836	31	LOT 17C	H-241	6	Ductile Iron	100	0	1.25	0.01	0	FALSE	0
P-453	837	34	H-241	LOT 17D	6	Ductile Iron	100	0	1.25	0.01	0	FALSE	0
P-454	839	358	LOT 104D-1A	H-242	6	Ductile Iron	100	0	1.25	0.01	0	FALSE	0
P-455	840	33	H-242	LOT 104D-1B	6	Ductile Iron	100	0	1.25	0.01	0	FALSE	0
P-244	441	107	lot28	lot29	6	Ductile Iron	100	0	-1.25	0.01	0	FALSE	0
P-224	405	103	lot2	J-50	8	Ductile Iron	110	0	-2.23	0.01	0	FALSE	0
P-226	408	75	J-50	lot1	8	Ductile Iron	110	0	-2.23	0.01	0	FALSE	0
P-356	635	44	lot51	lot50	8	Ductile Iron	110	0	2.5	0.02	0	FALSE	0
P-382	729	3317	J-196	J-208	8	Ductile Iron	110	0	2.5	0.02	0	FALSE	0
P-457	843	55	H-243	J-197	8	Ductile Iron	110	0	2.5	0.02	0	FALSE	0
P-459	846	519	H-244	H-243	8	Ductile Iron	110	0	2.5	0.02	0	FALSE	0
P-461	849	561	H-245	H-244	8	Ductile Iron	110	0	2.5	0.02	0	FALSE	0
P-463	852	659	H-246	H-245	8	Ductile Iron	110	0	2.5	0.02	0	FALSE	0
P-464	854	55	J-208	H-247	8	Ductile Iron	110	0	2.5	0.02	0	FALSE	0
P-465	855	636	H-247	H-246	8	Ductile Iron	110	0	2.5	0.02	0	FALSE	0
P-239	433	320	J-9	H-41	8	Ductile Iron	110	0	2.77	0.02	0	FALSE	0
P-312	553	185	lot5	H-41	8	Ductile Iron	110	0	-2.77	0.02	0	FALSE	0
P-361	689	5593	J-188	J-189	16	Ductile Iron	120	0	12.5	0.02	0	FALSE	0
P-367	701	3255	J-189	J-195	12	Ductile Iron	110	0	7.5	0.02	0	FALSE	0
P-208	380	247	J-41	H-35	8	Ductile Iron	110	0	-3.48	0.02	0	FALSE	0
P-209	381	94	H-35	lot27	8	Ductile Iron	110	0	-3.48	0.02	0	FALSE	0
P-211	385	324	J-2	H-36	8	Ductile Iron	110	0	-3.48	0.02	0	FALSE	0
P-212	386	105	H-36	J-41	8	Ductile Iron	110	0	-3.48	0.02	0	FALSE	0
P-227	409	255	lot1	J-2	8	Ductile Iron	110	0	-3.48	0.02	0	FALSE	0
P-350	626	65	lot52	H-68	8	Ductile Iron	110	0	3.75	0.02	0	FALSE	0
P-355	634	53	H-68	lot51	8	Ductile Iron	110	0	3.75	0.02	0	FALSE	0
P-135	263	301	lot42	lot43	6	Ductile Iron	100	0	2.5	0.03	0	FALSE	0
P-365	697	340	LOT 17F	LOT 17G	6	Ductile Iron	100	0	2.5	0.03	0	FALSE	0
P-370	707	32	J-197	LOT 104D-1A	6	Ductile Iron	100	0	2.5	0.03	0	FALSE	0
P-376	719	350	LOT 17B	LOT 17C	6	Ductile Iron	100	0	2.5	0.03	0	FALSE	0
P-254	456	79	H-43	lot30	6	Ductile Iron	100	0	-2.5	0.03	0	FALSE	0
P-257	462	203	lot29	H-44	6	Ductile Iron	100	0	-2.5	0.03	0	FALSE	0
P-258	463	536	H-44	H-43	6	Ductile Iron	100	0	-2.5	0.03	0	FALSE	0
P-190	351	96	lot27	lot25_26	8	Ductile Iron	110	0	-4.73	0.03	0	FALSE	0
P-352	629	85	lot48	lot52	8	Ductile Iron	110	0	5	0.03	0	FALSE	0
P-388	740	1898	J-195	PRV-PR B3	8	Ductile Iron	110	0	5	0.03	0	FALSE	0
P-395	750	293	FH 30+10 MOOMOMI	PRV-PR C1	8	Ductile Iron	110	0	5	0.03	0	FALSE	0
P-397	753	464	FH 35+10 MOOMOMI	FH 30+10 MOOMOMI	8	Ductile Iron	110	0	5	0.03	0	FALSE	0
P-399	756	602	FH 40+08 MOOMOMI	FH 35+10 MOOMOMI	8	Ductile Iron	110	0	5	0.03	0	FALSE	0
P-403	762	434	FH 45+10 MOOMOMI	FH 40+08 MOOMOMI	8	Ductile Iron	110	0	5	0.03	0	FALSE	0
P-405	765	450	FH 50+08 MOOMOMI	FH 45+10 MOOMOMI	8	Ductile Iron	110	0	5	0.03	0	FALSE	0

P-407	768	510	FH 55+10 MOOMOMI	FH 50+08 MOOMOMI	8	Ductile Iron	110	0	5	0.03	0	FALSE	0
P-409	771	549	FH 60+10 MOOMOMI	FH 55+10 MOOMOMI	8	Ductile Iron	110	0	5	0.03	0	FALSE	0
P-411	774	469	FH 65+10 MOOMOMI	FH 60+10 MOOMOMI	8	Ductile Iron	110	0	5	0.03	0	FALSE	0
P-413	777	476	FH 70+08 MOOMOMI	FH 65+10 MOOMOMI	8	Ductile Iron	110	0	5	0.03	0	FALSE	0
P-415	780	570	FH 75+10 MOOMOMI	FH 70+08 MOOMOMI	8	Ductile Iron	110	0	5	0.03	0	FALSE	0
P-417	783	546	FH 80+08 MOOMOMI	FH 75+10 MOOMOMI	8	Ductile Iron	110	0	5	0.03	0	FALSE	0
P-418	785	3755	J-206	FH 85+10 MOOMOMI	8	Ductile Iron	110	0	5	0.03	0	FALSE	0.01
P-419	786	401	FH 85+10 MOOMOMI	FH 80+08 MOOMOMI	8	Ductile Iron	110	0	5	0.03	0	FALSE	0
P-431	804	431	FH 44+20 FARRINGTON	PRV-PR C2	8	Ductile Iron	110	0	5	0.03	0	FALSE	0
P-433	807	496	FH 49+18 FARRINGTON	FH 44+20 FARRINGTON	8	Ductile Iron	110	0	5	0.03	0	FALSE	0
P-435	810	478	FH 54+20 FARRINGTON	FH 49+18 FARRINGTON	8	Ductile Iron	110	0	5	0.03	0	FALSE	0
P-437	813	543	FH 59+22 FARRINGTON	FH 54+20 FARRINGTON	8	Ductile Iron	110	0	5	0.03	0	FALSE	0
P-439	816	452	FH 64+20 FARRINGTON	FH 59+22 FARRINGTON	8	Ductile Iron	110	0	5	0.03	0	FALSE	0
P-441	819	461	FH 69+10 FARRINGTON	FH 64+20 FARRINGTON	8	Ductile Iron	110	0	5	0.03	0	FALSE	0
P-443	822	554	FH 74+10 FARRINGTON	FH 69+10 FARRINGTON	8	Ductile Iron	110	0	5	0.03	0	FALSE	0
P-445	825	539	FH 79+10 FARRINGTON	FH 74+10 FARRINGTON	8	Ductile Iron	110	0	5	0.03	0	FALSE	0
P-447	828	503	FH 84+10 FARRINGTON	FH 79+10 FARRINGTON	8	Ductile Iron	110	0	5	0.03	0	FALSE	0
P-448	830	4814	PRV-PR B3	FH 88+90 FARRINGTON	8	Ductile Iron	110	0	5	0.03	0	FALSE	0.01
P-449	831	401	FH 88+90 FARRINGTON	FH 84+10 FARRINGTON	8	Ductile Iron	110	0	5	0.03	0	FALSE	0
P-351	628	97	lot53	lot48	8	Ductile Iron	110	0	6.25	0.04	0	FALSE	0
P-374	715	21	LOT 17A	LOT 17B	6	Ductile Iron	100	0	3.75	0.04	0	FALSE	0
P-134	262	70	J-5	lot42	6	Ductile Iron	100	0	3.75	0.04	0	FALSE	0
P-364	695	24	LOT 17E	LOT 17F	6	Ductile Iron	100	0	3.75	0.04	0	FALSE	0
P-248	447	104	lot30	lot31	6	Ductile Iron	100	0	-3.75	0.04	0	FALSE	0
P-193	356	382	lot25_26	lot24	8	Ductile Iron	110	0	-7.23	0.05	0	FALSE	0
P-347	622	77	H-67	lot53	8	Ductile Iron	110	0	7.5	0.05	0	FALSE	0
P-358	638	40	lot54	H-67	8	Ductile Iron	110	0	7.5	0.05	0	FALSE	0
P-275	490	429	J-9	H-46	8	Ductile Iron	110	0	-7.77	0.05	0	FALSE	0
P-276	491	41	H-46	lot6	8	Ductile Iron	110	0	-7.77	0.05	0	FALSE	0
P-313	564	284	J-6	H-54	12	Ductile Iron	110	0	17.5	0.05	0	FALSE	0
P-314	565	330	H-54	H-55	12	Ductile Iron	110	0	17.5	0.05	0	FALSE	0
P-315	566	237	H-55	H-56	12	Ductile Iron	110	0	17.5	0.05	0	FALSE	0
P-316	568	556	H-56	H-57	12	Ductile Iron	110	0	17.5	0.05	0	FALSE	0
P-319	574	418	H-57	J-63	12	Ductile Iron	110	0	17.5	0.05	0	FALSE	0
P-320	575	739	J-63	H-58	12	Ductile Iron	110	0	17.5	0.05	0	FALSE	0
P-321	576	346	H-58	H-59	12	Ductile Iron	110	0	17.5	0.05	0	FALSE	0
P-322	578	626	H-59	H-60	12	Ductile Iron	110	0	17.5	0.05	0	FALSE	0
P-323	580	560	H-60	H-61	12	Ductile Iron	110	0	17.5	0.05	0	FALSE	0
P-324	582	426	H-61	H-62	12	Ductile Iron	110	0	17.5	0.05	0	FALSE	0
P-325	584	593	H-62	H-63	12	Ductile Iron	110	0	17.5	0.05	0	FALSE	0
P-326	586	546	H-63	H-64	12	Ductile Iron	110	0	17.5	0.05	0	FALSE	0
P-327	588	63	H-64	J-168	12	Ductile Iron	110	0	17.5	0.05	0	FALSE	0
P-205	375	101	lot24	H-34	8	Ductile Iron	110	0	-8.48	0.05	0	FALSE	0
P-206	376	97	H-34	lot23	8	Ductile Iron	110	0	-8.48	0.05	0	FALSE	0
P-357	637	145	lot55	lot54	8	Ductile Iron	110	0	8.75	0.06	0	FALSE	0
P-284	505	194	J-11	H-49	6	Ductile Iron	100	0	5	0.06	0	FALSE	0
P-285	506	456	H-49	H-48	6	Ductile Iron	100	0	5	0.06	0	FALSE	0
P-294	521	118	lot37	H-51	6	Ductile Iron	100	0	5	0.06	0	FALSE	0
P-363	693	41	J-190	LOT 17E	6	Ductile Iron	100	0	5	0.06	0	FALSE	0
P-373	713	23	J-200	LOT 17A	6	Ductile Iron	100	0	5	0.06	0	FALSE	0
P-391	744	141	FH 20+10 MOOMOMI	J-190	6	Ductile Iron	100	0	5	0.06	0	FALSE	0
P-392	746	196	PRV-PR C1	FH 25+10 MOOMOMI	6	Ductile Iron	100	0	5	0.06	0	FALSE	0
P-393	747	513	FH 25+10 MOOMOMI	FH 20+10 MOOMOMI	6	Ductile Iron	100	0	5	0.06	0	FALSE	0
P-421	789	58	FH 19+20 FARRINGTON	J-200	6	Ductile Iron	100	0	5	0.06	0	FALSE	0
P-423	792	383	FH 24+20 FARRINGTON	FH 19+20 FARRINGTON	6	Ductile Iron	100	0	5	0.06	0	FALSE	0
P-425	795	599	FH 29+18 FARRINGTON	FH 24+20 FARRINGTON	6	Ductile Iron	100	0	5	0.06	0	FALSE	0
P-427	798	623	FH 34+20 FARRINGTON	FH 29+18 FARRINGTON	6	Ductile Iron	100	0	5	0.06	0	FALSE	0
P-428	800	48	PRV-PR C2	FH 39+20 FARRINGTON	6	Ductile Iron	100	0	5	0.06	0	FALSE	0
P-429	801	407	FH 39+20 FARRINGTON	FH 34+20 FARRINGTON	6	Ductile Iron	100	0	5	0.06	0	FALSE	0
P-250	450	333	lot31	H-42	6	Ductile Iron	100	0	-5	0.06	0	FALSE	0
P-251	451	81	H-42	J-9	6	Ductile Iron	100	0	-5	0.06	0	FALSE	0
P-265	475	376	lot6	lot7	8	Ductile Iron	110	0	-9.02	0.06	0	FALSE	0
P-202	370	233	lot23	H-33	8	Ductile Iron	110	0	-9.73	0.06	0	FALSE	0
P-203	371	77	H-33	lot21	8	Ductile Iron	110	0	-9.73	0.06	0	FALSE	0
P-345	619	184	lot56	lot55	8	Ductile Iron	110	0	10	0.06	0	FALSE	0
P-267	478	80	lot7	lot8	8	Ductile Iron	110	0	-10.27	0.07	0	FALSE	0
P-184	342	173	J-3	H-31	8	Ductile Iron	110	0	-10.98	0.07	0	FALSE	0

P-185	343	125	H-31	lot22	8	Ductile Iron	110	0	-10.98	0.07	0	FALSE	0
P-199	365	426	lot21	H-32	8	Ductile Iron	110	0	-10.98	0.07	0	FALSE	0
P-200	366	123	H-32	J-3	8	Ductile Iron	110	0	-10.98	0.07	0	FALSE	0
P-289	513	182	lot32	lot37	6	Ductile Iron	100	0	6.25	0.07	0	FALSE	0
P-342	613	76	lot47	H-66	8	Ductile Iron	110	0	11.25	0.07	0	FALSE	0
P-343	615	130	H-66	lot56	8	Ductile Iron	110	0	11.25	0.07	0	FALSE	0
P-278	495	67	lot8	H-47	8	Ductile Iron	110	0	-11.52	0.07	0	FALSE	0
P-279	496	54	H-47	J-13	8	Ductile Iron	110	0	-11.52	0.07	0	FALSE	0
P-177	331	263	H-30	lot20	8	Ductile Iron	110	0	-12.23	0.08	0	FALSE	0
P-183	340	344	lot22	H-30	8	Ductile Iron	110	0	-12.23	0.08	0	FALSE	0
P-341	612	304	lot57	lot47	8	Ductile Iron	110	0	12.5	0.08	0	FALSE	0
P-291	516	277	J-13	H-50	6	Ductile Iron	100	0	7.5	0.09	0	FALSE	0
P-292	517	181	H-50	lot32	6	Ductile Iron	100	0	7.5	0.09	0	FALSE	0
P-179	334	78	lot20	J-37	8	Ductile Iron	110	0	-13.48	0.09	0	FALSE	0
P-180	335	183	J-37	lot19	8	Ductile Iron	110	0	-13.48	0.09	0	FALSE	0
P-83	170	170	J-8	H-5	20	Ductile Iron	120	0	-85	0.09	0	FALSE	0
P-86	175	579	H-5	H-4	20	Ductile Iron	120	0	-85	0.09	0	FALSE	0
P-90	182	485	H-4	H-3	20	Ductile Iron	120	0	-85	0.09	0	FALSE	0
P-93	187	484	H-3	H-2	20	Ductile Iron	120	0	-85	0.09	0	FALSE	0
P-96	192	447	H-2	H-1	20	Ductile Iron	120	0	-85	0.09	0	FALSE	0
P-97	193	2832	H-1	R-1	20	Ductile Iron	120	0	-85	0.09	0	FALSE	0.01
P-360	687	21	J-188	J-8	20	Ductile Iron	120	0	-85	0.09	0	FALSE	0
P-339	609	32	lot46	lot57	8	Ductile Iron	110	0	13.75	0.09	0	FALSE	0
P-173	324	524	lot19	lot18	8	Ductile Iron	110	0	-14.73	0.09	0	FALSE	0.01
P-338	607	29	lot58	lot46	8	Ductile Iron	110	0	15	0.1	0	FALSE	0
P-171	321	72	lot18	lot17	8	Ductile Iron	110	0	-15.98	0.1	0	FALSE	0
P-337	606	36	lot45	lot58	8	Ductile Iron	110	0	16.25	0.1	0	FALSE	0
P-162	306	271	H-27	lot16	8	Ductile Iron	110	0	-17.23	0.11	0	FALSE	0
P-166	313	382	H-28	H-27	8	Ductile Iron	110	0	-17.23	0.11	0	FALSE	0.01
P-169	318	64	lot17	H-28	8	Ductile Iron	110	0	-17.23	0.11	0	FALSE	0
P-328	590	560	J-168	H-65	8	Ductile Iron	110	0	17.5	0.11	0	FALSE	0.01
P-333	600	73	H-65	lot45	8	Ductile Iron	110	0	17.5	0.11	0	FALSE	0
P-160	303	64	lot16	lot15	8	Ductile Iron	110	0	-18.48	0.12	0	FALSE	0
P-19	63	206	J-13	J-11	8	Ductile Iron	110	0	-19.02	0.12	0	FALSE	0
P-155	295	288	H-26	J-10	8	Ductile Iron	110	0	-19.73	0.13	0	FALSE	0.01
P-158	300	146	lot15	H-26	8	Ductile Iron	110	0	-19.73	0.13	0	FALSE	0
P-282	501	247	H-48	lot9_10_11_12	4	Ductile Iron	100	0	5	0.13	0	FALSE	0.01
P-295	522	208	H-51	lot33_34_35_36	4	Ductile Iron	100	0	5	0.13	0	FALSE	0.01
P-298	528	63	J-11	lot13	8	Ductile Iron	110	0	-24.02	0.15	0	FALSE	0
P-118	234	243	H-19	J-6	12	Ductile Iron	110	0	-55	0.16	0	FALSE	0
P-120	237	530	H-20	H-19	12	Ductile Iron	110	0	-55	0.16	0	FALSE	0.01
P-121	239	451	J-5	H-21	12	Ductile Iron	110	0	-55	0.16	0	FALSE	0.01
P-122	240	567	H-21	H-20	12	Ductile Iron	110	0	-55	0.16	0	FALSE	0.01
P-302	534	71	lot13	H-52	8	Ductile Iron	110	0	-25.27	0.16	0	FALSE	0
P-303	535	48	H-52	lot38	8	Ductile Iron	110	0	-25.27	0.16	0	FALSE	0
P-305	539	70	lot38	J-62	8	Ductile Iron	110	0	-26.52	0.17	0	FALSE	0
P-307	542	100	J-62	lot14	8	Ductile Iron	110	0	-26.52	0.17	0	FALSE	0
P-309	545	359	lot14	H-53	8	Ductile Iron	110	0	-27.77	0.18	0	FALSE	0.01
P-310	546	320	H-53	J-10	8	Ductile Iron	110	0	-27.77	0.18	0	FALSE	0.01
P-23	71	211	J-7	H-12	12	Ductile Iron	110	0	-72.5	0.21	0	FALSE	0.01
P-28	78	408	H-7	H-6	12	Ductile Iron	110	0	-72.5	0.21	0	FALSE	0.01
P-30	81	484	H-8	H-7	12	Ductile Iron	110	0	-72.5	0.21	0	FALSE	0.01
P-32	84	523	H-9	H-8	12	Ductile Iron	110	0	-72.5	0.21	0	FALSE	0.01
P-34	87	366	H-10	H-9	12	Ductile Iron	110	0	-72.5	0.21	0	FALSE	0.01
P-35	89	412	H-12	H-11	12	Ductile Iron	110	0	-72.5	0.21	0	FALSE	0.01
P-36	90	442	H-11	H-10	12	Ductile Iron	110	0	-72.5	0.21	0	FALSE	0.01
P-48	113	75	J-6	J-16	12	Ductile Iron	110	0	-72.5	0.21	0	FALSE	0
P-49	114	90	J-16	H-18	12	Ductile Iron	110	0	-72.5	0.21	0	FALSE	0
P-53	120	114	H-17	J-17	12	Ductile Iron	110	0	-72.5	0.21	0	FALSE	0
P-55	124	52	H-18	J-18	12	Ductile Iron	110	0	-72.5	0.21	0	FALSE	0
P-56	125	453	J-18	H-17	12	Ductile Iron	110	0	-72.5	0.21	0	FALSE	0.01
P-57	127	74	J-17	J-19	12	Ductile Iron	110	0	-72.5	0.21	0	FALSE	0
P-59	130	68	J-19	J-20	12	Ductile Iron	110	0	-72.5	0.21	0	FALSE	0
P-63	136	226	J-20	H-16	12	Ductile Iron	110	0	-72.5	0.21	0	FALSE	0.01
P-64	137	112	H-16	J-21	12	Ductile Iron	110	0	-72.5	0.21	0	FALSE	0

P-66	141	551	J-21	H-15	12	Ductile Iron	110	0	-72.5	0.21	0	FALSE	0.01
P-74	156	331	H-14	J-22	12	Ductile Iron	110	0	-72.5	0.21	0	FALSE	0.01
P-76	159	151	J-22	H-13	12	Ductile Iron	110	0	-72.5	0.21	0	FALSE	0
P-79	164	126	H-13	J-23	12	Ductile Iron	110	0	-72.5	0.21	0	FALSE	0
P-80	165	297	J-23	J-7	12	Ductile Iron	110	0	-72.5	0.21	0	FALSE	0.01
P-81	167	178	H-15	J-24	12	Ductile Iron	110	0	-72.5	0.21	0	FALSE	0
P-82	168	298	J-24	H-14	12	Ductile Iron	110	0	-72.5	0.21	0	FALSE	0.01
P-359	686	350	H-6	J-188	12	Ductile Iron	110	0	-72.5	0.21	0	FALSE	0.01
P-151	289	249	J-10	H-25	8	Ductile Iron	110	0	-47.5	0.3	0	FALSE	0.02
P-152	290	61	H-25	lot39	8	Ductile Iron	110	0	-47.5	0.3	0	FALSE	0.01
P-150	287	241	lot39	lot40	8	Ductile Iron	110	0	-48.75	0.31	0	FALSE	0.02
P-142	274	80	J-29	lot41	8	Ductile Iron	110	0	-50	0.32	0	FALSE	0.01
P-144	277	168	lot40	J-29	8	Ductile Iron	110	0	-50	0.32	0	FALSE	0.02
P-137	266	173	H-23	J-5	8	Ductile Iron	110	0	-51.25	0.33	0	FALSE	0.02
P-145	279	69	lot41	H-24	8	Ductile Iron	110	0	-51.25	0.33	0	FALSE	0.01
P-146	280	340	H-24	H-23	8	Ductile Iron	110	0	-51.25	0.33	0	FALSE	0.03

EXISTING NAIWA SUBDIVISION
EXISTING FIRE FLOW TEST - MAX DAILY DEMANDS (SORTED BY PRESSURE AT FIRE HYDRANT)

Fire Flow Node FlexTable: Junction Table

Label	Elevation (ft)	Demand Collection	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)	Pressure (Calculated Residual) (psi)
H-1	649.53	<Collection: 0 items>	0	764	50	49
H-2	635.75	<Collection: 0 items>	0	764	55	55
H-3	623.12	<Collection: 0 items>	0	764	61	61
H-4	611.56	<Collection: 0 items>	0	764	66	66
H-5	600.09	<Collection: 0 items>	0	764	71	71
J-8	600.05	<Collection: 0 items>	0	764	71	(N/A)
J-188	600.04	<Collection: 0 items>	0	764	71	(N/A)
H-6	596.83	<Collection: 0 items>	0	763.99	72	72
H-7	587.01	<Collection: 0 items>	0	763.99	77	76
FH 39+20 FARRINGTON	400.88	<Collection: 0 items>	0	585.97	80	79
FH 25+10 MOOMOMI	403.52	<Collection: 0 items>	0	588.72	80	77
H-8	571.69	<Collection: 0 items>	0	763.99	83	82
J-195	566.49	<Collection: 0 items>	0	764	85	(N/A)
FH 34+20 FARRINGTON	388.1	<Collection: 0 items>	0	585.97	86	79
J-206	518.17	<Collection: 0 items>	0	724.97	89	(N/A)
FH 20+10 MOOMOMI	381.5	<Collection: 0 items>	0	588.72	90	79
J-190	380.74	<Collection: 0 items>	0	588.72	90	(N/A)
LOT 17F	379.04	<Collection: 1 item>	0.62	588.72	91	(N/A)
LOT 17E	379.04	<Collection: 1 item>	0.62	588.72	91	(N/A)
H-9	554.15	<Collection: 0 items>	0	763.98	91	90
J-189	545.83	<Collection: 0 items>	0	764	94	(N/A)
H-10	541.99	<Collection: 0 items>	0	763.98	96	95
LOT 17G	366.66	<Collection: 1 item>	0.62	588.72	96	(N/A)
LOT 17B	363.67	<Collection: 1 item>	0.62	585.97	96	(N/A)
H-240	365.58	<Collection: 0 items>	0	588.72	97	78
LOT 17H	364.2	<Collection: 1 item>	0.62	588.72	97	(N/A)
LOT 17A	361.32	<Collection: 1 item>	0.62	585.97	97	(N/A)
J-7	538.69	<Collection: 0 items>	0	763.97	97	(N/A)
LOT 17D	360	<Collection: 1 item>	0.62	585.97	98	(N/A)
H-241	360	<Collection: 0 items>	0	585.97	98	61
LOT 17C	360	<Collection: 1 item>	0.62	585.97	98	(N/A)
J-200	359.05	<Collection: 0 items>	0	585.97	98	(N/A)
H-12	536.64	<Collection: 0 items>	0	763.97	98	97
H-11	533.01	<Collection: 0 items>	0	763.98	100	99
J-23	532.65	<Collection: 0 items>	0	763.97	100	(N/A)
FH 29+18 FARRINGTON	354.14	<Collection: 0 items>	0	585.97	100	85
J-196	531.95	<Collection: 0 items>	0	764	100	(N/A)
H-13	530.2	<Collection: 0 items>	0	763.97	101	99
FH 19+20 FARRINGTON	348.75	<Collection: 0 items>	0	585.97	103	72
J-22	526.09	<Collection: 0 items>	0	763.97	103	(N/A)
H-14	520.38	<Collection: 0 items>	0	763.97	105	103
J-24	520.31	<Collection: 0 items>	0	763.96	105	(N/A)
H-15	520.09	<Collection: 0 items>	0	763.96	106	103
J-208	520.12	<Collection: 0 items>	0	764	106	(N/A)
H-247	518.27	<Collection: 0 items>	0	764	106	93
FH 24+20 FARRINGTON	338.8	<Collection: 0 items>	0	585.97	107	82
FH 64+20 FARRINGTON	478.11	<Collection: 0 items>	0	726.97	108	86
J-21	505.83	<Collection: 0 items>	0	763.96	112	(N/A)
FH 59+22 FARRINGTON	466.26	<Collection: 0 items>	0	726.97	113	89
H-16	502.84	<Collection: 0 items>	0	763.96	113	110
H-30	502.5	<Collection: 0 items>	0	763.9	113	101
lot22	502.2	<Collection: 1 item>	0.62	763.9	113	(N/A)
H-31	502	<Collection: 0 items>	0	763.9	113	101
J-3	501.66	<Collection: 0 items>	0	763.9	113	(N/A)
lot20	501.64	<Collection: 1 item>	0.62	763.9	113	(N/A)
J-37	499.45	<Collection: 0 items>	0	763.9	114	(N/A)
H-246	496.95	<Collection: 0 items>	0	764	116	100
J-20	496.79	<Collection: 0 items>	0	763.96	116	(N/A)
FH 69+10 FARRINGTON	459.53	<Collection: 0 items>	0	726.97	116	95
lot19	496.41	<Collection: 1 item>	0.62	763.9	116	(N/A)
J-19	495.03	<Collection: 0 items>	0	763.96	116	(N/A)
H-32	494.08	<Collection: 0 items>	0	763.9	117	104
J-17	493.07	<Collection: 0 items>	0	763.96	117	(N/A)
lot18	490.27	<Collection: 1 item>	0.62	763.9	118	(N/A)
H-17	489.97	<Collection: 0 items>	0	763.95	119	116

J-63	488.87	<Collection: 0 items>	0	763.95	119	(N/A)
lot17	488.52	<Collection: 1 item>	0.62	763.9	119	(N/A)
H-57	486.92	<Collection: 0 items>	0	763.95	120	116
H-28	486.76	<Collection: 0 items>	0	763.9	120	109
lot21	480.71	<Collection: 1 item>	0.62	763.9	123	(N/A)
J-18	479.33	<Collection: 0 items>	0	763.95	123	(N/A)
H-18	478.79	<Collection: 0 items>	0	763.95	123	120
J-16	477.77	<Collection: 0 items>	0	763.95	124	(N/A)
H-33	477.71	<Collection: 0 items>	0	763.9	124	111
H-56	477.63	<Collection: 0 items>	0	763.95	124	120
J-6	477.24	<Collection: 0 items>	0	763.95	124	(N/A)
H-55	476.73	<Collection: 0 items>	0	763.95	124	121
H-54	475.72	<Collection: 0 items>	0	763.95	125	121
H-19	475.48	<Collection: 0 items>	0	763.95	125	122
H-245	474.85	<Collection: 0 items>	0	764	125	108
FH 74+10 FARRINGTON	436.52	<Collection: 0 items>	0	726.97	126	107
H-27	472.33	<Collection: 0 items>	0	763.9	126	116
FH 84+10 FARRINGTON	434.2	<Collection: 0 items>	0	726.97	127	111
FH 88+90 FARRINGTON	430.62	<Collection: 0 items>	0	726.97	128	114
FH 79+10 FARRINGTON	430.2	<Collection: 0 items>	0	726.97	128	111
FH 54+20 FARRINGTON	430.07	<Collection: 0 items>	0	726.97	128	103
H-58	465.41	<Collection: 0 items>	0	763.95	129	125
lot23	465.13	<Collection: 1 item>	0.62	763.9	129	(N/A)
H-20	460.96	<Collection: 0 items>	0	763.95	131	128
FH 85+10 MOOMOMI	420.98	<Collection: 0 items>	0	724.97	132	120
lot16	459.63	<Collection: 1 item>	0.62	763.9	132	(N/A)
H-34	458.55	<Collection: 0 items>	0	763.9	132	119
lot15	457.02	<Collection: 1 item>	0.62	763.9	133	(N/A)
H-244	456.05	<Collection: 0 items>	0	764	133	114
H-59	454.63	<Collection: 0 items>	0	763.95	134	129
lot24	451.86	<Collection: 1 item>	0.62	763.9	135	(N/A)
H-26	450.78	<Collection: 0 items>	0	763.9	135	126
FH 49+18 FARRINGTON	411.69	<Collection: 0 items>	0	726.97	136	110
FH 44+20 FARRINGTON	411.35	<Collection: 0 items>	0	726.97	137	109
FH 80+08 MOOMOMI	408.7	<Collection: 0 items>	0	724.97	137	124
J-10	442.25	<Collection: 0 items>	0	763.91	139	(N/A)
H-21	440.93	<Collection: 0 items>	0	763.94	140	136
H-48	440.34	<Collection: 0 items>	0	763.9	140	120
J-4	440.18	<Collection: 0 items>	0	763.94	140	(N/A)
lot44	440.07	<Collection: 1 item>	0.62	763.94	140	(N/A)
H-25	439.99	<Collection: 0 items>	0	763.91	140	132
FH 30+10 MOOMOMI	400.9	<Collection: 0 items>	0	724.97	140	112
lot39	439.48	<Collection: 1 item>	0.62	763.91	140	(N/A)
lot9_10_11_12	439.35	<Collection: 4 items>	2.48	763.89	140	(N/A)
H-22	439.15	<Collection: 0 items>	0	763.94	141	130
FH 75+10 MOOMOMI	400.12	<Collection: 0 items>	0	724.97	141	126
FH 70+08 MOOMOMI	399.8	<Collection: 0 items>	0	724.97	141	125
H-53	438.63	<Collection: 0 items>	0	763.9	141	131
H-243	438.65	<Collection: 0 items>	0	764	141	120
H-60	438.49	<Collection: 0 items>	0	763.95	141	136
lot43	436.88	<Collection: 1 item>	0.62	763.94	142	(N/A)
J-197	436.82	<Collection: 0 items>	0	764	142	(N/A)
LOT 104D-1A	435.69	<Collection: 1 item>	0.62	764	142	(N/A)
FH 65+10 MOOMOMI	396.5	<Collection: 0 items>	0	724.97	142	125
lot40	435.12	<Collection: 1 item>	0.62	763.92	142	(N/A)
H-49	431.58	<Collection: 0 items>	0	763.9	144	130
lot14	431.34	<Collection: 1 item>	0.62	763.9	144	(N/A)
J-29	430.68	<Collection: 0 items>	0	763.92	144	(N/A)
J-62	429.83	<Collection: 0 items>	0	763.9	145	(N/A)
lot41	429.59	<Collection: 1 item>	0.62	763.93	145	(N/A)
lot38	428.79	<Collection: 1 item>	0.62	763.9	145	(N/A)
H-24	428.68	<Collection: 0 items>	0	763.93	145	139
H-52	428.15	<Collection: 0 items>	0	763.9	145	135
H-61	427.66	<Collection: 0 items>	0	763.95	145	141
lot42	427.28	<Collection: 1 item>	0.62	763.94	146	(N/A)
lot13	426.96	<Collection: 1 item>	0.62	763.9	146	(N/A)
J-5	426.47	<Collection: 0 items>	0	763.94	146	(N/A)
J-11	425.82	<Collection: 0 items>	0	763.9	146	(N/A)
lot25_26	425.79	<Collection: 2 items>	1.24	763.9	146	(N/A)
H-23	424.59	<Collection: 0 items>	0	763.94	147	142
J-13	422.83	<Collection: 0 items>	0	763.9	148	(N/A)
H-47	422.12	<Collection: 0 items>	0	763.9	148	137
lot8	421.33	<Collection: 1 item>	0.62	763.9	148	(N/A)
FH 60+10 MOOMOMI	382.4	<Collection: 0 items>	0	724.97	148	129

FH 40+08 MOOMOMI	381.9	<Collection: 0 items>	0	724.97	148	124
FH 45+10 MOOMOMI	381.63	<Collection: 0 items>	0	724.97	149	125
H-62	420.3	<Collection: 0 items>	0	763.95	149	144
lot7	420.02	<Collection: 1 item>	0.62	763.9	149	(N/A)
H-242	419.46	<Collection: 0 items>	0	764	149	123
lot27	419.08	<Collection: 1 item>	0.62	763.9	149	(N/A)
FH 35+10 MOOMOMI	379.5	<Collection: 0 items>	0	724.97	149	123
LOT 104D-1B	417.97	<Collection: 1 item>	0.62	764	150	(N/A)
H-50	414.84	<Collection: 0 items>	0	763.9	151	136
H-35	412.45	<Collection: 0 items>	0	763.9	152	139
H-63	411.9	<Collection: 0 items>	0	763.95	152	147
FH 55+10 MOOMOMI	371.55	<Collection: 0 items>	0	724.97	153	132
lot32	409.95	<Collection: 1 item>	0.62	763.89	153	(N/A)
FH 50+08 MOOMOMI	369.7	<Collection: 0 items>	0	724.97	154	132
H-64	405.85	<Collection: 0 items>	0	763.95	155	149
lot37	404.87	<Collection: 1 item>	0.62	763.89	155	(N/A)
J-168	404.66	<Collection: 0 items>	0	763.95	155	(N/A)
lot6	404.4	<Collection: 1 item>	0.62	763.9	156	(N/A)
H-46	402.29	<Collection: 0 items>	0	763.9	156	145
H-51	401.47	<Collection: 0 items>	0	763.89	157	135
lot33_34_35_36	400.35	<Collection: 4 items>	2.48	763.89	157	(N/A)
lot49	400.11	<Collection: 1 item>	0.62	763.94	157	(N/A)
lot50	400.09	<Collection: 1 item>	0.62	763.94	157	(N/A)
lot51	400.07	<Collection: 1 item>	0.62	763.94	157	(N/A)
H-68	400.03	<Collection: 0 items>	0	763.94	157	146
lot52	399.42	<Collection: 1 item>	0.62	763.94	158	(N/A)
J-41	396.52	<Collection: 0 items>	0	763.9	159	(N/A)
lot48	395.94	<Collection: 1 item>	0.62	763.94	159	(N/A)
H-65	395.89	<Collection: 0 items>	0	763.94	159	152
lot45	395.05	<Collection: 1 item>	0.62	763.94	160	(N/A)
lot58	394.62	<Collection: 1 item>	0.62	763.94	160	(N/A)
lot46	394.31	<Collection: 1 item>	0.62	763.94	160	(N/A)
lot57	394.01	<Collection: 1 item>	0.62	763.94	160	(N/A)
lot47	392.7	<Collection: 1 item>	0.62	763.94	161	(N/A)
lot53	392.34	<Collection: 1 item>	0.62	763.94	161	(N/A)
H-66	392.03	<Collection: 0 items>	0	763.94	161	152
lot56	391.82	<Collection: 1 item>	0.62	763.94	161	(N/A)
H-36	390.24	<Collection: 0 items>	0	763.9	162	149
H-67	390.19	<Collection: 0 items>	0	763.94	162	151
lot54	389.74	<Collection: 1 item>	0.62	763.94	162	(N/A)
lot55	389.66	<Collection: 1 item>	0.62	763.94	162	(N/A)
lot28	373.1	<Collection: 1 item>	0.62	763.89	169	(N/A)
J-2	370.86	<Collection: 0 items>	0	763.89	170	(N/A)
lot29	369.05	<Collection: 1 item>	0.62	763.89	171	(N/A)
H-44	367.79	<Collection: 0 items>	0	763.89	171	143
lot1	366.02	<Collection: 1 item>	0.62	763.89	172	(N/A)
H-45	365.36	<Collection: 0 items>	0	763.89	172	136
J-50	364.18	<Collection: 0 items>	0	763.89	173	(N/A)
lot2	361.58	<Collection: 1 item>	0.62	763.89	174	(N/A)
J-1	360.9	<Collection: 0 items>	0	763.89	174	(N/A)
H-40	356.13	<Collection: 0 items>	0	763.89	176	164
H-38	355.71	<Collection: 0 items>	0	763.89	177	164
lot5	354.77	<Collection: 1 item>	0.62	763.89	177	(N/A)
J-9	353.61	<Collection: 0 items>	0	763.89	178	(N/A)
H-42	353.53	<Collection: 0 items>	0	763.89	178	165
H-39	353.36	<Collection: 0 items>	0	763.89	178	165
H-41	353.31	<Collection: 0 items>	0	763.89	178	166
lot4	352.9	<Collection: 1 item>	0.62	763.89	178	(N/A)
lot3	352.13	<Collection: 1 item>	0.62	763.89	178	(N/A)
H-43	352.04	<Collection: 0 items>	0	763.89	178	158
lot30	351.53	<Collection: 1 item>	0.62	763.89	178	(N/A)
lot31	351.26	<Collection: 1 item>	0.62	763.89	179	(N/A)

		Alternative		
Scenario #	Scenario Name	Demand	Fire Flow	Steady State / EPS Solver Calculation Options
1	Existing Peak Hour Demand_3000Gal per Acre	Peak Hour_3000Gal per Acre	No Fire Flow	Base Calculation Options
2	Existing Fire Flow Max Daily_3000Gal per Acre	Max Daily_3000GAl per Acre	Fire Flow	Base Fire Flow

Scenario #1 (Existing Peak Hour Demand_3000Gal per Acre)

This WaterCAD model scenario using the alternative parameters listed in the table above, calculates system pressures at relevant nodes/junctions (in this case, the existing nodes/junctions at Naiwa Subdivision and Hoolehua Lots). Using the Design Criteria for Design Average Flow of 3000 Gal / Acre, Peak Hour Demands were calculated and assigned for each lot (please refer to the column "DESIGN PEAK HOUR FLOW" under the "EXISTING DEMANDS" tab of this spreadsheet). In accordance with section 111.04 (System Capacity) of the Water System Standards 2002, only Peak Hour Demands (without Fire Flows) were used to calculate pressures at each lot node/junction. This model scenario resulted in residual pressures higher than the required minimum 40 psi residual pressures (as per section 111.06 item #2 of the Water System Standards), with the lowest pressure being 69 psi located at node/junction designated as "*J-188* " (please refer to "EXISTING PEAK HOUR JUNCTIONS" tab of this spreadsheet).

Scenario #2 (Existing Fire Flow Max Daily_3000Gal per Acre)

This WaterCAD model scenario using the alternative parameters listed in the table above, calculates system pressures at designated existing Fire Hydrant nodes/junctions. Using the design criteria of 500gpm for fire flow, each existing hydrant pressure is calculated individually (one hydrant at a time) by the model to ensure that the Fire Flow system constraints are met (Fire Flow = 500 gpm, Min Residual Pressure = 20 psi). Along with the discussed Fire Flow system constraints, Max Daily Demands to the relevant lot nodes/junctions (please refer to column "DESIGN MAX DAILY FLOW" under the "EXISTING DEMANDS" tab of this spreadsheet) are applied at the same time. This model scenario resulted in residual pressures higher than the required minimum 20 psi residual pressures (as per section 111.06 item #1 of the Water System Standards), with the lowest pressure being 49 psi located at node/junction designated as "*H-1* " (please refer to "EXISTING FIRE FLOW - JUNCTIONS" tab of this spreadsheet).

EXISTING HOOLEHUA DEMANDS

NODE	LOT	AREA (ac)	DESIGN AVG. FLOW (GPM)	MAX DAILY FLOW FACTOR	DESIGN MAX DAILY FLOW (GPM)	PEAK FLOW FACTOR	DESIGN PEAK HOUR FLOW (GPM)	ELEV (FT)	STATIC PRESSURE (PSI)
lot1	lot1	5	10.41	1.5	15.62	3	31.23	366.02	172.29
lot2	lot2	5	10.41	1.5	15.62	3	31.23	361.58	174.21
lot3	lot3	5.4	11.24	1.5	16.86	3	33.73	352.13	178.30
lot4	lot4	5.7	11.87	1.5	17.80	3	35.60	352.90	177.97
lot5	lot5	5.4	11.24	1.5	16.86	3	33.73	354.77	177.16
lot6	lot6	5.4	11.24	1.5	16.86	3	33.73	404.40	155.67
lot7	lot7	5.5	11.45	1.5	17.18	3	34.35	420.02	148.91
lot8	lot8	5.5	11.45	1.5	17.18	3	34.35	421.33	148.34
lot9_10_11_12	lot9_10_11_12	4	8.33	1.5	12.49	3	24.98	439.35	140.54
		6.7	13.95	1.5	20.92	3	41.85	439.35	140.54
		8.5	17.70	1.5	26.55	3	53.09	439.35	140.54
		5	10.41	1.5	15.62	3	31.23	439.35	140.54
lot13	lot13	5	10.41	1.5	15.62	3	31.23	426.96	145.90
lot14	lot14	5	10.41	1.5	15.62	3	31.23	431.34	144.01
lot15	lot15	4	8.33	1.5	12.49	3	24.98	457.02	132.89
lot16	lot16	4	8.33	1.5	12.49	3	24.98	459.63	131.76
lot17	lot17	4	8.33	1.5	12.49	3	24.98	488.52	119.26
lot18	lot18	4	8.33	1.5	12.49	3	24.98	490.27	118.50
lot19	lot19	4	8.33	1.5	12.49	3	24.98	496.41	115.84
lot20	lot20	4.2	8.74	1.5	13.12	3	26.23	501.64	113.58
lot21	lot21	7.3	15.20	1.5	22.80	3	45.60	480.71	122.64
lot22	lot22	5	10.41	1.5	15.62	3	31.23	502.20	113.33
lot23	lot23	4	8.33	1.5	12.49	3	24.98	465.13	129.38
lot24	lot24	4	8.33	1.5	12.49	3	24.98	451.86	135.13
lot25_26	lot25_26	6.9	14.37	1.5	21.55	3	43.10	425.79	146.41
		6.8	14.16	1.5	21.24	3	42.47	425.79	146.41
lot27	lot27	4	8.33	1.5	12.49	3	24.98	419.08	149.32
lot28	lot28	5.3	11.03	1.5	16.55	3	33.10	373.10	169.22
lot29	lot29	5.3	11.03	1.5	16.55	3	33.10	369.05	170.97
lot30	lot30	5.3	11.03	1.5	16.55	3	33.10	351.53	178.56
lot31	lot31	5.3	11.03	1.5	16.55	3	33.10	351.26	178.68
lot32	lot32	5	10.41	1.5	15.62	3	31.23	409.95	153.27
lot33_34_35_36	lot33_34_35_36	5	10.41	1.5	15.62	3	31.23	400.35	157.42
		6	12.49	1.5	18.74	3	37.48	400.35	157.42
		5.8	12.08	1.5	18.11	3	36.23	400.35	157.42
		5.1	10.62	1.5	15.93	3	31.85	400.35	157.42
lot37	lot37	5.1	10.62	1.5	15.93	3	31.85	404.87	155.47
lot38	lot38	6.3	13.12	1.5	19.67	3	39.35	428.79	145.11
lot39	lot39	5	10.41	1.5	15.62	3	31.23	439.48	140.48
lot40	lot40	5.1	10.62	1.5	15.93	3	31.85	435.12	142.37
lot41	lot41	5.9	12.28	1.5	18.43	3	36.85	429.59	144.77
lot42	lot42	4.7	9.79	1.5	14.68	3	29.36	427.28	145.77
lot43	lot43	5.1	10.62	1.5	15.93	3	31.85	436.88	141.61
lot44	lot44	5.1	10.62	1.5	15.93	3	31.85	440.07	140.23
lot45	lot45	4.5	9.37	1.5	14.05	3	28.11	395.05	159.72
lot46	lot46	8	16.66	1.5	24.98	3	49.97	394.31	160.04
lot47	lot47	5.2	10.83	1.5	16.24	3	32.48	392.70	160.74
lot48	lot48	5.2	10.83	1.5	16.24	3	32.48	395.94	159.33
lot49	lot49	5.2	10.83	1.5	16.24	3	32.48	400.11	157.53
lot50	lot50	5.4	11.24	1.5	16.86	3	33.73	400.09	157.54
lot51	lot51	5.4	11.24	1.5	16.86	3	33.73	400.07	157.55
lot52	lot52	5.2	10.83	1.5	16.24	3	32.48	399.42	157.83
lot53	lot53	5.8	12.08	1.5	18.11	3	36.23	392.34	160.89
lot54	lot54	6	12.49	1.5	18.74	3	37.48	389.74	162.02
lot55	lot55	5.3	11.03	1.5	16.55	3	33.10	389.66	162.05
lot56	lot56	5.3	11.03	1.5	16.55	3	33.10	391.82	161.12
lot57	lot57	5.3	11.03	1.5	16.55	3	33.10	394.01	160.17
lot58	lot58	4.3	8.95	1.5	13.43	3	26.86	394.62	159.90
LOT 17A	LOT 17A	1.95	4.06	1.5	6.09	3	12.18	362.99	173.60
LOT 17B	LOT 17B	1.95	4.06	1.5	6.09	3	12.18	364.26	173.05
LOT 17C	LOT 17C	6	12.49	1.5	18.74	3	37.48	400.00	157.58
LOT 17D	LOT 17D	6	12.49	1.5	18.74	3	37.48	400.00	157.58
LOT 17E	LOT 17E	1.95	4.06	1.5	6.09	3	12.18	378.59	166.84
LOT 17F	LOT 17F	1.95	4.06	1.5	6.09	3	12.18	378.00	167.10
LOT 17G	LOT 17G	6	12.49	1.5	18.74	3	37.48	366.53	172.06
LOT 17H	LOT 17H	6	12.49	1.5	18.74	3	37.48	365.09	172.69
LOT 104D-1A	LOT 104D-1A	1	2.08	1.5	3.12	3	6.25	435.49	142.21
LOT 104D-1B	LOT 104D-1B	3	6.25	1.5	9.37	3	18.74	418.36	149.63
LOT 104D-1C	LOT 104D-1C	3.2	6.66	1.5	9.99	3	19.99	418.36	149.63
LOT 104D-1D	LOT 104D-1D	12.8	26.65	1.5	39.97	3	79.95	410.00	153.25

EXISTING HOOLEHUA
EXISTING PEAK HOUR TEST - EXISTING DEMANDS (SORTED BY PRESSURE)

FlexTable: Junction Table

Label	Elevation (ft)	Demand Collection	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
H-1	649.53	<Collection: 0 items>	0	761.19	48
J-188	600.04	<Collection: 0 items>	0	759.02	69
J-8	600.05	<Collection: 0 items>	0	759.04	69
J-7	538.69	<Collection: 0 items>	0	722.56	80
FH 25+10 MOOMOMI	403.52	<Collection: 0 items>	0	588.41	80
FH 39+20 FARRINGTON	400.88	<Collection: 0 items>	0	585.9	80
J-195	566.49	<Collection: 0 items>	0	758.51	83
FH 34+20 FARRINGTON	388.1	<Collection: 0 items>	0	585.24	85
FH 20+10 MOOMOMI	381.5	<Collection: 0 items>	0	587.58	89
J-190	380.74	<Collection: 0 items>	0	587.35	89
J-206	518.17	<Collection: 0 items>	0	724.96	89
LOT 17F	379.04	<Collection: 1 item>	12.49	587.25	90
LOT 17E	379.04	<Collection: 1 item>	12.49	587.28	90
J-189	545.83	<Collection: 0 items>	0	758.76	92
LOT 17B	363.67	<Collection: 1 item>	12.49	582.49	95
LOT 17G	366.66	<Collection: 1 item>	36.23	586.93	95
LOT 17A	361.32	<Collection: 1 item>	12.49	582.51	96
H-240	365.58	<Collection: 0 items>	0	586.93	96
LOT 17D	360	<Collection: 1 item>	36.23	582.14	96
H-241	360	<Collection: 0 items>	0	582.15	96
LOT 17C	360	<Collection: 1 item>	36.23	582.16	96
LOT 17H	364.2	<Collection: 1 item>	36.23	586.91	96
J-200	359.05	<Collection: 0 items>	0	582.55	97
J-196	531.95	<Collection: 0 items>	0	758.49	98
FH 29+18 FARRINGTON	354.14	<Collection: 0 items>	0	584.23	100
FH 19+20 FARRINGTON	348.75	<Collection: 0 items>	0	582.64	101
J-208	520.12	<Collection: 0 items>	0	758.36	103
H-247	518.27	<Collection: 0 items>	0	758.35	104
FH 24+20 FARRINGTON	338.8	<Collection: 0 items>	0	583.26	106
FH 64+20 FARRINGTON	478.11	<Collection: 0 items>	0	724.55	107
FH 59+22 FARRINGTON	466.26	<Collection: 0 items>	0	724.4	112
H-246	496.95	<Collection: 0 items>	0	758.33	113
FH 69+10 FARRINGTON	459.53	<Collection: 0 items>	0	724.7	115
H-245	474.85	<Collection: 0 items>	0	758.3	123
FH 74+10 FARRINGTON	436.52	<Collection: 0 items>	0	724.89	125
FH 84+10 FARRINGTON	434.2	<Collection: 0 items>	0	725.23	126
FH 54+20 FARRINGTON	430.07	<Collection: 0 items>	0	724.22	127
FH 88+90 FARRINGTON	430.62	<Collection: 0 items>	0	725.37	128
FH 79+10 FARRINGTON	430.2	<Collection: 0 items>	0	725.07	128
H-244	456.05	<Collection: 0 items>	0	758.28	131
FH 85+10 MOOMOMI	420.98	<Collection: 0 items>	0	723.71	131
FH 49+18 FARRINGTON	411.69	<Collection: 0 items>	0	724.06	135
FH 44+20 FARRINGTON	411.35	<Collection: 0 items>	0	723.89	135
FH 80+08 MOOMOMI	408.7	<Collection: 0 items>	0	723.58	136
H-243	438.65	<Collection: 0 items>	0	758.26	138
FH 30+10 MOOMOMI	400.9	<Collection: 0 items>	0	721.88	139
J-197	436.82	<Collection: 0 items>	0	758.26	139
LOT 104D-1A	435.69	<Collection: 1 item>	15.62	758.25	140
FH 75+10 MOOMOMI	400.12	<Collection: 0 items>	0	723.39	140
FH 70+08 MOOMOMI	399.8	<Collection: 0 items>	0	723.2	140
FH 65+10 MOOMOMI	396.5	<Collection: 0 items>	0	723.04	141
H-242	419.46	<Collection: 0 items>	0	758.23	147

LOT 104D-1B	417.97	<Collection: 1 item>	15.62	758.23	147
FH 40+08 MOOMOMI	381.9	<Collection: 0 items>	0	722.24	147
FH 60+10 MOOMOMI	382.4	<Collection: 0 items>	0	722.89	147
FH 45+10 MOOMOMI	381.63	<Collection: 0 items>	0	722.38	147
FH 35+10 MOOMOMI	379.5	<Collection: 0 items>	0	722.04	148
FH 55+10 MOOMOMI	371.55	<Collection: 0 items>	0	722.7	152
FH 50+08 MOOMOMI	369.7	<Collection: 0 items>	0	722.53	153

EXISTING HOOLEHUA
EXISTING PEAK HOUR TEST - EXISTING DEMANDS (SORTED BY VELOCITY)

FlexTable: Pipe Table

Label	ID	Length (Scaled) (ft)	Start Node	Stop Node	Diameter (in)	Material	Hazen-Williams C	Minor Loss Coefficient (Local)	Flow (gpm)	Velocity (ft/s)	Headloss Gradient (ft/ft)	Has User Defined Length?	Headloss (ft)
P-260	467	84	J-1	H-45	6	Ductile Iron	100	0	0	0	0	FALSE	0
P-261	468	262	H-45	lot28	6	Ductile Iron	100	0	0	0	0	FALSE	0
P-127	249	61	lot44	J-4	6	Ductile Iron	100	0	0	0	0	FALSE	0
P-220	399	97	lot4	lot3	8	Ductile Iron	110	0	-7.79	0.05	0	FALSE	0
P-368	703	3240	J-195	J-196	12	Ductile Iron	110	0	31.24	0.09	0	FALSE	0.02
P-386	737	2192	J-189	PRV-PR B2	16	Ductile Iron	120	0	97.44	0.16	0	FALSE	0.02
P-387	738	1125	PRV-PR B2	J-206	16	Ductile Iron	120	0	97.44	0.16	0	FALSE	0.01
P-454	839	358	LOT 104D-1A	H-242	6	Ductile Iron	100	0	15.62	0.18	0	FALSE	0.02
P-455	840	33	H-242	LOT 104D-1B	6	Ductile Iron	100	0	15.62	0.18	0	FALSE	0
P-233	422	97	H-39	lot4	8	Ductile Iron	110	0	27.81	0.18	0	FALSE	0
P-236	428	392	lot5	H-40	8	Ductile Iron	110	0	27.81	0.18	0	FALSE	0.01
P-237	429	356	H-40	H-39	8	Ductile Iron	110	0	27.81	0.18	0	FALSE	0.01
P-382	729	3317	J-196	J-208	8	Ductile Iron	110	0	31.24	0.2	0	FALSE	0.13
P-457	843	55	H-243	J-197	8	Ductile Iron	110	0	31.24	0.2	0	FALSE	0
P-459	846	519	H-244	H-243	8	Ductile Iron	110	0	31.24	0.2	0	FALSE	0.02
P-461	849	561	H-245	H-244	8	Ductile Iron	110	0	31.24	0.2	0	FALSE	0.02
P-463	852	659	H-246	H-245	8	Ductile Iron	110	0	31.24	0.2	0	FALSE	0.03
P-464	854	55	J-208	H-247	8	Ductile Iron	110	0	31.24	0.2	0	FALSE	0
P-465	855	636	H-247	H-246	8	Ductile Iron	110	0	31.24	0.2	0	FALSE	0.03
P-354	632	70	lot50	lot49	8	Ductile Iron	110	0	32.48	0.21	0	FALSE	0
P-229	413	409	lot3	H-38	8	Ductile Iron	110	0	-41.52	0.27	0	FALSE	0.03
P-230	414	381	H-38	lot2	8	Ductile Iron	110	0	-41.52	0.27	0	FALSE	0.03
P-370	707	32	J-197	LOT 104D-1A	6	Ductile Iron	100	0	31.24	0.35	0	FALSE	0.01
P-361	689	5593	J-188	J-189	16	Ductile Iron	120	0	226.12	0.36	0	FALSE	0.26
P-130	255	55	lot43	H-22	6	Ductile Iron	100	0	31.85	0.36	0	FALSE	0.01
P-131	256	53	H-22	lot44	6	Ductile Iron	100	0	31.85	0.36	0	FALSE	0.01
P-367	701	3255	J-189	J-195	12	Ductile Iron	110	0	128.68	0.37	0	FALSE	0.25
P-244	441	107	lot28	lot29	6	Ductile Iron	100	0	-33.1	0.38	0	FALSE	0.02
P-239	433	320	J-9	H-41	8	Ductile Iron	110	0	61.54	0.39	0	FALSE	0.05
P-312	553	185	lot5	H-41	8	Ductile Iron	110	0	-61.54	0.39	0	FALSE	0.03
P-450	833	34	LOT 17G	H-240	6	Ductile Iron	100	0	36.23	0.41	0	FALSE	0.01
P-451	834	44	H-240	LOT 17H	6	Ductile Iron	100	0	36.23	0.41	0	FALSE	0.01
P-452	836	31	LOT 17C	H-241	6	Ductile Iron	100	0	36.23	0.41	0	FALSE	0.01
P-453	837	34	H-241	LOT 17D	6	Ductile Iron	100	0	36.23	0.41	0	FALSE	0.01
P-356	635	44	lot51	lot50	8	Ductile Iron	110	0	66.21	0.42	0	FALSE	0.01
P-224	405	103	lot2	J-50	8	Ductile Iron	110	0	-72.75	0.46	0	FALSE	0.02
P-226	408	75	J-50	lot1	8	Ductile Iron	110	0	-72.75	0.46	0	FALSE	0.01
P-388	740	1898	J-195	PRV-PR B3	8	Ductile Iron	110	0	97.44	0.62	0	FALSE	0.63
P-395	750	293	FH 30+10 MOOMOMI	PRV-PR C1	8	Ductile Iron	110	0	97.44	0.62	0	FALSE	0.1
P-397	753	464	FH 35+10 MOOMOMI	FH 30+10 MOOMOMI	8	Ductile Iron	110	0	97.44	0.62	0	FALSE	0.15
P-399	756	602	FH 40+08 MOOMOMI	FH 35+10 MOOMOMI	8	Ductile Iron	110	0	97.44	0.62	0	FALSE	0.2
P-403	762	434	FH 45+10 MOOMOMI	FH 40+08 MOOMOMI	8	Ductile Iron	110	0	97.44	0.62	0	FALSE	0.14
P-405	765	450	FH 50+08 MOOMOMI	FH 45+10 MOOMOMI	8	Ductile Iron	110	0	97.44	0.62	0	FALSE	0.15
P-407	768	510	FH 55+10 MOOMOMI	FH 50+08 MOOMOMI	8	Ductile Iron	110	0	97.44	0.62	0	FALSE	0.17
P-409	771	549	FH 60+10 MOOMOMI	FH 55+10 MOOMOMI	8	Ductile Iron	110	0	97.44	0.62	0	FALSE	0.18
P-411	774	469	FH 65+10 MOOMOMI	FH 60+10 MOOMOMI	8	Ductile Iron	110	0	97.44	0.62	0	FALSE	0.16
P-413	777	476	FH 70+08 MOOMOMI	FH 65+10 MOOMOMI	8	Ductile Iron	110	0	97.44	0.62	0	FALSE	0.16
P-415	780	570	FH 75+10 MOOMOMI	FH 70+08 MOOMOMI	8	Ductile Iron	110	0	97.44	0.62	0	FALSE	0.19
P-417	783	546	FH 80+08 MOOMOMI	FH 75+10 MOOMOMI	8	Ductile Iron	110	0	97.44	0.62	0	FALSE	0.18
P-418	785	3755	J-206	FH 85+10 MOOMOMI	8	Ductile Iron	110	0	97.44	0.62	0	FALSE	1.25
P-419	786	401	FH 85+10 MOOMOMI	FH 80+08 MOOMOMI	8	Ductile Iron	110	0	97.44	0.62	0	FALSE	0.13
P-431	804	431	FH 44+20 FARRINGTON	PRV-PR C2	8	Ductile Iron	110	0	97.44	0.62	0	FALSE	0.14
P-433	807	496	FH 49+18 FARRINGTON	FH 44+20 FARRINGTON	8	Ductile Iron	110	0	97.44	0.62	0	FALSE	0.17
P-435	810	478	FH 54+20 FARRINGTON	FH 49+18 FARRINGTON	8	Ductile Iron	110	0	97.44	0.62	0	FALSE	0.16
P-437	813	543	FH 59+22 FARRINGTON	FH 54+20 FARRINGTON	8	Ductile Iron	110	0	97.44	0.62	0	FALSE	0.18
P-439	816	452	FH 64+20 FARRINGTON	FH 59+22 FARRINGTON	8	Ductile Iron	110	0	97.44	0.62	0	FALSE	0.15
P-441	819	461	FH 69+10 FARRINGTON	FH 64+20 FARRINGTON	8	Ductile Iron	110	0	97.44	0.62	0	FALSE	0.15
P-443	822	554	FH 74+10 FARRINGTON	FH 69+10 FARRINGTON	8	Ductile Iron	110	0	97.44	0.62	0	FALSE	0.18

P-445	825	539	FH 79+10 FARRINGTON	FH 74+10 FARRINGTON	8	Ductile Iron	110	0	97.44	0.62	0	FALSE	0.18
P-447	828	503	FH 84+10 FARRINGTON	FH 79+10 FARRINGTON	8	Ductile Iron	110	0	97.44	0.62	0	FALSE	0.17
P-448	830	4814	PRV-PR B3	FH 88+90 FARRINGTON	8	Ductile Iron	110	0	97.44	0.62	0	FALSE	1.61
P-449	831	401	FH 88+90 FARRINGTON	FH 84+10 FARRINGTON	8	Ductile Iron	110	0	97.44	0.62	0	FALSE	0.13
P-350	626	65	lot52	H-68	8	Ductile Iron	110	0	99.94	0.64	0	FALSE	0.02
P-355	634	53	H-68	lot51	8	Ductile Iron	110	0	99.94	0.64	0	FALSE	0.02
P-208	380	247	J-41	H-35	8	Ductile Iron	110	0	-103.98	0.66	0	FALSE	0.09
P-209	381	94	H-35	lot27	8	Ductile Iron	110	0	-103.98	0.66	0	FALSE	0.04
P-211	385	324	J-2	H-36	8	Ductile Iron	110	0	-103.98	0.66	0	FALSE	0.12
P-212	386	105	H-36	J-41	8	Ductile Iron	110	0	-103.98	0.66	0	FALSE	0.04
P-227	409	255	lot1	J-2	8	Ductile Iron	110	0	-103.98	0.66	0	FALSE	0.1
P-135	263	301	lot42	lot43	6	Ductile Iron	100	0	63.7	0.72	0.001	FALSE	0.22
P-254	456	79	H-43	lot30	6	Ductile Iron	100	0	-66	0.75	0.001	FALSE	0.06
P-257	462	203	lot29	H-44	6	Ductile Iron	100	0	-66	0.75	0.001	FALSE	0.16
P-258	463	536	H-44	H-43	6	Ductile Iron	100	0	-66	0.75	0.001	FALSE	0.42
P-365	697	340	LOT 17F	LOT 17G	6	Ductile Iron	100	0	72	0.82	0.001	FALSE	0.32
P-376	719	350	LOT 17B	LOT 17C	6	Ductile Iron	100	0	72	0.82	0.001	FALSE	0.33
P-190	351	96	lot27	lot25_26	8	Ductile Iron	110	0	-129	0.82	0.001	FALSE	0.05
P-352	629	85	lot48	lot52	8	Ductile Iron	110	0	132.42	0.85	0.001	FALSE	0.05
P-364	695	24	LOT 17E	LOT 17F	6	Ductile Iron	100	0	84.95	0.96	0.001	FALSE	0.03
P-374	715	21	LOT 17A	LOT 17B	6	Ductile Iron	100	0	84.95	0.96	0.001	FALSE	0.03
P-351	628	97	lot53	lot48	8	Ductile Iron	110	0	164.9	1.05	0.001	FALSE	0.09
P-134	262	70	J-5	lot42	6	Ductile Iron	100	0	93.06	1.06	0.001	FALSE	0.1
P-363	693	41	J-190	LOT 17E	6	Ductile Iron	100	0	97.44	1.11	0.002	FALSE	0.07
P-373	713	23	J-200	LOT 17A	6	Ductile Iron	100	0	97.44	1.11	0.002	FALSE	0.04
P-391	744	141	FH 20+10 MOOMOMI	J-190	6	Ductile Iron	100	0	97.44	1.11	0.002	FALSE	0.23
P-392	746	196	PRV-PR C1	FH 25+10 MOOMOMI	6	Ductile Iron	100	0	97.44	1.11	0.002	FALSE	0.32
P-393	747	513	FH 25+10 MOOMOMI	FH 20+10 MOOMOMI	6	Ductile Iron	100	0	97.44	1.11	0.002	FALSE	0.83
P-421	789	58	FH 19+20 FARRINGTON	J-200	6	Ductile Iron	100	0	97.44	1.11	0.002	FALSE	0.09
P-423	792	383	FH 24+20 FARRINGTON	FH 19+20 FARRINGTON	6	Ductile Iron	100	0	97.44	1.11	0.002	FALSE	0.62
P-425	795	599	FH 29+18 FARRINGTON	FH 24+20 FARRINGTON	6	Ductile Iron	100	0	97.44	1.11	0.002	FALSE	0.97
P-427	798	623	FH 34+20 FARRINGTON	FH 29+18 FARRINGTON	6	Ductile Iron	100	0	97.44	1.11	0.002	FALSE	1.01
P-428	800	48	PRV-PR C2	FH 39+20 FARRINGTON	6	Ductile Iron	100	0	97.44	1.11	0.002	FALSE	0.08
P-429	801	407	FH 39+20 FARRINGTON	FH 34+20 FARRINGTON	6	Ductile Iron	100	0	97.44	1.11	0.002	FALSE	0.66
P-248	447	104	lot30	lot31	6	Ductile Iron	100	0	-99.3	1.13	0.002	FALSE	0.17
P-275	490	429	J-9	H-46	8	Ductile Iron	110	0	-193.94	1.24	0.001	FALSE	0.51
P-276	491	41	H-46	lot6	8	Ductile Iron	110	0	-193.94	1.24	0.001	FALSE	0.05
P-347	622	77	H-67	lot53	8	Ductile Iron	110	0	197.53	1.26	0.001	FALSE	0.1
P-358	638	40	lot54	H-67	8	Ductile Iron	110	0	197.53	1.26	0.001	FALSE	0.05
P-313	564	284	J-6	H-54	12	Ductile Iron	110	0	471.73	1.34	0.001	FALSE	0.24
P-314	565	330	H-54	H-55	12	Ductile Iron	110	0	471.73	1.34	0.001	FALSE	0.28
P-315	566	237	H-55	H-56	12	Ductile Iron	110	0	471.73	1.34	0.001	FALSE	0.2
P-316	568	556	H-56	H-57	12	Ductile Iron	110	0	471.73	1.34	0.001	FALSE	0.48
P-319	574	418	H-57	J-63	12	Ductile Iron	110	0	471.73	1.34	0.001	FALSE	0.36
P-320	575	739	J-63	H-58	12	Ductile Iron	110	0	471.73	1.34	0.001	FALSE	0.63
P-321	576	346	H-58	H-59	12	Ductile Iron	110	0	472	1.34	0.001	FALSE	0.3
P-322	578	626	H-59	H-60	12	Ductile Iron	110	0	472	1.34	0.001	FALSE	0.54
P-323	580	560	H-60	H-61	12	Ductile Iron	110	0	472	1.34	0.001	FALSE	0.48
P-324	582	426	H-61	H-62	12	Ductile Iron	110	0	472	1.34	0.001	FALSE	0.37
P-325	584	593	H-62	H-63	12	Ductile Iron	110	0	471.73	1.34	0.001	FALSE	0.51
P-326	586	546	H-63	H-64	12	Ductile Iron	110	0	471.73	1.34	0.001	FALSE	0.47
P-327	588	63	H-64	J-168	12	Ductile Iron	110	0	471.73	1.34	0.001	FALSE	0.05
P-193	356	382	lot25_26	lot24	8	Ductile Iron	110	0	-214.53	1.37	0.001	FALSE	0.55
P-265	475	376	lot6	lot7	8	Ductile Iron	110	0	-227.67	1.45	0.002	FALSE	0.6
P-357	637	145	lot55	lot54	8	Ductile Iron	110	0	235.01	1.5	0.002	FALSE	0.25
P-250	450	333	lot31	H-42	6	Ductile Iron	100	0	-132.4	1.5	0.003	FALSE	0.95
P-251	451	81	H-42	J-9	6	Ductile Iron	100	0	-132	1.5	0.003	FALSE	0.23
P-205	375	101	lot24	H-34	8	Ductile Iron	110	0	-240	1.53	0.002	FALSE	0.18
P-206	376	97	H-34	lot23	8	Ductile Iron	110	0	-240	1.53	0.002	FALSE	0.17
P-294	521	118	lot37	H-51	6	Ductile Iron	100	0	137	1.55	0.003	FALSE	0.36
P-267	478	80	lot7	lot8	8	Ductile Iron	110	0	-262	1.67	0.002	FALSE	0.17
P-202	370	233	lot23	H-33	8	Ductile Iron	110	0	-264	1.69	0.002	FALSE	0.49
P-203	371	77	H-33	lot21	8	Ductile Iron	110	0	-264	1.69	0.002	FALSE	0.16
P-345	619	184	lot56	lot55	8	Ductile Iron	110	0	268	1.71	0.002	FALSE	0.4
P-284	505	194	J-11	H-49	6	Ductile Iron	100	0	151	1.72	0.004	FALSE	0.71
P-285	506	456	H-49	H-48	6	Ductile Iron	100	0	151	1.72	0.004	FALSE	1.66
P-278	495	67	lot8	H-47	8	Ductile Iron	110	0	-296	1.89	0.003	FALSE	0.18

P-279	496	54	H-47	J-13	8	Ductile Iron	110	0	-296	1.89	0.003	FALSE	0.14
P-289	513	182	lot32	lot37	6	Ductile Iron	100	0	169	1.91	0.004	FALSE	0.81
P-342	613	76	lot47	H-66	8	Ductile Iron	110	0	301	1.92	0.003	FALSE	0.2
P-343	615	130	H-66	lot56	8	Ductile Iron	110	0	301	1.92	0.003	FALSE	0.35
P-184	342	173	J-3	H-31	8	Ductile Iron	110	0	-310	1.98	0.003	FALSE	0.49
P-185	343	125	H-31	lot22	8	Ductile Iron	110	0	-310	1.98	0.003	FALSE	0.36
P-199	365	426	lot21	H-32	8	Ductile Iron	110	0	-310	1.98	0.003	FALSE	1.21
P-200	366	123	H-32	J-3	8	Ductile Iron	110	0	-310	1.98	0.003	FALSE	0.35
P-341	612	304	lot57	lot47	8	Ductile Iron	110	0	334	2.13	0.003	FALSE	0.99
P-83	170	170	J-8	H-5	20	Ductile Iron	120	0	-2,132	2.18	0.001	FALSE	0.17
P-86	175	579	H-5	H-4	20	Ductile Iron	120	0	-2,132	2.18	0.001	FALSE	0.57
P-90	182	485	H-4	H-3	20	Ductile Iron	120	0	-2,132	2.18	0.001	FALSE	0.48
P-93	187	484	H-3	H-2	20	Ductile Iron	120	0	-2,132	2.18	0.001	FALSE	0.48
P-96	192	447	H-2	H-1	20	Ductile Iron	120	0	-2,132	2.18	0.001	FALSE	0.44
P-97	193	2832	H-1	R-1	20	Ductile Iron	120	0	-2,132	2.18	0.001	FALSE	2.81
P-360	687	21	J-188	J-8	20	Ductile Iron	120	0	-2,132	2.18	0.001	FALSE	0.02
P-177	331	263	H-30	lot20	8	Ductile Iron	110	0	-341	2.18	0.003	FALSE	0.9
P-183	340	344	lot22	H-30	8	Ductile Iron	110	0	-341	2.18	0.003	FALSE	1.17
P-291	516	277	J-13	H-50	6	Ductile Iron	100	0	200	2.27	0.006	FALSE	1.69
P-292	517	181	H-50	lot32	6	Ductile Iron	100	0	200	2.27	0.006	FALSE	1.1
P-339	609	32	lot46	lot57	8	Ductile Iron	110	0	367	2.34	0.004	FALSE	0.12
P-179	334	78	lot20	J-37	8	Ductile Iron	110	0	-368	2.35	0.004	FALSE	0.3
P-180	335	183	J-37	lot19	8	Ductile Iron	110	0	-368	2.35	0.004	FALSE	0.71
P-173	324	524	lot19	lot18	8	Ductile Iron	110	0	-393	2.51	0.004	FALSE	2.31
P-338	607	29	lot58	lot46	8	Ductile Iron	110	0	417	2.66	0.005	FALSE	0.14
P-171	321	72	lot18	lot17	8	Ductile Iron	110	0	-418	2.66	0.005	FALSE	0.35
P-162	306	271	H-27	lot16	8	Ductile Iron	110	0	-442	2.82	0.005	FALSE	1.49
P-166	313	382	H-28	H-27	8	Ductile Iron	110	0	-442	2.82	0.005	FALSE	2.1
P-169	318	64	lot17	H-28	8	Ductile Iron	110	0	-442	2.82	0.005	FALSE	0.35
P-337	606	36	lot45	lot58	8	Ductile Iron	110	0	444	2.83	0.006	FALSE	0.2
P-160	303	64	lot16	lot15	8	Ductile Iron	110	0	-467	2.98	0.006	FALSE	0.39
P-328	590	560	J-168	H-65	8	Ductile Iron	110	0	472	3.01	0.006	FALSE	3.47
P-333	600	73	H-65	lot45	8	Ductile Iron	110	0	472	3.01	0.006	FALSE	0.45
P-155	295	288	H-26	J-10	8	Ductile Iron	110	0	-492	3.14	0.007	FALSE	1.93
P-158	300	146	lot15	H-26	8	Ductile Iron	110	0	-492	3.14	0.007	FALSE	0.98
P-19	63	206	J-13	J-11	8	Ductile Iron	110	0	-496	3.17	0.007	FALSE	1.4
P-295	522	208	H-51	lot33_34_35_36	4	Ductile Iron	100	0	137	3.49	0.022	FALSE	4.54
P-282	501	247	H-48	lot9_10_11_12	4	Ductile Iron	100	0	151	3.86	0.026	FALSE	6.5
P-118	234	243	H-19	J-6	12	Ductile Iron	110	0	-1,435	4.07	0.007	FALSE	1.64
P-120	237	530	H-20	H-19	12	Ductile Iron	110	0	-1,435	4.07	0.007	FALSE	3.57
P-121	239	451	J-5	H-21	12	Ductile Iron	110	0	-1,435	4.07	0.007	FALSE	3.04
P-122	240	567	H-21	H-20	12	Ductile Iron	110	0	-1,435	4.07	0.007	FALSE	3.82
P-298	528	63	J-11	lot13	8	Ductile Iron	110	0	-647	4.13	0.011	FALSE	0.71
P-302	534	71	lot13	H-52	8	Ductile Iron	110	0	-679	4.33	0.012	FALSE	0.86
P-303	535	48	H-52	lot38	8	Ductile Iron	110	0	-678.62	4.33	0.012	FALSE	0.58
P-305	539	70	lot38	J-62	8	Ductile Iron	110	0	-717.97	4.58	0.013	FALSE	0.94
P-307	542	100	J-62	lot14	8	Ductile Iron	110	0	-717.97	4.58	0.013	FALSE	1.35
P-309	545	359	lot14	H-53	8	Ductile Iron	110	0	-749.2	4.78	0.015	FALSE	5.24
P-310	546	320	H-53	J-10	8	Ductile Iron	110	0	-749.2	4.78	0.015	FALSE	4.66
P-23	71	211	J-7	H-12	12	Ductile Iron	110	0	-1906.37	5.41	0.011	FALSE	2.4
P-28	78	408	H-7	H-6	12	Ductile Iron	110	0	-1906.37	5.41	0.011	FALSE	4.66
P-30	81	484	H-8	H-7	12	Ductile Iron	110	0	-1906.37	5.41	0.011	FALSE	5.52
P-32	84	523	H-9	H-8	12	Ductile Iron	110	0	-1906.37	5.41	0.011	FALSE	5.97
P-34	87	366	H-10	H-9	12	Ductile Iron	110	0	-1906.37	5.41	0.011	FALSE	4.17
P-35	89	412	H-12	H-11	12	Ductile Iron	110	0	-1906.37	5.41	0.011	FALSE	4.7
P-36	90	442	H-11	H-10	12	Ductile Iron	110	0	-1906.37	5.41	0.011	FALSE	5.05
P-48	113	75	J-6	J-16	12	Ductile Iron	110	0	-1906.37	5.41	0.011	FALSE	0.86
P-49	114	90	J-16	H-18	12	Ductile Iron	110	0	-1906.37	5.41	0.011	FALSE	1.03
P-53	120	114	H-17	J-17	12	Ductile Iron	110	0	-1906.37	5.41	0.011	FALSE	1.3
P-55	124	52	H-18	J-18	12	Ductile Iron	110	0	-1906.37	5.41	0.011	FALSE	0.6
P-56	125	453	J-18	H-17	12	Ductile Iron	110	0	-1906.37	5.41	0.011	FALSE	5.17
P-57	127	74	J-17	J-19	12	Ductile Iron	110	0	-1906.37	5.41	0.011	FALSE	0.84
P-59	130	68	J-19	J-20	12	Ductile Iron	110	0	-1906.37	5.41	0.011	FALSE	0.77
P-63	136	226	J-20	H-16	12	Ductile Iron	110	0	-1906.37	5.41	0.011	FALSE	2.58
P-64	137	112	H-16	J-21	12	Ductile Iron	110	0	-1906.37	5.41	0.011	FALSE	1.27
P-66	141	551	J-21	H-15	12	Ductile Iron	110	0	-1906.37	5.41	0.011	FALSE	6.28
P-74	156	331	H-14	J-22	12	Ductile Iron	110	0	-1906.37	5.41	0.011	FALSE	3.77

P-76	159	151	J-22	H-13	12	Ductile Iron	110	0	-1906.37	5.41	0.011	FALSE	1.72
P-79	164	126	H-13	J-23	12	Ductile Iron	110	0	-1906.37	5.41	0.011	FALSE	1.44
P-80	165	297	J-23	J-7	12	Ductile Iron	110	0	-1906.37	5.41	0.011	FALSE	3.39
P-81	167	178	H-15	J-24	12	Ductile Iron	110	0	-1906.37	5.41	0.011	FALSE	2.03
P-82	168	298	J-24	H-14	12	Ductile Iron	110	0	-1906.37	5.41	0.011	FALSE	3.4
P-359	686	350	H-6	J-188	12	Ductile Iron	110	0	-1906.37	5.41	0.011	FALSE	4
P-151	289	249	J-10	H-25	8	Ductile Iron	110	0	-1241.65	7.93	0.037	FALSE	9.26
P-152	290	61	H-25	lot39	8	Ductile Iron	110	0	-1241.65	7.93	0.037	FALSE	2.27
P-150	287	241	lot39	lot40	8	Ductile Iron	110	0	-1272.88	8.12	0.039	FALSE	9.36
P-142	274	80	J-29	lot41	8	Ductile Iron	110	0	-1304.73	8.33	0.041	FALSE	3.25
P-144	277	168	lot40	J-29	8	Ductile Iron	110	0	-1304.73	8.33	0.041	FALSE	6.86
P-137	266	173	H-23	J-5	8	Ductile Iron	110	0	-1341.58	8.56	0.043	FALSE	7.43
P-145	279	69	lot41	H-24	8	Ductile Iron	110	0	-1341.58	8.56	0.043	FALSE	2.94
P-146	280	340	H-24	H-23	8	Ductile Iron	110	0	-1341.58	8.56	0.043	FALSE	14.57

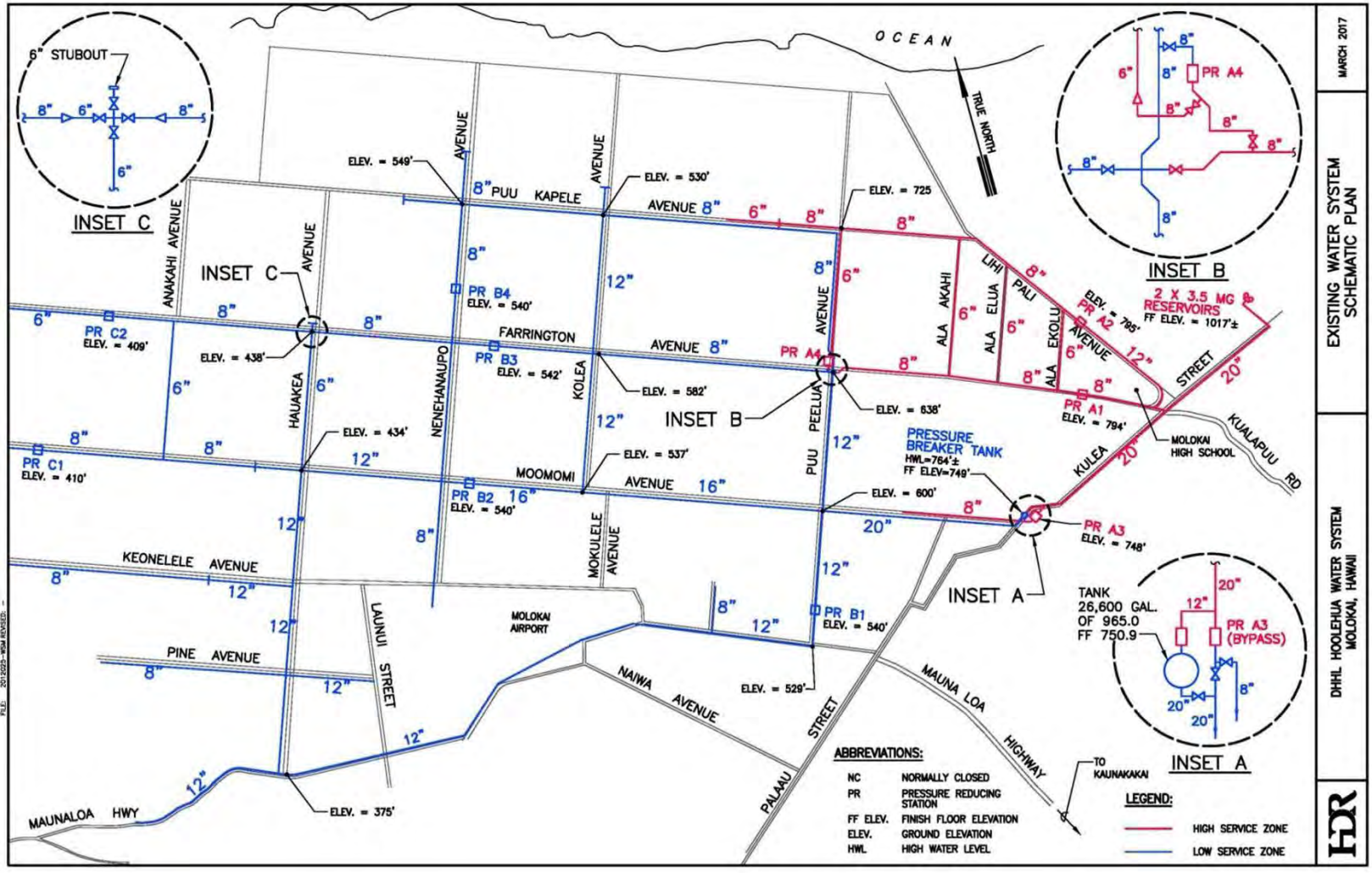
EXISTING HOOLEHUA
EXISTING FIRE FLOW TEST - MAX DAILY DEMANDS (SORTED BY PRESSURE AT FIRE HYDRANT)

Fire Flow Node FlexTable: Junction Table

Label	Elevation (ft)	Demand Collection	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)	Pressure (Calculated Residual) (psi)
H-1	649.53	<Collection: 0 items>	0	763.21	49	49
H-2	635.75	<Collection: 0 items>	0	763.08	55	55
H-3	623.12	<Collection: 0 items>	0	762.95	60	60
H-4	611.56	<Collection: 0 items>	0	762.81	65	65
J-8	600.05	<Collection: 0 items>	0	762.6	70	(N/A)
J-188	600.04	<Collection: 0 items>	0	762.6	70	(N/A)
H-5	600.09	<Collection: 0 items>	0	762.65	70	70
H-6	596.83	<Collection: 0 items>	0	761.47	71	70
H-7	587.01	<Collection: 0 items>	0	760.15	75	73
FH 39+20 FARRINGTON	400.88	<Collection: 0 items>	0	585.95	80	79
FH 25+10 MOOMOMI	403.52	<Collection: 0 items>	0	588.63	80	77
H-8	571.69	<Collection: 0 items>	0	758.6	81	78
J-195	566.49	<Collection: 0 items>	0	762.46	85	(N/A)
FH 34+20 FARRINGTON	388.1	<Collection: 0 items>	0	585.77	86	78
H-9	554.15	<Collection: 0 items>	0	756.91	88	84
J-206	518.17	<Collection: 0 items>	0	724.97	89	(N/A)
FH 20+10 MOOMOMI	381.5	<Collection: 0 items>	0	588.41	90	77
J-190	380.74	<Collection: 0 items>	0	588.34	90	(N/A)
LOT 17F	379.04	<Collection: 1 item>	6.25	588.32	91	(N/A)
LOT 17E	379.04	<Collection: 1 item>	6.25	588.32	91	(N/A)
J-7	538.69	<Collection: 0 items>	0	752.3	92	(N/A)
H-10	541.99	<Collection: 0 items>	0	755.73	92	88
H-12	536.64	<Collection: 0 items>	0	752.98	94	88
J-189	545.83	<Collection: 0 items>	0	762.53	94	(N/A)
lot22	502.2	<Collection: 1 item>	15.62	718.95	94	(N/A)
H-30	502.5	<Collection: 0 items>	0	719.29	94	62
H-31	502	<Collection: 0 items>	0	718.85	94	61
J-3	501.66	<Collection: 0 items>	0	718.7	94	(N/A)
lot20	501.64	<Collection: 1 item>	13.12	719.55	94	(N/A)
J-23	532.65	<Collection: 0 items>	0	751.34	95	(N/A)
J-37	499.45	<Collection: 0 items>	0	719.64	95	(N/A)
H-13	530.2	<Collection: 0 items>	0	750.94	96	89
H-11	533.01	<Collection: 0 items>	0	754.31	96	91
LOT 17B	363.67	<Collection: 1 item>	6.25	585.01	96	(N/A)
LOT 17G	366.66	<Collection: 1 item>	18.11	588.23	96	(N/A)
H-240	365.58	<Collection: 0 items>	0	588.22	96	75
lot19	496.41	<Collection: 1 item>	12.49	719.85	97	(N/A)
LOT 17A	361.32	<Collection: 1 item>	6.25	585.01	97	(N/A)
LOT 17H	364.2	<Collection: 1 item>	18.11	588.22	97	(N/A)
J-22	526.09	<Collection: 0 items>	0	750.45	97	(N/A)
H-32	494.08	<Collection: 0 items>	0	718.6	97	64
LOT 17D	360	<Collection: 1 item>	18.11	584.91	97	(N/A)
H-241	360	<Collection: 0 items>	0	584.91	97	54
LOT 17C	360	<Collection: 1 item>	18.11	584.92	97	(N/A)
J-200	359.05	<Collection: 0 items>	0	585.02	98	(N/A)
H-15	520.09	<Collection: 0 items>	0	747.85	99	90
J-24	520.31	<Collection: 0 items>	0	748.43	99	(N/A)
H-14	520.38	<Collection: 0 items>	0	749.39	99	92
lot18	490.27	<Collection: 1 item>	12.49	720.51	100	(N/A)
J-196	531.95	<Collection: 0 items>	0	762.45	100	(N/A)
FH 29+18 FARRINGTON	354.14	<Collection: 0 items>	0	585.49	100	82
lot17	488.52	<Collection: 1 item>	12.49	720.61	100	(N/A)
H-28	486.76	<Collection: 0 items>	0	720.71	101	71
FH 19+20 FARRINGTON	348.75	<Collection: 0 items>	0	585.05	102	67
lot21	480.71	<Collection: 1 item>	22.8	718.25	103	(N/A)
J-21	505.83	<Collection: 0 items>	0	746.08	104	(N/A)
H-33	477.71	<Collection: 0 items>	0	718.2	104	71
J-208	520.12	<Collection: 0 items>	0	762.41	105	(N/A)
H-16	502.84	<Collection: 0 items>	0	745.72	105	96
H-247	518.27	<Collection: 0 items>	0	762.41	106	91
FH 24+20 FARRINGTON	338.8	<Collection: 0 items>	0	585.22	107	78
FH 64+20 FARRINGTON	478.11	<Collection: 0 items>	0	726.3	107	82
J-20	496.79	<Collection: 0 items>	0	744.99	107	(N/A)
H-27	472.33	<Collection: 0 items>	0	721.32	108	78
J-19	495.03	<Collection: 0 items>	0	744.77	108	(N/A)

J-17	493.07	<Collection: 0 items>	0	744.54	109	(N/A)
J-63	488.87	<Collection: 0 items>	0	741.57	109	(N/A)
lot23	465.13	<Collection: 1 item>	12.49	718.06	109	(N/A)
H-17	489.97	<Collection: 0 items>	0	744.17	110	100
H-57	486.92	<Collection: 0 items>	0	741.67	110	98
H-34	458.55	<Collection: 0 items>	0	718.01	112	78
FH 59+22 FARRINGTON	466.26	<Collection: 0 items>	0	726.26	112	85
lot16	459.63	<Collection: 1 item>	12.49	721.75	113	(N/A)
J-18	479.33	<Collection: 0 items>	0	742.71	114	(N/A)
H-18	478.79	<Collection: 0 items>	0	742.54	114	103
H-56	477.63	<Collection: 0 items>	0	741.8	114	103
J-16	477.77	<Collection: 0 items>	0	742.25	114	(N/A)
J-6	477.24	<Collection: 0 items>	0	742.01	115	(N/A)
lot15	457.02	<Collection: 1 item>	12.49	721.86	115	(N/A)
H-55	476.73	<Collection: 0 items>	0	741.86	115	103
H-246	496.95	<Collection: 0 items>	0	762.41	115	98
H-19	475.48	<Collection: 0 items>	0	741.54	115	104
lot24	451.86	<Collection: 1 item>	21.55	717.95	115	(N/A)
H-54	475.72	<Collection: 0 items>	0	741.94	115	104
FH 69+10 FARRINGTON	459.53	<Collection: 0 items>	0	726.34	115	91
H-26	450.78	<Collection: 0 items>	0	722.14	117	90
H-58	465.41	<Collection: 0 items>	0	741.39	119	106
lot9_10_11_12	439.35	<Collection: 4 items>	75.58	716.17	120	(N/A)
H-48	440.34	<Collection: 0 items>	0	717.97	120	77
H-20	460.96	<Collection: 0 items>	0	740.53	121	109
J-10	442.25	<Collection: 0 items>	0	722.69	121	(N/A)
H-53	438.63	<Collection: 0 items>	0	721.37	122	94
H-25	439.99	<Collection: 0 items>	0	725.33	123	99
lot39	439.48	<Collection: 1 item>	15.62	725.97	124	(N/A)
H-59	454.63	<Collection: 0 items>	0	741.3	124	111
H-49	431.58	<Collection: 0 items>	0	718.43	124	90
H-245	474.85	<Collection: 0 items>	0	762.4	124	105
lot14	431.34	<Collection: 1 item>	15.62	719.89	125	(N/A)
J-62	429.83	<Collection: 0 items>	0	719.5	125	(N/A)
FH 74+10 FARRINGTON	436.52	<Collection: 0 items>	0	726.39	125	103
lot38	428.79	<Collection: 1 item>	19.67	719.24	126	(N/A)
H-52	428.15	<Collection: 0 items>	0	719.07	126	95
lot13	426.96	<Collection: 1 item>	15.62	718.83	126	(N/A)
lot25_26	425.79	<Collection: 2 items>	42.79	717.81	126	(N/A)
FH 84+10 FARRINGTON	434.2	<Collection: 0 items>	0	726.49	126	108
J-11	425.82	<Collection: 0 items>	0	718.63	127	(N/A)
lot40	435.12	<Collection: 1 item>	15.93	728.64	127	(N/A)
J-13	422.83	<Collection: 0 items>	0	718.22	128	(N/A)
FH 88+90 FARRINGTON	430.62	<Collection: 0 items>	0	726.53	128	111
H-47	422.12	<Collection: 0 items>	0	718.18	128	97
FH 54+20 FARRINGTON	430.07	<Collection: 0 items>	0	726.21	128	99
FH 79+10 FARRINGTON	430.2	<Collection: 0 items>	0	726.44	128	108
lot8	421.33	<Collection: 1 item>	17.18	718.13	128	(N/A)
lot7	420.02	<Collection: 1 item>	17.18	718.08	129	(N/A)
J-4	440.18	<Collection: 0 items>	0	738.5	129	(N/A)
lot44	440.07	<Collection: 1 item>	14.93	738.5	129	(N/A)
H-21	440.93	<Collection: 0 items>	0	739.45	129	116
lot27	419.08	<Collection: 1 item>	12.49	717.8	129	(N/A)
H-22	439.15	<Collection: 0 items>	0	738.51	130	109
J-29	430.68	<Collection: 0 items>	0	730.58	130	(N/A)
lot43	436.88	<Collection: 1 item>	15.93	738.51	131	(N/A)
lot41	429.59	<Collection: 1 item>	18.43	731.51	131	(N/A)
H-60	438.49	<Collection: 0 items>	0	741.15	131	117
H-50	414.84	<Collection: 0 items>	0	717.76	131	94
FH 85+10 MOOMOMI	420.98	<Collection: 0 items>	0	724.62	131	118
H-24	428.68	<Collection: 0 items>	0	732.34	131	113
H-35	412.45	<Collection: 0 items>	0	717.79	132	98
H-244	456.05	<Collection: 0 items>	0	762.39	133	112
lot32	409.95	<Collection: 1 item>	15.62	717.45	133	(N/A)
lot42	427.28	<Collection: 1 item>	14.68	738.57	135	(N/A)
H-23	424.59	<Collection: 0 items>	0	736.48	135	120
J-5	426.47	<Collection: 0 items>	0	738.59	135	(N/A)
lot37	404.87	<Collection: 1 item>	15.93	717.22	135	(N/A)
H-61	427.66	<Collection: 0 items>	0	741.02	136	121
lot6	404.4	<Collection: 1 item>	16.86	717.9	136	(N/A)
FH 49+18 FARRINGTON	411.69	<Collection: 0 items>	0	726.16	136	105
FH 44+20 FARRINGTON	411.35	<Collection: 0 items>	0	726.12	136	104
lot33_34_35_36	400.35	<Collection: 4 items>	68.4	715.87	137	(N/A)
H-46	402.29	<Collection: 0 items>	0	717.89	137	104

H-51	401.47	<Collection: 0 items>	0	717.13	137	91
FH 80+08 MOOMOMI	408.7	<Collection: 0 items>	0	724.59	137	122
H-62	420.3	<Collection: 0 items>	0	740.92	139	124
J-41	396.52	<Collection: 0 items>	0	717.77	139	(N/A)
FH 30+10 MOOMOMI	400.9	<Collection: 0 items>	0	724.12	140	107
H-243	438.65	<Collection: 0 items>	0	762.39	140	117
FH 75+10 MOOMOMI	400.12	<Collection: 0 items>	0	724.53	140	124
FH 70+08 MOOMOMI	399.8	<Collection: 0 items>	0	724.48	140	122
J-197	436.82	<Collection: 0 items>	0	762.38	141	(N/A)
LOT 104D-1A	435.69	<Collection: 1 item>	7.81	762.38	141	(N/A)
H-36	390.24	<Collection: 0 items>	0	717.76	142	108
FH 65+10 MOOMOMI	396.5	<Collection: 0 items>	0	724.44	142	122
H-63	411.9	<Collection: 0 items>	0	740.77	142	127
H-64	405.85	<Collection: 0 items>	0	740.64	145	130
J-168	404.66	<Collection: 0 items>	0	740.63	145	(N/A)
lot49	400.11	<Collection: 1 item>	16.24	738.68	146	(N/A)
lot50	400.09	<Collection: 1 item>	16.86	738.68	146	(N/A)
lot51	400.07	<Collection: 1 item>	16.86	738.68	147	(N/A)
H-68	400.03	<Collection: 0 items>	0	738.69	147	122
lot52	399.42	<Collection: 1 item>	16.24	738.69	147	(N/A)
FH 60+10 MOOMOMI	382.4	<Collection: 0 items>	0	724.39	148	126
FH 40+08 MOOMOMI	381.9	<Collection: 0 items>	0	724.22	148	119
FH 45+10 MOOMOMI	381.63	<Collection: 0 items>	0	724.26	148	121
lot48	395.94	<Collection: 1 item>	16.24	738.71	148	(N/A)
H-242	419.46	<Collection: 0 items>	0	762.38	148	120
H-65	395.89	<Collection: 0 items>	0	739.65	149	130
lot28	373.1	<Collection: 1 item>	16.55	717.17	149	(N/A)
LOT 104D-1B	417.97	<Collection: 1 item>	7.81	762.38	149	(N/A)
lot45	395.05	<Collection: 1 item>	14.05	739.52	149	(N/A)
FH 35+10 MOOMOMI	379.5	<Collection: 0 items>	0	724.16	149	118
lot58	394.62	<Collection: 1 item>	13.43	739.47	149	(N/A)
lot46	394.31	<Collection: 1 item>	24.98	739.43	149	(N/A)
lot57	394.01	<Collection: 1 item>	16.55	739.39	149	(N/A)
lot53	392.34	<Collection: 1 item>	18.11	738.73	150	(N/A)
lot47	392.7	<Collection: 1 item>	16.24	739.11	150	(N/A)
J-2	370.86	<Collection: 0 items>	0	717.73	150	(N/A)
H-66	392.03	<Collection: 0 items>	0	739.06	150	129
lot56	391.82	<Collection: 1 item>	16.55	738.96	150	(N/A)
lot29	369.05	<Collection: 1 item>	16.55	717.18	151	(N/A)
H-67	390.19	<Collection: 0 items>	0	738.76	151	128
lot54	389.74	<Collection: 1 item>	18.74	738.77	151	(N/A)
lot55	389.66	<Collection: 1 item>	16.55	738.84	151	(N/A)
H-44	367.79	<Collection: 0 items>	0	717.22	151	99
lot1	366.02	<Collection: 1 item>	15.62	717.71	152	(N/A)
H-45	365.36	<Collection: 0 items>	0	717.17	152	91
FH 55+10 MOOMOMI	371.55	<Collection: 0 items>	0	724.34	153	129
J-50	364.18	<Collection: 0 items>	0	717.71	153	(N/A)
FH 50+08 MOOMOMI	369.7	<Collection: 0 items>	0	724.3	153	128
lot2	361.58	<Collection: 1 item>	15.62	717.7	154	(N/A)
J-1	360.9	<Collection: 0 items>	0	717.17	154	(N/A)
H-40	356.13	<Collection: 0 items>	0	717.7	156	123
H-38	355.71	<Collection: 0 items>	0	717.7	157	123
lot5	354.77	<Collection: 1 item>	16.86	717.71	157	(N/A)
J-9	353.61	<Collection: 0 items>	0	717.73	158	(N/A)
H-42	353.53	<Collection: 0 items>	0	717.67	158	123
H-39	353.36	<Collection: 0 items>	0	717.69	158	124
H-41	353.31	<Collection: 0 items>	0	717.72	158	124
lot4	352.9	<Collection: 1 item>	17.8	717.69	158	(N/A)
H-43	352.04	<Collection: 0 items>	0	717.34	158	115
lot3	352.13	<Collection: 1 item>	16.86	717.69	158	(N/A)
lot30	351.53	<Collection: 1 item>	16.55	717.36	158	(N/A)
lot31	351.26	<Collection: 1 item>	16.55	717.41	158	(N/A)



MARCH 2017

EXISTING WATER SYSTEM SCHEMATIC PLAN

DHHL HOOLEHUA WATER SYSTEM MOLOKAI, HAWAII

HDR

APPENDIX C

Irrigation Calculations

EXISTING HOOLEHUA
DESIGN CRITERIA for Irrigation

1. Design Average Flow = (**5000** Gals/Acre/8 hour Day)

2. C Values:

8", 10", 12" dia pipe (ductile iron) = 110
16" dia pipe (ductile iron) = 120
16", 18" dia pipe (asbestos cement) = 140
24" dia pipe (concrete) = 130

3. Starting HGL of the reservoir was determined by taking the average between the minimum and maximum historical water levels from 2015 to 2020 and adding that value to the existing ground elevation indicated on reference USGS map. Water levels earlier than 2015 were not considered due to the fact that there were improvements made on the reservoir structure which took effect 2015 onwards (based on Google Earth historical images).

Minimum Reservoir Water Level from 2015 to 2020 =	28.50
Maximum Reservoir Water Level from 2015 to 2020 =	48.00
Average Water Level =	**38.25**
Approximate Reservoir Elevation based on USGS Map =	804.75
Starting HGL =	**843.00**

4. Minimum Residual Pressure = 30 Psi

EXISTING HOOLEHUA DEMANDS for IRRIGATION

NODE	LOT	AREA (ac)	ESTIMATED FLOW RATE (GPM)	ELEV (FT)	STATIC PRESSURE (PSI)	Gallons Served per day	
LOT 17A	LOT 17A	1.95	20.31	362.99	207.80	9,750.00	20.31
LOT 17B	LOT 17B	1.95	20.31	364.26	207.25	9,750.00	20.31
LOT 17C	LOT 17C	6	62.50	400.00	191.77	30,000.00	62.50
LOT 17D	LOT 17D	6	62.50	400.00	191.77	30,000.00	62.50
LOT 17E	LOT 17E	1.95	20.31	378.59	201.04	9,750.00	20.31
LOT 17F	LOT 17F	1.95	20.31	378.00	201.30	9,750.00	20.31
LOT 17G	LOT 17G	6	62.50	366.53	206.26	30,000.00	62.50
LOT 17H	LOT 17H	6	62.50	365.09	206.89	30,000.00	62.50
LOT 104D-1A	LOT 104D-1A	1	10.42	435.49	176.41	5,000.00	10.42
LOT 104D-1B	LOT 104D-1B	3	31.25	418.36	183.83	15,000.00	31.25
LOT 104D-1C	LOT 104D-1C	3.2	33.33	418.36	183.83	16,000.00	33.33
LOT 104D-1D	LOT 104D-1D	12.8	133.33	410.00	187.45	64,000.00	133.33

Total Acreage **51.8**

Total Gallons served per day **259,000.00**

Total Gallons served in a Month (31 days) **8,029,000.00**

EXISTING HOOLEHUA
EXISTING DEMANDS for IRRIGATION (SORTED BY PRESSURE)
(Based on Average Kualapuu Reservoir Water Level from 2015 - 2020)

FlexTable: Junction Table

Label	Elevation (ft)	Demand Collection	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-168	720.13	<Collection: 0 items>	0	838.59	51
J-283	640.68	<Collection: 0 items>	0	836.40	85
J-240	600.05	<Collection: 0 items>	0	836.42	102
J-284	566.99	<Collection: 0 items>	0	835.82	116
J-297	531.20	<Collection: 0 items>	0	835.51	132
J-268	438.63	<Collection: 0 items>	0	835.41	172
J-298	437.90	<Collection: 0 items>	0	834.97	172
LOT 104D-1A	435.49	<Collection: 1 item>	23	834.97	173
J-301	425.75	<Collection: 0 items>	0	835.11	177
LOT 104D-1B	418.36	<Collection: 1 item>	26	834.95	180
J-285	414.57	<Collection: 0 items>	0	835.41	182
LOT 17D	400.00	<Collection: 1 item>	60	832.80	187
LOT 17C	400.00	<Collection: 1 item>	60	832.80	187
J-292	380.29	<Collection: 0 items>	0	834.87	197
LOT 17E	378.59	<Collection: 1 item>	21	834.83	197
LOT 17F	378.00	<Collection: 1 item>	21	834.81	198
J-272	370.71	<Collection: 0 items>	0	835.02	201
LOT 17G	366.53	<Collection: 1 item>	60	834.63	203
LOT 17B	364.26	<Collection: 1 item>	21	832.98	203
LOT 17H	365.09	<Collection: 1 item>	60	834.63	203
LOT 17A	362.99	<Collection: 1 item>	21	832.99	203
J-286	363.60	<Collection: 0 items>	0	833.93	203
J-287	356.29	<Collection: 0 items>	0	833.05	206

EXISTING HOOLEHUA
EXISTING DEMANDS for IRRIGATION (SORTED BY VELOCITY)
(Based on Average Kualapuu Reservoir Water Level from 2015 - 2020)

FlexTable: Pipe Table

Label	ID	Length (Scaled) (ft)	Start Node	Stop Node	Diameter (in)	Material	Hazen-Williams C	Minor Loss Coefficient (Local)	Flow (gpm)	Velocity (ft/s)	Headloss Gradient (ft/ft)	Has User Defined Length?	Headloss (ft)
P-320	567	193	J-152	J-161	16	Asbestos Cement	140	0	0	0	0	FALSE	0
P-505	878	158	J-276	J-275	16	Ductile Iron	130	0	0	0	0	FALSE	0
P-531	930	3251	J-268	J-285	18	Asbestos Cement	140	0	18	0.02	0	FALSE	0
P-517	903	3255	J-240	J-283	24	Asbestos Cement	140	0	193	0.14	0	FALSE	0.01
P-535	938	390	LOT 104D-1A	LOT 104D-1B	8	Ductile Iron	110	0	26	0.17	0	FALSE	0.01
P-532	932	3240	J-284	J-297	8	Ductile Iron	110	0	49	0.31	0	FALSE	0.3
P-533	934	5,810	J-297	J-298	8	Ductile Iron	110	0	49	0.31	0	FALSE	0.54
P-534	936	69	J-298	LOT 104D-1A	8	Ductile Iron	110	0	49	0.31	0	FALSE	0.01
P-437	742	510	LOT43	LOT44	8	Ductile Iron	110	0	53	0.34	0	FALSE	0.06
P-366	635	561	LOT29	LOT28	8	Ductile Iron	110	0	55	0.35	0	FALSE	0.07
P-516	894	48	lot49	lot50	8	Ductile Iron	110	0	56	0.36	0	FALSE	0.01
P-356	620	47	LOT34	LOT35	8	Ductile Iron	110	0	60	0.39	0	FALSE	0.01
P-525	919	21	LOT 17C	LOT 17D	8	Ductile Iron	110	0	60	0.39	0	FALSE	0
P-530	929	26	LOT 17G	LOT 17H	8	Ductile Iron	110	0	60	0.39	0	FALSE	0
P-519	907	6634	J-284	J-285	12	Asbestos Cement	140	0	144	0.41	0	FALSE	0.41
P-526	921	7066	J-268	J-292	12	Asbestos Cement	140	0	162	0.46	0	FALSE	0.54
P-536	940	3895	J-285	J-301	12	Asbestos Cement	140	0	162	0.46	0	FALSE	0.3
P-518	905	5579	J-283	J-284	12	Asbestos Cement	140	0	193	0.55	0	FALSE	0.59
P-497	863	2671	J-268	J-269	24	Concrete	130	0	793	0.56	0	FALSE	0.15
P-498	865	2036	J-269	J-270	24	Concrete	130	0	793	0.56	0	FALSE	0.11
P-499	867	1576	J-270	J-271	24	Concrete	130	0	793	0.56	0	FALSE	0.09
P-500	869	667	J-271	J-272	24	Concrete	130	0	793	0.56	0	FALSE	0.04
P-501	871	2604	J-272	J-273	24	Concrete	130	0	793	0.56	0	FALSE	0.15
P-401	688	29	LOT10	LOT11	8	Ductile Iron	110	0	89	0.57	0	FALSE	0.01
P-389	670	209	J-176	J-195	8	Ductile Iron	110	0	-101	0.65	0	FALSE	0.08
P-436	741	323	LOT42	LOT43	8	Ductile Iron	110	0	106	0.68	0	FALSE	0.13
P-469	807	437	J-240	J-241	24	Concrete	130	0	973	0.69	0	FALSE	0.04
P-470	809	124	J-241	J-242	24	Concrete	130	0	973	0.69	0	FALSE	0.01
P-471	811	89	J-242	J-243	24	Concrete	130	0	973	0.69	0	FALSE	0.01
P-472	813	467	J-243	J-244	24	Concrete	130	0	973	0.69	0	FALSE	0.04
P-473	815	181	J-244	J-245	24	Concrete	130	0	973	0.69	0	FALSE	0.01
P-474	817	1080	J-245	J-246	24	Concrete	130	0	973	0.69	0	FALSE	0.09
P-475	819	770	J-246	J-247	24	Concrete	130	0	973	0.69	0	FALSE	0.06
P-476	821	177	J-247	J-248	24	Concrete	130	0	973	0.69	0	FALSE	0.01
P-477	823	195	J-248	J-249	24	Concrete	130	0	973	0.69	0	FALSE	0.02
P-478	825	134	J-249	J-250	24	Concrete	130	0	973	0.69	0	FALSE	0.01
P-479	827	567	J-250	J-251	24	Concrete	130	0	973	0.69	0	FALSE	0.05
P-480	829	801	J-251	J-252	24	Concrete	130	0	973	0.69	0	FALSE	0.07
P-481	831	412	J-252	J-253	24	Concrete	130	0	973	0.69	0	FALSE	0.03
P-482	833	193	J-253	J-254	24	Concrete	130	0	973	0.69	0	FALSE	0.02
P-483	835	278	J-254	J-255	24	Concrete	130	0	973	0.69	0	FALSE	0.02
P-484	837	765	J-255	J-256	24	Concrete	130	0	973	0.69	0	FALSE	0.06
P-485	839	579	J-256	J-257	24	Concrete	130	0	973	0.69	0	FALSE	0.05
P-486	841	175	J-257	J-258	24	Concrete	130	0	973	0.69	0	FALSE	0.01
P-487	843	922	J-258	J-259	24	Concrete	130	0	973	0.69	0	FALSE	0.08
P-488	845	587	J-259	J-260	24	Concrete	130	0	973	0.69	0	FALSE	0.05
P-489	847	39	J-260	J-261	24	Concrete	130	0	973	0.69	0	FALSE	0
P-490	849	148	J-261	J-262	24	Concrete	130	0	973	0.69	0	FALSE	0.01
P-491	851	486	J-262	J-263	24	Concrete	130	0	973	0.69	0	FALSE	0.04
P-492	853	661	J-263	J-264	24	Concrete	130	0	973	0.69	0	FALSE	0.05
P-493	855	298	J-264	J-265	24	Concrete	130	0	973	0.69	0	FALSE	0.02
P-494	857	542	J-265	J-266	24	Concrete	130	0	973	0.69	0	FALSE	0.04
P-495	859	458	J-266	J-267	24	Concrete	130	0	973	0.69	0	FALSE	0.04
P-496	861	645	J-267	J-268	24	Concrete	130	0	973	0.69	0	FALSE	0.05
P-368	638	476	LOT30	LOT29	8	Ductile Iron	110	0	110	0.7	0	FALSE	0.2

P-515	893	56	lot51	lot49	8	Ductile Iron	110	0	110	0.7	0	FALSE	0.02
P-524	917	358	LOT 17B	LOT 17C	8	Ductile Iron	110	0	121	0.77	0	FALSE	0.18
P-529	927	362	LOT 17F	LOT 17G	8	Ductile Iron	110	0	121	0.77	0	FALSE	0.18
P-358	623	101	LOT36	LOT34	8	Ductile Iron	110	0	123	0.78	0.001	FALSE	0.05
P-467	803	1074	J-154	J-239	24	Concrete	130	0	1167	0.83	0	FALSE	0.12
P-468	805	621	J-239	J-240	24	Concrete	130	0	1167	0.83	0	FALSE	0.07
P-523	915	24	LOT 17A	LOT 17B	8	Ductile Iron	110	0	142	0.9	0.001	FALSE	0.02
P-528	925	27	LOT 17E	LOT 17F	8	Ductile Iron	110	0	142	0.9	0.001	FALSE	0.02
P-434	738	328	LOT41	LOT42	8	Ductile Iron	110	0	155	0.99	0.001	FALSE	0.26
P-400	687	54	LOT9	LOT10	8	Ductile Iron	110	0	158	1.01	0.001	FALSE	0.04
P-521	911	1026	J-286	J-287	8	Ductile Iron	110	0	162	1.04	0.001	FALSE	0.88
P-522	913	66	J-287	LOT 17A	8	Ductile Iron	110	0	162	1.04	0.001	FALSE	0.06
P-527	923	45	J-292	LOT 17E	8	Ductile Iron	110	0	162	1.04	0.001	FALSE	0.04
P-537	941	2140	J-301	J-286	8	Asbestos Cement	140	0	162	1.04	0.001	FALSE	1.18
P-370	641	488	LOT31	LOT30	8	Ductile Iron	110	0	166	1.06	0.001	FALSE	0.43
P-513	890	194	lot52	lot51	8	Ductile Iron	110	0	167	1.06	0.001	FALSE	0.17
P-360	626	172	LOT33	LOT36	8	Ductile Iron	110	0	176	1.12	0.001	FALSE	0.17
P-506	879	1102	J-276	J-221	16	Ductile Iron	120	0	793	1.26	0	FALSE	0.52
P-504	877	1669	J-273	J-276	16	Ductile Iron	120	0	793	1.26	0	FALSE	0.79
P-398	684	27	LOT12	LOT9	8	Ductile Iron	110	0	200	1.28	0.001	FALSE	0.03
P-383	661	579	J-161	LOT27	16	Ductile Iron	120	0	-842	1.34	0.001	FALSE	0.31
P-432	735	505	LOT40	LOT41	8	Ductile Iron	110	0	217	1.38	0.001	FALSE	0.74
P-369	640	229	J-174	LOT31	8	Ductile Iron	110	0	221	1.41	0.002	FALSE	0.35
P-512	888	67	lot48	lot52	8	Ductile Iron	110	0	221	1.41	0.002	FALSE	0.1
P-385	664	234	LOT27	LOT26	16	Ductile Iron	120	0	-884	1.41	0.001	FALSE	0.13
P-362	629	263	LOT37	LOT33	8	Ductile Iron	110	0	228	1.46	0.002	FALSE	0.42
P-388	668	291	LOT7	J-176	8	Ductile Iron	110	0	232	1.48	0.002	FALSE	0.48
P-422	720	61	LOT26	LOT25	16	Ductile Iron	120	0	-955	1.52	0.001	FALSE	0.04
P-396	681	494	LOT13	LOT12	8	Ductile Iron	110	0	252	1.61	0.002	FALSE	0.96
P-424	723	257	LOT25	LOT24	16	Ductile Iron	120	0	-1027	1.64	0.001	FALSE	0.2
P-426	726	387	LOT24	LOT23	16	Ductile Iron	120	0	-1068	1.7	0.001	FALSE	0.32
P-430	732	450	J-175	LOT40	8	Ductile Iron	110	0	270	1.72	0.002	FALSE	0.99
P-511	887	101	lot53	lot48	8	Ductile Iron	110	0	275	1.76	0.002	FALSE	0.23
P-428	729	241	LOT23	LOT21	16	Ductile Iron	120	0	-1110	1.77	0.001	FALSE	0.21
P-364	632	208	LOT32	LOT37	8	Ductile Iron	110	0	281	1.8	0.002	FALSE	0.49
P-387	667	742	J-174	LOT7	8	Ductile Iron	110	0	289	1.85	0.003	FALSE	1.85
P-429	730	523	LOT21	J-162	16	Ductile Iron	120	0	-1186	1.89	0.001	FALSE	0.52
P-394	678	210	LOT8	LOT13	8	Ductile Iron	110	0	304	1.94	0.003	FALSE	0.58
P-363	631	177	J-176	LOT32	8	Ductile Iron	110	0	333	2.13	0.003	FALSE	0.58
P-464	788	102	lot54	lot53	8	Ductile Iron	110	0	335	2.14	0.003	FALSE	0.34
P-392	675	110	J-195	LOT8	8	Ductile Iron	110	0	361	2.31	0.004	FALSE	0.41
P-334	587	1150	J-154	J-167	24	Concrete	130	0	-3559	2.52	0.001	FALSE	1.05
P-336	590	1026	J-167	J-168	24	Concrete	130	0	-3559	2.52	0.001	FALSE	0.93
P-338	593	1464	J-168	J-169	24	Concrete	130	0	-3559	2.52	0.001	FALSE	1.33
P-339	594	1352	J-169	J-157	24	Concrete	130	0	-3559	2.52	0.001	FALSE	1.23
P-340	596	252	J-157	J-170	24	Concrete	130	0	-3559	2.52	0.001	FALSE	0.23
P-342	599	1097	J-170	J-171	24	Concrete	130	0	-3559	2.52	0.001	FALSE	1
P-343	600	685	J-171	R-1	24	Concrete	130	0	-3559	2.52	0.001	FALSE	0.62
P-463	787	97	lot55	lot54	8	Ductile Iron	110	0	398	2.54	0.005	FALSE	0.44
P-458	779	90	lot47	lot55	8	Ductile Iron	110	0	453	2.89	0.006	FALSE	0.52
P-402	690	276	J-195	LOT38	8	Ductile Iron	110	0	-463	2.95	0.006	FALSE	1.65
P-457	778	206	lot56	lot47	8	Ductile Iron	110	0	507	3.24	0.007	FALSE	1.46
P-372	644	200	LOT6	J-174	8	Ductile Iron	110	0	510	3.26	0.007	FALSE	1.43
P-404	693	90	LOT38	LOT14	8	Ductile Iron	110	0	-529	3.37	0.008	FALSE	0.69
P-510	885	222	lot46	lot56	8	Ductile Iron	110	0	563	3.59	0.009	FALSE	1.9
P-374	647	524	LOT5	LOT6	8	Ductile Iron	110	0	566	3.61	0.009	FALSE	4.55
P-406	696	230	LOT14	LOT39	8	Ductile Iron	110	0	-581	3.71	0.009	FALSE	2.09
P-331	582	3337	J-165	J-154	16	Asbestos Cement	140	0	-2393	3.82	0.003	FALSE	9.14
P-332	584	872	J-162	J-166	16	Asbestos Cement	140	0	-2393	3.82	0.003	FALSE	2.39
P-333	585	2386	J-166	J-165	16	Asbestos Cement	140	0	-2393	3.82	0.003	FALSE	6.53
P-411	703	664	LOT16	J-175	10	Ductile Iron	110	0	944	3.86	0.008	FALSE	5.01
P-376	650	499	LOT4	LOT5	8	Ductile Iron	110	0	623	3.97	0.01	FALSE	5.16
P-413	706	365	LOT17	LOT16	10	Ductile Iron	110	0	986	4.03	0.008	FALSE	2.98
P-408	699	236	LOT39	LOT15	8	Ductile Iron	110	0	-633	4.04	0.011	FALSE	2.52

P-509	884	133	lot57	lot46	8	Ductile Iron	110	0	646	4.12	0.011	FALSE	1.47
P-415	709	443	LOT18	LOT17	10	Ductile Iron	110	0	1028	4.2	0.009	FALSE	3.91
P-409	700	178	LOT15	J-175	8	Ductile Iron	110	0	-674	4.3	0.012	FALSE	2.13
P-378	653	349	LOT3	LOT4	8	Ductile Iron	110	0	682	4.35	0.012	FALSE	4.28
P-417	712	453	LOT19	LOT18	10	Ductile Iron	110	0	1069	4.37	0.01	FALSE	4.3
P-508	882	319	lot45	lot57	8	Ductile Iron	110	0	701	4.47	0.013	FALSE	4.11
P-419	715	312	LOT20	LOT19	10	Ductile Iron	110	0	1111	4.54	0.01	FALSE	3.18
P-380	656	446	LOT2	LOT3	8	Ductile Iron	110	0	738	4.71	0.014	FALSE	6.33
P-421	718	336	LOT22	LOT20	10	Ductile Iron	110	0	1155	4.72	0.011	FALSE	3.68
P-507	881	207	lot58	lot45	8	Ductile Iron	110	0	748	4.77	0.015	FALSE	3.01
P-420	717	449	J-162	LOT22	10	Ductile Iron	110	0	1207	4.93	0.012	FALSE	5.34
P-382	659	481	LOT1	LOT2	8	Ductile Iron	110	0	790	5.04	0.016	FALSE	7.74
P-449	766	252	J-221	lot58	8	Ductile Iron	110	0	793	5.06	0.016	FALSE	4.09
P-381	658	221	J-161	LOT1	8	Ductile Iron	110	0	842	5.38	0.018	FALSE	4.01

EXISTING HOOLEHUA SUBDIVISION
DESIGN CRITERIA for Irrigation

1. Design Average Flow = (**5000** Gals/Acre/8 hour Day)

2. C Values:

8", 10", 12" dia pipe (ductile iron) = 110
16" dia pipe (ductile iron) = 120
16", 18" dia pipe (asbestos cement) = 140
24" dia pipe (concrete) = 130

3. Starting HGL of the reservoir was assumed using 10' depth for the reservoir water level and adding that value to the existing ground elevation indicated on reference USGS map.

Assumed Water Level =	**10.00**
Approximate Reservoir Elevation based on USGS Map =	804.75
Starting HGL =	**814.75**

4. Minimum Residual Pressure = 30 Psi

EXISTING HOOLEHUA DEMANDS for IRRIGATION

NODE	LOT	AREA (ac)	ESTIMATED FLOW RATE (GPM)	ELEV (FT)	STATIC PRESSURE (PSI)	Gallons Served per day	
LOT 17A	LOT 17A	1.95	20.31	362.99	207.80	9,750.00	20.31
LOT 17B	LOT 17B	1.95	20.31	364.26	207.25	9,750.00	20.31
LOT 17C	LOT 17C	6	62.50	400.00	191.77	30,000.00	62.50
LOT 17D	LOT 17D	6	62.50	400.00	191.77	30,000.00	62.50
LOT 17E	LOT 17E	1.95	20.31	378.59	201.04	9,750.00	20.31
LOT 17F	LOT 17F	1.95	20.31	378.00	201.30	9,750.00	20.31
LOT 17G	LOT 17G	6	62.50	366.53	206.26	30,000.00	62.50
LOT 17H	LOT 17H	6	62.50	365.09	206.89	30,000.00	62.50
LOT 104D-1A	LOT 104D-1A	1	10.42	435.49	176.41	5,000.00	10.42
LOT 104D-1B	LOT 104D-1B	3	31.25	418.36	183.83	15,000.00	31.25
LOT 104D-1C	LOT 104D-1C	3.2	33.33	418.36	183.83	16,000.00	33.33
LOT 104D-1D	LOT 104D-1D	12.8	133.33	410.00	187.45	64,000.00	133.33

Total Acreage **51.8**

Total Gallons served per day **259,000.00**

Total Gallons served in a Month (31 days) **8,029,000.00**

EXISTING HOOLEHUA
EXISTING DEMANDS for IRRIGATION (SORTED BY PRESSURE)
(Based on Kualapuu Reservoir water Level depth of 10')

FlexTable: Junction Table

Label	Elevation (ft)	Demand Collection	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-168	720.13	<Collection: 0 items>	0	810.34	39
J-283	640.68	<Collection: 0 items>	0	808.15	72
J-240	600.05	<Collection: 0 items>	0	808.17	90
J-284	566.99	<Collection: 0 items>	0	807.57	104
J-297	531.20	<Collection: 0 items>	0	807.26	119
J-268	438.63	<Collection: 0 items>	0	807.16	159
J-298	437.90	<Collection: 0 items>	0	806.72	160
LOT 104D-1A	435.49	<Collection: 1 item>	23	806.72	161
J-301	425.75	<Collection: 0 items>	0	806.86	165
LOT 104D-1B	418.36	<Collection: 1 item>	26	806.70	168
J-285	414.57	<Collection: 0 items>	0	807.16	170
LOT 17D	400.00	<Collection: 1 item>	60	804.55	175
LOT 17C	400.00	<Collection: 1 item>	60	804.55	175
J-292	380.29	<Collection: 0 items>	0	806.62	184
LOT 17E	378.59	<Collection: 1 item>	21	806.58	185
LOT 17F	378.00	<Collection: 1 item>	21	806.56	185
J-272	370.71	<Collection: 0 items>	0	806.77	189
LOT 17G	366.53	<Collection: 1 item>	60	806.38	190
LOT 17B	364.26	<Collection: 1 item>	21	804.73	191
LOT 17H	365.09	<Collection: 1 item>	60	806.38	191
LOT 17A	362.99	<Collection: 1 item>	21	804.74	191
J-286	363.60	<Collection: 0 items>	0	805.68	191
J-287	356.29	<Collection: 0 items>	0	804.80	194

EXISTING HOOLEHUA
EXISTING DEMANDS for IRRIGATION (SORTED BY VELOCITY)
(Based on Kualapuu Reservoir water Level depth of 10')

FlexTable: Pipe Table

Label	ID	Length (Scaled) (ft)	Start Node	Stop Node	Diameter (in)	Material	Hazen-Williams C	Minor Loss Coefficient (Local)	Flow (gpm)	Velocity (ft/s)	Headloss Gradient (ft/ft)	Has User Defined Length?	Headloss (ft)
P-505	878	158	J-276	J-275	16	Ductile Iron	130	0	0	0	0	FALSE	0
P-320	567	193	J-152	J-161	16	Asbestos Cement	140	0	0	0	0	FALSE	0
P-531	930	3251	J-268	J-285	18	Asbestos Cement	140	0	18	0.02	0	FALSE	0
P-517	903	3255	J-240	J-283	24	Asbestos Cement	140	0	193	0.14	0	FALSE	0.01
P-535	938	390	LOT 104D-1A	LOT 104D-1B	8	Ductile Iron	110	0	26	0.17	0	FALSE	0.01
P-532	932	3240	J-284	J-297	8	Ductile Iron	110	0	49	0.31	0	FALSE	0.3
P-533	934	5,810	J-297	J-298	8	Ductile Iron	110	0	49	0.31	0	FALSE	0.54
P-534	936	69	J-298	LOT 104D-1A	8	Ductile Iron	110	0	49	0.31	0	FALSE	0.01
P-437	742	510	LOT43	LOT44	8	Ductile Iron	110	0	53	0.34	0	FALSE	0.06
P-366	635	561	LOT29	LOT28	8	Ductile Iron	110	0	55	0.35	0	FALSE	0.07
P-516	894	48	lot49	lot50	8	Ductile Iron	110	0	56	0.36	0	FALSE	0.01
P-356	620	47	LOT34	LOT35	8	Ductile Iron	110	0	60	0.39	0	FALSE	0.01
P-525	919	21	LOT 17C	LOT 17D	8	Ductile Iron	110	0	60	0.39	0	FALSE	0
P-530	929	26	LOT 17G	LOT 17H	8	Ductile Iron	110	0	60	0.39	0	FALSE	0
P-519	907	6634	J-284	J-285	12	Asbestos Cement	140	0	144	0.41	0	FALSE	0.41
P-526	921	7066	J-268	J-292	12	Asbestos Cement	140	0	162	0.46	0	FALSE	0.54
P-536	940	3895	J-285	J-301	12	Asbestos Cement	140	0	162	0.46	0	FALSE	0.3
P-518	905	5579	J-283	J-284	12	Asbestos Cement	140	0	193	0.55	0	FALSE	0.59
P-497	863	2671	J-268	J-269	24	Concrete	130	0	793	0.56	0	FALSE	0.15
P-498	865	2036	J-269	J-270	24	Concrete	130	0	793	0.56	0	FALSE	0.11
P-499	867	1576	J-270	J-271	24	Concrete	130	0	793	0.56	0	FALSE	0.09
P-500	869	667	J-271	J-272	24	Concrete	130	0	793	0.56	0	FALSE	0.04
P-501	871	2604	J-272	J-273	24	Concrete	130	0	793	0.56	0	FALSE	0.15
P-401	688	29	LOT10	LOT11	8	Ductile Iron	110	0	89	0.57	0	FALSE	0.01
P-389	670	209	J-176	J-195	8	Ductile Iron	110	0	-101	0.65	0	FALSE	0.08
P-436	741	323	LOT42	LOT43	8	Ductile Iron	110	0	106	0.68	0	FALSE	0.13
P-469	807	437	J-240	J-241	24	Concrete	130	0	973	0.69	0	FALSE	0.04
P-470	809	124	J-241	J-242	24	Concrete	130	0	973	0.69	0	FALSE	0.01
P-471	811	89	J-242	J-243	24	Concrete	130	0	973	0.69	0	FALSE	0.01
P-472	813	467	J-243	J-244	24	Concrete	130	0	973	0.69	0	FALSE	0.04
P-473	815	181	J-244	J-245	24	Concrete	130	0	973	0.69	0	FALSE	0.01
P-474	817	1080	J-245	J-246	24	Concrete	130	0	973	0.69	0	FALSE	0.09
P-475	819	770	J-246	J-247	24	Concrete	130	0	973	0.69	0	FALSE	0.06
P-476	821	177	J-247	J-248	24	Concrete	130	0	973	0.69	0	FALSE	0.01
P-477	823	195	J-248	J-249	24	Concrete	130	0	973	0.69	0	FALSE	0.02
P-478	825	134	J-249	J-250	24	Concrete	130	0	973	0.69	0	FALSE	0.01
P-479	827	567	J-250	J-251	24	Concrete	130	0	973	0.69	0	FALSE	0.05
P-480	829	801	J-251	J-252	24	Concrete	130	0	973	0.69	0	FALSE	0.07
P-481	831	412	J-252	J-253	24	Concrete	130	0	973	0.69	0	FALSE	0.03
P-482	833	193	J-253	J-254	24	Concrete	130	0	973	0.69	0	FALSE	0.02
P-483	835	278	J-254	J-255	24	Concrete	130	0	973	0.69	0	FALSE	0.02
P-484	837	765	J-255	J-256	24	Concrete	130	0	973	0.69	0	FALSE	0.06
P-485	839	579	J-256	J-257	24	Concrete	130	0	973	0.69	0	FALSE	0.05
P-486	841	175	J-257	J-258	24	Concrete	130	0	973	0.69	0	FALSE	0.01
P-487	843	922	J-258	J-259	24	Concrete	130	0	973	0.69	0	FALSE	0.08
P-488	845	587	J-259	J-260	24	Concrete	130	0	973	0.69	0	FALSE	0.05
P-489	847	39	J-260	J-261	24	Concrete	130	0	973	0.69	0	FALSE	0
P-490	849	148	J-261	J-262	24	Concrete	130	0	973	0.69	0	FALSE	0.01
P-491	851	486	J-262	J-263	24	Concrete	130	0	973	0.69	0	FALSE	0.04
P-492	853	661	J-263	J-264	24	Concrete	130	0	973	0.69	0	FALSE	0.05
P-493	855	298	J-264	J-265	24	Concrete	130	0	973	0.69	0	FALSE	0.02
P-494	857	542	J-265	J-266	24	Concrete	130	0	973	0.69	0	FALSE	0.04
P-495	859	458	J-266	J-267	24	Concrete	130	0	973	0.69	0	FALSE	0.04
P-496	861	645	J-267	J-268	24	Concrete	130	0	973	0.69	0	FALSE	0.05
P-368	638	476	LOT30	LOT29	8	Ductile Iron	110	0	110	0.7	0	FALSE	0.2

P-515	893	56	lot51	lot49	8	Ductile Iron	110	0	110	0.7	0	FALSE	0.02
P-524	917	358	LOT 17B	LOT 17C	8	Ductile Iron	110	0	121	0.77	0	FALSE	0.18
P-529	927	362	LOT 17F	LOT 17G	8	Ductile Iron	110	0	121	0.77	0	FALSE	0.18
P-358	623	101	LOT36	LOT34	8	Ductile Iron	110	0	123	0.78	0.001	FALSE	0.05
P-467	803	1074	J-154	J-239	24	Concrete	130	0	1167	0.83	0	FALSE	0.12
P-468	805	621	J-239	J-240	24	Concrete	130	0	1167	0.83	0	FALSE	0.07
P-523	915	24	LOT 17A	LOT 17B	8	Ductile Iron	110	0	142	0.9	0.001	FALSE	0.02
P-528	925	27	LOT 17E	LOT 17F	8	Ductile Iron	110	0	142	0.9	0.001	FALSE	0.02
P-434	738	328	LOT41	LOT42	8	Ductile Iron	110	0	155	0.99	0.001	FALSE	0.26
P-400	687	54	LOT9	LOT10	8	Ductile Iron	110	0	158	1.01	0.001	FALSE	0.04
P-521	911	1026	J-286	J-287	8	Ductile Iron	110	0	162	1.04	0.001	FALSE	0.88
P-522	913	66	J-287	LOT 17A	8	Ductile Iron	110	0	162	1.04	0.001	FALSE	0.06
P-527	923	45	J-292	LOT 17E	8	Ductile Iron	110	0	162	1.04	0.001	FALSE	0.04
P-537	941	2140	J-301	J-286	8	Asbestos Cement	140	0	162	1.04	0.001	FALSE	1.18
P-370	641	488	LOT31	LOT30	8	Ductile Iron	110	0	166	1.06	0.001	FALSE	0.43
P-513	890	194	lot52	lot51	8	Ductile Iron	110	0	167	1.06	0.001	FALSE	0.17
P-360	626	172	LOT33	LOT36	8	Ductile Iron	110	0	176	1.12	0.001	FALSE	0.17
P-506	879	1102	J-276	J-221	16	Ductile Iron	120	0	793	1.26	0	FALSE	0.52
P-504	877	1669	J-273	J-276	16	Ductile Iron	120	0	793	1.26	0	FALSE	0.79
P-398	684	27	LOT12	LOT9	8	Ductile Iron	110	0	200	1.28	0.001	FALSE	0.03
P-383	661	579	J-161	LOT27	16	Ductile Iron	120	0	-842	1.34	0.001	FALSE	0.31
P-432	735	505	LOT40	LOT41	8	Ductile Iron	110	0	217	1.38	0.001	FALSE	0.74
P-369	640	229	J-174	LOT31	8	Ductile Iron	110	0	221	1.41	0.002	FALSE	0.35
P-512	888	67	lot48	lot52	8	Ductile Iron	110	0	221	1.41	0.002	FALSE	0.1
P-385	664	234	LOT27	LOT26	16	Ductile Iron	120	0	-884	1.41	0.001	FALSE	0.13
P-362	629	263	LOT37	LOT33	8	Ductile Iron	110	0	228	1.46	0.002	FALSE	0.42
P-388	668	291	LOT7	J-176	8	Ductile Iron	110	0	232	1.48	0.002	FALSE	0.48
P-422	720	61	LOT26	LOT25	16	Ductile Iron	120	0	-955	1.52	0.001	FALSE	0.04
P-396	681	494	LOT13	LOT12	8	Ductile Iron	110	0	252	1.61	0.002	FALSE	0.96
P-424	723	257	LOT25	LOT24	16	Ductile Iron	120	0	-1027	1.64	0.001	FALSE	0.2
P-426	726	387	LOT24	LOT23	16	Ductile Iron	120	0	-1068	1.7	0.001	FALSE	0.32
P-430	732	450	J-175	LOT40	8	Ductile Iron	110	0	270	1.72	0.002	FALSE	0.99
P-511	887	101	lot53	lot48	8	Ductile Iron	110	0	275	1.76	0.002	FALSE	0.23
P-428	729	241	LOT23	LOT21	16	Ductile Iron	120	0	-1110	1.77	0.001	FALSE	0.21
P-364	632	208	LOT32	LOT37	8	Ductile Iron	110	0	281	1.8	0.002	FALSE	0.49
P-387	667	742	J-174	LOT7	8	Ductile Iron	110	0	289	1.85	0.003	FALSE	1.85
P-429	730	523	LOT21	J-162	16	Ductile Iron	120	0	-1186	1.89	0.001	FALSE	0.52
P-394	678	210	LOT8	LOT13	8	Ductile Iron	110	0	304	1.94	0.003	FALSE	0.58
P-363	631	177	J-176	LOT32	8	Ductile Iron	110	0	333	2.13	0.003	FALSE	0.58
P-464	788	102	lot54	lot53	8	Ductile Iron	110	0	335	2.14	0.003	FALSE	0.34
P-392	675	110	J-195	LOT8	8	Ductile Iron	110	0	361	2.31	0.004	FALSE	0.41
P-334	587	1150	J-154	J-167	24	Concrete	130	0	-3559	2.52	0.001	FALSE	1.05
P-336	590	1026	J-167	J-168	24	Concrete	130	0	-3559	2.52	0.001	FALSE	0.93
P-338	593	1464	J-168	J-169	24	Concrete	130	0	-3559	2.52	0.001	FALSE	1.33
P-339	594	1352	J-169	J-157	24	Concrete	130	0	-3559	2.52	0.001	FALSE	1.23
P-340	596	252	J-157	J-170	24	Concrete	130	0	-3559	2.52	0.001	FALSE	0.23
P-342	599	1097	J-170	J-171	24	Concrete	130	0	-3559	2.52	0.001	FALSE	1
P-343	600	685	J-171	R-1	24	Concrete	130	0	-3559	2.52	0.001	FALSE	0.62
P-463	787	97	lot55	lot54	8	Ductile Iron	110	0	398	2.54	0.005	FALSE	0.44
P-458	779	90	lot47	lot55	8	Ductile Iron	110	0	453	2.89	0.006	FALSE	0.52
P-402	690	276	J-195	LOT38	8	Ductile Iron	110	0	-463	2.95	0.006	FALSE	1.65
P-457	778	206	lot56	lot47	8	Ductile Iron	110	0	507	3.24	0.007	FALSE	1.46
P-372	644	200	LOT6	J-174	8	Ductile Iron	110	0	510	3.26	0.007	FALSE	1.43
P-404	693	90	LOT38	LOT14	8	Ductile Iron	110	0	-529	3.37	0.008	FALSE	0.69
P-510	885	222	lot46	lot56	8	Ductile Iron	110	0	563	3.59	0.009	FALSE	1.9
P-374	647	524	LOT5	LOT6	8	Ductile Iron	110	0	566	3.61	0.009	FALSE	4.55
P-406	696	230	LOT14	LOT39	8	Ductile Iron	110	0	-581	3.71	0.009	FALSE	2.09
P-331	582	3337	J-165	J-154	16	Asbestos Cement	140	0	-2393	3.82	0.003	FALSE	9.14
P-332	584	872	J-162	J-166	16	Asbestos Cement	140	0	-2393	3.82	0.003	FALSE	2.39
P-333	585	2386	J-166	J-165	16	Asbestos Cement	140	0	-2393	3.82	0.003	FALSE	6.53
P-411	703	664	LOT16	J-175	10	Ductile Iron	110	0	944	3.86	0.008	FALSE	5.01
P-376	650	499	LOT4	LOT5	8	Ductile Iron	110	0	623	3.97	0.01	FALSE	5.16
P-413	706	365	LOT17	LOT16	10	Ductile Iron	110	0	986	4.03	0.008	FALSE	2.98
P-408	699	236	LOT39	LOT15	8	Ductile Iron	110	0	-633	4.04	0.011	FALSE	2.52

P-509	884	133	lot57	lot46	8	Ductile Iron	110	0	646	4.12	0.011	FALSE	1.47
P-415	709	443	LOT18	LOT17	10	Ductile Iron	110	0	1028	4.2	0.009	FALSE	3.91
P-409	700	178	LOT15	J-175	8	Ductile Iron	110	0	-674	4.3	0.012	FALSE	2.13
P-378	653	349	LOT3	LOT4	8	Ductile Iron	110	0	682	4.35	0.012	FALSE	4.28
P-417	712	453	LOT19	LOT18	10	Ductile Iron	110	0	1069	4.37	0.01	FALSE	4.3
P-508	882	319	lot45	lot57	8	Ductile Iron	110	0	701	4.47	0.013	FALSE	4.11
P-419	715	312	LOT20	LOT19	10	Ductile Iron	110	0	1111	4.54	0.01	FALSE	3.18
P-380	656	446	LOT2	LOT3	8	Ductile Iron	110	0	738	4.71	0.014	FALSE	6.33
P-421	718	336	LOT22	LOT20	10	Ductile Iron	110	0	1155	4.72	0.011	FALSE	3.68
P-507	881	207	lot58	lot45	8	Ductile Iron	110	0	748	4.77	0.015	FALSE	3.01
P-420	717	449	J-162	LOT22	10	Ductile Iron	110	0	1207	4.93	0.012	FALSE	5.34
P-382	659	481	LOT1	LOT2	8	Ductile Iron	110	0	790	5.04	0.016	FALSE	7.74
P-449	766	252	J-221	lot58	8	Ductile Iron	110	0	793	5.06	0.016	FALSE	4.09
P-381	658	221	J-161	LOT1	8	Ductile Iron	110	0	842	5.38	0.018	FALSE	4.01

EXISTING HOOLEHUA SUBDIVISION
DESIGN CRITERIA for Irrigation

1. Design Average Flow = (**5000** Gals/Acre/8 hour Day)

2. C Values:

8", 10", 12" dia pipe (ductile iron) = 110
16" dia pipe (ductile iron) = 120
16", 18" dia pipe (asbestos cement) = 140
24" dia pipe (concrete) = 130

3. Starting HGL of the reservoir was determined by taking the lowest possible water level of the reservoir (1 ft) and adding that value to the existing ground elevation indicated on reference USGS map.

Lowest Water Level =	**1.00**
Approximate Reservoir Elevation based on USGS Map =	804.75
Starting HGL =	**805.75**

4. Minimum Residual Pressure = 30 Psi

EXISTING HOOLEHUA DEMANDS for IRRIGATION

NODE	LOT	AREA (ac)	ESTIMATED FLOW RATE (GPM)	ELEV (FT)	STATIC PRESSURE (PSI)	Gallons Served per day	
LOT 17A	LOT 17A	1.95	20.31	362.99	207.80	9,750.00	20.31
LOT 17B	LOT 17B	1.95	20.31	364.26	207.25	9,750.00	20.31
LOT 17C	LOT 17C	6	62.50	400.00	191.77	30,000.00	62.50
LOT 17D	LOT 17D	6	62.50	400.00	191.77	30,000.00	62.50
LOT 17E	LOT 17E	1.95	20.31	378.59	201.04	9,750.00	20.31
LOT 17F	LOT 17F	1.95	20.31	378.00	201.30	9,750.00	20.31
LOT 17G	LOT 17G	6	62.50	366.53	206.26	30,000.00	62.50
LOT 17H	LOT 17H	6	62.50	365.09	206.89	30,000.00	62.50
LOT 104D-1A	LOT 104D-1A	1	10.42	435.49	176.41	5,000.00	10.42
LOT 104D-1B	LOT 104D-1B	3	31.25	418.36	183.83	15,000.00	31.25
LOT 104D-1C	LOT 104D-1C	3.2	33.33	418.36	183.83	16,000.00	33.33
LOT 104D-1D	LOT 104D-1D	12.8	133.33	410.00	187.45	64,000.00	133.33

Total Acreage **51.8**

Total Gallons served per day **259,000.00**

Total Gallons served in a Month (31 days) **8,029,000.00**

EXISTING HOOLEHUA
EXISTING DEMANDS for IRRIGATION (SORTED BY PRESSURE)
(Based on Kualapuu Reservoir lowest possible water Level depth of 1')

FlexTable: Junction Table

Label	Elevation (ft)	Demand Collection	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-168	720.13	<Collection: 0 items>	0	801.34	35
J-283	640.68	<Collection: 0 items>	0	799.15	69
J-240	600.05	<Collection: 0 items>	0	799.17	86
J-284	566.99	<Collection: 0 items>	0	798.57	100
J-297	531.20	<Collection: 0 items>	0	798.26	116
J-268	438.63	<Collection: 0 items>	0	798.16	156
J-298	437.90	<Collection: 0 items>	0	797.72	156
LOT 104D-1A	435.49	<Collection: 1 item>	23	797.72	157
J-301	425.75	<Collection: 0 items>	0	797.86	161
LOT 104D-1B	418.36	<Collection: 1 item>	26	797.70	164
J-285	414.57	<Collection: 0 items>	0	798.16	166
LOT 17D	400.00	<Collection: 1 item>	60	795.55	171
LOT 17C	400.00	<Collection: 1 item>	60	795.55	171
J-292	380.29	<Collection: 0 items>	0	797.62	181
LOT 17E	378.59	<Collection: 1 item>	21	797.58	181
LOT 17F	378.00	<Collection: 1 item>	21	797.56	182
J-272	370.71	<Collection: 0 items>	0	797.77	185
LOT 17G	366.53	<Collection: 1 item>	60	797.38	186
LOT 17B	364.26	<Collection: 1 item>	21	795.73	187
LOT 17H	365.09	<Collection: 1 item>	60	797.38	187
LOT 17A	362.99	<Collection: 1 item>	21	795.74	187
J-286	363.60	<Collection: 0 items>	0	796.68	187
J-287	356.29	<Collection: 0 items>	0	795.80	190

EXISTING HOOLEHUA
EXISTING DEMANDS for IRRIGATION (SORTED BY VELOCITY)
(Based on Kualapuu Reservoir lowest possible water Level depth of 1')

FlexTable: Pipe Table

Label	ID	Length (Scaled) (ft)	Start Node	Stop Node	Diameter (in)	Material	Hazen-Williams C	Minor Loss Coefficient (Local)	Flow (gpm)	Velocity (ft/s)	Headloss Gradient (ft/ft)	Has User Defined Length?	Headloss (ft)
P-320	567	193	J-152	J-161	16	Asbestos Cement	140	0	0	0	0	FALSE	0
P-505	878	158	J-276	J-275	16	Ductile Iron	130	0	0	0	0	FALSE	0
P-531	930	3251	J-268	J-285	18	Asbestos Cement	140	0	18	0.02	0	FALSE	0
P-517	903	3255	J-240	J-283	24	Asbestos Cement	140	0	193	0.14	0	FALSE	0.01
P-535	938	390	LOT 104D-1A	LOT 104D-1B	8	Ductile Iron	110	0	26	0.17	0	FALSE	0.01
P-532	932	3240	J-284	J-297	8	Ductile Iron	110	0	49	0.31	0	FALSE	0.3
P-533	934	5,810	J-297	J-298	8	Ductile Iron	110	0	49	0.31	0	FALSE	0.54
P-534	936	69	J-298	LOT 104D-1A	8	Ductile Iron	110	0	49	0.31	0	FALSE	0.01
P-437	742	510	LOT43	LOT44	8	Ductile Iron	110	0	53	0.34	0	FALSE	0.06
P-366	635	561	LOT29	LOT28	8	Ductile Iron	110	0	55	0.35	0	FALSE	0.07
P-516	894	48	lot49	lot50	8	Ductile Iron	110	0	56	0.36	0	FALSE	0.01
P-356	620	47	LOT34	LOT35	8	Ductile Iron	110	0	60	0.39	0	FALSE	0.01
P-525	919	21	LOT 17C	LOT 17D	8	Ductile Iron	110	0	60	0.39	0	FALSE	0
P-530	929	26	LOT 17G	LOT 17H	8	Ductile Iron	110	0	60	0.39	0	FALSE	0
P-519	907	6634	J-284	J-285	12	Asbestos Cement	140	0	144	0.41	0	FALSE	0.41
P-526	921	7066	J-268	J-292	12	Asbestos Cement	140	0	162	0.46	0	FALSE	0.54
P-536	940	3895	J-285	J-301	12	Asbestos Cement	140	0	162	0.46	0	FALSE	0.3
P-518	905	5579	J-283	J-284	12	Asbestos Cement	140	0	193	0.55	0	FALSE	0.59
P-497	863	2671	J-268	J-269	24	Concrete	130	0	793	0.56	0	FALSE	0.15
P-498	865	2036	J-269	J-270	24	Concrete	130	0	793	0.56	0	FALSE	0.11
P-499	867	1576	J-270	J-271	24	Concrete	130	0	793	0.56	0	FALSE	0.09
P-500	869	667	J-271	J-272	24	Concrete	130	0	793	0.56	0	FALSE	0.04
P-501	871	2604	J-272	J-273	24	Concrete	130	0	793	0.56	0	FALSE	0.15
P-401	688	29	LOT10	LOT11	8	Ductile Iron	110	0	89	0.57	0	FALSE	0.01
P-389	670	209	J-176	J-195	8	Ductile Iron	110	0	-101	0.65	0	FALSE	0.08
P-436	741	323	LOT42	LOT43	8	Ductile Iron	110	0	106	0.68	0	FALSE	0.13
P-469	807	437	J-240	J-241	24	Concrete	130	0	973	0.69	0	FALSE	0.04
P-470	809	124	J-241	J-242	24	Concrete	130	0	973	0.69	0	FALSE	0.01
P-471	811	89	J-242	J-243	24	Concrete	130	0	973	0.69	0	FALSE	0.01
P-472	813	467	J-243	J-244	24	Concrete	130	0	973	0.69	0	FALSE	0.04
P-473	815	181	J-244	J-245	24	Concrete	130	0	973	0.69	0	FALSE	0.01
P-474	817	1080	J-245	J-246	24	Concrete	130	0	973	0.69	0	FALSE	0.09
P-475	819	770	J-246	J-247	24	Concrete	130	0	973	0.69	0	FALSE	0.06
P-476	821	177	J-247	J-248	24	Concrete	130	0	973	0.69	0	FALSE	0.01
P-477	823	195	J-248	J-249	24	Concrete	130	0	973	0.69	0	FALSE	0.02
P-478	825	134	J-249	J-250	24	Concrete	130	0	973	0.69	0	FALSE	0.01
P-479	827	567	J-250	J-251	24	Concrete	130	0	973	0.69	0	FALSE	0.05
P-480	829	801	J-251	J-252	24	Concrete	130	0	973	0.69	0	FALSE	0.07
P-481	831	412	J-252	J-253	24	Concrete	130	0	973	0.69	0	FALSE	0.03
P-482	833	193	J-253	J-254	24	Concrete	130	0	973	0.69	0	FALSE	0.02
P-483	835	278	J-254	J-255	24	Concrete	130	0	973	0.69	0	FALSE	0.02
P-484	837	765	J-255	J-256	24	Concrete	130	0	973	0.69	0	FALSE	0.06
P-485	839	579	J-256	J-257	24	Concrete	130	0	973	0.69	0	FALSE	0.05
P-486	841	175	J-257	J-258	24	Concrete	130	0	973	0.69	0	FALSE	0.01
P-487	843	922	J-258	J-259	24	Concrete	130	0	973	0.69	0	FALSE	0.08
P-488	845	587	J-259	J-260	24	Concrete	130	0	973	0.69	0	FALSE	0.05
P-489	847	39	J-260	J-261	24	Concrete	130	0	973	0.69	0	FALSE	0
P-490	849	148	J-261	J-262	24	Concrete	130	0	973	0.69	0	FALSE	0.01
P-491	851	486	J-262	J-263	24	Concrete	130	0	973	0.69	0	FALSE	0.04
P-492	853	661	J-263	J-264	24	Concrete	130	0	973	0.69	0	FALSE	0.05
P-493	855	298	J-264	J-265	24	Concrete	130	0	973	0.69	0	FALSE	0.02
P-494	857	542	J-265	J-266	24	Concrete	130	0	973	0.69	0	FALSE	0.04
P-495	859	458	J-266	J-267	24	Concrete	130	0	973	0.69	0	FALSE	0.04
P-496	861	645	J-267	J-268	24	Concrete	130	0	973	0.69	0	FALSE	0.05
P-368	638	476	LOT30	LOT29	8	Ductile Iron	110	0	110	0.7	0	FALSE	0.2

P-515	893	56	lot51	lot49	8	Ductile Iron	110	0	110	0.7	0	FALSE	0.02
P-524	917	358	LOT 17B	LOT 17C	8	Ductile Iron	110	0	121	0.77	0	FALSE	0.18
P-529	927	362	LOT 17F	LOT 17G	8	Ductile Iron	110	0	121	0.77	0	FALSE	0.18
P-358	623	101	LOT36	LOT34	8	Ductile Iron	110	0	123	0.78	0.001	FALSE	0.05
P-467	803	1074	J-154	J-239	24	Concrete	130	0	1167	0.83	0	FALSE	0.12
P-468	805	621	J-239	J-240	24	Concrete	130	0	1167	0.83	0	FALSE	0.07
P-523	915	24	LOT 17A	LOT 17B	8	Ductile Iron	110	0	142	0.9	0.001	FALSE	0.02
P-528	925	27	LOT 17E	LOT 17F	8	Ductile Iron	110	0	142	0.9	0.001	FALSE	0.02
P-434	738	328	LOT41	LOT42	8	Ductile Iron	110	0	155	0.99	0.001	FALSE	0.26
P-400	687	54	LOT9	LOT10	8	Ductile Iron	110	0	158	1.01	0.001	FALSE	0.04
P-521	911	1026	J-286	J-287	8	Ductile Iron	110	0	162	1.04	0.001	FALSE	0.88
P-522	913	66	J-287	LOT 17A	8	Ductile Iron	110	0	162	1.04	0.001	FALSE	0.06
P-527	923	45	J-292	LOT 17E	8	Ductile Iron	110	0	162	1.04	0.001	FALSE	0.04
P-537	941	2140	J-301	J-286	8	Asbestos Cement	140	0	162	1.04	0.001	FALSE	1.18
P-370	641	488	LOT31	LOT30	8	Ductile Iron	110	0	166	1.06	0.001	FALSE	0.43
P-513	890	194	lot52	lot51	8	Ductile Iron	110	0	167	1.06	0.001	FALSE	0.17
P-360	626	172	LOT33	LOT36	8	Ductile Iron	110	0	176	1.12	0.001	FALSE	0.17
P-506	879	1102	J-276	J-221	16	Ductile Iron	120	0	793	1.26	0	FALSE	0.52
P-504	877	1669	J-273	J-276	16	Ductile Iron	120	0	793	1.26	0	FALSE	0.79
P-398	684	27	LOT12	LOT9	8	Ductile Iron	110	0	200	1.28	0.001	FALSE	0.03
P-383	661	579	J-161	LOT27	16	Ductile Iron	120	0	-842	1.34	0.001	FALSE	0.31
P-432	735	505	LOT40	LOT41	8	Ductile Iron	110	0	217	1.38	0.001	FALSE	0.74
P-369	640	229	J-174	LOT31	8	Ductile Iron	110	0	221	1.41	0.002	FALSE	0.35
P-512	888	67	lot48	lot52	8	Ductile Iron	110	0	221	1.41	0.002	FALSE	0.1
P-385	664	234	LOT27	LOT26	16	Ductile Iron	120	0	-884	1.41	0.001	FALSE	0.13
P-362	629	263	LOT37	LOT33	8	Ductile Iron	110	0	228	1.46	0.002	FALSE	0.42
P-388	668	291	LOT7	J-176	8	Ductile Iron	110	0	232	1.48	0.002	FALSE	0.48
P-422	720	61	LOT26	LOT25	16	Ductile Iron	120	0	-955	1.52	0.001	FALSE	0.04
P-396	681	494	LOT13	LOT12	8	Ductile Iron	110	0	252	1.61	0.002	FALSE	0.96
P-424	723	257	LOT25	LOT24	16	Ductile Iron	120	0	-1027	1.64	0.001	FALSE	0.2
P-426	726	387	LOT24	LOT23	16	Ductile Iron	120	0	-1068	1.7	0.001	FALSE	0.32
P-430	732	450	J-175	LOT40	8	Ductile Iron	110	0	270	1.72	0.002	FALSE	0.99
P-511	887	101	lot53	lot48	8	Ductile Iron	110	0	275	1.76	0.002	FALSE	0.23
P-428	729	241	LOT23	LOT21	16	Ductile Iron	120	0	-1110	1.77	0.001	FALSE	0.21
P-364	632	208	LOT32	LOT37	8	Ductile Iron	110	0	281	1.8	0.002	FALSE	0.49
P-387	667	742	J-174	LOT7	8	Ductile Iron	110	0	289	1.85	0.003	FALSE	1.85
P-429	730	523	LOT21	J-162	16	Ductile Iron	120	0	-1186	1.89	0.001	FALSE	0.52
P-394	678	210	LOT8	LOT13	8	Ductile Iron	110	0	304	1.94	0.003	FALSE	0.58
P-363	631	177	J-176	LOT32	8	Ductile Iron	110	0	333	2.13	0.003	FALSE	0.58
P-464	788	102	lot54	lot53	8	Ductile Iron	110	0	335	2.14	0.003	FALSE	0.34
P-392	675	110	J-195	LOT8	8	Ductile Iron	110	0	361	2.31	0.004	FALSE	0.41
P-334	587	1150	J-154	J-167	24	Concrete	130	0	-3559	2.52	0.001	FALSE	1.05
P-336	590	1026	J-167	J-168	24	Concrete	130	0	-3559	2.52	0.001	FALSE	0.93
P-338	593	1464	J-168	J-169	24	Concrete	130	0	-3559	2.52	0.001	FALSE	1.33
P-339	594	1352	J-169	J-157	24	Concrete	130	0	-3559	2.52	0.001	FALSE	1.23
P-340	596	252	J-157	J-170	24	Concrete	130	0	-3559	2.52	0.001	FALSE	0.23
P-342	599	1097	J-170	J-171	24	Concrete	130	0	-3559	2.52	0.001	FALSE	1
P-343	600	685	J-171	R-1	24	Concrete	130	0	-3559	2.52	0.001	FALSE	0.62
P-463	787	97	lot55	lot54	8	Ductile Iron	110	0	398	2.54	0.005	FALSE	0.44
P-458	779	90	lot47	lot55	8	Ductile Iron	110	0	453	2.89	0.006	FALSE	0.52
P-402	690	276	J-195	LOT38	8	Ductile Iron	110	0	-463	2.95	0.006	FALSE	1.65
P-457	778	206	lot56	lot47	8	Ductile Iron	110	0	507	3.24	0.007	FALSE	1.46
P-372	644	200	LOT6	J-174	8	Ductile Iron	110	0	510	3.26	0.007	FALSE	1.43
P-404	693	90	LOT38	LOT14	8	Ductile Iron	110	0	-529	3.37	0.008	FALSE	0.69
P-510	885	222	lot46	lot56	8	Ductile Iron	110	0	563	3.59	0.009	FALSE	1.9
P-374	647	524	LOT5	LOT6	8	Ductile Iron	110	0	566	3.61	0.009	FALSE	4.55
P-406	696	230	LOT14	LOT39	8	Ductile Iron	110	0	-581	3.71	0.009	FALSE	2.09
P-331	582	3337	J-165	J-154	16	Asbestos Cement	140	0	-2393	3.82	0.003	FALSE	9.14
P-332	584	872	J-162	J-166	16	Asbestos Cement	140	0	-2393	3.82	0.003	FALSE	2.39
P-333	585	2386	J-166	J-165	16	Asbestos Cement	140	0	-2393	3.82	0.003	FALSE	6.53
P-411	703	664	LOT16	J-175	10	Ductile Iron	110	0	944	3.86	0.008	FALSE	5.01
P-376	650	499	LOT4	LOT5	8	Ductile Iron	110	0	623	3.97	0.01	FALSE	5.16
P-413	706	365	LOT17	LOT16	10	Ductile Iron	110	0	986	4.03	0.008	FALSE	2.98
P-408	699	236	LOT39	LOT15	8	Ductile Iron	110	0	-633	4.04	0.011	FALSE	2.52

P-509	884	133	lot57	lot46	8	Ductile Iron	110	0	646	4.12	0.011	FALSE	1.47
P-415	709	443	LOT18	LOT17	10	Ductile Iron	110	0	1028	4.2	0.009	FALSE	3.91
P-409	700	178	LOT15	J-175	8	Ductile Iron	110	0	-674	4.3	0.012	FALSE	2.13
P-378	653	349	LOT3	LOT4	8	Ductile Iron	110	0	682	4.35	0.012	FALSE	4.28
P-417	712	453	LOT19	LOT18	10	Ductile Iron	110	0	1069	4.37	0.01	FALSE	4.3
P-508	882	319	lot45	lot57	8	Ductile Iron	110	0	701	4.47	0.013	FALSE	4.11
P-419	715	312	LOT20	LOT19	10	Ductile Iron	110	0	1111	4.54	0.01	FALSE	3.18
P-380	656	446	LOT2	LOT3	8	Ductile Iron	110	0	738	4.71	0.014	FALSE	6.33
P-421	718	336	LOT22	LOT20	10	Ductile Iron	110	0	1155	4.72	0.011	FALSE	3.68
P-507	881	207	lot58	lot45	8	Ductile Iron	110	0	748	4.77	0.015	FALSE	3.01
P-420	717	449	J-162	LOT22	10	Ductile Iron	110	0	1207	4.93	0.012	FALSE	5.34
P-382	659	481	LOT1	LOT2	8	Ductile Iron	110	0	790	5.04	0.016	FALSE	7.74
P-449	766	252	J-221	lot58	8	Ductile Iron	110	0	793	5.06	0.016	FALSE	4.09
P-381	658	221	J-161	LOT1	8	Ductile Iron	110	0	842	5.38	0.018	FALSE	4.01

DATE	LEVEL (ft)	DATE	LEVEL (ft)	DATE	LEVEL (ft)	DATE	LEVEL (ft)	DATE	LEVEL (ft)	DATE	LEVEL (ft)	DATE	LEVEL (ft)	DATE	LEVEL (ft)	DATE	LEVEL (ft)	DATE	LEVEL (ft)	DATE	LEVEL (ft)	DATE	LEVEL (ft)	DATE	LEVEL (ft)	DATE	LEVEL (ft)
Began Readings on 8/1/0		1/1/2009		1/1/2010		1/1/2011		1/1/2012		1/1/2013		1/1/2014		1/1/2015		1/1/2016		1/1/2017		1/1/2018		1/1/2019		1/1/2020			
		1/2/2009	19.0	1/2/2010		1/2/2011		1/2/2012		1/2/2013	13.00	1/2/2014	13.25	1/2/2015	31.75	1/2/2016		1/2/2017		1/2/2018	37.750	1/2/2019	44.00	1/2/2020	38.000		
		1/3/2009		1/3/2010		1/3/2011	17.00	1/3/2012	11.75	1/3/2013	14.00	1/3/2014	15.00	1/3/2015		1/3/2016		1/3/2017	45.00	1/3/2018	37.750	1/3/2019	44.25	1/3/2020	38.000		
		1/4/2009		1/4/2010		1/4/2011	17.00	1/4/2012	11.75	1/4/2013	14.50	1/4/2014		1/4/2015		1/4/2016	40.75	1/4/2017	45.00	1/4/2018	37.750	1/4/2019	44.25	1/4/2020			
		1/5/2009	19.0	1/5/2010		1/5/2011	17.00	1/5/2012	11.75	1/5/2013		1/5/2014		1/5/2015	32.00	1/5/2016	40.75	1/5/2017	45.00	1/5/2018	37.750	1/5/2019		1/5/2020			
		1/6/2009	19.0	1/6/2010		1/6/2011	17.00	1/6/2012	11.75	1/6/2013		1/6/2014	15.25	1/6/2015	32.00	1/6/2016	40.50	1/6/2017	45.00	1/6/2018		1/6/2019		1/6/2020	38.000		
		1/7/2009	19.0	1/7/2010		1/7/2011	17.00	1/7/2012		1/7/2013	16.50	1/7/2014	15.25	1/7/2015	32.00	1/7/2016	40.50	1/7/2017		1/7/2018		1/7/2019	44.25	1/7/2020	38.000		
		1/8/2009	19.0	1/8/2010		1/8/2011		1/8/2012		1/8/2013	16.75	1/8/2014	15.25	1/8/2015	32.00	1/8/2016	40.50	1/8/2017		1/8/2018	37.500	1/8/2019	44.00	1/8/2020	38.250		
		1/9/2009	19.0	1/9/2010		1/9/2011		1/9/2012	11.75	1/9/2013	16.75	1/9/2014	15.25	1/9/2015	32.00	1/9/2016		1/9/2017	44.75	1/9/2018	37.500	1/9/2019	44.00	1/9/2020	38.250		
		1/10/2009		1/10/2010		1/10/2011	17.00	1/10/2012	11.50	1/10/2013	16.75	1/10/2014	15.25	1/10/2015		1/10/2016		1/10/2017	44.50	1/10/2018	37.500	1/10/2019	44.00	1/10/2020	38.250		
		1/11/2009		1/11/2010		1/11/2011	17.00	1/11/2012	11.50	1/11/2013	16.75	1/11/2014		1/11/2015		1/11/2016	40.25	1/11/2017	44.50	1/11/2018	37.500	1/11/2019	44.00	1/11/2020			
		1/12/2009	19.5	1/12/2010		1/12/2011	17.00	1/12/2012	11.50	1/12/2013		1/12/2014		1/12/2015	32.00	1/12/2016	40.25	1/12/2017	44.50	1/12/2018	37.250	1/12/2019		1/12/2020			
		1/13/2009	19.5	1/13/2010		1/13/2011	18.50	1/13/2012	11.50	1/13/2013		1/13/2014	15.50	1/13/2015	32.00	1/13/2016	40.00	1/13/2017	44.25	1/13/2018		1/13/2019		1/13/2020	40.500		
		1/14/2009	19.5	1/14/2010		1/14/2011	18.50	1/14/2012		1/14/2013	16.75	1/14/2014	15.75	1/14/2015	32.00	1/14/2016	40.00	1/14/2017		1/14/2018		1/14/2019	44.00	1/14/2020	40.500		
		1/15/2009	19.5	1/15/2010		1/15/2011		1/15/2012		1/15/2013	17.25	1/15/2014	16.00	1/15/2015	32.00	1/15/2016	40.00	1/15/2017		1/15/2018		1/15/2019	44.00	1/15/2020	40.750		
		1/16/2009	19.5	1/16/2010		1/16/2011		1/16/2012		1/16/2013	17.25	1/16/2014	16.00	1/16/2015	32.00	1/16/2016		1/16/2017		1/16/2018	37.250	1/16/2019	43.75	1/16/2020	40.750		
		1/17/2009		1/17/2010		1/17/2011		1/17/2012	11.25	1/17/2013	17.25	1/17/2014	16.00	1/17/2015		1/17/2016		1/17/2017	44.00	1/17/2018	37.000	1/17/2019	43.75	1/17/2020	41.000		
		1/18/2009		1/18/2010		1/18/2011	18.50	1/18/2012	11.25	1/18/2013	17.25	1/18/2014		1/18/2015		1/18/2016		1/18/2017	43.75	1/18/2018	37.000	1/18/2019	43.75	1/18/2020			
		1/19/2009		1/19/2010		1/19/2011	18.50	1/19/2012	11.25	1/19/2013		1/19/2014		1/19/2015		1/19/2016	39.50	1/19/2017	43.75	1/19/2018	36.750	1/19/2019		1/19/2020			
		1/20/2009	20.0	1/20/2010		1/20/2011	18.50	1/20/2012	11.25	1/20/2013		1/20/2014		1/20/2015	32.00	1/20/2016	39.50	1/20/2017	43.75	1/20/2018		1/20/2019		1/20/2020			
		1/21/2009	20.0	1/21/2010		1/21/2011	18.50	1/21/2012		1/21/2013		1/21/2014	16.25	1/21/2015	31.75	1/21/2016	39.50	1/21/2017		1/21/2018		1/21/2019	43.50	1/21/2020	42.000		
		1/22/2009	20.0	1/22/2010		1/22/2011		1/22/2012		1/22/2013	17.25	1/22/2014	16.50	1/22/2015	31.75	1/22/2016	39.25	1/22/2017		1/22/2018	36.750	1/22/2019	43.50	1/22/2020	42.000		
		1/23/2009	20.0	1/23/2010		1/23/2011		1/23/2012	11.25	1/23/2013	17.25	1/23/2014	16.75	1/23/2015	31.75	1/23/2016		1/23/2017	43.75	1/23/2018	36.750	1/23/2019	43.50	1/23/2020	42.000		
		1/24/2009		1/24/2010		1/24/2011	18.50	1/24/2012	11.00	1/24/2013		1/24/2014	16.75	1/24/2015		1/24/2016		1/24/2017	43.75	1/24/2018	37.000	1/24/2019	43.50	1/24/2020	42.000		
		1/25/2009		1/25/2010		1/25/2011	18.50	1/25/2012	11.00	1/25/2013	17.25	1/25/2014		1/25/2015		1/25/2016	39.25	1/25/2017	43.75	1/25/2018	37.000	1/25/2019	43.50	1/25/2020			
		1/26/2009	20.0	1/26/2010		1/26/2011	18.50	1/26/2012	11.00	1/26/2013		1/26/2014		1/26/2015	32.50	1/26/2016	39.25	1/26/2017	43.75	1/26/2018	37.000	1/26/2019		1/26/2020			
		1/27/2009	20.0	1/27/2010		1/27/2011	18.50	1/27/2012	11.00	1/27/2013		1/27/2014	17.50	1/27/2015	32.50	1/27/2016	39.00	1/27/2017	43.50	1/27/2018		1/27/2019		1/27/2020	42.000		
		1/28/2009	20.0	1/28/2010		1/28/2011		1/28/2012		1/28/2013		1/28/2014	18.00	1/28/2015	32.50	1/28/2016	39.00	1/28/2017		1/28/2018		1/28/2019	43.50	1/28/2020	42.000		
		1/29/2009	21.0	1/29/2010		1/29/2011		1/29/2012		1/29/2013		1/29/2014	18.50	1/29/2015	32.50	1/29/2016	38.75	1/29/2017		1/29/2018	37.000	1/29/2019	43.25	1/29/2020	42.000		
		1/30/2009	21.0	1/30/2010		1/30/2011		1/30/2012	10.75	1/30/2013	17.50	1/30/2014	19.00	1/30/2015	32.50	1/30/2016		1/30/2017	43.75	1/30/2018	37.000	1/30/2019	43.25	1/30/2020	42.000		
		1/31/2009		1/31/2010		1/31/2011	18.50	1/31/2012	10.75	1/31/2013	17.50	1/31/2014	19.00	1/31/2015		1/31/2016		1/31/2017	43.75	1/31/2018	37.000	1/31/2019	43.50	1/31/2020	41.750		
		2/1/2009		2/1/2010		2/1/2011	18.50	2/1/2012	10.75	2/1/2013	17.50	2/1/2014		2/1/2015		2/1/2016	38.50	2/1/2017	43.50	2/1/2018	37.000	2/1/2019	43.50	2/1/2020			
		2/2/2009	21.5	2/2/2010		2/2/2011	18.50	2/2/2012	10.75	2/2/2013		2/2/2014		2/2/2015	32.50	2/2/2016	38.50	2/2/2017	43.50	2/2/2018	37.000	2/2/2019		2/2/2020			
		2/3/2009	21.5	2/3/2010		2/3/2011	18.50	2/3/2012	10.75	2/3/2013		2/3/2014	19.25	2/3/2015	32.50	2/3/2016	38.50	2/3/2017	43.50	2/3/2018		2/3/2019		2/3/2020	41.750		
		2/4/2009	21.5	2/4/2010		2/4/2011		2/4/2012		2/4/2013	17.50	2/4/2014	19.50	2/4/2015	32.50	2/4/2016	38.25	2/4/2017		2/4/2018		2/4/2019	44.50	2/4/2020	41.750		
		2/5/2009	21.5	2/5/2010		2/5/2011		2/5/2012		2/5/2013	17.50	2/5/2014	19.50	2/5/2015	32.75	2/5/2016	38.25	2/5/2017		2/5/2018	36.75	2/5/2019	44.75	2/5/2020	41.750		
		2/6/2009	21.5	2/6/2010		2/6/2011		2/6/2012	10.50	2/6/2013	17.50	2/6/2014	19.50	2/6/2015	32.75	2/6/2016		2/6/2017	43.25	2/6/2018	37.25	2/6/2019	44.75	2/6/2020	41.750		
		2/7/2009		2/7/2010		2/7/2011	18.50	2/7/2012	10.50	2/7/2013	17.75	2/7/2014	19.50	2/7/2015		2/7/2016		2/7/2017	43.25	2/7/2018	37.25	2/7/2019	44.75	2/7/2020	42.000		
		2/8/2009		2/8/2010		2/8/2011	18.50	2/8/2012	10.50	2/8/2013		2/8/2014		2/8/2015		2/8/2016	38.25	2/8/2017	43.25	2/8/2018	37.25	2/8/2019	44.75	2/8/2020			
		2/9/2009	21.5	2/9/2010		2/9/2011	18.50	2/9/2012	10.50	2/9/2013		2/9/2014		2/9/2015	32.75	2/9/2016	38.25	2/9/2017	43.25	2/9/2018	37.50	2/9/2019		2/9/2020			
		2/10/2009	21.5	2/10/2010		2/10/2011	18.50	2/10/2012	10.50	2/10/2013		2/10/2014	20.00	2/10/2015	32.50	2/10/2016	38.00	2/10/2017	43.00	2/10/2018		2/10/2019		2/10/2020	42.000		
		2/11/2009	21.5	2/11/2010		2/11/2011	18.50	2/11/2012		2/11/2013	18.00	2/11/2014	20.00	2/11/2015	32.50	2/11/2016	38.00	2/11/2017		2/11/2018		2/11/2019	45.50	2/11/2020	42.500		
		2/12/2009	21.5	2/12/2010		2/12/2011		2/12/2012		2/12/2013	18.00	2/12/2014	20.00	2/12/2015	32.50	2/12/2016	38.00	2/12/2017		2/12/2018	37.50	2/12/2019	45.75	2/12/2020	42.500		
		2/13/2009	21.5	2/13/2010		2/13/2011		2/13/2012	10.50	2/13/2013	18.00	2/13/2014	20.00	2/13/2015	32.50	2/13/2016		2/13/2017	43.000	2/13/2018	37.50	2/13/2019	46.00	2/13/2020	42.500		
		2/14/2009		2/14/2010		2/14/2011	18.75	2/14/2012	10.50	2/14/2013	18.00	2/14/2014	20.00	2/14/2015		2/14/2016		2/14/2017	42.750	2/14/2018	37.50	2/14/2019	46.25	2/14/2020	42.500		
		2/15/2009		2/15/2010		2/15/2011	18.75	2/15/2012	10.50	2/15/2013	18.00	2/15/2014		2/15/2015		2/15/2016		2/15/2017	42.750	2/15/2018	38.00	2/15/2019	46.50	2/15/2020			
		2/16/2009		2/16/2010		2/16/2011	18.75	2/16/2012	10.25	2/16/2013		2/16/2014		2/16/2015		2/16/2016	37.75	2/16/2017	42.750	2/16/2018	38.25	2/16/2019		2/16/2020			
		2/17/2009	21.5	2/17/2010		2/17/2011	18.75	2/17/2012	10.25	2/17/2013		2/17/2014		2/17/2015	32.75	2/17/2016	38.00	2/17/2017	42.500	2/17/2018		2/17/2019		2/17/2020			
		2/18/2009	21.5	2/18/2010		2/18/2011	18.75	2/18/2012		2/18/2013		2/18/2014	20.75	2/18/2015	32.75	2/18/2016	38.25	2/18/2017		2/18/2018		2/18/2019		2/18/2020	42.750		
		2/19/2009	21.5	2/19/2010		2/19/2011		2/19/2012		2/19/2013	18.50	2/19/2014	20.75	2/19/2015	32.75	2/19/2016	38.50	2/19/2017		2/19/2018		2/19/2019	47.75	2/19/2020	42.750		
		2/20/2009	21.5	2/20/2010		2/20/2011		2/20/2012		2/20/2013	18.50	2/20/2014	20.75	2/20/2015	32.75	2/20/2016		2/20/2017		2/20/2018	39.00	2/20/2019	47.75	2/20/2020	43.000		
		2/21/2009		2/21/2010		2/21/2011		2/21/2012	10.75	2/21/2013	18.75	2/21/2014	20.75	2/21/2015		2/21/2016		2/21/2017	42.50	2/21/2018	39.00	2/21/2019	47.75	2/21/2020	43.000		
		2/22/2009		2/22/2010		2/22/2011	18.75	2/22/2012	10.75	2/22/2013	19.25	2/22/2014		2/22/2015		2/22/2016	38.50	2/22/2017	42.50	2/22/2018	39.00	2/22/2019	48.00	2/22/2020			
		2/23/2009	21.5	2/23/2010		2/23/2011	18.75	2/23/2012	10.75	2/23/2013		2/23/2014		2/23/2015	32.75	2/23/2016	38.50	2/23/2017	42.25	2/23/2018	39.00	2/23/2019		2/23/2020			
		2/24/2009	21.5	2/24/2010		2/24/2011	18.75	2/24/2012	10.75	2/24/2013		2/24/2014	20.75	2/24/2015	32.75	2/24/2016	38.50	2/24/2017	42.25	2/24/2018		2/24/2019		2/24/2020	43.000		
		2/25/2009	21.5	2/25/2010		2/25/2011	18.75	2/25/2012		2/25/2013		2/25/2014	21.00	2/25/2015	32.75	2/25/2016	38.50	2/25/2017		2/25/2018		2/25/2019	48.00	2/25/2020	43.250		
		2/26/2009	21.5	2/26/2010		2/26/2011		2/26/2012		2/26/2013	19.75	2/26/2014	21.00	2/26/2015	32.75	2/26/2016	38.25	2/26/2017		2/26/2018	39.50	2/26/2019	48.00	2/26/2020	43.250		
		2/27/2009	21.5	2/27/2010		2/27/2011		2/27/2012	10.75	2/27/2013	19.75	2/27/2014	21.00	2/27/2015	32.50	2/27/2016		2/27/2017	42.00	2/27/2018	39.75	2/27/2019	48.00	2/27/2020	43.250		
		2/28/2009		2/28/2010		2/28/2011	18.75	2/28/2012	10.75	2/28/2013	19.75	2/28/2014	21.00	2/28/2015		2/28/2016		2/28/2017	42.00	2/28/2018	39.75	2/28/2019	48.00	2/28/2020	43.250		
		3/1/2009		3/1/2010		3/1/2011	18.50	2/29/2012	10.75	3/1/2013	19.75	3/1/2014		3/1/2015		2/29/2016	38.25	3/1/2017	42.00	3/1/2018	40.00	3/1/2019	48.00	2/29/2020			
		3/2/2009	21.5	3/2/2010		3/2/2011	18.50	3/1/2012	10.75	3/2/2013		3/2/2014		3/2/2015	33.00	3/1/2016	38.00	3/2/2017	42.25	3/2/2018	40.25	3/2/2019		3/1/2020			
		3/3/2009	21.5	3/3/2010		3/3/2011	18.50	3/2/2012	11.00	3/3/2013		3/3/2014	21.75	3/3/2015	33.25	3/2/2016	38.00	3/3/2017	42.25	3/3/2018		3/3/2019		3/2/2020	43.250		
		3/4/2009	21.5	3/4/2010		3/4/2011	18.50	3/3/2012		3/4/2013		3/4/2014	22.00	3/4/2015	33.75	3/3/2016	37.75	3/4/2017		3/4/2018		3/4/2019	48.00	3/3/2020	43.250		
		3/5/2009	21.5	3/6/2010		3/5/2011		3/4/2012		3/5/2013	19.50	3/5/2014	22.00	3/5/2015	34.25	3/4/2016	37.75	3/5/2017		3/5/2018	40.50	3/5/2019	48.00	3/4/2020	43.250		
		3/6/2009	21.5	3/6/2010		3/6/2011		3/5/2012	11.50	3/6/2013		3/6/2014	22.00	3/6/2015	35.00	3/5/2016		3/6/2017	42.25	3/6/2018	40.50	3/6/2019	48.00	3/5/2020	43.250		
		3/7/2009		3/7/2010		3/7/2011	19.00	3/6/2012	12.50	3/7/2013	19.50	3/7/2014	22.00	3/7/2015		3/6/2016		3/7/2017	42.25	3/7/2018	40.50	3/7/2019	48.00	3/6/2020	43.250		
		3/8/2009		3/8/2010		3/8/2011		3/7/2012	13.00	3/8/2013	19.50	3/8/2014		3/8/2015		3/7/2016	37.50	3/8/2017	42.25	3/8/2018	40.50	3/8/2019	48.00	3/7/2020			
		3/9/2009	21.5	3/9/2010		3/9/2011	19.00	3/8/2012	14.00	3/9/2013		3/9/2014		3/9/2015	35.25	3/8/2016	37.50	3/9/2017	42.25	3/9/2018	40.75	3/9/2019		3/8/2020			
		3/10/2009	21.5	3/10/2010		3/10/2011	19.00	3/9/2012	15.00	3/10/2013		3/10/2014	23.00	3/10/2015	35.25	3/9/2016	38.00	3/10/2017	42.00	3/10/2018		3/10/2019		3/9/2020	43.250		
		3/11/2009	21.5	3/11/2010		3/11/2011	19.00	3/10/2012		3/11/2013	20.00	3/11/2014	23.00	3/11/2015	35.25	3/10/2016	38.25	3/11/2017		3/11/2018		3/11/2019	48.00	3/10/2020	43.250		
		3/12/2009	21.5	3/13/2010		3/12/2011		3/11/2012		3/12/2013	20.00	3/12/2014	23.00	3/12/2015	35.25	3/11/2016	38.25	3/12/2017		3/12/2018	40.75	3/12/2019	47.75	3/11/2020	43.250		
		3/13/2009	21.5	3/13/2010		3/13/2011		3/12/2012	16.25	3/13/2013	20.00	3/13/2014	23.00	3/13/2015	35.25	3/12/2016		3/13/2017	41.75	3/13/2018	40.75	3/13/2019	47.75	3/12/2020	43.250		
		3/14/2009		3/14/2010		3/14/2011	19.00	3/13/2012	16.50	3/14/2013	20.00	3/14/2014	23.00	3/14/2015		3/13/2016		3/14/2017	41.75	3/14/2018	41.00	3/14/2019	47.75	3/13/2020	43.250		
		3/15/2009		3/15/2010		3/15/2011	19.00	3/14/2012	16.50	3/15/2013	20.00	3/15/2014		3/15/2015		3/14/2016	38.00	3/15/2017	41.75	3/15/2018	41.00	3/15/2019	47.75	3/14/2020			
		3/16/2009	21.5	3/16/2010		3/16/2011	19.00	3/15/2012	16.50	3/16/2013		3/16/2014		3/16/2015	35.25	3/15/2016	38.00	3/16/2017	41.75	3/16/2018	41.00	3/16/2019		3/15/2020			
		3/17/2009	22.5	3/17/2010		3/17/2011	19.00	3/16/2012	16.50	3/17/2013		3/17/2014	24.00	3/17/2015	35.00	3/16/2016	37.75	3/17/2017	41.50	3/17/2018		3/17/2019		3/16/2020	43.250		
		3/18/2009	22.5	3/18/2010		3/18/2011	19.00	3/17/2012		3/18/2013	20.00	3/18/2014	24.00	3/18/2015	35.00	3/17/2016	38.00	3/18/2017		3/18/2018		3/18/2019	47.50	3/17/2020	43.500		
		3/19/2009	22.5	3/19/2010		3/19/2011		3/18/2012		3/19/2013	20.00	3/19/2014	24.00	3/19/2015	35.00	3/18/2016	38.00	3/19/2017		3/19/2018	41.00	3/19/2019	47.50	3/18/2020	43.750		
		3/20/2009	22.5	3/20/2010		3/20/2011		3/19/2012	16.75	3/20/2013	20.00	3/20/2014	24.00	3/20/2015	35.00	3/19/2016		3/20/2017	41.50	3/20/2018	41.00	3/20/2019	47.50	3/19/2020	43.750		
		3/21/2009		3/21/2010		3/21/2011	19.00	3/20/2012	16.75	3/21/2013	20.00	3/21/2014	24.00	3/21/2015		3/20/2016		3/21/2017	41.50	3/21/2018	41.00	3/21/2019	47.25	3/20/2020	44.000		
		3/22/2009		3/22/2010		3/22/2011	19.00	3/21/2012	16.75	3/22/2013	20.00	3/22/2014		3/22/2015		3/21/2016	38.25	3/22/2017	41.25	3/22/2018	40.75	3/22/2019	47.25	3/21/2020			
		3/23/2009	22.5	3/23/2010		3/23/2011	19.00	3/22/2012	16.75	3/23/2013		3/23/2014		3/23/2015	35.50	3/22/2016	38.25	3/23/2017	41.25	3/23/2018	40.75	3/23/2019		3/22/2020			
		3/24/2009	22.5	3/24/2010		3/24/2011	19.00	3/23/2012	16.75	3/24/2013		3/24/2014	24.50	3/24/2015	35.50	3/23/2016	38.25	3/24/2017	41.25	3/24/2018		3/24/2019		3/23/2020	44.000		
		3/25/2009	22.5	3/25/2010		3/25/2011		3/24/2012		3/25/2013		3/25/2014	24.50	3/25/2015	35.50	3/24/2016	38.25	3/25/2017		3/25/2018		3/25/2019	47.25	3/24/2020	44.000		
		3/26/2009	22.5	3/26/2010		3/26/2011		3/25/2012		3/26/2013		3/26/2014		3/26/2015		3/25/2016		3/26/2017		3/26/2018		3/26/2019		3/25/2020	44.000		
		3/27/2009	22.5	3/27/2010		3/27/2011		3/26/2012		3/27/2013		3/27/2014	24.50	3/27/2015	35.50	3/26/2016		3/27/2017		3/27/2018	41.00	3/27/2019	47.00	3/26/2020			
		3/28/2009		3/28/2010		3/28/2011	19.00	3/27/2012	16.75	3/28/2013		3/28/2014	24.75	3/28/2015		3/27/2016		3/28/2017	41.00	3/28/2018	41.00	3/28/2019	47.00	3/27/2020	44.000		
		3/29/2009		3/29/2010		3/29/2011	19.00	3/28/2012	16.75	3/29/2013		3/29/2014		3/29/2015		3/28/2016	38.00	3/29/2017	40.75	3/29/2018	41.00	3/29/2019	46.75	3/28/2020			

| | | |

		6/24/2009	18.0	6/24/2010	18.0	6/24/2011		6/23/2012		6/24/2013		6/24/2014	30.00	6/24/2015	35.50	6/23/2016	40.00	6/24/2017		6/24/2018		6/24/2019	43.50	6/23/2020	41.000											
		6/25/2009	18.0	6/25/2010		6/25/2011		6/24/2012		6/25/2013	21.75	6/25/2014	29.75	6/25/2015	35.25	6/24/2016	40.00	6/25/2017		6/25/2018	42.00	6/25/2019	43.25	6/24/2020	40.750											
		6/26/2009	18.0	6/26/2010		6/26/2011		6/25/2012	15.75	6/26/2013	21.75	6/26/2014	29.75	6/26/2015	35.25	6/25/2016		6/26/2017	38.25	6/26/2018	41.75	6/26/2019	43.50	6/25/2020	40.750											
		6/27/2009		6/27/2010		6/27/2011	17.50	6/26/2012	15.75	6/27/2013	21.75	6/27/2014	29.75	6/27/2015		6/26/2016		6/27/2017	38.25	6/27/2018	41.75	6/27/2019	44.00	6/26/2020	40.750											
		6/28/2009		6/28/2010	17.5	6/28/2011	17.50	6/27/2012	15.75	6/28/2013	21.75	6/28/2014		6/28/2015		6/27/2016	39.75	6/28/2017	38.00	6/28/2018	41.50	6/28/2019	44.00	6/27/2020												
		6/29/2009	18.0	6/29/2010	17.5	6/29/2011		6/28/2012	16.00	6/29/2013		6/29/2014		6/29/2015	35.25	6/28/2016	39.75	6/29/2017	37.75	6/29/2018	41.50	6/29/2019		6/28/2020												
		6/30/2009	18.0	6/30/2010	17.5	6/30/2011	17.25	6/29/2012	16.00	6/30/2013		6/30/2014	29.50	6/30/2015	35.00	6/29/2016	39.75	6/30/2017	37.75	6/30/2018		6/30/2019		6/29/2020	40.500											
		7/1/2009	17.5	7/1/2010	17.5	7/1/2011	17.25	6/30/2012		7/1/2013	21.80	7/1/2014	29.50	7/1/2015	35.00	6/30/2016	39.75	7/1/2017		7/1/2018		7/1/2019	44.50	6/30/2020	40.500											
		7/2/2009	17.5	7/2/2010	17.5	7/2/2011		7/1/2012		7/2/2013	21.50	7/2/2014	29.50	7/2/2015	35.00	7/1/2016	39.75	7/2/2017		7/2/2018	41.25	7/2/2019	44.50	7/1/2020	40.500											
		7/3/2009		7/3/2010		7/3/2011		7/2/2012	16.00	7/3/2013	21.50	7/3/2014	29.25	7/3/2015		7/2/2016		7/3/2017	37.50	7/3/2018	41.25	7/3/2019	44.25	7/2/2020	40.250											
		7/4/2009		7/4/2010		7/4/2011		7/3/2012	16.00	7/4/2013		7/4/2014		7/4/2015		7/3/2016		7/4/2017		7/4/2018		7/4/2019		7/3/2020												
		7/5/2009		7/5/2010		7/5/2011	17.25	7/4/2012		7/5/2013	21.25	7/5/2014		7/5/2015		7/4/2016		7/5/2017	37.25	7/5/2018	41.00	7/5/2019	44.00	7/4/2020												
		7/6/2009	17.0	7/6/2010	16.5	7/6/2011	17.25	7/5/2012	16.00	7/6/2013		7/6/2014		7/6/2015	34.75	7/5/2016	39.50	7/6/2017	37.25	7/6/2018	41.00	7/6/2019		7/5/2020												
		7/7/2009	17.0	7/7/2010	16.5	7/7/2011	17.25	7/6/2012	16.00	7/7/2013		7/7/2014	28.75	7/7/2015	34.75	7/6/2016	39.50	7/7/2017	37.00	7/7/2018		7/7/2019		7/6/2020	40.250											
		7/8/2009	17.0	7/8/2010	16.5	7/8/2011	17.25	7/7/2012		7/8/2013	21.25	7/8/2014	28.75	7/8/2015	34.50	7/7/2016	39.50	7/8/2017		7/8/2018		7/8/2019	43.75	7/7/2020	40.000											
		7/9/2009	17.0	7/9/2010	16.5	7/9/2011		7/8/2012		7/9/2013	21.25	7/9/2014	28.50	7/9/2015	34.50	7/8/2016	39.50	7/9/2017		7/9/2018	41.25	7/9/2019	43.75	7/8/2020	40.000											
		7/10/2009	17.0	7/10/2010		7/10/2011		7/9/2012	16.00	7/10/2013	21.00	7/10/2014	28.50	7/10/2015	34.50	7/9/2016		7/10/2017	36.50	7/10/2018	41.25	7/10/2019	43.75	7/9/2020	40.000											
		7/11/2009		7/11/2010		7/11/2011	17.00	7/10/2012	16.00	7/11/2013	21.00	7/11/2014	28.50	7/11/2015		7/10/2016		7/11/2017	36.50	7/11/2018	41.25	7/11/2019	43.50	7/10/2020	40.000											
		7/12/2009		7/12/2010	16.5	7/12/2011	17.00	7/11/2012	16.25	7/12/2013	21.00	7/12/2014		7/12/2015		7/11/2016	39.25	7/12/2017	36.25	7/12/2018	41.25	7/12/2019	43.50	7/11/2020												
		7/13/2009	17.0	7/13/2010	16.5	7/13/2011	17.00	7/12/2012	16.25	7/13/2013		7/13/2014		7/13/2015	34.50	7/12/2016	39.25	7/13/2017	36.25	7/13/2018	41.00	7/13/2019		7/12/2020												
		7/14/2009	17.0	7/14/2010	16.5	7/14/2011	17.00	7/13/2012	16.25	7/14/2013		7/14/2014	28.25	7/14/2015	34.50	7/13/2016	39.25	7/14/2017	36.00	7/14/2018		7/14/2019		7/13/2020	39.750											
		7/15/2009	17.0	7/15/2010	16.0	7/15/2011	17.00	7/14/2012		7/15/2013	21.00	7/15/2014	28.25	7/15/2015	34.25	7/14/2016	39.25	7/15/2017		7/15/2018		7/15/2019	43.00	7/14/2020	39.750											
		7/16/2009	17.0	7/16/2010		7/16/2011		7/15/2012		7/16/2013	20.75	7/16/2014	28.25	7/16/2015	34.25	7/15/2016	39.25	7/16/2017		7/16/2018	40.75	7/16/2019	42.75	7/15/2020	39.750											
		7/17/2009	17.0	7/17/2010		7/17/2011		7/16/2012	16.25	7/17/2013	20.75	7/17/2014	28.00	7/17/2015	34.25	7/16/2016		7/17/2017	35.75	7/17/2018	40.75	7/17/2019	42.75	7/16/2020	39.500											
		7/18/2009		7/18/2010		7/18/2011	17.00	7/17/2012	16.25	7/18/2013	20.75	7/18/2014	28.00	7/18/2015		7/17/2016		7/18/2017	35.50	7/18/2018	40.75	7/18/2019	42.75	7/17/2020	39.500											
		7/19/2009		7/19/2010	16.0	7/19/2011	17.00	7/18/2012	16.50	7/19/2013	20.75	7/19/2014		7/19/2015		7/18/2016	39.50	7/19/2017	35.50	7/19/2018	40.50	7/19/2019	42.50	7/18/2020												
		7/20/2009	16.5	7/20/2010	16.0	7/20/2011	17.00	7/19/2012	16.50	7/20/2013		7/20/2014		7/20/2015	34.25	7/19/2016	39.50	7/20/2017	35.50	7/20/2018	40.50	7/20/2019		7/19/2020												
		7/21/2009	16.5	7/21/2010	16.0	7/21/2011	16.75	7/20/2012	16.50	7/21/2013		7/21/2014	28.75	7/21/2015	34.00	7/20/2016	39.50	7/21/2017	35.50	7/21/2018		7/21/2019		7/20/2020	39.250											
		7/22/2009	16.5	7/22/2010	16.0	7/22/2011	16.75	7/21/2012		7/22/2013	20.25	7/22/2014	29.00	7/22/2015	34.00	7/21/2016	39.50	7/22/2017		7/22/2018		7/22/2019	42.25	7/21/2020	39.000											
		7/23/2009	16.5	7/23/2010		7/23/2011		7/22/2012		7/23/2013	20.25	7/23/2014	29.00	7/23/2015	34.00	7/22/2016	39.50	7/23/2017		7/23/2018	40.25	7/23/2019	42.25	7/22/2020	39.000											
		7/24/2009	16.0	7/24/2010		7/24/2011		7/23/2012	16.5	7/24/2013	20.25	7/24/2014	29.00	7/24/2015	34.00	7/23/2016		7/24/2017	35.25	7/24/2018	40.25	7/24/2019	42.25	7/23/2020	38.750											
		7/25/2009		7/25/2010		7/25/2011	16.75	7/24/2012	16.50	7/25/2013	20.25	7/25/2014	29.00	7/25/2015		7/24/2016		7/25/2017	35.50	7/25/2018	40.25	7/25/2019	42.00	7/24/2020	38.750											
		7/26/2009		7/26/2010	15.5	7/26/2011	16.75	7/25/2012	16.50	7/26/2013	20.00	7/26/2014		7/26/2015		7/25/2016	40.25	7/26/2017	35.50	7/26/2018	40.25	7/26/2019	42.00	7/25/2020												
		7/27/2009	16.0	7/27/2010	15.5	7/27/2011	16.75	7/26/2012	16.50	7/27/2013		7/27/2014		7/27/2015	33.75	7/26/2016	40.25	7/27/2017	35.50	7/27/2018	40.00	7/27/2019		7/26/2020												
		7/28/2009	16.0	7/28/2010	15.5	7/28/2011	16.75	7/27/2012	16.25	7/28/2013		7/28/2014	29.00	7/28/2015	33.75	7/27/2016	40.25	7/28/2017	35.50	7/28/2018		7/28/2019		7/27/2020	38.750											
		7/29/2009	16.0	7/29/2010	15.5	7/29/2011	16.50	7/28/2012		7/29/2013	19.75	7/29/2014	29.00	7/29/2015	33.75	7/28/2016	40.25	7/29/2017		7/29/2018		7/29/2019	41.75	7/28/2020	38.750											
		7/30/2009	15.5	7/30/2010	15.5	7/30/2011		7/29/2012		7/30/2013	19.75	7/30/2014	29.00	7/30/2015	33.50	7/29/2016	40.25	7/30/2017		7/30/2018	40.00	7/30/2019	41.50	7/29/2020	38.500											
		7/31/2009	15.5	7/31/2010		7/31/2011		7/30/2012	16.25	7/31/2013	20.00	7/31/2014	28.75	7/31/2015	33.50	7/30/2016		7/31/2017	35.25	7/31/2018	40.00	7/31/2019	41.50	7/30/2020	38.500											
		8/1/2009		8/1/2010		8/1/2011	16.50	7/31/2012	16.25	8/1/2013	20.00	8/1/2014	28.75	8/1/2015		7/31/2016		8/1/2017	35.00	8/1/2018	39.75	8/1/2019	41.50	7/31/2020	38.500											
8/1/2008	16.5	8/2/2009		8/2/2010	15.5	8/2/2011	16.50	8/1/2012	16.00	8/2/2013	20.00	8/2/2014		8/2/2015		8/1/2016	40.00	8/2/2017	34.75	8/2/2018	39.75	8/2/2019	41.25	8/1/2020												
8/2/2008		8/3/2009	15.0	8/3/2010	15.0	8/3/2011	16.50	8/2/2012	16.00	8/3/2013		8/3/2014		8/3/2015	33.50	8/2/2016	40.00	8/3/2017	34.75	8/3/2018	39.75	8/3/2019		8/2/2020												
8/3/2008		8/4/2009	15.0	8/4/2010	15.0	8/4/2011	16.50	8/3/2012	16.00	8/4/2013		8/4/2014	28.75	8/4/2015	33.25	8/3/2016	40.00	8/4/2017	34.75	8/4/2018		8/4/2019		8/3/2020	38.250											
8/4/2008	16.0	8/5/2009	15.0	8/5/2010	15.0	8/5/2011	16.50	8/4/2012		8/5/2013	19.50	8/5/2014	28.50	8/5/2015	33.25	8/4/2016	40.00	8/5/2017		8/5/2018		8/5/2019	41.00	8/4/2020	38.000											
8/5/2008	16.5	8/6/2009	15.0	8/6/2010		8/6/2011		8/5/2012		8/6/2013	19.50	8/6/2014	28.50	8/6/2015	33.25	8/5/2016	40.00	8/6/2017		8/6/2018	39.50	8/6/2019	41.00	8/5/2020	38.000											
8/6/2008	16.5	8/7/2009	15.0	8/7/2010		8/7/2011		8/6/2012	16.00	8/7/2013	19.25	8/7/2014	28.50	8/7/2015	33.50	8/6/2016		8/7/2017	34.25	8/7/2018	39.50	8/7/2019	40.75	8/6/2020	37.750											
8/7/2008	16.5	8/8/2009		8/8/2010		8/8/2011	16.25	8/7/2012	16.00	8/8/2013	19.25	8/8/2014		8/8/2015		8/7/2016		8/8/2017	34.00	8/8/2018	39.50	8/8/2019	40.75	8/7/2020	37.750											
8/8/2008	16.5	8/9/2009		8/9/2010	15.0	8/9/2011	16.25	8/8/2012	16.00	8/9/2013	19.25	8/9/2014		8/9/2015		8/8/2016	40.25	8/9/2017	34.00	8/9/2018	39.50	8/9/2019	40.75	8/8/2020												
8/9/2008		8/10/2009	15.0	8/10/2010	15.0	8/10/2011	16.25	8/9/2012	16.00	8/10/2013		8/10/2014		8/10/2015	33.50	8/9/2016	40.25	8/10/2017	33.75	8/10/2018	39.50	8/10/2019		8/9/2020												
8/10/2008		8/11/2009	15.0	8/11/2010	15.0	8/11/2011	16.25	8/10/2012	15.75	8/11/2013		8/11/2014	29.00	8/11/2015	33.50	8/10/2016	40.25	8/11/2017	33.75	8/11/2018		8/11/2019		8/10/2020	37.500											
8/11/2008	16.5	8/12/2009	15.0	8/12/2010	15.0	8/12/2011	16.25	8/11/2012		8/12/2013	19.25	8/12/2014	29.00	8/12/2015	33.50	8/11/2016	40.25	8/12/2017		8/12/2018		8/12/2019	40.50	8/11/2020	37.500											
8/12/2008	16.5	8/13/2009	15.5	8/13/2010	14.5	8/13/2011		8/12/2012		8/13/2013	19.25	8/13/2014	28.75	8/13/2015	33.50	8/12/2016	40.25	8/13/2017		8/13/2018	39.50	8/13/2019	40.50	8/12/2020	37.250											
8/13/2008	16.5	8/14/2009	15.5	8/14/2010		8/14/2011		8/13/2012	15.75	8/14/2013		8/14/2014	28.75	8/14/2015	33.25	8/13/2016		8/14/2017	33.50	8/14/2018	39.250	8/14/2019	40.00	8/13/2020	37.250											
8/14/2008	16.5	8/15/2009		8/15/2010		8/15/2011	16.25	8/14/2012	15.75	8/15/2013		8/15/2014		8/15/2015		8/14/2016		8/15/2017	33.25	8/15/2018	39.250	8/15/2019	40.00	8/14/2020	37.000											
8/15/2008		8/16/2009		8/16/2010	14.5	8/16/2011	16.00	8/15/2012	15.75	8/16/2013		8/16/2014		8/16/2015		8/15/2016	40.25	8/16/2017	33.25	8/16/2018	39.250	8/16/2019		8/15/2020												
8/16/2008		8/17/2009	15.5	8/17/2010	14.5	8/17/2011		8/16/2012	15.75	8/17/2013		8/17/2014		8/17/2015	33.25	8/16/2016	40.00	8/17/2017	33.00	8/17/2018		8/17/2019		8/16/2020												
8/17/2008		8/18/2009	15.5	8/18/2010	14.5	8/18/2011	16.00	8/17/2012		8/18/2013		8/18/2014	28.75	8/18/2015	33.25	8/17/2016	40.00	8/18/2017		8/18/2018		8/18/2019		8/17/2020	36.750											
8/18/2008	16.5	8/19/2009	15.5	8/19/2010	14.5	8/19/2011		8/18/2012		8/19/2013		8/19/2014	28.75	8/19/2015	33.25	8/18/2016	39.75	8/19/2017		8/19/2018		8/19/2019	39.75	8/18/2020	36.750											
8/19/2008	16.5	8/20/2009	15.5	8/20/2010		8/20/2011		8/19/2012		8/20/2013		8/20/2014	28.50	8/20/2015	33.25	8/19/2016		8/20/2017		8/20/2018	39.25	8/20/2019	39.50	8/19/2020	36.500											
8/20/2008	16.5	8/21/2009		8/21/2010		8/21/2011		8/20/2012	15.50	8/21/2013		8/21/2014	28.50	8/21/2015		8/20/2016		8/21/2017	32.25	8/21/2018	39.00	8/21/2019	39.50	8/20/2020	36.500											
8/21/2008	16.5	8/22/2009		8/22/2010		8/22/2011	16.00	8/21/2012	15.50	8/22/2013		8/22/2014		8/22/2015		8/21/2016		8/22/2017	32.25	8/22/2018		8/22/2019	39.50	8/21/2020												
8/22/2008	16.5	8/23/2009		8/23/2010	14.5	8/23/2011	15.75	8/22/2012	15.00	8/23/2013		8/23/2014		8/23/2015		8/22/2016	39.50	8/23/2017	32.25	8/23/2018		8/23/2019	39.25	8/22/2020												
8/23/2008		8/24/2009	15.5	8/24/2010	14.5	8/24/2011	15.75	8/23/2012	15.50	8/24/2013		8/24/2014		8/24/2015	33.75	8/23/2016	39.50	8/24/2017	32.25	8/24/2018		8/24/2019		8/23/2020												
8/24/2008		8/25/2009	15.0	8/25/2010	14.5	8/25/2011	15.75	8/24/2012	15.50	8/25/2013		8/25/2014	28.50	8/25/2015	34.00	8/24/2016	39.50	8/25/2017	32.00	8/25/2018		8/25/2019		8/24/2020	36.250											
8/25/2008	16.5	8/26/2009	15.0	8/26/2010	14.5	8/26/2011	15.75	8/25/2012		8/26/2013		8/26/2014	28.50	8/26/2015	34.00	8/25/2016	39.50	8/26/2017		8/26/2018		8/26/2019	39.25	8/25/2020	36.250											
8/26/2008		8/27/2009	15.0	8/27/2010		8/27/2011		8/26/2012		8/27/2013		8/27/2014	28.50	8/27/2015	34.25	8/26/2016	39.50	8/27/2017		8/27/2018	40.50	8/27/2019	39.00	8/26/2020	36.000											
8/27/2008	16.5	8/28/2009	15.0	8/28/2010		8/28/2011		8/27/2012	15.25	8/28/2013		8/28/2014	28.50	8/28/2015	34.25	8/27/2016		8/28/2017	31.75	8/28/2018	40.50	8/28/2019	39.00	8/27/2020	36.000											
8/28/2008	16.5	8/29/2009		8/29/2010		8/29/2011	15.50	8/28/2012	15.25	8/29/2013		8/29/2014	28.50	8/29/2015		8/28/2016		8/29/2017	31.75	8/29/2018	40.25	8/29/2019	39.00	8/28/2020	36.000											
8/29/2008	16.5	8/30/2009		8/30/2010	14.0	8/30/2011	15.50	8/29/2012	15.25	8/30/2013		8/30/2014		8/30/2015		8/29/2016	39.75	8/30/2017	31.75	8/30/2018	40.25	8/30/2019	38.75	8/29/2020												
8/30/2008		8/31/2009	15.0	8/31/2010	14.0	8/31/2011	15.50	8/30/2012	15.25	8/31/2013		8/31/2014		8/31/2015	34.75	8/30/2016	40.00	8/31/2017	31.75	8/31/2018	40.25	8/31/2019		8/30/2020												
8/31/2008		9/1/2009	15.0	9/1/2010	14.0	9/1/2011	15.50	8/31/2012	15.00	9/1/2013		9/1/2014		9/1/2015	35.00	8/31/2016	40.25	9/1/2017	31.50	9/1/2018		9/1/2019		8/31/2020	35.750											
9/1/2008		9/2/2009	15.0	9/2/2010	14.0	9/2/2011	15.25	9/1/2012		9/2/2013		9/2/2014	28.25	9/2/2015	35.25	9/1/2016	40.50	9/2/2017		9/2/2018		9/2/2019		9/1/2020	35.500											
9/2/2008	16.5	9/3/2009	14.5	9/3/2010	14.0	9/3/2011		9/2/2012		9/3/2013		9/3/2014	28.25	9/3/2015	35.25	9/2/2016	40.50	9/3/2017		9/3/2018		9/3/2019	38.50	9/2/2020	35.500											
9/3/2008	16.5	9/4/2009	14.5	9/4/2010		9/4/2011		9/3/2012		9/4/2013		9/4/2014	28.25	9/4/2015	35.50	9/3/2016		9/4/2017		9/4/2018	40.25	9/4/2019	38.25	9/3/2020	35.500											
9/4/2008	16.5	9/5/2009		9/5/2010		9/5/2011		9/4/2012	15.00	9/5/2013	18.00	9/5/2014	28.25	9/5/2015		9/4/2016		9/5/2017	31.25	9/5/2018	40.25	9/5/2019	38.25	9/4/2020	35.250											
9/5/2008	16.5	9/6/2009		9/6/2010		9/6/2011	15.00	9/5/2012	15.00	9/6/2013	18.00	9/6/2014		9/6/2015		9/5/2016		9/6/2017	31.00	9/6/2018	40.25	9/6/2019	38.00	9/5/2020												
9/6/2008		9/7/2009	14.5	9/7/2010	14.0	9/7/2011	15.00	9/6/2012	15.00	9/7/2013		9/7/2014		9/7/2015		9/6/2016	41.00	9/7/2017	31.00	9/7/2018	40.25	9/7/2019		9/6/2020												
9/7/2008		9/8/2009	14.5	9/8/2010	14.0	9/8/2011	15.00	9/7/2012	15.00	9/8/2013		9/8/2014	28.25	9/8/2015	35.50	9/7/2016	41.00	9/8/2017	30.75	9/8/2018		9/8/2019		9/7/2020												
9/8/2008	16.0	9/9/2009	14.0	9/9/2010	14.0	9/9/2011	15.00	9/8/2012		9/9/2013	17.75	9/9/2014	28.25	9/9/2015	35.75	9/8/2016	41.00	9/9/2017		9/9/2018		9/9/2019	38.25	9/8/2020	35.250											
9/9/2008	16.0	9/10/2009	14.0	9/10/2010	14.0	9/10/2011		9/9/2012		9/10/2013	17.75	9/10/2014	28.25	9/10/2015	35.75	9/9/2016	41.00	9/10/2017		9/10/2018	40.50	9/10/2019	38.25	9/9/2020	35.000											
9/10/2008	16.0	9/11/2009	14.0	9/11/2010		9/11/2011		9/10/2012	15.00	9/11/2013	17.75	9/11/2014	28.25	9/11/2015	35.75	9/10/2016		9/11/2017	30.50	9/11/2018	40.50	9/11/2019	38.25	9/10/2020	35.000											
9/11/2008	16.0	9/12/2009		9/12/2010		9/12/2011	14.75	9/11/2012	15.00	9/12/2013	17.75	9/12/2014	28.25	9/12/2015		9/11/2016		9/12/2017	30.50	9/12/2018		9/12/2019	38.00	9/11/2020	35.000											
9/12/2008	16.0	9/13/2009		9/13/2010	13.5	9/13/2011	14.75	9/12/2012	15.00	9/13/2013	17.75	9/13/2014		9/13/2015		9/12/2016	41.25	9/13/2017	30.50	9/13/2018	41.25	9/13/2019	38.00	9/12/2020												
9/13/2008		9/14/2009	14.0	9/14/2010	13.5	9/14/2011	14.75	9/13/2012	15.00	9/14/2013		9/14/2014		9/14/2015	35.75	9/13/2016	41.50	9/14/2017	30.50	9/14/2018	41.25	9/14/2019		9/13/2020												
9/14/2008		9/15/2009	13.5	9/15/2010	13.5	9/15/2011	14.75	9/14/2012	14.75	9/15/2013		9/15/2014	28.00	9/15/2015	36.00	9/14/2016	42.00	9/15/2017	30.50	9/15/2018		9/15/2019		9/14/2020	34.750											
9/15/2008	16.0	9/16/2009	13.5	9/16/2010	13.5	9/16/2011	14.50	9/15/2012		9/16/2013	17.50	9/16/2014	28.00	9/16/2015	36.25	9/15/2016	42.25	9/16/2017		9/16/2018		9/16/2019	37.75	9/15/2020	34.750											
9/16/2008	16.0	9/17/2009	13.5	9/17/2010		9/17/2011		9/16/2012		9/17/2013	17.50	9/17/2014	28.00	9/17/2015	36.50	9/16/2016	42.50	9/17/2017		9/17/2018	41.25	9/17/2019	37.75	9/16/2020	34.750											

| | | |

| | | |

APPENDIX D

Miscellaneous Documents

HOOLEHUA

MOLOKAI, HAWAII

R. M. TOWILL CORPORATION

TRUE NORTH
1" = 500'

200

400

PUU KAPELE AVE.

EXISTING UNPAVED ROADWAY — 2722.5' (NEW PAVED ROADWAY) — EXISTING PAVED ROADWAY

LOT 104D

4 LOTS

ANAKAHI AVE.

HAUAKEA AVE.

NENEHANAUPO AVE.

EXISTING UNPAVED ROADWAY — 3443.86' (NEW PAVED ROADWAY) — EXISTING PAVED ROADWAY

FARRINGTON AVE.

PROPOSED FARRINGTON AVE.
CULVERT CROSSING
11'x8' BOX CULVERT (2-BARREL)

LOT 17

8 LOTS

MOOMOMI AVE.

EXISTING UNPAVED ROADWAY — 3629.15' (NEW PAVED ROADWAY) — EXISTING PAVED ROADWAY

OVERALL ROAD LAYOUT PLAN

SCALE: 1" = 500'

GRAPHIC SCALE:
500' 250' 0 500' 1000'
1" = 500'
SCALES IN FEET

REVISION	DATE	BRIEF	BY	APPROVED

APPROVED BY

ENGINEER

DRAFTSMAN

CHECKED BY

SCALE AS SHOWN

DATE

DPP FILE NO.

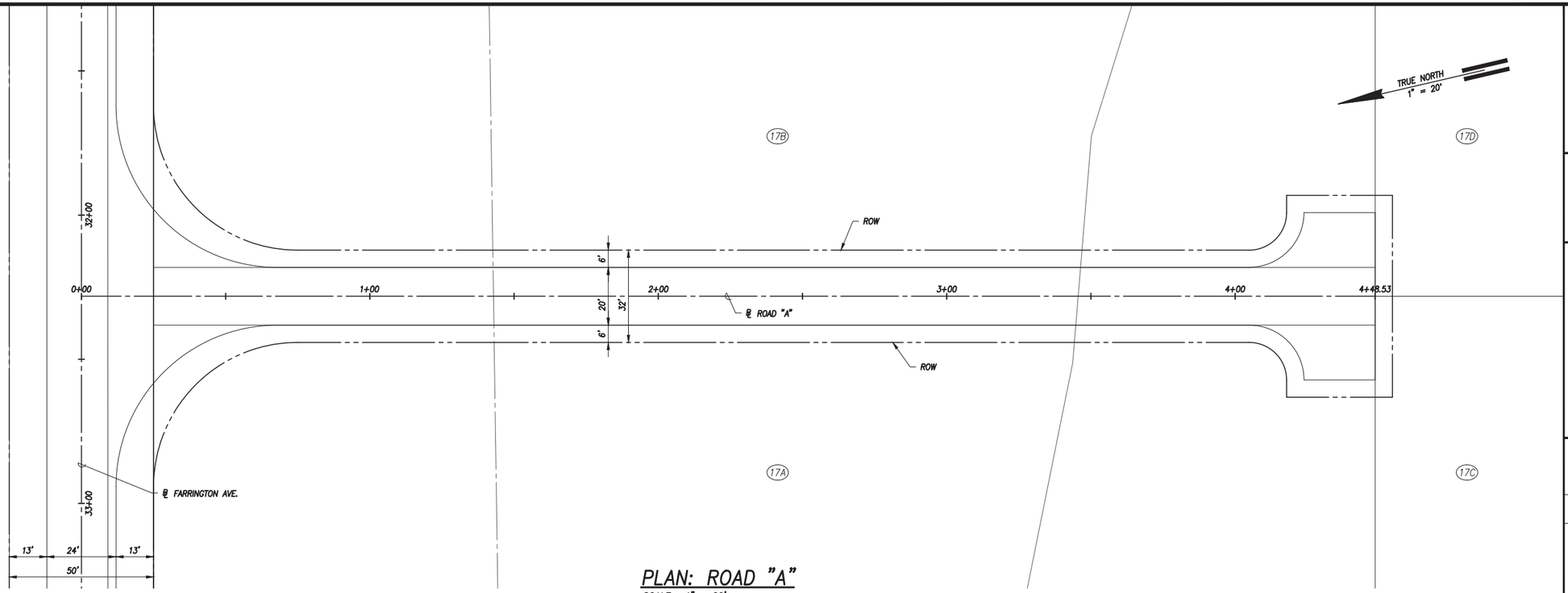
OVERALL
ROAD LAYOUT PLAN

RMTC JOB NO.: 1-23452-0E

K:\civil\23375 Hoolehua Naiwa\PER\Hoolehua\04 Roads\CAD files\C100_Overall Road Layout Plan.dwg October 26, 2023

C100 SHEET OF SHEETS

FILE	POCKET	FOLDER	NO.



PLAN: ROAD "A"
SCALE: 1" = 20'

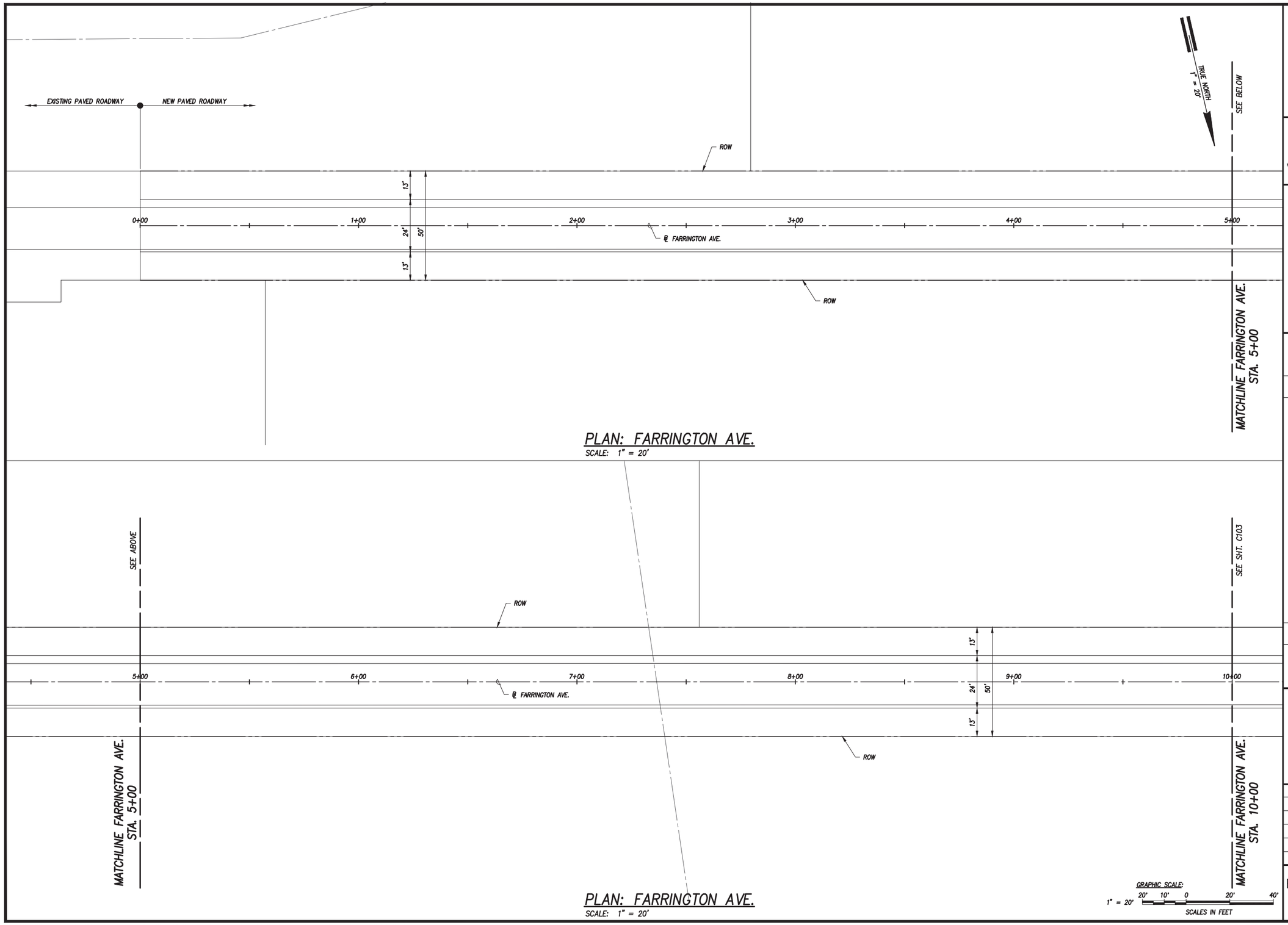
GRAPHIC SCALE:
1" = 20'
20' 10' 0 20' 40'
SCALES IN FEET

HOOLEHUA

MOLOKAI, HAWAII

R. M. TOWILL CORPORATION

	BY	APPROVED



PLAN: FARRINGTON AVE.
SCALE: 1" = 20'

PLAN: FARRINGTON AVE.
SCALE: 1" = 20'

HOOLEHUA

MOLOKAI, HAWAII

R. M. TOWILL CORPORATION

REVISION	DATE	BY	APPROVED

APPROVED BY

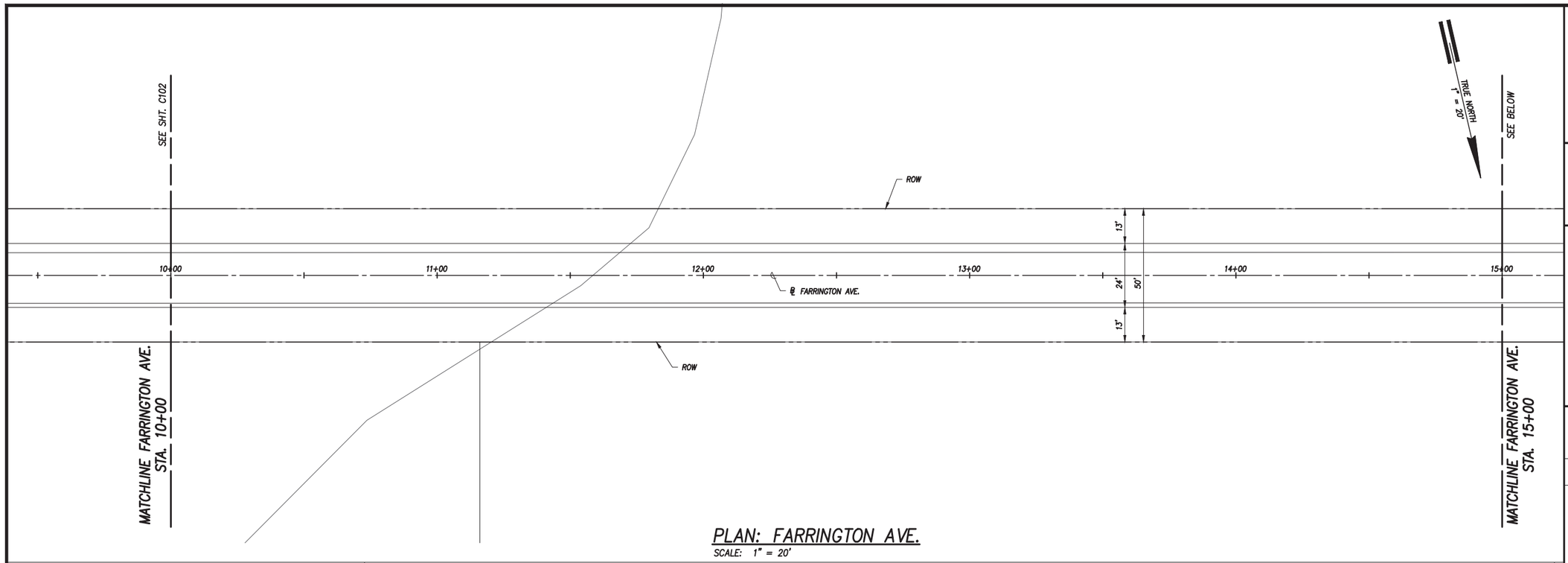
ENGINEER	
DRAFTSMAN	
CHECKED BY	
SCALE	AS SHOWN
DATE	
DPP FILE NO.	

FARRINGTON AVE. PLAN–1
(STA. 0+00 TO 10+00)

RMTC JOB NO.: 1–23452–0E

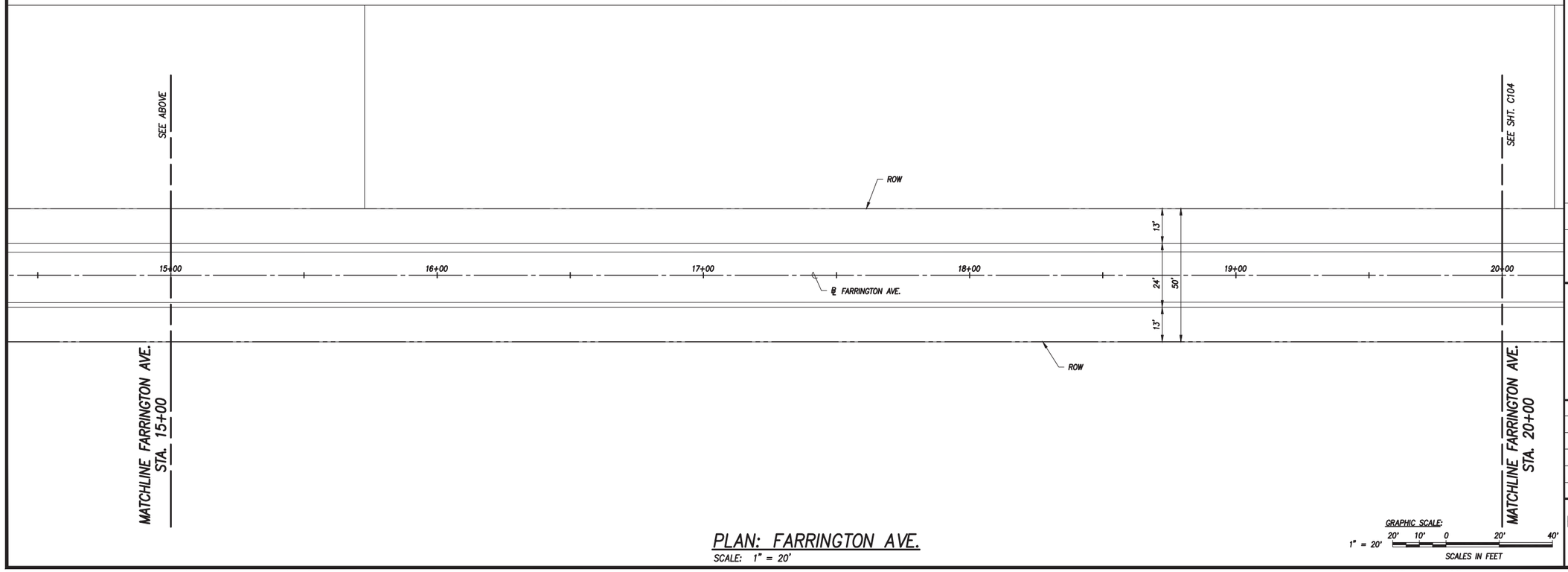
Z:\12. 2021 Project\JN–2143 RM–Hoolehua PER\01. 30%\Construction Dwgs\Road\C102_FARRINGTON AVE Plan – 1.dwg 11? 26, 2021

FILE	POCKET	FOLDER	NO.



PLAN: FARRINGTON AVE.

SCALE: 1" = 20'



PLAN: FARRINGTON AVE.

SCALE: 1" = 20'

GRAPHIC SCALE:
20' 10' 0 20' 40'
1" = 20'
SCALES IN FEET

RMTC JOB NO.: 1-23452-0E

Z:\12. 2021 Project\JN-2143 RM-Hoolehua PER\01. 30%\Construction Dwgs\Road\C103_FARRINGTON AVE Plan - 2.dwg 11? 26, 2021

C103 SHEET OF SHEETS

HOOLEHUA

MOLOKAI, HAWAII

R. M. TOWILL CORPORATION

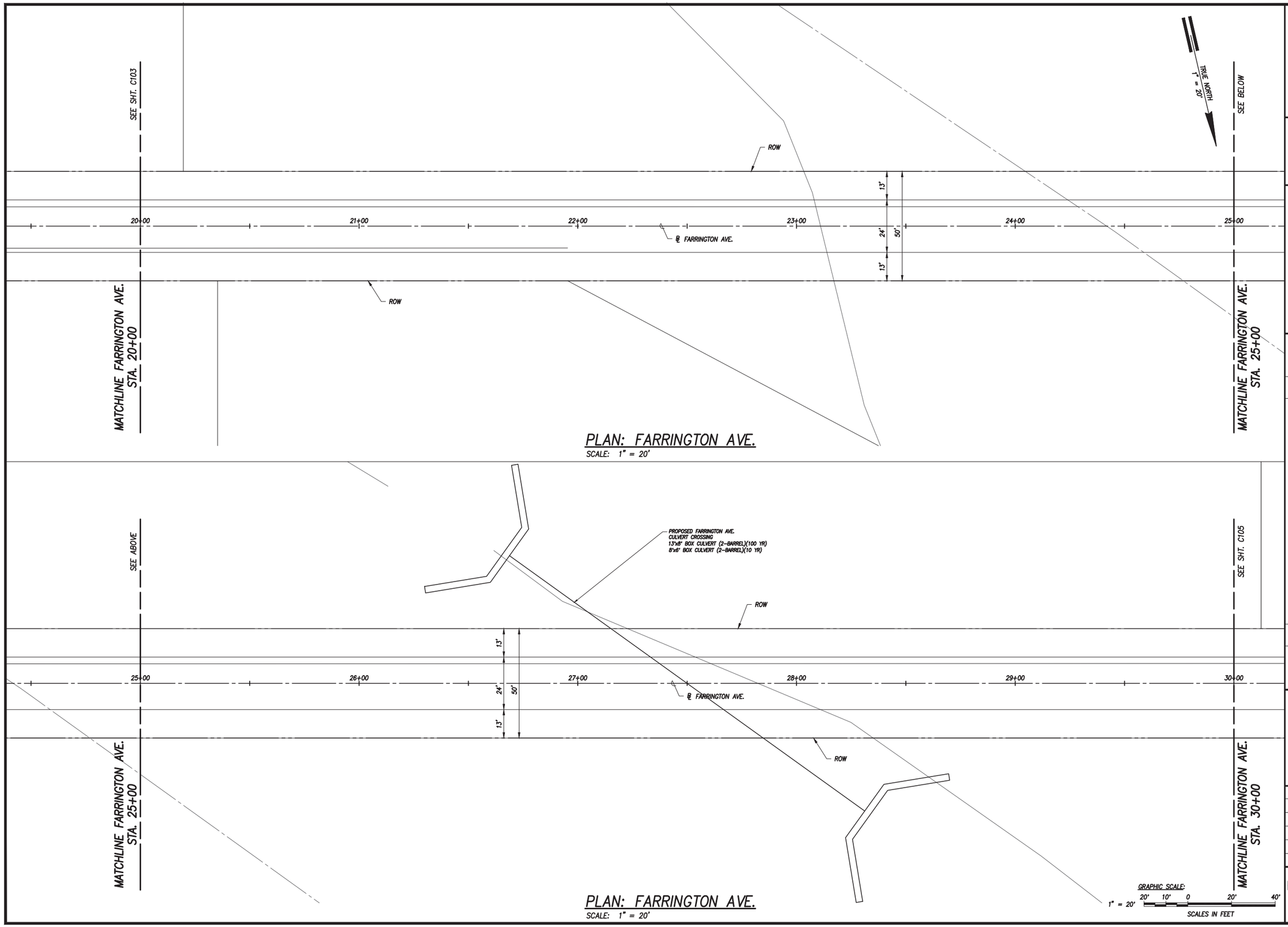
REVISION	DATE	BY	APPROVED

APPROVED BY

ENGINEER	
DRAFTSMAN	
CHECKED BY	
SCALE	AS SHOWN
DATE	
DPP FILE NO.	

FARRINGTON AVE. PLAN-2
(STA. 10+00 TO 20+00)

FILE	POCKET	FOLDER	NO.



PLAN: FARRINGTON AVE.
SCALE: 1" = 20'

PLAN: FARRINGTON AVE.
SCALE: 1" = 20'

HOOLEHUA

MOLOKAI, HAWAII

R. M. TOWILL CORPORATION

REVISION	DATE	BRIEF

BY	APPROVED

APPROVED BY

ENGINEER	
DRAFTSMAN	
CHECKED BY	
SCALE	AS SHOWN
DATE	
DPP FILE NO.	

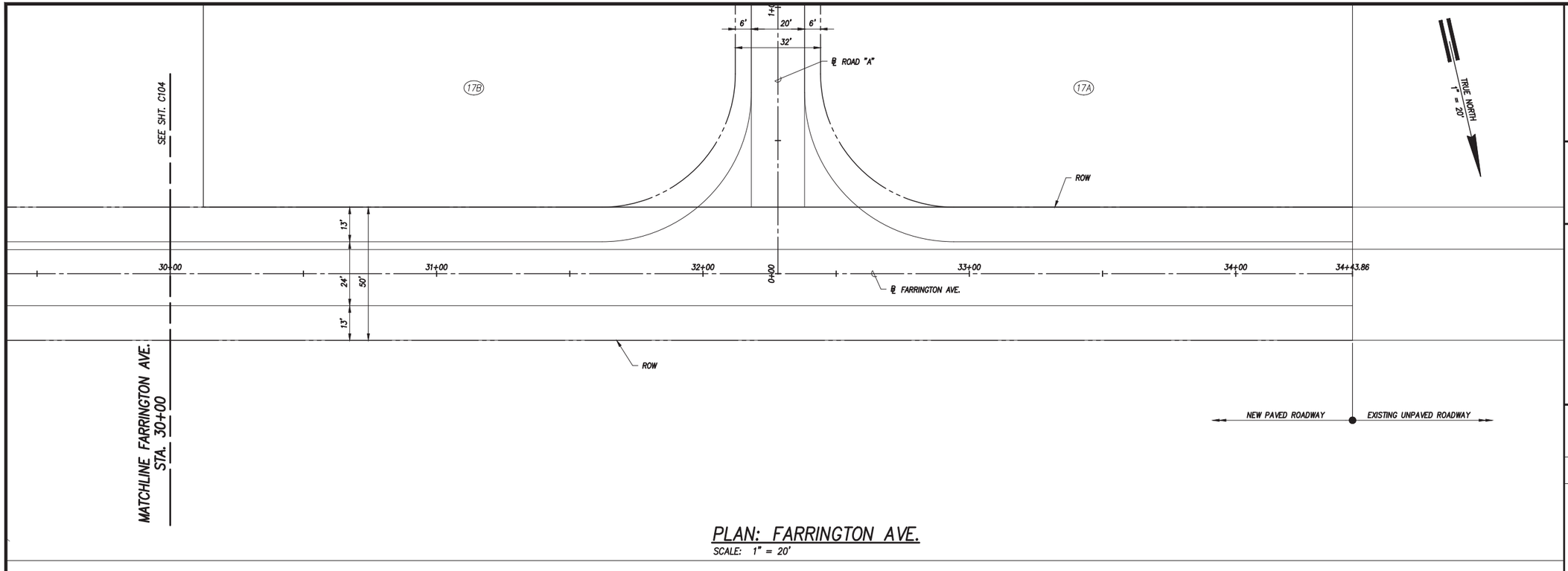
FARRINGTON AVE. PLAN-3 (STA. 20+00 TO 30+00)

FILE	POCKET	FOLDER	NO.

C104 SHEET OF SHEETS

RMTC JOB NO.: 1-23452-0E

Z:\12. 2021 Project\JN-2143 RM-Hoolehua PER\01. 30%\Construction Dwgs\Road\C104_FARRINGTON AVE Plan - 3.dwg December 3, 2021



PLAN: FARRINGTON AVE.

SCALE: 1" = 20'

GRAPHIC SCALE:
1" = 20'
20' 10' 0 20' 40'
SCALES IN FEET

HOOLEHUA

MOLOKAI, HAWAII

R. M. TOWILL CORPORATION

REVISION	DATE	BRIEF	BY	APPROVED

APPROVED BY

ENGINEER	
DRAFTSMAN	
CHECKED BY	
SCALE	AS SHOWN
DATE	
DPP FILE NO.	

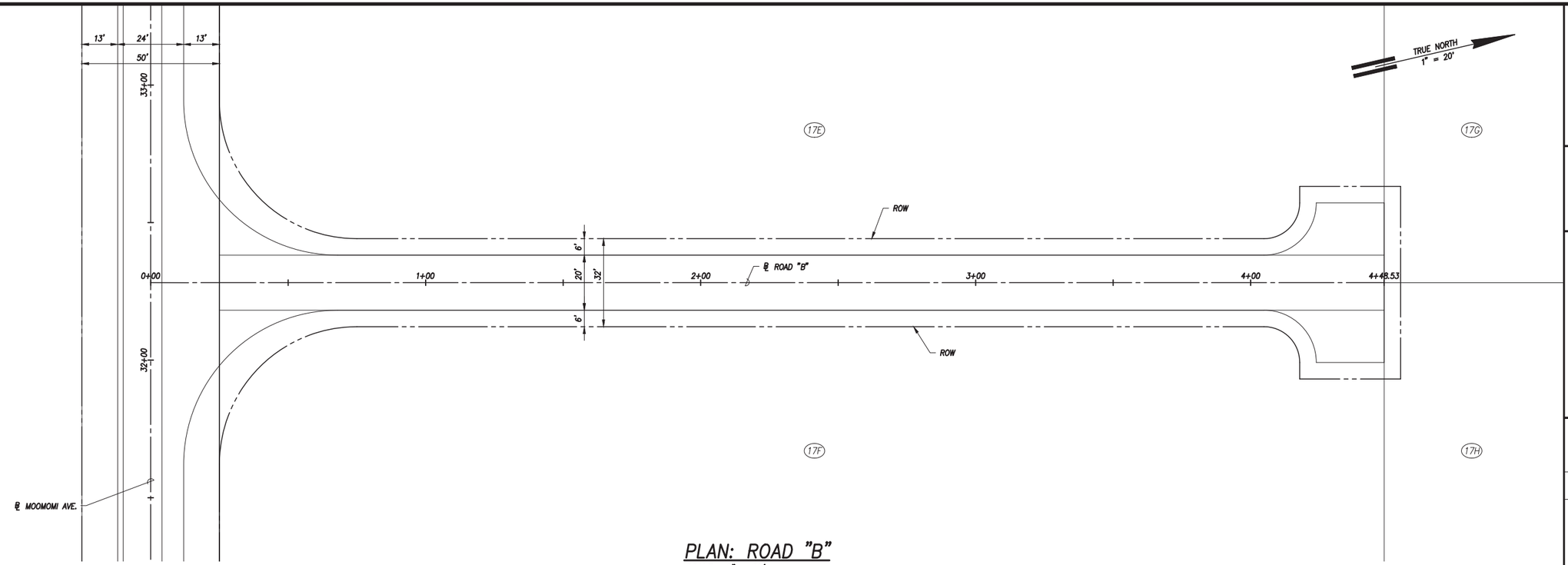
FARRINGTON AVE. PLAN-4
(STA.30+00 TO 34+43.86)

RMTC JOB NO.: 1-23452-0E

Z:\12. 2021 Project\JN-2143 RM-Hoolehua PER\01. 30%\Construction Dwgs\Road\C105_FARRINGTON AVE Plan - 4.dwg 11? 26, 2021

C105 SHEET OF SHEETS

FILE	POCKET	FOLDER	NO.



PLAN: ROAD "B"

SCALE: 1" = 20'

GRAPHIC SCALE:

1" = 20' — 20' 10' 0 20' 40'

SCALES IN FEET

HOOLEHUA

MOLOKAI, HAWAII

R. M. TOWILL CORPORATION

REVISION	DATE	BRIEF	BY	APPROVED

APPROVED BY

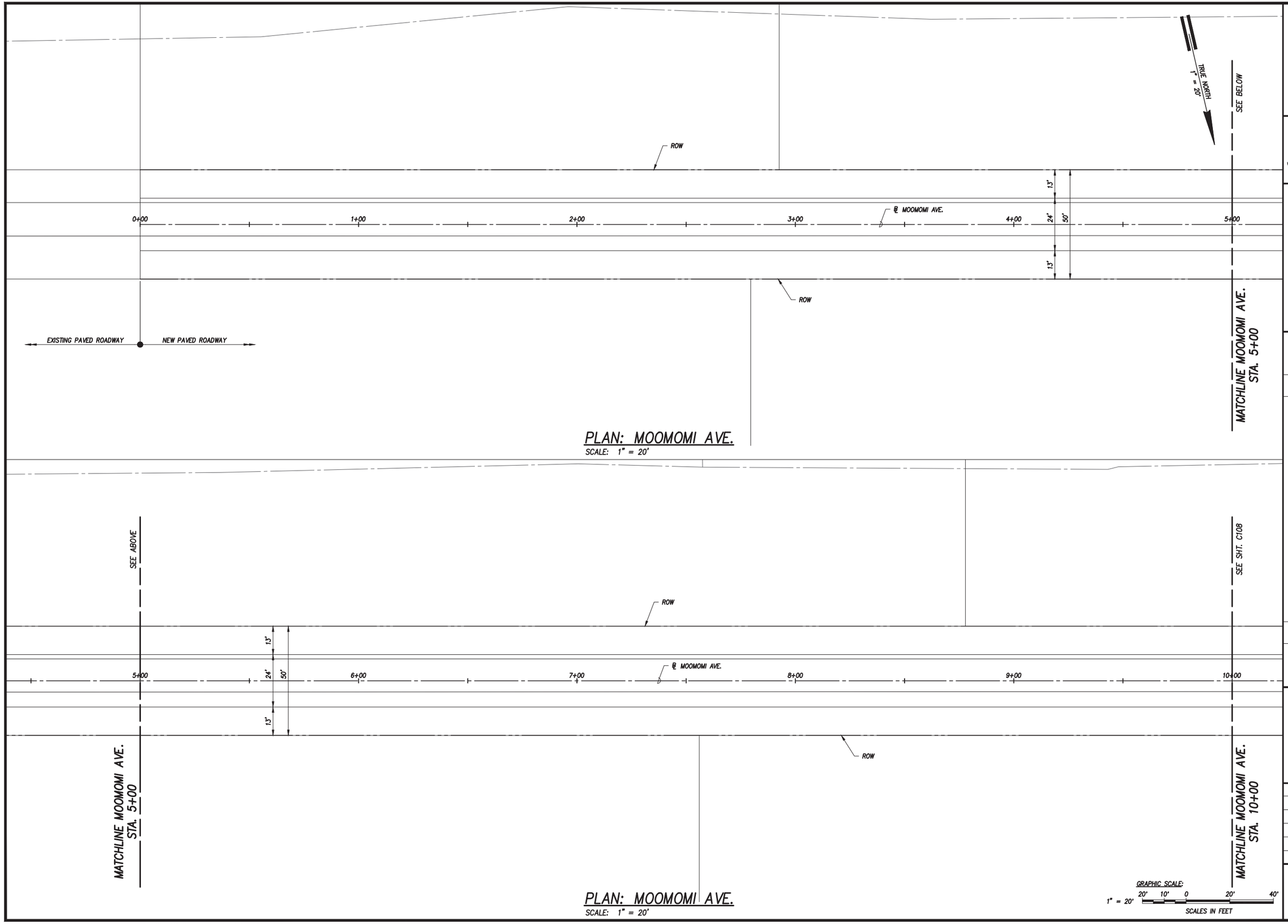
ENGINEER	
DRAFTSMAN	
CHECKED BY	
SCALE	AS SHOWN
DATE	
DPP FILE NO.	

ROAD "B" PLAN (STA. 0+00 TO 4+48.53)

RMTC JOB NO.: 1-23452-0E

Z:\12. 2021 Project\JN-2143 RM-Hoolehua PER\01. 30%\Construction Dwgs\Road\C106_Road B Plan - 1.dwg 11? 26, 2021

FILE	POCKET	FOLDER	NO.



PLAN: MOOMOMI AVE.
SCALE: 1" = 20'

PLAN: MOOMOMI AVE.
SCALE: 1" = 20'

GRAPHIC SCALE:
1" = 20' 20' 10' 0 20' 40'
SCALES IN FEET

HOOLEHUA

MOLOKAI, HAWAII

R. M. TOWILL CORPORATION

REVISION	DATE	BY
		APPROVED

APPROVED BY

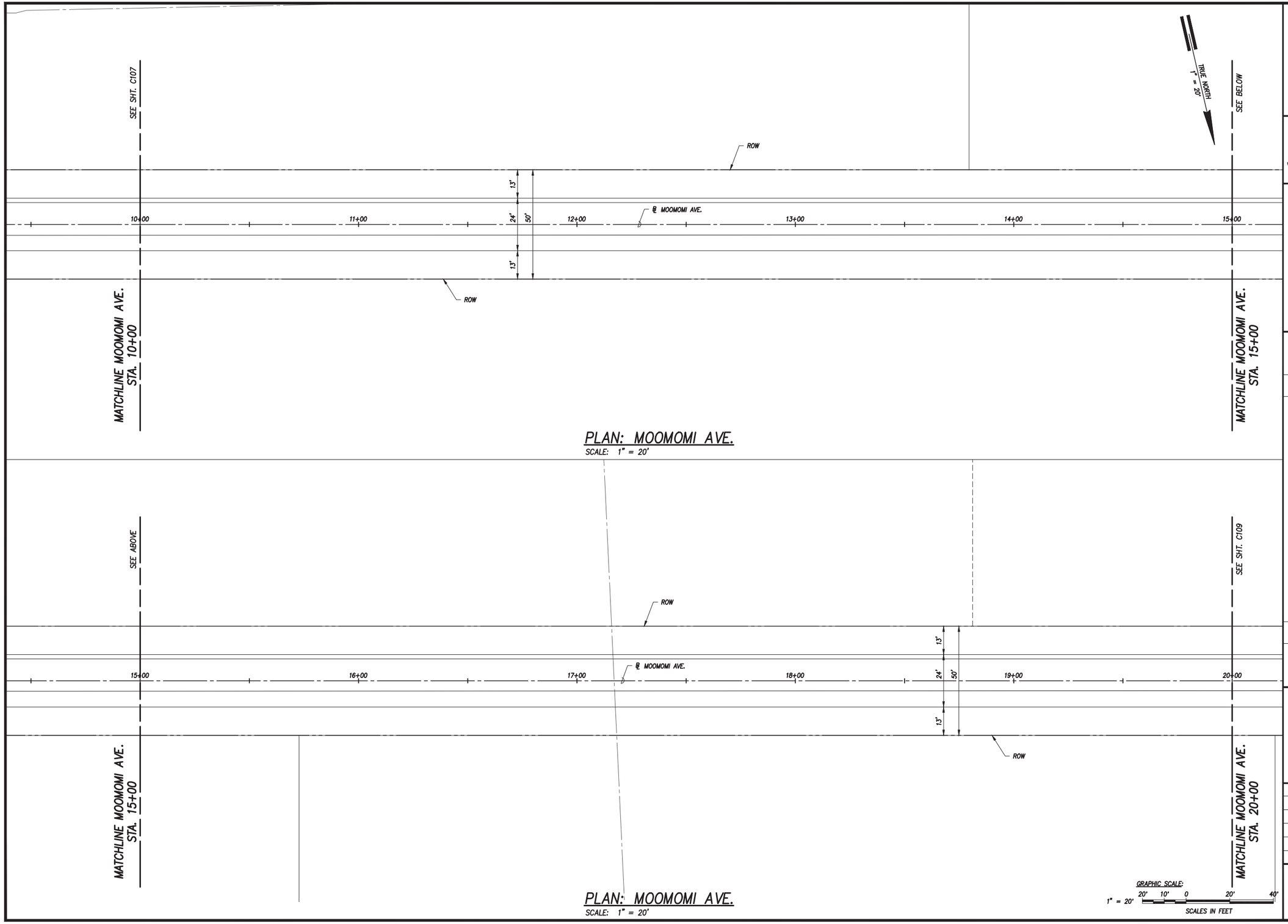
ENGINEER	
DRAFTSMAN	
CHECKED BY	
SCALE	AS SHOWN
DATE	
DPP FILE NO.	

MOOMOMI AVE. PLAN-1
(STA. 0+00 TO 10+00)

FILE	POCKET	FOLDER	NO.

RMTC JOB NO.: 1-23452-0E

Z:\12. 2021 Project\JN-2143 RM-Hoolehua PER\01. 30%\Construction Dwgs\Road\C107_MOOMOMI AVE Plan - 1.dwg 11? 26, 2021



PLAN: MOOMOMI AVE.

SCALE: 1" = 20'

PLAN: MOOMOMI AVE.

SCALE: 1" = 20'

GRAPHIC SCALE:
1" = 20'
20' 10' 0 20' 40'
SCALES IN FEET

HOOLEHUA

MOLOKAI, HAWAII

R. M. TOWILL CORPORATION

APPROVED BY	
ENGINEER	
DRAFTSMAN	
CHECKED BY	
SCALE	AS SHOWN
DATE	
DPP FILE NO.	

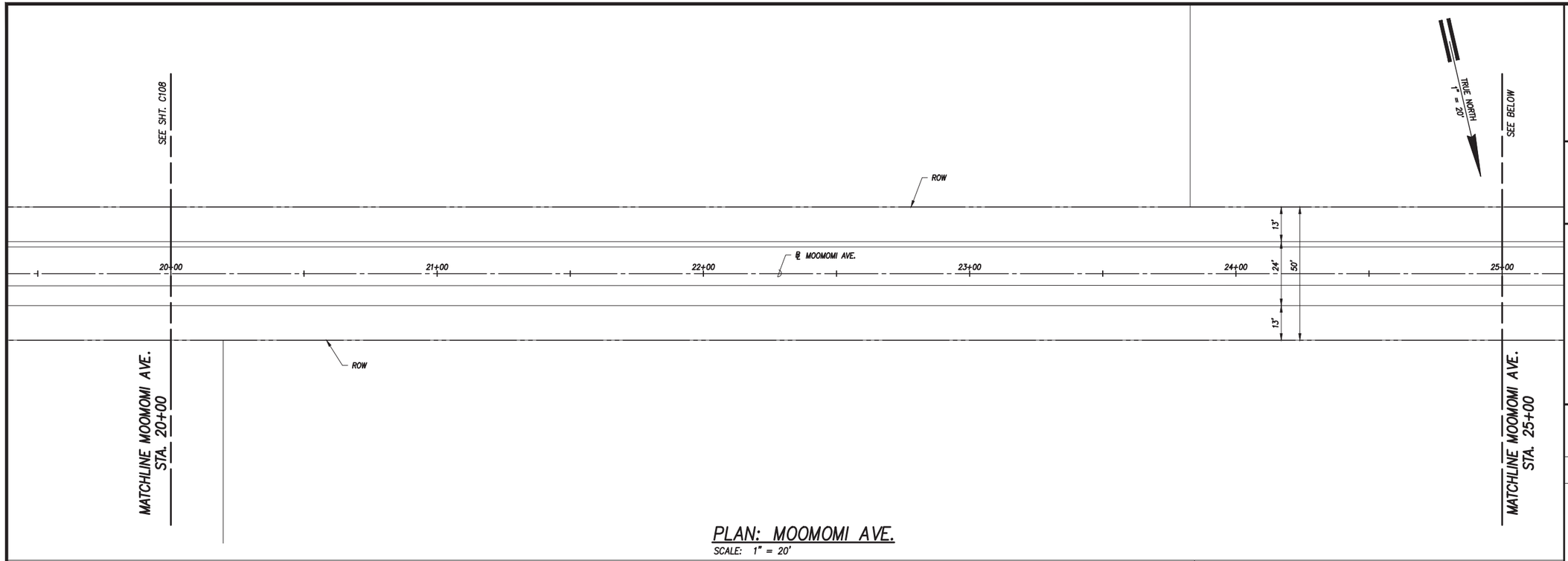
MOOMOMI AVE. PLAN–2
(STA. 10+00 TO 20+00)

NO.	REVISION	DATE	BY	APPROVED

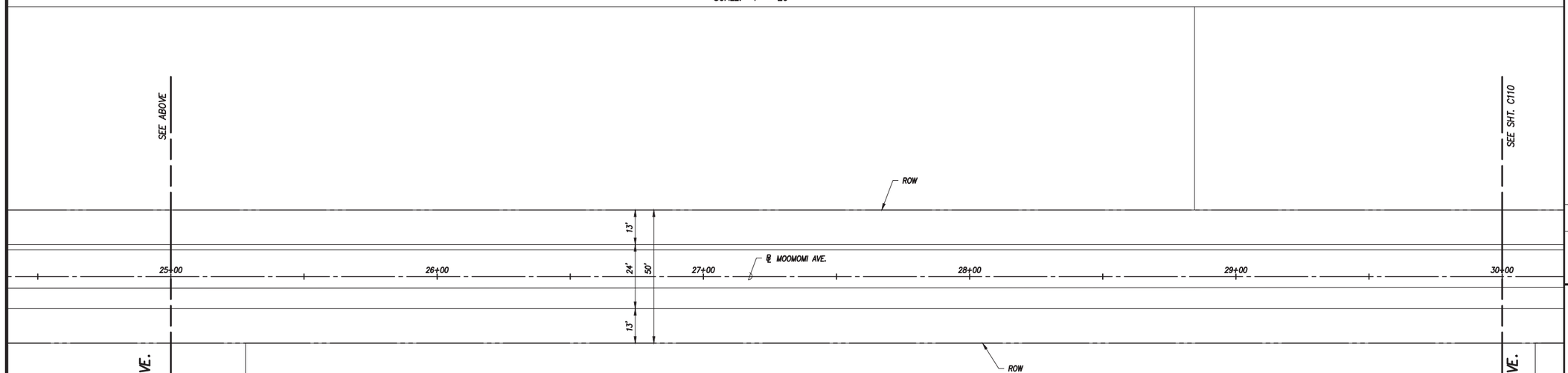
FILE	POCKET	FOLDER	NO.

RMTC JOB NO.: 1–23452–0E

Z:\12. 2021 Project\JN–2143 RM–Hoolehua PER\01. 30%\Construction Dwgs\Road\C108_MOOMOMI AVE Plan – 2.dwg 11? 26, 2021



PLAN: MOOMOMI AVE.
SCALE: 1" = 20'



PLAN: MOOMOMI AVE.
SCALE: 1" = 20'

GRAPHIC SCALE:
1" = 20'
20' 10' 0 20' 40'
SCALES IN FEET

HOOLEHUA

MOLOKAI, HAWAII

R. M. TOWILL CORPORATION

REVISION	DATE	BRIEF

BY	APPROVED

APPROVED BY

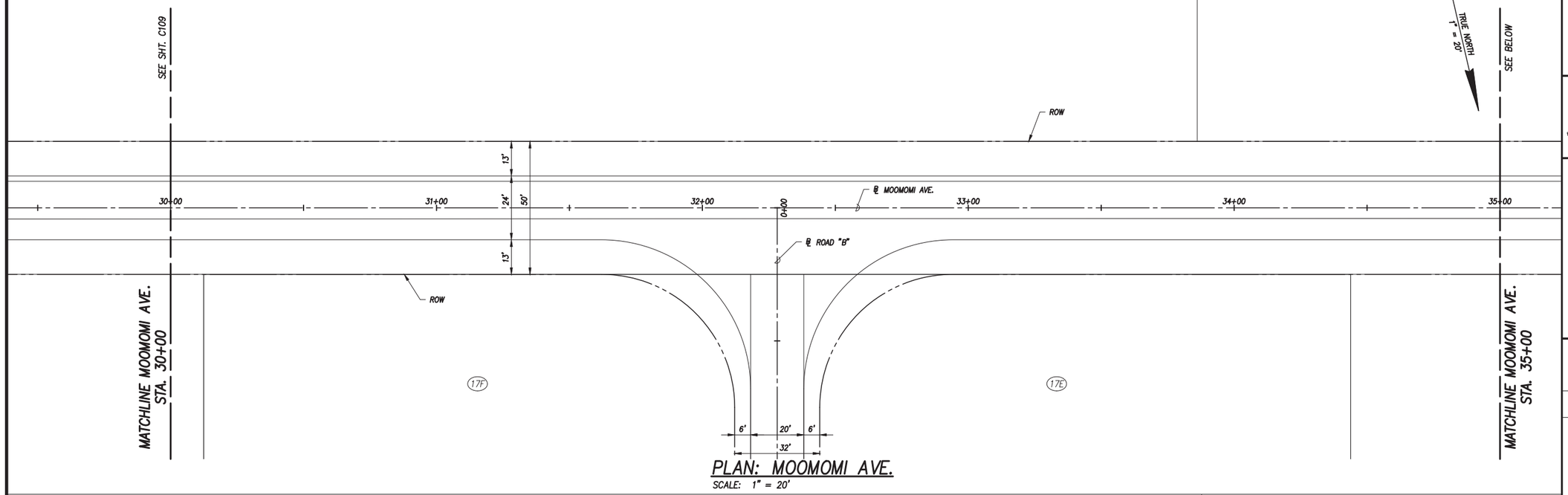
ENGINEER	
DRAFTSMAN	
CHECKED BY	
SCALE	AS SHOWN
DATE	
DPP FILE NO.	

MOOMOMI AVE. PLAN–3
(STA. 20+00 TO 30+00)

FILE	POCKET	FOLDER	NO.

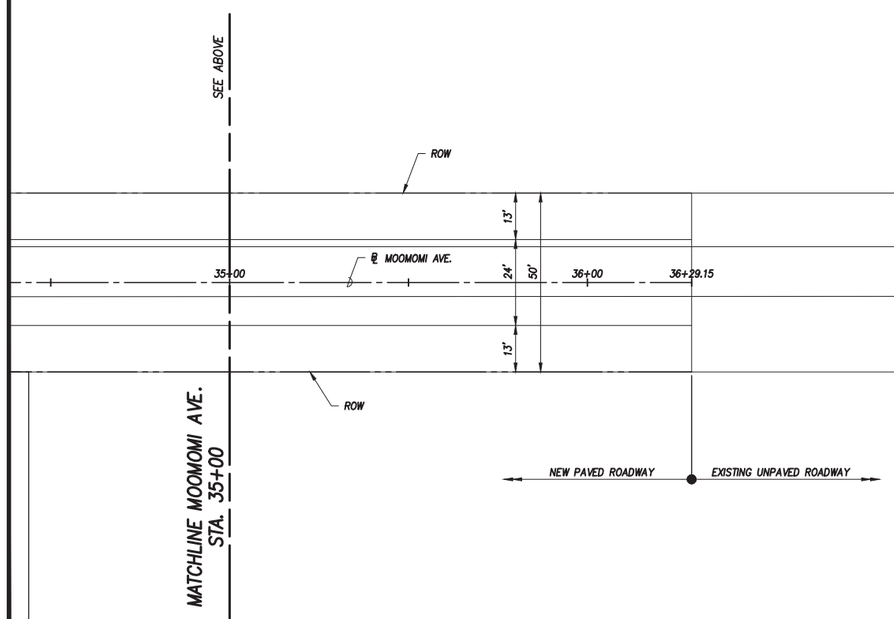
RMTC JOB NO.: 1–23452–0E

Z:\12. 2021 Project\JN–2143 RM–Hoolehua PER\01. 30%\Construction Dwgs\Road\C109_MOOMOMI AVE Plan – 3.dwg 11? 26, 2021



PLAN: MOOMOMI AVE.

SCALE: 1" = 20'



PLAN: MOOMOMI AVE.

SCALE: 1" = 20'

GRAPHIC SCALE:
1" = 20' 20' 10' 0 20' 40'
SCALES IN FEET

HOOLEHUA

MOLOKAI, HAWAII

R. M. TOWILL CORPORATION

REVISION	DATE	BY	APPROVED

APPROVED BY

ENGINEER

DRAFTSMAN

CHECKED BY

SCALE AS SHOWN

DATE

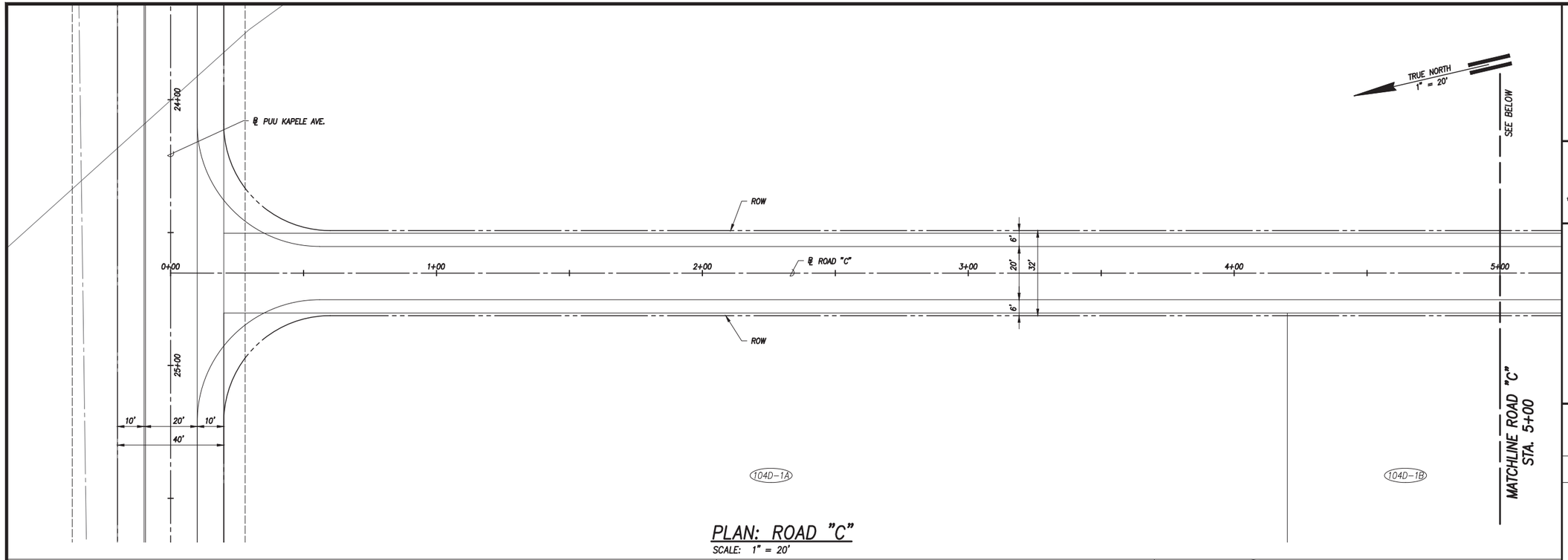
DPP FILE NO.

MOOMOMI AVE. PLAN–4
(STA.30+00 TO 36+29.15)

FILE	POCKET	FOLDER	NO.

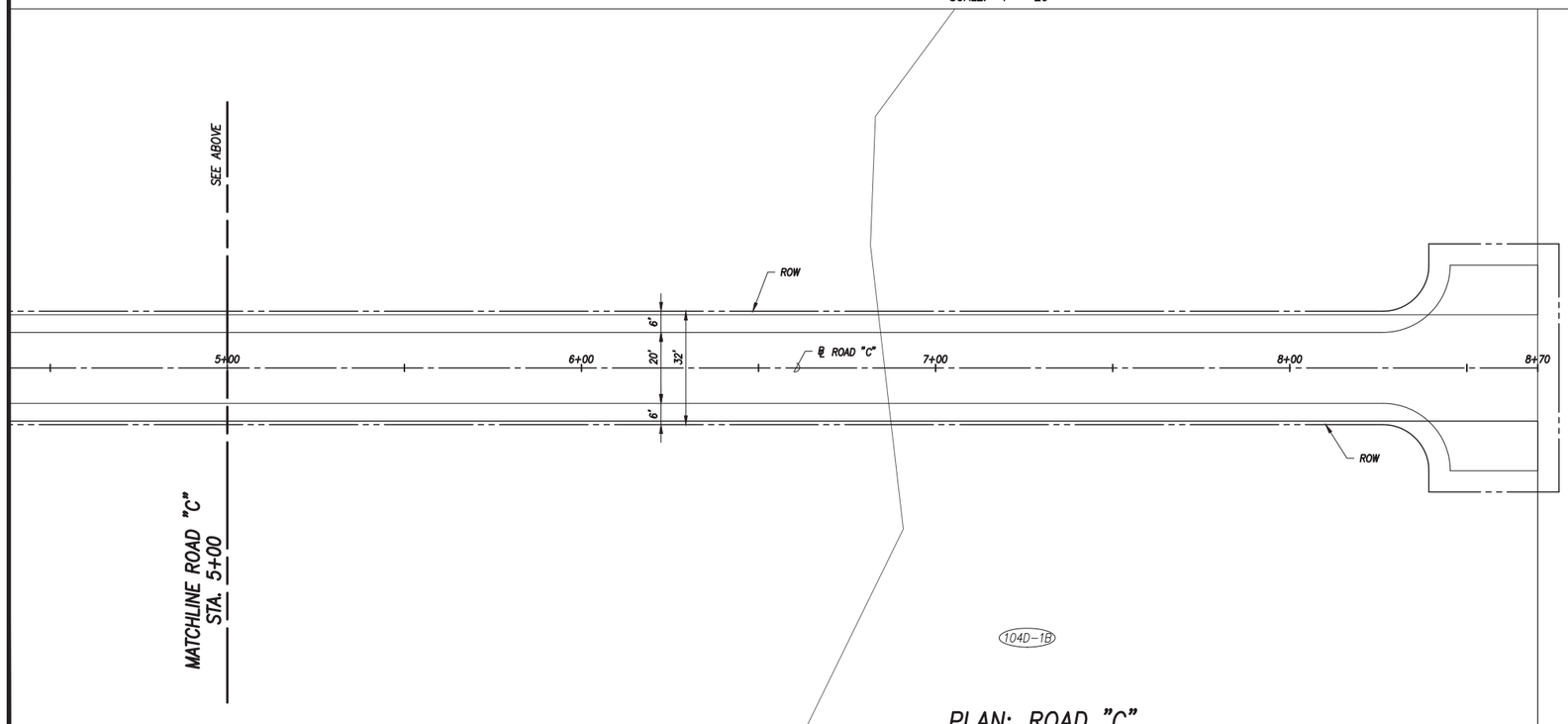
RMTC JOB NO.: 1-23452-0E

Z:\12. 2021 Project\JN-2143 RM-Hoolehua PER\01. 30%\Construction Dwgs\Road\C110_MOOMOMI AVE Plan - 4.dwg 11? 26, 2021



PLAN: ROAD "C"

SCALE: 1" = 20'



PLAN: ROAD "C"

SCALE: 1" = 20'

GRAPHIC SCALE:
1" = 20' 20' 10' 0 20' 40'
SCALES IN FEET

HOOLEHUA

MOLOKAI, HAWAII

R. M. TOWILL CORPORATION

REVISION	DATE	BRIEF

BY	APPROVED

APPROVED BY

ENGINEER	
DRAFTSMAN	
CHECKED BY	
SCALE	AS SHOWN
DATE	
DPP FILE NO.	

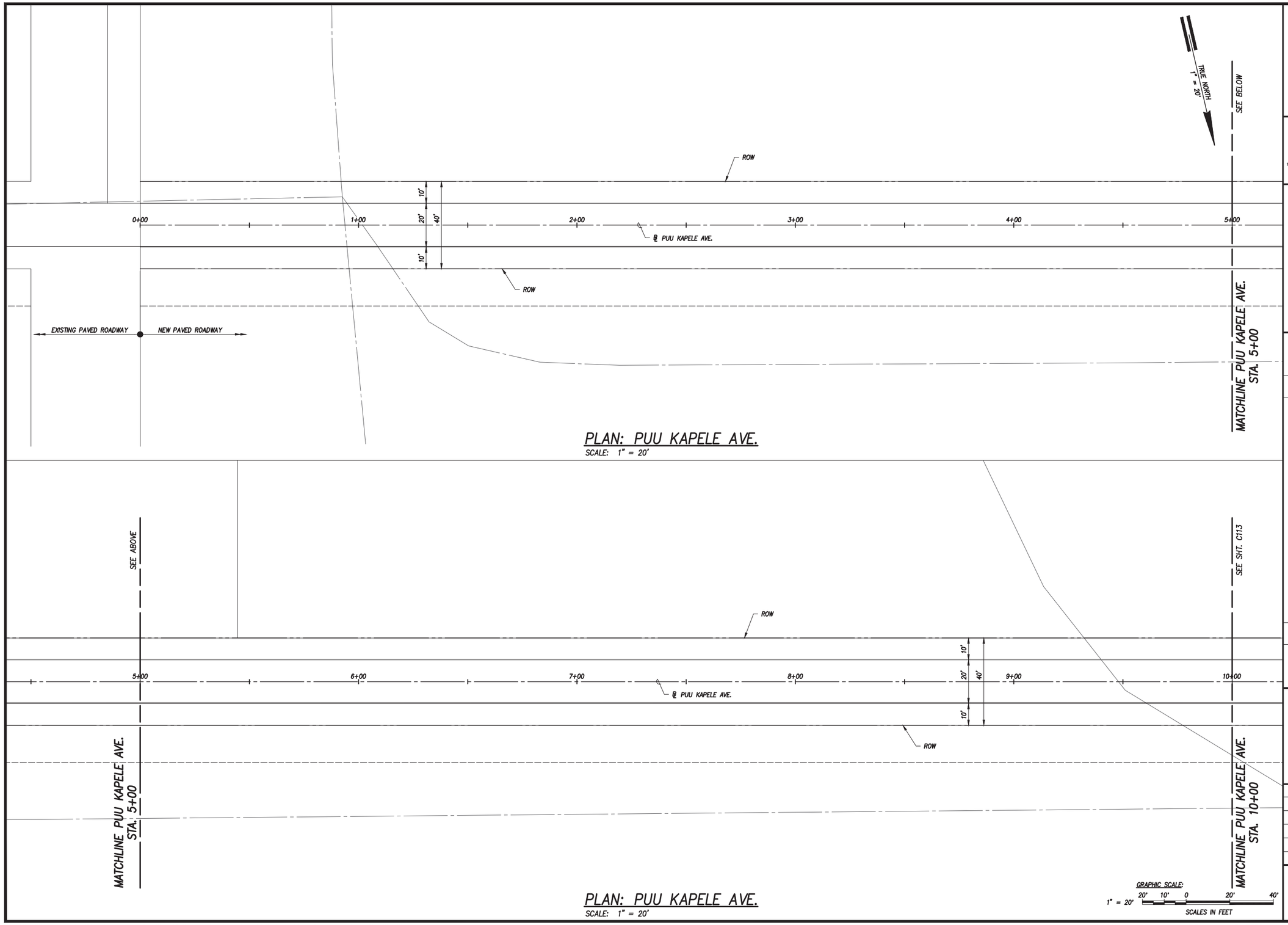
ROAD "C" PLAN (STA. 0+00 TO 8+70)

FILE	POCKET	FOLDER	NO.

C111 SHEET OF SHEETS

RMTC JOB NO.: 1-23452-0E

Z:\12. 2021 Project\JN-2143 RM-Hoolehua PER\01. 30%\Construction Dwgs\Road\C111_Road C Plan - 1.dwg 11? 26, 2021



HOOLEHUA

MOLOKAI, HAWAII

R. M. TOWILL CORPORATION

REVISION	DATE	BY	APPROVED

APPROVED BY

ENGINEER

DRAFTSMAN

CHECKED BY

SCALE AS SHOWN

DATE

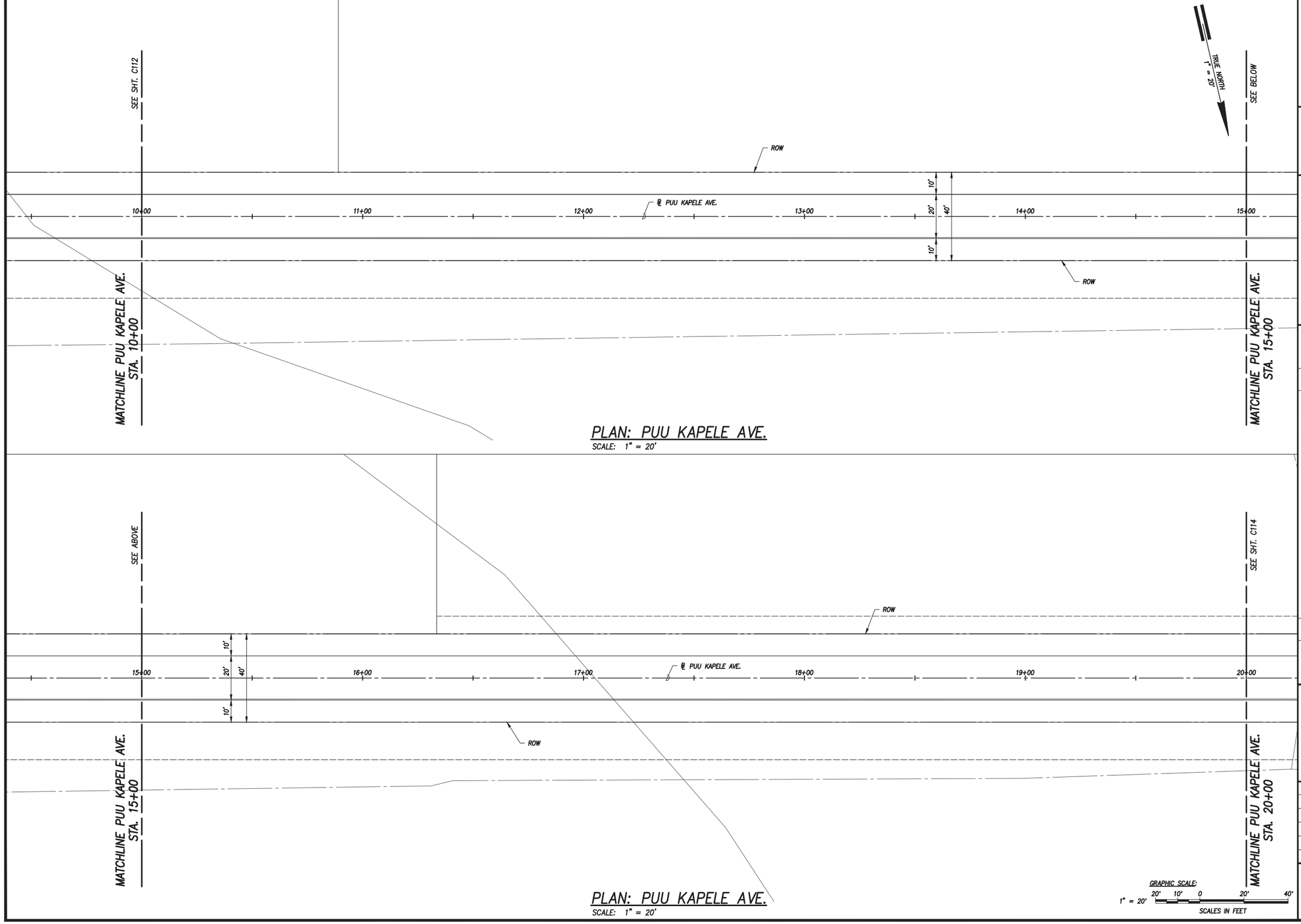
DPP FILE NO.

PUU KAPELE AVE. PLAN-1
(STA. 0+00 TO 10+00)

FILE	POCKET	FOLDER	NO.

RMTC JOB NO.: 1-23452-0E

Z:\12. 2021 Project\JN-2143 RM-Hoolehua PER\01. 30%\Construction Dwgs\Road\C112_PUU KAPELE AVE Plan - 1.dwg 11? 26, 2021



HOOLEHUA

MOLOKAI, HAWAII

R. M. TOWILL CORPORATION

REVISION	DATE	BY	APPROVED

APPROVED BY

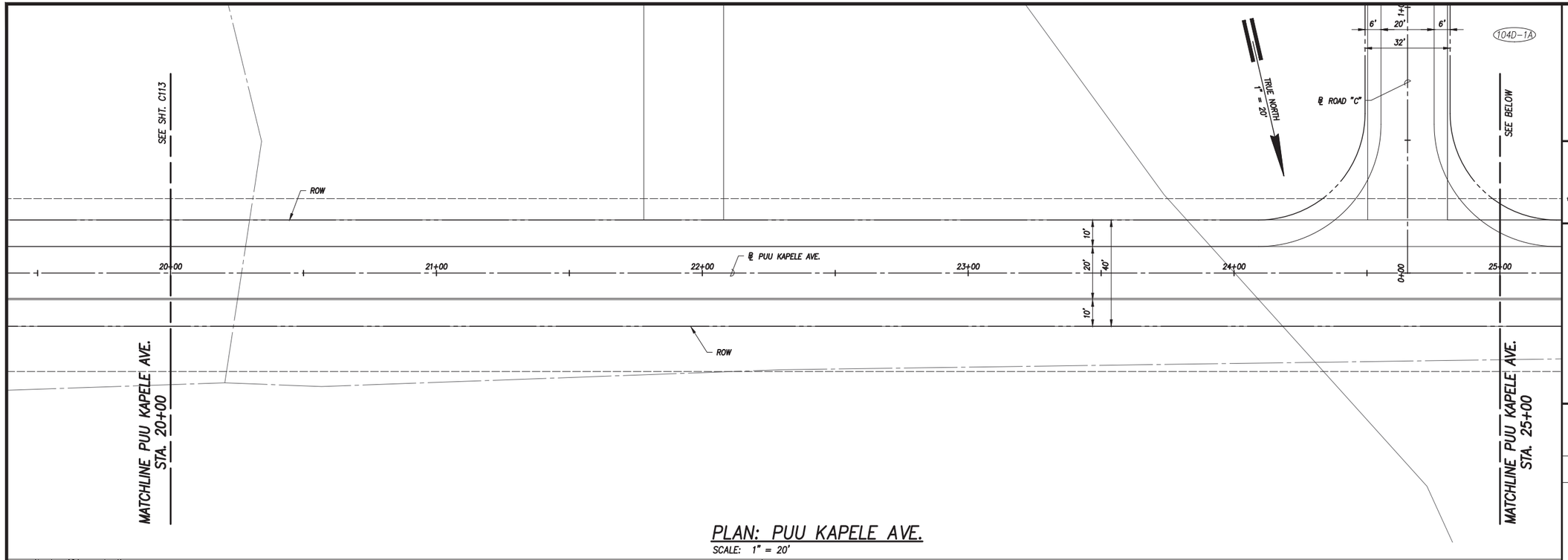
ENGINEER	
DRAFTSMAN	
CHECKED BY	
SCALE	AS SHOWN
DATE	
DPP FILE NO.	

PUU KAPELE AVE. PLAN–2
(STA. 10+00 TO 20+00)

FILE	POCKET	FOLDER	NO.

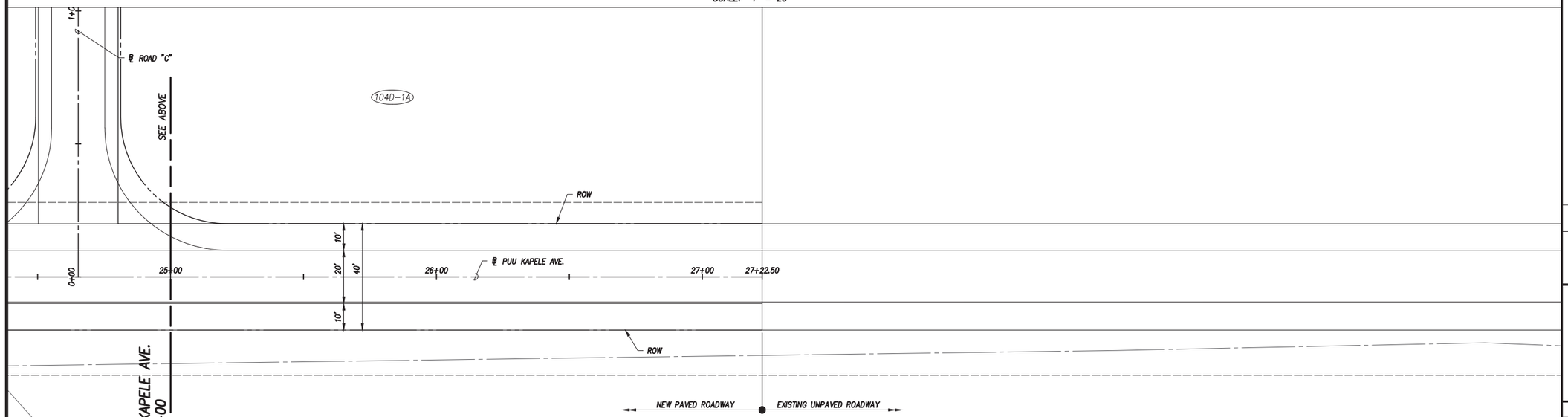
RMTC JOB NO.: 1–23452–0E

Z:\12. 2021 Project\JN–2143 RM–Hoolehua PER\01. 30%\Construction Dwgs\Road\C113_PUU KAPELE AVE Plan – 2.dwg 11? 26, 2021



PLAN: PUU KAPELE AVE.

SCALE: 1" = 20'



PLAN: PUU KAPELE AVE.

SCALE: 1" = 20'

GRAPHIC SCALE:
1" = 20' 20' 10' 0 20' 40'
SCALES IN FEET

HOOLEHUA

MOLOKAI, HAWAII

R. M. TOWILL CORPORATION

NO.	REVISION	DATE	BRIEF

APPROVED BY

ENGINEER

DRAFTSMAN

CHECKED BY

SCALE AS SHOWN

DATE

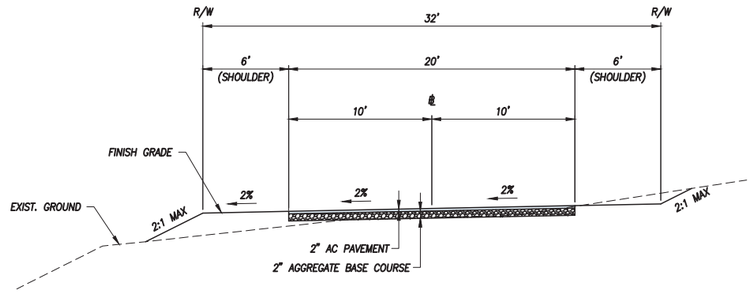
DPP FILE NO.

PUU KAPELE AVE. PLAN-3
(STA.20+00 TO 27+22.50)

RMTC JOB NO.: 1-23452-0E

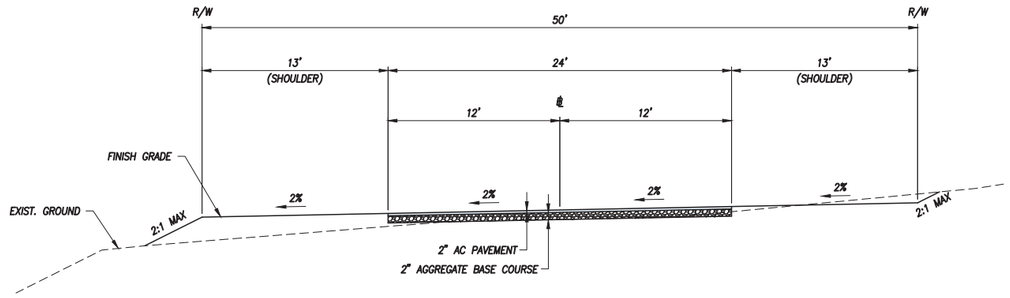
Z:\12. 2021 Project\JN-2143 RM-Hoolehua PER\01. 30%\Construction Dwgs\Road\C114_PUU KAPELE AVE Plan - 3.dwg 11? 26, 2021

FILE	POCKET	FOLDER	NO.



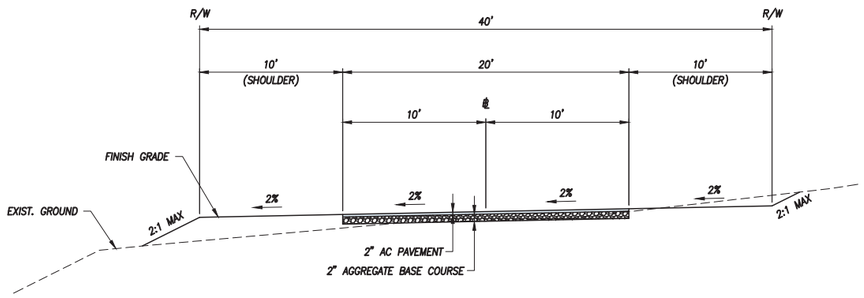
TYPICAL SECTION – ROAD "A", "B", "C"

SCALE: 1" = 5'



TYPICAL SECTION – "FARRINGTON" AVENUE AND "MOOMOMI" AVENUE

SCALE: 1" = 5'



TYPICAL SECTION – "PUU KAPELE" AVENUE

SCALE: 1" = 5'

GRAPHIC SCALE:
1" = 5'
5' 0 5' 10'
SCALES IN FEET

HOOLEHUA

MOLOKAI, HAWAII

R. M. TOWILL CORPORATION

REVISION	DATE	BY	APPROVED

APPROVED BY

ENGINEER

DRAFTSMAN

CHECKED BY

SCALE AS SHOWN

DATE

DPP FILE NO.

TYPICAL SECTIONS

C121 SHEET OF SHEETS

FILE	POCKET	FOLDER	NO.

RMTC JOB NO.: 1-23452-0E

Z:\12. 2021 Project\JN-2143 RM-Hoolehua PER\01. 30%\Construction Dwgs\Road\C121 Typical Road Sections.dwg 11? 29, 2021

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Island of Molokai, Hawaii

Lot 17

January 3, 2022

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Contents

Preface.....2
How Soil Surveys Are Made.....5
Soil Map.....8
Soil Map.....9
Legend.....10
Map Unit Legend.....11
Map Unit Descriptions.....11
Island of Molokai, Hawaii.....13
MuA—Molokai silty clay loam, 0 to 3 percent slopes, MLRA 158.....13
MuB—Molokai silty clay loam, 3 to 7 percent slopes, MLRA 158.....14
MuC3—Molokai silty clay loam, 7 to 15 percent slopes, severely eroded, MLRA 158.....15
rVT2—Very stony land, eroded.....16
References.....17

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

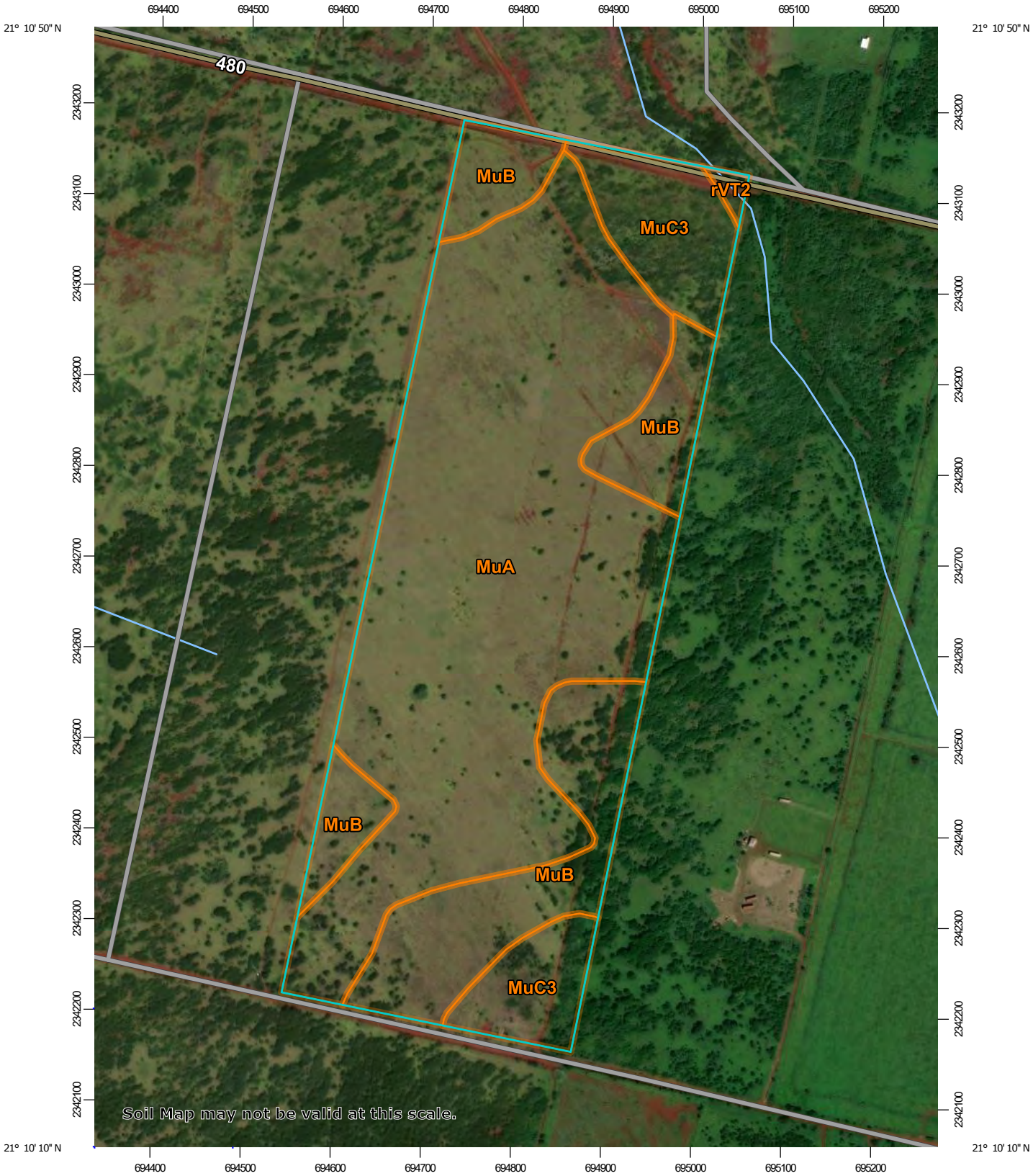
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



Map Scale: 1:6,040 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 50 100 200 300

Feet
0 250 500 1000 1500

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 Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

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 Molokai, Hawaii
Survey Area Data: Version 16, Sep 15, 2021

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.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
MuA	Molokai silty clay loam, 0 to 3 percent slopes, MLRA 158	50.8	64.0%
MuB	Molokai silty clay loam, 3 to 7 percent slopes, MLRA 158	18.8	23.7%
MuC3	Molokai silty clay loam, 7 to 15 percent slopes, severely eroded, MLRA 158	9.4	11.9%
rVT2	Very stony land, eroded	0.4	0.5%
Totals for Area of Interest		**79.4**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Island of Molokai, Hawaii

MuA—Molokai silty clay loam, 0 to 3 percent slopes, MLRA 158

Map Unit Setting

National map unit symbol: 2w049
Elevation: 0 to 1,500 feet
Mean annual precipitation: 20 to 25 inches
Mean annual air temperature: 72 to 75 degrees F
Frost-free period: 365 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Molokai and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Molokai

Setting

Landform: Hillslopes
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Residuum weathered from basalt

Typical profile

Ap1 - 0 to 7 inches: silty clay loam
Ap2 - 7 to 15 inches: silty clay loam
Bto1 - 15 to 35 inches: silty clay loam
Bto2 - 35 to 64 inches: silty clay loam
Bto3 - 64 to 72 inches: silty clay loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 7.0
Available water supply, 0 to 60 inches: Moderate (about 6.9 inches)

Interpretive groups

Land capability classification (irrigated): 1
Land capability classification (nonirrigated): 4c
Hydrologic Soil Group: C
Ecological site: R158XY002HI - Isohyperthermic Torric Naturalized Grassland
Hydric soil rating: No

MuB—Molokai silty clay loam, 3 to 7 percent slopes, MLRA 158

Map Unit Setting

National map unit symbol: 2w04b
Elevation: 0 to 1,500 feet
Mean annual precipitation: 20 to 25 inches
Mean annual air temperature: 72 to 75 degrees F
Frost-free period: 365 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Molokai and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Molokai

Setting

Landform: Hillslopes
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Residuum weathered from basalt

Typical profile

Ap1 - 0 to 7 inches: silty clay loam
Ap2 - 7 to 15 inches: silty clay loam
Bto1 - 15 to 35 inches: silty clay loam
Bto2 - 35 to 64 inches: silty clay loam
Bto3 - 64 to 72 inches: silty clay loam

Properties and qualities

Slope: 3 to 7 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 7.0
Available water supply, 0 to 60 inches: Moderate (about 6.9 inches)

Interpretive groups

Land capability classification (irrigated): 2e
Land capability classification (nonirrigated): 4c
Hydrologic Soil Group: C
Ecological site: R158XY002HI - Isohyperthermic Torric Naturalized Grassland
Hydric soil rating: No

MuC3—Molokai silty clay loam, 7 to 15 percent slopes, severely eroded, MLRA 158

Map Unit Setting

National map unit symbol: 2w04d
Elevation: 0 to 1,500 feet
Mean annual precipitation: 20 to 25 inches
Mean annual air temperature: 72 to 75 degrees F
Frost-free period: 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Molokai and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Molokai

Setting

Landform: Hillslopes
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Residuum weathered from basalt

Typical profile

Ap - 0 to 5 inches: silty clay loam
Bto1 - 5 to 35 inches: silty clay loam
Bto2 - 35 to 60 inches: silty clay loam

Properties and qualities

Slope: 7 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 7.0
Available water supply, 0 to 60 inches: Moderate (about 7.1 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C
Ecological site: R158XY002HI - Isohyperthermic Torric Naturalized Grassland
Hydric soil rating: No

rVT2—Very stony land, eroded

Map Unit Setting

National map unit symbol: hq70
Elevation: 0 to 1,500 feet
Mean annual precipitation: 10 to 25 inches
Mean annual air temperature: 72 to 75 degrees F
Frost-free period: 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Very stony land, eroded, eroded, and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Very Stony Land, Eroded, Eroded

Setting

Landform position (two-dimensional): Summit
Landform position (three-dimensional): Mountaintop
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Aa lava and volcanic ash

Typical profile

H1 - 0 to 10 inches: extremely stony silty clay loam
H2 - 10 to 30 inches: extremely stony silty clay loam
H3 - 30 to 40 inches: bedrock

Properties and qualities

Slope: 7 to 30 percent
Depth to restrictive feature: 5 to 35 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 2.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: C
Hydric soil rating: No

References

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

National Research Council. 1995. Wetlands: Characteristics and boundaries.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577

Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580

Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374

United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Island of Molokai, Hawaii

Lot 104D

April 24, 2024

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Contents

Preface.....2
How Soil Surveys Are Made.....5
Soil Map.....8
Soil Map.....9
Legend.....10
Map Unit Legend.....11
Map Unit Descriptions.....11
Island of Molokai, Hawaii.....13
MuB—Molokai silty clay loam, 3 to 7 percent slopes, MLRA 158.....13
MvD3—Lithic Eutrotorrox, 15 to 25 percent slopes, severely eroded, MLRA 158.....14
References.....16

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

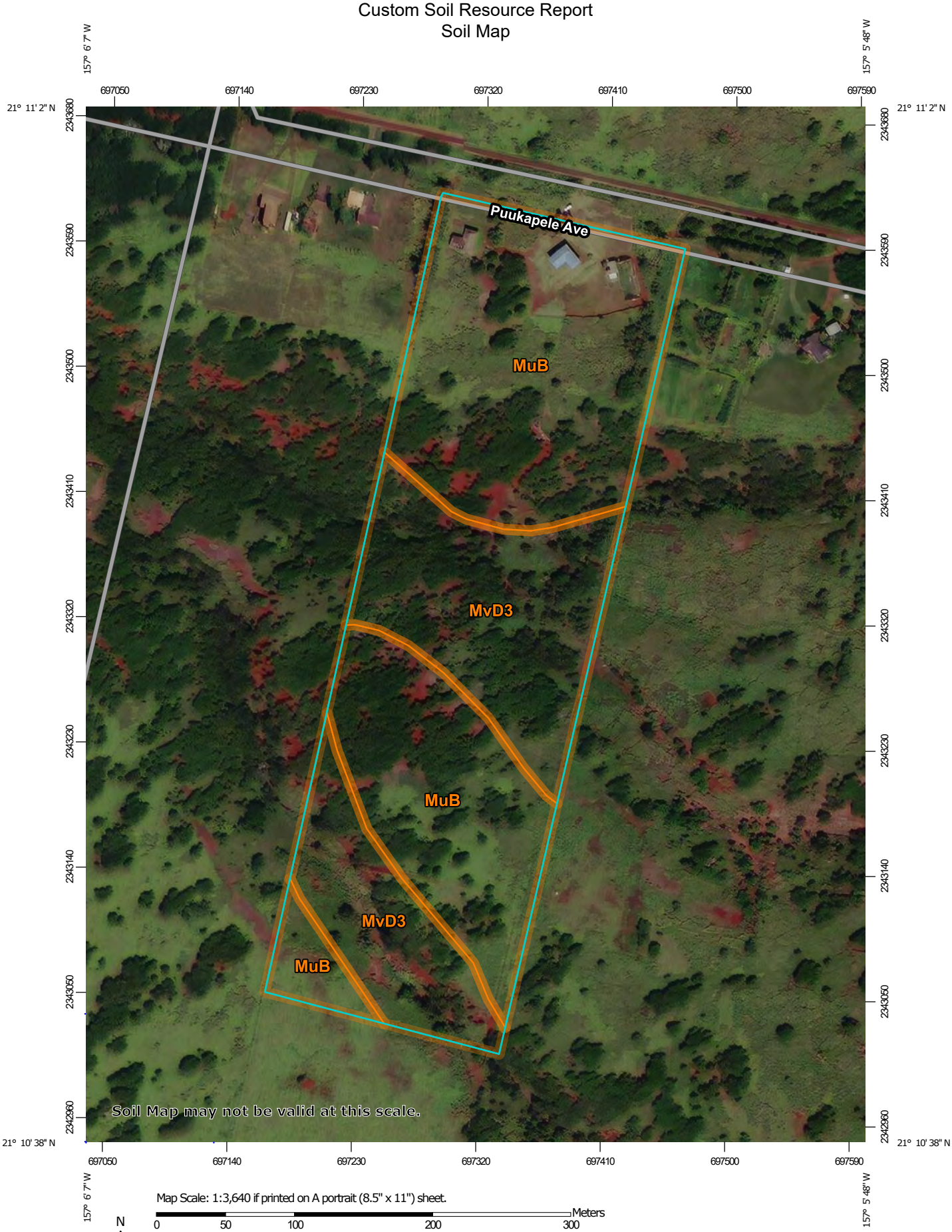
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



Map Scale: 1:3,640 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 150 300 600 900

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 Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

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 Molokai, Hawaii
Survey Area Data: Version 18, Sep 8, 2023

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.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
MuB	Molokai silty clay loam, 3 to 7 percent slopes, MLRA 158	16.4	62.9%
MvD3	Lithic Eutrotorrox, 15 to 25 percent slopes, severely eroded, MLRA 158	9.7	37.1%
Totals for Area of Interest		**26.1**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the

development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Island of Molokai, Hawaii

MuB—Molokai silty clay loam, 3 to 7 percent slopes, MLRA 158

Map Unit Setting

National map unit symbol: 2w04b
Elevation: 0 to 1,500 feet
Mean annual precipitation: 20 to 25 inches
Mean annual air temperature: 72 to 75 degrees F
Frost-free period: 365 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Molokai and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Molokai

Setting

Landform: Hillslopes
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Residuum weathered from basalt

Typical profile

Ap1 - 0 to 7 inches: silty clay loam
Ap2 - 7 to 15 inches: silty clay loam
Bto1 - 15 to 35 inches: silty clay loam
Bto2 - 35 to 64 inches: silty clay loam
Bto3 - 64 to 72 inches: silty clay loam

Properties and qualities

Slope: 3 to 7 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 7.0
Available water supply, 0 to 60 inches: Moderate (about 6.9 inches)

Interpretive groups

Land capability classification (irrigated): 2e
Land capability classification (nonirrigated): 4c
Hydrologic Soil Group: C
Ecological site: R158XY002HI - Isohyperthermic Torric Naturalized Grassland
Hydric soil rating: No

MvD3—Lithic Eutrotorrox, 15 to 25 percent slopes, severely eroded, MLRA 158

Map Unit Setting

National map unit symbol: 2w04f
Elevation: 0 to 1,500 feet
Mean annual precipitation: 20 to 25 inches
Mean annual air temperature: 72 to 75 degrees F
Frost-free period: 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Lithic eutrotorrox and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Lithic Eutrotorrox

Setting

Landform: Drainageways
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Residuum weathered from basalt

Typical profile

Bto1 - 0 to 3 inches: silty clay loam
Bto2 - 3 to 18 inches: silty clay loam
R - 18 to 28 inches: bedrock

Properties and qualities

Slope: 15 to 25 percent
Surface area covered with cobbles, stones or boulders: 10.0 percent
Depth to restrictive feature: 8 to 20 inches to lithic bedrock
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 7.0
Available water supply, 0 to 60 inches: Very low (about 2.1 inches)

Interpretive groups

Land capability classification (irrigated): 6e
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Rock outcrop

Percent of map unit: 15 percent
Landform: Hillslopes
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Mountaintop, interfluve
Down-slope shape: Linear
Across-slope shape: Convex
Hydric soil rating: Unranked

References

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

National Research Council. 1995. Wetlands: Characteristics and boundaries.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577

Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580

Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374

United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf

U.S. FISH AND WILDLIFE SERVICE OFFICIAL SPECIES LIST

APPENDIX

C

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Pacific Islands Fish And Wildlife Office
300 Ala Moana Boulevard, Box 50088
Honolulu, HI 96850-5000
Phone: (808) 792-9400 Fax: (808) 792-9580

In Reply Refer To: October 31, 2023
Project Code: 2024-0010818
Project Name: Ho'olehua Scattered Lots

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened and endangered species, as well as designated critical habitat that may occur within the boundary of your proposed project and that may be affected by project related actions. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*). Please contact the Service's Pacific Islands Fish and Wildlife Office (PIFWO) at 808-792-9400 if you have any questions regarding your IPaC species list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may adversely affect threatened and endangered species and/or designated critical habitat.

Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the IPaC system by completing the same process used to receive the enclosed list.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a Biological

Evaluation, similar to a Biological Assessment, be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment or Biological Evaluation are described at 50 CFR 402.12.

Due to the significant number of listed species found on each island within PIFWO's regulatory jurisdiction, and the difficulty in accurately mapping ranges for species that we have limited information about, your species list may include more species than if you obtained the list directly from a Service biologist. We recommend you use the species links in IPaC to view the life history, habitat descriptions, and recommended avoidance and minimization measures to assist with your initial determination of whether the species or its habitat may occur within your project area. If appropriate habitat is present for a listed species, we recommend surveys be conducted to determine whether the species is also present. If no surveys are conducted, we err on the side of the species, by regulation, and assume the habitat is occupied. Updated avoidance and minimization measures for plants and animals, best management practices for work in or near aquatic environments, and invasive species biosecurity protocols can be found on the PIFWO website at: https://www.fws.gov/office/pacific-islands-fish-and-wildlife/library.

If a Federal agency determines, based on the Biological Assessment or Biological Evaluation, that a listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at: http://www.fws.gov/endangered/esa-library/index.

Non-federal entities can also use the IPaC generated species list to develop Habitat Conservation Plans (HCP) in accordance with section 10(a)(1)(B) of the Act. We recommend HCP applicants coordinate with the Service early during the HCP development process. For additional information on HCPs, the Habitat Conservation Planning handbook can be found at https://www.fws.gov/sites/default/files/documents/habitat-conservation-planning-handbook-entire.pdf.

Please be aware that wind energy projects should follow the Service's wind energy guidelines (http://www.fws.gov/windenergy) for minimizing impacts to migratory birds. Listed birds and the Hawaiian hoary bat may also be affected by wind energy development and we recommend development of a Habitat Conservation Plan for those species, as described above. Guidance for minimizing impacts to migratory birds for projects including communications towers can be found at:

- http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers
- http://www.towerkill.com
- http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation actions that benefit threatened and endangered species into their project planning to further the purposes of the Act in accordance with section 7(a)(1). Please include the Consultation Tracking Number associated with your IPaC species list in any

request for consultation or correspondence about your project that you submit to our office. Please feel free to contact us at PIFWO_admin@fws.gov or 808-792-9400 if you need more current information or assistance regarding the potential impacts to federally listed species and federally designated critical habitat.

Attachment(s):

- Official Species List
- USFWS National Wildlife Refuges and Fish Hatcheries
- Bald & Golden Eagles
- Migratory Birds
- Wetlands

OFFICIAL SPECIES LIST

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Pacific Islands Fish And Wildlife Office
300 Ala Moana Boulevard, Box 50088
Honolulu, HI 96850-5000
(808) 792-9400

PROJECT SUMMARY

Project Code: 2024-0010818
Project Name: Ho‘olehua Scattered Lots
Project Type: New Constr - Below Ground
Project Description: The Department of Hawaiian Home Lands (DHHL) proposes the subdivision and improvements to lands in Ho‘olehua, Moloka‘i for lease as subsistence agricultural lots to DHHL beneficiaries.

Project Location:

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@21.181116799999998,-157.0992221140703,14z

Counties: Maui County, Hawaii

ENDANGERED SPECIES ACT SPECIES

There is a total of 23 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

MAMMALS

NAME	STATUS
Hawaiian Hoary Bat *Lasiurus cinereus semotus*	Endangered

No critical habitat has been designated for this species.
Species profile: https://ecos.fws.gov/ecp/species/770
General project design guidelines:
https://ipac.ecosphere.fws.gov/project/EE32JCM73JEDTBKISMB7GT7VWI/documents/generated/6477.pdf

BIRDS

NAME	STATUS
Band-rumped Storm-petrel *Oceanodroma castro*	Endangered

Population: USA (HI)
No critical habitat has been designated for this species.
Species profile: https://ecos.fws.gov/ecp/species/1226
General project design guidelines:
https://ipac.ecosphere.fws.gov/project/EE32JCM73JEDTBKISMB7GT7VWI/documents/generated/6939.pdf

Hawaiian Coot (alae Ke`oke`o) *Fulica alai* — Endangered

No critical habitat has been designated for this species.
Species profile: https://ecos.fws.gov/ecp/species/7233
General project design guidelines:
https://ipac.ecosphere.fws.gov/project/EE32JCM73JEDTBKISMB7GT7VWI/documents/generated/6934.pdf

Hawaiian Duck *Anas wyvilliana* — Endangered

No critical habitat has been designated for this species.
Species profile: https://ecos.fws.gov/ecp/species/7712
General project design guidelines:
https://ipac.ecosphere.fws.gov/project/EE32JCM73JEDTBKISMB7GT7VWI/documents/generated/6934.pdf

Hawaiian Goose *Branta (=Nesochen) sandvicensis* — Threatened

No critical habitat has been designated for this species.
Species profile: https://ecos.fws.gov/ecp/species/1627
General project design guidelines:
https://ipac.ecosphere.fws.gov/project/EE32JCM73JEDTBKISMB7GT7VWI/documents/generated/6925.pdf

Hawaiian Petrel *Pterodroma sandwichensis* — Endangered

No critical habitat has been designated for this species.
Species profile: https://ecos.fws.gov/ecp/species/6746
General project design guidelines:
https://ipac.ecosphere.fws.gov/project/EE32JCM73JEDTBKISMB7GT7VWI/documents/generated/6939.pdf

Hawaiian Stilt *Himantopus mexicanus knudseni* — Endangered

No critical habitat has been designated for this species.
Species profile: https://ecos.fws.gov/ecp/species/2082
General project design guidelines:
https://ipac.ecosphere.fws.gov/project/EE32JCM73JEDTBKISMB7GT7VWI/documents/generated/6934.pdf

Newell's Townsend's Shearwater *Puffinus auricularis newelli* — Threatened

No critical habitat has been designated for this species.
Species profile: https://ecos.fws.gov/ecp/species/2048
General project design guidelines:
https://ipac.ecosphere.fws.gov/project/EE32JCM73JEDTBKISMB7GT7VWI/documents/generated/6939.pdf

REPTILES

NAME	STATUS
Hawksbill Sea Turtle *Eretmochelys imbricata* There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/3656	Endangered

FLOWERING PLANTS

NAME	STATUS
(=native Yellow Hibiscus) Ma`o Hau Hele *Hibiscus brackenridgei* There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/4075	Endangered
`aiea *Nothocestrum latifolium* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/1061	Endangered
`ena`ena *Pseudognaphalium sandwicensium var. molokaiense* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/5993	Endangered
Awiwi *Schenkia sebaeoides* There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/7103	Endangered
Carter's Panicgrass *Panicum fauriei var. carteri* There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/5578	Endangered
Ihi *Portulaca villosa* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/4886	Endangered
Koki`o *Kokia cookei* There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/2459	Endangered
Lanai Sandalwood (=`iliahi) *Santalum haleakalae var. lanaiense* There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/3282	Endangered
Ohai *Sesbania tomentosa* There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/8453 General project design guidelines: https://ipac.ecosphere.fws.gov/project/EE32JCM73JEDTBKISMB7GT7VWI/documents/generated/7050.pdf	Endangered
Round-leaved Chaff-flower *Achyranthes splendens var. rotundata* There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/4709	Endangered
Spermolepis hawaiiensis There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/1670	Endangered
Tetramolopium rockii There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/5215	Threatened
Vigna o-wahuensis	Endangered

NAME	STATUS
There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/8445	
Wahine Noho Kula *Isodendrion pyrifolium* There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/2235	Endangered

CRITICAL HABITATS

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

YOU ARE STILL REQUIRED TO DETERMINE IF YOUR PROJECT(S) MAY HAVE EFFECTS ON ALL ABOVE LISTED SPECIES.

USFWS NATIONAL WILDLIFE REFUGE LANDS AND FISH HATCHERIES

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS OR FISH HATCHERIES WITHIN YOUR PROJECT AREA.

BALD & GOLDEN EAGLES

Bald and golden eagles are protected under the Bald and Golden Eagle Protection Act[1] and the Migratory Bird Treaty Act[2].

Any person or organization who plans or conducts activities that may result in impacts to bald or golden eagles, or their habitats[3], should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

1. The Bald and Golden Eagle Protection Act of 1940.
2. The Migratory Birds Treaty Act of 1918.
3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

THERE ARE NO BALD AND GOLDEN EAGLES WITHIN THE VICINITY OF YOUR PROJECT AREA.

MIGRATORY BIRDS

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats[3] should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.
3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Red-tailed Tropicbird *Phaethon rubricauda melanorhynchos* This is a Bird of Conservation Concern (BCC) throughout its range in Hawaii and the Pacific Islands. https://ecos.fws.gov/ecp/species/10563	Breeds Dec 15 to Oct 15

PROBABILITY OF PRESENCE SUMMARY

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read the supplemental information and specifically the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (▪)

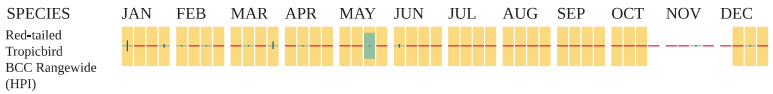
Green bars; the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during that week of the year.

Breeding Season (▪)
Yellow bars; liberal estimate of the timeframe inside which the bird breeds across its entire range.

Survey Effort (|)
Vertical black lines; the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

▪ probability of presence ▪ breeding season | survey effort – no data



Additional information can be found using the following links:

- Eagle Management https://www.fws.gov/program/eagle-management
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide conservation measures for birds https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf
- Supplemental Information for Migratory Birds and Eagles in IPaC https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action

WETLANDS

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

RIVERINE

- R4SBC

IPAC USER CONTACT INFORMATION

Agency: Hawaiian Home Lands
Name: Emily Murai
Address: 305 High Street
Address Line 2: Suite 104
City: Wailuku
State: HI
Zip: 96793
Email emily@munekiyohiraga.com
Phone: 8089831233

LEAD AGENCY CONTACT INFORMATION

Lead Agency: Hawaiian Home Lands

BIOLOGICAL RESOURCES SURVEY

APPENDIX

D

A natural resources assessment for the Department of Hawaiian Home Lands' Molokaʻi Water Systems Improvement Project, Infill Lots & Scattered Lots, Hoʻolehua, Island of Molokaʻi

LeGrande Biological Surveys Inc
4348 Waialae Ave 940
Honolulu HI 96816

Prepared by: Maya L. LeGrande

Prepared for: PBR Hawaii

May 13, 2023

A natural resources assessment for the Department of Hawaiian Home Lands' Molokaʻi Water Systems Improvement Project, Infill Lots & Scattered Lots, Hoʻolehua, Island of Molokaʻi

Introduction

The State of Hawaiʻi, Department of Hawaiian Home Lands (DHHL) is currently working on several road, water facility, and housing projects on Molokaʻi Island. This report summarizes site visits at current project locations for the water systems project as well as scattered homestead lots throughout the Hoʻolehua area in order to update previous biological reports (SWCA 2011 & 2015) and document any changes or new species that occur at the locations. A description of the plants, animals, and habitats that were documented during the recent April 2023 biological surveys for the following locations are described in the Results section of this report.

Site Descriptions

Water System Improvements

There are 4 main survey locations that needed updating within the Water System Improvements Project:

Site #1 -Well Site Improvements is located in the mauka area of the Kalamaʻula DHHL Lands near the Waiakalaʻe Gulch. The site is located along a sloping ridge and an east facing slope that descends into a gulch. The ridgeline has an exisiting access road running along it with vegetation on either side of the road. The majority of the planned work has been carried out in this location including the new 200,000 gallon water tank and infrastructure. The PV system which was intially proposed to by built on seven acres of the sloping land to the east of the access road has been put on hold as of this survey date. The area was included in the current survey in the case that renewed interest in the project is ressurected in the future.

Site #4 – Hoʻolehua Tank Site Improvements is located at two 3.5 MG tanks in Hoʻolehua, approximatley 1 km northeast and mauka of Molokaʻi High School. The site also extends from the two tanks down to Pālāʻau Road through lands owned by Kualapuʻu Ranch. The majority of the work for both the Tank site and the new roadway to access the tanks has

been initiated and the new access road has been fully graded and asphalt has been layed down along a section of the roadway. Active construction by Goodfellow Brothers International was ongoing during our survey of the roadway. The boundary area proposed for new 8 foot tall deer fencing was included in our surveys.

Site #6 – Ho'olehua Pressure Breaker Tank Facility Improvements is located from the intersection of Kūle'a and Mo'omomi Avenue to Farrington Avenue. The new roadway has been completed and the improvements to the Pressure Breaker Tank Facility has been completed.

Site #7 -Ho'olehua Maintenance Yard Improvement and Scattered Valve and Hydrant Replacements is located at the site of the current Ho'olehua Maintenance Building, and at scattered locations across Ho'olehua-Pālā'au. Ongoing improvements to the Maintenance yard continues and all of the valve and hydrant replacements have been completed.

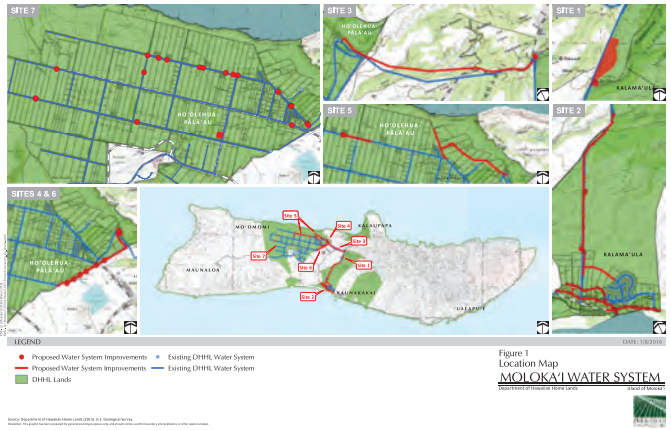


Figure 1
Location Map
MOLOKA'I WATER SYSTEM

Scattered Lots

There are six lots designated within this grouping. Four lots are located along Pu'u Kapele Avenue, two of which have exisiting structures on them and were not included in the surveys. One is located along Mo'omomi Avenue and the last is located along Farrington Avenue.

Infill Lots

There are 22 Infill Lots, all are located in residential neighborhoods in Ho'olehua. Two of the lots have structures built on them and were not included in the survey.

Methods

Botanical Survey

Maya LeGrande and Stephanie Dunbar-Co surveyed the water system improvement project areas, and infill lots, and scattered lots on April 20th & 21st, 2023. Plant species were identified as they were encountered during transects through the project areas and along boundaries. Notes were made on plant associations and distribution, disturbances, topography, substrate type, exposure, and drainage. Species names follow *Manual of the Flowering Plants of Hawai'i* (Wagner, Herbst, & Sohmer, 1990; Wagner & Herbst, 1999) for native and naturalized flowering plants, *Hawai'i'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 plants. More recent name changes for naturalized plant species follow Imada (2019).

Terrestrial Vertebrates Survey

Avian Survey

Bird surveys were conducted in the morning hours of April 20th & 21st, 2023. Birds were identified by visual observations aided by Leica 8 X 42 binoculars, and by listening for vocalizations. Avian species were documented at individual point count-station at each of the four study areas for the Water Systems Improvements Project and at stations at each grouping of Infill Lots and Scattered Lots. A single eight-minute avian point-count was made at each of the count-stations. Weather conditions were ideal, with no rain, unlimited visibility, and winds between 1 and 5 kilometers per hour. The avian phylogenetic order and nomenclature used in this report follows the *AOU Check-List of North and Middle American Birds* 2021 and the 63rd Supplement to the Checklist (Chesser et al., 2021, 2022).

Mammalian Survey

A list was made of mammals encountered during the survey. Indicators of mammalian presence, such as tracks, scat, and other signs were noted. Mammalian phylogenetic order and nomenclature follow *Mammal Species of the World* (Wilson and Reeder, 2005).

Results

Vegetation

The project areas all consist of disturbed non-native introduced vegetation. Mixed non-native forest dominates the vegetation at the majority of the sites with common species such as Formosan koa (*Acacia confusa*), Christmas berry (*Schinus terebinthifolius*), and Java plum (*Syzygium cumini*) growing in dense stands with little to no understory plants. Large thickets of ironwood (*Casuarina equisetifolia*) can be found in many of the survey locations with shrubs and herbs growing at the edges of the forested areas and along roadsides. The majority of the Infill lots and Scattered lots are characterized by koa hoale (*Leucaena leucocephala*) forest with Guinea grass (*Megathyrsus maximus*) or buffelgrass (*Cenchrus ciliaris*) understories. The following section lists each project area and lot with a description of the dominant plant species and any native plants that were observed in the area.

Water System Improvements

Site #1: The majority of the work has been completed in this area for the new water tank, equipment, and access road. The proposed PV project location is dominated by a slope covered with thick forested areas of Christmas berry, Java plum, swamp mahogany (*Eucalyptus robusta*), silver oak (*Grevillea robusta*), and guava (*Psidium guajava*). Understory plants include lantana (*Lantana camara*), indigo (*Indigofera suffruticosa*), spiny amaranth (*Amaranthus spinosus*), *Solanum seaforthianum*, and vines of *Neonotonia wightii*. Along the access road on either side at the upper elevations of the project area, stands of ironwood dominate the vegetation. An area at the edges of ironwood stands and the access road, a patch of native ʻākia comprised of 2 seperate species, (*Wikstroemia oahuensis* var. *oahuensis* & *W. uva-ursi* var. *uva-ursi)* was observed along with the native ʻaʻaliʻi (*Dodonaea viscosa*) and ʻuhaloa (*Waltheria indica*).

Site #4: The area around the exisiting water tanks is dominated by a monotypic forest of Formosan koa. The 8-foot tall fence installation is ongoing with transects of Formosan koa cleared. The tank improvements are ongoing with limited disturbance to the surrounding areas of maintained vegetation. Plant species around the tanks include sourgrass (*Digitaria insularis*), indigo, partridge pea (*Chamaecrista nictitans* subsp. *patellaria* var. *glabrata*), fuzzy rattlepod (*Crotalaria incana*), liliko'i (*Passiflora edulis*), Christmas Berry, and Chinese banyan (*Ficus microcarpa*). The new roadway access is nearly complete with the grubbing and grading finished and installation of gravel and asphalt nearing completion. The dominant plant along the roadway

transect is Formosan koa. This invasive species is already resprouting from stumps left during the initial clearance for the roadway build.

Site #6: The new roadway to the Pressure Breaker Tank Facility has been completed and a cursory survey was completed along the roadway. Guinea grass and various weedy species were observed along the roadway access. No native plant species were observed.

Site #7: Construction at the DHHL baseyard is ongoing. Limited disturbance to the area includes installation of a gravel pad between the exisiting warehouse buildings and the main road. Vegetation within the baseyard areas include a maintained lawn area with non-native surrounding vegetation including; Cooke pine (*Araucaria columnaris*), koa haole, Guinea grass, golden crown-beard (*Verbesina encelioides*), sourbush (*Pluchea carolinensis*), false ragweed (*Parthenium hysterophorus*), and castor bean (*Ricinus communis*). All of the valve and hydrant replacement locations were located and surveyed along Farrington Avenue, Lihi Pali Avenue, Puʻu Kapele Avenue, and Moʻomomi Avenue. These locations were surrounded by mowed grassy lawns with non-native koa hoale and Guinea grass being the most dominant plant. In one location along Farrington Avenue, a few native plants, pāʻūohiʻiaka (*Jacquemontia ovalifolia*) and ʻuhaloa, were observed in and around a hydrant location.

Infill Lots

1030 Mamalu Lai Place: Lot with ironwood, koa haole, and Guinea grass. Trees up to 25 feet tall.
1036 Mamalu Lai Place: Lot with ironwood, koa haole, and Guinea grass. Trees up to 25 feet tall.
1044 Mamalu Lai Place: Lot with overgrown vegetation including ironwood, Christmas berry, and Guinea grass. Trees up to 15 feet tall. Flagged lot with house located on front lot.
1075 Mamalu Lai Place & 1045 Mamalu Lai Place: Lots with overgrown koa haole, Christmas berry, Formosan koa, and Guinea grass. Trees up to 20 feet tall.
995 Mamalu Lai Place & 2660 Puʻu Kapele Avenue: Mostly cleared vegetation with white shrimp plant (*Justicia betonica*) and Guinea grass along the street side of lots.
4, 11, 20, and 24 Puʻu Kukui Place: These lots are all dominated by koa haole with Guinea grass and buffelgrass understory. [20 Puʻu Kukui has an exisiting structure].
2291, 1347, & 1331 Lihi Pali Avenue, 2, 18, & 27 Malu Kukui Place: These six lots are all dominated by koa haole up to 15 feet tall and Guinea grass. A few sisal (*Agave sisalana*) plants were observed along Lihi Pali Avenue.
664 Ala Ekolu Street: This lot is almost completely Guinea grass with a few 5 to 10 foot tall koa haole at the boundaries of the lot.

686 Ala Ekolu Street: This lot has koa haole and Formosan koa growing up to 15 feet tall with and understory of flase ragweed, Guinea grass, sourgrass (*Digitaria insularis*), and a few native pua kala (*Argemone glauca* var. *glauca*) plants along the sidewalk boundary.
706 Ala Ekolu Street: Exisiting structure on lot.
692 Lei Kukui Place: Mostly Guinea grass mixed with *Neonotonia wightii*, a few koa haole at edges of lot.
724 Le Kukui Place: Koa haole up to 15 feet in height with Guinea grass understory.

Scattered Lots

Puu Kapele Avenue : Lots 52026014 & 52026016 have exisiting house structures and were not included in the current surveys.
Lots 52026003 & 52026017: Vegetation at these lots consist of koa haole and Formosan Koa scrub with buffelgrass and Guinea grass dominating the ground cover. A few scattered natives include ʻuhaloa and ʻilima (*Sida fallax*).

2465 Farrington Avenue: A large portion of this 3.9 areas lot is cleared with a mowed grassy area. Forested edges of the lot harbor non-native trees such as koa haole, mango, chinese banyan, kukui (*Aleurites moluccana*), and Formosan koa. Shrubs include false ragweed, golden crown-beard, and sourgrass. A drainage at the southern section of the property was dry and appears to be intermittent, most likely only having water in heavy precipitation events. No hydric plant species were noted in the area.

4710 Moʻomomi Avenue: This approximately 35-acres lot runs from the northern boundary along Farrington Avenue south to Moʻomomi Avenue. The entire lot consists of a buffelgrass grassland with scattered kiawe (*Prosopis pallida*) and koa haole trees up to 25 feet tall. Native shrubs and vines observed along dirt roadways include koali ʻawa (*Ipomoea indica*), ʻuhaloa, and ʻilima.

Avian Fauna

A total of 17 bird species were recorded during station counts (Table 1). All but one of the avian species recorded are alien to the Hawaiian Islands.

Table 1. Avian species detected during the April 2023 surveys for the DHHL Water Systems Improvements, Infill, and Scattered Lots project areas, Hoʻolehua, Moloka'i

Common Name	Species	Status
Kōlea or Pacific golden-plover	*Pluvialis fulva*	MB
Red Junglefowl	*Gallus gallus*	A
Black francolin	*Francolinus francolinus*	A
Gray francolin	*Ortygornis pondicerianus*	A
Spotted Dove	*Streptopelia chinensis*	A
Zebra Dove	*Geopelia striata*	A
Cattle egret	*Bubulcus ibis*	A
Warbling White-eye	*Zosterops japonicus*	A
Common Myna	*Acridotheres tristis*	A
Scaly-breasted Munia	*Lonchura punctulata*	A
Common Waxbill	*Estrilda astrild*	A
House Finch	*Haemorhous mexicanus*	A
White-rumped shama	*Copsychus malabaricus*	A
Northern Cardinal	*Cardinalis cardinalis*	A
Red- crested Cardinal	*Paroaria coronata*	A
Saffron Finch	*Sicalis flaveola*	A
Red-vented bulbul	*Pycnonotus cafer*	A

Key to Table1

Status:
A = Naturalized, non-native species (introduced).
MB = Migratory Bird (native).

Avian diversity was in keeping with the location and vegetation present within the study site. Four species— Warbling White-eye (*Zosterops japonicus*), Cattle egret (*Bulbulcus ibis*), Zebra Dove (*Geopelia striata*), and common myna (*Acridotheres tristis*)—accounted for the majority of all birds recorded during station counts. The most frequently recorded species was Warbling White-eye.

Mammalian Fauna

Five terrestrial mammalian species were detected during this survey. Direct observation or signs including scat or tracks included; small Asian mongoose (*Herpestes javanicus*), domestic cat (*Felis catus*), pig (*Sus scrofa*), goat (*Capra hircus*), horse (*Equus ferus caballus*), and axis deer (*Axis axis*). Numerous dogs (*Canis lupus familiaris*) were heard barking and observed throughout the survey areas.

Invertebrate Fauna

Passive observations of invertebrates included various naturalized species previously recorded by SWCA in 2011 and 2015. A few individuals of the native green darner (*Anax junius*) were observed at Site #7.

Discussion and Recommendations

Recommendations are partly based on U.S. Fish and Wildlife Service, Animal Avoidance and Minimization Measures (USFWS-PIFWO, 2022). Implementation of the recommendations (provided below as bulleted items) by the Project contractor will minimize potential impacts to listed species to the maximum extent practicable.

Floral Resources

Native plant habitat within the proposed project area has been highly modified by human activities and dominated by non-native species. The six native species that were observed infrequently amongst the survey areas were ʻuhaloa, ʻilima, ʻaʻaliʻi, pua kala, and ʻākia (2). All of these species are encountered frequently throughout the Hawaiian Islands and none are considered Rare, Threatened, or Endangered. Due to human activity, introduced feral ungulates, and competition with non-native plants, the all of the sites surveyed are dominated by common, naturalized plant species. None of the plant species observed are listed as endangered or threatened under either the federal or State of Hawaiʻi endangered species statutes. (HDLNR, 1998; USFWS, nd-a).

None of the 27 Threatened and Endangered plant species provided by the USFWS Information for Planning and Consultation (IPaC) (January 2023 & November 2022) and "Refined species list for DHHL Hoʻolehua Water Systems and Associated Housing Development" were observed during our survey of the project areas. They are; maʻo hau hele (*Hibiscus brackenridgei*), ʻaiea (*Nothocestrum latifolium*), ʻenaʻena (*Pseudognaphalium sandwicensium* var. *molokaiense*), ʻawiwi (*Schenkia sebaeoides*), nānū (*Gardenia brighamii*), *Bonamia menziesii*, *Cyanea manii, Scheidea globosa,* Carterʻs panicgrass (*Panicum fauriei* var. *carteri*), Cookeʻs kokiʻo (*Kokia cookei*), *Cyperus fauriei*, dwarf naupaka (*Scaevola coriacea*), *Gouania hillebrandii*, ihi (*Portulaca villosa*), ʻiliahi (*Santalum haleakalae* var. *lanaiense*), makou (*Peucedanum sandwicense*), mehamehame (*Flueggea neowawraea*), *Neraudia sericea*, ʻohai (*Sesbania tomentosa*), round-leaved chaff-flower (*Achyranthes splendens* var. *rotundata*), *Silene lanceolata*, *Spermolepis hawaiiensis, stenogyne angustifolia var. angustifolia, Tetramolopium rockii, Vigna o-wahuensis,* wahine noho kula (*Isodendrion pyrifolium*), and *Microlepia strigosa* var. *mauiensis*. Owing to the highly degraded nature of the survey areas, as well as location of the project areas, the majority of these taxa were not expected to be extant.

Avian Resources

All but one avian species detected are alien to the Hawaiian Islands. The USFWS IPaC portal lists (January 2023 & November 2022) and "Refined species list for DHHL Hoʻolehua Water Systems and Associated Housing Development" list contained the following eight avian species: Short-tailed Albatross (*Phoebastria albatrus*), Band-

rumped Storm-Petrel (*Oceanodroma castro*)[1], Hawaiian Petrel (*Pterodroma sandwichensis*), and Newell's Townsends Shearwater (*Puffinus auricularis newelli*)[2], Hawaiian Stilt (*Himatopus mexicanus knudseni*), Hawaiian Duck (*Anas wyvilliana*), Hawaiian Coot (*Fulica alai*), Hawaiian Goose (*Branta sandvicensis*), (USFWS, 2023).

None of the eight Threatened or Endangered vertebrate avian species provided by the IPac system was detected during the survey. For three of them , Hawaiian Duck, Hawaiian Coot, and Hawaiian Stilt there is no suitable habitat within the site or immediately adjacent to any of the sites to support these water obligate species. Nēnē are not water obligate but require relatively low stature grass and or shrubs as suitable habitat, currently limited habitat is present at the project sites. However, see the discussion below as to the potential of four of the listed species provided by the USFWS, and a fifth State of Hawaiʻi listed species potentially using either airspace or habitat within one or more of the sites on a temporal or seasonal basis.

Seabirds

It is possible that the endangered Hawaiian Petrel, Band-rumped Storm-Petrel (*Hydrobates castro*), and the threatened Newell's Shearwater (*Puffinus newelli*) over-fly the project areas between April and the middle of December each year in small numbers. The primary cause of mortality in Hawaiian Petrels, Newell's Shearwaters and Band-rumped Storm-Petrels in Hawaiʻi is thought to be predation by alien mammalian species at the nesting colonies (USFWS, 1983; Simons and Hodges, 1998; Ainley et al., 2001). Collision with man-made structures is considered the second most significant cause of mortality of these seabird species in Hawaiʻi. Nocturnally flying seabirds, especially fledglings on their way to sea in the summer and fall, can become disoriented by exterior lighting. Disoriented seabirds may collide with man-made structures and, if not killed outright, become easy targets of opportunity for feral mammals (Hadley, 1961; Telfer, 1979; Sincock, 1981; Reed et al., 1985; Telfer et al., 1987; Cooper and Day, 1998; Podolsky et al., 1998; Ainley et al., 2001; Hue et al., 2001; Day et al., 2003). No suitable nesting habitat exists within or close to the project areas for any of these three seabird species.

The principal potential impact that development and ongoing construction poses to protected seabirds is an increased threat that birds will be downed after becoming disoriented by lights. The two ways outdoor lighting can pose a threat to nocturnally flying seabirds is if: 1) during construction it is deemed expedient or necessary to conduct night-time construction activities; or, 2) following build-out, security lighting is operated during the seabird nesting season.

[1] The scientific name of this species was changed to (*Hydrobatis castro*) by the American Ornithological Union (AOU) in 2019 (Chesser et. al. 2019).

[2] The common and scientific name of this species were changed by the AOU to Newell's Shearwater (*Puffinus newelli*) in 2015 (Chesser et. al., 2015)

- If night-time construction activity or equipment maintenance is proposed during any of the construction phases of the projects, all associated lights should be shielded, and when large flood/work lights are used, they should be placed on poles that are high enough to allow the lights to be pointed directly at the ground (Reed et al., 1985; Telfer et al., 1987). Deleterious impacts to transiting seabirds can be avoided if construction occurs during daylight hours and all outdoor lighting installed is fully "dark sky compliant" (HDLNR-DOFAW, 2016). DLNR recommends avoiding construction-related night-time lighting between September 15 and December 15 (DLNR, 2016).

Hawaiian Goose/nēnē

Hawaiian Goose were not observed during the current survey in any of the project areas. Nēnē may forage in the low statured grassy areas found in and around some of the water project area. USFWS requires ceasing construction activity within 100 feet of any nests (December through April) until chicks have hatched and fledged or moved into a new area. USFWS should be notified if any nests are observed within 100 feet of work areas.

Hawaiian Short-eared owl/pueo

Hawaiian short-eared owl or pueo (*Asio flammeus sandwichensis*) is an endemic subspecies to Hawai'i. Threats to this species include habitat degradation, predation by introduced animals, disease, and pesticide use in rodents. Pueo are found on all of the main Hawaiian Islands at elevations ranging from sea level to 8,000 feet (Pueo Project 2019a). This state listed species, for the island of O'ahu only, is regularly seen in the the grassland of Moloka'i. Although no individuals were recorded during our survey, the habitat at scattered lot: 4710 Mo'omomi Avenue [52005031], is suitable for pueo to forage and nest. Out of an abundance of caution it would be prudent to consider the following before vegetation clearance :

- Prior to the initiation of clearing and grubbing a qualified biologist could conduct a pueo nest survey to ensure that no active nest is disturbed during intial phases of construction.

Mammalian Resources

The findings of the mammalian survey are consistent with the location of the property and habitats present within all of the survey areas. Although no rodents were recorded it is likely that some of the four established Muridae found on Moloka'i Island—roof rat (*Rattus rattus*), brown rat (*Rattus norvegicus*), Polynesian rat (*Rattus exulans hawaiiensis*), and European house mouse (*Mus musculus*

domesticus) use resources within the general areas on a seasonal basis. These introduced rodents are deleterious to native ecosystems and native faunal species.

No mammalian species currently protected or proposed for protection under either the federal or State of Hawai'i endangered species programs were detected during this survey (DLNR, 2015; USFWS, nd-a).

Hawaiian hoary bat

It is probable that the Hawaiian hoary bat (*Lasiurus cinsereus semotus*), overflies the project areas on a seasonal basis. The removal of trees within any of the project areas could temporarily displace individual bats using the trees for roosting. As bats use multiple roosts within their home territories, the potential disturbance resulting from the removal of the vegetation is likely to be minimal. However, during the pupping season, females carrying their pups may be less able to vacate a roost site if the tree is felled. Further, adult female bats sometimes leave their pups in the roost tree while they forage. Very small pups may be unable to flee a tree that is being felled.

- Potential adverse impacts from such disturbance can be avoided or minimized by not clearing woody vegetation taller than 4.6 m (15 ft) between June 1 and September 15, the period in which bats may have pups.

Other Resources of Potential Concern

Reptiles

Although the Green Sea Turtle or Honu (*Chelonia mydas*) was listed on the IpaC from USFWS (2011 & 2015), the current locations for the updated survey sites do not include coastal habitats needed for this species.

Invertebrates

The native damselflies, *Megalagrion xanthomelas* and *M. pacificum*, *M. hawaiiense, M. blackburni,* and *M. calliphya* were listed on the "USFWS Refined species list of DHHL Ho'olehua Water Systems and Associated Housing Development" document. None of these cryptic insects were located or observed during the surveys. All of these damselflies need water features that were non-existant within any of the survey areas.

Critical Habitat

No federally delineated Critical Habitat for any species occurs within the project areas (USFWS, nd-b). There is no equivalent designation under State of Hawai'i endangered species statutes.

Wetlands/Riparian Habitat

Although no wetlands are delineated within the project areas, a few riparian pathways are located either on the boundary or just outside of some of the project areas/scattered lots. All waterways were observed to be intermittent (water flow only during intense rain events) and would not be habitat for any of the Threatened or Endangered plants, animals, or invertebrates known to have previously or currently inhabit the area.

Photographs of Survey Areas

Photo 1. Site #1 showing thick forested section proposed for PV.

Photo 2. Site #1 showing habitat of ʻākia plants with ironwood along access road.

Picture 3. Site #1 water tanks and retaining wall to the right of tank.

Picture 4. Site #4 water tank upgrades and valve replacements.

Picture 5. New 8-foot fenceline installation at Site #4

Picture 6. New access road at Site #4

Picture 7. Maintenance Yard Site #7 with new gravel pad installed.

Picture 8. Site #7 includes new hydrant and valve locations.

Picture 9. Typical Infill Lot in Ho'olehua Lots with Guinea grass and koa haole.

Picture 10. Scattered lot at 2465 Farrington Avenue.

Picture 11. View of Scattered Lots 52026003 & 52026017 Formosan koa and buffelgrass vegetation.

Picture 12. Scattered Lot 52005031 with buffelgrass pueo habitat.

References Cited

Ainley, D. G, R. Podolsky, L. Deforest, G. Spencer, and N. Nur. 2001. The Status and Population Trends of the Newell's Shearwater on Kaua'i: Insights from Modeling, in: Scott, J. M, S. Conant, and C. Van Riper III (editors) *Evolution, Ecology, Conservation, and Management of Hawaiian Birds: A Vanishing Avifauna. Studies in Avian Biology No. 22*. Cooper's Ornithological Society, Allen Press, Lawrence, Kansas. Pp. 108-123.

Chesser, R. T., K. J. Burns, C. Cicero, J. L. Dunn, A. W. Kratter, I. J. Lovette, P. C. Rasmussen, J. V. Remsen, Jr., D. F. Stotz, and K. Winker. 2019. Sixtieth supplement to the American Ornithologist Society's Check-list of North American Birds. The Auk, Ornithological Advances, 138: 1-23.

Chesser, R. T., R. C. Banks, K. J. Burns, C. Cicero, J. L. Dunn, A. W. Kratter, I. J. Lovette, A. G. Navarro-Sigüenza, P. C. Rasmussen, J. V. Remsen, Jr., J. D. Rising, D. F. Stotz, and K. Winker. 2015. Fifty-sixth supplement to the American Ornithologist Union Check-list of North American Birds. The Auk, Ornithological Advances, 132: 748-764.

Chesser, R. T., S. M. Billerman, K. J. Burns, C. Cicero, J. L. Dunn, B.E. Hernández-Baños, A. W. Kratter, I. J. Lovette, N. A. Mason, P. C. Rassmusen, J. V. Remsen Jr., D. F. Stotz, and K. Winker. 2021. Check-list of North American Birds. American Ornithological Society. Available online at URL: http://checklist.aou.org/taxa.

Chesser, R. T., S. M. Billerman, K. J. Burns, C. Cicero, J. L. Dunn, B.E. Hernández-Baños, R. A. Jiménez, A. W. Kratter, N. A. Mason, P. C. Rassmusen, J. V. Remsen Jr., D. F. Stotz, and K. Winker. 2022. Sixty-third supplement to the American Ornithological Society's *Check-list of North American Birds*. Ornithology, Volume 138, 2022, pp. 1-13.

Cooper, B. A., and R. H. Day. 1998. Summer Behavior and Mortality of Dark-rumped Petrels and Newells' Shearwaters at Power Lines on Kauai. *Colonial Waterbirds*, 21 (1): 11-19.

Day, R. H., B. Cooper, and T. C. Telfer. 2003. Decline of Townsend's (Newell's Shearwaters (*Puffinus auricularis newelli*) on Kauai, Hawaii. *The Auk,* 120: 669-679.

Hadley, T. H. 1961. Shearwater calamity on Kauai. '*Elepaio* 21: 60.

Hue, D., C. Glidden, J. Lippert, L. Schnell, J. MacIvor and J. Meisler. 2001. Habitat Use and Limiting Factors in a Population of Hawaiian Dark-rumped Petrels on Mauna Loa, Hawai'i. Pp. 234-242, in: Scott, J. M, S. Conant, and C. Van Riper III (eds), Evolution, Ecology, Conservation, and Management of Hawaiian Birds: A Vanishing Avifauna. Studies in Avian Biology No. 22. Cooper's Ornithological Society, Allen Press, Lawrence, Kansas.

Hawaii Department of Land and Natural Resources (HDLNR). 1998. Indigenous Wildlife, Endangered And Threatened Wildlife And Plants, And Introduced Wild Birds. Department of Land and Natural Resources. State of Hawaii. Administrative Rule §13-134-1 through §13-134-10, dated March 02, 1998.

HDLNR. 2015. Hawai'i Administrative Rules, Title 13, Department of Land and Natural Resources, Subtitle 5 Forestry and Wildlife, Part 2 Wildlife, Chapter 124, Indigenous Wildlife, Endangered and Threatened Wildlife, Injurious Wildlife, Introduced Wild Birds, and Introduced Wildlife. February 27, 2015. 16 pp.

Hawai'i Department of Land and Natural Resources-Division of Forestry and Wildlife (HDLNR-DOFAW). 2016. Wildlife Lighting. PDF available at URL: http://dlnr.hawaii.gov/wildlife/files/2016/03/DOC439.pdf; last retrieved February 21, 2020.

Imada, C. T. 2019. Hawaiian Naturalized Vascular Plants Checklist (February 2019 update). *Bishop Museum Tech. Rept. 69*. 209 pp.

Palmer, D. D. 2003. *Hawai`i's ferns and fern allies*. University of Hawaii Press, Honolulu. 324 pp.

Podolsky, R., D. G. Ainley, G. Spencer, L. de Forest, and N. Nur. 1998. Mortality of Newell's Shearwaters Caused by Collisions with Urban Structures on Kaua'i. *Colonial Waterbirds*, 21: 20-34.

Ranker, T.A., C.T. Imada, K. Lynch, D.D. Palmer, A.L. Vernon, and M.K. Thomas. 2019. Taxonomic Nomenclature Updates to the Fern and Lycophyte Fora of the Hawaiian Islands. American Fern Journal 109(1):54-72. Published on 30 April 2019.

Reed, J. R., J. L Sincock, and J. P. Hailman 1985. Light Attraction in Endangered Procellariform Birds: Reduction by Shielding Upward Radiation. *The Auk*, 102: 377-383.

Scott. J. M., S. Mountainspring, F. L. Ramsey, and C. B. Kepler. 1986. Forest Bird Communities of the Hawaiian Islands: Their Dynamics, Ecology, and Conservation. Cooper Ornithological Society – Studies in Avian Biology No. 9. 431 pp.

Simons, T. R., and C. N. Hodges. 1998. Dark-rumped Petrel (Pterodroma phaeopygia). In A. Poole and F. Gill (editors). The Birds of North America, No. 345. The Academy of Natural Sciences, Philadelphia, PA. and the American Ornithologists Union, Washington, D.C.

Staples, G. W. and D. R. Herbst. 2005. *A Tropical Garden Flora. Plants Cultivated in the Hawaiian Islands and other Tropical Places.* Bishop Museum, Honolulu. 908 pp.

Sincock, J. L. 1981. Saving the Newell's Shearwater. Pp 76-78 *in*: Proceedings of the Hawaii Forestry and Wildllife Conference, 2-4 October 1980. Department of Land and Natural Resources, State of Hawaii, Honolulu.

SWCA Environmental Consultants. 2011. Natural Resource Survey for the Proposed Moloka'i Water Systems Improvement Project. Honolulu, Hawai'i: SWCA.

SWCA Environmental Consultants. 2015. Biological Resource Survey Report for the Proposed Department of Hawaiian Home Lands' Moloka'i Water Systems Improvement Project. Honolulu, Hawai'i: SWCA.

Telfer, T. C. 1979. Successful Newell's Shearwater Salvage on Kauai. *'Elepaio*, 39:71

Telfer, T. C., J. L. Sincock, G. V. Byrd, and J. R. Reed. 1987. Attraction of Hawaiian seabirds to lights: Conservation efforts and effects of moon phase. *Wildlife Soc. Bull.*, 15:406-413.

U.S. Fish & Wildlife Service (USFWS). 1983. Hawaiian Dark-Rumped Petrel & Newell's Manx Shearwater Recovery Plan. USFWS, Portland, Oregon. February 1983.

USFWS. 2022. Ipac Letter- Project Code: 2023-0017528. Subject: List of theatened and endangered species that may occur in your proposed project location or may be affected by your proposed project -Hoolehua PWS 230 Water System Improvements. November 20, 2022.

USFWS. 2023. Ipac Letter- Project Code: 2023-0006614. Subject: List of theatened and endangered species that may occur in your proposed project location or may be affected by your proposed project -Hoolehua Residential Infill lots ERR update. January 26, 2023.

USFWS. Undated (nd-a). USFWS Endangered Species. Available online at URL: https://www.fws.gov/endangered/; Last visited on January 4, 2023 and Environmental Conservation Online System (ECOS), online at URL: https://ecos.fws.gov/ecp/species-reports; last retrieved October 30, 2022.

USFWS. Undated website (nd-b). Critical Habitat Portal. Available online at URL: https://ecos.fws.gov/ecp/report/table/ critical-habitat.html; last retrieved March 21, 2023.

U.S. Fish & Wildlife Service-Pacific Islands Fish and Wildlife Office (USFWS-PIFWO). 2022. FINAL Avoidance and Minimization Measures (AMMs). Revised April 2022. Available online at URL: fws.gov/sites/default/files/documents/Animal%20Avoidance%20and%20Minimization%20Measures-April%202022.pdf; last retrieved June 10, 2022.

Wagner, W. L., D. R. Herbst, and S. H. Sohmer. 1990. *Manual of the Flowering Plants of Hawai'i: Volume I and II*. Bishop Museum Special Publication 83. University of Hawai'i Press. 1853 pp.

Wagner, W. L. and D. R. Herbst, 1999. *Supplement to the Manual of the flowering plants of Hawai'i*, pp. 1855-1918. *In:* Wagner, W. L., D. R. Herbst, and S. H. Sohmer, Manual of the flowering plants of Hawai'i. Revised edition. 2 vols. University of Hawaii Press and B.P. Bishop Museum.

Wilson, D. E., and D. M. Reeder (editors), 2005. *Mammal species of the world: a taxonomic and geographic reference.* 3rd edition. 2 vols. John Hopkins University Press. Baltimore, Maryland. 2142 pp.

LITERATURE REVIEW AND FIELD INSPECTION REPORT

APPENDIX

E

Draft

Archaeological Field Inspection and Literature Review to Support Consultation with SHPD for the Department of Hawaiian Home Lands Hoʻolehua Scattered Lots Subdivision and Improvements Project, Pālāʻau Ahupuaʻa, Molokaʻi District, Molokaʻi Island

TMKs: [2] 5-2-005:031, Lot 17 and [2] 5-2-026:014, Lot 104D-1

Prepared for
Munekiyo Hiraga
on behalf of the
Department of Hawaiian Home Lands

Prepared by
David W. Shideler, M.A.,
and
Hallett H. Hammatt, Ph.D.

Cultural Surveys Hawaiʻi, Inc.
Kailua, Hawaiʻi
(Job Code: PALAAU 10)

November 2021

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	Archaeological Field Inspection and Literature Review to Support Consultation with SHPD for the Department of Hawaiian Home Lands Hoʻolehua Scattered Lots Subdivision and Improvements Project, Pālāʻau Ahupuaʻa, Molokaʻi District, Molokaʻi Island, TMKs: [2] 5-2-005:031, Lot 17 and [2] 5-2-026:014, Lot 104D-1 (Shideler and Hammatt 2021)
Date	November 2021
Project Number(s)	Cultural Surveys Hawaiʻi, Inc. (CSH) Job Code: PALAAU 10
Investigation Permit Number	CSH completed the fieldwork component of this study under archaeological fieldwork permit number 21-10, issued by the Hawaiʻi State Historic Preservation Division (SHPD) per Hawaiʻi Administrative Rules (HAR) §13-13-282.
Agencies	SHPD; Department of Hawaiian Home Lands (DHHL)
Land Jurisdiction and Project Funding	DHHL
Project Location	The project area includes two discrete parcels, a western TMK: [2] 5-2-005:031, Lot 17 (31.7 acres or 12.8 hectares), and an eastern TMK: [2] 5-2-026:014, Lot 104D-1 (4.7 acres or 1.9 hectares) for a total project area of 36.4 acres (14.7 hectares). The scattered lots subdivision project area parcels are within the Hawaiian Hoʻolehua-Pālāʻau Homesteads, and are located northwest and north from Molokaʻi Airport. The long, narrow west project area is bound by Farrington Avenue (a dirt road) on the north and Moʻomomi Avenue (a dirt road) on the south. The eastern project area is on the south side of Puʻu Kapele Avenue (a dirt road). The project area is depicted on a portion of the 1993 Molokai Airport and Kaunakakai U.S. Geological Survey (USGS) 7.5-minute topographic quadrangles (Figure 1), and many other figures.
Project Description	DHHL proposes to construct infrastructure improvements including clearing, grading, and installation of roadway, electrical, domestic water, and irrigation water utilities. The proposed plan calls for ground-disturbing activities to be confined to the two subject parcels, but will extend to existing roadways for access and connection for utilities. These improvements will support DHHL beneficiaries through the provision of essential services necessary for agricultural homesteading. While installation of wastewater treatment systems will be the responsibility of the lessee, the environmental impacts are being considered as part of this action.
Project Acreage	The project parcel size is as follows: The western TMK: [2] 5-2-005:031 parcel is 31.7 acres (12.8 hectare) The eastern TMK: [2] 5-2-026:014 parcel is 4.7 acres (1.9 hectare) The total project area is 36.4 acres (14.7 hectare)

Document Purpose	This investigation was designed—through detailed historical, cultural, and archaeological background research and a field inspection of the project area—to determine the likelihood that historic properties may be affected by the project and based on findings, consider cultural resource management recommendations. This document is intended to facilitate the project's planning and support the project's historic preservation and environmental review compliance and to support obtaining an SHPD determination letter (as per HAR§ 13-275-3).
Fieldwork Effort	Fieldwork was conducted on 21 September 2021 by CSH archaeologist David W. Shideler, M.A., and CSH cultural specialist Kellen Tanaka, B.A., under the general supervision of Principal Investigator Hallett H. Hammatt, Ph.D. This work required approximately 2 person-days to complete.
Results Summary	The results of the field inspection were consistent with what was expected based on background research and previous archaeological studies conducted in the vicinity. The project areas were determined to be relatively far from potable surface water, access to the coast, or notable land forms. The annual rainfall of 802 mm (32.83 inches) at the neighboring "Gage 34" station (Giambelluca et al. 2013) is suggested to be insufficient for non-irrigated agriculture. No historic properties have been identified previously within either project area or within 500 m of either project area. A 1964 USGS aerial photograph clearly shows the western TMK: [2] 5-2-005:031 (31.7-acre) parcel as entirely within intensive commercial pineapple cultivation that was thought likely to have removed any evidence of earlier historic properties. The absence of trees in the vicinity of either project as indicated on a 1950 USGS aerial photograph suggests ground clearing for prior ranching activities. Field inspection found no evidence of historic properties at the western TMK: [2] 5-2-005:031 parcel. Field inspection identified two terrace alignments on the south side of a natural drainage swale at the eastern TMK: [2] 5-2-026:014 (4.7-acre) parcel. These short sections of boulder alignments were interpreted as agricultural features to retain moisture, perhaps of an exploratory nature. The potential for subsurface deposits associated with these two terrace alignments was evaluated in the field to be very low. The antiquity of these boulder alignments is uncertain; they could be pre-Contact but may date to as late as the occupation of an adjacent abandoned house ca. 1980.

Recommendations	The results of this literature review and field inspection (LRFI) indicate there is no potential for archaeological historic properties in the western project area and that the archaeological potential in the eastern project area is limited to two boulder alignments. This LRFI would support an HAR§13-275-7(a)(2) determination of "Effect with proposed mitigation" with the proposed mitigation (as per HAR§13-275-8[a][1)[a]) of Preservation" in the form of avoidance and protection of the two boulder alignments.

Table of Contents

Management Summary i

Section 1 Introduction 1

1.1 Project Background 1
1.2 Document Purpose 1
1.3 Environmental Setting 1
1.3.1 Natural Environment 1
1.3.2 Built Environment 10

Section 2 Methods 11

2.1 Background Research 11
2.2 Fieldwork 11

Section 3 Background Research 12

3.1 Traditional and Historical Background 12
3.1.1 Place Names 12
3.1.2 *Mo‘olelo* 12
3.1.3 Origin of Moloka‘i 16
3.1.4 Pā‘aka‘a and His Son Kū-a-Pā‘aka‘a 16
3.1.5 Pu‘u Ka Pe‘elua, Caterpillar Hill 16
3.1.6 Pele’s Long Sleep 17
3.1.7 Sorcery on Moloka‘i 17
3.1.8 *‘Ōlelo No‘eau* 18
3.1.9 Subsistence and Settlement 19
3.2 Early Historic Period 20
3.3 Early 1800s 21
3.4 The Māhele and the Kuleana Act 22
3.5 Mid- to Late 1800s 22
3.5.1 Cattle Ranching 22
3.5.2 Agriculture 27
3.6 1900s 28
3.6.1 Molokai Ranch 28
3.6.2 Hawaiian Homes Commission 28
3.6.1 Pineapple 31
3.6.1 School Farm 31
3.6.2 Corn 33
3.6.3 Infrastructure 36
3.7 Contemporary Land Use 41

Section 4 Previous Archaeological Research 43

4.1 Summers (1971) 43
4.1.1 AECOS Inc. (1980) 55
4.1.2 Environmental Impact Study Corp. (1981) 56
4.1.3 Neller (1982) 56
4.1.4 Griffin (1993) 57
4.1.5 Hammatt et al. (1993) 57
4.1.6 Nagahara and Kolb (1994) 58

4.1.7 Major and Dixon (1995) 58
4.1.8 Hartzell (2000) 58
4.1.9 Pantaleo and Rotunno-Hazuka (2003) 59
4.1.10 Pantaleo (2004) 59
4.1.11 Hammatt (2008) 59
4.1.12 Pfennig et al. (2011) 59
4.1.13 McIntosh et al. (2019) 60
4.2 Background Summary and Predictive Model 61

Section 5 Results of Field Work 62

Section 6 Summary and Recommendations 76

6.1 Summary 76
6.2 Recommendations 77

Section 7 References Cited 79

List of Figures

Figure 1. Portion of the 1993 Molokai Airport and Kaunakakai USGS 7.5-minute topographic quadrangles showing the location(s) of the project area....2
Figure 2. Portion of the 1993 Molokai Airport and Kaunakakai USGS 7.5-minute topographic quadrangles with an overlay of TMK parcels (mostly DHHL lots) showing the location(s) of the project area....3
Figure 3. TMK: [2] 5-2-0005 showing the western TMK: [2] 5-2-005:031 Lot 17 portion of the project area (Hawai‘i TMK Service 2014)....4
Figure 4. TMK: [2] 5-2-026 showing the eastern TMK: [2] 5-2-026:014, Lot 104D-1 project area (Hawai‘i TMK Service 2014)....5
Figure 5. 2013 aerial photograph (ESRI 2013) showing the project area(s) and surrounding lands....6
Figure 6. 2013 aerial photograph (ESRI 2013) with an overlay of TMK parcels (mostly DHHL lots) showing the location(s) of the project area....7
Figure 7. Portion of the 1993 Molokai Airport and Kaunakakai USGS 7.5-minute topographic quadrangles and overlay of Foote et al. (1972) *Soil Survey of Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii*, indicating soil types within and surrounding the project area(s) (USDA 2006)....9
Figure 8. Map from Summers (1971) showing place names near the project area(s)....13
Figure 9. Portion of Dodge et al. (1897) map of Moloka‘i showing 1848 land divisions (Crown [yellow], government [green], LCAs [no color]); the western and eastern project areas as within Crown lands....23
Figure 10. LCAs and Grants in the project area vicinity depicted on a portion of 1993 Molokai Airport and Kaunakakai USGS topographic quadrangles (none of the three project areas were close to a Native Tenant LCA or grant)....24
Figure 11. Portion of Monsarrat (1886) Hawaiian Government Survey Map of Molokai, Middle and West Sections (RM 1288); showing the western and eastern project areas as within the Momomi Paddock....26
Figure 12. Portion of 1922 USGS topographic map of Kualapuu quadrangle, showing the project areas as relatively undeveloped (an unimproved Moomomi Road passed through the western project area and a Waihii Pipeline and adjacent unimproved road extended east to storage tanks southeast of the eastern project area)....30
Figure 13. Sketch plan of Ho‘olehua Homesteads (Keesing 1936:26) showing current project areas (the eastern lot was within the indicated Hoolehua Homesteads area while the western project area appears to have been in “Community Pasture”)....32
Figure 14. Community Center for Ho‘olehua Homesteads including, from left to right, a hall, school, church, and farm, ca. 1939 (Keesing 1936:124)....34
Figure 15. A Ho‘olehua homestead in 1939 (Keesing 1936:59)....34
Figure 16. Letter to the editor praising the quality of Moloka‘i corn in 1922 *(Honolulu Star-Bulletin* 1922:6)....35
Figure 17. Experimental corn farmer, Kaye Waldorf, in West Moloka‘i; pipeline (left) transported water to his crops (Roll 1968:B-1)....35

Figure 18. 1950 USGS aerial photograph of Molokai (UH MAGIS) showing pineapple cultivation neighboring, but not within, the project areas....37
Figure 19. Portion of 1952 Kaunakakai and Molokai Airport USGS topographic quadrangles showing unpaved roads are present within and surrounding the project area; the pipeline south of the project area(s) was used to transport water from East Moloka‘i....38
Figure 20. 1964 USGS aerial photograph of Moloka‘i showing the present project areas (note the general absence of trees in the project areas and the indicated active cultivation of pineapple in the western project area)....39
Figure 21. Portion of the 1967 Kaunakakai and 1968 Molokai Airport USGS topographic quadrangles showing unpaved roads abutting the project area(s) and an aqueduct crossing the Ho‘oleuha Plain to the south....40
Figure 22. Portion of 1983 Molokai West USGS topographic quadrangle showing an aqueduct crossing the Ho‘olehua Plain to the south and the Kualapuu Reservoir southeast of the project area(s)....42
Figure 23. Previous archaeological studies in the project area vicinity depicted on a portion of the 1993 Kaunakakai and Molokai Airport USGS topographic quadrangles....44
Figure 24. Previously identified historic properties in the project area vicinity depicted on a portion of the 1993 Kaunakakai and Molokai Airport USGS topographic quadrangles....48
Figure 25. Overview showing tracklogs at both of the project areas (see following tracklog and photo key figures for details on the fieldwork at the western 31.7-acre TMK: [2] 5-2-005:031 parcel and the eastern 4.7-acre TMK: [2] 5-2-026:014 parcel....63
Figure 26. Tracklog and key to subsequent photographs for the western 31.7-acre TMK: [2] 5-2-005:031 parcel project area....64
Figure 27. Photo A: General view of the 31.7-acre TMK: [2] 5-2-005:031 parcel from the northwest corner (Farrington Avenue in foreground), view to south-southeast....65
Figure 28. Photo B: General view of the 31.7-acre TMK: [2] 5-2-005:031 parcel from the southwest corner, view to south-southeast....65
Figure 29. Photo C: General view of the 31.7-acre TMK: [2] 5-2-005:031 parcel from the southeast corner (Mo‘omomi Avenue in foreground), view to north-northwest....66
Figure 30. Photo D: General view of the 31.7-acre TMK: [2] 5-2-005:031 parcel from the northeast corner, view to south-southwest....66
Figure 31. Photo E: View of collapsed structure in the 31.7-acre TMK: [2] 5-2-005:031 parcel, view to southwest....67
Figure 32. Photo F: View of collapsed structure in the 31.7-acre TMK: [2] 5-2-005:031 parcel, view to northeast....67
Figure 33. Tracklog and key to subsequent photographs for the eastern project area, the 4.7-acre TMK: [2] 5-2-026:014 parcel....68
Figure 34. Photo G: General view of the 4.7-acre TMK: [2] 5-2-026:014 parcel from the northwest corner, view to southeast....69
Figure 35. Photo H: General view of the 4.7-acre TMK: [2] 5-2-026:014 parcel from the southwest corner, view to northeast....69
Figure 36. Photo I: General view of the 4.7-acre TMK: [2] 5-2-026:014 parcel from the southeast corner, view to northwest....70

Figure 37. Photo J: General view of the 4.7-acre TMK: [2] 5-2-026:014 parcel from the northeast corner, view to southeast 70
Figure 38. Photo K: General view of the abandoned house in the 4.7-acre TMK: [2] 5-2-026:014 parcel, view to northwest 71
Figure 39. Photo L: View of the abandoned house in the 4.7-acre TMK: [2] 5-2-026:014 parcel 71
Figure 40. Photo M: View of small drainage from the east edge of the 4.7-acre TMK: [2] 5-2-026:014 parcel, view to west 73
Figure 41. Photo N: View of small drainage from the west edge of the 4.7-acre TMK: [2] 5-2-026:014 parcel, view to east 73
Figure 42. Photo O: View of the eastern terrace alignment in the 4.7-acre TMK: [2] 5-2-026:014 parcel on the south side of a small gulch (1 m of tape shown at center for scale), view to south 74
Figure 43. Photo P: View of the eastern terrace alignment in the 4.7-acre TMK: [2] 5-2-026:014 parcel on the south side of a small gulch (1 m of tape shown at center for scale), view to west 74
Figure 44. Photo Q: View of the western terrace alignment in the eastern 4.7-acre TMK: [2] 5-2-026:014 parcel on the south side of a small gulch (1 m of tape shown at center for scale), view to south 75

List of Tables

Table 1. Place names near the current project area(s) 14
Table 2. Previous archaeological studies conducted in the project area vicinity 45
Table 3. Previously identified historic properties in the project area vicinity 49

Section 1 Introduction

1.1 Project Background

At the request of Munekiyo Hiraga, and on behalf of Department of Hawaiian Home Lands (DHHL), Cultural Surveys Hawai‘i, Inc. (CSH) has prepared this archaeological literature review and field inspection (LRFI) report for the proposed DHHL Ho‘olehua Scattered Lots Subdivision and Improvements Project, Pālā‘au Ahupua‘a, Moloka‘i District, Moloka‘i Island, including two parcels, a western TMK: [2] 5-2-005:031, Lot 17 (31.7 acres or 12.8 hectares), and an eastern TMK: [2] 5-2-026:014, Lot 104D-1 (4.7 acres or 1.9 hectares) for a total project area of 36.4 acres (14.7 hectares). The scattered lots subdivision project area parcels are within the Hawaiian Ho‘olehua-Palā‘au Homesteads, and are located northwest and north from Moloka‘i Airport. The long, narrow west project area is bound by Farrington Avenue on the north and Mo‘omomi Avenue on the south. The eastern project area is on the south side of Pu‘u Kapele Avenue. The project area is depicted on a portion of the 1993 Molokai Airport and Kaunakakai U.S. Geological Survey (USGS) 7.5-minute topographic quadrangles (Figure 1), a copy of the same map showing an overlay of TMK parcels (Figure 2), tax map key (TMK) plats (Figure 3 and Figure 4), on an aerial photograph (ESRI 2013) (Figure 5) and on the same aerial photograph with an overlay showing an TMK parcels (Figure 6).

DHHL proposes to construct infrastructure improvements including clearing, grading, and installation of roadway, electrical, domestic water, and irrigation water utilities. The proposed plan calls for ground-disturbing activities to be confined to the two subject parcels, but will extend to existing roadways for access and connection for utilities. These improvements will support DHHL beneficiaries through the provision of essential services necessary for agricultural homesteading. While installation of wastewater treatment systems will be the responsibility of the lessee, the environmental impacts are being considered as part of this action.

1.2 Document Purpose

This investigation was designed—through detailed historical, cultural, and archaeological background research of the project area and a field inspection—to determine the likelihood that cultural resources/ historic properties may be affected by the project and based on findings, consider cultural resource management recommendations. This document is intended to facilitate the project’s planning and support the project’s historic preservation and environmental review compliance and is intended specifically to support consultation with the State Historic Preservation Division (SHPD) and to support obtaining an SHPD determination letter (as per Hawai‘i Administrative Rules or HAR §13-13-275-3).

1.3 Environmental Setting

1.3.1 Natural Environment

The project area is on relatively flat lands at approximately 120 foot (ft) elevation above sea level in the north central portion of Moloka‘i Island, approximately 1.1 to 2.9 km (0.7 to 1.8 miles) inland (south) from Moloka‘i’s north shore sea cliffs.

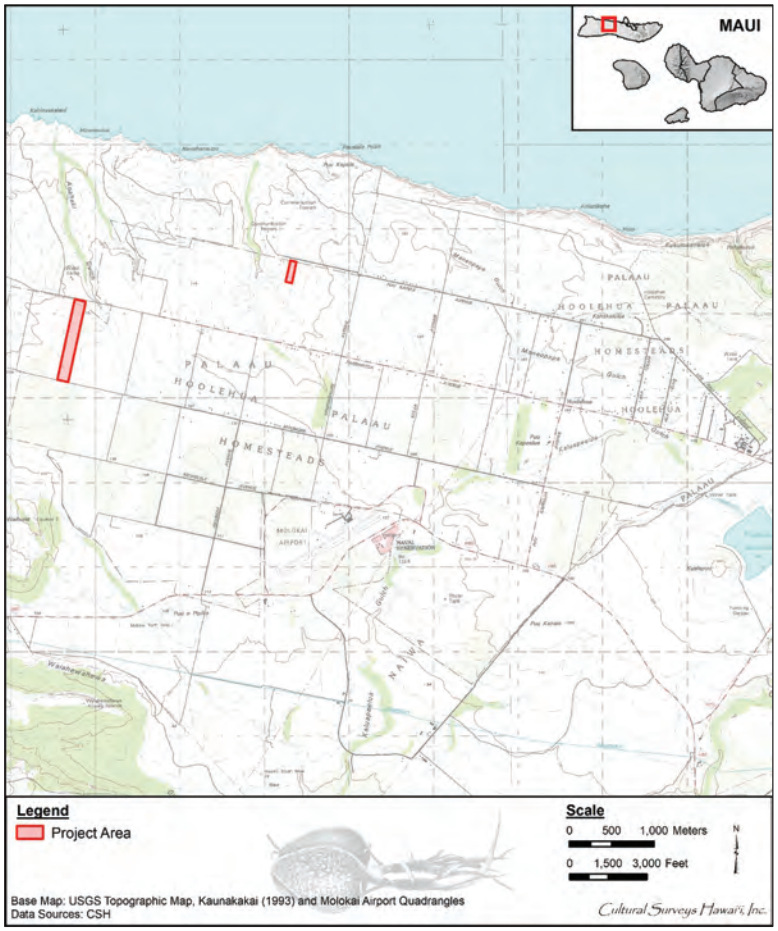


Figure 1. Portion of the 1993 Molokai Airport and Kaunakakai USGS 7.5-minute topographic quadrangles showing the location(s) of the project area

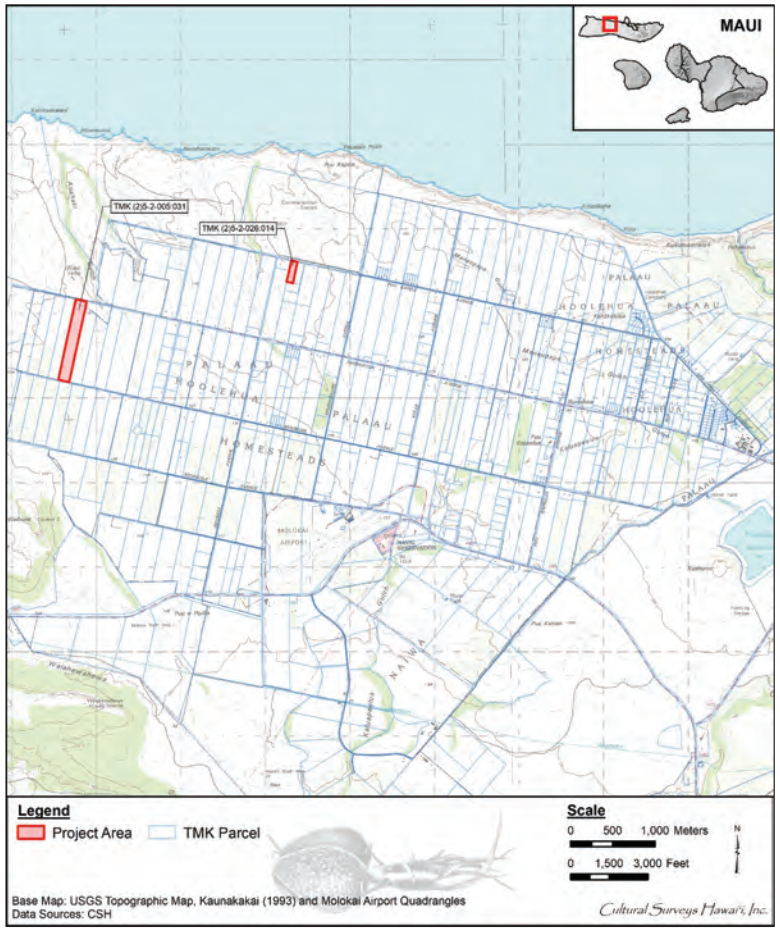


Figure 2. Portion of the 1993 Molokai Airport and Kaunakakai USGS 7.5-minute topographic quadrangles with an overlay of TMK parcels (mostly DHHL lots) showing the location(s) of the project area

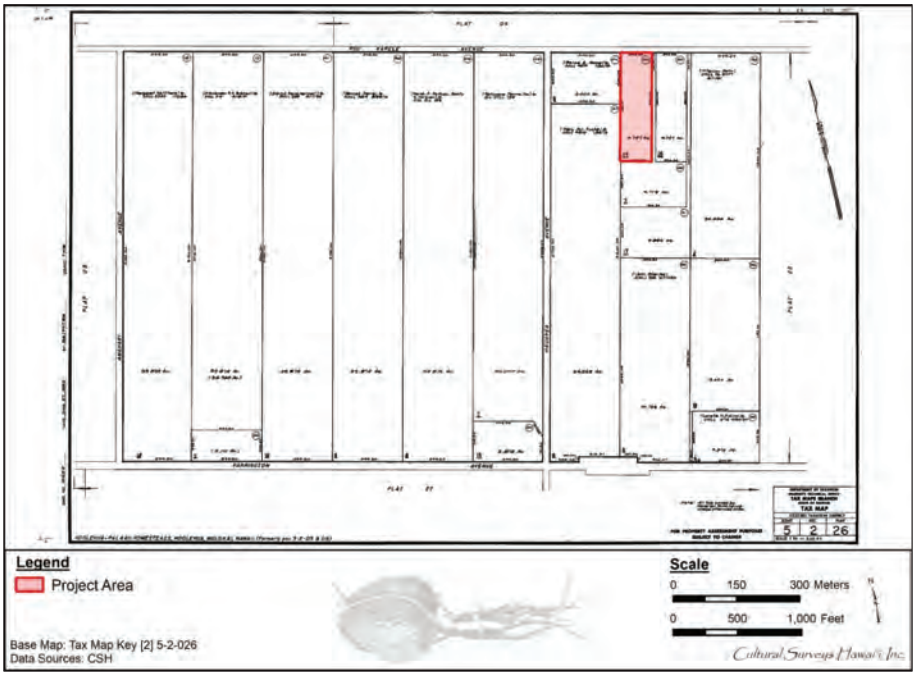


Figure 4. TMK: [2] 5-2-026 showing the eastern TMK: [2] 5-2-026:014, Lot 104D-1 project area (Hawai‘i TMK Service 2014)

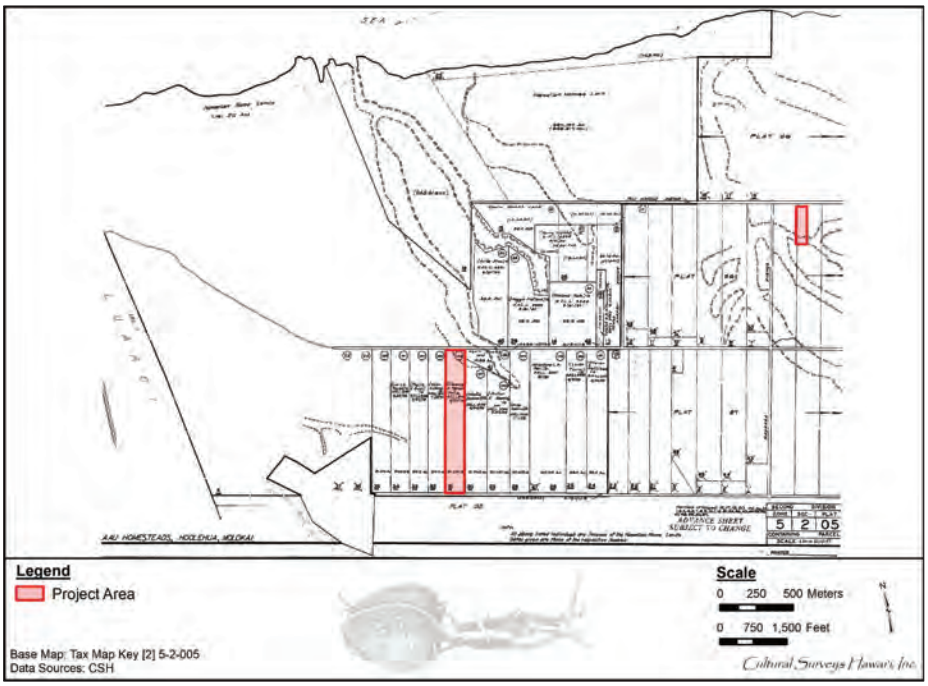


Figure 3. TMK: [2] 5-2-0005 showing the western TMK: [2] 5-2-005:031 Lot 17 portion of the project area (Hawai‘i TMK Service 2014)

Figure 5. 2013 aerial photograph (ESRI 2013) showing the project area(s) and surrounding lands

Figure 6. 2013 aerial photograph (ESRI 2013) with an overlay of TMK parcels (mostly DHHL lots) showing the location(s) of the project area

Due to its low elevation and partial shielding by the East Moloka‘i volcano from trade winds, the vicinity is arid with only shallow, intermittent stream gulches (MacDonald et al. 1990:411).

The west project area lies just southwest of Anahaki Gulch that flows to the north. The eastern project area is just east of an unnamed gulch. It is believed these gulches rarely run with water and that there is no source of potable water nearby.

The project area receives an approximate mean annual rainfall of 802 mm (32.83 inches) at the neighboring “Gage 34” station, according to the University of Hawai‘i Online Rainfall Atlas of Hawaii (Giambelluca et al. 2013) which is suggested to be insufficient for non-irrigated agriculture.

MacDonald et al. (1990:411) provide the following description for soil in West Moloka‘ì:

> Long periods of weathering, accompanied by comparatively little stripping by erosion, have left a deep red soil cover over the top of West Molokai. In places recent erosion has cut through the upper horizon exposing the lower horizon, which locally exhibits pronounced iron enrichment in the form of masses of lateritic iron oxide. [MacDonald et al. 1990:411]

The “deep, red soil” described by MacDonald et al. (1990:411) is characteristic of the current project area and vicinity and is apparent in recent aerial imagery (see Figure 5).

According to the 2006 United States Department of Agriculture (USDA) Soil Survey Geographic (SSURGO) database (USDA 2006) and soil survey data gathered by Foote et al. (1972), the soils within the west project area consist of Molokai series soils including Molokai silty clay loam, 0 to 3% slopes (MuA), Molokai silty clay loam, 3 to 7% slopes (MuB), and Molokai silty clay loam, 7 to 15% slopes, severely eroded (MuC3) soils (Figure 7).

Molokai series soils are described as follows:

> […] well-drained soils on uplands on the islands of Maui, Lanai, Molokai, and Oahu. These soils formed in material weathered from basic igneous rock. They are nearly level to moderately steep. Elevations range mainly from nearly sea level to 1,000 feet […]
>
> These soils are used for sugarcane, pineapple, pasture, wildlife habitat, and homesites. The natural vegetation consists of kiawe, ilima, uhaloa, feather fingergrass, and buffelgrass. [Foote et al. 1971:96]

MuA soils are further described as follows:

> […] The material at depths between 35 and 64 inches is moderately compact in place. The substratum is soft, weathered rock. The soil is slightly 'acid to neutral, except that areas used for pineapple are commonly very strongly acid or extremely acid in the surface layer.
>
> Permeability is moderate. Runoff is slow, and the erosion hazard is slight. [Foote et al. 1971:96]

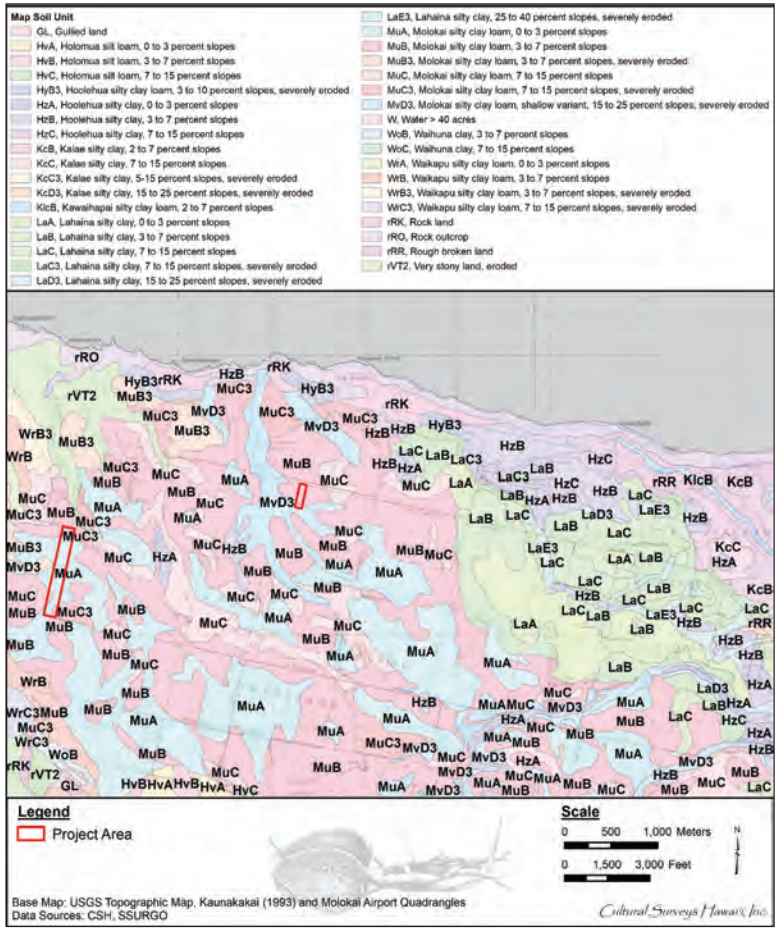


Figure 7. Portion of the 1993 Molokai Airport and Kaunakakai USGS 7.5-minute topographic quadrangles and overlay of Foote et al. (1972) *Soil Survey of Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii*, indicating soil types within and surrounding the project area(s) (USDA 2006)

MuB soils are further described as, “On this soil, runoff is slow to medium and the erosion hazard is slight to moderate. Included in mapping were a few small areas that are eroded to soft, weathered rock […]” (Foote et al. 1971:96).

MuC3 soils are further described as, “This soil occurs on knolls and sharp slope breaks. Runoff is medium; and the erosion hazard is moderate” (Foote et al. 1971:97).

The eastern project area includes MuB soils (described above) and Molokai silty clay loam, shallow variant, 15 to 25% slopes, severely eroded (MvD3) soils (see Figure 7). These soils are described as follows:

> This soil occurs on the sides of drainageways. In most places all of the surface layer and part of the subsoil have been removed, and about 12 to 20 inches of dark reddish-brown soil overlies the soft, weathered rock. In some places the soil is eroded to soft, weathered, rock and, as a result, is grayer or browner than is typical of the Molokai series. There are few to common stones and boulders on the surface. These are unweathered rock cores that have been exposed by erosion. Runoff is rapid, and the erosion hazard is severe. Workability is difficult. [Foote et al. 1971:97]

Ground visibility during the field inspection was good throughout much of the project area. The project area vegetation consisted primarily of introduced species including exotic grasses, *koa haole* (*Leucaena leucocephala*), and some *kiawe* (*Prosopis pallida*), *klu* (*Acacia farnesiana*), and lantana (*Lantana camara*). The only native species identified in the project area were *‘ilima* (*Sida fallax*) and *‘uhaloa* (*Waltheria indica*), and possibly an observed morning glory vine (*Ipomea* species).

The surrounding area was largely undeveloped with scattered DHHL homesteads.

1.3.2 Built Environment

The built environment within and surrounding the project area is minimal. The project area mostly consists of undeveloped DHHL parcels. Active homesteads are sporadic throughout the project area, located particularly along the bounding roadways. The long, narrow west project area is bound by Farrington Avenue (a dirt road) on the north and Mo‘omomi Avenue (a dirt road) on the south. The eastern project area is on the south side of Pu‘u Kapele Avenue (a dirt road). Molokai Airport and associated infrastructure is located approximately 2 km southeast of the project area(s).

Section 2 Methods

2.1 Background Research

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 (2021) database.

This research provided the environmental, cultural, historic, and archaeological background for the project area. The sources studied were used to formulate a predictive model regarding the expected types and locations of cultural resources in the project area.

2.2 Fieldwork

Fieldwork was conducted on 21 September 2021 by CSH archaeologist David W. Shideler, M.A., and CSH cultural specialist Kellen Tanaka, B.A., under the general supervision of Principal Investigator Hallett H. Hammatt, Ph.D. This work required approximately 2 person-days to complete. The fieldwork was conducted with systematic sweeps at approximately 15 m intervals with the tracklogs presented in Figure 25, Figure 26, and Figure 33. The purpose of the fieldwork was to identify, locate, and describe any potential historic properties and to provide representative photographs of the project areas.

Section 3 Background Research

3.1 Traditional and Historical Background

Traditionally, Moloka‘i was divided into two *moku*, or districts: Kona and Ko‘olau. Kona Moku was comprised of the lands of the southern and western sections of the island (which included Pālā‘au and Ho‘olehua Ahupua‘a) and the Ko‘olau Moku which comprised the lands of the northeastern portion of the island from Hālawa Valley to the Kalaupapa Peninsula. In 1859, the traditional *moku* of Kona and Ko‘olau were dropped and the island as a whole was referred to as the Moloka‘i district. In 1909, the island was again divided into two districts: Kalawao District, containing the lands of Kalaupapa, Kalawao, and Waikolu, and Moloka‘i District, comprising the remainder of the island (Coulters in Summers 1971:2), including the current project area.

The two project areas are both within Pālā‘au Ahupua‘a (see Figure 9). Mrs. Pukui in Handy described the subdistricts of Pālā‘au on Moloka‘i as *kalana* (Handy et al. 1991:47). Today, the *kalana* of Pālā‘au consists of one major land division and two *lele*. Pālā‘au 1 is located at the southern shores of central Moloka‘i, while Pālā‘au 3 is in uplands, at the summit of the sea cliffs above Kalaupapa Peninsula. These two *lele* of Pālā‘au Ahupua‘a are significantly smaller than Pālā‘au 2—which includes the present project areas. Pālā‘au 2, the largest of the three land sections, is adjacent to the northwest of the *ahupua‘a* of Ho‘olehua (Dodge et al. 1897; Summers 1971:81, see Figure 9).

3.1.1 Place Names

In the preface of *Place Names of Hawaii* (Pukui et al. 1974:x), Samuel Elbert offers the following description regarding place names:

> Hawaiians named taro patches, rocks and trees that represented deities and ancestors, sites of houses and heiau, canoe landings, fishing stations in the sea, resting places in the forests, and the tiniest spots where miraculous or interesting events are believed to have taken place.
>
> Place names are far from static […] names are constantly being given to new houses and buildings, land holdings, airstrips, streets, and towns and old names are replaced by new ones […] it is all the more essential, then to record the names and the lore associated with them [the ancient names] now. [Pukui et al. 1974:x]

Inherent in Elbert’s statements is knowledge that the oldest place names held meaning and told the story of an area prior to European Contact. Many place names in the vicinity of the project area are provided in Figure 8. Literal translations of place names for land areas and divisions near the project area are listed in Table 1 and may provide insight into the area prior to Western Contact.

3.1.2 *Mo‘olelo*

Early Hawaiian affairs and traditions were transmitted orally through *mo‘olelo* (traditional stories). These legendary stories recount events involving nature, people, gods, and spirits, thereby offering a window to the essence of Hawaiian ideology and lifestyles prior to Western Contact. Several *mo‘olelo* are associated with place names within or near Pālā‘au and Ho‘olehua are summarized below.

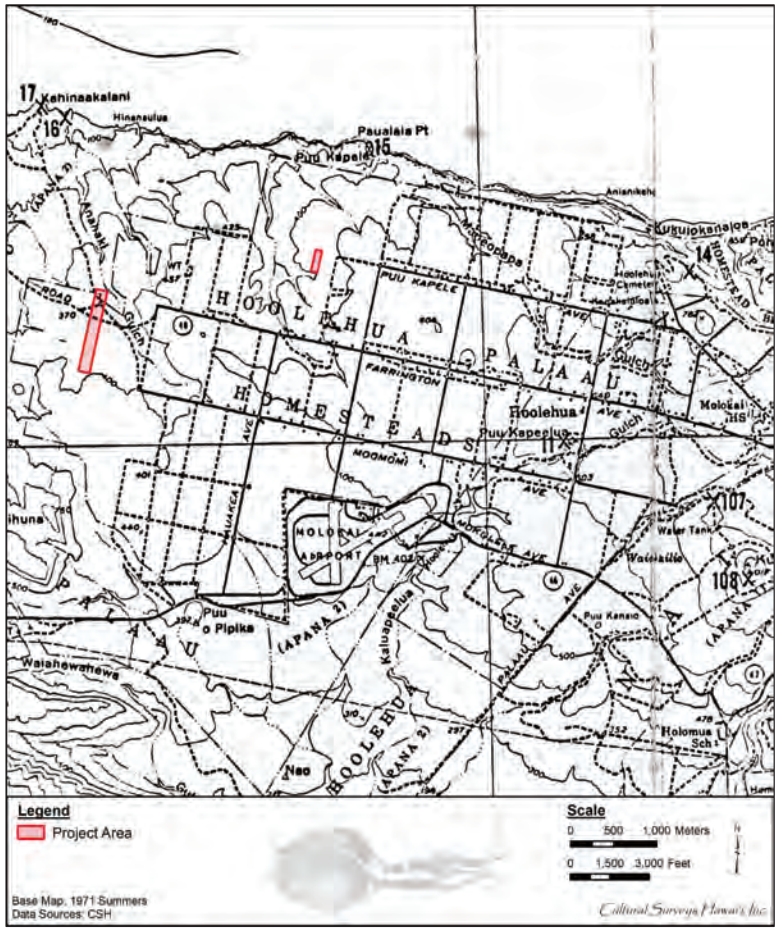


Figure 8. Map from Summers (1971) showing place names near the project area(s)

Table 1. Place names near the current project area(s)

Place Name	Description
Anahaki	Name of a gulch on the north side of the west project area. *Lit.* “Broken cave” (Pukui et al. 1974:12)
Anianikeha	Place along the sea cliff NW of the eastern project area. *Lit.* “blowing [on the] heights” (Pukui et al. 1974:12)
Hinanaulua	A point on the sea cliff north of the western project area. *Lit.* “inspired [by a god] *hinana* fish.” (Pukui et al. 1974:46)
Ho‘olehua	*Lit.* acting the expert. Village, land division, and Hawaiian homestead area near the Moloka‘i airport; said to be named for a chief (Pukui et al. 1974:51–52). Ho‘olehua Ahupua‘a encompasses most of the current project area.
Kahinaakalani	A point on the sea cliff NW of the western project area. *Lit.* “the grayness of the sky, heaven” (Pukui et al. 1974:65)
Kāluape‘elua	*Lit.* baked caterpillar. A caterpillar infestation was ended by baking the caterpillars (Pukui et al. 1974:79). Name of gulch within project area.
Kanakaloloa	Place NW of the eastern project area. *Lit.* “tall person” (Pukui et al. 1974:83)
Kualapu‘u	*Lit.* hill overturned. Hill, elementary school, reservoir, and Del Monte pineapple cannery village (Pukui et al. 1974:119). Summers Site 107, a *hōlua* (sled used on grassy slopes) slide, was documented on the SSW side of Kualapu‘u Hill (Summers 1971). This hill was formerly named Ka ‘Uala Pu‘u (the sweet potato hill) and appears on some maps as Mid Hill; the area had “many sweet potato patches […] defined by rows of stones” (Summers 1971:80). Other maps label the hill as Middle Hill.
Kukuiokanaloa	Name of a stretch of sea cliff N of the eastern project area. *Lit.* “light of Kanaloa” (Pukui et al. 1974:122)
Lepekaheo	According to Summers (1971:37), “Monsarrat referred to Lepekaheo as an ‘old heiau.’” This *heiau* (pre-Christian place of worship), designated Summers Site 12, is located approx. 1.3 km north of the project area.
Manawainui	*Lit.* large water branch. Manawainui Gulch stream flows approx. 2.0 km SE of the project area. Manawainui also refers to an area S and adjacent to Ho‘olehua and Pālā‘au, which contains stone platforms used in the past by students of hula, and a stone outcrop modified by Native Hawaiians in traditional times known as the “Sacrifice Stones” (Fowke 1922:181).
Mane‘opapa	Gulch NW of the western project area. Meaning uncertain.
Nā‘iwa	*Lit.* the frigate birds (perhaps named for the beauty of the birds) (Pukui et al. 1974:161). Nā‘iwa Ahupua‘a comprises three *‘āpana* (lots) in Moloka‘i. The largest section, Nā‘iwa 1, borders the project area E.

Place Name	Description
Pālā‘au	*Lit.* wooden fence or enclosure (Pukui et al. 1974:176). Pālā‘au comprises three land sections in north, central, and southwest Moloka‘i and along with Ho‘olehua, names the homesteads where the current project area is located. A western portion of the project area is in Pālā‘au 2, the largest *‘āpana,* of Pālā‘au Ahupua‘a.
Paualala	A point on the sea cliff N of the central project area. Meaning uncertain.
Pu‘u Kanaio	*Lit.* the pinworm hill. Hill on the slopes of Kuala pu‘u (Pukui et al. 1974:198). This hill is within 400 m E of the project area.
Pu‘u-Ka Pe‘elua	*Lit.* “hill of the caterpillar” (Pukui et al. 1974:198) (For *mo‘olelo* see subsection 3.1.1.2.3). Location of Summers Sites 11A and 11B/ State Inventory of Historic Places (SIHP) # 50-60-03-11, Kape‘elua Complex (see subsection 3.2.1).
Pu‘u ka Pele	Hill on the sea cliff N of the central project area. *Lit.* “the volcano hill” (Pukui et al. 1974:198).
Waiakailio	*Lit.* water used by the dog (Pukui et al. 1974:219). Area with a stream approx. 375 m northeast of the project area’s NE corner.

3.1.3 Origin of Moloka‘i

Mo‘olelo provide varying accounts for the origin of Moloka‘i. Paku‘i, a historian in the time of Kamehameha I, wrote of the Hawaiian Islands having been born of Wākea and his wives. According to this version, Wākea’s first wife, Papa, gave birth to Hawai‘i, Maui, and Kaho‘olawe before returning to Tahiti. Wākea took Kaulawahine as his second wife, and she gave birth to Lāna‘i. He then took a third wife:

> Then Wakea turned around and found Hina, *Hoi ae O Wakea loaa Hina*,
> Hina was found as a wife for Wakea, *Loaa Hina he wahine moe na Wakea,*
> Hina conceived Molokai, an island; *Hapai Hina ia Molokai, he moku*,
> Hina’s Molokai is an island child. *O Molokai a Hina he keiki moku.*
> [Fornander 1916-1917:12–13]

The historian Kahako‘ikamoana recorded a different lineage for Moloka‘i:

> Kuluwaiea of Haumea as the husband, *Na Kuluwaiea o Haumea he kane*,
> Of Hinanuiakalana as the wife *Na Hinanuialana he wahine*
> Was born Molokai, a god, a priest, *Loaa Molokai, ke akua, he kahuna,*
> The first morning light from Nuumea, *He pualena no Nuumea*,
> [Fornander 1916-1917:2–3]

3.1.4 Pā‘aka‘a and His Son Kū-a-Pā‘aka‘a

The following *mo‘olelo* recounts two chiefs, Pālā‘au and Ho‘olehua, which are also the names of the *ahupua‘a* in which the current project areas are located (Pālā‘au) and the adjacent *ahupua‘a* to the east (Ho‘olehua).

> On Molokai lived a very beautiful woman, Hikauhi, the daughter of Hoolehua and Ilali. Now it happened that the girl’s father had promised her hand to Palaau, the chief of that part of the island. But as soon as she had seen Paakaa, she forgot all about her former lover and demanded that the stranger be given to her. Palaau very generously consented, and so they all lived in peace. Paakaa cultivated the lands well, fished skillfully, and brought great prosperity to his wife and her family. [Handy 1922:76]

3.1.5 Pu‘u Ka Pe‘elua, Caterpillar Hill

According to Harriet Ne (1992), the story of Pu‘u Pe‘elua involves Pele, the daughter of a chief of Pālā‘au, who fell in-love with the *pe‘elua* (caterpillar) of Ho‘olehua, the *‘aumakua* (family or personal gods, deified ancestors) of that district:

> A beautiful young girl named Pele, the daughter of a chief in the Pālā‘au area, encountered in the early twilight a handsome young man. They fell in love, and he courted her for almost a year. She concealed her love from her parents and lived only for the hours she spent with him.
>
> She did not know that he was the *pe‘elua* of the district, revered and loved by the people of Ho‘olehua—even worshipped. Nor did she know that he had the form of a young man only at night but that in the day he returned to the form of a caterpillar.

> As the days passed, Pele grew pale and listless. […] The *kahuna* perceived the problem at once. ‘She is in love with the supreme manifestation of the caterpillar-Pe‘elua,’ he told [her parents]. ‘When he comes to her at night, it is in the form of a handsome young man; but his power is draining her strength. She is human. She cannot live with a magical being. To save her, you must kill him. You must destroy him completely.’ [Ne et al. 1992:49–50]

The same story is also told by Cooke (1949):

> […] this beautiful girl was visited each night by a lover who left before daylight. She was unable to discover who he was, this suspense told on her, and she began to waste away. A priest, consulted by her parents, advised the girl to attach a piece of white tapa to a wart on her lover’s back. In the morning, shreds of tapa helped to trace the demi-god lover to the hill Puu Peelua, in the middle of Hoolehua. The kahuna [priest] and friends of the family found a large peelua [caterpillar] asleep on the hill. The kahuna ordered the people to collect wood which was placed around the sleeping peelua, and a fire was lit. As the heat of the fire increased, the caterpillar burst into myriads of small caterpillars which were scattered over the plain. That accounts for the army-worm pest, called peelua. [Cooke 1949:102]

3.1.6 Pele’s Long Sleep

An ancient chant concerning Lohi‘au, the king of Kaua‘i, includes reference to Pālā‘au. At the beginning of his romance with Pele,

> Lohiau watched her while he partook of the feast with his chiefs, and she was resting on the couch of mats. He was thinking of her marvelous, restful beauty, as given in the ancient chant known as ‘Lei Mauna Loa.’
>
> Lei of Mauna Loa, beautiful to look upon.
> The mountain honored by the winds.
> Known by the peaceful motion.
> Calm becomes the whirlwind.
> Beautiful is the sun upon the plain.
> Dark-leaved the trees in the midst of the hot sun
> Heat rising from the face of the moist lava.
> The sunrise mist lying on the grass,
> Free from the care of the strong wind.
> The bird returns to rest at Palaau.
> He who owns the right to sleep is at Palaau.
> I am alive for your love—
> For you indeed. [Westervelt 1916:77]

3.1.7 Sorcery on Moloka‘i

Kamakau (1992a) recounts a story regarding the origin of sorcery use on Moloka‘i, in which the Ho‘olehua and Pālā‘au plains are mentioned:

> Kaiakea, a prominent man of Kala‘e and its vicinity, was said to have been a man without a god. He built a large new household below Kahanui and provided all kinds of food, such as poi, pig, *‘awa*, bananas, fish, and everything else necessary

for a ‘house-warming’ (*o ka hale komo*). When the day came, Kaiakea’s wife and the other women were at the *hale noa*, the common house, and Kaiakea and the other men and the servers were at the *hale mua*, the men’s house. The *hale noa* was apart from the *hale mua*, which was surrounded by a lanai. Kaiakea was in the doorway of the *hale mua*, and while the feast was being prepared, he saw a long procession of women coming over the plains of Ho‘olehua to Pala‘au. They were dressed in yellow tapa skirts and yellow tapa shoulder coverings (*kihei*), with variegated (*papahi*) leis of *ma‘o* and *‘ilima* crowning their heads. There was one man among them. The procession went down to the spring, named Piliwale, and left their things (*he ukana*) there. These were a *puniu hulihuli*, or coconut-shell container, and the women's *‘alae* bird bodies. When Kaiakea saw the many beautiful women in that company, he called out to them to come in on the lanai, but they remained outside. Only the man who was with them approached and stood at the door of Kaiakea’s house and talked with him. Kaiakea offered them food, but the spirit man (*kanaka anela*) said they would not eat his food unless a leaf-thatched house, a *hale lau*, was built for them; then they would eat of his food. This man revealed that they were not humans, but ‘angels,’ and he told Kaiakea their names. Pua was his name, and Kauluimaunaloa (the-grove-at-Maunaloa, that is, Kapo) was the name of the chiefess who led the procession. He said they would become Kaiakea’s gods if the *hale lau* was finished that day, and would give into his charge the *puniu hulihuli*, their visible form (*ko lakau kino ‘ike maka ‘ia*), and all the paraphernalia to do their work (*ka lakau mau hana a pau*), which was inside it. The *‘alae* birds were their bodies which they showed abroad (*kino ho‘ike ‘ia iwaho*). After revealing these things to Kaiakea, the being vanished. Kaiakea went to the spring to look for the *puniu*, and got it; the *‘alae* birds were resting there at the spring. That very day Kaiakea erected the *hale lau* and filled it with poi, *‘awa*, bananas, and tapas appropriate to these gods; that same evening it was dedicated (*ke kapu no ‘ia*). The food offerings (*ka ‘ai me ka i‘a*) and the *‘awa* were all consumed by the *‘alae* birds, and they were well content with the food provided for them.

It was in this way that Kaiakea became the *kahu* of gods, and he became known as a man who had gods. He was the *kahu* of Kapo (Kauluimaunaloa) and Pua. Kaiakea, however, just took care (*malama pono*) of these gods. He did no harm to others, and did not send his gods to bring death (*ho‘aunauna e make*) to any man or to any chief. He just took care of his *akua ho‘ola‘a* (the spirits who had been made gods by his consecration and offerings). Upon his death he commanded his children to take care of the gods against the days of trouble; the gods would repay them with life (*ola*). But they were not to seek wealth from the gods through sorcery. [Kamakau1992a:131–132]

3.1.8 *‘Ōlelo No‘eau*

Pukui (1983) compiled an extensive list of *‘ōlelo no‘eau* (proverbs or traditional sayings) in *‘Ōlelo No‘eau: Hawaiian Proverbs & Poetical Sayings.* Authors of the preface to the book discuss these expressions as follows:

The sayings may be appreciated individually and collectively for their aesthetic, historic, and educational values. 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. [Pukui 1983:VII]

Several *‘ōlelo no‘eau* concern Moloka‘i. For example, the following references an origin story:

Moloka‘i nui a Hina. *Great Moloka‘i, land of Hina.*
[Pukui 1983:239]

Other sayings regard powers associated with Moloka‘i. Though Kaiakea cautioned his children not to spread sorcery, his wishes went unheeded (Kamakau 1992a) (see subsection 3.1.1.2.5). Molokai‘i became traditionally known for its medicinal and magical powers, as the following Hawaiian proverbs demonstrate:

Moloka‘i ku‘i lā‘au. *Moloka‘i, pounder of medicine.*

Moloka‘i pule o‘o. *Moloka‘i of the potent prayers.*
[Pukui 1983:239]

At least two proverbs are associated with aspects of former ways of life in Ho‘olehua:

Ku‘u manu lawelawe ō o Ho‘olehua. *My bird of Ho‘olehua that cries out about food.* [Pukui 1983:235]

Mo‘a nopu ka lā i ke kula o Ho‘olehua *The sun scorches the plain of Ho‘olehua* [Pukui 1983:207]

Pukui (1983:207) tells that the *kioea* bird cries out *Lawelawe keō! Lawelawe keō!* (Take the food! Take the food!) to the fishermen as they head out to sea.

3.1.9 Subsistence and Settlement

During his archaeological survey of Moloka‘i in 1937, Southwick Phelps (1937) noted the following about West Moloka‘i:

It is said that in former days western Molokai was not as devoid of forest as it is now. While this may be true to a limited extent, I think that the essential conditions have remained the same and that the western half was always a semi-arid region. One certainly finds there no extensive taro patches and no signs of dense population. We learn, furthermore, that it was traditionally a land of the sweet-potato, a plant that does not require much water. [Phelps 1937:6–7]

While exact boundaries for yam and sweet potato cultivation in Pālā‘au and Ho‘olehua are unknown, these tubers, along with fish, were staples of inhabitants in the area (Phelps 1937).

The region including Ho‘olehua was a fertile plain known particularly for the cultivation of *‘uala* (sweet potato). Summers (1971:38) cites Malihinihele who stated in 1876, “In the olden days this [Pālā‘au 2] was a good land with a fertile plain where plants grew. The population was large but today it is uninhabited.” Handy (1940:157) remarks, “In 1931 there were many flourishing

patches on the Hawaiian homesteads at Hoolehua. It is said that Hoolehua and Palaau were noted for sweet potatoes in olden days" although Handy and Handy (1972:283) note that homesteaders in Ho‘olehua were growing the sweet potatoes on land that had not been planted in ancient times.

The importance of *‘uala* to the area is further suggested by place names such as Pu‘u Pe‘elua (hill of the caterpillar) and Kāluape‘elua (baked caterpillar), which illustrate the connection to the environment of the area (Pukui et al. 1974). The *pe‘elua,* or the caterpillar, feeds on the sweet potato and is considered a pest by *‘uala* farmers of the region. Pukui et al. (1974) noted hilled sweet potatoes in the region south of Ho‘olehua and Pālā‘au known as Uala-pu‘e, which is also the name of a fishpond in that area. In addition to sweet potato, *‘olo* or *hokeo*, the long gourd used for holding fishing tackle and to make the *hula* drum, notably grew in Ho‘olehua (Handy et al. 1991:213).

The actual size of the pre-Contact Hawaiian population tending and supported by crops in central and western portions of Moloka‘i can only be conjectured. While the greater portion of the population resided on the eastern side of the island, a late nineteenth century anecdote by Abraham Fornander (1880) suggests a former substantial population that may have been widely dispersed:

> As an instance of the dense population, even a few years previous to Kamehameha's death, the author has often been told by a grand-niece of Kekaulike, who was a grown-up girl at the time, that when the chiefs trumpetshell sounded, over a thousand able-bodied men would respond to the call, within a circle described by Palaau, Naiwa, Kalae and Kaunakakai. Those lands together cannot muster a hundred men this day. [Fornander 1880:73 footnote]

3.2 Early Historic Period

Early historic accounts briefly mention Moloka‘i. Summers (1971:18) relates that in 1779 when Captain Cook visited Hawai‘i, the status of Moloka‘i was uncertain. However, Kamakau (1992b) cites several reasons why Moloka‘i was as important as O‘ahu in the late 1700s, since both of the islands contained "rich lands, many walled fish-ponds, springs, and water taro patches. The island of Oahu was very fertile and Molokai scarcely less so" (Kamakau 1992b:132–133).

Captain George Vancouver (1798), sailing along the southern coast of Moloka‘i in 1793, essayed a portrait of the island's geographic texture and distribution of Hawaiian population:

> Early the next morning, with a pleasant breeze from the N.E., we stood over towards the east point of Morotai, […] we sailed along to the westward, […] About half a league south of the east point of Morotai [...] lies a small barren rocky islet, called by the natives Modooenete […] In this direction east the land rises rather abruptly from the sea, towards the lofty mountains in the center of the east part of Morotai; and though the acclivity was great, yet the face of the country diversified by eminences and vallies; bore a verdant and fertile appearance. It seemed to be well inhabited, in a high state of cultivation, and presented not only a rich but a romantic prospect. To the westward of these cliffs, the shores terminated in the former direction, by a low point of land, called by the natives Crynoa […] From Crynoa the country assumes a dreary aspect. The mountains, forming the eastern part of the island, gradually descend to the westward, and like those of Mowee, terminate on a low isthmus, which appears to divide the island into two peninsulas

> […] the easternmost, which is far the largest is composed of very high land, but the westernmost does not rise to any elevation, beyond that of a mean height. The country from Crynoa rises from the sea by an ascent, uninterrupted with chasms, hills or vallies. This uniform surface, on advancing to westward, exhibited a gradual decrease in the population; it discovered an uncultivated barren soil, and a tract of land that gave residence only to a few of the lower orders of the islanders, who resort to the shores for the purpose of taking fish, with which they abound. Those so employed are obliged to fetch their fresh water from a great distance; none but what is brackish being attainable on the western parts of Morotai. [Vancouver 1798:201–202]

Early visitors and Hawaiian historians confirm Vancouver's perception of a wide-spread Hawaiian population throughout the eastern portion of the island and a much smaller population clustered along the shoreline within the western portion.

After conquering the island of Maui in 1790, Kamehameha I advanced on to Moloka‘i where he secured the allegiance of the chiefs. Archibald Menzies (1920), the naturalist who accompanied Captain George Vancouver to the Hawaiian Islands in the 1790s, relates that Kamehameha I "destroy[ed] the fields and plantations of the inhabitants" (Menzies 1920:115). He and his warriors remained on Moloka‘i for a year to prepare the attack on O‘ahu. He is said to have grown taro and "had all his canoes put in order. He drilled his warriors on the Hoolehua plain near where the airport is now" (Cooke 1949:112).

3.3 Early 1800s

The first Protestant missionaries arrived in Hawai‘i in 1820. In the following years, the ruling Hawaiian chiefs and governors established a network of public schools throughout the villages of the Hawaiian Islands. In September 1828, a group of missionaries travelled to Moloka‘i to determine the progress of the schools (Andrews 1829). After landing on the southeast side at Honomuni, they traveled west over the next two days to the villages of Hālawa, Halana, Makanalua (Kalaupapa Peninsula), and overland to Kaunakakai where they put up for the night:

> During the whole night, the people continued to arrive; and, about sunrising, the chiefs made their appearance […] Having examined a large school here, we walked on, and the chiefs followed, in canoes. We travelled along, on the sea shore, finding very little vegetation, on account of the drought. There is scarcely any water on this side of the island. [Andrews 1829:273]

They completed their examination of the schools on Moloka‘i the following day, noting that they "numbered nearly 700 houses, and think there are about 1,000 on the island" (Andrews 1829:274).

The United States Navy Exploring Expedition under the command of Captain Charles Wilkes visited the island of Moloka‘i in 1840 and described the island as follows:

> […] forty miles long, from east to west, and nine miles wide: the western portion, embracing about one third of the whole extent, is a barren waste; and the remaining two thirds is mountainous, in some places rising to the height of twenty-eight hundred feet, with the exception of a narrow strip of land on the south side, which has a most favorable exposure, and is highly productive. [Jenkins 1850:258]

3.4 The Māhele and the Kuleana Act

The Organic Acts of 1845 and 1846 initiated the process of the Māhele—the division of Hawaiian lands—that introduced private property into Hawaiian society. During the Māhele, all lands in the Kingdom of Hawai‘i were divided among *mō‘ī* (king), *ali‘i* (royalty), *konohiki* (overseer of an *ahupua‘a*), and *maka‘āinana* (common people/tenants of the land) and passed into the western land tenure model of private ownership. In 1848, the crown and the *ali‘i* received their land titles. On 8 March 1848, Kauikeaouli (Kamehameha III) further divided his personal holdings into lands he would retain as private holdings (Crown Lands) and parcels he would give to the government. According to an 1897 Hawaiian Government Survey map of Moloka‘i showing 1848 divisions of land, the entire *ahupua‘a* of Ho‘olehua was given to the government, and all of Pālā‘au Ahupua‘a (including the western and central project areas) was retained by the Crown (Figure 9).

Native Hawaiians who desired to claim the lands on which they resided were required to present testimony before the Board of Commissioners to Quiet Land Titles. Upon acceptance of a claim the Board granted a Land Commission Award (LCA) to the individual. The awardee was then required to pay a cash amount equal to one-third of the total land value or to pay in unused land. Following this payment, a Royal Patent (RP) was issued giving full title of ownership to the tenant.

On 19 October 1849, the Hawaiian Privy Council adopted resolutions to protect the rights of Native tenants, the *maka‘āinana*. The *maka‘āinana* were offered fee-simple titles for their house lots and lands that they cultivated for themselves. *Kuleana* awards for individual parcels within the *ahupua‘a* were subsequently granted through a land commission. These awards were first presented to Native Hawaiian tenants followed by the naturalized foreigners (non-Hawaiians born in the islands) or long-term resident foreigners who could prove occupancy on the parcels before 1845. No commutation fee was necessary to apply for a Royal Patent for a *kuleana* award as the commutation fee had presumably already been paid by *ali‘i*/*konohiki* who had been awarded the entire *ahupua‘a*, or an *‘ili* (a land division within an *ahupua‘a*) in which the Native tenant claimed his own small parcels (Chinen 1958:29–30).

No native tenant LCAs were awarded near the current project areas, and only one LCA and one Land Grant were awarded in the vicinity. Approximately 4.6 km southeast of the eastern project area, LCA 11216 (LCA 11216*Mo) was awarded to Kekauonohi (see Figure 9 and Figure 10) a member of the House of Kamehameha and a wife to King Kamehameha II. This LCA included 5,803-acres comprising approximately half of the *ahupua‘a* of Na‘iwa. Southwest of the project area, Grant 3146 was awarded to Charles R. Bishop (see Figure 10). No land use information is provided for Grant 3146 (Waihona ‘Aina 2021).

3.5 Mid- to Late 1800s

3.5.1 Cattle Ranching

Cattle were introduced to Moloka‘i in the 1840s. De Loach (1975) summarizes this first effort at commercial ranching:

> Rudolph W. Meyer, who was, [...] responsible, along with [Reverend] Hitchcock, for the introduction of cattle on the island, had come to Moloka‘i in the 1840s. He established a ranch stocked with longhorns in the Kala‘e [north central Moloka‘i]

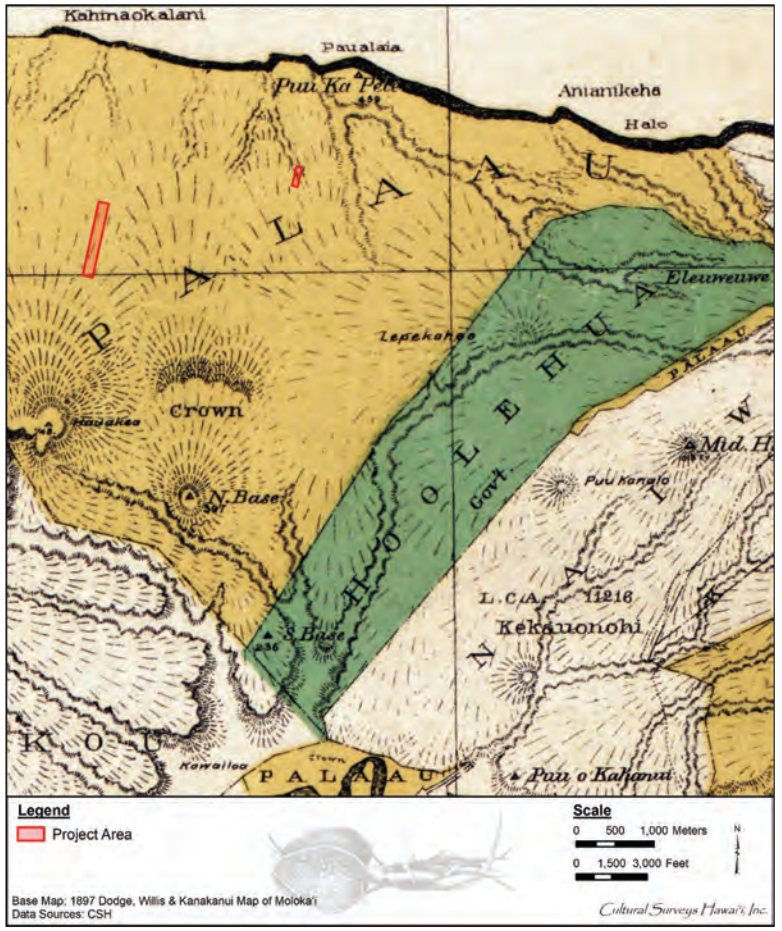


Figure 9. Portion of Dodge et al. (1897) map of Moloka‘i showing 1848 land divisions (Crown [yellow], government [green], LCAs [no color]); the western and eastern project areas as within Crown lands

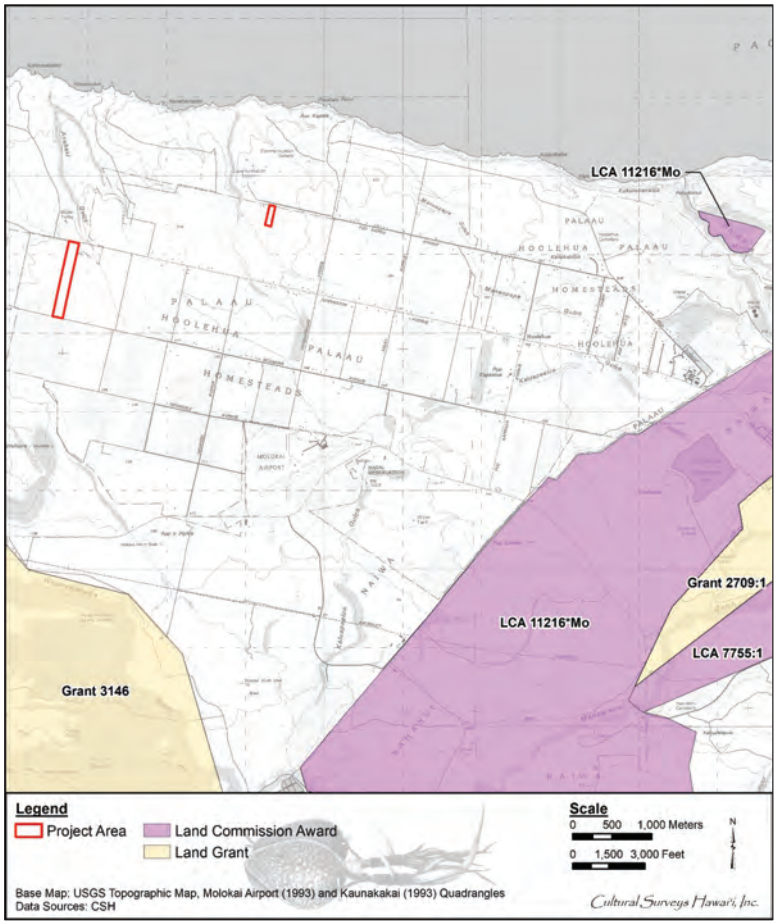


Figure 10. LCAs and Grants in the project area vicinity depicted on a portion of 1993 Molokai Airport and Kaunakakai USGS topographic quadrangles (none of the three project areas were close to a Native Tenant LCA or grant)

> Area. A lucrative trade in cattle and hides was begun between Moloka‘i and Honolulu. The cattle were exported from the village of Pālā‘au on the southwestern shore, over the reef, and onto a waiting ship. Pālā‘au grew wealthy on cattle and dry land taro. All this came to an end, however, in the 1850s, when Meyer discovered that the number of cattle in the herd had diminished considerably. He found that almost every male in the village was guilty of rustling, and so all the men were shipped off to jail in Honolulu. The men’s families followed, And the village was deserted. Today Palaau sits abandoned in a kiawe forest, as no one ever returned to live there. [de Loach 1975:68]

Despite these early setbacks, cattle (and sheep) ranching expanded greatly in the second half of the nineteenth century:

> During this period, cattle, sheep and goats were imported to the island in ever-increasing numbers. According to Judd, there were no cattle on the island in 1832 and by 1853 there were only 200 head, The 1866 census, however, revealed 2,586 head of cattle, 13,332 sheep and 196 goats on the island. […] In 1868, Kamehameha V released axis deer on the island. [de Loach 1975:86]

In 1855, Lot Kapuaiwa (King Kamehameha V) purchased the *ahupua‘a* of Kaunakakai for two hundred dollars (Interior Department Letter, July 1885) to maintain the value of a sheep station established there by his brother, Alexander Liholiho (King Kamehameha IV) (Kuykendall 1953:152). Lot Kapuaiwa also actively sought to increase his Moloka‘i holdings: “in the desire to have a country estate, he bought up land and cattle from the resident Hawaiians and used Moloka‘i as a vacation ground from his cares of State” (Judd 1936:9–10).

In 1868, King Kamehameha V was sent seven live axis deer from Hong Kong as a gift (Tomich 1986:127). He released the deer, adding to the free-roaming game population on the island but, consequently, also to the destruction of vegetation by the flourishing population of foraging animals. In a 1902 talk given in Japan on Hawaiian Forests, E.M. Griffith (1902) remarked on the already alarmingly denuded state of Moloka‘i:

> Cattle, goats and deer have totally destroyed the forests upon the larger portion of the island of Molokai so that the western half is practically destitute of any tree growth. It is possible that the algaroba forests which have secured such a strong hold along the coast near Kaunakakai may gradually spread over this end of the island […] The condition at present time is that the forest has been pushed back into the deeper and more inaccessible canyons and onto the highest slopes of the mountain. The effective watershed in respect to the conservation of the water supply has thus been greatly reduced and the careful protection of the remaining forests is an absolute necessity. [Griffith 1902:Appendix G]

An 1886 Government Survey map (Figure 11) depicts an approximate upper growth line of the algaroba (*kiawe*) forests approximately 3.5 km south of the present project areas. The western and eastern project areas are depicted as within the Momomi Paddock. Extensive pasture land is indicated with no other development suggested.

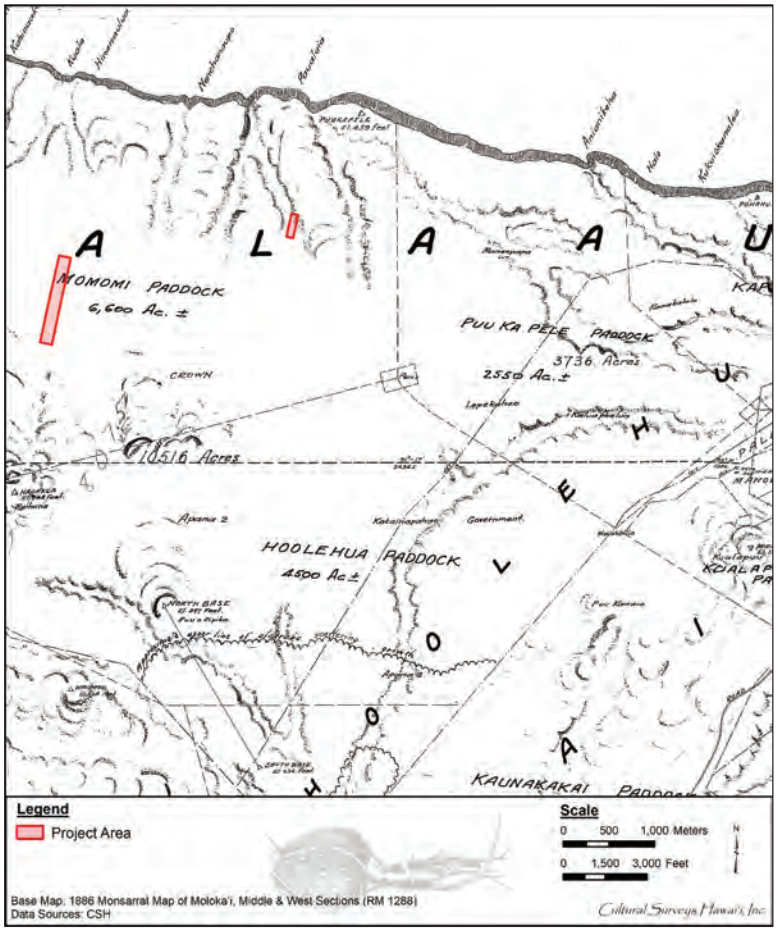


Figure 11. Portion of Monsarrat (1886) Hawaiian Government Survey Map of Molokai, Middle and West Sections (RM 1288); showing the western and eastern project areas as within the Momomi Paddock

During the Māhele in 1848, Bernice Pauahi Bishop, daughter of Abner Pākī and Laura Konia and last descendant of the Kamehameha dynasty, inherited much of the lands which are now Molokai Ranch lands. Her husband, Charles R. Bishop, inherited the lands of Kaluako‘i in 1875. The Molokai Ranch was formed in 1897 when a *hui* (group of investors) purchased approximately 70,000 acres of central and western holdings from the Bishop Estate (Cooke 1949; Stearns and Macdonald 1947).

3.5.2 Agriculture

Mr. Harvey R. Hitchcock and Mrs. Rebecca H. Hitchcock became the first permanent missionaries on Moloka‘i. They established a Protestant church at Kalua‘aha in 1832, at which point the only agricultural crops they noted were bananas and taro grown in the valleys where water was most readily available. No “regular schools, churches, houses of permanent nature, no garments, no cattle, only one horse, and home articles of the most primitive nature” were present then (Wiebke 1940). Twenty years later, the island had a number of churches, 1,000 students enrolled in 21 schools across the island, and livestock including goats, hogs, 400 horses, and cattle. Taro, potatoes, and grapes were “cultivated quite extensively” (Wiebke 1940:1).

In the early 1840s, the Meyer family in Kala‘e was growing and exporting coffee, corn, wheat, and potatoes to the mainland. The Meyer family started a sugar mill at Kala‘e in 1878 using 30 acres of land to grow cane. This was one of the few locations on Moloka‘i that had adequate rainfall to grow cane, but problems stemmed from the cane being planted at an elevation of 1,500 ft above sea level. Sugarcane matured slower at higher elevations, so yields were lower. The Meyer plantation produced 50 tons of sugar annually (Wiebke 1940). The sugar mill was closed in 1894, because it was too small to compete with larger operations.

Two other large sugar plantations were developed on Moloka‘i beginning in the late 1870s, one at Moa-nui in East Moloka‘i and one at Kaunakakai. Both of these plantations quickly failed and were abandoned (Wiebke 1940).

In 1898, American Sugar Company, Limited (ASCO) was incorporated by Molokai Ranch, which leased an additional 30,000 acres (Cooke 1949). Following the incorporation, a full-scale cane operation in central and western Moloka‘i began, including an attempt to develop the arid lands of the Ho‘olehua plain. “On the Hoolehua plain 750 acres were prepared in parallel trenches following the contours. 500 acres were actually planted in young cane shoots” (Judd 1936:12). Due to an inadequate water supply, this sugar enterprise was also unsuccessful. The well pumps, which had been installed in surface wells, were of such large capacity that they soon exhausted the fresh water, and irrigation ditches 8 miles long brought pumped water with such a high salt content that it could not be used to grow sugarcane:

> Wells were dug in the lowlands and water pumped into a system of irrigation ditches above. As the pumping increased, the salt content of the water gradually increased until it became detrimental to the cane. This plantation like the others was quickly abandoned. [Wiebke 1940:1]

The ASCO plantation at Kamalō was the only Moloka‘i sugar plantation to invest money in a railroad. Railroad tracks were constructed from Kaunakakai harbor “up through Palaau and Iloli to the middle of the Hoolehua plateau” (Judd 1936:11). After failed sugar cultivation efforts, “graded railroad bed cutting through the gulches of Palaau” and “irrigation ditches […] on the

Hoolehua plain" were all that remained (Judd 1936:11–12). No locomotives were ever shipped to Moloka‘i. The tracks were removed and recycled into cattle guards. Today, stones mark the old railway route from Pālā‘au to Mahana (Strazar 2000).

By 1900, all sugar production on Moloka‘i had ceased (Stearns and Macdonald 1947:3). Regarding the ASCO plantation's demise, former Molokai Ranch manager, George C. Munro, recalled the following:

> Hawaiians claimed that the plantation was doomed from the start, because as the company constructed the railroad along the shore to Palaau it tore down an ancient fishing heiau near Kahunui. It used the rocks for the railroad bed and ran the rails through the center of the heiau. [Morse 1953:6]

3.6 1900s

3.6.1 Molokai Ranch

Molokai Ranch became a more organized operation in the early 1900s. By 1905, the ranch had transitioned from an open country system to the paddock system (Henke 1929). During the transition, wild deer and feral goat populations were reduced, a water distribution system was implemented, and a breeding program begun. Water from the East Moloka‘i mountains was gravity fed to a concrete reservoir and then piped down to the ranch. By 1929, Molokai Ranch had approximately 75 miles of water pipes and more than 100 miles of smooth wire fences. An 1886 Hawaiian Government Survey map shows several paddocks surrounding the current project area (see Figure 11). These labels were most likely added after the map's original creation, since the paddocks appear to indicate land use by Molokai Ranch, which wasn't established until 1897 and then transitioned to the paddock system from 1898 to 1905 (Henke 1929). The western and eastern project areas are within the Momomi Paddock.

In the 1920s, Molokai Ranch lands consisted of about 10,000 acres leased for pineapple cultivation, 8,000 acres of forest reserves, and 50,000 acres utilized for ranching (Henke 1929:52). Most ranching activities were associated with cattle. Beginning in 1923, Molokai Ranch imported Hereford bulls from the Parker Ranch on Hawai‘i Island, which resulted in a beef cattle population of over 4,500 head by 1929. In 1929, the ranch also had 400 swine and about 200 sheep. Sheep ranching was formerly more prevalent, with sheep numbers up to approximately 17,000 in 1907. However, the combination of sheep and cattle ranching caused over-pasturing, and since cattle ranching was more lucrative, sheep ranching began phasing out. In 1951, grazing land for sheep ranching remained a viable industry, despite its heyday being many decades prior (Carlson 1951). Cattle ranching remains an important industry on Moloka‘i.

Molokai Ranch also produced honey. In 1903, an Italian breed of bees was purchased and crossbred with the island's endemic species (Cooke 1949). In 1928, 350 tons of *kiawe* honey were produced on Molokai Ranch, most of which was sold to Germany (Henke 1929).

3.6.2 Hawaiian Homes Commission

In 1920, the U.S. Congress passed the Hawaiian Homes Commission Act to administer and manage some 200,000 acres of land that belonged to the government of the Kingdom of Hawai‘i or was recognized as Crown lands. Agricultural homesteads were to be leased to Native Hawaiians, with leasehold terms generally lasting 99 years at one dollar a year. The following year, the

program began attracting people to Moloka‘i. Kalaniana‘ole Colony was the first homestead established under the Hawaiian Homestead Act of 1920. The settlement is located in Kalama‘ula Ahupua‘a, near the southern shores of Moloka‘i Island.

The Moloka‘i homestead program initially was impacted by many problems, including drought and high winds (McGregor 1990:37–38). Insect pests were also a discouraging impediment, at one point accounting for destruction of over 50% of many of the most desirable crops on the island (Wiebke 1940). A *Maui News* article from 1940 recounts the following:

> With the birth of the Hawaiian Homes commission, Hawaiian homesteaders began pouring into the Kala‘e and Ho‘olehua sections. For a number of years extensive truck crops of every kind were raised successfully, but today this project has become a sorrowful enigma. [Wiebke 1940:1]

The 1922 USGS map (Figure 12) shows the project areas as relatively undeveloped. An unimproved Moomomi Road passed through the western project area and a Waihii Pipeline and adjacent unimproved road passed to storage tanks 1.3 km southeast of the eastern project area. The pipelines reflect the burst of agricultural activity.

Despite such difficulties, people managed to cultivate their plots (McGregor 1990:37–38). For instance, at Kalaniana‘ole Colony, water for "bathing, laundry, and farming" was originally supplied by wooden flume from a spring in Kaunakakai, with drinking water provided by a spring in Kalama‘ula (Tomonari-Tuggle 1990:10). Farming was diversified and successful crops included corn, watermelons, cucumbers, sweet potatoes, eggplant, and papaya (Keesing 1936; Wiebke 1940). In addition, demand became high for Moloka‘i alfalfa, and homestead tomatoes "controlled the Honolulu market" in 1924 (Keesing 1936:56).

Overall, the program succeeded and was expanded to include 11,400 acres of Pālā‘au-Ho‘olehua beginning in 1924. The current project area consists of approximately 36.4 acres (14.7 hectares) of these Pālā‘au-Ho‘olehua Homestead lands and includes Lots 17 and 104D-1. Due to the homestead program, the Pālā‘au-Ho‘olehua region had the largest population of Native Hawaiians in 1930. Of the 1,031 residents, 826 were Hawaiian (McGregor 1990:10).

In addition to agricultural pursuits, the Hawaiian Homes Commission encouraged raising livestock and ranching. Raising pigs brought the most revenue and economic value; however, a few families sold eggs and every family owned some cattle (Keesing 1936). In 1929, 54 homesteaders owned a total 358 cattle, including two Hereford bulls, 106 horses, 15 mules, and six donkeys (Henke 1929). Community pastures allowed each lot holder to graze up to 60 head of livestock. Additionally, three 250-acre pastures were reserved specifically for ranching. Pastures in Ho‘olehua and Pālā‘au totaled 6,630 acres. In 1935, 979 cattle, 72 horses, and 25 mules utilized the community pastures though less than half Ho‘olehua families had cattle on these lands.

The Hawaiian Homes Commission was also instrumental in the establishment and expansion of Moloka‘i High School, approximately 5.5 km east of the current eastern project area. The school gym was constructed between 1931 and 1932 by the Hawaiian Homes Commission and the county. Moloka‘i High School became the first and only high school on the island when it expanded from an intermediate school to a high school in 1939. Situated at Ho‘olehua on Hawaiian Homes Commission land, it opened to all students on the island with an enrollment of over 400. In 1950, the board of supervisors approved negotiation of the purchase of 40-acres of Hawaiian

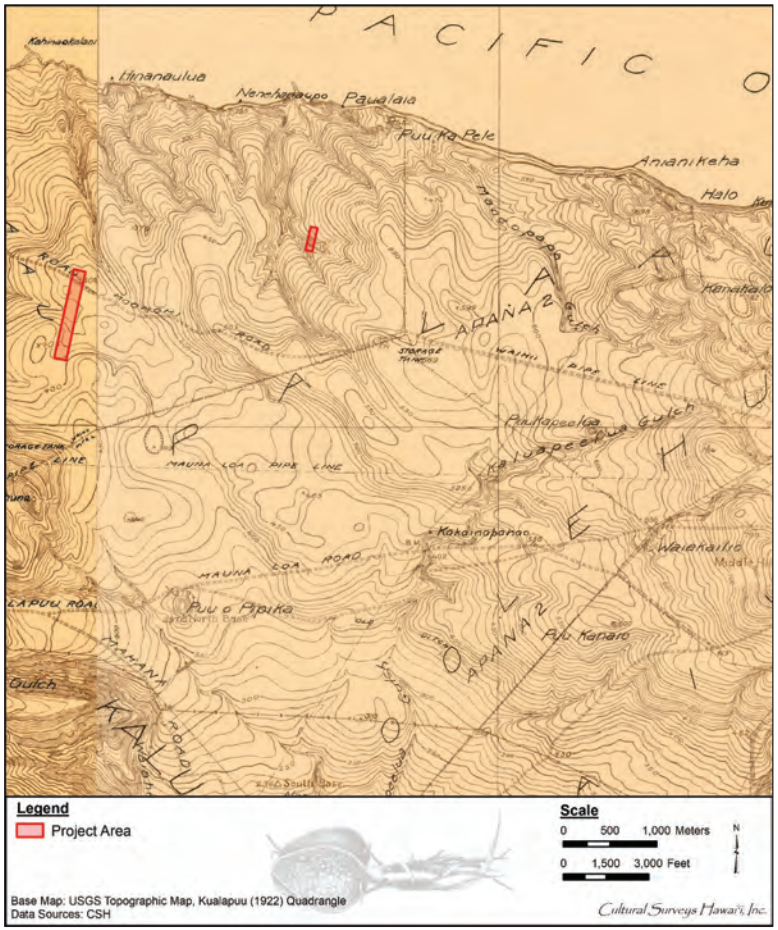


Figure 12. Portion of 1922 USGS topographic map of Kualapuu quadrangle, showing the project areas as relatively undeveloped (an unimproved Moomomi Road passed through the western project area and a Waihii Pipeline and adjacent unimproved road extended east to storage tanks southeast of the eastern project area)

Homes Commission lands adjacent to the extant campus for construction of a new high school site (Maui News 1950).

3.6.1 Pineapple

Starting in 1918, independent pineapple growers tilled “the hillsides from Ualapua to Halawa, but due to high cost of operations these small plantations were short lived” (Wiebke 1940:1). The commercial pineapple industry arrived on Moloka‘i in the early 1920s, with Molokai Ranch owning a majority of the leased pineapple lands (Lee-Greig and Hammatt 2008). Pineapple cultivation began in Pālā‘au-Ho‘olehua in 1926, when Libby, McNeill and Libby signed up some homesteaders to grow pineapple on homestead land operated in leased blocks of several 35-acre homesteads, which were cultivated by Libby.

By 1929, the California Packing Corporation (Calpac) had begun enlisting Native Hawaiian homesteaders in the Kualapu‘u region, including areas near the current project area, to grow pineapple. The system adopted by both Libby McNeill & Libby and Calpac involved homesteaders growing pineapple in blocks of land leased by the plantation. Between 12 to 15 abutting homesteads were assembled by the pineapple plantation to form a contiguous area that was assigned a block number (Figure 13). Homesteaders under this block system planted, tended, and harvested to receive a proportionate share of the sale of fruit from each block. The harvested fruit was trucked by Calpac to a pier constructed at Kaunakakai, where it was crane-loaded onto barges and shipped to the Calpac cannery at Kahului, Maui (Larsen and Marks 2010:371–372). Homestead residents received almost two million dollars in cash payments for their efforts between 1929 and 1935.

Despite droughts, including one between 1944 and 1945 that caused the loss of the entire crop, pineapple production in the vicinity of the project area continued until the 1970s (Larsen and Marks 2010:379). Dole Pineapple, which had subsumed Libby, McNeill and Libby’s operations, ceased pineapple cultivation in 1975. The California Packing Corporation had planned on closing the same year but continued cultivation until 1983, when a majority of its production ceased business on Moloka‘i (Larsen and Marks 2010:382).

3.6.1 School Farm

In the early 1920s, Ho‘olehua consisted of an undeveloped wide, grassy plain used for pasture with little development and no public school. Several families moved into the area when the land opened to Hawaiian homesteading and California Packing Corporation started their pineapple plantation at Kualapu‘u, formerly a Molokai Ranch camp. Kalae School, a one-room schoolhouse at Kalae, eventually moved to the old recreation hall at Kualapu‘u to better accommodate students coming from the ranch camp. As homesteads and pineapple cultivation expanded in the area, a new school was constructed at Ho‘olehua to meet growing numbers of student enrollment; in 1926 the students at Kalae School moved to the new school. The staff originally consisted of three teachers, including an instructor of agriculture, but within three years the faculty grew to 15.

The school established a progressive agricultural department in 1930, which rapidly developed into a highly reputable agricultural training center. Modern methods of farming and animal husbandry were taught to male vocational students (numbering 70 in 1939). Students cultivated crops designed to give them needed experience and experimented with plantings to test for possible improved crops or strains for use on the island. About half of the vocational boys came from

homesteads and the other half from Calpac-employed families. A cooperative program between Moloka'i High School and Calpac was initiated in 1948, where boys from the vocational program worked at the plantation in the mornings before school for seniority consideration for employment post-graduation (*Maui News* 1948).

Hawaiian Homes Commission provided a 26-acre farm (Figure 14) to the department for educational purposes on "well selected land […] makai of the Hawaiian Homes Commission office in Ho'olehua" (*Maui News* 1940:1). The farm had chicken houses and pigpens built by the vocational students in the farm shop. "The instructor of agriculture and three classes of boys spent weeks with tractors and ropes clearing lantana" from the area to be cultivated (*Maui News* 1939:6). A 1939 news article describes the farm:

> The farm is up to date and well equipped. It serves the community as a practice ground for students; a source of improved livestock, poultry and plans; an example to the community of good landscaping and agricultural methods and is an experimental ground for new crops. Here the boys are receiving thorough instruction in the fundamentals of good scientific farming coupled with training to farm management—increasingly important because of the vital necessity that the modern tiller of the soil have a good working knowledge of farm economics in Hawaii if local small scale agrarian enterprises are to be operated at a profit. [*Maui News* 1939:6]

Figure 15 illustrates a typical resident homestead lot in Ho'olehua during the 1930s. Families farmed a variety of crops in Ho'olehua, including corn, melons, tomatoes, cucumbers, pumpkins, sweet potatoes, squash, peanuts, beans, onions, and cabbage (Keesing 1936). Pumpkin poi became a staple for these homesteaders. Though dryland agriculture had successes at Pālā'au-Ho'olehua Homesteads, constant care was needed to combat hardships caused by droughts, winds, and pests.

3.6.2 Corn

Corn was grown on Moloka'i from as early as the 1920s. In a letter to the editor of the *Honolulu Star-Bulletin* in 1922, the writer comments quite fondly of Moloka'i corn (Figure 16). In the 1940s, the Moloka'i corn project was intended to provide a local source of food for livestock, since all feed corn was being imported (*Honolulu Advertiser* 1944a). Approximately 1,400 acres of field corn and 1,000 acres of milo maize were planted and harvested by resident high-schoolers and homesteaders. Homesteaders also grew feed corn separate from the Moloka'i corn project (*Honolulu Advertiser* 1944b). In Ho'olehua, large amounts of corn were sold or fed to livestock (Keesing 1926).

In 1967, Kaye Waldorf became a third partner in Hawaiian Research, Ltd. and moved from his 430-acre corn and soybean farm in Iowa to become resident manager of the company and grow corn on Moloka'i (Lynch 1968) (Figure 17). Hawaiian Research, Ltd. began experimenting with seed corn on Moloka'i in the winter of 1966; by autumn 1968, the company was growing over 900 strains of corn. Fertile soils, a year-long temperate albeit arid climate, a culturally diverse environment for his teenage children, and an "intellectual curiosity" attracted Waldorf to experimental agricultural farming on Moloka'i (Lynch 1968:B-1).

Figure 13. Sketch plan of Ho'olehua Homesteads (Keesing 1936:26) showing current project areas (the eastern lot was within the indicated Hoolehua Homesteads area while the western project area appears to have been in "Community Pasture")

Figure 14. Community Center for Ho‘olehua Homesteads including, from left to right, a hall, school, church, and farm, ca. 1939 (Keesing 1936:124)

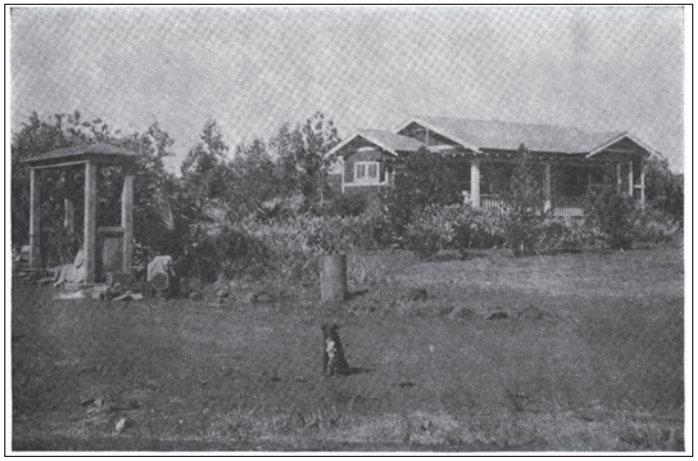
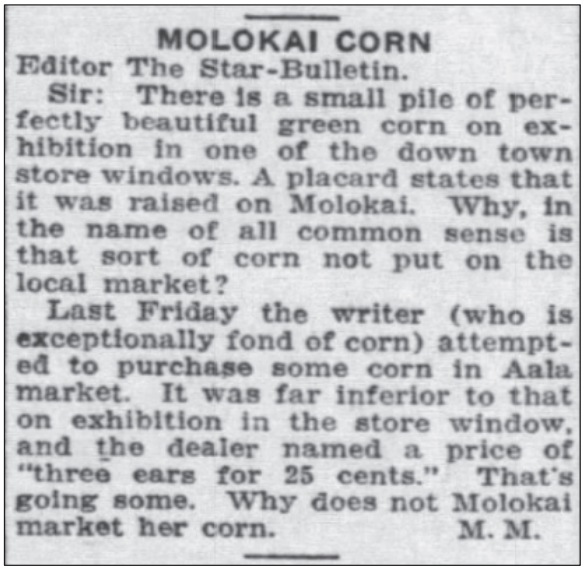


Figure 15. A Ho‘olehua homestead in 1939 (Keesing 1936:59)



MOLOKAI CORN

Editor The Star-Bulletin.

Sir: There is a small pile of perfectly beautiful green corn on exhibition in one of the down town store windows. A placard states that it was raised on Molokai. Why, in the name of all common sense is that sort of corn not put on the local market?

Last Friday the writer (who is exceptionally fond of corn) attempted to purchase some corn in Aala market. It was far inferior to that on exhibition in the store window, and the dealer named a price of "three ears for 25 cents." That's going some. Why does not Molokai market her corn. M. M.

Figure 16. Letter to the editor praising the quality of Moloka‘i corn in 1922 *(Honolulu Star-Bulletin* 1922:6)

Figure 17. Experimental corn farmer, Kaye Waldorf, in West Moloka‘i; pipeline (left) transported water to his crops (Roll 1968:B-1)

The same State Department of Land and Natural Resources (DLNR), Water and Land Development Division irrigation project that supplied water to about 14,500 acres of pineapple fields in West Moloka‘i was also used to irrigate the corn fields, which comprised a portion of 1,500 acres of diversified agricultural land that also included “experimental potato plantings and some Hawaiian Homestead truck farm lands” (Lynch 1968:B-1). In October 1968, the final stages were underway for a project involving 5 miles of tunnel and additional miles of pipeline to transport water from the wet, northeastern Waikolu Valley to crops in West Moloka‘i. In addition, a 1.4-billion-gallon earth reservoir was being constructed at a central location in Kualapu‘u to store any excess water collected during the rainy winter season in order to provide a year-round supply of water to arid West Moloka‘i’s crops. Kualapu‘u Reservoir is located approximately 6 km southeast of the current eastern project area. While the lack of a natural water supply certainly created obstacles, Waldorf preferred the more controlled distribution of water to his crops via a pipeline (see Figure 17) to the unpredictable rains he experienced as a corn farmer in Iowa.

3.6.3 Infrastructure

In conjunction with agricultural, residential, and economic changes, the twentieth century also brought infrastructure improvements to the island of Moloka‘i. On 13 May 1909, a telephone line was authorized for Moloka‘i Island (*Maui News* 1926). In 1925, construction began on a road connecting Kaunakakai to Ho‘olehua, which was used regularly during Moloka‘i’s pineapple era to transport loads for export. Access roads within the homesteads were established and have been maintained by the Hawaiian Homes Commission without charge to homesteaders or Maui County (Keesing 1936:49). Aerial photographs and topographic maps show unpaved roadways traversing the current project area(s) vicinity in the 1950s and 1960s (Figure 18 through Figure 21). The 1950 aerial photograph (see Figure 18) shows pineapple cultivation neighboring, but not within, the project areas. The 1964 USGS aerial photograph (see Figure 20) indicates active cultivation of pineapple in the western project area.

In 1932, Molokai Electric Company was incorporated and established an electric generating station in Kaunakakai with one 200-horsepower diesel generator, which first supplied electricity to 59 customers in Kaunakakai Village that year (Young 1961). By the 1960s, the company serviced the entire island with nine generators channeling electricity through 80 miles of transmission lines (Young 1961).

Following the development of aerial combat in the First World War, the availability of war-surplus aircraft for civilian aviation in the Hawaiian Islands led to the establishment of a civilian airfield at Ho‘olehua in 1919 named Moloka‘i Field. In the 1930s, improvements were made at Moloka‘i Field including the construction of a terminal building for the use of Inter-Island Airways, the first commercial inter-island carrier. The segregation of part of the civilian airfield at Ho‘olehua for military use occurred when the U.S. Army Air Corps established a portion of the field as “Homestead Field,” beginning in September 1931 (Horvat 1966:38,40–47). By the time the United States entered World War II in 1941, aircraft of the Fifth Bombardment Group were stationed at Homestead Field. Heavy rains caused water and mud to flow into the operating area of the airport until a drainage ditch was completed in 1953. In 1954, the sod-on-sand runway was replaced by a paved runway and the airport terminal was built in 1957. Figure 19 shows the airport during the 1950s prior to the construction of the terminal. Improvements to the airport continued from 1969 through 1993, including terminal expansions, perimeter security fence installation, a

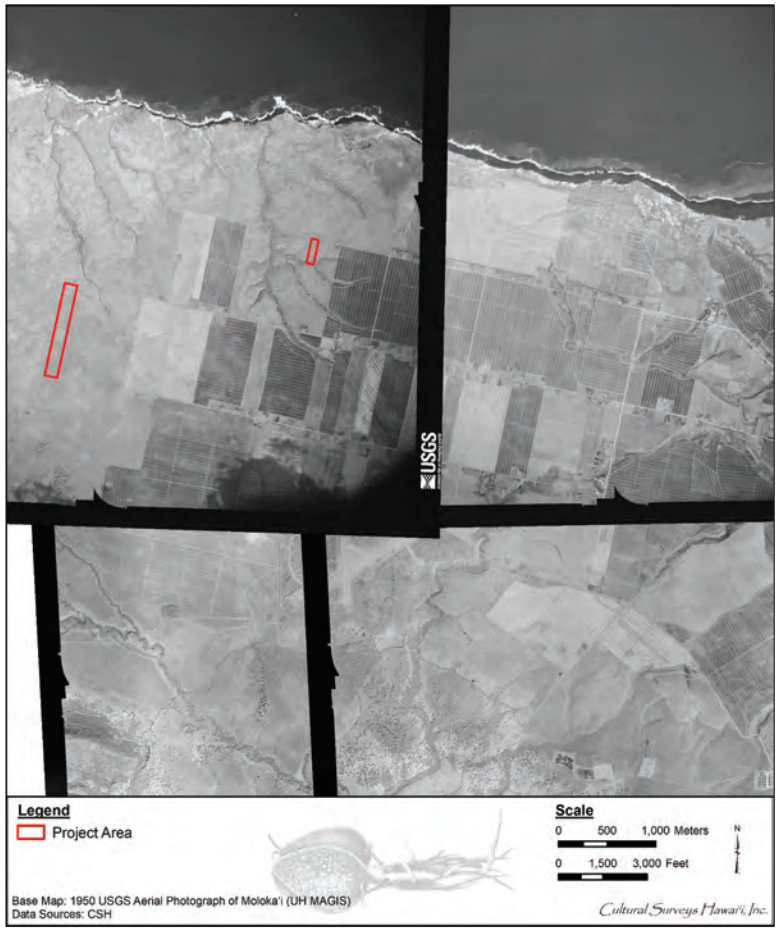


Figure 18. 1950 USGS aerial photograph of Molokai (UH MAGIS) showing pineapple cultivation neighboring, but not within, the project areas

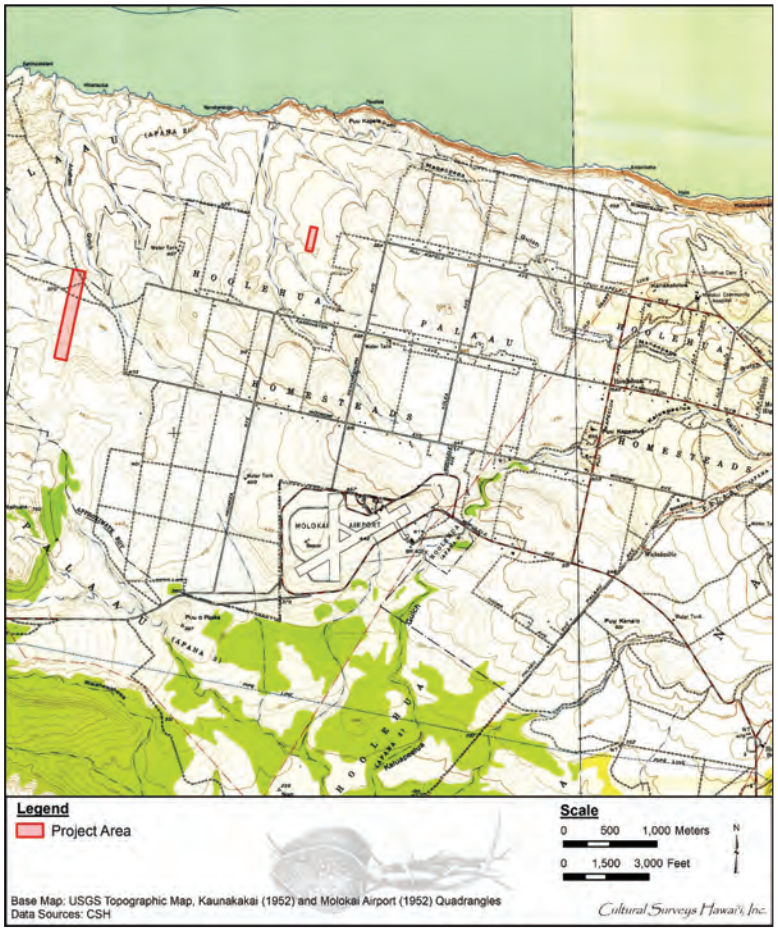


Figure 19. Portion of 1952 Kaunakakai and Molokai Airport USGS topographic quadrangles showing unpaved roads are present within and surrounding the project area; the pipeline south of the project area(s) was used to transport water from East Moloka‘i

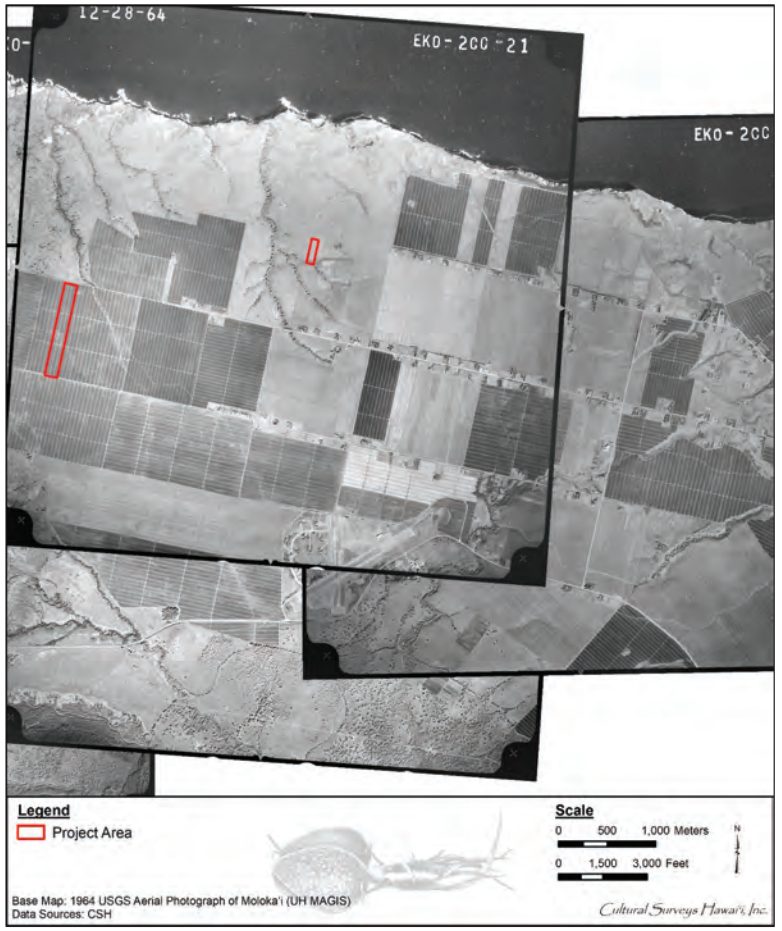


Figure 20. 1964 USGS aerial photograph of Moloka‘i showing the present project areas (note the general absence of trees in the project areas and the indicated active cultivation of pineapple in the western project area)

Figure 21. Portion of the 1967 Kaunakakai and 1968 Molokai Airport USGS topographic quadrangles showing unpaved roads abutting the project area(s) and an aqueduct crossing the Ho‘oleuha Plain to the south

new FAA air traffic control tower, a fire protection system, and a maintenance base yard (State of Hawai‘i 2008).

A heliport associated with the United States Navy reservation, appears on a 1983 topographic map (Figure 22) and 1993 topographic map quadrangles (see Figure 1). However, this development does not appear in recent aerial imagery (see Figure 5).

3.7 Contemporary Land Use

Pineapple production on Moloka‘i phased out during the 1970s, with complete abandonment by the early 1980s. Tourism and service-related industries replaced commercial agriculture as the economic foundation of urban areas. The towns of Maunaloa and Kualapu‘u have continued to support sizeable populations, though Kaunakakai has remained the island’s major urban center.

The development history of large land holdings on the island of Moloka‘i includes Molokai Ranch Company lands, some

> 55,575 acres, or 35 percent of the entire island. This ranch includes 20 miles of coastline and two hotel properties, the former Molokai Lodge and the former Kaluakoi Hotel, two golf courses, residential, agricultural and conservation land, as well as nearly 30 acres of commercial land near Kaunakakai and 85 acres of industrial land at Maunaloa and Kualapuu. [Magin 2017]

The company that owned all these properties, Molokai Properties Limited, ceased all operations on the island in 2008 (Mangieri 2019). These holdings have been listed for sale since 2017. While community interests actively desire purchasing the lands for residents and/or the state, the fate of these lands and, consequently Moloka‘i in general, is still unknown.

DHHL proposes to construct infrastructure improvements including clearing, grading, and installation of roadway, electrical, connections to domestic water, and irrigation water utilities. The proposed plan calls for ground-disturbing activities to be confined to the two subject parcels, but will extend to existing roadways for access and connection for utilities. These improvements will support DHHL beneficiaries through the provision of essential services necessary for agricultural homesteading. While installation of wastewater treatment systems will be the responsibility of the lessee, the environmental impacts are being considered as part of this action.

.

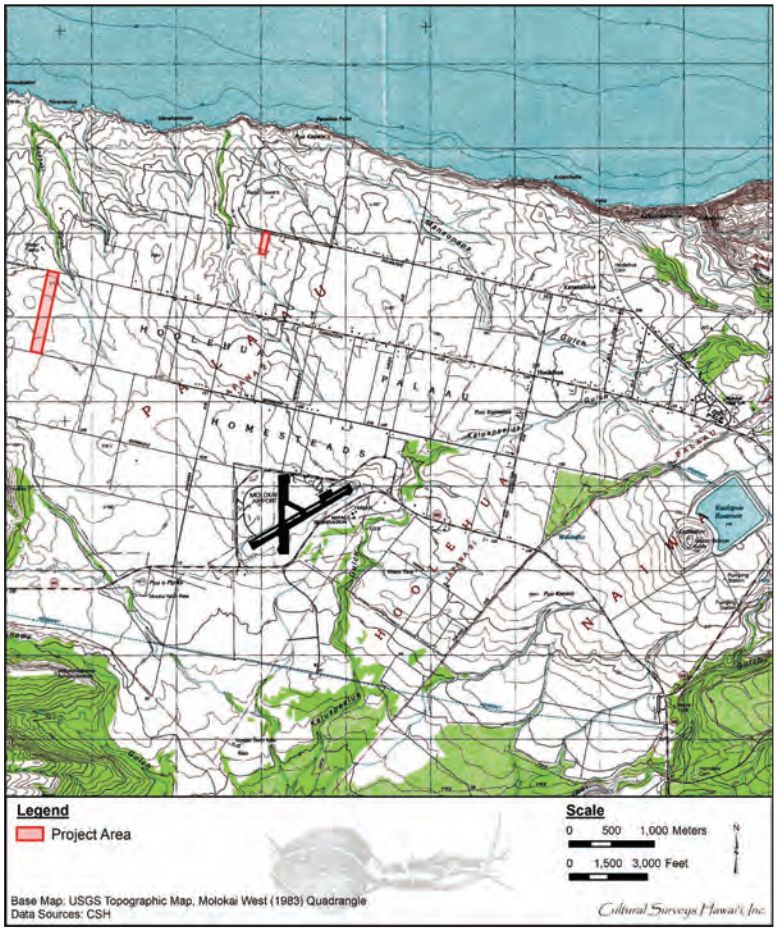


Figure 22. Portion of 1983 Molokai West USGS topographic quadrangle showing an aqueduct crossing the Ho‘olehua Plain to the south and the Kualapuu Reservoir southeast of the project area(s)

Section 4 Previous Archaeological Research

Previous archaeological studies conducted within approximately 3.0 km (1.9 miles) of the current project area include archaeological reconnaissance, field inspections, inventory surveys, and monitoring programs (Figure 23 and Table 2). No historic properties have been previously identified within the project area, and few have been identified within the vicinity (Figure 24 and Table 3).

4.1 Summers (1971)

Archaeological work accomplished prior to the late 1960s has been summarized by Catherine Summers (1971) in *Moloka‘i: A Site Survey*, the most comprehensive island-wide study to date. Based on previous research, particularly the John F.G. Stokes (1909) survey of *heiau* and other major sites on Moloka‘i, and through revisiting some 100 locations, Summers (1971) compiled a brief history and archaeological site survey for Moloka‘i Island with the Bernice Pauahi Bishop Museum. Data in the compilation include documentation by M.D. Monsarrat in 1884 published by Thrum (1908); Cobb (1902); Cooke (1949); Emory’s data in Bonk (1954); unpublished materials by Stokes from surveys in 1909 and Dunn in 1957, and map records by Cartwright. Summers (1971) documents over 300 sites, mainly concentrated along the coastal regions. These sites are described by individual *ahupua‘a*, as well as legendary, traditional, and historical information related to Moloka‘i. None of the sites were identified within the current project area. However, Summers (1971) documents seven sites in the project area vicinity.

Sites 11A and 11B are approximately 3.5 km southeast of the eastern project area. Together these two sites comprise the Kape‘elua Complex, a historic property designated by the SHPD as SIHP # 50-60-03-11. Summers described the sites as follows:

> Site 11A. ‘Caterpillar Stones,’ Ho‘olehua 2
>
> The stones are on top of the hill, Pu‘u Kape‘elua, ‘The Caterpillar Hill.’
>
> Cooke gave the following legend about these stones:
>
> > […] this beautiful girl was visited each night by a lover who left before daylight. She was unable to discover who he was. This suspense told on her, and she began to waste away. A priest, consulted by her parents, advised the girl to attach a piece of white tapa to a wart on her lover's back. In the morning, shreds of tapa helped to trace the demi-god lover to the hill Puu Peelua, in the middle of Hoolehua. The kahuna (priest) and friends of the family found a large peelua (caterpillar) asleep on the hill. The kahuna ordered the people to collect wood which was placed around the sleeping peelua, and a fire was lit. As the heat of the fire increased, the caterpillar burst into myriads of small caterpillars which were scattered over the plain. That accounts for the army-worm pest, called peelua (Cooke, 1949:102).

Table 2. Previous archaeological studies conducted in the project area vicinity

Reference	Type of Study	Location	Results
Summers 1971	Site survey	Island-wide	Documented four sites in project area vicinity: 11A (SIHP # 50-60-03-11A), Caterpillar Stones; Site 11B, Stone at Pu'u Kape'elua; Site 12, Lepekaheo Heiau; and Site 16, Heiau at Anahaki
AECOS Inc. 1980	Archaeological reconnaissance survey	Moloka'i Airport and proposed airport site near Mo'omomi Beach	No historic properties identified in project area vicinity; however, a complex of WWII-era (not historic at time of study) bunker sites identified near Moloka'i Airport, west of project area
Environmental Impact Study Corp. 1981	Biological and archaeological reconnaissance survey	90 acres by Cooke Land Co., Inc., TMK: [2] 5-2-011:007 por.	Failed to locate Summers Site 106 (petroglyphs) within their study area (likely buried or destroyed) but observed two remnant features that indicate possible agricultural use of seasonal stream flow in gulch
Neller 1982	Archaeological aerial reconnaissance	Ho'olehua training Area, particularly north coastal Pālā'au	Documented Summers Site 16 *heiau* at Anahaki and numerous stone walls and platforms near Kahinaokalani Point he associated with Summers Site 17
Griffin 1993	Archaeological reconnaissance	North/central Ho'olehua uplands	She noted, "sites consisting of enclosures, L-shapes, U-shapes on the low promontories along the coast, in addition to the shelter sites noted by Summers between sites 16 and 17"; main focus associated with an anomalous growth of ti plants in an area with a wall segment, and lithic scatter and featuring a boulder that showed evidence of human modification as a "basin"
Hammatt et al. 1993	Archaeological inventory survey	One parcel in Pālā'au 2 adjacent to airport, and two parcels in Na'iwa	No historic properties identified

Figure 23. Previous archaeological studies in the project area vicinity depicted on a portion of the 1993 Kaunakakai and Molokai Airport USGS topographic quadrangles

Reference	Type of Study	Location	Results
Nagahara and Kolb 1994	Field inspection	Kape‘elua complex, Ho‘olehua-Pālā‘au Homesteads	Confirmed and GPS mapped Kape‘elua Complex, SIHP # 50-60-03-11 (Summer Sites 11A and 11B)
Major and Dixon 1995	Archaeological inventory survey	364 acre (147.4 hectares) USAF Receiver Station near Ho‘olehua	Two previously unrecorded historic properties documented consisting of pre-Contact dwelling (SIHP # 50-60-02-1624) and another structure of unknown function (SIHP # 50-60-02-1623); SIHP # -1624 consisted of enclosure with marine shell deposits, fire-cracked rocks and reworked basalt flake; SIHP # -1623 included two enclosures, each with minor amounts of marine shell and some modern refuse and 20th century rubbish dumps
Hartzell 2000	Archaeological inventory survey (supplemental)	USAF Molokai Receiver Station	Recorded 37 surface features for SIHP # 50-60-02-843 (Pu‘ukaPele Rock Wall complex), consisting of 26 stacked-faced walls, five alignments, four enclosures, a depression, and a prominent, massive natural boulder; boundary or possibly religious function posited for 15 of the features with other features associated with water control/ diversion, habitation and a planting area
Pantaleo and Rotunno-Hazuka 2003	Archaeological monitoring	Ho‘olehua uplands to coastal Kalama‘ula	No historic properties identified (but monitoring on-call with spot-checks)
Pantaleo 2004	Archaeological monitoring	Ho‘olehua uplands	No historic properties identified
Hammatt 2008	Field inspection an literature review	DOE Molokai schools including Kualapu‘u Elementary School	No historic properties identified but a monitoring program was recommended

Reference	Type of Study	Location	Results
Pfennig et al. 2011	Archaeological literature review	8,955 acres of DHHL Molokai lands including 8,055 acres at Ho‘olehua Ahupua‘a and present project areas	Discuss four sites discussed by Summers (1971): SIHP # 50-60-03-11A, caterpillar stones; SIHP # -11B, stone at Pu‘u Kape‘elua; SIHP # -13, Kahua Maika at a place called Akani; and SIHP # -14, *heiau* near Ho‘olehua Cemetery
McIntosh et al. 2019	Archaeological inventory survey	DHHL lands, including in Ho‘olehua	No historic properties identified in project area vicinity; of note identifications of SIHP # 50-60-03-2521, concrete tank stands associated with ranching and Isolated Find (IF)-01, an *‘ulu maika*

Table 3. Previously identified historic properties in the project area vicinity

SIHP #	Source	Site Type	Description
50-60-02-995	Griffin 1993	Agricultural shrine	Notes "sites consisting of enclosures, L-shapes, U-shapes on the low promontories along the coast," in addition to the shelter sites noted by Summers between sites 16 and 17 but her main focus was associated with an anomalous growth of ti plants and was described as including a wall segment, basalt flakes and a fragment of an adze blank and a rock with a flat surface, with a rectangular "basin" measuring about 8" x 14" pecked into it. She posits that "In addition to the practical purpose of the boulders for collecting rain water, it is possible that this site was an agricultural shrine for the worship of the god Lono."
50-60-02-1623	Major and Dixon 1995	Two enclosures and dumps	SIHP # -1624, regarded as a pre-Contact dwelling consisted of an enclosure with marine shell deposits, fire-cracked rocks and a re-worked basalt flake.
50-60-02-1624	Major and Dixon 1995	An enclosure and an artifact	SIHP # -1623, a site of unknown function, included two enclosures, each with minor amounts of marine shell and some modern refuse and 20th century rubbish dumps.

Figure 24. Previously identified historic properties in the project area vicinity depicted on a portion of the 1993 Kaunakakai and Molokai Airport USGS topographic quadrangles

SIHP #	Source	Site Type	Description
50-60-03-11A	Summers 1971:37	“Caterpillar Stones,” Ho‘olehua 2	The stones are on top of the hill; Pu‘u Kape‘elua, “The Caterpillar Hill.”’ Cooke gave the following legend about these stones: “[…] this beautiful girl was visited each night by·a lover who left before daylight. She was unable to discover who he was. This suspense told on her, and she began to waste away. A priest, consulted by her parents, advised. the girl to attach a piece of white tapa to a wart on her lover’s back. In the morning, shreds of tapa helped to trace the demi-god lover to the hill Pu‘u Pe‘elua, in the middle or Ho‘olehua. The kahuna (priest) and friends of the family found a large·*pe‘elua* (caterpillar) asleep on the hill. The kahuna ordered the people to collect wood which was placed around the sleeping *pe‘elua*, and a fire was lit. As the heat of the fire increased, the caterpillar burst into myriads of small caterpillars which were scattered over the plain. That accounts for the army-worm pest, called *pe‘elua*” (Cooke, 1949:102). Akana (n.d.) told a legend similar to the one above; and added, “Today, about January to the first of March, many caterpillars are seen around Pu‘u Pe‘elua.”

SIHP #	Source	Site Type	Description
50-60-03-11B	Summers 1971:37	Stone at Pu‘u Kape‘elua Ho‘olehua 2	The stone is located just S of the Caterpillar Stones (Site 11A) on Pu‘u Kape‘elua. When seen in 1959, this fairly flat stone measured 6 ft N to S, and 7 ft E to W. It stood about 22 in. high on the N and 18 in. high on the S. On the face of the stone was a hollowed-out basin, 21 in. E to W, 8.5 in. N to S, and 3 in. deep. Leading from the N side of the surface into either side of the basin were two grooves 1 in. wide and 2.5 in. deep. Two more grooves led from the S side of the basin to another basin located on a shelf 5 in. below the face, on the S side of the stone. This basin, which was 1.75 in. deep, measured 18 in. E to W and 6 in. N to S. Numerous sea shells were found in the vicinity of the site. G.P. Cooke (personal communication) said the stone was used for sharpening adzes. K.P. Emory was of the opinion that, because this is an arid region, the stone may have been for collecting water.
SIHP # 50-60-03-2521	McIntosh et al. 2019	Ranching infrastructure	Concrete tank stands associated with ranching
Summers Site 9	Summers 1971:34-36	“Kipu Ruins, Kipu”	The site is located on a headland about 800 ft S of the cliffs and N of Kapale Gulch, at an elevation of 1000 ft. Several structures are distributed over an area about 500 ft long and 250 (Structures “A” through “I” are described)
Summers Site 12	Summers 1971:37	*Heiau* (Lepekaheo Heiau)	This site is located on the boundary of Ho‘olehua 2 and Pala‘au 2, W of Kaluape‘elua Gulch. Monsarrat referred to Lepekaheo as an “old heiau.”
Summers Site 13	Summers 1971:38	“Kahua Maika, Pala‘au 2” *(‘ulu maika* bowling course)	The kahua maika was situated on a rise at a place called Akani; Monsarrat referred to it as an “old *kahua maika*”

SIHP #	Source	Site Type	Description
Summers Site 14	Summers 1971:38	*“Heiau,* Pala‘au 2”	“The site is located E of the Ho‘olehua Cemetery in the pineapple fields W of the gulch, at an elevation of 800 ft. Cartwright reported this (in 1922) as being a heiau. The structure was in ruins in 1957, however. Traces of paving could still be found, and the remains of a wall, 35 ft long NE to SE; 13 ft from the NE side was an upright stone 2 ft high, 2 ft wide, and l ft thick.”
Summers Site 16	Summers 1971:38	*Heiau* and house site	This *heiau* is located on the W side of the mouth of Anahaki Gulch at an elevation of about 50 ft above sea level. Cartwright (1922) reported the site as being a *heiau*. Originally the structure was an enclosure. The exterior measurements in 1964 were 43 ft N to Sand 36 ft E to W; the maximum height of the eastern wall was 5 ft. The northern wall was probably this same height originally, but the wall on the S was lower. Both the S and W walls were badly damaged. An inner division on the N side of the enclosure measured 17 ft E to W and extended the entire width of the structure. The southern portion of the enclosure was paved. On the crest of the hill to the S of the above site was a house site or shelter, which had a 5-ft-high wall running N to S; the rest of the site was open. Adjoining the northern portion of the wall on the E side was a small, paved terrace.
Summers Site 17 (02-0017)	Summers 1971:38	“Sites at Kahinaokalani, Pala‘au 2”	“Emory reported seeing two house sites and a *ko‘a* at Kahinaokalani; the *ko‘a* was at the edge of the cliff. Phelps described a structure, which he called a canoe *halau*, which was on a bluff about 30 ft above the sea”

SIHP #	Source	Site Type	Description
Summers Site 107	Summers 1971:80	“Holua slide at Kualapu‘u, Na‘iwa”	The slide was on the SSW side of Kualapu‘u hill, and traces of it can still be seen. No indications of paving could be found in 1966. Apparently it was similar to … Site 3. On the S and W slopes of Kualapu‘u hill, there used to be many sweet potato patches, which were defined by rows of stones (Cooke 1949:121). According to Sophie J. Cooke (1964:58), the former name of Kualapu‘u was Ka ‘Uala Pu‘u, “The Sweet Potato Hill.” On some maps it is called “Mid Hill.”
Isolated Find (IF)-01	McIntosh et al. 2019	Bowling game stone	An *‘ulu maika*

> Akana (n.d.) told a legend similar to the one above, and added, ‘Today, about January to the first of March, many caterpillars are seen around Pu‘u Pe‘elua’ [Summers 1971:37]
>
> Site 11B. Stone at Pu‘u Kape‘elua, Ho‘olehua 2
>
> The stone is located just S of the Caterpillar Stones (Site llA) on Pu‘u Kape‘elua. When seen in 1959, this fairly flat stone measured 6 ft N to S, and 7 ft E to W. It stood about 22 in. high on the N and 18 in. high on the S. On the face of the stone was a hollowed-out basin, 21 in. E to W, 8.5 in. N to S, and 3 in. deep. Leading from the N side of the surface into either side of the basin were two grooves 1 in. wide and 2.5 in. deep. Two more grooves led from the S side of the basin to another basin located on a shelf 5 in. below the face, on the S side of the stone. This basin, which was 1.75 in. deep, measured 18 in. E to Wand 6 in. N to S. Numerous sea shells were found in the vicinity of the site.
>
> G.P. Cooke (personal communication) said the stone was used for sharpening adzes. K.P. Emory was of the opinion that, because this is an arid region, the stone may have been for collecting water.

A recent archaeological study (Martell III et al. 2021, draft:45) noted the distinctive basins designated as Site 11B are indeed in very close proximity to the Caterpillar Stones designated Site 11A but neither the Cooke explanation of an adze sharpening function nor the Emory explanation of a water collecting function reflects this geographic relationship. A third theory is posited that these basins were for offerings (possibly *‘awa* narcotic drink) to propitiate the destructive caterpillar pests.

Site 14. *Heiau*, Pala‘au 2

> The site is located E of the Ho‘olehua Cemetery in the pineapple fields W of the gulch, at an elevation of 800 ft. Cartwright reported this (in 1922) as being a heiau. The structure was in ruins in 1957, however. Traces of paving could still be found, and the remains of a wall, 35 ft long NE to SE; 13 ft from the NE side was an upright stone 2 ft high, 2 ft wide, and l ft thick. [Summers 1971:38]

This *heiau* was located near the Kukuiokanaloa sea cliff approximately 4.2 km east of the eastern project area.

Site 15. *Ko‘a* at Pu‘u Kapele, Pala‘au 2

Summers (1971:38) describes this as “A small ko‘a is on the top of .the hill, Pu‘u Kapele” (citing a Phelps, n.d.:27 source.) This *ko‘a* was located near Paualaia Point, 1,400 m north of the eastern project area.

Site 16. Heiau at Anahaki, Pala‘au 2

> This heiau is located on the W side of the mouth of Anahaki Gulch at an elevation of about 50 ft above sea level. Cartwright (1922) reported the site as being a heiau. Originally the structure was an enclosure. The exterior measurements in 1964 were 43 ft N to Sand 36 ft E to W; the maximum height of the eastern wall was 5 ft. The northern wall was probably this same height originally, but the wall on the S was

> lower. Both the S and W walls were badly damaged. An inner division on the N side of the enclosure measured 17 ft E to W and extended the entire width of the structure. The southern portion of the enclosure was paved,
>
> On the crest of the hill to the S of the above site was a house site or shelter, which had a 5-ft-high wall running N to S; the rest of the site was open. Adjoining the northern portion of the wall on the E side was a small, paved terrace. [Summers 1971:38]

This *heiau* was approximately 2.0 km northwest of the western project area.

Site 17. Sites at Kahinaokalani, Pala‘au 2

> Emory (n.d.) reported seeing two house sites and a ko‘a at Kahinaokalani; the ko‘a was at the edge of the cliff. Phelps described a structure, which he called a canoe halau, which was on a bluff about 30 ft above the sea: [Summers 1971:38]

Summers quotes Phelps (n.d.:17):

> […] the parallel walls [of the halau] are 20 feet long and 3 1/2 feet apart. They are no [now] so broken down that no estimate can be made of their height or width. Apparently the structure was open at both ends. The longitudinal axis of the shelter is at a slight angle to the line of the water’s edge. [Summers 1971:38–39]

These sites were approximately 2.0 km northwest of the western project area.

Site 107. *Hōlua* Slide at Kualapu‘u, Nā‘iwa 1

> The slide was on the SSW side of Kualapu‘u hill, and traces of it can still be seen. No indications of paving could be found in 1966. Apparently it was similar to the one shown in Fig. 5, Site 3 [refers to a Site 3 *hōlua* Slide near Kauleonanahoa].
>
> On the S and W slopes of Kualapu‘u hill, there used to be many sweet potato patches, which were defined by rows of stones (Cooke, 1949:121). According to Sophie J. Cooke (1964:58), the former name of Kualapu‘u was Ka ‘Uala Pu‘u, ‘The Sweet Potato Hill.’ On some maps it is called ‘Mid Hill.’ [Summers 1971:80]

This *hōlua* slide was approximately 800 m southeast of the eastern project area.

Site 108. Kalakupale or Palakupale Heiau, Nā‘iwa 1

> Monsarrat wrote that, from the heiau site, ‘Puu Lua bears N 66°47' East true, Puu Luahine bears S 55°4' East true’ (n.d.b:43). He referred to the structure as Kalakupale, ‘a small heiau.’ Cartwright (n.d.d) gave the name Palakupale. [Summers 1971:80]

This *heiau* was located approximately 1.9 km southeast of the eastern project area.

4.1.1 AECOS Inc. (1980)

In 1980, AECOS, Inc. conducted an archaeological reconnaissance survey for the Moloka‘i Airport Master Plan Survey (AECOS Inc. 1980). Archaeologists Robert Connolly III and Paul Rosendahl surveyed the existing airport and two proposed sites for airport expansion: Site A-4, the potential connecting taxiway area, and Site C-1 and C-2, an alternate airport area located *mauka*

(inland) of Mo‘omomi Beach. Neither the airport and Site A-4 provided evidence of prehistoric cultural remains. However, at the proposed Site C-1/C-2, AECOS Inc. (1980) documented seven features, six historic hunting blinds, and one likely pre-Contact wall.

Though no prehistoric cultural remains were observed at the proposed Site A-4, approximately 2.5 km to the south of the current eastern project area, the report noted the area did contain “an extensive complex of World War II bunkers consisting of horseshoe-shaped earthen revetments, earth-covered Quonset huts with concrete floors, wood-lined causeways, and extensive road systems. This complex was constructed during the years 1942-1947” (AECOS Inc. 1980:6). In 1980, these properties were insufficient age to be considered historic properties (50 years old or older). If these properties are still in existence, they likely would now be considered historic properties.

4.1.2 Environmental Impact Study Corp. (1981)

In 1981, Environmental Impact Study Corp. conducted biological and archaeological reconnaissance on approximately 90 acres of land owned by Cooke Land Company, Inc., designated as TMK: [2] 5-2-011:portion of parcel 007, located approximately 2.5 km to the south of the eastern project area.

Reconnaissance efforts did not locate the previously identified Summers Site 106 (petroglyphs) within their study area, although they did locate two other new sites within their study area. The first is a small series of terrace fragments above the west bank of the stream at the *mauka* end of the study area. Other possible agricultural cleared mounds were observed, but observations were inconclusive. The second site is a possible stacked wall on the high point of the ridge above the stream, roughly 90 m east of the first site. The stacked stone wall appeared to be placed between large natural outcrops and has collapsed.

Environmental Impact Study Corp. concluded that indications for possible agricultural use of the seasonal stream flow in the gulch existed, but the absence of more substantial and identifiable structures made it an assumption rather than fact. They recommended none of the sites located warrant further archaeological work, and that heavy ground disturbance at the location of Summers Site 106 (Petroglyphs) argues against the survival of this site, and that no further archaeological work was necessary and that no specific measures need be undertaken to preserve or protect the features already identified.

4.1.3 Neller (1982)

Earl (Buddy) Neller (then of the State Historic Preservation Office, DLNR) produced an archaeological reconnaissance of proposed Marine Corps Training Areas on Moloka‘i at Kalama‘ula and Pālā‘au. His work at Pālā‘au was exclusively a “helicopter windshield survey” (Neller 1982:1) He noted the presence of a number of house sites in the area east of Mo‘omomi Beach (east of Naaukahihi Point) in the vicinity of Summer’s sites 16 and 17. He documented the Site 16 *heiau* at Anahaki and numerous stone walls and platforms near Kahinaokalani Point he associated with Site 17. He comments regarding the north Pālā‘au area:

> Sites have not been noted previously in the *mauka* portion of the property.
>
> Our windshield survey verified the existence of readily visible stone structures along the coast. Inland we saw nothing but dry grazing land and traces of former pineapple fields.
>
> It is suspected that continued military activities in this parcel would have little impact on archaeological sites, except at the coast. It is also suspected, however, that an intensive field survey would identify a number of small archaeological sites in the mauka portion of the parcel, presumably altered by farming and ranching activities.[Neller 1982:2]

4.1.4 Griffin (1993)

Annie Griffin of the SHPD (1993) produced a memorandum on a newly identified historic site (SIHP # 60-02-995) at Pālā‘au. She noted, “sites consisting of enclosures, L-shapes, U-shapes on the low promontories along the coast, in addition to the shelter sites noted by Summers between sites 16 and 17” (Griffin 1993:1). Her main focus was associated with an anomalous growth of ti plants and was described as follows:

> Ground visibility was poor due to the dense grass cover, but a wall, possibly a c-shape or a wall segment, basalt flakes and a fragment of an adze blank were observed at the northwest base of the promontory. The promontory itself consists of large basalt boulders, in various natural positions. Only one boulder showed evidence of human modification. This rock has a flat surface, with a rectangular ‘basin’ measuring about 8” x 14” pecked into it. The ‘basin’ contained water along with decaying vegetation. An alignment of 6 rocks was placed along its basin's windward (east) edge, probably to minimize evaporation from wind. [Griffin 1993:1]

She posits that “In addition to the practical purpose of the boulders for collecting rain water, it is possible that this site was an agricultural shrine for the worship of the god Lono” (Griffin 1993:2)

4.1.5 Hammatt et al. (1993)

In 1993, CSH conducted an archaeological inventory survey of three parcels, which the study refers to as Sites #1, #2, and #5 (Hammatt et al. 1993). Only Site #5 is in proximity to the current project area, while Sites #1 and #2 are located further away to the southeast from the present project area(s) and will not be discussed.

Site #5 is an approximately 15-acre parcel within Pālā‘au, adjacent to and west of Moloka‘i Airport and approximately 2.5 km south of the current eastern project area. The parcel, which adjoined the airport security fence, was formerly part of the airfield and used for parking planes. At least 50% of this study area was paved. Grasses, *koa haole* (*Leucaena leucocephala*), and weeds covered unpaved areas, which appeared “denuded of soil: decomposing bedrock C-horizon was exposed on the surface and as was evidence of bulldozer tracks in various places […]” (Hammatt et al. 1993:24). No historic properties were identified with the exception of the former plane taxiways and parking areas. No further archaeological work was recommended.

4.1.6 Nagahara and Kolb (1994)

On 1 June 1994, the SHPD and DHHL archaeologists conducted a field inspection in the Ho‘olehua-Pālā‘au Homesteads to locate and GPS map SIHP # 50-60-03-11, Kape‘elua Complex (Nagahara and Kolb 1994). The Kape‘elua Complex is a legendary site located on top of Pu‘u Kape‘elua (“caterpillar hill”), consisting of several various-sized basalt boulders and outcrops known as “caterpillar stones.” One boulder was previously identified with two pecked rectangular channels and basins, which the property owner stated was a “birthing stone.” During the inspection, a similar pecked basin was found in another stone. The function for the basin was regarded as unknown. The authors noted other pecking in some stones as possible pre-Contact modifications resembling footholds for climbing up the large boulders. A historic midden scatter composed of shells, bottle glass shards, and a thermometer was identified under a boulder. The property owner suggested the midden was associated with a former plantation camp. The field inspection resulted in adequate mapping of the complex, which involved the SHPD carving an X in one of the peripheral boulders. Overall, the site appeared in good condition, and preservation without additional mitigation was recommended.

4.1.7 Major and Dixon (1995)

The Bishop Museum Department of Anthropology (Major and Dixon 1995) prepared a report on an archaeological survey and evaluation at a 364-acre (147.42-hectare) USAF Receiver Station. Two previously unrecorded historic properties were documented in the project area, including a pre-Contact dwelling (SIHP # 50-60-02-1624) and another structure of unknown function (SIHP # 50-60-02-1623). SIHP # -1624 consisted of an enclosure with marine shell deposits, fire-cracked rocks and a reworked basalt flake. SIHP # -1623 included two enclosures, each with minor amounts of marine shell and some modern refuse and twentieth century rubbish dumps. The authors noted that “Immediately to the north, in the narrow strip between the project area and the sea, lie many more features indicating exploitation of coastal resources from pre-Contact times until the present” (Major and Dixon 1995:ii).

4.1.8 Hartzell (2000)

Leslie Hartzell of the Bernice Pauahi Bishop Museum Department of Anthropology reported on a supplemental archaeological inventory survey at the USAF Molokai Receiver Station with a 16-hectare rectangular project area along the upper rim and lower slopes of Mane‘opapa Gulch and across the peak of Pu‘ukaPele to the coastal cliff edges. A total of three archaeological sites were identified either entirely within or bisected by the boundaries of the USAF Molokai Receiver Station leased property. Two of the sites (SIHP #s 50-60-02-1623 and -1624) were recorded during the initial inventory survey investigation in 1994 (Major and Dixon 1995) and a third site (SIHP # 50-60-02-843) was identified as being partially within the northern property boundary of the Receiver Station during the supplemental inventory survey. Thirty-seven surface features were recorded for SIHP # 50-60-02-843 (the Pu‘ukaPele Rock Wall complex), consisting of 26 stacked-faced walls, five alignments, four enclosures, a depression, and a prominent, massive natural boulder. A boundary of possibly religious function was posited for 15 of the features with other features associated with water control/diversion, habitation, and a planting area.

4.1.9 Pantaleo and Rotunno-Hazuka (2003)

Between September 2002 and February 2003, Archaeological Services Hawaii, LLC (ASH) conducted on-call archaeological monitoring and weekly site inspections for the Sandwich Isles Communications, Inc. (SIC) Moloka‘i Rural Fiber Optics Duct Lines project, which connected DHHL properties to a modern, high-speed broad band telecommunications system (Pantaleo and Rotunno-Hazuka 2003). The study area was divided into six sections extending along state, DHHL, and county road rights-of-way from Ho‘olehua uplands to coastal Kalama‘ula. Sections 1 and 2 are in the current project area vicinity (see Figure 23) and it appears their project area extended along the north side of the eastern and western present project areas (although again the monitoring was just on-call with weekly spot-checks). No historic properties were encountered during the monitoring program; no additional archaeological work was recommended.

4.1.10 Pantaleo (2004)

Between October and December 2003, ASH conducted archaeological monitoring for Phase II of the SIC Moloka‘i Rural Fiber Optics Duct Lines project (Pantaleo 2004). The area monitored appears to have included roads immediately north of the current eastern project area (see Figure 23). No historic properties were identified during this phase of the monitoring program. Stratigraphy observed (Pantaleo 2004:13, 14), as at his Profile 2 at “Ala Elua,” located approximately 250 m north of the eastern project area, was as follows:

> Layer I (approximately 0-35 cmbs), representing the most recent phase of post-occupation soil accumulation of overburden, consisted of a dark brown (IOYR 3/3), dry, crumbly, fine grain, loose, nonsticky, non-plastic, non-cultural, silt with abundant roots and rootlets, and minimal rocks and modem debris. This layer was present throughout the entire project area.
>
> Layer II (approximately 35 to 65 cmbs), representing the till zone, consisted of a dark yellowish-brown (IOYR 3/4) to dark reddish-brown (5YR 3/4), moist, loose, powdery, fine grain, non-plastic, slightly sticky, non-cultural, silt with minimal roots and rootlets and rocks and black sheeting from pineapple cultivation.
>
> Layer III (approximately 65 to 130 cmbs), representing the basal layer, consisted of a yellowish-brown (I OYR 5/6) to dark yellowish-brown (I OYR 3/6), compact, moist, fine grain, slightly sticky, slightly plastic, silt to silty clay with abundant basalt cobbles and boulders.

4.1.11 Hammatt (2008)

CSH (Hammatt 2008) carried out archaeological literature review and field check study of four DOE Schools on Moloka‘i including Kualapu‘u Elementary School. No historic properties were identified, but noting some traditional habitation, transit in the vicinity between Kalaupapa and Kaunakalkai and historic ranching, an on-site archaeological monitoring program was recommended.

4.1.12 Pfennig et al. (2011)

Pacific Legacy, Inc. (Pfennig et al. 2011) produced an archaeological literature review of 8,955 acres of DHHL Moloka‘i lands including 8,055 acres at Ho‘olehua Ahupua‘a, including the present project areas. They discuss four sites discussed by Summers (1971): SIHP # 50-60-03-

11A, the caterpillar stones; SIHP # -11B, the stone at Pu‘u Kape‘elua; SIHP # -13, the Kahua Maika at a place called Akani; and SIHP # -14, a *heiau* near the Ho‘olehua Cemetery (Pfennig et al. 2011:73).

The authors note,

> […] archaeological sites appear more sparse on the Ho‘olehua Plain, as the area lacks adequate rainfall to support the same population density as the southeast coastal region of Moloka‘i. However, this vast plain contains several zones, particularly in the north and northeast, which boast a high concentration of religious sites and places associated with Traditional mythology. [Pfennig et al. 2011:81]

4.1.13 McIntosh et al. (2019)

In October 2011, November 2012, and September and November 2015, Pacific Legacy, Inc. (McIntosh et al. 2019) conducted an archaeological inventory survey of DHHL lands in seven areas across Moloka‘i for proposed water system improvements (McIntosh et al. 2019). Area 7 of the study included four locations near the current project area, which were investigated for proposed maintenance yard improvements and valve and hydrant replacements in Ho‘olehua. No historic properties were identified in Area 7.

Of note were the identification of SIHP # 50-60-03-2521, concrete tank stands associated with ranching, and Isolated Find (IF)-01, an *‘ulu maika*.

Regarding SIHP # 50-60-03-2521, the authors report,

> Four separate sets of tank stands were recorded a short distance from the now existing 3.5 MG tanks at Ho‘olehua. Each set of stands measures ca. 5.0 m long, 3.7 to 5.9 m wide, and 0.3 m wide. It not known when these stands were constructed but were likely abandoned after the larger Ho‘olehua tanks became operational in the 1930s. [McIntosh et al. 2019:96]

Regarding the IF-01 *‘ulu maika*, the authors report,

> IF-1 consists of an isolated sandstone *‘ulu maika* located on the surface of an abandoned agricultural field situated along Project Area 5 (5-A Ho‘olehua to Veterans’ Cemetery to Lihi Pali Avenue Transmission Main) in Ho‘olehua.
>
> The *‘ulu maika* is discoidal in shape and measures ca. 6.5 cm in diameter by 2.9 cm thick. Several fragments of the artifact have been broken off, but the overall shape is still clearly visible. The *‘ulu maika* was collected from the field.
>
> No surface archaeological features were observed in the vicinity of IF-1. It is likely that if any archaeological site was present in the area, it was destroyed during the modification of the landscape for commercial agriculture. The ‘ulu maika appears to have been manufactured and utilized during the pre-Contact or early post-Contact periods. Halealoha Ayau posits that this isolated find may be down slope of the traditional makahiki grounds known a Naiwa (pers. comm. 1/20/2016). [McIntosh et al. 2019:103]

4.2 Background Summary and Predictive Model

The current project area consists of DHHL lands on the northern plains of Pālā‘au Ahupua‘a. Historical anecdote and environmental data for this region indicate a possible substantial pre-Contact population (Fornander 1880; Summers 1971), which would have subsisted on dryland agriculture consisting mostly of sweet potatoes. According to Handy (1940:157),“in 1931 there were many flourishing patches on the Hawaiian homesteads at Hoolehua” and “Hoolehua and Palaau were noted for sweet potatoes in olden days.” However, Handy and Handy (1972:283) note that homesteaders in Ho‘olehua were growing the sweet potatoes on land that had not been planted in ancient times.

Nearly the entire current project area appears to have been government owned lands since the Māhele land divisions in 1848. In 1924, the Hawaiian Homes Commission expanded their homestead program to include 11,400 acres of Pālā‘au-Ho‘olehua. The current project area consists of three discrete lots for a total of a 40.3 acres (16.3 hectares), a portion of these Pālā‘au-Ho‘olehua Homestead lands. Life on these lands involved dryland agriculture (including commercial pineapple cultivation) and some ranching.

Currently, the project area consists mostly of undeveloped DHHL parcels, of which only a few contain active residences.

No prior archaeological study has been conducted within the project areas and although one recent archaeological study was adjacent to the north of the western project area (Pantaleo and Rotunno-Hazuka 2003), much of that project is understood to have been on-call monitoring. No historic properties have been identified within the project area or within approximately 500 m (see Figure 24).

Historic properties previously identified in the vicinity are limited to a few sites recorded by Summers (1971) including the legendary Kape‘elua Complex (SIHP # 50-60-03-11). There appears to have been a locus of traditional Hawaiian activity in Anahaki Gulch north of the western project area (see Figure 24) but this is suggested to relate to the micro-environment of that gulch and greater proximity to the coast.

Based on background research, cultural deposits and features related to historic homesteading (i.e., agricultural and/or habitation features) may be present at the current project areas. However, potential also exists for encountering evidence of pre-Contact and post-Contact land use such as ranching and commercial pineapple cultivation.

Section 5 Results of Field Work

Fieldwork was carried out at TMK: [2] 5-2-005:031, Lot 17 and TMK: [2] 5-2-026:014, Lot 104D-1 by CSH archaeologist David W. Shideler, M.A. and CSH cultural specialist Kellen Tanaka, B.A., on 21 September 2021. An overview showing tracklogs at both of the project areas is provided in Figure 25 with a more detailed view of the track logs and a key to the general location and direction of photographs provided in Figure 26 for the western 31.7-acre TMK: [2] 5-2-005:031 parcel project area and in Figure 33 for the eastern project area, the 4.7-acre TMK: [2] 5-2-026:014 parcel.

The fieldwork for the western project area (TMK: [2] 5-2-005:031, Lot 17) began at the northwest corner along the (dirt) Farrington Avenue with representative photographs of this project area proceeding counter clockwise from the northwest corner (Figure 27), southwest corner (Figure 28), southeast corner (Figure 29), and northeast corner (Figure 30). The project area was relatively flat and open with 50-cm high dry exotic grasses and scattered *haole koa* (*Leucaena glauca*), with relatively few *kiawe* (*Prosopis pallida*), and *klu* (*Acacia farnesiana*) and lantana (Lantana camara). Native plants were limited to *‘ilima* (*Sida fallax*), *uhaloa* (*Waltheria americana*), and possibly a species of morning glory (*koali*, *Ipomea* sp.). The project area was bounded on the north side by a rutted dirt road (Farrington Avenue) and was bounded on the south side by another rutted dirt road (Mo‘omomi Avenue) but was otherwise remarkably featureless. Remnants of black plastic irrigation lines and fragments of black plastic mulch related to this parcel having been entirely in commercial pineapple cultivation in the early 1960s (see Figure 20). There were suggestions of pineapple plantation furrows but the configuration of field access roads indicated on the 1964 USGS aerial photograph (see Figure 20) was not clear. Remnants of one or more (neighboring) collapsed wooden structures in the form of a somewhat amorphous pile of modern wood and tar paper and a 55-gallon drum was observed in the northeast corner of this project area. It was uncertain if this construction material was in situ or had been brought in and dumped. Figure 30 and Figure 31 convey the nature of this debris pile evaluated in the field as a possible historic property but which was considered as lacking sufficient integrity for designation as a historic property. This structure was not discerned on the 1964 USGS aerial photograph (see Figure 20) and was thought to likely post-date that aerial photograph.

No historic properties were observed in the western TMK: [2] 5-2-005:031, Lot 17 project area and the prospect of subsurface historic properties was evaluated as very low.

A tracklog and photo key for the eastern 4.7-acre TMK: [2] 5-2-026:014 parcel project area is provided in Figure 33. The project area was accessed via Pu‘u Kapela Avenue but when this dirt road ended it was determined that a nearby parallel road just to the north did indeed access the parcel. Representative photographs are provided from the northwest corner (Figure 34) and proceeding counter-clockwise to the southwest corner (Figure 35), the southeast corner (Figure 36), and the northeast corner (Figure 37). The north half of this parcel is relatively open with 50 cm high exotic grass and few *haole koa* trees and is dominated by an abandoned house in the northwest corner of the lot (see Figure 34 and Figure 37 for views from the north corners of the property). Close-up views of the abandoned house are provided in Figure 38 and Figure 39. The date of construction is uncertain but it was thought likely to have been used in the 1970s. We do not make out this house on the 1964 aerial photograph (see Figure 20) or the 1967/68 USGS map

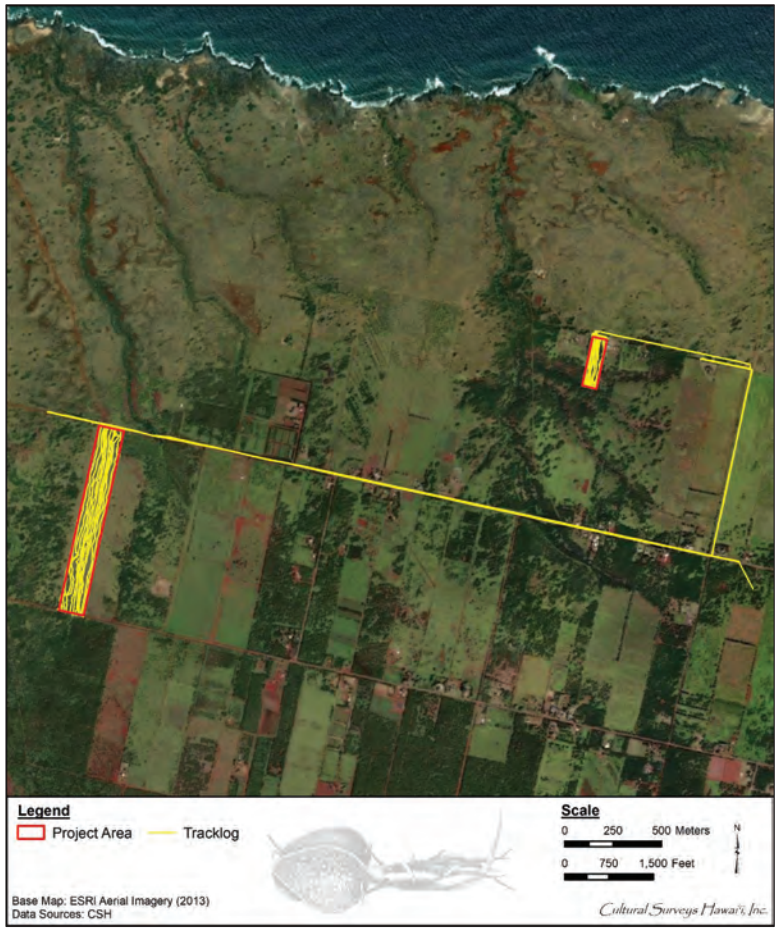


Figure 25. Overview showing tracklogs at both of the project areas (see following tracklog and photo key figures for details on the fieldwork at the western 31.7-acre TMK: [2] 5-2-005:031 parcel and the eastern 4.7-acre TMK: [2] 5-2-026:014 parcel

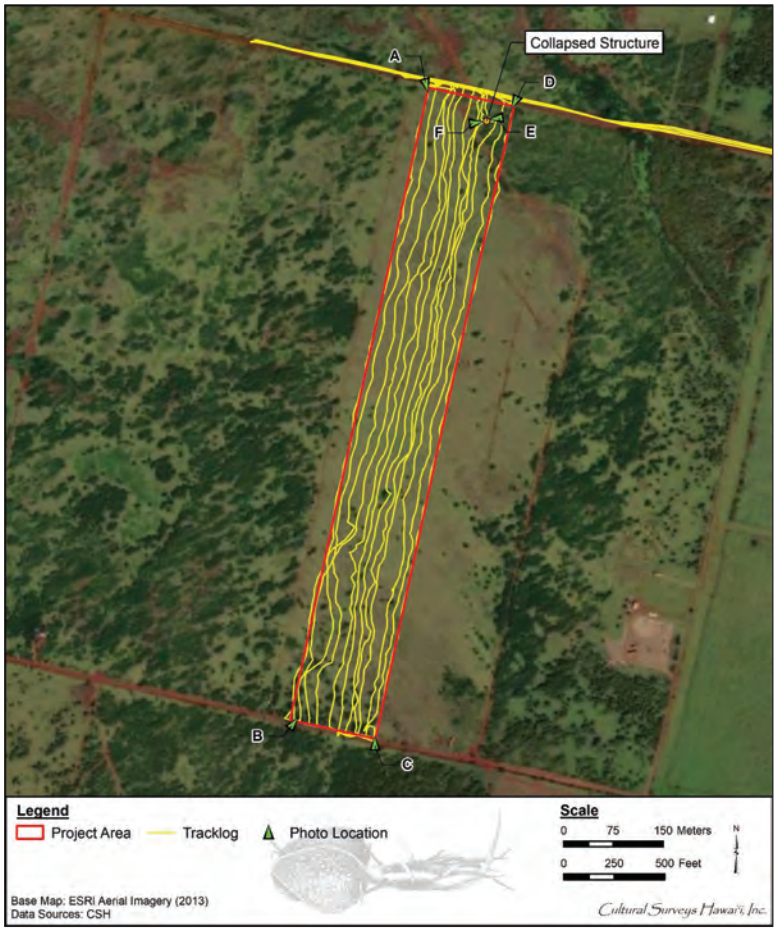


Figure 26. Tracklog and key to subsequent photographs for the western 31.7-acre TMK: [2] 5-2-005:031 parcel project area

Figure 27. Photo A: General view of the 31.7-acre TMK: [2] 5-2-005:031 parcel from the northwest corner (Farrington Avenue in foreground), view to south-southeast

Figure 28. Photo B: General view of the 31.7-acre TMK: [2] 5-2-005:031 parcel from the southwest corner, view to south-southeast

Figure 29. Photo C: General view of the 31.7-acre TMK: [2] 5-2-005:031 parcel from the southeast corner (Mo‘omomi Avenue in foreground), view to north-northwest

Figure 30. Photo D: General view of the 31.7-acre TMK: [2] 5-2-005:031 parcel from the northeast corner, view to south-southwest

Figure 31. Photo E: View of collapsed structure in the 31.7-acre TMK: [2] 5-2-005:031 parcel, view to southwest

Figure 32. Photo F: View of collapsed structure in the 31.7-acre TMK: [2] 5-2-005:031 parcel, view to northeast

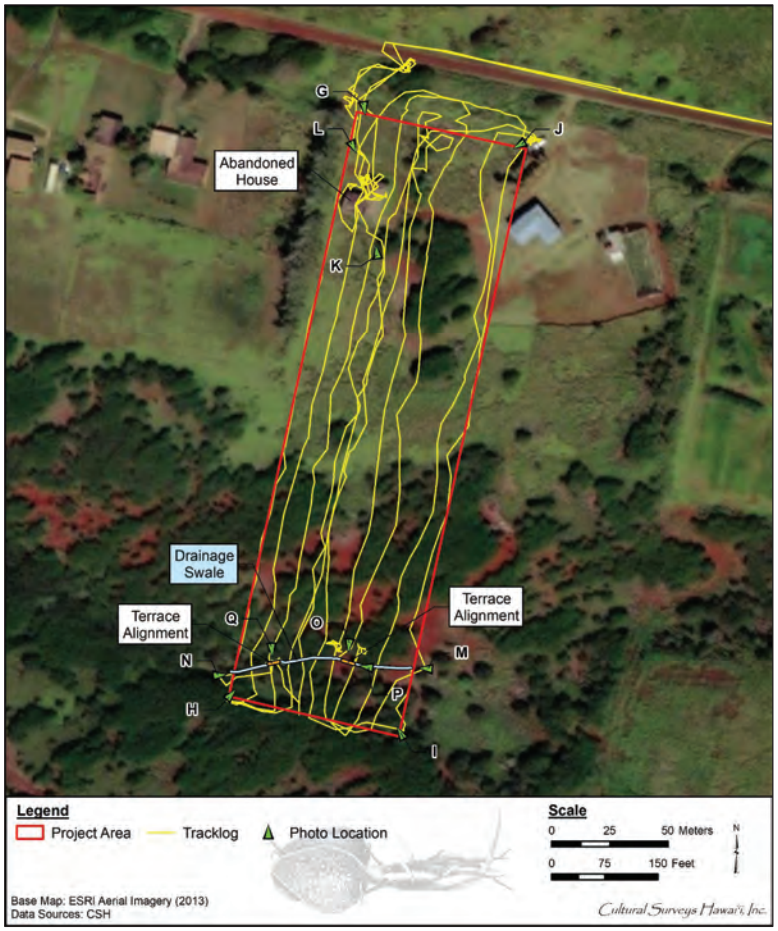


Figure 33. Tracklog and key to subsequent photographs for the eastern project area, the 4.7-acre TMK: [2] 5-2-026:014 parcel

Figure 34. Photo G: General view of the 4.7-acre TMK: [2] 5-2-026:014 parcel from the northwest corner, view to southeast

Figure 35. Photo H: General view of the 4.7-acre TMK: [2] 5-2-026:014 parcel from the southwest corner, view to northeast

Figure 36. Photo I: General view of the 4.7-acre TMK: [2] 5-2-026:014 parcel from the southeast corner, view to northwest

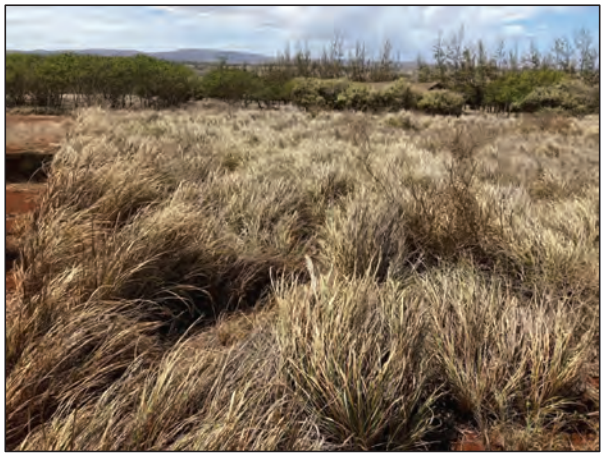


Figure 37. Photo J: General view of the 4.7-acre TMK: [2] 5-2-026:014 parcel from the northeast corner, view to southeast

Figure 38. Photo K: General view of the abandoned house in the 4.7-acre TMK: [2] 5-2-026:014 parcel, view to northwest

Figure 39. Photo L: View of the abandoned house in the 4.7-acre TMK: [2] 5-2-026:014 parcel

(see Figure 21) but we think we see it on the 1983 USGS map (see Figure 22).

The southern portion of this project area has a substantial cover of mature dry *haole koa* trees but was largely lacking in grass or any other ground cover with bare red dirt dominant (Figure 40, Figure 42, and Figure 43 are representative). A natural drainage swale crosses the south portion of the project area extending roughly east/west (see Figure 33 for the location and orientation of this drainage swale). Most of the south portion of this project area descends to this swale and then at the extreme south side, the project area rises. Views of this small drainage swale are provided from the east edge (see Figure 40) and the west edge (see Figure 41) of this project area. Two segments of boulder alignments were observed on the south side of this swale parallel to the ill-defined flow channel.

The eastern terrace alignment was more clearly defined, with a length of 8.4 m, and included approximately 24 waterworn small boulders roughly in a line (see Figure 33 for location and Figure 42 and Figure 43 for general views). There was no stacking of the boulders (the alignment was only one course high). A small clump of dead weeds at the west end of the slightly retained slope suggested some small degree of moisture retention resulting from the very modest terrace alignment.

The western terrace alignment was similar and included approximately 11 waterworn boulders over a length of 5.2 m (again with no stacking) (see Figure 33 for location and Figure 44 for a general view).

The function of these two terrace alignments was to retain the slope on the south side of this small drainage swale and likely to retain moisture for plant propagation. They were thought likely to be agricultural in function but were so very modest as unlikely to produce more than a meal or two of perhaps sweet potatoes in an exceptionally wet winter. It was thought that perhaps these terraces were experimental in nature to assess the utility of possible further terracing prior to a significant investment in labor. The antiquity of these two alignments is uncertain. We thought they might date to as recently as the abandoned house on the parcel but we cannot rule out that they were traditional Hawaiian constructions. The prospect of any related cultural or agricultural subsurface deposits was assessed in the field as very low.

Figure 40. Photo M: View of small drainage from the east edge of the 4.7-acre TMK: [2] 5-2-026:014 parcel, view to west

Figure 41. Photo N: View of small drainage from the west edge of the 4.7-acre TMK: [2] 5-2-026:014 parcel, view to east

Figure 42. Photo O: View of the eastern terrace alignment in the 4.7-acre TMK: [2] 5-2-026:014 parcel on the south side of a small gulch (1 m of tape shown at center for scale), view to south

Figure 43. Photo P: View of the eastern terrace alignment in the 4.7-acre TMK: [2] 5-2-026:014 parcel on the south side of a small gulch (1 m of tape shown at center for scale), view to west

Figure 44. Photo Q: View of the western terrace alignment in the eastern 4.7-acre TMK: [2] 5-2-026:014 parcel on the south side of a small gulch (1 m of tape shown at center for scale), view to south

.

Section 6 Summary and Recommendations

6.1 Summary

The current project area consists of DHHL lands on the northern plains of Pālā‘au Ahupua‘a. Historical anecdote and environmental data for this region indicate a possible substantial pre-Contact population (Fornander 1880; Summers 1971), which would have subsisted on dryland agriculture consisting mostly of sweet potatoes. According to Handy (1940:157), “in 1931 there were many flourishing patches on the Hawaiian homesteads at Hoolehua” and “Hoolehua and Palaau were noted for sweet potatoes in olden days.” However, Handy and Handy (1972:283) note homesteaders in Ho‘olehua were growing the sweet potatoes on land that had not been planted in ancient times.

The vicinity in central Moloka‘i has historically been an area conducive to military training activities. In the 1790s, Kamehameha I reportedly “drilled his warriors on the Hoolehua plain near where the airport is now” (Cooke 1949:112). These training grounds may have included the current project area. A civilian airfield was established in Ho‘olehua in 1919. In 1931, the U.S. Army Air Corps established a portion of this field as “Homestead Field” (Horvat 1966:38, 40–47). By the time the United States entered World War II in 1941, aircraft of the Fifth Bombardment Group were stationed at Homestead Field. A complex of World War II bunker sites was identified on the airport property well south of the present project areas in 1980 by AECOS Inc. (1980).

Nearly the entire current project area appears to have been government owned lands since the Māhele land divisions in 1848 (when Pālā‘au was “Crown lands” owned by Kamehameha III). In 1924, the Hawaiian Homes Commission expanded their homestead program to include 11,400 acres of Pālā‘au-Ho‘olehua. The current project area consists of a western TMK: [2] 5-2-005:031, Lot 17 (31.7 acres or 12.8 hectares), and an eastern TMK: [2] 5-2-026:014, Lot 104D-1 (4.7 acres or 1.9 hectares) for a total project area of 36.4 acres (14.7 hectares) of these Pālā‘au-Ho‘olehua Homestead lands. Life on these approximately 40-acre joint residential and agricultural plots likely involved dryland agriculture and some ranching.

Currently, the project area consists of undeveloped DHHL parcels. An abandoned home is present on the TMK: [2] 5-2-026:014, Lot 104D-1.

No historic properties have been previously identified within the project areas or within 500 m. Historic properties previously identified in the vicinity are limited to a few sites recorded by Summers (1971), including the legendary Kape‘elua Complex (SIHP # 50-60-03-11). There appears to have been a locus of traditional Hawaiian activity in Anahaki Gulch north of the western project area (see Figure 24) but this is suggested to relate to the micro-environment of that gulch and greater proximity to the coast.

Generally, the majority of the project area appears to have been modified by grading to some extent. A 1964 USGS aerial photograph clearly shows the western TMK: [2] 5-2-005:031 (31.7-acre) parcel as entirely within intensive commercial pineapple cultivation that likely removed any evidence of earlier historic properties.

No historic properties were observed in the western TMK: [2] 5-2-005:031, Lot 17 and none are believed to be present.

In the south portion of the eastern TMK: [2] 5-2-026:014, Lot 104D-1, two segments of boulder alignments were observed on the south side of a drainage swale parallel to the ill-defined flow channel.

The eastern terrace alignment was more clearly defined, with a length of 8.4 m, and included approximately 24 waterworn small boulders roughly in a line parallel to the base of the drainage swale (see Figure 33 for location and Figure 42 and Figure 43 for general views). There was no stacking of the boulders (the alignment was only one course high). A small clump of dead weeds at the west end of the slightly retained slope suggested some small degree of moisture retention resulting from the very modest terrace alignment.

The western terrace alignment was similar and included approximately 11 waterworn boulders over a length of 5.2 m (again with no stacking) and again parallel to the base of the drainage swale (see Figure 33 for location and Figure 44 for a general view).

The function of these two terrace alignments was to retain the slope on the south side of this small drainage swale and likely to retain moisture for plant propagation. They were thought likely to be agricultural in function but were so very modest as unlikely to produce more than a meal or two of perhaps sweet potatoes in an exceptionally wet winter. It was thought that perhaps these terraces were experimental in nature to assess the utility of possible further terracing prior to a significant investment in labor. The antiquity of these two alignments is uncertain. We thought they might date to as recently as the abandoned house on the parcel (ca. 1980) but we cannot rule out that they were traditional Hawaiian constructions. The prospect of any related cultural or agricultural subsurface deposits was assessed in the field as very low.

According to Handy (1940:157),“in 1931 there were many flourishing patches on the Hawaiian homesteads at Hoolehua” and “Hoolehua and Palaau were noted for sweet potatoes in olden days.” However, Handy and Handy (1972:283) note that homesteaders in Ho‘olehua were growing the sweet potatoes on land that had not been planted in ancient times—supporting the possibility that these are twentieth century constructions. No other potential historic properties were observed in the eastern TMK: [2] 5-2-026:014, Lot 104D-1 and no other potential historic properties are believed to be present.

6.2 Recommendations

The results of this LRFI indicate there is no potential for archaeological historic properties in the western project area and the archaeological potential in the eastern project area is limited to two boulder alignments.

This LRFI would support an HAR §13-275-7(a)(2) determination of “Effect with proposed mitigation” with the proposed mitigation (as per HAR §13-275-8[a][1][a]) of Preservation” in the form of avoidance and protection of the two boulder alignments.

The two terrace alignments are adjacent to a drainage swale near the southwest end of the eastern TMK: [2] 5-2-026:014, Lot 104D-1 drainage swale and are relatively far from the access road and the likely location of any home development (in the vicinity of the abandoned house). It is thus hoped that passive preservation would be only a very minor concern for development of this lot.

The newly identified potential historic properties (two small terrace alignments, a single stone high) are suggested to have been fully documented and have reached their information potential. Because of uncertainty over the antiquity of these features and their modest nature it is not clear that much would be gained by preparing a formal preservation plan to address them.

Consultation with the SHPD can determine the future course of action. As a general precaution, the project plans should include provisions stating that “In the event that historic resources, including structural remains, subsurface cultural deposits, or human skeletal remains, are identified during the construction project, cease all work in the immediate vicinity of the find, protect the find, protect the find from additional disturbance, and contact the SHPD at (808) 692-8015.”

.

Section 7 References Cited

AECOS Inc.
1980 *Environmental Field Studies for the Moloka‘i Airport Master Plan.* AECOS, Inc., Kailua, Hawai‘i.

Akana, Francis
n.d. Legend of Pu‘u Pe‘elua (1938). (Ms. in possession of M.K. Pukui). In *Molokai a Site Survey*, Catherine C. Summers. Department of Anthropology, Bernice Pauahi Bishop Museum, Honolulu.

Andrews, Lorrin
1829 Tour Around Morokai. In *The Missionary Herald*, Vol XXV. No. 50 Cornhill Crocker & Brewster, Printers, Boston, Massachusetts.

Bonk, William
1954 Archaeological Excavations on West Molokai. Master of Arts Thesis, Department of Anthropology, University of Hawai‘i, Honolulu.

Carlson, Norman K.
1951 Grazing Land Problems, Molokai Island, Territory of Hawaii. *Hawaiian Agricultural Experiment Station Bulletin.*

Cartwright. Bruce
1922 Letter to Dr. C.M. Cooke, Jr., Apr 20. Bernice Pauahi Bishop Museum, Honolulu.

Chinen, Jon J.
1958 *The* Great *Mahele: Hawaii's Land Division of 1848*. University of Hawaii Press, Honolulu.

Cobb, John N.
1902 Commercial Fisheries of the Hawaiian Islands. In *U.S. Fish Commission Report for 1901* pp. 383–490. Government Printing Office, Washington.

Cooke, George Paul
1949 *Moolelo O Molokai: A Ranch Story of Molokai*. Honolulu Star-Bulletin, Honolulu.

Cooke Sophie J.
1964 Sincerely, Sophie. Honolulu. Tongg Publishing Company, Ltd. Honolulu.

de Loach, Lucille Fortunato
1975 Land and People on Molokai: An Overview. Master of Arts Thesis, University of Hawai‘i at Mānoa, Honolulu.

Dodge, F.S., C.J. Willis, and S.M. Kanakanui
1897 Molokai, 1:90000. Hawaiian Government Survey. Washington, D.C.

Environmental Impact Study Corp.
1981 *PROPOSED INDUSTRIAL SITE: BIOLOGICAL AND ARCHAEOLOGICAL EVALUATION Naiwa, Molokai, Hawaii.* Environment Impact Study Corp., Honolulu and Maui, Hawai‘i.

Emory, Kenneth, P.
n.d. Field Notebook (1922). Department of Anthropology, Bernice Pauahi Bishop Museum, Honolulu.

ESRI, Inc.
2013 Map Image Layer. Esri, Inc., Redlands, California.

Foote, Donald E., Elmer L. Hill, Sakuichi Nakamura, and Floyd Stephens
1972 *Soil Survey of Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii*. Soi Conservation Service, United States Department of Agriculture, Washington, D.C.

Fornander, Abraham
1880 *An Account of the Polynesian Race, its Origins and Migrations, and the Ancient History of the Hawaiian People to the Times of Kamehameha I*. 6 vols. Trubner & Company, London.

1916-1917 *Hawaiian Antiquities and Folk-Lore, The Hawaiian Account of the Formation of the Islands and Origin of their Race, with the Traditions of their Migrations, Etc., as Gathered from Original Sources*. Memoirs of the Bernice Pauahi Bishop Museum. Bishop Museum Press, Honolulu.

Fowke, Gerard
1922 Archaeological Work In Hawaii. In *Archaeological Investigations*. Bureau of American Ethnology, Bulletin 76. Smithsonian Institution, Washington, D.C.

Giambelluca, Thomas W., Q. Chen, A.G. Frazier, J.P. Price, Y.L. Chen, P.S. Chu, J.K. Eischeid, and D.M. Delparte
2013 The Rainfall Atlas of Hawai‘i. In *Bull. Amer.Meteor. Soc.*, pp. 313–316. Vol. 94. University of Hawai‘i at Mānoa, Honolulu.

Griffin, Annie
1993 *Newly Identified Historic Site 60-02-995 Palaau Molokai TMK: 5-2-05:6 por*. State Historic Preservation Division, Department of Land and Natural Resources, State of Hawai‘i, Honolulu.

Griffith, E.M.
1902 *A Report of U.S. Forester E.M. Griffith on Hawaiian Forests.* Yokohama, Japan.

Hammatt, Hallett H., Tamara Craddock, and William H. Folk
1993 *Archaeological Inventory Survey of Three I5-Acre Parcels in the Ahupua'a of Pala'au and Na'iwa, Island of Moloka'i (TMK 5-2-1l:por.29; TMK 5-2-1l:por.I2; TMK 5-2-04:por.84). Cultural* Surveys Hawai‘i, Kailua, Hawai‘i.

Handy, E.S. Craighill
1940 *The Hawaiian Planter*. Bishop Museum Bulletin Volume 1, No. 161. Bernice Pauahi Bishop Museum, Honolulu.

Handy, E.S. Craighill, and Elizabeth G. Handy
1972 Native *Planters in Old Hawaii: Their Life, Lore, and Environment*. Bishop Museum Bulletin 233. Bishop Museum Press, Honolulu.

Handy, E.S. Craighill, Elizabeth Green Handy, and Mary Kawena Pukui
1991 *Native Planters in Old Hawaii: Their Life, Lore, and Environment*. Revised edition. Bishop Museum Bulletin 233. Bishop Museum Press, Honolulu.

Handy, Willowdean Chatterson
1922 *Tattooing in the Marquesas*. Bishop Museum Bulletin I, Bayard Dominick Expedition, Publication Number 3. Bernice Pauahi Bishop Museum, Honolulu.

Hartzell, Leslie L.
2000 *Pu‘u Kapele Rock Wall Complex: Supplemental Archaeological Inventory Survey at the USAF Molokai Receiver Station, Island of Moloka‘i, Maui County, Hawai’i (TMK: 5-2-06:63, 69)*. Department of Anthropology, Bernice Pauahi Bishop Museum, Honolulu.

Hawaii TMK Service
2014 Tax Map Key [2] 5-2-005, 5-2-007, and 5-2-026. Hawai‘i TMK Service, Honolulu.

Henke, L.A.
1929 A Survey of Livestock in Hawaii. In *University of Hawaii Research Publication No. 5*, pp. 82. University of Hawai‘i, Honolulu.

Honolulu Advertiser
1944a Molokai May Yield 1200 Tons of Corn if Conditions are O.K. *Honolulu Advertiser* 25 April.

1944b "Fair" Corn Crop Seen For Molokai By Julian Yates. *Honolulu Advertiser* 14 July.

Honolulu Star-Bulletin
1922 Molokai Corn. *Honolulu Star-Bulletin* 7 November.

Horvat, William J.
1966 *Above the Pacific*. AERO Publishers, Inc., Fallbrook, California.

Jenkins, John S.
1850 *Voyage of the U.S. Exploring Squadron Commanded by Captain Charles Wilkes*. James M. Alden, New York.

Judd, Gerrit P.
1936 *Puleoo, The Story of Molokai.* Honolulu.

Kamakau, Samuel Mānaiakalani
1992a *Ka Po‘e Kahiko: The People of Old*. Bishop Museum Press, Honolulu.

1992b *Ruling Chiefs of Hawaii*. Revised edition. Kamehameha Schools Press, Honolulu.

Keesing, Felix Maxwell
1936 *Hawaiian homesteading on Molokai*. Research publications, Vol. no. 12. University of Hawai‘i, Honolulu.

Kuykendall, R.S.
1953 *The Hawaiian Kingdom: 1854-1874*. University of Hawaii Press, Honolulu.

Larsen, Jack L. and Thomas A. Marks
2010 *Hawaiian Pineapple Entrepreneurs*. Creative Company, Sheridan, Oregon.

Hammatt, Hallett H.
2008 *Archaeological Literature Review and Field Check Study of Four DOE Schools, Island of Moloka‘i Hawai‘i Inter-Island DOE Cesspool Project.* Cultural Surveys Hawai‘i, Inc., Wailuku, Hawai‘i.

Lynch, Russ
1968 An Iowa corn farmer on Molokai. *Honolulu Star-Bulletin* 5 October.

MacDonald, Gordon A., Agatin T. Abbot, and Frank L. Peterson
1990 *Volcanoes in the Sea: The Geology of Hawaii*. Second edition. University of Hawaii Press, Honolulu.

Magin, Janis L.
2017 Hawaii's Molokai Ranch on the market for $260M. *Pacific Business News,* 7 September.

Major, Maurice and Boyd Dixon
1994 *A Final Technical Report, Archaeological Survey and Evaluation, USAF Receiver Station, Ho‘olehua, Moloka‘i, Maui County Hawai‘i.* Department of Anthropology, Bernice Pauahi Bishop Museum, Honolulu.

Mangieri, Gina
2019 *Molokai Ranch sale has community talking public, private options.* Nexstar Broadcasting, Inc.

Martel, Thomas III, Trevor Yucha, and Hallett H. Hammatt
2021 *(Draft) Archaeological Literature Review and Field Inspection Report for the Department of Hawaiian Homelands Nā‘iwa Agricultural Subdivision Project, Pala‘au and Ho‘olehua Ahupua‘a, Moloka‘i District, Moloka‘i Island, TMKs: [2] 5-2-003:001, 5-3-004:001, 002, 004, 007, and 046.* Cultural Surveys Hawai‘i, Inc., Kailua, Hawai‘i.

Maui News
1926 *Maui News Industrial Edition* 4 December. Wailuku, Hawai‘i.
1939 Molokai Hi Grows from Tiny School. *Maui News* 11 October. Wailuku, Hawai‘i.
1940 School Is Center For Ag Training. *Maui News* 30 March. Wailuku, Hawai‘i.
1948 Pine Co-op Plan Works On Molokai. *Maui News* 6 October. Wailuku, Hawai‘i.
1950 Hoolehua Is Selected As School Site. *Maui News* 22 July. Wailuku, Hawai‘i.

McGregor, Davianna Pomaikai, Ph.D.
1990 Aina hoopulapula: Hawaiian Homesteading. *The Hawaiian Journal of History* 24.

McIntosh, James D., Caleb C. Fechner, and Paul L. Cleghorn
2019 *Archaeological Inventory Survey for the Proposed Improvements to the Department Of Hawaiian Home Lands Water System on Moloka‘i Lands in Pala‘au, Ho‘olehua, Na‘iwa,* Kahanui, *and Kalama‘ula Ahupua‘a Kona District, Island Of Moloka‘i*. Pacific Legacy, Inc., Kailua, Hawai’i.

Menzies, Archibald
1920 *Hawaii Nei 128 Years Ago*. Unknown publisher.

Monsarrat, M.D.
1886 Registered Map 1288. Hawai‘i Land Survey Division, Department of Accounting and General Services, Honolulu. Available online at http://dags.hawaii.gov/survey/search.php

Morse, Gordon
1953 Kamaiana Naturalist Recalls: Brackish Water, Old Heiau, Had Part In Molokai Sugar Failure. *Honolulu Advertiser*.

Nagahara, Valerie and Michael Kolb
1994 *Field Inspection and Location of Site 50-60-03-11, Kape' elua Complex Hoolehua,* Molokai *(TMK 5-2-23:30).* State of Hawai‘i, State Historic Preservation Division, Honolulu.

Ne, Harriet, Gloria L. Cronin, and Terry Reffell
1992 *Tales of Molokai: The Voice of Harriet Ne*. Institute for Polynesian Studies, Lāi‘e, Hawai‘i.

Neller, Earl (Buddy)
1982 *An Archaeological Reconnaissance of Proposed Marine Corps Training Areas on Molokai: Palaau (Hoolehua), Kalamaula, and Kaapakea, and Kaapakea-Kamiloloa, TMK: 5-2 var, 5-3 var, and 5-4 var.* State Historic Preservation Division, Department of Land and Natural Resources, Honolulu.

Pantaleo, Jeffrey
2004 *Addendum Archaeological Monitoring Report for the Sandwich Isles Communications, Inc.* Phase *II Moloka‘i Rural Fiber Optics Duct Line TMK S-2-03, 04, 06,07, 15, 17, 21, 22,23 Naiwa and Palaau Ahupua‘a Island of Molokai*. Archaeological Services Hawaii, LLC, Honolulu.

Pantaleo, Jeffrey and Lisa Rotunno-Hazuka
2003 *Archaeological Monitoring Report for the Sandwich Isles Communications, Inc. Moloka‘i Rural Fiber Optics Duct Lines Hoolehua 2, Naiw A 1, Kalama‘ula Ahupua‘a Moloka‘i Island, State Of Hawaii (Tmk 5-2-04,07).* Archaeological Services Hawaii, LLC, Wailuku, Hawai‘i.

Pfennig, Kelene, Kimberly M. Mooney, Elizabeth L. Kahahane and Paul L. Cleghorn
2011 *Literature Review of Previous Archaeological Work within 8,955 Acres Owned by the Department of Hawaiian Home Lands on the Island of Moloka‘i.* Pacific Legacy, Inc., Kailua Hawai‘i.

Phelps, S.
1937 *A Regional Study of Molokai.* On file at Bernice Pauahi Bishop Museum Archives, Honolulu.

Pukui, Mary Kawena
1983 *‘Olelo no‘eau : Hawaiian Proverbs & Poetical Sayings.* Bishop Museum Special Publication No. 71. Bishop Museum Press, Honolulu.

Pukui, Mary Kawena, Samuel H. Elbert, and Esther T. Mookini
1974 *Place Names of Hawaii*. Revised and enlarged edition. University of Hawaii Press, Honolulu.

Roll, Warren
1968 Where the Tall Corn Grows. *Honolulu Star-Bulletin*.

State of Hawai‘i
2008 Molokai Airport. State of Hawai‘i website: http://hawaii.gov/hawaiiaviation/hawaii-airfields-airports/molokai/molokai-airport (accessed 2008).

Stearns, Harold T. and Gordon A. Macdonald
1947 *Geology and Ground-Water Resources of the Island of Molokai, Hawaii*. Vol. Bulletin 11. U.S. Geological Survey, United States Department of the Interior, Honolulu.

Stokes, John F.G.
1909 Heiaus of Molokai, Molokai Survey Field Note Book, Honolulu.

Strazar, Marie D.
2000 *Moloka‘i in History: A Guide to the Resources*. History and Humanities Program of the Hawai‘i State Foundation on Culture and the Arts, Honolulu.

Summers, Catherine C.
1971 *Molokai: A Site Survey*. Department of Anthropology, Bernice Pauahi Bishop Museum, Honolulu.

Thrum, Thomas G.
1908 Tales from the Temples. In *Hawaiian Alamanac and Annual for 1909 The Reference Book of Information and Statistics Relating to the Territory of Hawaii, of Value to Merchants, Tourists and Others.* Thos. G. Thrum, Honolulu.

Tomich, Prosper Quentin
1986 *Mammals in Hawaii: A Synopsis and Notational Bibliography*. Second edition. Bishop Museum Press, Honolulu.

Tomonari-Tuggle, M.J.
1990 *Archaeological Inventory Survey of a Portion of Kalama‘ula. Island of Moloka‘i*. International Archaeological Research Institute, Inc., Honolulu.

USDA (U.S. Department of Agriculture, Natural Resources Conservation Service)
2006 Soil Survey Geographic (SSURGO) database for Island of Molokai, Hawaii (hi980). U.S. Department of Agriculture, Natural Resources Conservation Service.

USGS (U.S. Geological Survey)
1922 Kualapuu USGS 7.5-minute topographic quadrangle. USGS Information Services, Denver, Colorado.

1950 USGS aerial photograph of Molokai. USGS Information Services, Denver, Colorado.

1952 Kaunakakai and Molokai Airport USGS 7.5-minute topographic quadrangles. USGS Information Services, Denver, Colorado.

1964 USGS aerial photograph of Molokai. USGS Information Services, Denver, Colorado.

1967 Kaunakakai USGS 7.5-minute topographic quadrangle. USGS Information Services, Denver, Colorado.

1968 Molokai Airport USGS 7.5-minute topographic quadrangle. USGS Information Services, Denver, Colorado.

1983 Molokai West USGS 7.5-minute topographic quadrangle. USGS Information Services, Denver, Colorado.

1993 Kaunakakai and Molokai Airport USGS 7.5-minute topographic quadrangles. USGS Information Services, Denver, Colorado.

Vancouver, George
1798 *A Voyage of Discovery to the North Pacific Ocean, and Round the World; in Which the Coast of North-West America Has Been Carefully Examined and Accurately Surveyed. Undertaken by His Majesty’s Command, Principally with a View to Ascertain the Existence of Any Navigable* Communication *between the North Pacific and North Atlantic Oceans; and Performed in the Years 1790, 1791, 1792, 1793, 1794, and 1795, in the “Discovery” Sloop of War, and Armed Tender “Chatham*. Three vols. G. G. & J. Robinson, Paternaster Row; and J. Edwards, Pall-Mall., London.

Waihona ‘Aina
2021 Mahele Database. Waihona ‘Aina Corporation.

Westervelt, W.D.
1916 Hawaiian *Legends of Volcanoes*. George H. Ellis Press, Boston, Massachussetts.

Wiebke, Henry
1940 History Of Agriculture On Molokai Is Presented. *Maui News* 30 March. Wailuku, Hawai‘i.

Young, Charles C.
1961 Molokai Electric's George Will Has Guided Firm Since Inception. *Honolulu Star-Bulletin.* Honolulu.

SUPPLEMENTAL LITERATURE REVIEW AND FIELD INSPECTION REPORT

APPENDIX

E-1

Draft

Archaeological Field Inspection and Literature Review to Support Consultation with SHPD for the Department of Hawaiian Home Lands Hoʻolehua Scattered Lots Subdivision and Improvements Project, Pālāʻau Ahupuaʻa, Molokaʻi District, Molokaʻi Island

TMKs: (2) 5-2-026:003, 016, and 017

Prepared for
Munekiyo Hiraga
on behalf of the
Department of Hawaiian Home Lands

Prepared by
David W. Shideler, M.A.,
and
Hallett H. Hammatt, Ph.D.

Cultural Surveys Hawaiʻi, Inc.
Kailua, Hawaiʻi
(Job Code: PALAAU 14)

January 2024

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	Archaeological Field Inspection and Literature Review to Support Consultation with SHPD for the Department of Hawaiian Home Lands Hoʻolehua Scattered Lots Subdivision and Improvements Project, Pālāʻau Ahupuaʻa, Molokaʻi District, Molokaʻi Island, TMKs: (2) 5-2-026:003,016, and 017 (Shideler and Hammatt 2024)
Date	January 2024
Project Number(s)	Cultural Surveys Hawaiʻi, Inc. (CSH) Job Code: PALAAU 14
Investigation Permit Number	CSH completed the fieldwork component of this study under archaeological fieldwork permit number 23-30, issued by the Hawaiʻi State Historic Preservation Division (SHPD) per Hawaiʻi Administrative Rules (HAR) §13-13-282.
Agencies	SHPD; Department of Hawaiian Home Lands (DHHL)
Land Jurisdiction and Project Funding	DHHL
Project Location	The project area includes three adjacent "Scattered Lots" parcels, TMK: (2) 5-2-026:003 (4.72 acres or 1.91 hectares), TMK: (2) 5-2-026:016 (4.73 acres or 1.91 hectares), and TMK: (2) 5-2-026:017 (5.83 acres or 2.36 hectares) located in the north portion of the Hoʻolehua plain of central Molokaʻi. These three scattered lots subdivision project area parcels are within the DHHL Hoʻolehua-Pālāʻau Homesteads, and are located approximately 2.2 km northwest from the Molokaʻi (Hoʻolehua) Airport. These contiguous parcels are bounded on the north by Puʻu Kapele Avenue and on the other sides by other DHHL parcels. The project area is depicted on a portion of the 1993 Molokai Airport and Kaunakakai U.S. Geological Survey (USGS) 7.5-minute topographic quadrangles (Figure 1), and many other figures.
Project Description	The project entails subdividing five lots on DHHL-owned lands in the Hoʻolehua area on Molokaʻi into 12 lots to be designated for subsistence agriculture use and improving them for lease to DHHL beneficiaries. The five lots are hereafter referred to as "subject properties." Two of these five lots—TMKs: (2) 5-2-005:031, Lot 17 and 5-2-026:014, Lot 04D-1—were the subject of a prior *Archaeological Field Inspection and Literature Review to Support Consultation with SHPD for the Department of Hawaiian Home Lands Hoʻolehua Scattered Lots Subdivision and Improvements Project…* (Shideler and Hammatt, November 2021) that resulted in an SHPD §6E-8 Historic Preservation Review dated 16 February 2022,(Project No. 2021PR01540, Doc. No. 2201IK03, included here as Appendix A) that concurred with DHHL's determination of "No historic properties affected" for those two lots.

	This companion study addresses three additional lots (TMKs: [2] 5-2-026:003, 016, and 017) in the immediate vicinity of one of the lots previously addressed (TMK: [2] 5-2-026:014). Improvements to be undertaken include creating access driveways to each of the newly created lots with connections for domestic water and irrigation water for each lot provided within the access driveways from existing systems in the neighboring roadways. The lots will be made available to DHHL beneficiaries currently on the waitlist for an agricultural lease on Moloka‘i. Once awarded, lessees will be able to construct homes on the lots, in addition to utilizing the lots for agricultural purposes.
Project Acreage	The project parcel size is as follows: TMK: (2) 5-2-026:003 parcel is 4.72 acres (1.91 hectares) TMK: (2) 5-2-026:016 parcel is 4.73 acres (1.91 hectares) TMK: (2) 5-2-026:017 parcel is 5.83 acres (2.36 hectares) The total project area is 15.28 acres (6.18 hectares)
Document Purpose	This investigation was designed—through detailed historical, cultural, and archaeological background research and a field inspection of the project area—to determine the likelihood that historic properties may be affected by the project and based on findings, consider cultural resource management recommendations. This document is intended to facilitate the project’s planning and support the project’s historic preservation and environmental review compliance and to support obtaining an SHPD determination letter (as per HAR§ 13-275-3).
Fieldwork Effort	Fieldwork was conducted on 19 December 2023 by CSH archaeologist David W. Shideler, M.A. This work required approximately 1 person-day to complete.
Results Summary	The results of the field inspection of the additional three lots of the DHHL Ho‘olehua Scattered Lots Subdivision and Improvements project were consistent with what was expected based on background research and previous archaeological studies conducted in the vicinity. These three lots were also determined to be relatively far from potable surface water, access to the coast, or notable landforms. The annual rainfall of 802 mm (32.83 inches) at the neighboring “Gage 34” station (Giambelluca et al. 2013) is suggested to be insufficient for non-irrigated agriculture. No historic properties have been identified previously within 500 m of these three additional lots. The general absence of trees in the vicinity of these three additional lots as indicated on a 1950 USGS aerial photograph suggests ground clearing for prior ranching activities. Field inspection found no evidence of historic properties in the three lots newly addressed in this study.

Recommendations	The results of this literature review and field inspection (LRFI) indicate there is no potential for archaeological historic properties in the three-lot project area addressed. This LRFI would support an HAR §13-275-7(a)(1) determination of “No historic properties affected” for these three lots. In light of the SHPD §6E-8 Historic Preservation Review dated 16 February 2022, (Project No. 2021PR01540, Doc. No. 2201IK03, included here as Appendix A) that concurred with DHHL’s determination of “No historic properties affected” for the two lots previously studied, a determination of “No historic properties affected” would be appropriate for the five lots of the DHHL Ho‘olehua Scattered Lots Subdivision and Improvements project.

Table of Contents

Management Summary ..... **i**

Section 1 Introduction **1**

1.1 Project Background 1
1.2 Document Purpose 1
1.1 Environmental Setting 7
1.1.1 Natural Environment 7
1.1.2 Built Environment 9

Section 2 Methods **10**

2.1 Background Research 10
2.2 Fieldwork 10

Section 3 Background Research **11**

3.1 Traditional and Historical Background 11
3.1.1 Place Names 11
3.1.2 *Mo‘olelo* 11
3.1.3 Origin of Moloka‘i 14
3.1.4 Pā‘aka‘a and His Son Kū-a-Pā‘aka‘a 14
3.1.5 Pu‘u Ka Pe‘elua, Caterpillar Hill 14
3.1.6 Pele’s Long Sleep 15
3.1.7 Sorcery on Moloka‘i 15
3.1.8 *‘Ōlelo No‘eau* 16
3.1.9 Subsistence and Settlement 17
3.2 Early Historic Period 18
3.3 Early 1800s 19
3.4 The Māhele and the Kuleana Act 20
3.5 Mid- to Late 1800s 20
3.5.1 Cattle Ranching 20
3.5.2 Agriculture 25
3.6 1900s 26
3.6.1 Molokai Ranch 26
3.6.2 Hawaiian Homes Commission 26
3.6.3 Pineapple 29
3.6.4 School Farm 29
3.6.5 Corn 31
3.6.6 Infrastructure 34
3.7 Contemporary Land Use 39

Section 4 Previous Archaeological Research **41**

4.1 Summers (1971) 41
4.1.1 AECOS Inc. (1980) 53
4.1.2 Environmental Impact Study Corp. (1981) 54
4.1.3 Neller (1982) 54
4.1.4 Griffin (1993) 55
4.1.5 Hammatt et al. (1993) 55
4.1.6 Nagahara and Kolb (1994) 55

4.1.7 Major and Dixon (1995) 56
4.1.8 Hartzell (2000) 56
4.1.9 Pantaleo and Rotunno-Hazuka (2003) 56
4.1.10 Pantaleo (2004) 57
4.1.11 Hammatt (2008) 57
4.1.12 Pfennig et al. (2011) 57
4.1.13 McIntosh et al. (2019) 58
4.1.14 Shideler and Hammatt (2021) 58
4.2 Background Summary and Predictive Model 59

Section 5 Results of Field Work **60**

Section 6 Summary and Recommendations **69**

6.1 Summary 69
6.2 Recommendations 69

Section 7 References Cited **70**

Appendix A SHPD Review of Two “Scattered Lots” TMK: (2) 5-2-005:031 por. and (2) 5-2-026:014 ..... **77**

List of Figures

Figure 1. Portion of the 1993 Molokai Airport and Kaunakakai USGS 7.5-minute topographic quadrangles showing the location(s) of the three “Scattered Lots” presently addressed (in red) as well as the two previously addressed “Scattered Lots” (in blue).....2
Figure 2. Portion of the 1993 Molokai Airport and Kaunakakai USGS 7.5-minute topographic quadrangles with an overlay of TMK parcels (mostly DHHL lots) showing the location(s) of the three “Scattered Lots” presently addressed (in red) as well as the two previously addressed “Scattered Lots” (in blue).....3
Figure 3. TMK: (2) 5-2-026 showing the location of the previously addressed TMK: (2) 5-2-026:014, Lot 104D-1 (in blue), and the three lots presently addressed (in red) (Hawai‘i TMK Service 2023).....4
Figure 4. 2013 satellite photograph (ESRI 2013) showing the three lots presently addressed (in red) and the two lots previously addressed (in blue).....5
Figure 5. 2013 aerial photograph (ESRI 2013) with an overlay of TMK parcels (mostly DHHL lots) showing the location(s) of the three lots presently addressed (in red) and the two lots previously addressed (in blue).....6
Figure 6. Portion of the 1993 Molokai Airport and Kaunakakai USGS 7.5-minute topographic quadrangles and overlay of Foote et al. (1972) *Soil Survey of Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii*, indicating soil types within and surrounding the three lots presently addressed (USDA 2006).....8
Figure 7. Map from Summers (1971) showing place names near the project area(s).....12
Figure 8. Portion of Dodge et al. (1897) map of Moloka‘i showing 1848 land divisions (Crown [yellow], government [green], LCAs [no color]); the three lots presently addressed (and all five scattered lots) were within Crown lands.....21
Figure 9. LCAs and Grants in the vicinity of the three lots presently addressed depicted on a portion of 1993 Molokai Airport and Kaunakakai USGS topographic quadrangles (the three lots presently addressed were not close to a Native Tenant LCA or grant).....22
Figure 10. Portion of Monsarrat (1886) Hawaiian Government Survey map of Moloka‘i, Middle and West Sections (RM 1288); showing the three lots presently addressed (and all five scattered lots) as within the Momomi Paddock.....24
Figure 11. Portion of 1922 USGS topographic map of Kualapuu quadrangle, showing the three lots presently addressed as relatively undeveloped (an unimproved Moomomi Road passed to the south and a Waihii Pipeline and adjacent unimproved road extended east to storage tanks southeast of the project area).....28
Figure 12. Sketch plan of Ho‘olehua Homesteads (Keesing 1936:26) showing the three lots presently addressed as within the indicated Hoolehua Homesteads.....30
Figure 13. Community Center for Ho‘olehua Homesteads including, from left to right, a hall, school, church, and farm, ca. 1939 (Keesing 1936:124).....32
Figure 14. A Ho‘olehua homestead in 1939 (Keesing 1936:59).....32
Figure 15. Letter to the editor praising the quality of Moloka‘i corn in 1922 *(Honolulu Star-Bulletin* 1922:6).....33
Figure 16. Experimental corn farmer, Kaye Waldorf, in West Moloka‘i; pipeline (left) transported water to his crops (Roll 1968:B-1).....33

Figure 17. 1950 USGS aerial photograph of Molokai (UH MAGIS) showing pineapple cultivation neighboring, but not within, the project areas.....35
Figure 18. Portion of 1952 Kaunakakai and Molokai Airport USGS topographic quadrangles showing unpaved roads present surrounding, but not immediately adjacent, to the three lots presently addressed.....36
Figure 19. 1964 USGS aerial photograph of Moloka‘i showing pineapple cultivation neighboring, but not within, the three lots presently addressed (note the general absence of trees in the project area.....37
Figure 20. Portion of the 1967 Kaunakakai and 1968 Molokai Airport USGS topographic quadrangles showing unpaved roads in the general vicinity of the three lots presently addressed including Pu‘u Kapele Road on the north side of Lot TMK: (2) 5-2-026:016 .38
Figure 21. Portion of 1983 Molokai West USGS topographic quadrangle showing an aqueduct crossing the Ho‘olehua Plain to the south and the Kualapuu Reservoir well to the southeast of the three lots presently addressed.....40
Figure 22. Previous archaeological studies in the vicinity of the three lots presently addressed depicted on a portion of the 1993 Kaunakakai and Molokai Airport USGS topographic quadrangles.....42
Figure 23. Previously identified historic properties in the vicinity of the three lots presently addressed depicted on a portion of the 1993 Kaunakakai and Molokai Airport USGS topographic quadrangles.....46
Figure 24. Overview showing tracklogs at the three DHHL Ho‘olehua Scattered Lots Subdivision and Improvements project parcels addressed in this study showing the general location and direction of the following representative photographs.....61
Figure 25. Photo A: View from the northeast corner of TMK: (2) 5-2-026:016, view to southwest toward the center of the parcel.....62
Figure 26. Photo B: View from the southeast corner of TMK: (2) 5-2-026:016, view to northwest toward the center of the parcel.....62
Figure 27. Photo C: View of outbuildings from the main Hill Residence building, view to east .63
Figure 28. Photo D: View from the southwest corner of TMK: (2) 5-2-026:016, view to northeast toward the center of the parcel.....63
Figure 29. Photo E: View from the northwest corner of TMK: (2) 5-2-026:016, view to southeast (dominated by the main Hill Residence) toward the center of the parcel.....64
Figure 30. Photo F: View from the northern northwest side of TMK: (2) 5-2-026:016 (from just southwest of the Hill Residence) to southeast toward the center of the parcel.....64
Figure 31. Photo G: View of TMK: (2) 5-2-026:003 parcel from the northwest corner, view to southeast toward the center of the parcel.....65
Figure 32. Photo H: View of TMK: (2) 5-2-026:003 parcel from the southwest corner, view to northeast toward the center of the parcel.....65
Figure 33. Photo I: View of TMK: (2) 5-2-026:003 parcel from the northeast corner, view to southwest toward the center of the parcel.....66
Figure 34. Photo J: View of TMK: (2) 5-2-026:003 parcel from the southeast corner, view to northwest toward the center of the parcel.....66
Figure 35. Photo K: View of TMK: (2) 5-2-026:017 parcel from the northeast corner, view to southwest toward the center of the parcel.....67

Figure 36. Photo L: View of TMK: (2) 5-2-026:017 parcel from the southeast corner, view to northwest toward the center of the parcel 67
Figure 37. Photo M: View of TMK: (2) 5-2-026:017 parcel from the southwest corner, view to northeast toward the center of the parcel 68

List of Tables

Table 1. Place names near the current project area(s) 13
Table 2. Previous archaeological studies conducted in the vicinity of the three lots presently addressed....43
Table 3. Previously identified historic properties in the vicinity of the three lots presently addressed....47

Section 1 Introduction

1.1 Project Background

At the request of Munekiyo Hiraga, and on behalf of Department of Hawaiian Home Lands (DHHL), Cultural Surveys Hawai‘i, Inc. (CSH) has prepared this archaeological literature review and field inspection (LRFI) report for the proposed DHHL Ho‘olehua Scattered Lots Subdivision and Improvements Project, Pālā‘au Ahupua‘a, Moloka‘i District, Moloka‘i Island, including three parcels, TMK: (2) 5-2-026:003 (4.72 acres or 1.91 hectares), TMK: (2) 5-2-026:016 (4.73 acres or 1.91 hectares), and TMK: (2) 5-2-026:017 (5.83 acres or 2.36 hectares). These three scattered lots subdivision project area parcels are within the DHHL Ho‘olehua-Pālā‘au Homesteads, and are located within the north portion of the Ho‘olehua plain of central Moloka‘i, approximately 2.2 km northwest from Moloka‘i (Ho‘olehua) Airport. These contiguous parcels are bounded on the north by Pu‘u Kapele Avenue and on the other sides by other DHHL parcels. The project area is depicted on a portion of the 1993 Molokai Airport and Kaunakakai U.S. Geological Survey (USGS) 7.5-minute topographic quadrangles (Figure 1 and Figure 2, with an overlay of TMK parcels, mostly DHHL lots), on a tax map plat (Figure 3), and on 2012 ESRI satellite photograph (Figure 4, and Figure 5 with an overlay of TMK parcels).

The project entails subdividing five lots on DHHL-owned lands in the Ho‘olehua area on Moloka‘i into 12 lots to be designated for subsistence agriculture use and improving them for lease to DHHL beneficiaries. The five lots are hereafter referred to as “subject properties.” Two of these five lots—TMKs: (2) 5-2-005:031, Lot 17 and 5-2-026:014, Lot 104D-—were the subject of a prior *Archaeological Field Inspection and Literature Review to Support Consultation with SHPD for the Department of Hawaiian Home Lands Ho‘olehua Scattered Lots Subdivision and Improvements Project…* (Shideler and Hammatt, November 2021) that resulted in a State Historic Preservation Division (SHPD) §6E-8 Historic Preservation Review dated 16 February 2022, (Project No. 2021PR01540, Doc. No. 2201IK03, included here as Appendix A) that concurred with DHHL’s determination of “No historic properties affected” for those two lots. This study addressing an additional three scattered lots is intended as a companion to the prior study (Shideler and Hammatt 2021) that addressed two lots of what is now one project.

DHHL proposes to construct infrastructure improvements including clearing, grading, and installation of roadway, electrical, domestic water, and irrigation water utilities. The proposed plan calls for ground-disturbing activities to be confined to the subject parcels but will extend to existing roadways for access and connection for utilities. These improvements will support DHHL beneficiaries through the provision of essential services necessary for agricultural homesteading. While installation of wastewater treatment systems will be the responsibility of the lessee, the environmental impacts are being considered as part of this action.

1.2 Document Purpose

This investigation was designed—through detailed historical, cultural, and archaeological background research of the project area and a field inspection—to determine the likelihood that cultural resources/ historic properties may be affected by the project and based on findings, consider cultural resource management recommendations. This document is intended to facilitate the project’s planning and support the project’s historic preservation and environmental review

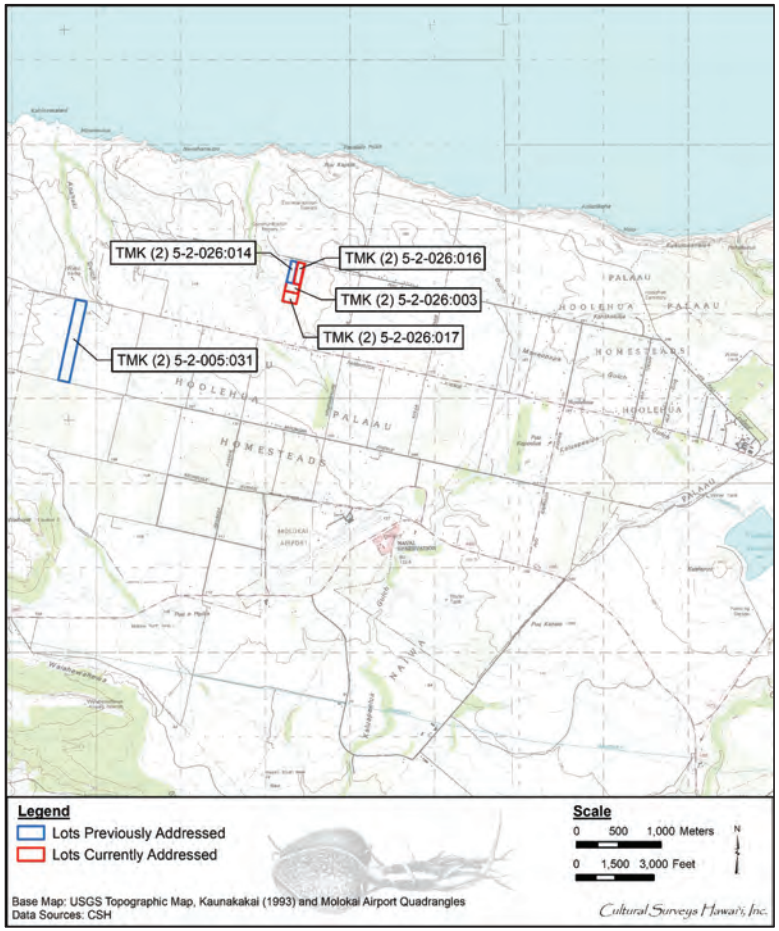


Figure 1. Portion of the 1993 Molokai Airport and Kaunakakai USGS 7.5-minute topographic quadrangles showing the location(s) of the three “Scattered Lots” presently addressed (in red) as well as the two previously addressed “Scattered Lots” (in blue)

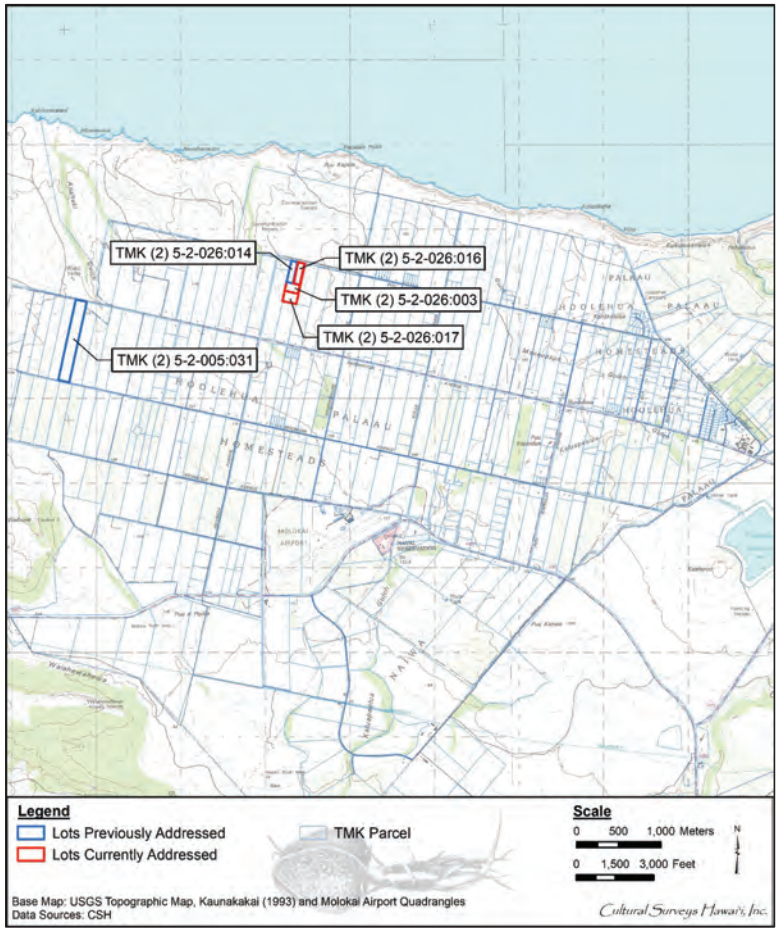


Figure 2. Portion of the 1993 Molokai Airport and Kaunakakai USGS 7.5-minute topographic quadrangles with an overlay of TMK parcels (mostly DHHL lots) showing the location(s) of the three “Scattered Lots” presently addressed (in red) as well as the two previously addressed “Scattered Lots” (in blue)

Figure 4. 2013 satellite photograph (ESRI 2013) showing the three lots presently addressed (in red) and the two lots previously addressed (in blue)

Figure 3. TMK: (2) 5-2-026 showing the location of the previously addressed TMK: (2) 5-2-026:014, Lot 104D-1 (in blue), and the three lots presently addressed (in red) (Hawai'i TMK Service 2023)

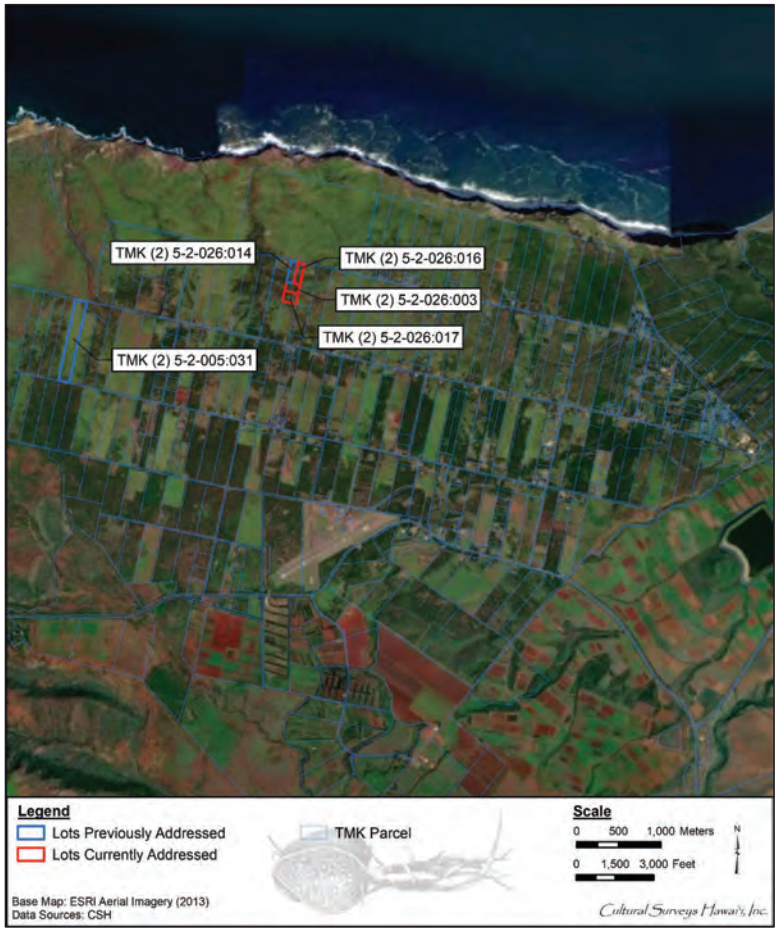


Figure 5. 2013 aerial photograph (ESRI 2013) with an overlay of TMK parcels (mostly DHHL lots) showing the location(s) of the three lots presently addressed (in red) and the two lots previously addressed (in blue)

compliance and is intended specifically to support consultation with the SHPD and to support obtaining an SHPD determination letter (as per Hawai‘i Administrative Rules or HAR §13-13-275-3).

1.1 Environmental Setting

1.1.1 Natural Environment

The three lots presently addressed are on relatively flat lands at approximately 40 m (130 foot [ft]) elevation above sea level in the north central portion of Moloka‘i Island, approximately 1.3 km (0.8 miles) inland (south) from Moloka‘i’s north shore sea cliffs.

Due to its low elevation and partial shielding by the East Moloka‘i volcano from trade winds, the vicinity is arid with only shallow, intermittent stream gulches (MacDonald et al. 1990:411).

The three lots presently addressed are just east of an unnamed gulch. It is believed this gulch rarely runs with water and that there is no source of potable water nearby.

The project area receives an approximate mean annual rainfall of 802 mm (32.83 inches) at the neighboring “Gage 34” station, according to the University of Hawai‘i Online Rainfall Atlas of Hawaii (Giambelluca et al. 2013) which is suggested to be insufficient for non-irrigated agriculture.

MacDonald et al. (1990:411) provide the following description for soil in West Moloka‘i:

> Long periods of weathering, accompanied by comparatively little stripping by erosion, have left a deep red soil cover over the top of West Molokai. In places recent erosion has cut through the upper horizon exposing the lower horizon, which locally exhibits pronounced iron enrichment in the form of masses of lateritic iron oxide. [MacDonald et al. 1990:411]

The “deep, red soil” described by MacDonald et al. (1990:411) is characteristic of the current project area and vicinity and is apparent in recent aerial imagery (see Figure 4).

According to the 2006 United States Department of Agriculture (USDA) Soil Survey Geographic (SSURGO) database (USDA 2006) and soil survey data gathered by Foote et al. (1972), the soils within the west project area consist of Molokai series soils including Molokai silty clay loam, 3 to 7% slopes (MuB), and Molokai silty clay loam, shallow variant, 15 to 25% slopes, severely eroded (MvD3) soils (Figure 6).

Molokai series soils are described as follows:

> […] well-drained soils on uplands on the islands of Maui, Lanai, Molokai, and Oahu. These soils formed in material weathered from basic igneous rock. They are nearly level to moderately steep. Elevations range mainly from nearly sea level to 1,000 feet […]
>
> These soils are used for sugarcane, pineapple, pasture, wildlife habitat, and homesites. The natural vegetation consists of kiawe, ilima, uhaloa, feather fingergrass, and buffelgrass. [Foote et al. 1971:96]

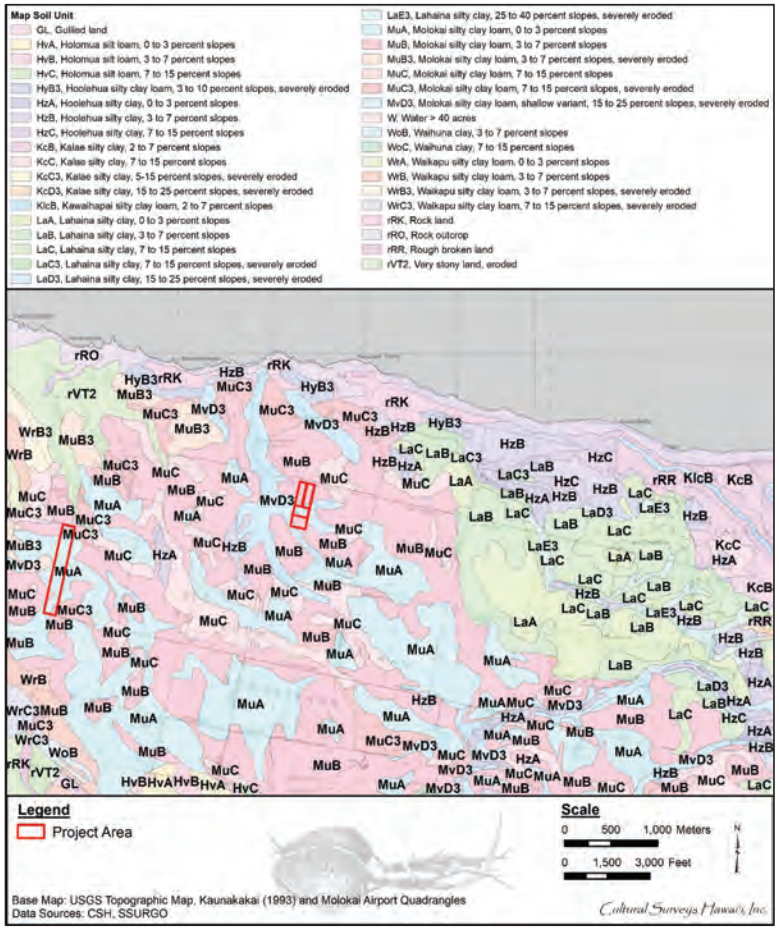


Figure 6. Portion of the 1993 Molokai Airport and Kaunakakai USGS 7.5-minute topographic quadrangles and overlay of Foote et al. (1972) *Soil Survey of Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii*, indicating soil types within and surrounding the three lots presently addressed (USDA 2006)

MuB soils are further described as, "On this soil, runoff is slow to medium and the erosion hazard is slight to moderate. Included in mapping were a few small areas that are eroded to soft, weathered rock […]" (Foote et al. 1971:96).

MvD3 soils are further described as follows:

> This soil occurs on the sides of drainageways. In most places all of the surface layer and part of the subsoil have been removed, and about 12 to 20 inches of dark reddish-brown soil overlies the soft, weathered rock. In some places the soil is eroded to soft, weathered, rock and, as a result, is grayer or browner than is typical of the Molokai series. There are few to common stones and boulders on the surface. These are unweathered rock cores that have been exposed by erosion. Runoff is rapid, and the erosion hazard is severe. Workability is difficult. [Foote et al. 1971:97]

Ground visibility during the field inspection was variable from good in areas under a mature canopy of *koa haole* to poor in areas where exotic grasses were up to 1.5 m high. The project area vegetation consisted primarily of introduced species including exotic grasses, *koa haole* (*Leucaena leucocephala*), and some *kiawe* (*Prosopis pallida*), *klu* (*Acacia farnesiana*), and lantana (*Lantana camara*). The only native species identified in the project area were *'ilima* (*Sida fallax*) and *'uhaloa* (*Waltheria indica*).

The surrounding area was largely undeveloped with scattered DHHL homesteads.

1.1.2 Built Environment

The built environment within and surrounding the project area is minimal. The project area vicinity mostly consists of undeveloped DHHL parcels. Active homesteads are sporadic throughout the vicinity, located particularly along the bounding roadways. The three-lot project area is bound by Pu'u Kapele Avenue (a dirt road) on the north side of parcel TMK: (2) 5-2-026:016. There is a boarded-up home (understood as the "Hill Residence") in the northwest corner of TMK: (2) 5-2-026:016. The home seems to be in relatively good shape. Certain outbuildings to the east of the home are dilapidated or completely collapsed.

Molokai Airport and associated infrastructure is located approximately 2 km south of the project area(s).

Section 2 Methods

2.1 Background Research

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 (2021) database.

This research provided the environmental, cultural, historic, and archaeological background for the project area. The sources studied were used to formulate a predictive model regarding the expected types and locations of cultural resources in the project area.

2.2 Fieldwork

Fieldwork was conducted on 19 December 2023 by CSH archaeologist David W. Shideler, M.A. This work required approximately 1 person-day to complete. The fieldwork was conducted with systematic sweeps, typically in a northeast to southwest direction, at approximately 15 m intervals with the tracklogs presented in Figure 24. The purpose of the fieldwork was to identify, locate, and describe any potential historic properties and to provide representative photographs of the project areas. No potential historic properties were identified.

Section 3 Background Research

3.1 Traditional and Historical Background

Traditionally, Moloka‘i was divided into two *moku*, or districts: Kona and Ko‘olau. Kona Moku was comprised of the lands of the southern and western sections of the island (which included Pālā‘au and Ho‘olehua Ahupua‘a) and the Ko‘olau Moku which comprised the lands of the northeastern portion of the island from Hālawa Valley to the Kalaupapa Peninsula. In 1859, the traditional *moku* of Kona and Ko‘olau were dropped and the island as a whole was referred to as the Moloka‘i district. In 1909, the island was again divided into two districts: Kalawao District, containing the lands of Kalaupapa, Kalawao, and Waikolu, and Moloka‘i District, comprising the remainder of the island (Coulter in Summers 1971:2), including the current project area.

The three lots addressed in this study are within Pālā‘au Ahupua‘a (see Figure 8). Mrs. Pukui in Handy described the subdistricts of Pālā‘au on Moloka‘i as *kalana* (Handy et al. 1991:47). Today, the *kalana* of Pālā‘au consists of one major land division and two *lele*. Pālā‘au 1 is located at the southern shores of central Moloka‘i, while Pālā‘au 3 is in uplands, at the summit of the sea cliffs above Kalaupapa Peninsula. These two *lele* of Pālā‘au Ahupua‘a are significantly smaller than Pālā‘au 2—which includes the present project areas. Pālā‘au 2, the largest of the three land sections, is adjacent to the northwest of the *ahupua‘a* of Ho‘olehua (Dodge et al. 1897; Summers 1971:81, see Figure 8).

3.1.1 Place Names

In the preface of *Place Names of Hawaii* (Pukui et al. 1974:x), Samuel Elbert offers the following description regarding place names:

> Hawaiians named taro patches, rocks and trees that represented deities and ancestors, sites of houses and heiau, canoe landings, fishing stations in the sea, resting places in the forests, and the tiniest spots where miraculous or interesting events are believed to have taken place.
>
> Place names are far from static […] names are constantly being given to new houses and buildings, land holdings, airstrips, streets, and towns and old names are replaced by new ones […] it is all the more essential, then to record the names and the lore associated with them [the ancient names] now. [Pukui et al. 1974:x]

Inherent in Elbert’s statements is knowledge that the oldest place names held meaning and told the story of an area prior to European Contact. Many place names in the vicinity of the project area are provided in Figure 7. Literal translations of place names for land areas and divisions near the project area are listed in Table 1 and may provide insight into the area prior to Western Contact.

3.1.2 *Mo‘olelo*

Early Hawaiian affairs and traditions were transmitted orally through *mo‘olelo* (traditional stories). These legendary stories recount events involving nature, people, gods, and spirits, thereby offering a window on the essence of Hawaiian ideology and lifestyles prior to Western Contact. Several *mo‘olelo* are associated with place names within or near Pālā‘au and Ho‘olehua are summarized below.

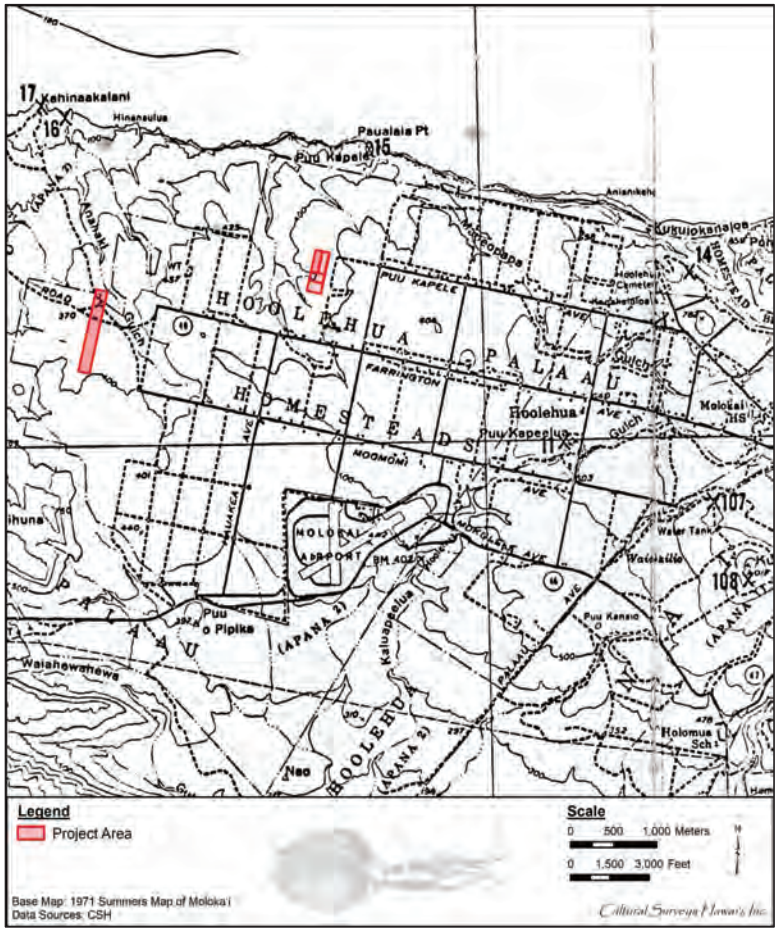


Figure 7. Map from Summers (1971) showing place names near the project area(s)

Table 1. Place names near the current project area(s)

Place Name	Description
Anahaki	Name of a gulch 2.5 km west of the three lots presently addressed. *Lit*. “Broken cave” (Pukui et al. 1974:12)
Anianikeha	Place along the sea cliff 3.0 km northeast of the three lots presently addressed. *Lit*. “blowing [on the] heights” (Pukui et al. 1974:12)
Hinanaulua	A point on the sea cliff 2.5 km northwest of the three lots presently addressed. *Lit*. “inspired [by a god] *hinana* fish.” (Pukui et al. 1974:46)
Ho‘olehua	*Lit*. acting the expert. Village, land division, and Hawaiian homestead area near the Moloka‘i airport; said to be named for a chief (Pukui et al. 1974:51–52). Ho‘olehua Ahupua‘a encompasses the three lots presently addressed.
Kahinaakalani	A point on the sea cliff 3.2 km northwest of the three lots presently addressed *Lit*. “the grayness of the sky, heaven” (Pukui et al. 1974:65)
Kāluape‘elua	*Lit*. baked caterpillar. A caterpillar infestation was ended by baking the caterpillars (Pukui et al. 1974:79). Name of gulch 3.5 km southeast of the three lots presently addressed.
Kanakaloloa	Place 3.5 km southeast NW of the three lots presently addressed. *Lit*. “tall person” (Pukui et al. 1974:83)
Kukuiokanaloa	Name of a stretch of sea cliff 3.7 km northeast N of the three lots presently addressed *Lit*. “light of Kanaloa” (Pukui et al. 1974:122)
Mane‘opapa	Gulch 2.0 km northeast of the three lots presently addressed. Meaning uncertain.
Pālā‘au	*Lit*. wooden fence or enclosure (Pukui et al. 1974:176). Pālā‘au comprises three land sections in north, central, and southwest Moloka‘i and along with Ho‘olehua, names the homesteads where the three lots presently addressed are located. A western portion of the project area is in Pālā‘au 2, the largest *‘āpana* [lot, parcel], of Pālā‘au Ahupua‘a.
Paualala	A point on the sea cliff 1.5 km north of the three lots presently addressed. Meaning uncertain.
Pu‘u Kanaio	*Lit*. the pinworm hill. Hill on the slopes of Kuala pu‘u (Pukui et al. 1974:198). This hill is 5.0 km southeast of the three lots presently addressed.
Pu‘u ka Pele	Hill on the sea cliff 1.4 km north of the three lots presently addressed. *Lit*. “the volcano hill” (Pukui et al. 1974:198).
Pu‘u o Pipika	Hill, 4.0 km southwest of the three lots presently addressed, meaning uncertain (Pukui et al. 1974:204).
Waiakailio	*Lit*. water used by the dog (Pukui et al. 1974:219). Area with a stream approx. 4.7 km southeast of the three lots presently addressed.

3.1.3 Origin of Moloka‘i

Mo‘olelo provide varying accounts for the origin of Moloka‘i. Paku‘i, a historian in the time of Kamehameha I, wrote of the Hawaiian Islands having been born of Wākea and his wives. According to this version, Wākea’s first wife, Papa, gave birth to Hawai‘i, Maui, and Kaho‘olawe before returning to Tahiti. Wākea took Kaulawahine as his second wife, and she gave birth to Lāna‘i. He then took a third wife:

> Then Wakea turned around and found Hina, *Hoi ae O Wakea loaa Hina*,
> Hina was found as a wife for Wakea, *Loaa Hina he wahine moe na Wakea,*
> Hina conceived Molokai, an island; *Hapai Hina ia Molokai, he moku*,
> Hina’s Molokai is an island child. *O Molokai a Hina he keiki moku.*
> [Fornander 1916-1917:12–13]

The historian Kahako‘ikamoana recorded a different lineage for Moloka‘i:

> Kuluwaiea of Haumea as the husband, *Na Kuluwaiea o Haumea he kane*,
> Of Hinanuiakalana as the wife *Na Hinanuialana he wahine*
> Was born Molokai, a god, a priest, *Loaa Molokai, ke akua, he kahuna,*
> The first morning light from Nuumea, *He pualena no Nuumea*,
> [Fornander 1916-1917:2–3]

3.1.4 Pā‘aka‘a and His Son Kū-a-Pā‘aka‘a

The following *mo‘olelo* recounts two chiefs, Pālā‘au and Ho‘olehua, which are also the names of the *ahupua‘a* in which the current project areas are located (Pālā‘au) and the adjacent *ahupua‘a* to the east (Ho‘olehua).

> On Molokai lived a very beautiful woman, Hikauhi, the daughter of Hoolehua and Ilali. Now it happened that the girl’s father had promised her hand to Palaau, the chief of that part of the island. But as soon as she had seen Paakaa, she forgot all about her former lover and demanded that the stranger be given to her. Palaau very generously consented, and so they all lived in peace. Paakaa cultivated the lands well, fished skillfully, and brought great prosperity to his wife and her family. [Handy 1922:76]

3.1.5 Pu‘u Ka Pe‘elua, Caterpillar Hill

According to Harriet Ne (1992), the story of Pu‘u Pe‘elua involves Pele, the daughter of a chief of Pālā‘au, who fell in love with the *pe‘elua* (caterpillar) of Ho‘olehua, the *‘aumakua* (family or personal gods, deified ancestors) of that district:

> A beautiful young girl named Pele, the daughter of a chief in the Pālā‘au area, encountered in the early twilight a handsome young man. They fell in love, and he courted her for almost a year. She concealed her love from her parents and lived only for the hours she spent with him.
>
> She did not know that he was the *pe‘elua* of the district, revered and loved by the people of Ho‘olehua—even worshipped. Nor did she know that he had the form of a young man only at night but that in the day he returned to the form of a caterpillar.

> As the days passed, Pele grew pale and listless. […] The *kahuna* perceived the problem at once. ‘She is in love with the supreme manifestation of the caterpillar-Pe‘elua,’ he told [her parents]. ‘When he comes to her at night, it is in the form of a handsome young man; but his power is draining her strength. She is human. She cannot live with a magical being. To save her, you must kill him. You must destroy him completely.’ [Ne et al. 1992:49–50]

The same story is also told by Cooke (1949):

> […] this beautiful girl was visited each night by a lover who left before daylight. She was unable to discover who he was, this suspense told on her, and she began to waste away. A priest, consulted by her parents, advised the girl to attach a piece of white tapa to a wart on her lover’s back. In the morning, shreds of tapa helped to trace the demi-god lover to the hill Puu Peelua, in the middle of Hoolehua. The kahuna [priest] and friends of the family found a large peelua [caterpillar] asleep on the hill. The kahuna ordered the people to collect wood which was placed around the sleeping peelua, and a fire was lit. As the heat of the fire increased, the caterpillar burst into myriads of small caterpillars which were scattered over the plain. That accounts for the army-worm pest, called peelua. [Cooke 1949:102]

3.1.6 Pele’s Long Sleep

An ancient chant concerning Lohi‘au, the king of Kaua‘i, includes reference to Pālā‘au. At the beginning of his romance with Pele,

> Lohiau watched her while he partook of the feast with his chiefs, and she was resting on the couch of mats. He was thinking of her marvelous, restful beauty, as given in the ancient chant known as ‘Lei Mauna Loa.’
>
> Lei of Mauna Loa, beautiful to look upon.
> The mountain honored by the winds.
> Known by the peaceful motion.
> Calm becomes the whirlwind.
> Beautiful is the sun upon the plain.
> Dark-leaved the trees in the midst of the hot sun
> Heat rising from the face of the moist lava.
> The sunrise mist lying on the grass,
> Free from the care of the strong wind.
> The bird returns to rest at Palaau.
> He who owns the right to sleep is at Palaau.
> I am alive for your love—
> For you indeed. [Westervelt 1916:77]

3.1.7 Sorcery on Moloka‘i

Kamakau (1992a) recounts a story regarding the origin of sorcery use on Moloka‘i, in which the Ho‘olehua and Pālā‘au plains are mentioned:

> Kaiakea, a prominent man of Kala‘e and its vicinity, was said to have been a man without a god. He built a large new household below Kahanui and provided all kinds of food, such as poi, pig, *‘awa*, bananas, fish, and everything else necessary

for a ‘house-warming’ (*o ka hale komo*). When the day came, Kaiakea’s wife and the other women were at the *hale noa*, the common house, and Kaiakea and the other men and the servers were at the *hale mua*, the men’s house. The *hale noa* was apart from the *hale mua*, which was surrounded by a lanai. Kaiakea was in the doorway of the *hale mua*, and while the feast was being prepared, he saw a long procession of women coming over the plains of Ho‘olehua to Pala‘au. They were dressed in yellow tapa skirts and yellow tapa shoulder coverings (*kihei*), with variegated (*papahi*) leis of *ma‘o* and *‘ilima* crowning their heads. There was one man among them. The procession went down to the spring, named Piliwale, and left their things (*he ukana*) there. These were a *puniu hulihuli*, or coconut-shell container, and the women's *‘alae* bird bodies. When Kaiakea saw the many beautiful women in that company, he called out to them to come in on the lanai, but they remained outside. Only the man who was with them approached and stood at the door of Kaiakea’s house and talked with him. Kaiakea offered them food, but the spirit man (*kanaka anela*) said they would not eat his food unless a leaf-thatched house, a *hale lau*, was built for them; then they would eat of his food. This man revealed that they were not humans, but ‘angels,’ and he told Kaiakea their names. Pua was his name, and Kauluimaunaloa (the-grove-at-Maunaloa, that is, Kapo) was the name of the chiefess who led the procession. He said they would become Kaiakea’s gods if the *hale lau* was finished that day, and would give into his charge the *puniu hulihuli*, their visible form (*ko lakau kino ‘ike maka ‘ia*), and all the paraphernalia to do their work (*ka lakau mau hana a pau*), which was inside it. The *‘alae* birds were their bodies which they showed abroad (*kino ho‘ike ‘ia iwaho*). After revealing these things to Kaiakea, the being vanished. Kaiakea went to the spring to look for the *puniu*, and got it; the *‘alae* birds were resting there at the spring. That very day Kaiakea erected the *hale lau* and filled it with poi, *‘awa*, bananas, and tapas appropriate to these gods; that same evening it was dedicated (*ke kapu no ‘ia*). The food offerings (*ka ‘ai me ka i‘a*) and the *‘awa* were all consumed by the *‘alae* birds, and they were well content with the food provided for them.

It was in this way that Kaiakea became the *kahu* of gods, and he became known as a man who had gods. He was the *kahu* of Kapo (Kauluimaunaloa) and Pua. Kaiakea, however, just took care (*malama pono*) of these gods. He did no harm to others, and did not send his gods to bring death (*ho‘aunauna e make*) to any man or to any chief. He just took care of his *akua ho‘ola‘a* (the spirits who had been made gods by his consecration and offerings). Upon his death he commanded his children to take care of the gods against the days of trouble; the gods would repay them with life (*ola*). But they were not to seek wealth from the gods through sorcery. [Kamakau1992a:131–132]

3.1.8 *‘Ōlelo No‘eau*

Pukui (1983) compiled an extensive list of *‘ōlelo no‘eau* (proverbs or traditional sayings) in *‘Ōlelo No‘eau: Hawaiian Proverbs & Poetical Sayings.* Authors of the preface to the book discuss these expressions as follows:

The sayings may be appreciated individually and collectively for their aesthetic, historic, and educational values. 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. [Pukui 1983:VII]

Several *‘ōlelo no‘eau* concern Moloka‘i. For example, the following references an origin story:

Moloka‘i nui a Hina. [Pukui 1983:239]	*Great Moloka‘i, land of Hina.*

Other sayings regard powers associated with Moloka‘i. Though Kaiakea cautioned his children not to spread sorcery, his wishes went unheeded (Kamakau 1992a) (see subsection 3.1.1.2.5). Molokai‘i became traditionally known for its medicinal and magical powers, as the following Hawaiian proverbs demonstrate:

Moloka‘i ku‘i lā‘au.	*Moloka‘i, pounder of medicine.*
Moloka‘i pule o‘o. [Pukui 1983:239]	*Moloka‘i of the potent prayers.*

At least two proverbs are associated with aspects of former ways of life in Ho‘olehua:

Ku‘u manu lawelawe ō o Ho‘olehua.	*My bird of Ho‘olehua that cries out about food.* [Pukui 1983:235]
Mo‘a nopu ka lā i ke kula o Ho‘olehua	*The sun scorches the plain of Ho‘olehua* [Pukui 1983:207]

Pukui (1983:207) tells that the *kioea* bird cries out *Lawelawe keō! Lawelawe keō!* (Take the food! Take the food!) to the fishermen as they head out to sea.

3.1.9 Subsistence and Settlement

During his archaeological survey of Moloka‘i in 1937, Southwick Phelps (1937) noted the following about West Moloka‘i:

> It is said that in former days western Molokai was not as devoid of forest as it is now. While this may be true to a limited extent, I think that the essential conditions have remained the same and that the western half was always a semi-arid region. One certainly finds there no extensive taro patches and no signs of dense population. We learn, furthermore, that it was traditionally a land of the sweet-potato, a plant that does not require much water. [Phelps 1937:6–7]

While exact boundaries for yam and sweet potato cultivation in Pālā‘au and Ho‘olehua are unknown, these tubers, along with fish, were staples of inhabitants in the area (Phelps 1937).

The region including Ho‘olehua was a fertile plain known particularly for the cultivation of *‘uala* (sweet potato). Summers (1971:38) cites Malihinihele who stated in 1876, “In the olden days this [Pālā‘au 2] was a good land with a fertile plain where plants grew. The population was large but today it is uninhabited.” Handy (1940:157) remarks, “In 1931 there were many flourishing

patches on the Hawaiian homesteads at Hoolehua. It is said that Hoolehua and Palaau were noted for sweet potatoes in olden days" although Handy and Handy (1972:283) note homesteaders in Ho‘olehua were growing the sweet potatoes on land that had not been planted in ancient times.

The importance of *‘uala* to the area is further suggested by place names such as Pu‘u Pe‘elua (hill of the caterpillar) and Kāluape‘elua (baked caterpillar), which illustrate the connection to the environment of the area (Pukui et al. 1974). The *pe‘elua,* or the caterpillar, feeds on the sweet potato and is considered a pest by *‘uala* farmers of the region. Pukui et al. (1974) noted hilled sweet potatoes in the region south of Ho‘olehua and Pālā‘au known as Uala-pu‘e, which is also the name of a fishpond in that area. In addition to sweet potato, *‘olo* or *hokeo*, the long gourd used for holding fishing tackle and to make the *hula* drum, notably grew in Ho‘olehua (Handy et al. 1991:213).

The actual size of the pre-Contact Hawaiian population tending and supported by crops in central and western portions of Moloka‘i can only be conjectured. While the greater portion of the population resided on the eastern side of the island, a late nineteenth century anecdote by Abraham Fornander (1880) suggests a former substantial population that may have been widely dispersed:

> As an instance of the dense population, even a few years previous to Kamehameha's death, the author has often been told by a grand-niece of Kekaulike, who was a grown-up girl at the time, that when the chiefs trumpetshell sounded, over a thousand able-bodied men would respond to the call, within a circle described by Palaau, Naiwa, Kalae and Kaunakakai. Those lands together cannot muster a hundred men this day. [Fornander 1880:73 footnote]

3.2 Early Historic Period

Early historic accounts briefly mention Moloka‘i. Summers (1971:18) relates that in 1779 when Captain Cook visited Hawai‘i, the status of Moloka‘i was uncertain. However, Kamakau (1992b) cites several reasons why Moloka‘i was as important as O‘ahu in the late 1700s, since both of the islands contained "rich lands, many walled fish-ponds, springs, and water taro patches. The island of Oahu was very fertile and Molokai scarcely less so" (Kamakau 1992b:132–133).

Captain George Vancouver (1798), sailing along the southern coast of Moloka‘i in 1793, essayed a portrait of the island's geographic texture and distribution of Hawaiian population:

> Early the next morning, with a pleasant breeze from the N.E., we stood over towards the east point of Morotai, […] we sailed along to the westward, […] About half a league south of the east point of Morotai [...] lies a small barren rocky islet, called by the natives Modooenete […] In this direction east the land rises rather abruptly from the sea, towards the lofty mountains in the center of the east part of Morotai; and though the acclivity was great, yet the face of the country diversified by eminences and vallies; bore a verdant and fertile appearance. It seemed to be well inhabited, in a high state of cultivation, and presented not only a rich but a romantic prospect. To the westward of these cliffs, the shores terminated in the former direction, by a low point of land, called by the natives Crynoa […] From Crynoa the country assumes a dreary aspect. The mountains, forming the eastern part of the island, gradually descend to the westward, and like those of Mowee, terminate on a low isthmus, which appears to divide the island into two peninsulas

> […] the easternmost, which is far the largest is composed of very high land, but the westernmost does not rise to any elevation, beyond that of a mean height. The country from Crynoa rises from the sea by an ascent, uninterrupted with chasms, hills or vallies. This uniform surface, on advancing to westward, exhibited a gradual decrease in the population; it discovered an uncultivated barren soil, and a tract of land that gave residence only to a few of the lower orders of the islanders, who resort to the shores for the purpose of taking fish, with which they abound. Those so employed are obliged to fetch their fresh water from a great distance; none but what is brackish being attainable on the western parts of Morotai. [Vancouver 1798:201–202]

Early visitors and Hawaiian historians confirm Vancouver's perception of a wide-spread Hawaiian population throughout the eastern portion of the island and a much smaller population clustered along the shoreline within the western portion.

After conquering the island of Maui in 1790, Kamehameha I advanced on to Moloka‘i where he secured the allegiance of the chiefs. Archibald Menzies (1920), the naturalist who accompanied Captain George Vancouver to the Hawaiian Islands in the 1790s, relates that Kamehameha I "destroy[ed] the fields and plantations of the inhabitants" (Menzies 1920:115). He and his warriors remained on Moloka‘i for a year to prepare the attack on O‘ahu. He is said to have grown taro and "had all his canoes put in order. He drilled his warriors on the Hoolehua plain near where the airport is now" (Cooke 1949:112).

3.3 Early 1800s

The first Protestant missionaries arrived in Hawai‘i in 1820. In the following years, the ruling Hawaiian chiefs and governors established a network of public schools throughout the villages of the Hawaiian Islands. In September 1828, a group of missionaries travelled to Moloka‘i to determine the progress of the schools (Andrews 1829). After landing on the southeast side at Honomuni, they traveled west over the next two days to the villages of Hālawa, Halana, Makanalua (Kalaupapa Peninsula), and overland to Kaunakakai where they put up for the night:

> During the whole night, the people continued to arrive; and, about sunrising, the chiefs made their appearance […] Having examined a large school here, we walked on, and the chiefs followed, in canoes. We travelled along, on the sea shore, finding very little vegetation, on account of the drought. There is scarcely any water on this side of the island. [Andrews 1829:273]

They completed their examination of the schools on Moloka‘i the following day, noting that they "numbered nearly 700 houses, and think there are about 1,000 on the island" (Andrews 1829:274).

The United States Navy Exploring Expedition under the command of Captain Charles Wilkes visited the island of Moloka‘i in 1840 and described the island as follows:

> […] forty miles long, from east to west, and nine miles wide: the western portion, embracing about one third of the whole extent, is a barren waste; and the remaining two thirds is mountainous, in some places rising to the height of twenty-eight hundred feet, with the exception of a narrow strip of land on the south side, which has a most favorable exposure, and is highly productive. [Jenkins 1850:258]

3.4 The Māhele and the Kuleana Act

The Organic Acts of 1845 and 1846 initiated the process of the Māhele—the division of Hawaiian lands—that introduced private property into Hawaiian society. During the Māhele, all lands in the Kingdom of Hawai‘i were divided among *mō‘ī* (king), *ali‘i* (royalty), *konohiki* (overseer of an *ahupua‘a* [traditional land division]), and *maka‘āinana* (common people/tenants of the land) and passed into the western land tenure model of private ownership. In 1848, the crown and the *ali‘i* received their land titles. On 8 March 1848, Kauikeaouli (Kamehameha III) further divided his personal holdings into lands he would retain as private holdings (Crown Lands) and parcels he would give to the government. According to an 1897 Hawaiian Government Survey map of Moloka‘i showing 1848 divisions of land, the entire *ahupua‘a* of Ho‘olehua was given to the government, and all of Pālā‘au Ahupua‘a (including the western and central project areas) was retained by the Crown (Figure 8).

Native Hawaiians who desired to claim the lands on which they resided were required to present testimony before the Board of Commissioners to Quiet Land Titles. Upon acceptance of a claim the Board granted a Land Commission Award (LCA) to the individual. The awardee was then required to pay a cash amount equal to one-third of the total land value or to pay in unused land. Following this payment, a Royal Patent (RP) was issued giving full title of ownership to the tenant.

On 19 October 1849, the Hawaiian Privy Council adopted resolutions to protect the rights of Native tenants, the *maka‘āinana*. The *maka‘āinana* were offered fee-simple titles for their house lots and lands that they cultivated for themselves. *Kuleana* awards for individual parcels within the *ahupua‘a* were subsequently granted through a land commission. These awards were first presented to Native Hawaiian tenants followed by the naturalized foreigners (non-Hawaiians born in the Islands) or long-term resident foreigners who could prove occupancy on the parcels before 1845. No commutation fee was necessary to apply for a Royal Patent for a *kuleana* award as the commutation fee had presumably already been paid by *ali‘i*/*konohiki* who had been awarded the entire *ahupua‘a*, or an *‘ili* (a land division within an *ahupua‘a*) in which the Native tenant claimed his own small parcels (Chinen 1958:29–30).

No native tenant LCAs were awarded near the three lots presently addressed, and only one LCA and one Land Grant were awarded in the vicinity. Approximately 4.6 km southeast of the three lots presently addressed, LCA 11216 (LCA 11216*Mo) was awarded to Kekauonohi (see Figure 8 and Figure 9) a member of the House of Kamehameha and a wife to King Kamehameha II. This LCA included 5,803 acres comprising approximately half of the *ahupua‘a* of Na‘iwa. Approximately 4.8 km southwest of the three lots presently addressed, Grant 3146 was awarded to Charles R. Bishop (see Figure 9). No land use information is provided for Grant 3146 (Waihona ‘Aina 2021).

3.5 Mid- to Late 1800s

3.5.1 Cattle Ranching

Cattle were introduced to Moloka‘i in the 1840s. De Loach (1975) summarizes this first effort at commercial ranching:

> Rudolph W. Meyer, who was, [...] responsible, along with [Reverend] Hitchcock, for the introduction of cattle on the island, had come to Moloka‘i in the 1840s. He

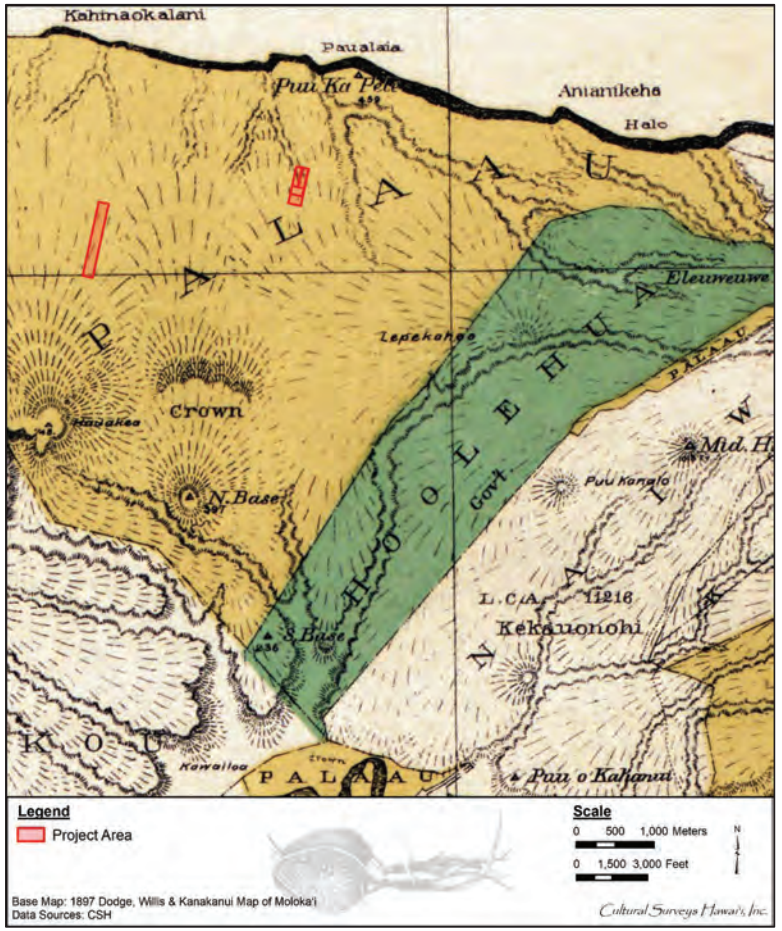


Figure 8. Portion of Dodge et al. (1897) map of Moloka‘i showing 1848 land divisions (Crown [yellow], government [green], LCAs [no color]); the three lots presently addressed (and all five scattered lots) were within Crown lands

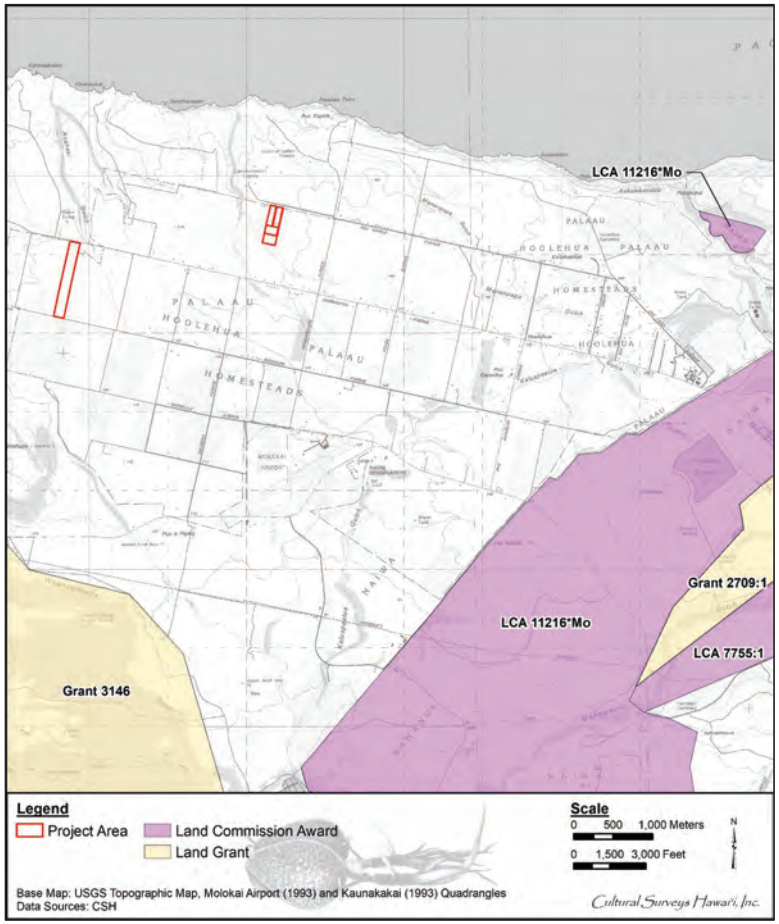


Figure 9. LCAs and Grants in the vicinity of the three lots presently addressed depicted on a portion of 1993 Molokai Airport and Kaunakakai USGS topographic quadrangles (the three lots presently addressed were not close to a Native Tenant LCA or grant)

> established a ranch stocked with longhorns in the Kala‘e [north central Moloka‘i] Area. A lucrative trade in cattle and hides was begun between Moloka‘i and Honolulu. The cattle were exported from the village of Pālā‘au on the southwestern shore, over the reef, and onto a waiting ship. Pālā‘au grew wealthy on cattle and dry land taro. All this came to an end, however, in the 1850s, when Meyer discovered that the number of cattle in the herd had diminished considerably. He found that almost every male in the village was guilty of rustling, and so all the men were shipped off to jail in Honolulu. The men’s families followed, And the village was deserted. Today Palaau sits abandoned in a kiawe forest, as no one ever returned to live there. [de Loach 1975:68]

Despite these early setbacks, cattle (and sheep) ranching expanded greatly in the second half of the nineteenth century:

> During this period, cattle, sheep and goats were imported to the island in ever-increasing numbers. According to Judd, there were no cattle on the island in 1832 and by 1853 there were only 200 head, The 1866 census, however, revealed 2,586 head of cattle, 13,332 sheep and 196 goats on the island. […] In 1868, Kamehameha V released axis deer on the island. [de Loach 1975:86]

In 1855, Lot Kapuaiwa (King Kamehameha V) purchased the *ahupua‘a* of Kaunakakai for two hundred dollars (Interior Department Letter, July 1885) to maintain the value of a sheep station established there by his brother, Alexander Liholiho (King Kamehameha IV) (Kuykendall 1953:152). Lot Kapuaiwa also actively sought to increase his Moloka‘i holdings: “in the desire to have a country estate, he bought up land and cattle from the resident Hawaiians and used Moloka‘i as a vacation ground from his cares of State” (Judd 1936:9–10).

In 1868, King Kamehameha V was sent seven live axis deer from Hong Kong as a gift (Tomich 1986:127). He released the deer, adding to the free-roaming game population on the island but, consequently, also to the destruction of vegetation by the flourishing population of foraging animals. In a 1902 talk given in Japan on Hawaiian Forests, E.M. Griffith (1902) remarked on the already alarmingly denuded state of Moloka‘i:

> Cattle, goats and deer have totally destroyed the forests upon the larger portion of the island of Molokai so that the western half is practically destitute of any tree growth. It is possible that the algaroba forests which have secured such a strong hold along the coast near Kaunakakai may gradually spread over this end of the island […] The condition at present time is that the forest has been pushed back into the deeper and more inaccessible canyons and onto the highest slopes of the mountain. The effective watershed in respect to the conservation of the water supply has thus been greatly reduced and the careful protection of the remaining forests is an absolute necessity. [Griffith 1902:Appendix G]

An 1886 Government Survey map (Figure 10) depicts an approximate upper growth line of the algaroba (*kiawe*) forests approximately 3.5 km south of the present project areas. The western and eastern project areas are depicted as within the Momomi Paddock. Extensive pastureland is indicated with no other development suggested.

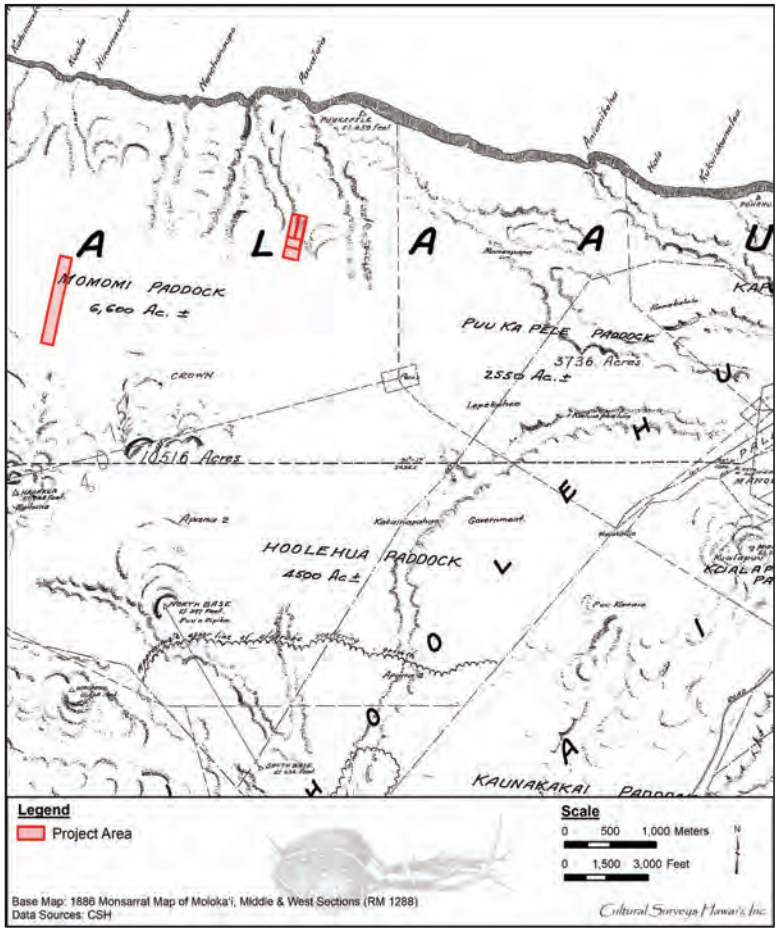


Figure 10. Portion of Monsarrat (1886) Hawaiian Government Survey map of Moloka‘i, Middle and West Sections (RM 1288); showing the three lots presently addressed (and all five scattered lots) as within the Momomi Paddock

During the Māhele in 1848, Bernice Pauahi Bishop, daughter of Abner Pākī and Laura Konia and last descendant of the Kamehameha dynasty, inherited much of the lands which are now Molokai Ranch lands. Her husband, Charles R. Bishop, inherited the lands of Kaluako‘i in 1875. The Molokai Ranch was formed in 1897 when a *hui* (group of investors) purchased approximately 70,000 acres of central and western holdings from the Bishop Estate (Cooke 1949; Stearns and Macdonald 1947).

3.5.2 Agriculture

Mr. Harvey R. Hitchcock and Mrs. Rebecca H. Hitchcock became the first permanent missionaries on Moloka‘i. They established a Protestant church at Kalua‘aha in 1832, at which point the only agricultural crops they noted were bananas and taro grown in the valleys where water was most readily available. No “regular schools, churches, houses of permanent nature, no garments, no cattle, only one horse, and home articles of the most primitive nature” were present then (Wiebke 1940). Twenty years later, the island had a number of churches, 1,000 students enrolled in 21 schools across the island, and livestock including goats, hogs, 400 horses, and cattle. Taro, potatoes, and grapes were “cultivated quite extensively” (Wiebke 1940:1).

In the early 1840s, the Meyer family in Kala‘e was growing and exporting coffee, corn, wheat, and potatoes to the mainland. The Meyer family started a sugar mill at Kala‘e in 1878 using 30 acres of land to grow cane. This was one of the few locations on Moloka‘i that had adequate rainfall to grow cane, but problems stemmed from the cane being planted at an elevation of 1,500 ft above sea level. Sugarcane matured slower at higher elevations, so yields were lower. The Meyer plantation produced 50 tons of sugar annually (Wiebke 1940). The sugar mill was closed in 1894, because it was too small to compete with larger operations.

Two other large sugar plantations were developed on Moloka‘i beginning in the late 1870s, one at Moa-nui in East Moloka‘i and one at Kaunakakai. Both of these plantations quickly failed and were abandoned (Wiebke 1940).

In 1898, American Sugar Company, Limited (ASCO) was incorporated by Molokai Ranch, which leased an additional 30,000 acres (Cooke 1949). Following the incorporation, a full-scale cane operation in central and western Moloka‘i began, including an attempt to develop the arid lands of the Ho‘olehua plain. “On the Hoolehua plain 750 acres were prepared in parallel trenches following the contours. 500 acres were actually planted in young cane shoots” (Judd 1936:12). Due to an inadequate water supply, this sugar enterprise was also unsuccessful. The well pumps, which had been installed in surface wells, were of such large capacity that they soon exhausted the fresh water, and irrigation ditches 8 miles long brought pumped water with such a high salt content that it could not be used to grow sugarcane:

> Wells were dug in the lowlands and water pumped into a system of irrigation ditches above. As the pumping increased, the salt content of the water gradually increased until it became detrimental to the cane. This plantation like the others was quickly abandoned. [Wiebke 1940:1]

The ASCO plantation at Kamalō was the only Moloka‘i sugar plantation to invest money in a railroad. Railroad tracks were constructed from Kaunakakai harbor “up through Palaau and Iloli to the middle of the Hoolehua plateau” (Judd 1936:11). After failed sugar cultivation efforts, “graded railroad bed cutting through the gulches of Palaau” and “irrigation ditches […] on the

Hoolehua plain" were all that remained (Judd 1936:11–12). No locomotives were ever shipped to Moloka‘i. The tracks were removed and recycled into cattle guards. Today, stones mark the old railway route from Pālā‘au to Mahana (Strazar 2000).

By 1900, all sugar production on Moloka‘i had ceased (Stearns and Macdonald 1947:3). Regarding the ASCO plantation's demise, former Molokai Ranch manager, George C. Munro, recalled the following:

> Hawaiians claimed that the plantation was doomed from the start, because as the company constructed the railroad along the shore to Palaau it tore down an ancient fishing heiau near Kahunui. It used the rocks for the railroad bed and ran the rails through the center of the heiau. [Morse 1953:6]

3.6 1900s

3.6.1 Molokai Ranch

Molokai Ranch became a more organized operation in the early 1900s. By 1905, the ranch had transitioned from an open country system to the paddock system (Henke 1929). During the transition, wild deer and feral goat populations were reduced, a water distribution system was implemented, and a breeding program begun. Water from the East Moloka‘i mountains was gravity fed to a concrete reservoir and then piped down to the ranch. By 1929, Molokai Ranch had approximately 75 miles of water pipes and more than 100 miles of smooth wire fences. An 1886 Hawaiian Government Survey map shows several paddocks surrounding the three lots presently addressed (see Figure 10). These labels were most likely added after the map's original creation, since the paddocks appear to indicate land use by Molokai Ranch, which wasn't established until 1897 and then transitioned to the paddock system from 1898 to 1905 (Henke 1929). The western and eastern project areas are within the Momomi Paddock.

In the 1920s, Molokai Ranch lands consisted of about 10,000 acres leased for pineapple cultivation, 8,000 acres of forest reserves, and 50,000 acres utilized for ranching (Henke 1929:52). Most ranching activities were associated with cattle. Beginning in 1923, Molokai Ranch imported Hereford bulls from the Parker Ranch on Hawai‘i Island, which resulted in a beef cattle population of over 4,500 head by 1929. In 1929, the ranch also had 400 swine and about 200 sheep. Sheep ranching was formerly more prevalent, with sheep numbers up to approximately 17,000 in 1907. However, the combination of sheep and cattle ranching caused over-pasturing, and since cattle ranching was more lucrative, sheep ranching began phasing out. In 1951, grazing land for sheep ranching remained a viable industry, despite its heyday being many decades prior (Carlson 1951). Cattle ranching remains a significant industry on Moloka‘i.

Molokai Ranch also produced honey. In 1903, an Italian breed of bees was purchased and crossbred with the island's endemic species (Cooke 1949). In 1928, 350 tons of *kiawe* honey were produced on Molokai Ranch, most of which was sold to Germany (Henke 1929).

3.6.2 Hawaiian Homes Commission

In 1920, the U.S. Congress passed the Hawaiian Homes Commission Act to administer and manage some 200,000 acres of land that belonged to the government of the Kingdom of Hawai‘i or was recognized as Crown lands. Agricultural homesteads were to be leased to Native Hawaiians, with leasehold terms generally lasting 99 years at one dollar a year. The following year, the

program began attracting people to Moloka‘i. Kalaniana‘ole Colony was the first homestead established under the Hawaiian Homestead Act of 1920. The settlement is located in Kalama‘ula Ahupua‘a, near the southern shores of Moloka‘i Island.

The Moloka‘i homestead program initially was impacted by many problems, including drought and high winds (McGregor 1990:37–38). Insect pests were also a discouraging impediment, at one point accounting for destruction of over 50% of many of the most desirable crops on the island (Wiebke 1940). A *Maui News* article from 1940 recounts the following:

> With the birth of the Hawaiian Homes commission, Hawaiian homesteaders began pouring into the Kala‘e and Ho‘olehua sections. For a number of years extensive truck crops of every kind were raised successfully, but today this project has become a sorrowful enigma. [Wiebke 1940:1]

The 1922 USGS map (Figure 11) shows the area of the three lots presently addressed as relatively undeveloped. An unimproved Moomomi Road passed through the western project area and a Waihii Pipeline and adjacent unimproved road passed to storage tanks 1.3 km southeast of the three lots presently addressed. The pipelines reflect the burst of agricultural activity.

Despite such difficulties, people managed to cultivate their plots (McGregor 1990:37–38). For instance, at Kalaniana‘ole Colony, water for "bathing, laundry, and farming" was originally supplied by wooden flume from a spring in Kaunakakai, with drinking water provided by a spring in Kalama‘ula (Tomonari-Tuggle 1990:10). Farming was diversified and successful crops included corn, watermelons, cucumbers, sweet potatoes, eggplant, and papaya (Keesing 1936; Wiebke 1940). In addition, demand became high for Moloka‘i alfalfa, and homestead tomatoes "controlled the Honolulu market" in 1924 (Keesing 1936:56).

Overall, the program succeeded and was expanded to include 11,400 acres of Pālā‘au-Ho‘olehua beginning in 1924. The current project area consists of approximately 36.4 acres (14.7 hectares) of these Pālā‘au-Ho‘olehua Homestead lands and includes Lots 17 and 104D-1. Due to the homestead program, the Pālā‘au-Ho‘olehua region had the largest population of Native Hawaiians in 1930. Of the 1,031 residents, 826 were Hawaiian (McGregor 1990:10).

In addition to agricultural pursuits, the Hawaiian Homes Commission encouraged raising livestock and ranching. Raising pigs brought the most revenue and economic value; however, a few families sold eggs and every family owned some cattle (Keesing 1936). In 1929, 54 homesteaders owned a total 358 cattle, including two Hereford bulls, 106 horses, 15 mules, and six donkeys (Henke 1929). Community pastures allowed each lot holder to graze up to 60 head of livestock. Additionally, three 250-acre pastures were reserved specifically for ranching. Pastures in Ho‘olehua and Pālā‘au totaled 6,630 acres. In 1935, 979 cattle, 72 horses, and 25 mules utilized the community pastures though less than half Ho‘olehua families had cattle on these lands.

The Hawaiian Homes Commission was also instrumental in the establishment and expansion of Moloka‘i High School, approximately 5.5 km east of the current eastern project area. The school gym was constructed between 1931 and 1932 by the Hawaiian Homes Commission and the county. Moloka‘i High School became the first and only high school on the island when it expanded from an intermediate school to a high school in 1939. Situated at Ho‘olehua on Hawaiian Homes Commission land, it opened to all students on the island with an enrollment of over 400. In 1950, the board of supervisors approved negotiation of the purchase of 40 acres of Hawaiian

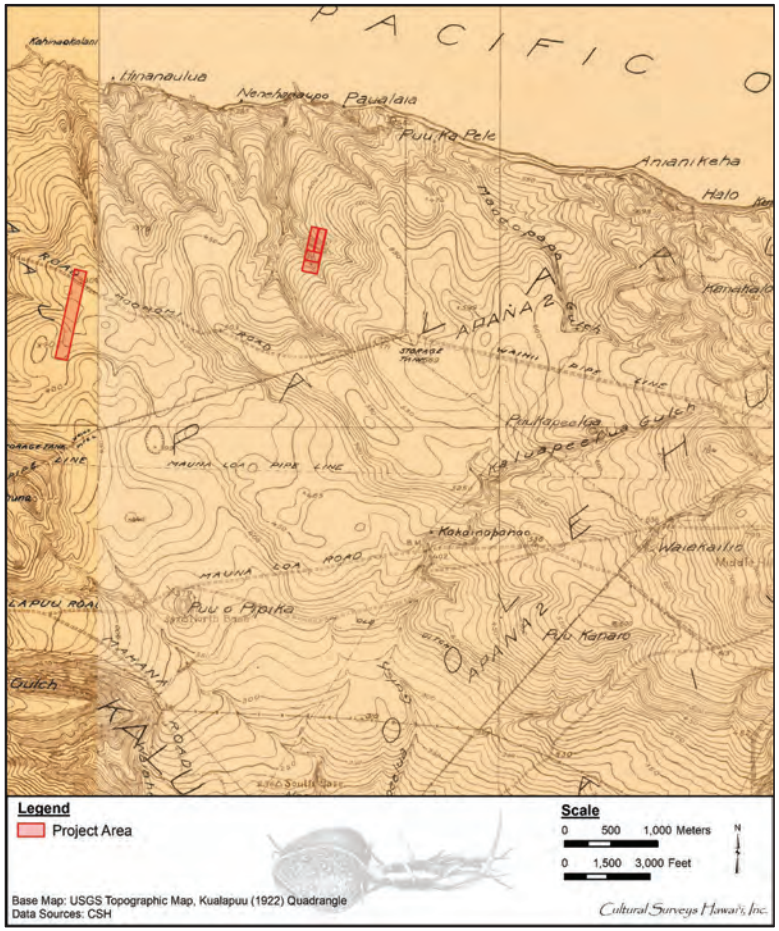


Figure 11. Portion of 1922 USGS topographic map of Kualapuu quadrangle, showing the three lots presently addressed as relatively undeveloped (an unimproved Moomomi Road passed to the south and a Waihii Pipeline and adjacent unimproved road extended east to storage tanks southeast of the project area)

Homes Commission lands adjacent to the extant campus for construction of a new high school site (Maui News 1950).

3.6.3 Pineapple

Starting in 1918, independent pineapple growers tilled “the hillsides from Ualapua to Halawa, but due to high cost of operations these small plantations were short lived” (Wiebke 1940:1). The commercial pineapple industry arrived on Moloka‘i in the early 1920s, with Molokai Ranch owning a majority of the leased pineapple lands (Lee-Greig and Hammatt 2008). Pineapple cultivation began in Pālā‘au-Ho‘olehua in 1926, when Libby, McNeill and Libby signed up some homesteaders to grow pineapple on homestead land operated in leased blocks of several 35-acre homesteads, which were cultivated by Libby.

By 1929, the California Packing Corporation (Calpac) had begun enlisting Native Hawaiian homesteaders in the Kualapu‘u region, including areas near the current project area, to grow pineapple. The system adopted by both Libby McNeill & Libby and Calpac involved homesteaders growing pineapple in blocks of land leased by the plantation. Between 12 to 15 abutting homesteads were assembled by the pineapple plantation to form a contiguous area that was assigned a block number (Figure 12). Homesteaders under this block system planted, tended, and harvested to receive a proportionate share of the sale of fruit from each block. The harvested fruit was trucked by Calpac to a pier constructed at Kaunakakai, where it was crane-loaded onto barges and shipped to the Calpac cannery at Kahului, Maui (Larsen and Marks 2010:371–372). Homestead residents received almost two million dollars in cash payments for their efforts between 1929 and 1935.

Despite droughts, including one between 1944 and 1945 that caused the loss of the entire crop, pineapple production in the vicinity of the project area continued until the 1970s (Larsen and Marks 2010:379). Dole Pineapple, which had subsumed Libby, McNeill and Libby’s operations, ceased pineapple cultivation in 1975. The California Packing Corporation had planned on closing the same year but continued cultivation until 1983, when a majority of its production ceased business on Moloka‘i (Larsen and Marks 2010:382).

3.6.4 School Farm

In the early 1920s, Ho‘olehua consisted of an undeveloped wide, grassy plain used for pasture with little development and no public school. Several families moved into the area when the land opened to Hawaiian homesteading and California Packing Corporation started their pineapple plantation at Kualapu‘u, formerly a Molokai Ranch camp. Kalae School, a one-room schoolhouse at Kalae, eventually moved to the old recreation hall at Kualapu‘u to better accommodate students coming from the ranch camp. As homesteads and pineapple cultivation expanded in the area, a new school was constructed at Ho‘olehua to meet growing numbers of student enrollment; in 1926 the students at Kalae School moved to the new school. The staff originally consisted of three teachers, including an instructor of agriculture, but within three years the faculty grew to 15.

The school established a progressive agricultural department in 1930, which rapidly developed into a highly reputable agricultural training center. Modern methods of farming and animal husbandry were taught to male vocational students (numbering 70 in 1939). Students cultivated crops designed to give them needed experience and experimented with plantings to test for possible improved crops or strains for use on the island. About half of the vocational boys came from

homesteads and the other half from Calpac-employed families. A cooperative program between Moloka'i High School and Calpac was initiated in 1948, where boys from the vocational program worked at the plantation in the mornings before school for seniority consideration for employment post-graduation (*Maui News* 1948).

Hawaiian Homes Commission provided a 26-acre farm (Figure 13) to the department for educational purposes on "well selected land […] makai of the Hawaiian Homes Commission office in Ho'olehua" (*Maui News* 1940:1). The farm had chicken houses and pigpens built by the vocational students in the farm shop. "The instructor of agriculture and three classes of boys spent weeks with tractors and ropes clearing lantana" from the area to be cultivated (*Maui News* 1939:6). A 1939 news article describes the farm:

> The farm is up to date and well equipped. It serves the community as a practice ground for students; a source of improved livestock, poultry and plans; an example to the community of good landscaping and agricultural methods and is an experimental ground for new crops. Here the boys are receiving thorough instruction in the fundamentals of good scientific farming coupled with training to farm management—increasingly important because of the vital necessity that the modern tiller of the soil have a good working knowledge of farm economics in Hawaii if local small scale agrarian enterprises are to be operated at a profit. [*Maui News* 1939:6]

Figure 14 illustrates a typical resident homestead lot in Ho'olehua during the 1930s. Families farmed a variety of crops in Ho'olehua, including corn, melons, tomatoes, cucumbers, pumpkins, sweet potatoes, squash, peanuts, beans, onions, and cabbage (Keesing 1936). Pumpkin poi became a staple for these homesteaders. Though dryland agriculture had successes at Pālā'au-Ho'olehua Homesteads, constant care was needed to combat hardships caused by droughts, winds, and pests.

3.6.5 Corn

Corn was grown on Moloka'i from as early as the 1920s. In a letter to the editor of the *Honolulu Star-Bulletin* in 1922, the writer comments quite fondly of Moloka'i corn (Figure 15). In the 1940s, the Moloka'i corn project was intended to provide a local source of food for livestock, since all feed corn was being imported (*Honolulu Advertiser* 1944a). Approximately 1,400 acres of field corn and 1,000 acres of milo maize were planted and harvested by resident high-schoolers and homesteaders. Homesteaders also grew feed corn separate from the Moloka'i corn project (*Honolulu Advertiser* 1944b). In Ho'olehua, large amounts of corn were sold or fed to livestock (Keesing 1926).

In 1967, Kaye Waldorf became a third partner in Hawaiian Research, Ltd. and moved from his 430-acre corn and soybean farm in Iowa to become resident manager of the company and grow corn on Moloka'i (Lynch 1968) (Figure 16). Hawaiian Research, Ltd. began experimenting with seed corn on Moloka'i in the winter of 1966; by autumn 1968, the company was growing over 900 strains of corn. Fertile soils, a year-long temperate albeit arid climate, a culturally diverse environment for his teenage children, and an "intellectual curiosity" attracted Waldorf to experimental agricultural farming on Moloka'i (Lynch 1968:B-1).

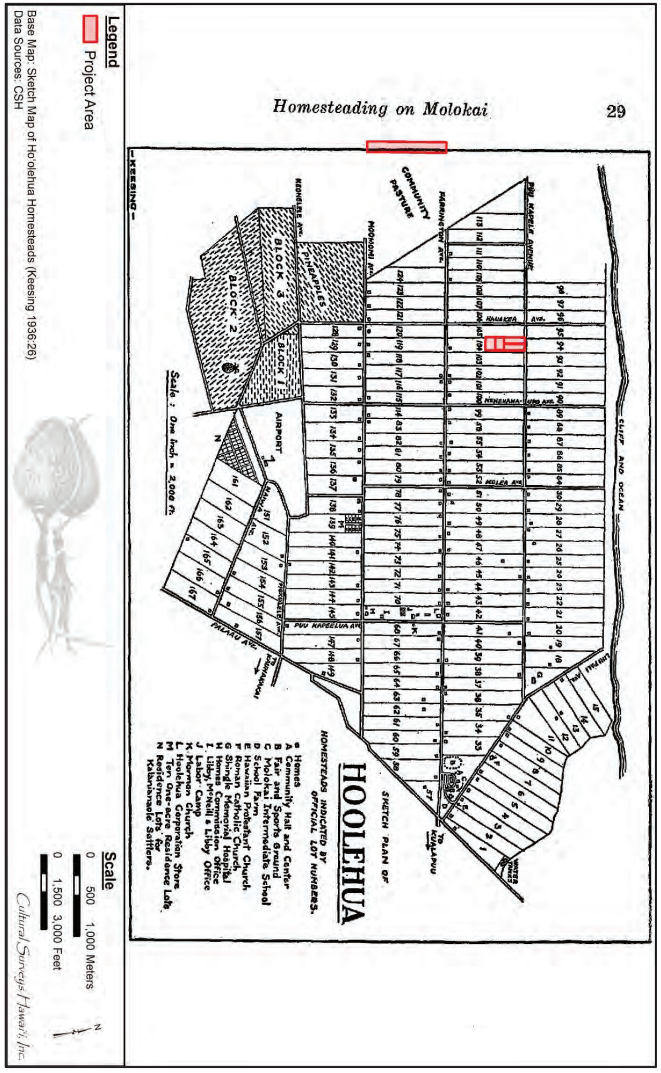

Homesteading on Molokai 29
HOOLEHUA
SKETCH PLAN OF
HOMESTEADS INDICATED BY OFFICIAL LOT NUMBERS.
A Homes
B Community Hall and Center
C Molokai Intermediate School
D School Farm
E Hawaiian Protestant Church
F Roman Catholic Church
G Shingle Memorial Hospital
H Library
I Libby McNeill & Libby Office
J Labor Camp
K Mormon Church
L Hawaiian Association Store
M Ten One-acre Residence Lots for Responsible Settlers.
N Residence Lots for Responsible Settlers.
Scale : One Inch = 2,000 ft.
KEESING
COMMUNITY PASTURE
AIRPORT
BLOCK 1
BLOCK 2
BLOCK 3
PINEAPPLES
KAMEHA AVE.
KUHIO AVE.
KALANIANAOLE AVE.
KAMEHAMEHA AVE.
PUU KAEELUA AVE.
PALAAU AVE.
KEMOOLEA AVE.
POOHOKU AVE.
KAMEHAMEHA AVE.
KAMEHAMEHA AVE.
KAMEHAMEHA

Figure 13. Community Center for Ho‘olehua Homesteads including, from left to right, a hall, school, church, and farm, ca. 1939 (Keesing 1936:124)

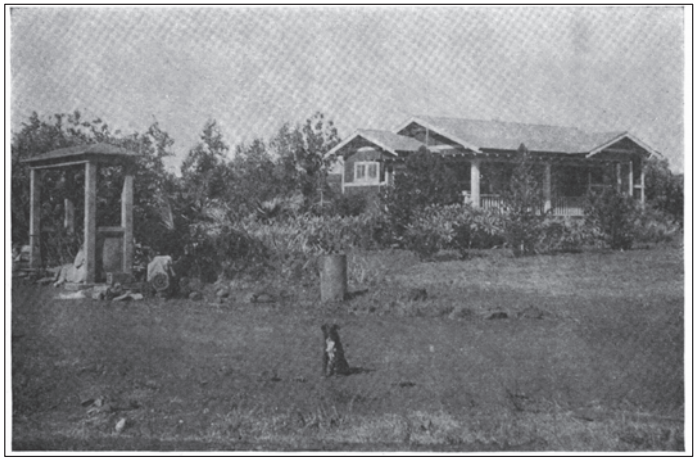
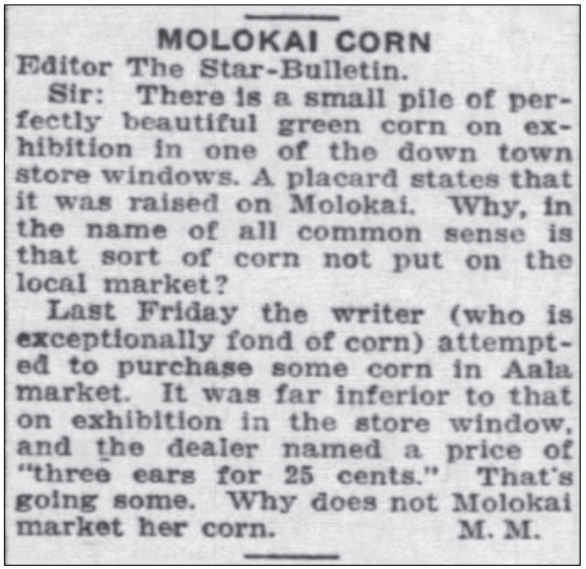


Figure 14. A Ho‘olehua homestead in 1939 (Keesing 1936:59)



MOLOKAI CORN

Editor The Star-Bulletin.

Sir: There is a small pile of perfectly beautiful green corn on exhibition in one of the down town store windows. A placard states that it was raised on Molokai. Why, in the name of all common sense is that sort of corn not put on the local market?

Last Friday the writer (who is exceptionally fond of corn) attempted to purchase some corn in Aala market. It was far inferior to that on exhibition in the store window, and the dealer named a price of "three ears for 25 cents." That's going some. Why does not Molokai market her corn. M. M.

Figure 15. Letter to the editor praising the quality of Moloka‘i corn in 1922 *(Honolulu Star-Bulletin* 1922:6)

Figure 16. Experimental corn farmer, Kaye Waldorf, in West Moloka‘i; pipeline (left) transported water to his crops (Roll 1968:B-1)

The same State Department of Land and Natural Resources (DLNR), Water and Land Development Division irrigation project that supplied water to about 14,500 acres of pineapple fields in West Moloka‘i was also used to irrigate the corn fields, which comprised a portion of 1,500 acres of diversified agricultural land that also included “experimental potato plantings and some Hawaiian Homestead truck farm lands” (Lynch 1968:B-1). In October 1968, the final stages were underway for a project involving 5 miles of tunnel and additional miles of pipeline to transport water from the wet, northeastern Waikolu Valley to crops in West Moloka‘i. In addition, a 1.4-billion-gallon earth reservoir was being constructed at a central location in Kualapu‘u to store any excess water collected during the rainy winter season in order to provide a year-round supply of water to arid West Moloka‘i’s crops. Kualapu‘u Reservoir is located approximately 6 km southeast of the current eastern project area. While the lack of a natural water supply certainly created obstacles, Waldorf preferred the more controlled distribution of water to his crops via a pipeline (see Figure 16) to the unpredictable rains he experienced as a corn farmer in Iowa.

3.6.6 Infrastructure

In conjunction with agricultural, residential, and economic changes, the twentieth century also brought infrastructure improvements to the island of Moloka‘i. On 13 May 1909, a telephone line was authorized for Moloka‘i Island (*Maui News* 1926). In 1925, construction began on a road connecting Kaunakakai to Ho‘olehua, which was used regularly during Moloka‘i’s pineapple era to transport loads for export. Access roads within the homesteads were established and have been maintained by the Hawaiian Homes Commission without charge to homesteaders or Maui County (Keesing 1936:49). Aerial photographs and topographic maps show unpaved roads in the general vicinity in the 1950s and 1960s (Figure 17 through Figure 20). It appears Pu‘u kapelle Avenue was extended west on the north side of TMK: (2) 5-2-026:016 between 1952 (Figure 18) and 1964 (Figure 19). The three lots presently addressed were something of an undeveloped island with significantly more development to the west, south, and east. The 1950 and 1964 aerial photographs (Figure 17 and Figure 19) show pineapple cultivation neighboring, but not within, the three lots.

In 1932, Molokai Electric Company was incorporated and established an electric generating station in Kaunakakai with one 200-horsepower diesel generator, which first supplied electricity to 59 customers in Kaunakakai Village that year (Young 1961). By the 1960s, the company serviced the entire island with nine generators channeling electricity through 80 miles of transmission lines (Young 1961).

Following the development of aerial combat in the First World War, the availability of war-surplus aircraft for civilian aviation in the Hawaiian Islands led to the establishment of a civilian airfield at Ho‘olehua in 1919 named Moloka‘i Field. In the 1930s, improvements were made at Moloka‘i Field including the construction of a terminal building for the use of Inter-Island Airways, the first commercial inter-island carrier. The segregation of part of the civilian airfield at Ho‘olehua for military use occurred when the U.S. Army Air Corps established a portion of the field as “Homestead Field,” beginning in September 1931 (Horvat 1966:38,40–47). By the time the United States entered World War II in 1941, aircraft of the Fifth Bombardment Group were stationed at Homestead Field. Heavy rains caused water and mud to flow into the operating area of the airport until a drainage ditch was completed in 1953. In 1954, the sod-on-sand runway was replaced by a paved runway and the airport terminal was built in 1957. Figure 18 shows the airport during the 1950s prior to the construction of the terminal. Improvements to the airport continued

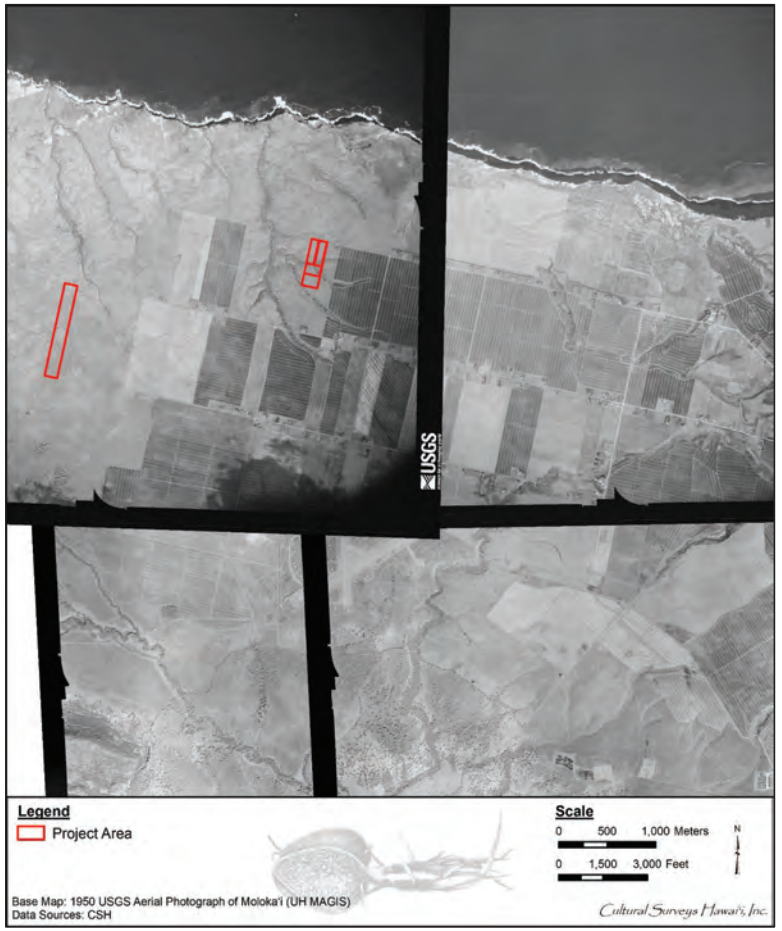


Figure 17. 1950 USGS aerial photograph of Molokai (UH MAGIS) showing pineapple cultivation neighboring, but not within, the project areas

Figure 18. Portion of 1952 Kaunakakai and Molokai Airport USGS topographic quadrangles showing unpaved roads present surrounding, but not immediately adjacent, to the three lots presently addressed

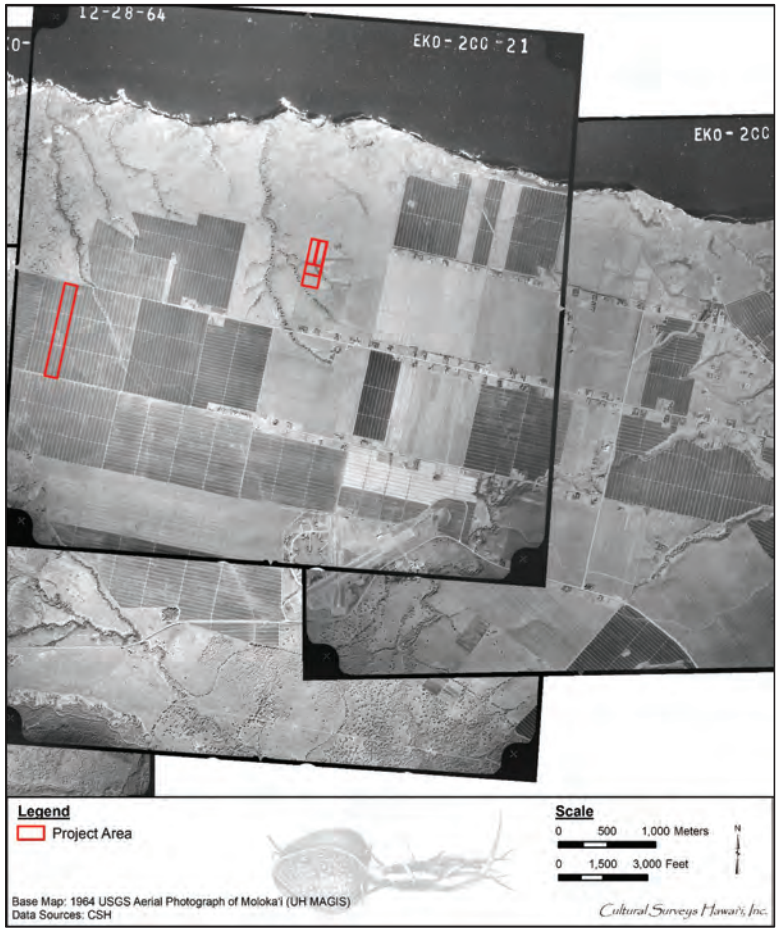


Figure 19. 1964 USGS aerial photograph of Moloka‘i showing pineapple cultivation neighboring, but not within, the three lots presently addressed (note the general absence of trees in the project area

Figure 20. Portion of the 1967 Kaunakakai and 1968 Molokai Airport USGS topographic quadrangles showing unpaved roads in the general vicinity of the three lots presently addressed including Pu‘u Kapele Road on the north side of Lot TMK: (2) 5-2-026:016

from 1969 through 1993, including terminal expansions, perimeter security fence installation, a new FAA air traffic control tower, a fire protection system, and a maintenance base yard (State of Hawai‘i 2008).

A heliport associated with the United States Navy reservation, appears on a 1983 topographic map (Figure 21) and 1993 topographic map quadrangles (see Figure 1). However, this development does not appear in recent aerial imagery (see Figure 4).

3.7 Contemporary Land Use

Pineapple production on Moloka‘i phased out during the 1970s, with complete abandonment by the early 1980s. Tourism and service-related industries replaced commercial agriculture as the economic foundation of urban areas. The towns of Maunaloa and Kualapu‘u have continued to support sizeable populations, though Kaunakakai has remained the island’s major urban center.

The development history of large land holdings on the island of Moloka‘i includes Molokai Ranch Company lands, some

> 55,575 acres, or 35 percent of the entire island. This ranch includes 20 miles of coastline and two hotel properties, the former Molokai Lodge and the former Kaluakoi Hotel, two golf courses, residential, agricultural and conservation land, as well as nearly 30 acres of commercial land near Kaunakakai and 85 acres of industrial land at Maunaloa and Kualapuu. [Magin 2017]

The company that owned all these properties, Molokai Properties Limited, ceased all operations on the island in 2008 (Mangieri 2019). These holdings have been listed for sale since 2017. While community interests actively desire purchasing the lands for residents and/or the state, the fate of these lands, and consequently Moloka‘i in general, is still unknown.

DHHL proposes to construct infrastructure improvements including clearing, grading, and installation of roadway, electrical, connections to domestic water, and irrigation water utilities. The proposed plan calls for ground-disturbing activities to be confined to the two subject parcels but will extend to existing roadways for access and connection for utilities. These improvements will support DHHL beneficiaries through the provision of essential services necessary for agricultural homesteading. While installation of wastewater treatment systems will be the responsibility of the lessee, the environmental impacts are being considered as part of this action.

.

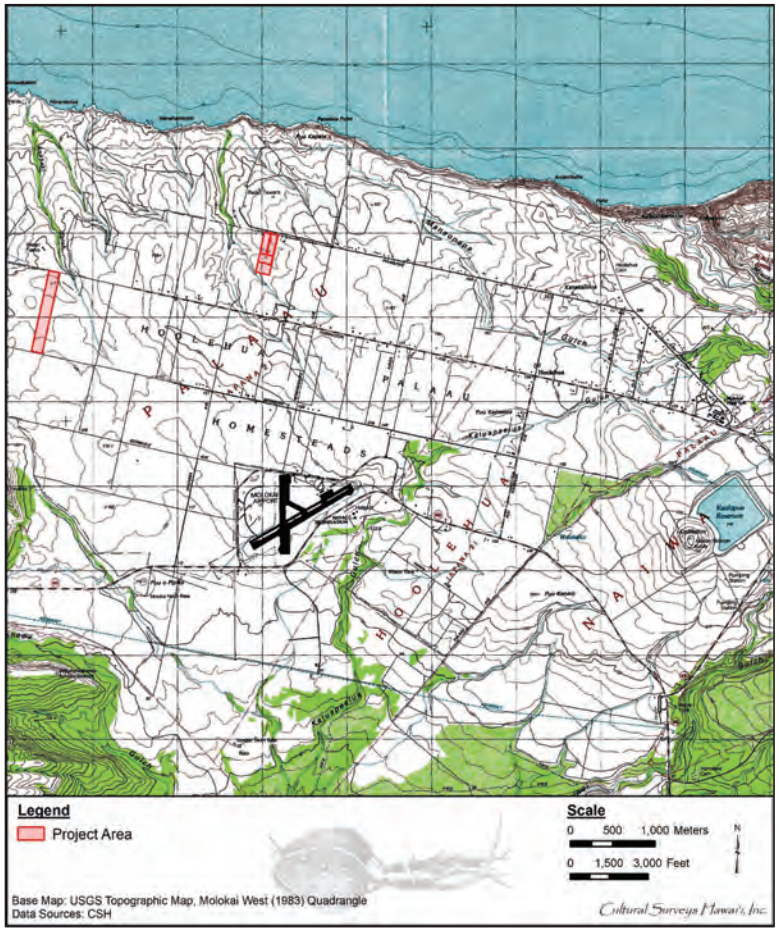


Figure 21. Portion of 1983 Molokai West USGS topographic quadrangle showing an aqueduct crossing the Ho‘olehua Plain to the south and the Kualapuu Reservoir well to the southeast of the three lots presently addressed

Section 4 Previous Archaeological Research

Previous archaeological studies conducted within approximately 3.0 km (1.9 miles) of the three lots presently addressed include archaeological reconnaissance, field inspections, inventory surveys, and monitoring programs (Figure 22 and Table 2). No historic properties have been previously identified within the three lots presently addressed, and few have been identified within the vicinity (Figure 23 and Table 3).

4.1 Summers (1971)

Archaeological work accomplished prior to the late 1960s has been summarized by Catherine Summers (1971) in *Moloka‘i: A Site Survey*, the most comprehensive island-wide study to date. Based on previous research, particularly the John F.G. Stokes (1909) survey of *heiau* (pre-Christian place of worship) and other major sites on Moloka‘i, and through revisiting some 100 locations, Summers (1971) compiled a brief history and archaeological site survey for Moloka‘i Island with the Bernice Pauahi Bishop Museum. Data in the compilation include documentation by M.D. Monsarrat in 1884 published by Thrum (1908); Cobb (1902); Cooke (1949); Emory’s data in Bonk (1954); unpublished materials by Stokes from surveys in 1909 and Dunn in 1957, and map records by Cartwright. Summers (1971) documents over 300 sites, mainly concentrated along the coastal regions. These sites are described by individual *ahupua‘a*, as well as legendary, traditional, and historical information related to Moloka‘i. None of the sites were identified within the three lots presently addressed. However, Summers (1971) documents seven sites in the project area vicinity.

Sites 11A and 11B are approximately 3.5 km southeast of the three-lot project area. Together these two sites comprise the Kape‘elua Complex, a historic property designated by the SHPD as SIHP # 50-60-03-00011. Summers described the sites as follows:

> Site 11A. ‘Caterpillar Stones,’ Ho‘olehua 2
>
> The stones are on top of the hill, Pu‘u Kape‘elua, ‘The Caterpillar Hill.’
>
> Cooke gave the following legend about these stones:
>
> > […] this beautiful girl was visited each night by a lover who left before daylight. She was unable to discover who he was. This suspense told on her, and she began to waste away. A priest, consulted by her parents, advised the girl to attach a piece of white tapa to a wart on her lover's back. In the morning, shreds of tapa helped to trace the demi-god lover to the hill Puu Peelua, in the middle of Hoolehua. The kahuna (priest) and friends of the family found a large peelua (caterpillar) asleep on the hill. The kahuna ordered the people to collect wood which was placed around the sleeping peelua, and a fire was lit. As the heat of the fire increased, the caterpillar burst into myriads of small caterpillars which were scattered over the plain. That accounts for the army-worm pest, called peelua (Cooke, 1949:102).

Table 2. Previous archaeological studies conducted in the vicinity of the three lots presently addressed

Reference	Type of Study	Location	Results
Summers 1971	Site survey	Island-wide	Documented four sites in vicinity: 11A (SIHP # 50-60-03-00011A), Caterpillar Stones; Site 11B, Stone at Puʻu Kapeʻelua; Site 12, Lepekaheo Heiau; and Site 16, Heiau at Anahaki
AECOS Inc. 1980	Archaeological reconnaissance survey	Molokaʻi Airport and proposed airport site near Moʻomomi Beach	No historic properties identified in vicinity; however, complex of WWII-era (not historic at time of study) bunker sites identified near Molokaʻi Airport, south of three lots presently addressed
Environmental Impact Study Corp. 1981	Biological and archaeological reconnaissance survey	90 acres by Cooke Land Co., Inc., TMK: (2) 5-2-011:007 por.	Failed to locate Summers Site 106 (petroglyphs) within their study area (likely buried or destroyed) but observed two remnant features that indicate possible agricultural use of seasonal stream flow in gulch
Neller 1982	Archaeological aerial reconnaissance	Hoʻolehua training Area, particularly north coastal Pālāʻau	Documented Summers Site 16 *heiau* at Anahaki and numerous stone walls and platforms near Kahinaokalani Point he associated with Summers Site 17
Griffin 1993	Archaeological reconnaissance	North/central Hoʻolehua uplands	She noted, "sites consisting of enclosures, L-shapes, U-shapes on the low promontories along the coast, in addition to the shelter sites noted by Summers between sites 16 and 17"; main focus associated with anomalous growth of ti plants in area with a wall segment, and lithic scatter and featuring a boulder that showed evidence of human modification as a "basin"
Hammatt et al. 1993	Archaeological inventory survey	One parcel in Pālāʻau 2 adjacent to airport, and two parcels in Naʻiwa	No historic properties identified

Figure 22. Previous archaeological studies in the vicinity of the three lots presently addressed depicted on a portion of the 1993 Kaunakakai and Molokai Airport USGS topographic quadrangles

Reference	Type of Study	Location	Results
Nagahara and Kolb 1994	Field inspection	Kape‘elua complex, Ho‘olehua-Pālā‘au Homesteads	Confirmed and GPS mapped Kape‘elua Complex, SIHP # 50-60-03-00011 (Summer Sites 11A and 11B)
Major and Dixon 1995	Archaeological inventory survey	364-acre (147.4-hectare) USAF Receiver Station near Ho‘olehua	Two previously unrecorded historic properties documented consisting of pre-Contact dwelling (SIHP # 50-60-02-01624) and another structure of unknown function (SIHP # 50-60-02-01623); SIHP # -01624 consisted of enclosure with marine shell deposits, fire-cracked rocks, and reworked basalt flake; SIHP # -01623 included two enclosures, each with minor amounts of marine shell and some modern refuse and 20th century rubbish dumps
Hartzell 2000	Archaeological inventory survey (supplemental)	USAF Molokai Receiver Station	Recorded 37 surface features for SIHP # 50-60-02-00843 (Pu‘ukaPele Rock Wall complex), consisting of 26 stacked-faced walls, five alignments, four enclosures, a depression, and a prominent, massive natural boulder; boundary or possibly religious function posited for 15 features with other features associated with water control/ diversion, habitation and a planting area
Pantaleo and Rotunno-Hazuka 2003	Archaeological monitoring	Ho‘olehua uplands to coastal Kalama‘ula	No historic properties identified (but monitoring on-call with spot-checks)
Pantaleo 2004	Archaeological monitoring	Ho‘olehua uplands	No historic properties identified
Hammatt 2008	Field inspection and literature review	DOE Molokai schools including Kualapu‘u Elementary School	No historic properties identified but monitoring program recommended

Reference	Type of Study	Location	Results
Pfennig et al. 2011	Archaeological literature review	8,955 acres of DHHL Molokai lands including 8,055 acres at Ho‘olehua Ahupua‘a and present three-lot project area	Discusses four sites mentioned by Summers (1971): SIHP # 50-60-03-00011A, caterpillar stones; SIHP # -00011B, stone at Pu‘u Kape‘elua; SIHP # -00013, Kahua Maika at a place called Akani; and SIHP # -00014, *heiau* near Ho‘olehua Cemetery
McIntosh et al. 2019	Archaeological inventory survey	DHHL lands, including in Ho‘olehua	No historic properties identified in project area vicinity; of note identifications of SIHP # 50-60-03-02521, concrete tank stands associated with ranching and Isolated Find (IF)-01, an *‘ulu maika* (game stone)
Shideler and Hammatt 2021	Archaeological literature review and field inspection	Two DHHL scattered lots including one adjacent to three lots presently addressed	No historic properties identified in more distant lot; in neighboring lot, two terrace alignments documented on south side of a natural drainage swale and interpreted as agricultural features to retain moisture; antiquity of these boulder alignments uncertain; and no SIHP # assigned

Table 3. Previously identified historic properties in the vicinity of the three lots presently addressed

SIHP #	Source	Site Type	Description
50-60-02-00995	Griffin 1993	Agricultural shrine	Notes "sites consisting of enclosures, L-shapes, U-shapes on the low promontories along the coast," in addition to the shelter sites noted by Summers between sites 16 and 17 but her main focus was associated with an anomalous growth of ti plants and was described as including a wall segment, basalt flakes and a fragment of an adze blank and a rock with a flat surface, with a rectangular "basin" measuring about 8" x 14" pecked into it. She posits that "In addition to the practical purpose of the boulders for collecting rain water, it is possible that this site was an agricultural shrine for the worship of the god Lono."
50-60-02-01623	Major and Dixon 1995	Two enclosures and dumps	SIHP # -01624, regarded as a pre-Contact dwelling consisted of an enclosure with marine shell deposits, fire-cracked rocks, and a re-worked basalt flake.
50-60-02-01624	Major and Dixon 1995	An enclosure and an artifact	SIHP # -01623, a site of unknown function, included two enclosures, each with minor amounts of marine shell and some modern refuse and 20th century rubbish dumps.

Figure 23. Previously identified historic properties in the vicinity of the three lots presently addressed depicted on a portion of the 1993 Kaunakakai and Molokai Airport USGS topographic quadrangles

SIHP #	Source	Site Type	Description
50-60-03-00011A	Summers 1971:37	“Caterpillar Stones,” Ho‘olehua 2	The stones are on top of the hill; Pu‘u Kape‘elua, “The Caterpillar Hill.”’ Cooke gave the following legend about these stones: “[…] this beautiful girl was visited each night by a lover who left before daylight. She was unable to discover who he was. This suspense told on her, and she began to waste away. A priest, consulted by her parents, advised. the girl to attach a piece of white tapa to a wart on her lover’s back. In the morning, shreds of tapa helped to trace the demi-god lover to the hill Pu‘u Pe‘elua, in the middle or Ho‘olehua. The kahuna (priest) and friends of the family found a large·*pe‘elua* (caterpillar) asleep on the hill. The kahuna ordered the people to collect wood which was placed around the sleeping *pe‘elua*, and a fire was lit. As the heat of the fire increased, the caterpillar burst into myriads of small caterpillars which were scattered over the plain. That accounts for the army-worm pest, called *pe‘elua*” (Cooke, 1949:102). Akana (n.d.) told a legend similar to the one above; and added, “Today, about January to the first of March, many caterpillars are seen around Pu‘u Pe‘elua.”

SIHP #	Source	Site Type	Description
50-60-03-00011B	Summers 1971:37	Stone at Pu‘u Kape‘elua Ho‘olehua 2	The stone is located just S of the Caterpillar Stones (Site 00011A) on Pu‘u Kape‘elua. When seen in 1959, this fairly flat stone measured 6 ft N to S, and 7 ft E to W. It stood about 22 in. high on the N and 18 in. high on the S. On the face of the stone was a hollowed-out basin, 21 in. E to W, 8.5 in. N to S, and 3 in. deep. Leading from the N side of the surface into either side of the basin were two grooves 1 in. wide and 2.5 in. deep. Two more grooves led from the S side of the basin to another basin located on a shelf 5 in. below the face, on the S side of the stone. This basin, which was 1.75 in. deep, measured 18 in. E to W and 6 in. N to S. Numerous sea shells were found in the vicinity of the site. G.P. Cooke (personal communication) said the stone was used for sharpening adzes. K.P. Emory was of the opinion that, because this is an arid region, the stone may have been for collecting water.
SIHP # 50-60-03-02521	McIntosh et al. 2019	Ranching infrastructure	Concrete tank stands associated with ranching
Summers Site 9	Summers 1971:34-36	“Kipu Ruins, Kipu”	The site is located on a headland about 800 ft S of the cliffs and N of Kapale Gulch, at an elevation of 1000 ft. Several structures are distributed over an area about 500 ft long and 250 (Structures “A” through “I” are described)
Summers Site 12	Summers 1971:37	*Heiau* (Lepekaheo Heiau)	This site is located on the boundary of Ho‘olehua 2 and Pala‘au 2, W of Kaluape‘elua Gulch. Monsarrat referred to Lepekaheo as an “old heiau.”
Summers Site 13	Summers 1971:38	“Kahua Maika, Pala‘au 2” *(‘ulu maika* bowling course)	The *kahua maika* was situated on a rise at a place called Akani; Monsarrat referred to it as an “old *kahua maika*.”

SIHP #	Source	Site Type	Description
Summers Site 14	Summers 1971:38	*“Heiau,* Pala‘au 2”	“The site is located E of the Ho‘olehua Cemetery in the pineapple fields W of the gulch, at an elevation of 800 ft. Cartwright reported this (in 1922) as being a heiau. The structure was in ruins in 1957, however. Traces of paving could still be found, and the remains of a wall, 35 ft long NE to SE; 13 ft from the NE side was an upright stone 2 ft high, 2 ft wide, and l ft thick.”
Summers Site 16	Summers 1971:38	*Heiau* and house site	This *heiau* is located on the W side of the mouth of Anahaki Gulch at an elevation of about 50 ft above sea level. Cartwright (1922) reported the site as being a *heiau*. Originally the structure was an enclosure. The exterior measurements in 1964 were 43 ft N to Sand 36 ft E to W; the maximum height of the eastern wall was 5 ft. The northern wall was probably this same height originally, but the wall on the S was lower. Both the S and W walls were badly damaged. An inner division on the N side of the enclosure measured 17 ft E to W and extended the entire width of the structure. The southern portion of the enclosure was paved. On the crest of the hill to the S of the above site was a house site or shelter, which had a 5-ft-high wall running N to S; the rest of the site was open. Adjoining the northern portion of the wall on the E side was a small, paved terrace.
Summers Site 17 (02-0017)	Summers 1971:38	“Sites at Kahinaokalani, Pala‘au 2”	“Emory reported seeing two house sites and a *ko‘a* at Kahinaokalani; the *ko‘a* was at the edge of the cliff. Phelps described a structure, which he called a canoe *halau*, which was on a bluff about 30 ft above the sea”

SIHP #	Source	Site Type	Description
Summers Site 107	Summers 1971:80	“Holua slide at Kualapu‘u, Na‘iwa”	The slide was on the SSW side of Kualapu‘u hill, and traces of it can still be seen. No indications of paving could be found in 1966. Apparently it was similar to […] Site 3. On the S and W slopes of Kualapu‘u hill, there used to be many sweet potato patches, which were defined by rows of stones (Cooke 1949:121). According to Sophie J. Cooke (1964:58), the former name of Kualapu‘u was Ka ‘Uala Pu‘u, “The Sweet Potato Hill.” On some maps it is called “Mid Hill.”
Isolated Find (IF)-01	McIntosh et al. 2019	Bowling game stone	An *‘ulu maika*
No SIHP # assigned	Shideler and Hammatt 2021	Terraces	Two terrace alignments were documented on the south side of a natural drainage swale and were interpreted as agricultural features to retain moisture. The antiquity of these boulder alignments was uncertain; and no SIHP # was assigned.

> Akana (n.d.) told a legend similar to the one above, and added, ‘Today, about January to the first of March, many caterpillars are seen around Pu‘u Pe‘elua’ [Summers 1971:37]
>
> Site 11B. Stone at Pu‘u Kape‘elua, Ho‘olehua 2
>
> The stone is located just S of the Caterpillar Stones (Site llA) on Pu‘u Kape‘elua. When seen in 1959, this fairly flat stone measured 6 ft N to S, and 7 ft E to W. It stood about 22 in. high on the N and 18 in. high on the S. On the face of the stone was a hollowed-out basin, 21 in. E to W, 8.5 in. N to S, and 3 in. deep. Leading from the N side of the surface into either side of the basin were two grooves 1 in. wide and 2.5 in. deep. Two more grooves led from the S side of the basin to another basin located on a shelf 5 in. below the face, on the S side of the stone. This basin, which was 1.75 in. deep, measured 18 in. E to Wand 6 in. N to S. Numerous sea shells were found in the vicinity of the site.
>
> G.P. Cooke (personal communication) said the stone was used for sharpening adzes. K.P. Emory was of the opinion that, because this is an arid region, the stone may have been for collecting water.

A recent archaeological study (Martell III et al. 2021:45) noted the distinctive basins designated as Site 00011B are indeed in very close proximity to the Caterpillar Stones designated Site 00011A but neither the Cooke explanation of an adze sharpening function nor the Emory explanation of a water collecting function reflects this geographic relationship. A third theory is posited that these basins were for offerings (possibly *‘awa* narcotic drink) to propitiate the destructive caterpillar pests.

Site 14. *Heiau*, Pala‘au 2

> The site is located E of the Ho‘olehua Cemetery in the pineapple fields W of the gulch, at an elevation of 800 ft. Cartwright reported this (in 1922) as being a heiau. The structure was in ruins in 1957, however. Traces of paving could still be found, and the remains of a wall, 35 ft long NE to SE; 13 ft from the NE side was an upright stone 2 ft high, 2 ft wide, and l ft thick. [Summers 1971:38]

This *heiau* was located near the Kukuiokanaloa sea cliff approximately 4.2 km east of the eastern project area.

Site 15. *Ko‘a* at Pu‘u Kapele, Pala‘au 2

Summers (1971:38) describes this as “A small ko‘a is on the top of the hill, Pu‘u Kapele” (citing a Phelps, n.d.:27 source). This *ko‘a* was located near Paualaia Point, 1,400 m north of the eastern project area.

Site 16. Heiau at Anahaki, Pala‘au 2

> This heiau is located on the W side of the mouth of Anahaki Gulch at an elevation of about 50 ft above sea level. Cartwright (1922) reported the site as being a heiau. Originally the structure was an enclosure. The exterior measurements in 1964 were 43 ft N to Sand 36 ft E to W; the maximum height of the eastern wall was 5 ft. The northern wall was probably this same height originally, but the wall on the S was

> lower. Both the S and W walls were badly damaged. An inner division on the N side of the enclosure measured 17 ft E to W and extended the entire width of the structure. The southern portion of the enclosure was paved,
>
> On the crest of the hill to the S of the above site was a house site or shelter, which had a 5-ft-high wall running N to S; the rest of the site was open. Adjoining the northern portion of the wall on the E side was a small, paved terrace. [Summers 1971:38]

This *heiau* was approximately 3.3 km northwest of three lots presently addressed.

Site 17. Sites at Kahinaokalani, Pala‘au 2

> Emory (n.d.) reported seeing two house sites and a ko‘a at Kahinaokalani; the ko‘a was at the edge of the cliff. Phelps described a structure, which he called a canoe halau, which was on a bluff about 30 ft above the sea: [Summers 1971:38]

Summers quotes Phelps (n.d.:17):

> […] the parallel walls [of the halau] are 20 feet long and 3 1/2 feet apart. They are no [now] so broken down that no estimate can be made of their height or width. Apparently the structure was open at both ends. The longitudinal axis of the shelter is at a slight angle to the line of the water’s edge. [Summers 1971:38–39]

These sites were approximately 3.7 km northwest of the three lots presently addressed.

Site 107. *Hōlua* Slide at Kualapu‘u, Nā‘iwa 1

> The slide was on the SSW side of Kualapu‘u hill, and traces of it can still be seen. No indications of paving could be found in 1966. Apparently it was similar to the one shown in Fig. 5, Site 3 [refers to a Site 3 *hōlua* Slide near Kauleonanahoa].
>
> On the S and W slopes of Kualapu‘u hill, there used to be many sweet potato patches, which were defined by rows of stones (Cooke, 1949:121). According to Sophie J. Cooke (1964:58), the former name of Kualapu‘u was Ka ‘Uala Pu‘u, ‘The Sweet Potato Hill.’ On some maps it is called ‘Mid Hill.’ [Summers 1971:80]

This *hōlua* slide was approximately 5.0 km southeast of the three lots presently addressed.

4.1.1 AECOS Inc. (1980)

In 1980, AECOS, Inc. conducted an archaeological reconnaissance survey for the Moloka‘i Airport Master Plan Survey (AECOS Inc. 1980). Archaeologists Robert Connolly III and Paul Rosendahl surveyed the existing airport and two proposed sites for airport expansion: Site A-4, the potential connecting taxiway area, and Site C-1 and C-2, an alternate airport area located *mauka* (inland) of Mo‘omomi Beach. Neither the airport or Site A-4 provided evidence of prehistoric cultural remains. However, at the proposed Site C-1/C-2, AECOS Inc. (1980) documented seven features, six historic hunting blinds, and one likely pre-Contact wall.

Though no prehistoric cultural remains were observed at the proposed Site A-4, approximately 2.5 km to the south of the current eastern project area, the report noted the area did contain “an extensive complex of World War II bunkers consisting of horseshoe-shaped earthen revetments,

earth-covered Quonset huts with concrete floors, wood-lined causeways, and extensive road systems. This complex was constructed during the years 1942-1947" (AECOS Inc. 1980:6). In 1980, these properties were insufficient age to be considered historic properties (50 years old or older). If these properties are still in existence, they likely would now be considered historic properties.

4.1.2 Environmental Impact Study Corp. (1981)

In 1981, Environmental Impact Study Corp. conducted biological and archaeological reconnaissance on approximately 90 acres of land owned by Cooke Land Company, Inc., designated as TMK: (2) 5-2-011: portion of parcel 007, located approximately 2.2 km to the south of the three lots presently addressed.

Reconnaissance efforts did not locate the previously identified Summers Site 106 (petroglyphs) within their study area, although they did locate two other new sites within their study area. The first is a small series of terrace fragments above the west bank of the stream at the *mauka* end of the study area. Other possible agricultural cleared mounds were observed, but observations were inconclusive. The second site is a possible stacked wall on the high point of the ridge above the stream, roughly 90 m east of the first site. The stacked stone wall appeared to be placed between large natural outcrops and has collapsed.

Environmental Impact Study Corp. concluded that indications for possible agricultural use of the seasonal stream flow in the gulch existed, but the absence of more substantial and identifiable structures made it an assumption rather than fact. They recommended none of the sites located warrant further archaeological work, and that heavy ground disturbance at the location of Summers Site 106 (Petroglyphs) argues against the survival of this site, and that no further archaeological work was necessary and no specific measures need be undertaken to preserve or protect the features already identified.

4.1.3 Neller (1982)

Earl (Buddy) Neller (then of the State Historic Preservation Office, DLNR) produced an archaeological reconnaissance of proposed Marine Corps Training Areas on Moloka‘i at Kalama‘ula and Pālā‘au. His work at Pālā‘au was exclusively a "helicopter windshield survey" (Neller 1982:1) He noted the presence of a number of house sites in the area east of Mo‘omomi Beach (east of Naaukahihi Point) in the vicinity of Summer's sites 16 and 17. He documented the Site 16 *heiau* at Anahaki and numerous stone walls and platforms near Kahinaokalani Point he associated with Site 17. He comments regarding the north Pālā‘au area:

> Sites have not been noted previously in the *mauka* portion of the property.
>
> Our windshield survey verified the existence of readily visible stone structures along the coast. Inland we saw nothing but dry grazing land and traces of former pineapple fields.
>
> It is suspected that continued military activities in this parcel would have little impact on archaeological sites, except at the coast. It is also suspected, however, that an intensive field survey would identify a number of small archaeological sites in the mauka portion of the parcel, presumably altered by farming and ranching activities.[Neller 1982:2]

4.1.4 Griffin (1993)

Annie Griffin of the SHPD (1993) produced a memorandum on a newly identified historic site (SIHP # 60-02-00995) at Pālā‘au. She noted, "sites consisting of enclosures, L-shapes, U-shapes on the low promontories along the coast, in addition to the shelter sites noted by Summers between sites 16 and 17" (Griffin 1993:1). Her main focus was associated with an anomalous growth of ti plants and was described as follows:

> Ground visibility was poor due to the dense grass cover, but a wall, possibly a c-shape or a wall segment, basalt flakes and a fragment of an adze blank were observed at the northwest base of the promontory. The promontory itself consists of large basalt boulders, in various natural positions. Only one boulder showed evidence of human modification. This rock has a flat surface, with a rectangular 'basin' measuring about 8" x 14" pecked into it. The 'basin' contained water along with decaying vegetation. An alignment of 6 rocks was placed along its basin's windward (east) edge, probably to minimize evaporation from wind. [Griffin 1993:1]

She posits that "In addition to the practical purpose of the boulders for collecting rain water, it is possible that this site was an agricultural shrine for the worship of the god Lono" (Griffin 1993:2).

4.1.5 Hammatt et al. (1993)

In 1993, CSH conducted an archaeological inventory survey (AIS) of three parcels, which the study refers to as Sites #1, #2, and #5 (Hammatt et al. 1993). Only Site #5 is in proximity to the current project area, while Sites #1 and #2 are located further away to the southeast from the present project area(s) and will not be discussed.

Site #5 is an approximately 15-acre parcel within Pālā‘au, adjacent to and west of Moloka‘i Airport and approximately 2.5 km south of the current eastern project area. The parcel, which adjoined the airport security fence, was formerly part of the airfield and used for parking planes. At least 50% of this study area was paved. Grasses, *koa haole* (*Leucaena leucocephala*), and weeds covered unpaved areas, which appeared "denuded of soil: decomposing bedrock C-horizon was exposed on the surface and as was evidence of bulldozer tracks in various places […]" (Hammatt et al. 1993:24). No historic properties were identified with the exception of the former plane taxiways and parking areas. No further archaeological work was recommended.

4.1.6 Nagahara and Kolb (1994)

On 1 June 1994, the SHPD and DHHL archaeologists conducted a field inspection in the Ho‘olehua-Pālā‘au Homesteads to locate and GPS map SIHP # 50-60-03-00011, Kape‘elua Complex (Nagahara and Kolb 1994). The Kape‘elua Complex is a legendary site located on top of Pu‘u Kape‘elua ("caterpillar hill"), consisting of several various-sized basalt boulders and outcrops known as "caterpillar stones." One boulder was previously identified with two pecked rectangular channels and basins, which the property owner stated was a "birthing stone." During the inspection, a similar pecked basin was found in another stone. The function for the basin was regarded as unknown. The authors noted other pecking in some stones as possible pre-Contact modifications resembling footholds for climbing up the large boulders. A historic midden scatter composed of shells, bottle glass shards, and a thermometer was identified under a boulder. The

property owner suggested the midden was associated with a former plantation camp. The field inspection resulted in adequate mapping of the complex, which involved the SHPD carving an X in one of the peripheral boulders. Overall, the site appeared in good condition, and preservation without additional mitigation was recommended.

4.1.7 Major and Dixon (1995)

The Bernice Pauahi Bishop Museum Department of Anthropology (Major and Dixon 1995) prepared a report on an archaeological survey and evaluation at a 364-acre (147.42-hectare) USAF Receiver Station. Two previously unrecorded historic properties were documented in the project area, including a pre-Contact dwelling (SIHP # 50-60-02-01624) and another structure of unknown function (SIHP # 50-60-02-01623). SIHP # -01624 consisted of an enclosure with marine shell deposits, fire-cracked rocks, and a reworked basalt flake. SIHP # -01623 included two enclosures, each with minor amounts of marine shell and some modern refuse and twentieth century rubbish dumps. The authors noted that “Immediately to the north, in the narrow strip between the project area and the sea, lie many more features indicating exploitation of coastal resources from pre-Contact times until the present” (Major and Dixon 1995:ii).

4.1.8 Hartzell (2000)

Leslie Hartzell of the Bernice Pauahi Bishop Museum Department of Anthropology reported on a supplemental archaeological inventory survey at the USAF Molokai Receiver Station with a 16-hectare rectangular project area along the upper rim and lower slopes of Mane‘opapa Gulch and across the peak of Pu‘ukaPele to the coastal cliff edges. Three archaeological sites were identified either entirely within or bisected by the boundaries of the USAF Molokai Receiver Station leased property. Two of the sites (SIHP #s 50-60-02-01623 and -01624) were recorded during the initial inventory survey investigation in 1994 (Major and Dixon 1995) and a third site (SIHP # 50-60-02-00843) was identified as being partially within the northern property boundary of the Receiver Station during the supplemental inventory survey. Thirty-seven surface features were recorded for SIHP # 50-60-02-00843 (the Pu‘ukaPele Rock Wall complex), consisting of 26 stacked-faced walls, five alignments, four enclosures, a depression, and a prominent, massive natural boulder. A boundary of possibly religious function was posited for 15 of the features with other features associated with water control/diversion, habitation, and a planting area.

4.1.9 Pantaleo and Rotunno-Hazuka (2003)

Between September 2002 and February 2003, Archaeological Services Hawaii, LLC (ASH) conducted on-call archaeological monitoring and weekly site inspections for the Sandwich Isles Communications, Inc. (SIC) Moloka‘i Rural Fiber Optics Duct Lines project, which connected DHHL properties to a modern, high-speed broad band telecommunications system (Pantaleo and Rotunno-Hazuka 2003). The study area was divided into six sections extending along state, DHHL, and county road rights-of-way from Ho‘olehua uplands to coastal Kalama‘ula. Sections 1 and 2 are in the current project area vicinity (see Figure 22) and it appears their project area extended along the north side of the eastern and western present project areas (although again the monitoring was just on-call with weekly spot-checks). No historic properties were encountered during the monitoring program; no additional archaeological work was recommended.

4.1.10 Pantaleo (2004)

Between October and December 2003, ASH conducted archaeological monitoring for Phase II of the SIC Moloka‘i Rural Fiber Optics Duct Lines project (Pantaleo 2004). No historic properties were identified during this phase of the monitoring program. Stratigraphy observed (Pantaleo 2004:13, 14), as at his Profile 2 at “Ala Elua,” located approximately 250 m north of the eastern project area, was as follows:

> Layer I (approximately 0-35 cmbs), representing the most recent phase of post-occupation soil accumulation of overburden, consisted of a dark brown (IOYR 3/3), dry, crumbly, fine grain, loose, nonsticky, non-plastic, non-cultural, silt with abundant roots and rootlets, and minimal rocks and modem debris. This layer was present throughout the entire project area.
>
> Layer II (approximately 35 to 65 cmbs), representing the till zone, consisted of a dark yellowish-brown (IOYR 3/4) to dark reddish-brown (5YR 3/4), moist, loose, powdery, fine grain, non-plastic, slightly sticky, non-cultural, silt with minimal roots and rootlets and rocks and black sheeting from pineapple cultivation.
>
> Layer III (approximately 65 to 130 cmbs), representing the basal layer, consisted of a yellowish-brown (I OYR 5/6) to dark yellowish-brown (I OYR 3/6), compact, moist, fine grain, slightly sticky, slightly plastic, silt to silty clay with abundant basalt cobbles and boulders. [Pantaleo 2004:13, 14]

4.1.11 Hammatt (2008)

CSH (Hammatt 2008) carried out archaeological literature review and field check study of four DOE schools on Moloka‘i including Kualapu‘u Elementary School. No historic properties were identified, but noting some traditional habitation, transit in the vicinity between Kalaupapa and Kaunakakai and historic ranching, an on-site archaeological monitoring program was recommended.

4.1.12 Pfennig et al. (2011)

Pacific Legacy, Inc. (Pfennig et al. 2011) produced an archaeological literature review of 8,955 acres of DHHL Moloka‘i lands including 8,055 acres at Ho‘olehua Ahupua‘a, including the three lots presently addressed. They discuss four sites discussed by Summers (1971): SIHP # 50-60-03-00011A, the caterpillar stones; SIHP # -00011B, the stone at Pu‘u Kape‘elua; SIHP # -00013, the Kahua Maika at a place called Akani; and SIHP # -00014, a *heiau* near the Ho‘olehua Cemetery (Pfennig et al. 2011:73).

The authors note,

> […] archaeological sites appear more sparse on the Ho‘olehua Plain, as the area lacks adequate rainfall to support the same population density as the southeast coastal region of Moloka‘i. However, this vast plain contains several zones, particularly in the north and northeast, which boast a high concentration of religious sites and places associated with Traditional mythology. [Pfennig et al. 2011:81]

4.1.13 McIntosh et al. (2019)

In October 2011, November 2012, and September and November 2015, Pacific Legacy, Inc. (McIntosh et al. 2019) conducted an archaeological inventory survey of DHHL lands in seven areas across Moloka‘i for proposed water system improvements (McIntosh et al. 2019). Area 7 of the study included four locations near the three lots presently addressed, which were investigated for proposed maintenance yard improvements and valve and hydrant replacements in Ho‘olehua. No historic properties were identified in Area 7.

Of note was the identification of SIHP # 50-60-03-02521, concrete tank stands associated with ranching, and Isolated Find (IF)-01, an *‘ulu maika*.

Regarding SIHP # 50-60-03-02521, the authors report,

> Four separate sets of tank stands were recorded a short distance from the now existing 3.5 MG tanks at Ho‘olehua. Each set of stands measures ca. 5.0 m long, 3.7 to 5.9 m wide, and 0.3 m wide. It not known when these stands were constructed but were likely abandoned after the larger Ho‘olehua tanks became operational in the 1930s. [McIntosh et al. 2019:96]

Regarding the IF-01 *‘ulu maika*, the authors report,

> IF-1 consists of an isolated sandstone *‘ulu maika* located on the surface of an abandoned agricultural field situated along Project Area 5 (5-A Ho‘olehua to Veterans’ Cemetery to Lihi Pali Avenue Transmission Main) in Ho‘olehua.
>
> The *‘ulu maika* is discoidal in shape and measures ca. 6.5 cm in diameter by 2.9 cm thick. Several fragments of the artifact have been broken off, but the overall shape is still clearly visible. The *‘ulu maika* was collected from the field.
>
> No surface archaeological features were observed in the vicinity of IF-1. It is likely that if any archaeological site was present in the area, it was destroyed during the modification of the landscape for commercial agriculture. The ‘ulu maika appears to have been manufactured and utilized during the pre-Contact or early post-Contact periods. Halealoha Ayau posits that this isolated find may be down slope of the traditional makahiki grounds known a Naiwa (pers. comm. 1/20/2016). [McIntosh et al. 2019:103]

4.1.14 Shideler and Hammatt (2021)

CSH (Shideler and Hammatt 2021) carried out an archaeological field inspection and literature review for a prior DHHL Ho‘olehua Scattered Lots Subdivision project that included two widely separated lots (TMKs: [2] 5-2-005:031, Lot 17 and 5-2-026:014, Lot 104D-1). The TMK: (2) 5-2-026:014 parcel studied is in the immediate vicinity of the three lots presently addressed. No potential historic properties were identified at the more distant parcel (TMK: [2] 5-2-005:031). At the neighboring parcel field inspection identified two terrace alignments on the south side of a natural drainage swale. These short sections of boulder alignments were interpreted as agricultural features to retain moisture, perhaps of an exploratory nature. The potential for subsurface deposits associated with these two terrace alignments was evaluated in the field to be very low. The antiquity of these boulder alignments was uncertain; it was posited they could be pre-Contact but

might date to as late as the occupation of an adjacent abandoned house ca. 1980. No SIHP # was assigned.

4.2 Background Summary and Predictive Model

The three lots presently addressed are within DHHL lands on the northern plains of Pālā‘au Ahupua‘a. Historical anecdote and environmental data for this region indicate a possible substantial pre-Contact population (Fornander 1880; Summers 1971), which would have subsisted on dryland agriculture consisting mostly of sweet potatoes. According to Handy (1940:157),“in 1931 there were many flourishing patches on the Hawaiian homesteads at Hoolehua” and “Hoolehua and Palaau were noted for sweet potatoes in olden days.” However, Handy and Handy (1972:283) note homesteaders in Ho‘olehua were growing the sweet potatoes on land that had not been planted in ancient times.

The entirety of the three lots presently addressed appears to have been government-owned lands since the Māhele land divisions in 1848. In 1924, the Hawaiian Homes Commission expanded their homestead program to include 11,400 acres of Pālā‘au-Ho‘olehua. The current project area consists of three discrete lots for a total of 15.28 acres (6.18 hectares), a portion of these Pālā‘au-Ho‘olehua Homestead lands. Life on these lands involved dryland agriculture (including commercial pineapple cultivation) and some ranching.

Currently, the vicinity of the three lots presently addressed consists mostly of undeveloped DHHL parcels, of which only a few contain active residences.

No prior archaeological study has been conducted within the three lots presently addressed and although one recent archaeological study was adjacent to the north of the western project area (Pantaleo and Rotunno-Hazuka 2003), much of that project is understood to have been on-call monitoring. No historic properties have been identified within the project area or within approximately 500 m (see Figure 23).

Historic properties previously identified in the vicinity are limited to a few sites recorded by Summers (1971) including the legendary Kape‘elua Complex (SIHP # 50-60-03-00011). There appears to have been a locus of traditional Hawaiian activity in Anahaki Gulch 2.5 km west of the three lots presently addressed (see Figure 23) but this is suggested to relate to the micro-environment of that gulch and greater proximity to the coast.

Based on background research, cultural deposits and features related to historic homesteading (i.e., agricultural and/or habitation features) may be present at the three lots presently addressed. However, potential also exists for encountering evidence of pre-Contact and post-Contact land use such as ranching and commercial pineapple cultivation.

Section 5 Results of Field Work

Fieldwork was carried out at TMKs: (2) 5-2-026:003, 016, and 017 by CSH archaeologist David W. Shideler, M.A., on 19 December 2023. An archaeologist's track log and a key to the general location and direction of representative photographs is provided in Figure 24.

The project area was accessed via Pu‘u Kapele Avenue but when this dirt road ended it was determined that a nearby parallel road just to the north did indeed access the parcels. No potential historic properties were identified in the course of the fieldwork and none are believed to be present. Representative photographs are provided for each parcel.

For TMK: (2) 5-2-026:016 (the northern parcel fronting Pu‘u Kapele Avenue) representative photographs are supplied in Figure 25 through Figure 30. A modern home understood as the "Hill residence" (presently boarded up) is present in the northwest corner of the parcel (see Figure 29). This appears to be in relatively good condition but the interior was not observed. To the east of this residence are certain outbuildings (see Figure 27), with the more formal structure in a dilapidated state and a greenhouse-like structure in a state of total collapse.

The intermediate lot, TMK: (2) 5-2-026:003 is depicted in Figure 31 through Figure 34. This was the easiest parcel to traverse as mature *haole koa* provided for some clear ground.

Views of TMK: (2) 5-2-026:017 parcel are provided in Figure 35 through Figure 37.

The entire three-lot project area appeared to have been previously graded. No potential historic properties were observed. The potential for subsurface cultural deposits was evaluated for each lot and was regarded as uniformly low.

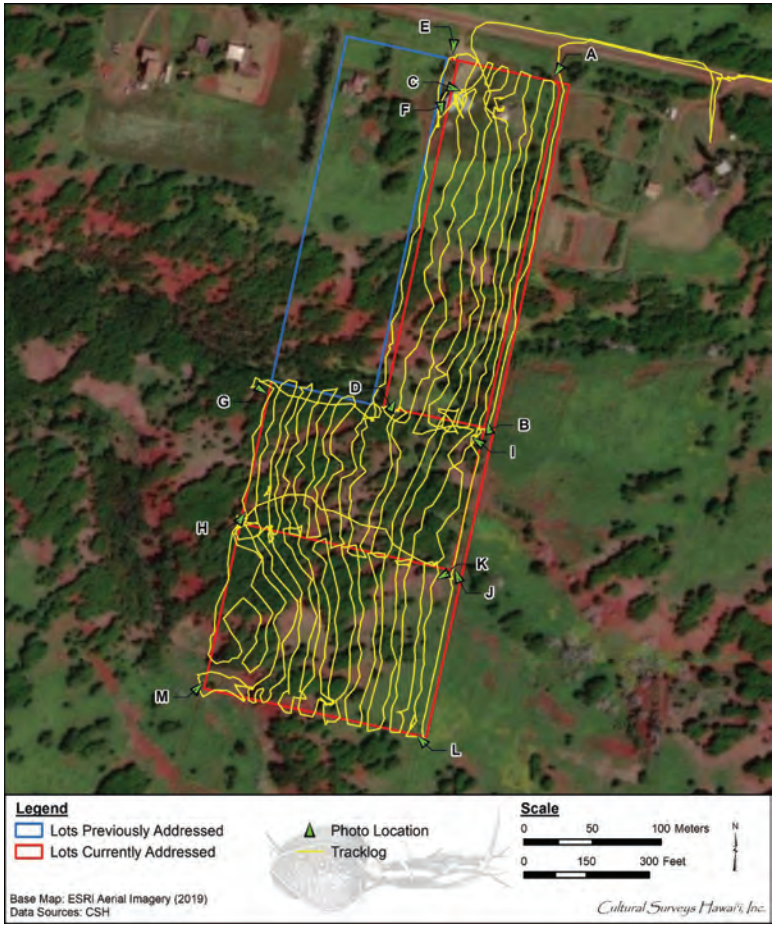


Figure 24. Overview showing tracklogs at the three DHHL Ho‘olehua Scattered Lots Subdivision and Improvements project parcels addressed in this study showing the general location and direction of the following representative photographs

Figure 25. Photo A: View from the northeast corner of TMK: (2) 5-2-026:016, view to southwest toward the center of the parcel

Figure 26. Photo B: View from the southeast corner of TMK: (2) 5-2-026:016, view to northwest toward the center of the parcel

Figure 27. Photo C: View of outbuildings from the main Hill Residence building, view to east

Figure 28. Photo D: View from the southwest corner of TMK: (2) 5-2-026:016, view to northeast toward the center of the parcel

Figure 29. Photo E: View from the northwest corner of TMK: (2) 5-2-026:016, view to southeast (dominated by the main Hill Residence) toward the center of the parcel

Figure 30. Photo F: View from the northern northwest side of TMK: (2) 5-2-026:016 (from just southwest of the Hill Residence) to southeast toward the center of the parcel

Figure 31. Photo G: View of TMK: (2) 5-2-026:003 parcel from the northwest corner, view to southeast toward the center of the parcel

Figure 32. Photo H: View of TMK: (2) 5-2-026:003 parcel from the southwest corner, view to northeast toward the center of the parcel

Figure 33. Photo I: View of TMK: (2) 5-2-026:003 parcel from the northeast corner, view to southwest toward the center of the parcel

Figure 34. Photo J: View of TMK: (2) 5-2-026:003 parcel from the southeast corner, view to northwest toward the center of the parcel

Figure 35. Photo K: View of TMK: (2) 5-2-026:017 parcel from the northeast corner, view to southwest toward the center of the parcel

Figure 36. Photo L: View of TMK: (2) 5-2-026:017 parcel from the southeast corner, view to northwest toward the center of the parcel

Figure 37. Photo M: View of TMK: (2) 5-2-026:017 parcel from the southwest corner, view to northeast toward the center of the parcel

Section 6 Summary and Recommendations

6.1 Summary

The three lots presently addressed are within DHHL lands on the northern plains of Pālā‘au Ahupua‘a. Historical anecdote and environmental data for this region indicate a possible substantial pre-Contact population (Fornander 1880; Summers 1971), which would have subsisted on dryland agriculture consisting mostly of sweet potatoes. According to Handy (1940:157), “in 1931 there were many flourishing patches on the Hawaiian homesteads at Hoolehua” and “Hoolehua and Palaau were noted for sweet potatoes in olden days.” However, Handy and Handy (1972:283) note homesteaders in Ho‘olehua were growing the sweet potatoes on land that had not been planted in ancient times.

The vicinity of the project area in central Moloka‘i has historically been an area conducive to military training activities. In the 1790s, Kamehameha I reportedly “drilled his warriors on the Hoolehua plain near where the airport is now” (Cooke 1949:112). These training grounds may have included the current project area. A civilian airfield was established in Ho‘olehua in 1919. In 1931, the U.S. Army Air Corps established a portion of this field as “Homestead Field” (Horvat 1966:38, 40–47). By the time the United States entered World War II in 1941, aircraft of the Fifth Bombardment Group were stationed at Homestead Field. A complex of World War II bunker sites was identified on the airport property well south of the present project areas in 1980 by AECOS Inc. (1980).

The three lots presently addressed appear to have been government-owned lands since the Māhele land divisions in 1848 (when Pālā‘au was “Crown lands” owned by Kamehameha III). In 1924, the Hawaiian Homes Commission expanded their homestead program to include 11,400 acres of Pālā‘au-Ho‘olehua.

No historic properties have been previously identified within the project areas or within 500 m. Historic properties previously identified in the vicinity are limited to a few sites recorded by Summers (1971), including the legendary Kape‘elua Complex (SIHP # 50-60-03-00011). There appears to have been a locus of traditional Hawaiian activity in Anahaki Gulch 3 kms northwest of the three-lot project area (see Figure 23) but this is suggested to relate to the micro-environment of that gulch and greater proximity to the coast.

The entirety of the three-lot project area appears to have been modified by grading to some extent associated with pasture improvement.

6.2 Recommendations

The results of this LRFI indicate there is no potential for archaeological historic properties in the three-lot project area.

This LRFI would support an HAR §13-275-7(a)(1) determination of “No historic properties affected.” In light of the SHPD §6E-8 Historic Preservation Review dated 16 February 2022, (Project No. 2021PR01540, Doc. No. 2201IK03, included here as Appendix A) that concurred with DHHL’s determination of “No historic properties affected” for the two lots previously studied, a determination of “No historic properties affected” would be appropriate for the five lots of the DHHL Ho‘olehua Scattered Lots Subdivision and Improvements project.

Section 7 References Cited

AECOS Inc.
1980 *Environmental Field Studies for the Moloka‘i Airport Master Plan.* AECOS, Inc., Kailua, Hawai‘i.

Akana, Francis
n.d. Legend of Pu‘u Pe‘elua (1938). (Ms. in possession of M.K. Pukui). In *Molokai a Site Survey*, Catherine C. Summers. Department of Anthropology, Bernice Pauahi Bishop Museum, Honolulu.

Andrews, Lorrin
1829 Tour Around Morokai. In *The Missionary Herald*, Vol XXV. No. 50 Cornhill Crocker & Brewster, Printers, Boston, Massachusetts.

Bonk, William
1954 Archaeological Excavations on West Molokai. Master of Arts Thesis, Department of Anthropology, University of Hawai‘i, Honolulu.

Carlson, Norman K.
1951 Grazing Land Problems, Molokai Island, Territory of Hawaii. *Hawaiian Agricultural Experiment Station Bulletin.*

Cartwright, Bruce
1922 Letter to Dr. C.M. Cooke, Jr., Apr 20. Bernice Pauahi Bishop Museum, Honolulu.

Chinen, Jon J.
1958 *The* Great *Mahele: Hawaii's Land Division of 1848*. University of Hawaii Press, Honolulu.

Cobb, John N.
1902 Commercial Fisheries of the Hawaiian Islands. In *U.S. Fish Commission Report for 1901* pp. 383–490. Government Printing Office, Washington.

Cooke, George Paul
1949 Moolelo O Molokai: A Ranch Story of Molokai. *Honolulu Star-Bulletin*, Honolulu.

Cooke Sophie J.
1964 *Sincerely, Sophie.* Tongg Publishing Company, Ltd. Honolulu.

de Loach, Lucille Fortunato
1975 Land and People on Molokai: An Overview. Master of Arts Thesis, University of Hawai‘i at Mānoa, Honolulu.

Dodge, F.S., C.J. Willis, and S.M. Kanakanui
1897 Molokai, 1:90000. Hawaiian Government Survey. Washington, D.C.

Environmental Impact Study Corp.
1981 *PROPOSED INDUSTRIAL SITE: BIOLOGICAL AND ARCHAEOLOGICAL EVALUATION Naiwa, Molokai, Hawaii.* Environment Impact Study Corp., Honolulu and Maui, Hawai‘i.

Emory, Kenneth, P.
n.d. Field Notebook (1922). Department of Anthropology, Bernice Pauahi Bishop Museum, Honolulu.

ESRI, Inc.
2013 Map Image Layer. Esri, Inc., Redlands, California.

Foote, Donald E., Elmer L. Hill, Sakuichi Nakamura, and Floyd Stephens
1972 *Soil Survey of Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii*. Soi Conservation Service, United States Department of Agriculture, Washington, D.C.

Fornander, Abraham
1880 *An Account of the Polynesian Race, its Origins and Migrations, and the Ancient History of the Hawaiian People to the Times of Kamehameha I*. 6 vols. Trubner & Company, London.

1916-1917 *Hawaiian Antiquities and Folk-Lore, The Hawaiian Account of the Formation of the Islands and Origin of their Race, with the Traditions of their Migrations, Etc., as Gathered from Original Sources*. Memoirs of the Bernice Pauahi Bishop Museum. Bishop Museum Press, Honolulu.

Giambelluca, Thomas W., Q. Chen, A.G. Frazier, J.P. Price, Y.L. Chen, P.S. Chu, J.K. Eischeid, and D.M. Delparte
2013 The Rainfall Atlas of Hawai‘i. In *Bull. Amer.Meteor. Soc.*, pp. 313–316. Vol. 94. University of Hawai‘i at Mānoa, Honolulu.

Griffin, Annie
1993 *Newly Identified Historic Site 60-02-995 Palaau Molokai TMK: 5-2-05:6 por.* State Historic Preservation Division, Department of Land and Natural Resources, State of Hawai‘i, Honolulu.

Griffith, E.M.
1902 *A Report of U.S. Forester E.M. Griffith on Hawaiian Forests.* Yokohama, Japan.

Hammatt, Hallett H.
2008 *Archaeological Literature Review and Field Check Study of Four DOE Schools, Island of Moloka‘i Hawai‘i Inter-Island DOE Cesspool Project.* Cultural Surveys Hawai‘i, Inc., Wailuku, Hawai‘i.

Hammatt, Hallett H., Tamara Craddock, and William H. Folk
1993 *Archaeological Inventory Survey of Three 15-Acre Parcels in the Ahupua'a of Pala'au and Na'iwa, Island of Moloka'i (TMK 5-2-11:por.29; TMK 5-2-11:por.12; TMK 5-2-04:por.84)*. Cultural Surveys Hawai‘i, Kailua, Hawai‘i.

Handy, E.S. Craighill
1940 *The Hawaiian Planter*. Bishop Museum Bulletin Volume 1, No. 161. Bernice Pauahi Bishop Museum, Honolulu.

Handy, E.S. Craighill, and Elizabeth G. Handy
1972 *Native Planters in Old Hawaii: Their Life, Lore, and Environment*. Bishop Museum Bulletin 233. Bishop Museum Press, Honolulu.

Handy, E.S. Craighill, Elizabeth Green Handy, and Mary Kawena Pukui
1991 *Native Planters in Old Hawaii: Their Life, Lore, and Environment*. Revised edition. Bishop Museum Bulletin 233. Bishop Museum Press, Honolulu.

Handy, Willowdean Chatterson
1922 *Tattooing in the Marquesas*. Bishop Museum Bulletin I, Bayard Dominick Expedition, Publication Number 3. Bernice Pauahi Bishop Museum, Honolulu.

Hartzell, Leslie L.
2000 *Pu‘u Kapele Rock Wall Complex: Supplemental Archaeological Inventory Survey at the USAF Molokai Receiver Station, Island of Moloka‘i, Maui County, Hawai’i (TMK: 5-2-06:63, 69).* Department of Anthropology, Bernice Pauahi Bishop Museum, Honolulu.

Hawaii TMK Service
2023 Tax Map Key (2) 5-2-005, 007, and 026. Hawai‘i TMK Service, Honolulu.

Henke, L.A.
1929 A Survey of Livestock in Hawaii. In *University of Hawaii Research Publication No. 5*, pp. 82. University of Hawai‘i, Honolulu.

Honolulu Advertiser
1944a Molokai May Yield 1200 Tons of Corn if Conditions are O.K. *Honolulu Advertiser* 25 April.

1944b "Fair" Corn Crop Seen For Molokai By Julian Yates. *Honolulu Advertiser* 14 July.

Honolulu Star-Bulletin
1922 Molokai Corn. *Honolulu Star-Bulletin* 7 November.

Horvat, William J.
1966 *Above the Pacific*. AERO Publishers, Inc., Fallbrook, California.

Jenkins, John S.
1850 *Voyage of the U.S. Exploring Squadron Commanded by Captain Charles Wilkes*. James M. Alden, New York.

Judd, Gerrit P.
1936 *Puleoo, The Story of Molokai.* Honolulu.

Kamakau, Samuel Mānaiakalani
1992a *Ka Po‘e Kahiko: The People of Old*. Bishop Museum Press, Honolulu.

1992b *Ruling Chiefs of Hawaii*. Revised edition. Kamehameha Schools Press, Honolulu.

Keesing, Felix Maxwell
1936 *Hawaiian homesteading on Molokai*. Research publications, Vol. no. 12. University of Hawai‘i, Honolulu.

Kuykendall, R.S.
1953 *The Hawaiian Kingdom: 1854-1874*. University of Hawaii Press, Honolulu.

Larsen, Jack L. and Thomas A. Marks
2010 *Hawaiian Pineapple Entrepreneurs*. Creative Company, Sheridan, Oregon.

Lee-Greig, Tanya and Hallett H. Hammatt
2008 *Archaeological Monitoring Plan for Three Schools within the Molokai School Complex Hawaii Inter-Island DOE Cesspool Project (TMK [2] 5-3-002:052; 5-6-02: 008; 5-2-013:027).* Cultural Surveys Hawaii, Inc., Kailua, Hawai‘i.

Lynch, Russ
1968 An Iowa corn farmer on Molokai. *Honolulu Star-Bulletin,* 5 October.

MacDonald, Gordon A., Agatin T. Abbot, and Frank L. Peterson
1990 *Volcanoes in the Sea: The Geology of Hawaii*. Second edition. University of Hawaii Press, Honolulu.

Magin, Janis L.
2017 Hawaii's Molokai Ranch on the market for $260M. *Pacific Business News,* 7 September.

Major, Maurice and Boyd Dixon
1994 *A Final Technical Report, Archaeological Survey and Evaluation, USAF Receiver Station, Ho‘olehua, Moloka‘i, Maui County Hawai‘i.* Department of Anthropology, Bernice Pauahi Bishop Museum, Honolulu.

Mangieri, Gina
2019 *Molokai Ranch sale has community talking public, private options.* Nexstar Broadcasting, Inc.

Martel, Thomas III, Trevor Yucha, and Hallett H. Hammatt
2021 *Archaeological Literature Review and Field Inspection Report for the Department of Hawaiian Homelands Nā‘iwa Agricultural Subdivision Project, Pala‘au and Ho‘olehua Ahupua‘a, Moloka‘i District, Moloka‘i Island, TMKs: [2] 5-2-003:001, 5-3-004:001, 002, 004, 007, and 046.* Cultural Surveys Hawai‘i, Inc., Kailua, Hawai‘i.

Maui News
1926 *Maui News Industrial Edition* 4 December. Wailuku, Hawai‘i.

1939 Molokai Hi Grows from Tiny School. *Maui News* 11 October. Wailuku, Hawai‘i.

1940 School Is Center For Ag Training. *Maui News* 30 March. Wailuku, Hawai‘i.

1948 Pine Co-op Plan Works On Molokai. *Maui News* 6 October. Wailuku, Hawai‘i.

1950 Hoolehua Is Selected As School Site. *Maui News* 22 July. Wailuku, Hawai‘i.

McGregor, Davianna Pomaikai, Ph.D.
1990 Aina hoopulapula: Hawaiian Homesteading. *The Hawaiian Journal of History* 24.

McIntosh, James D., Caleb C. Fechner, and Paul L. Cleghorn
2019 *Archaeological Inventory Survey for the Proposed Improvements to the Department Of Hawaiian Home Lands Water System on Moloka‘i Lands in Pala‘au, Ho‘olehua, Na‘iwa,* Kahanui, *and Kalama‘ula Ahupua‘a Kona District, Island Of Moloka‘i*. Pacific Legacy, Inc., Kailua, Hawai’i.

Menzies, Archibald
1920 *Hawaii Nei 128 Years Ago*. Unknown publisher.

Monsarrat, M.D.
1886 Registered Map 1288. Hawai‘i Land Survey Division, Department of Accounting and General Services, Honolulu. Available online at http://dags.hawaii.gov/survey/search.php

Morse, Gordon
1953 Kamaiana Naturalist Recalls: Brackish Water, Old Heiau, Had Part In Molokai Sugar Failure. *Honolulu Advertiser*.

Nagahara, Valerie and Michael Kolb
1994 *Field Inspection and Location of Site 50-60-03-11, Kape' elua Complex Hoolehua, Molokai (TMK 5-2-23:30)*. State of Hawai‘i, State Historic Preservation Division, Honolulu.

Ne, Harriet, Gloria L. Cronin, and Terry Reffell
1992 *Tales of Molokai: The Voice of Harriet Ne*. Institute for Polynesian Studies, Lāi‘e, Hawai‘i.

Neller, Earl (Buddy)
1982 *An Archaeological Reconnaissance of Proposed Marine Corps Training Areas on Molokai: Palaau (Hoolehua), Kalamaula, and Kaapakea, and Kaapakea-Kamiloloa, TMK: 5-2 var, 5-3 var, and 5-4 var*. State Historic Preservation Division, Department of Land and Natural Resources, Honolulu.

Pantaleo, Jeffrey
2004 *Addendum Archaeological Monitoring Report for the Sandwich Isles Communications, Inc.* Phase *II Moloka‘i Rural Fiber Optics Duct Line TMK S-2-03, 04, 06,07, 15, 17, 21, 22,23 Naiwa and Palaau Ahupua‘a Island of Molokai*. Archaeological Services Hawaii, LLC, Honolulu.

Pantaleo, Jeffrey and Lisa Rotunno-Hazuka
2003 *Archaeological Monitoring Report for the Sandwich Isles Communications, Inc. Moloka‘i Rural Fiber Optics Duct Lines Hoolehua 2, Naiw A 1, Kalama‘ula Ahupua‘a Moloka‘i Island, State Of Hawaii (Tmk 5-2-04,07)*. Archaeological Services Hawaii, LLC, Wailuku, Hawai‘i.

Pfennig, Kelene, Kimberly M. Mooney, Elizabeth L. Kahahane, and Paul L. Cleghorn
2011 *Literature Review of Previous Archaeological Work within 8,955 Acres Owned by the Department of Hawaiian Home Lands on the Island of Moloka‘i*. Pacific Legacy, Inc., Kailua Hawai‘i.

Phelps, S.
1937 *A Regional Study of Molokai*. On file at Bernice Pauahi Bishop Museum Archives, Honolulu.

Pukui, Mary Kawena
1983 *‘Olelo no‘eau : Hawaiian Proverbs & Poetical Sayings*. Bishop Museum Special Publication No. 71. Bishop Museum Press, Honolulu.

Pukui, Mary Kawena, Samuel H. Elbert, and Esther T. Mookini
1974 *Place Names of Hawaii*. Revised and enlarged edition. University of Hawaii Press, Honolulu.

Roll, Warren
1968 Where the Tall Corn Grows. *Honolulu Star-Bulletin*.

Shideler, David W. and Hallett H. Hammatt
2021 *Archaeological Field Inspection and Literature Review to Support Consultation with SHPD for the Department of Hawaiian Home Lands Ho‘olehua Scattered Lots Subdivision and Improvements Project, Pālā‘au Ahupua‘a, Moloka‘i District, Moloka‘i Island,TMKs: [2] 5-2-005:031, Lot 17 and [2] 5-2-026:014, Lot 104D-1*. Cultural Surveys Hawai‘i, Inc., Kailua, Hawai‘i.

State of Hawai‘i
2008 Molokai Airport. State of Hawai‘i website: http://hawaii.gov/hawaiiaviation/hawaii-airfields-airports/molokai/molokai-airport (accessed 2008).

Stearns, Harold T. and Gordon A. Macdonald
1947 *Geology and Ground-Water Resources of the Island of Molokai, Hawaii*. Vol. Bulletin 11. U.S. Geological Survey, United States Department of the Interior, Honolulu.

Stokes, John F.G.
1909 Heiaus of Molokai, Molokai Survey Field Note Book, Honolulu.

Strazar, Marie D.
2000 *Moloka‘i in History: A Guide to the Resources*. History and Humanities Program of the Hawai‘i State Foundation on Culture and the Arts, Honolulu.

Summers, Catherine C.
1971 *Molokai: A Site Survey*. Department of Anthropology, Bernice Pauahi Bishop Museum, Honolulu.

Thrum, Thomas G.
1908 Tales from the Temples. In *Hawaiian Alamanac and Annual for 1909 The Reference Book of Information and Statistics Relating to the Territory of Hawaii, of Value to Merchants, Tourists and Others.* Thos. G. Thrum, Honolulu.

Tomich, Prosper Quentin
1986 *Mammals in Hawaii: A Synopsis and Notational Bibliography*. Second edition. Bishop Museum Press, Honolulu.

Tomonari-Tuggle, M.J.
1990 *Archaeological Inventory Survey of a Portion of Kalama‘ula. Island of Moloka‘i*. International Archaeological Research Institute, Inc., Honolulu.

USDA (U.S. Department of Agriculture, Natural Resources Conservation Service)
2006 Soil Survey Geographic (SSURGO) database for Island of Molokai, Hawaii (hi980). U.S. Department of Agriculture, Natural Resources Conservation Service.

USGS (U.S. Geological Survey)
1922 Kualapuu USGS 7.5-minute topographic quadrangle. USGS Information Services, Denver, Colorado.

1950 USGS aerial photograph of Molokai. USGS Information Services, Denver, Colorado.

1952 Kaunakakai and Molokai Airport USGS 7.5-minute topographic quadrangles. USGS Information Services, Denver, Colorado.

1964 USGS aerial photograph of Molokai. USGS Information Services, Denver, Colorado.

1967 Kaunakakai USGS 7.5-minute topographic quadrangle. USGS Information Services, Denver, Colorado.

1968 Molokai Airport USGS 7.5-minute topographic quadrangle. USGS Information Services, Denver, Colorado.

1983 Molokai West USGS 7.5-minute topographic quadrangle. USGS Information Services, Denver, Colorado.

1993 Kaunakakai and Molokai Airport USGS 7.5-minute topographic quadrangles. USGS Information Services, Denver, Colorado.

Vancouver, George

1798 *A Voyage of Discovery to the North Pacific Ocean, and Round the World; in Which the Coast of North-West America Has Been Carefully Examined and Accurately Surveyed. Undertaken by His Majesty's Command, Principally with a View to Ascertain the Existence of Any Navigable* Communication *between the North Pacific and North Atlantic Oceans; and Performed in the Years 1790, 1791, 1792, 1793, 1794, and 1795, in the "Discovery" Sloop of War, and Armed Tender "Chatham*. Three vols. G. G. & J. Robinson, Paternaster Row; and J. Edwards, Pall-Mall., London.

Waihona ‘Aina

2021 Mahele Database. Waihona ‘Aina Corporation.

Westervelt, W.D.

1916 *Hawaiian Legends of Volcanoes*. George H. Ellis Press, Boston, Massachussetts.

Wiebke, Henry

1940 History Of Agriculture On Molokai Is Presented. *Maui News* 30 March. Wailuku, Hawai‘i.

Young, Charles C.

1961 Molokai Electric's George Will Has Guided Firm Since Inception. *Honolulu Star-Bulletin.* Honolulu.

Appendix A SHPD Review of Two "Scattered Lots" TMK: (2) 5-2-005:031 por. and (2) 5-2-026:014

DAVID Y. IGE
GOVERNOR OF
HAWAII

SUZANNE D. CASE
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

ROBERT K. MASUDA
FIRST DEPUTY

M. KALEO MANUEL
DEPUTY DIRECTOR - WATER

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
BUREAU OF CONVEYANCES
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND COASTAL LANDS
CONSERVATION AND RESOURCES ENFORCEMENT
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
STATE HISTORIC PRESERVATION DIVISION
KAKUHIHEWA BUILDING
601 KAMOKILA BLVD., STE 555
KAPOLEI, HI 96707

February 16, 2022

IN REPLY REFER TO:
Project No. 2021PR01540
Doc. No. 2201IK03
Archaeology

William J. Ailā Jr., Chairman
State of Hawaii
Department of Hawaiian Home Lands (DHHL)
P.O. Box 1879
Honolulu, HI 96805
c/o james.e.richardson@hawaii.gov

Dear William J. Ailā Jr.:

SUBJECT: **Chapter 6E-8 Historic Preservation Review –**
DHHL Request for Determination
Ho‘olehua Scattered Lots Subdivision and Improvements Projects
Pālā‘au Ahupua‘a, Kona District, Island of Moloka‘i
TMK: (2) 5-2-005:031 por. and (2) 5-2-026:014

This letter provides the State Historic Preservation Division's (SHPD's) review of the DHHL Ho'olehua Scattered Lots Subdivision and Improvements Projects. SHPD received the submittal on December 8, 2021, including a DHHL letter requesting SHPD's concurrence with a Chapter 6E-8 project effect determination of "Effect, with proposed mitigation commitments" for the proposed project, an HRS 6E Submittal Form, Cultural Surveys Hawaii, Inc. (CSH) cover letters, and a literature review field inspection (LRFI) report titled, *Archaeological Field Inspection and Literature Review to Support Consultation with SHPD for the Department of Hawaiian Home Lands Ho'olehua Scattered Lots Subdivision and Improvements Project...* (Shideler and Hammatt, November 2021). Subsequently, SHPD received a CSH letter on February 11, 2022 (Submission No. 2021PR01540.002) and a DHHL letter with a revised project effect determination of "No historic properties affected" on February 16, 2022 (Submission No. 2021PR01540.003)

The DHHL proposes to construct infrastructure improvements, including clearing, grading, and installation of roadway, electrical, domestic water, and irrigation water utilities. The proposed plan calls for ground-disturbing activities confined to the two subject parcels. However, it will extend to existing roadways for access and connection to utilities. These improvements will support DHHL beneficiaries by providing essential services necessary for agricultural homesteading. While installation of wastewater treatment systems will be the responsibility of the lessee, the environmental impacts are being considered as part of this action. The project area consists of two discontinuous areas totaling 36.4 acres located within the Ho'olehua Scattered Lots Subdivision.

CSH produced the subject LRFI (Shideler and Hammatt, November 2021) in support of the proposed DHHL project. The LRFI includes a project history, background research, previous archaeological research, and results of the field inspection. The LRFI conducted a 100% pedestrian survey of the project area with transects spaced at 15-meter intervals. Two terrace alignments were documented as well as an abandoned house structure and a pile of lumber. The historic properties were documented within Lot 104D-1 [TMK: (2) 5-2-026:014], situated on the southside of a drainage swale parallel to an ill-defined flow channel. Shideler and Hammatt (November 2021) assessed the sites' function to retain the slope of a small drainage swale for plant propagation. The LRFI report indicates the age of the two features' is indeterminate and contains a very low probability of any related cultural or agricultural subsurface deposits. No significance assessments are provided in the LRFI report. However, Shideler and Hammatt (November 2021) made a project effect determination of "Effect with proposed mitigation commitments" with the proposed mitigation in the form of preservation through avoidance. Furthermore, the report

William J. Aila Jr.
02/16/22
Page 2

stipulates that due to the uncertainty over the antiquity of these features and their modest nature, no further data can be gained by preparing a formal preservation plan to address them. The report indicates that SHPD shall be consulted to determine the future course of action.

Subsequently, SHPD consulted with CSH (Susan Lebo and 'Iolani Kauhane [SHPD] to David Shideler [CSH]) on February 10, 2022, regarding the two alignment features. During consultation, it was agreed that the features contain a very low probability of collecting additional data to determine the features' antiquity and to assess the features' significance. SHPD received an email from DHHL on February 15, 2022 (Bryan Toda [DHHL] to Dr. Susan Lebo [SHPD]) requesting SHPD's concurrence with a revised project effect determination of "No historic properties affected" for the proposed project.

Per HAR §13-275-7, the project will have no effect on significant historic properties, and therefore, **SHPD concurs** with DHHL's determination of "No historic properties affected" for the current project. 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. The HRS 6E historic preservation review process is ended. The project initiation process may proceed.

Please attach to plans: In the unlikely event that subsurface historic resources, including human skeletal remains, structural remains, cultural deposits, artifacts, sand deposits, or sink holes are identified during the demolition and/or construction work, cease work in the immediate vicinity of the find, protect the find from additional disturbance, and contact the State Historic Preservation Division, at (808) 652-1510.

Please contact 'Iolani Kauhane, Historic Preservation Archaeologist III, at Iolani.Kauhane@hawaii.gov for matters regarding archaeological resources or this letter.

Aloha,
Alan Downer

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

cc: Bryan Esmeralda, bryan@munekiyohiraga.com
David Shideler, submittals@culturalsurveys.com
Stewart Matsunaga, stewart.t.matsunaga@hawaii.gov
Emily Murai, emily@munekiyohiraga.com
Bryan Toda, bryan.toda@hawaii.gov

STATE HISTORIC PRESERVATION DIVISION CHAPTER 6E DETERMINATION LETTER

APPENDIX

E-2

DAVID Y. IGE
GOVERNOR OF
HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

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

SUZANNE D. CASE
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

ROBERT K. MASUDA
FIRST DEPUTY

M. KALEO MANUEL
DEPUTY DIRECTOR - WATER

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
BUREAU OF CONVEYANCES
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND COASTAL LANDS
CONSERVATION AND RESOURCES ENFORCEMENT
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

February 16, 2022

IN REPLY REFER TO:
Project No. 2021PR01540
Doc. No. 2201IK03
Archaeology

William J. Ailā Jr., Chairman
State of Hawaii
Department of Hawaiian Home Lands (DHHL)
P.O. Box 1879
Honolulu, HI 96805
c/o james.c.richardson@hawaii.gov

Dear William J. Ailā Jr.:

SUBJECT: **Chapter 6E-8 Historic Preservation Review –**
DHHL Request for Determination
Hoʻolehua Scattered Lots Subdivision and Improvements Projects
Pālāʻau Ahupuaʻa, Kona District, Island of Molokaʻi
TMK: (2) 5-2-005:031 por. and (2) 5-2-026:014

This letter provides the State Historic Preservation Division's (SHPD's) review of the DHHL Hoʻolehua Scattered Lots Subdivision and Improvements Projects. SHPD received the submittal on December 8, 2021, including a DHHL letter requesting SHPD's concurrence with a Chapter 6E-8 project effect determination of "Effect, with proposed mitigation commitments" for the proposed project, an HRS 6E Submittal Form, Cultural Surveys Hawaii, Inc. (CSH) cover letters, and a literature review field inspection (LRFI) report titled, *Archaeological Field Inspection and Literature Review to Support Consultation with SHPD for the Department of Hawaiian Home Lands Hoʻolehua Scattered Lots Subdivision and Improvements Project…* (Shideler and Hammatt, November 2021). Subsequently, SHPD received a CSH letter on February 11, 2022 (Submission No. 2021PR01540.002) and a DHHL letter with a revised project effect determination of "No historic properties affected" on February 16, 2022 (Submission No. 2021PR01540.003)

The DHHL proposes to construct infrastructure improvements, including clearing, grading, and installation of roadway, electrical, domestic water, and irrigation water utilities. The proposed plan calls for ground-disturbing activities confined to the two subject parcels. However, it will extend to existing roadways for access and connection to utilities. These improvements will support DHHL beneficiaries by providing essential services necessary for agricultural homesteading. While installation of wastewater treatment systems will be the responsibility of the lessee, the environmental impacts are being considered as part of this action. The project area consists of two discontinuous areas totaling 36.4 acres located within the Hoʻolehua Scattered Lots Subdivision.

CSH produced the subject LRFI (Shideler and Hammatt, November 2021) in support of the proposed DHHL project. The LRFI includes a project history, background research, previous archaeological research, and results of the field inspection. The LRFI conducted a 100% pedestrian survey of the project area with transects spaced at 15-meter intervals. Two terrace alignments were documented as well as an abandoned house structure and a pile of lumber. The historic properties were documented within Lot 104D-1 [TMK: (2) 5-2-026:014], situated on the southside of a drainage swale parallel to an ill-defined flow channel. Shideler and Hammatt (November 2021) assessed the sites' function to retain the slope of a small drainage swale for plant propagation. The LRFI report indicates the age of the two features' is indeterminate and contains a very low probability of any related cultural or agricultural subsurface deposits. No significance assessments are provided in the LRFI report. However, Shideler and Hammatt (November 2021) made a project effect determination of "Effect with proposed mitigation commitments" with the proposed mitigation in the form of preservation through avoidance. Furthermore, the report

stipulates that due to the uncertainty over the antiquity of these features and their modest nature, no further data can be gained by preparing a formal preservation plan to address them. The report indicates that SHPD shall be consulted to determine the future course of action.

Subsequently, SHPD consulted with CSH (Susan Lebo and ʻIolani Kauhane [SHPD] to David Shideler [CSH]) on February 10, 2022, regarding the two alignment features. During consultation, it was agreed that the features contain a very low probability of collecting additional data to determine the features' antiquity and to assess the features' significance. SHPD received an email from DHHL on February 15, 2022 (Bryan Toda [DHHL] to Dr. Susan Lebo [SHPD]) requesting SHPD's concurrence with a revised project effect determination of "No historic properties affected" for the proposed project.

Per HAR §13-275-7, the project will have no effect on significant historic properties, and therefore, **SHPD concurs** with DHHL's determination of "No historic properties affected" for the current project. 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. The HRS 6E historic preservation review process is ended. The project initiation process may proceed.

Please attach to plans: In the unlikely event that subsurface historic resources, including human skeletal remains, structural remains, cultural deposits, artifacts, sand deposits, or sink holes are identified during the demolition and/or construction work, cease work in the immediate vicinity of the find, protect the find from additional disturbance, and contact the State Historic Preservation Division, at (808) 652-1510.

Please contact ʻIolani Kauhane, Historic Preservation Archaeologist III, at Iolani.Kauhane@hawaii.gov for matters regarding archaeological resources or this letter.

Aloha,
Alan Downer

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

cc: Bryan Esmeralda, bryan@munekiyohiraga.com
David Shideler, submittals@culturalsurveys.com
Stewart Matsunaga, stewart.t.matsunaga@hawaii.gov
Emily Murai, emily@munekiyohiraga.com
Bryan Toda, bryan.toda@hawaii.gov

CULTURAL IMPACT ASSESSMENT REPORT

APPENDIX

F-1

Cultural Impact Assessment for the Department of Hawaiian Home Lands Hoʻolehua Scattered Lots Subdivision and Improvements Project, Pālāʻau Ahupuaʻa, Molokaʻi District, Molokaʻi Island

TMKs: (2) 5-2-005:031 and 5-2-026:014

Prepared for
Munekiyo Hiraga
on behalf of the
Department of Hawaiian Home Lands

Prepared by
Kamuela Kaapana,
Kellen Tanaka, B.S.,
and
Hallett H. Hammatt, Ph.D.

Cultural Surveys Hawaiʻi, Inc.
Kailua, Hawaiʻi
(Job Code: PALAAU 11)

September 2023

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 for the Department of Hawaiian Home Lands Hoʻolehua Scattered Lots Subdivision and Improvements Project, Pālāʻau Ahupuaʻa, Molokaʻi District, Molokaʻi Island, TMKs: (2) 5-2-005:031 and 5-2-026:014 (Kaapana et al. 2023)
Date	September 2023
Project Number(s)	Cultural Surveys Hawaiʻi, Inc. (CSH) Job Code: PALAAU 11
Agencies	State Office of Planning and Sustainable Development (OPSD), Environmental Review Program (ERP)
Land Jurisdiction	Department of Hawaiian Home Lands (DHHL)
Project Location	The assessed area includes two discrete parcels, a western TMK: (2) 5-2-005:031, Parcel 31 (31.7 acres or 12.8 hectares), and an eastern TMK: (2) 5-2-026:014, Parcel 14 (4.7 acres or 1.9 hectares) for a total area of 36.4 acres (14.7 hectares). Two (2) of the scattered lots subdivision project area parcels are within the Hoʻolehua-Pālāʻau Hawaiian Homesteads, and are located northwest and north from Molokaʻi Airport. Parcel 31 is bound by Farrington Avenue (a dirt road) on the north and Moʻomomi Avenue (a dirt road) on the south. Parcel 14 is on the south side of Puʻu Kapele Avenue (a dirt road). The project area is depicted on a portion of the 1993 Molokai Airport and Kaunakakai U.S. Geological Survey (USGS) 7.5-minute topographic quadrangles and many other figures.
Project Description	DHHL proposes to construct infrastructure improvements including clearing, grading, and installation of roadway, electrical, and water irrigation utilities. The proposed plan calls for ground-disturbance activities to be confined to the two subject parcels, but will extend to existing roadways for access and connection for utilities. These improvements will support DHHL beneficiaries through the provision of essential services necessary for agricultural homesteading. While installation of wastewater treatment systems will be the responsibility of the lessee, the environmental impacts are being considered as part of this action.
Project Acreage	The project parcel size is as follows: The western TMK: (2) 5-2-005:031 parcel is 31.7 acres (12.8 hectare). The eastern TMK: (2) 5-2-026:014 parcel is 4.7 acres (1.9 hectare). The total project area included in this report is 36.4 acres (14.7 hectare).
Document Purpose and Regulatory Context	This cultural impact assessment (CIA) supports compliance for the Department of Hawaiian Home Lands Hoʻolehua Scattered Lots Subdivision and Improvements project with: • The mandate set forth by the Hawaiʻi State Constitution (Articles IX and XII), courts, Hawaiʻi 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); • and 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 in order 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).
Results of Background Research	Background research for the proposed project yielded the following information: 1. Traditionally, Moloka‘i was divided into two *moku*, or districts: Kona and Ko‘olau. In 1859, the traditional *moku* of Kona and Ko‘olau were dropped and the island as a whole was referred to as the Moloka‘i district. In 1909, the island was again divided into two districts: Kalawao District, containing the lands of Kalaupapa, Kalawao, and Waikolu, and Moloka‘i District, comprising the remainder of the island (Coulters in Summers 1971:2), including the current project area. 2. The winds of Pālā‘au are Ho‘olua, Moa‘e, Ka‘ele, and Haualialia (*Ka Hae Hawaii* 1861; Nakuina 1995:64). The rain of the area is known as Nāulu (Akana and Gonzalez 2015:175). 3. The prominent *ka‘ao* (legends) of Pāka‘a and Kū-a-Pāka‘a originates from Moloka‘i (Handy 1922:76). Chief Ho‘olehua

	was married to ‘Īloli and they had a daughter named Hikauhi, who later became wife of Pāka‘a and mother of Kū-a-Pāka‘a, the caretakers of the wind gourd of La‘amaomao (Nakuina 1992:29–30). 4. Pu‘u Pe‘elua, or Caterpillar Hill, is located in Ho‘olehua and named after the *pe‘elua* (caterpillar). This *pe‘elua* was a *kupua* (demigod), who took the form of a caterpillar in the day and a handsome man at night. The *pe‘elua* became an *‘aumakua* (family or personal gods, deified ancestors) for the district of Ho‘olehua (Ne et al. 1992:49–50). 5. Four *heiau* (pre-Contact place of worship) were recorded in the Pālā‘au and Ho‘olehua Ahupua‘a including Lepekaheo Heiau and three unnamed *heiau* (Summers 1971:37–38). 6. Historical anecdote and environmental data for this region indicate a possible substantial pre-Contact population (Fornander 1880; Summers 1971), which would have subsisted on dryland agriculture consisting mostly of sweet potatoes. 7. Historic properties previously identified in the vicinity are limited to a few sites recorded by Summers (1971), including the legendary Kape‘elua Complex (State Inventory of Historic Places [SIHP] # 50-60-03-00011). There appears to have been a locus of traditional Hawaiian activity in Anahaki Gulch north of the western project area but this is suggested to relate to the micro-environment of that gulch and greater proximity to the coast. 8. In the 1790s, Kamehameha I reportedly “drilled his warriors on the Hoolehua plain near where the airport is now” (Cooke 1949:112). These training grounds may have included the current project area. 9. Following the Māhele in 1848, the entire *ahupua‘a* (traditional land division usually extending from the mountains to the sea) of Ho‘olehua was given to the government, and all of Pālā‘au Ahupua‘a (including the western and central project areas) was “Crown lands” owned by Kamehameha III (Dodge et al. 1897). 10. Cattle were introduced to Moloka‘i in the 1840s (De Loach 1975:68). In the second half of the nineteenth century, cattle, sheep and goat ranching expanded greatly. By 1866, there were “2,586 head of cattle, 13,332 sheep and 196 goats on the island” (de Loach 1975:86). 11. Molokai Ranch was formed in 1897 when a *hui* (group) of investors purchased approximately 70,000 acres of central and western holdings from the Bishop Estate (Cooke 1949; Stearns

	and Macdonald 1947). By 1905, the ranch had transitioned from an open country system to the paddock system (Henke 1929). The western and eastern project areas are within the Momomi Paddock. In the 1920s, Molokai Ranch lands consisted of about 10,000 acres leased for pineapple cultivation, 8,000 acres of forest reserves, and 50,000 acres utilized for ranching (Henke 1929:52). Cattle ranching remains an important industry on Moloka‘i. 12. In 1920, the U.S. Congress passed the Hawaiian Homes Commission Act to administer and manage some 200,000 acres of land that belonged to the government of the Kingdom of Hawai‘i or was recognized as Crown lands. The following year, the program began attracting people to Moloka‘i. Overall, the program succeeded and was expanded to include 11,400 acres of Pālā‘au-Ho‘olehua beginning in 1924. Parcels 31 and 14 consists of approximately 36.4 acres (14.7 hectares) of these Pālā‘au-Ho‘olehua Homestead lands and includes Lots 17 and 104D-1. 13. The Moloka‘i homestead program initially was impacted by many problems, including drought and high winds (McGregor 1990:37–38). Despite such difficulties, people managed to cultivate their plots (McGregor 1990:37–38). Farming was diversified and successful crops included corn, watermelons, cucumbers, sweet potatoes, eggplant, and papaya (Keesing 1936; Wiebke 1940). In addition to agricultural pursuits, the Hawaiian Homes Commission encouraged raising livestock and ranching. Raising pigs brought the most revenue and economic value; however, a few families sold eggs and every family owned some cattle (Keesing 1936). 14. According to Handy (1940:157), “in 1931 there were many flourishing patches on the Hawaiian homesteads at Hoolehua” and “Hoolehua and Palaau were noted for sweet potatoes in olden days.” However, Handy and Handy (1972:283) note homesteaders in Ho‘olehua were growing the sweet potatoes on land that had not been planted in ancient times. 15. A civilian airfield was established in Ho‘olehua in 1919. In 1931, the U.S. Army Air Corps established a portion of this field as “Homestead Field” (Horvat 1966:38, 40–47). By the time the United States entered World War II in 1941, aircraft of the Fifth Bombardment Group were stationed at Homestead Field. A complex of World War II bunker sites were identified on the

	airport property well south of the present project areas in 1980 by AECOS Inc. (1980).
Results of Community Consultation	CSH attempted to contact Native Hawaiian Organizations (NHO), agencies, and community members as well as cultural and lineal descendants in order to identify individuals with cultural expertise and/or knowledge of the project area and vicinity. Community outreach letters were sent to 20 individuals or groups; eight (8) responded, and three (3) 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. Kilia Purdy-Avelino and Justin Avelino, *kama‘āina* of Ho‘olehua 2. Malia Lani Forbes Greaney, *kama‘āina* of Pālā‘au
Identification of Cultural Practices	Consultation identified the following cultural, historical, and natural resources where cultural practices (including traditional and customary Native Hawaiian rights) are being exercised in Pālā‘au Ahupua‘a: 1. Agricultural and gathering practices 2. Marine resources 3. *Mo‘olelo* (stories) and *wahi pana* (storied places) 4. Recreational activities 5. Healing practices 6. Religious activities 7. Burial practices CSH has determined that no ongoing cultural practices were identified within the project area during community consultation, however, the project area is also located in the general vicinity of ongoing cultural practices such as agricultural and gathering activities, ceremonial purposes, and traditional burial practices.
Identification of Impacts to Cultural Practices	No impacts to ongoing cultural practices were identified within the project area during community consultation for this CIA. Consultation identified a number of concerns related to the environment and the broader community: 1. Availability of water 2. Soil quality 3. Impacts to *‘uhane* (spirits) and *‘iwi kūpuna* (ancestral remains) 4. Impacts to *wahi pana*
Mitigation Possibilities Identified During Background Research and Consultation	The results of community consultation, underscored by background research conducted for this CIA, inform the following mitigation possibilities promoting and preserving cultural beliefs, practices, and resources of Native Hawaiians and other ethnic groups:

	1. Mrs. Purdy-Avelino expressed concerns for sacred sites located in the vicinity of the project area. She supports the development of more homestead lots for homesteaders on the waitlist, however, she emphasized the need to make sure to continue to protect sacred sites. 2. Mr. Avelino stated that it is vital that no work be done to the Makahiki Grounds. 3. Ms. Greaney expressed concern regarding the availability of water. She noted that Ho‘olehua, including Nā‘iwa, is historically known for its dry and barren land, with little to no water available. She stressed that it is also important to ensure access to the appropriate amount of water is available and at a reasonable cost. 4. Ms. Greaney strongly suggests the soil is well tested by third party professionals for any presence of harmful chemical residue possibly remaining in the soil. This is a good safety precaution for farmers. 5. Ms. Greaney also suggested that future studies may also look at nearshore areas off of Pālā‘au to assess for the presence of chemicals from runoff and any impacts. 6. Ms. Greaney insists that the homestead community should be notified well in advance of any proposed developments that will occur on the Makahiki lands. 7. Ms. Greaney also stated that if there are any future developments, it is important that in depth archaeological inventory surveys be conducted as it is known that many artifacts still exist in the *mauka* (toward the mountains) and central regions of Nā‘iwa and Pālā‘au. 8. 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. 9. Non-Native Hawaiian human remains will undergo the process laid out under state law (HAR 13-300), however, Native Hawaiian human remains and cultural items found on DHHL lands are subject to the Native American Graves Protection and Repatriation Act (NAGPRA), 25 U.S.C. 3001 et seq and its implementing regulations (43 CFR Part 10). As 43 CFR § 10.2 provides, tribal lands include “All lands administered by the Department of Hawaiian Home Lands (DHHL) under the Hawaiian Homes Commission Act of 1920 (HHCA, 42 Stat. 108) and Section 4 of the Act to Provide for the Admission of the State of Hawai‘i into the Union (73 Stat. 4), including “available

	lands” and “Hawaiian home lands.” Under NAGPRA, DHHL must prepare a plan of action (POA) prior to any planned activity that is likely to result in a discovery or excavation of human remains or cultural items. If not part of a planned activity, a POA is required after the discovery of human remains or cultural items. In developing a POA, DHHL will initiate consultation with lineal and cultural descendants, consult on the POA, and approve and sign the POA and provide a copy to all consulting parties. The 3-step process for drafting a POA pursuant to NAGPRA can be found in 43 CFR § 10.4(b).

Table of Contents

Management Summary ..... **i**

Section 1 Introduction **1**

1.1 Project Description 1
1.2 Regulatory Context 1
1.3 Document Purpose 8
1.4 Natural Environment 8
1.4.1 *Nā Lepo* (Soils) 8
1.4.2 *Nā Ua* (Rains) 10
1.4.3 *Nā Makani* (Winds) 11
1.5 Built Environment 11

Section 2 CIA Methods **12**

2.1 Archival Research 12
2.2 Consultation 12
2.2.1 Community Outreach, Interview, and Transcription Methods 12

Section 3 Archival Research Results **14**

3.1 Traditional Accounts 14
3.1.1 *Nā Ka‘ao a me Nā Mo‘olelo* (Legends and Stories) 14
3.1.2 *Nā Wahi Pana* (Storied Places) 17
3.1.3 *Nā ‘Ōlelo No‘eau* (Proverbs) 23
3.1.4 *Nā Oli* (Chants) 25
3.1.5 *Nā Mele* (Songs) 27
3.2 Archaeological and Historical Narrative 30
3.2.1 Pre-Contact and Early Post-Contact Period 30
3.2.2 Early Historic Period 33
3.2.3 Early 1800s 34
3.2.4 Mid- to Late 1800s 35
3.2.5 1900s 40
3.3 Archaeological and Historic Properties 54
3.3.1 Discussion and Overview of Archaeological Historic Properties in the Project Area Vicinity 56
3.3.2 Overview of Architectural Historic Properties in the Project Area Vicinity 59

Section 4 Consultation Results **60**

4.1 Introduction 60
4.2 Community Outreach Letter 60
4.3 Community Outreach Table 62
4.4 *Kama‘āina* Interview Discussions 63
4.4.1 Kilia Purdy-Avelino and Justin Avelino 63
4.4.2 Malia Lani Forbes Greaney 66

Section 5 Cultural Practices and Cultural Resources Identified During Consultation as Associated with the Project Area/ Greater Ahupua‘a **74**

5.1 Agricultural and Gathering Practices 74
5.2 Marine Resources 75

5.3 Recreational Activities 75
5.4 *Mo‘olelo* and *Wahi Pana* 76
5.5 Healing Practices 78
5.6 Religious Activities and Burials 78

Section 6 Summary and Recommendations **80**

6.1 Summary of Cultural Practices and Resources Identified During Background Research and Consultation 80
6.1.1 Agricultural Practices and Gathering Practices 80
6.1.2 Marine Resources 84
6.1.3 *Mo‘olelo* and *Wahi Pana* 84
6.1.4 Healing Practices 87
6.1.5 Religious Activities and Burials 88
6.2 Assessment of Impacts Posed to Cultural Practices and Cultural Resources 89
6.2.1 Individual’s comments or thoughts on the potential impacts the proposed project may have on ongoing traditional cultural practices and natural resources within the proposed project area and greater *ahupua‘a* 89
6.2.2 Comments or thoughts on the potential impacts the proposed project may have cultural sites and *wahi pana* within the proposed project area and greater *ahupua‘a* 89
6.2.3 CSH Assessment of Impacts Posed to Cultural Practices and Cultural Resources, integrating perspectives from consultation, and evidence from background research 90
6.2.4 Discussion of impacts to historic properties (i.e., cultural resources) identified during background research and consultation 90
6.2.5 Discussion of impacts to cultural practices and resources identified during background research and consultation 90
6.3 Mitigation Possibilities Identified During Consultation and Background Research 90

Section 7 References Cited **93**

Appendix A Community Outreach Letter **100**

Appendix B Consultee Interview Transcripts **103**

B 1 Kilia Purdy-Avelino and Justin Avelino Summary 103
B 2 Malia Lani Forbes Greaney Summary 105

List of Figures

Figure 1. Portion of the 1993 Molokai Airport and Kaunakakai USGS 7.5-minute topographic quadrangles showing the location(s) of the project area....2
Figure 2. Portion of the 1993 Molokai Airport and Kaunakakai USGS 7.5-minute topographic quadrangles with an overlay of TMK parcels (mostly DHHL lots) showing the location(s) of the project area....3
Figure 3. TMK: (2) 5-2-0005 showing the western TMK: (2) 5-2-005:031 portion of the project area (Hawai‘i TMK Service 2023) 4
Figure 4. TMK: (2) 5-2-026 showing the eastern TMK: (2) 5-2-026:014 project area (Hawai‘i TMK Service 2023) 5
Figure 5. 2013 aerial photograph (ESRI 2013) showing the project area(s) and surrounding lands 6
Figure 6. 2013 aerial photograph (ESRI 2013) with an overlay of TMK parcels (mostly DHHL lots) showing the location(s) of the project area....7
Figure 7. Portion of the 1993 Molokai Airport and Kaunakakai USGS 7.5-minute topographic quadrangles and overlay of Foote et al. (1972) *Soil Survey of Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii*, indicating soil types within and surrounding the project area(s) (USDA 2006) 9
Figure 8. Map from Summers (1971) showing place names near the project area(s) 19
Figure 9. Portion of Dodge et al. (1897) map of Moloka‘i showing 1848 land divisions (Crown [yellow], government [green], LCAs [no color]); the western and eastern project areas as within Crown lands....32
Figure 10. LCAs and Grants in the project area vicinity depicted on a portion of 1993 Molokai Airport and Kaunakakai USGS topographic quadrangles (none of the three project areas were close to a Native Tenant LCA or grant)....36
Figure 11. Portion of Monsarrat (1886) Hawaiian Government Survey Map of Molokai, Middle and West Sections (RM 1288); showing the western and eastern project areas as within the Momomi Paddock....38
Figure 12. Portion of 1922 Kualapuu USGS topographic quadrangle, showing the project areas as relatively undeveloped (an unimproved Moomomi Road passed through the western project area and a Waihii Pipeline and adjacent unimproved road extended east to storage tanks southeast of the eastern project area)....42
Figure 13. Sketch plan of Ho‘olehua Homesteads (Keesing 1936:26) showing current project areas (the eastern lot was within the indicated Hoolehua Homesteads area while the western project area appears to have been in “Community Pasture”) 44
Figure 14. Community Center for Ho‘olehua Homesteads including, from left to right, a hall, school, church, and farm, ca. 1939 (Keesing 1936:124) 45
Figure 15. A Ho‘olehua homestead in 1939 (Keesing 1936:59) 45
Figure 16. Letter to the editor praising the quality of Moloka‘i corn in 1922 (*Honolulu Star-Bulletin* 1922:6) 47
Figure 17. Experimental corn farmer, Kaye Waldorf, in West Moloka‘i; pipeline (left) transported water to his crops (Roll 1968:B-1)....47
Figure 18. 1950 USGS aerial photograph of Molokai (UH MAGIS) showing pineapple cultivation neighboring, but not within, the project areas 49

Figure 19. Portion of 1952 Kaunakakai and Molokai Airport USGS topographic quadrangles showing unpaved roads are present within and surrounding the project area; the pipeline south of the project area(s) was used to transport water from East Moloka‘i 50
Figure 20. 1964 USGS aerial photograph of Moloka‘i showing the present project areas (note the general absence of trees in the project areas and the indicated active cultivation of pineapple in the western project area) 51
Figure 21. Portion of the 1967 Kaunakakai and 1968 Molokai Airport USGS topographic quadrangles showing unpaved roads abutting the project area(s) and an aqueduct crossing the Ho‘olehua Plain to the south....52
Figure 22. Portion of 1983 Molokai West USGS topographic quadrangle showing an aqueduct crossing the Ho‘olehua Plain to the south and the Kualapuu Reservoir southeast of the project area(s)....53
Figure 23. Previously identified historic properties in the project area vicinity depicted on a portion of the 1993 Kaunakakai and Molokai Airport USGS topographic quadrangles...55

List of Tables

Table 1. Place names near the current project area(s) 20
Table 2. Archaeological historic properties in the project area vicinity....56
Table 3. Architectural historic properties in the project area vicinity 59
Table 4. Community outreach table....62
Table 5. Cultural resources associated with the project area and vicinity identified during consultation....81
Table 6. Potential impacts posed by the proposed project to cultural resources or activities within the project area vicinity....90

Section 1 Introduction

1.1 Project Description

At the request of Munekiyo Hiraga, and on behalf of Department of Hawaiian Home Lands (DHHL), Cultural Surveys Hawai‘i, Inc. (CSH) has prepared this cultural impact assessment (CIA) report for the proposed DHHL Ho‘olehua Scattered Lots Subdivision and Improvements Project, Pālā‘au Ahupua‘a, Moloka‘i District, Moloka‘i Island, including two parcels, a western TMK: (2) 5-2-005:031, Parcel 31 (31.7 acres or 12.8 hectares), and an eastern TMK: (2) 5-2-026:014, Parcel 14 (4.7 acres or 1.9 hectares) for a total project area of 36.4 acres (14.7 hectares). The scattered lots subdivision project area parcels are within the Ho‘olehua-Palā‘au Hawaiian Homesteads, and are located northwest and north from Moloka‘i Airport. The long, narrow west project area is bound by Farrington Avenue on the north and Mo‘omomi Avenue on the south. The eastern project area is on the south side of Pu‘u Kapele Avenue. The project area is depicted on a portion of the 1993 Molokai Airport and Kaunakakai U.S. Geological Survey (USGS) 7.5-minute topographic quadrangles (Figure 1), a copy of the same map showing an overlay of TMK parcels (Figure 2), tax map key (TMK) plats (Figure 3 and Figure 4), on an aerial photograph (ESRI 2013) (Figure 5) and on the same aerial photograph with an overlay showing an TMK parcels (Figure 6).

DHHL proposes to construct infrastructure improvements including clearing, grading, and installation of roadway, electrical, and water irrigation utilities. The proposed plan calls for ground-disturbance activities to be confined to the two subject parcels, but will extend to existing roadways for access and connection for utilities. These improvements will support DHHL beneficiaries through the provision of essential services necessary for agricultural homesteading. While installation of wastewater treatment systems will be the responsibility of the lessee, the environmental impacts are being considered as part of this action.

1.2 Regulatory Context

This CIA supports compliance for the DHHL Ho‘olehua Scattered Lots Subdivision and Improvements project with:

- The mandate set forth by the Hawai‘i State Constitution (Articles IX and XII), courts, Hawai‘i Regulatory 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);
- and, 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)

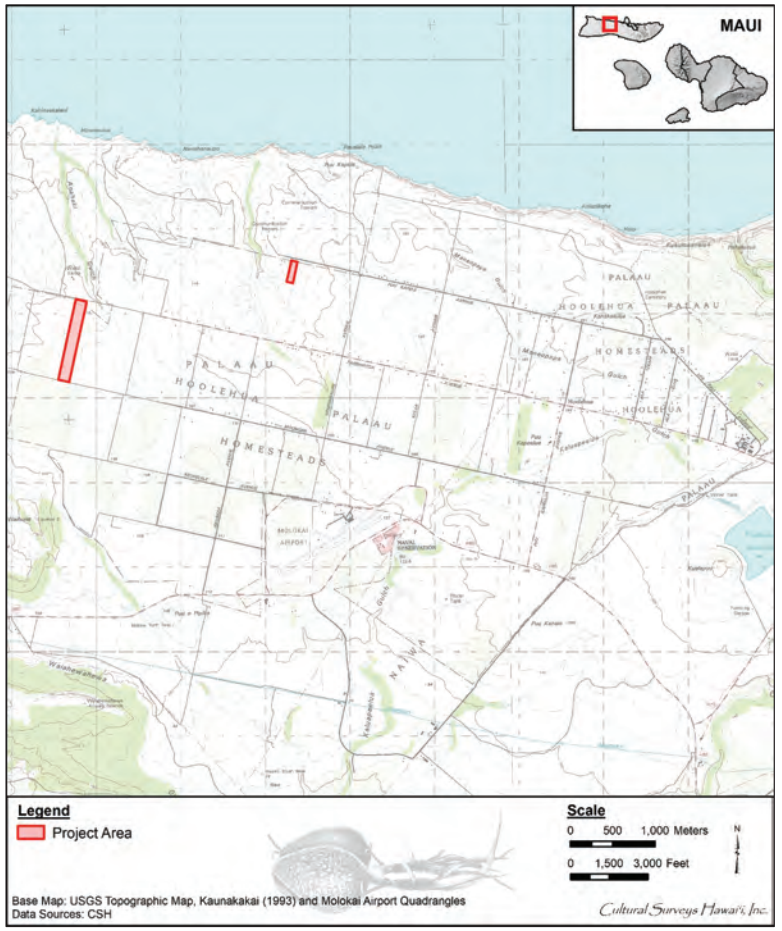


Figure 1. Portion of the 1993 Molokai Airport and Kaunakakai USGS 7.5-minute topographic quadrangles showing the location(s) of the project area

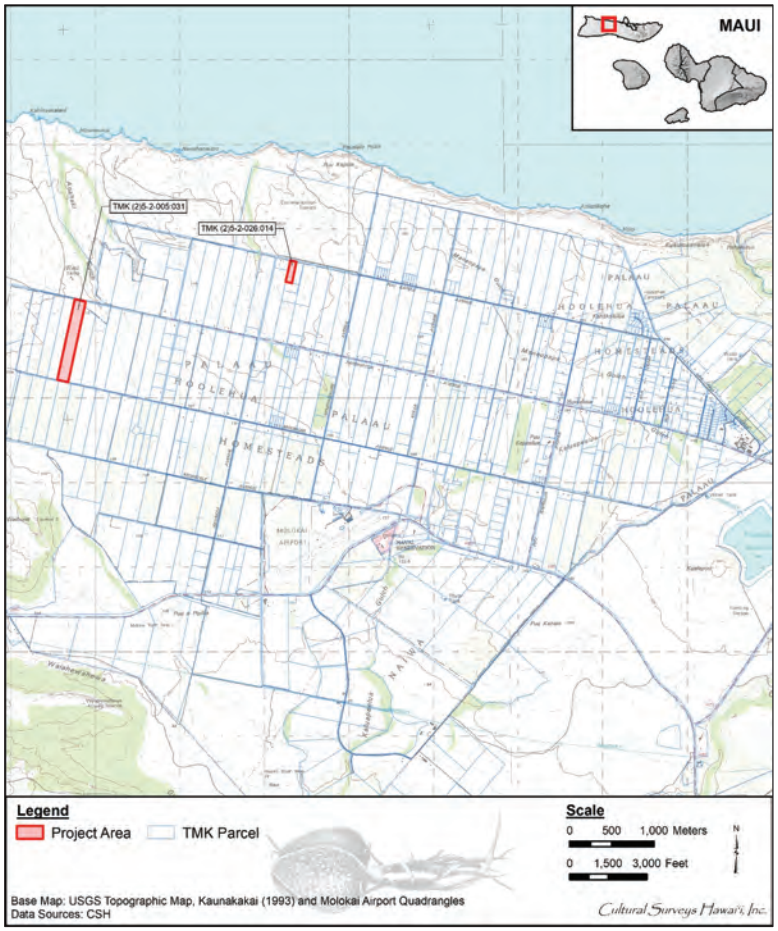


Figure 2. Portion of the 1993 Molokai Airport and Kaunakakai USGS 7.5-minute topographic quadrangles with an overlay of TMK parcels (mostly DHHL lots) showing the location(s) of the project area

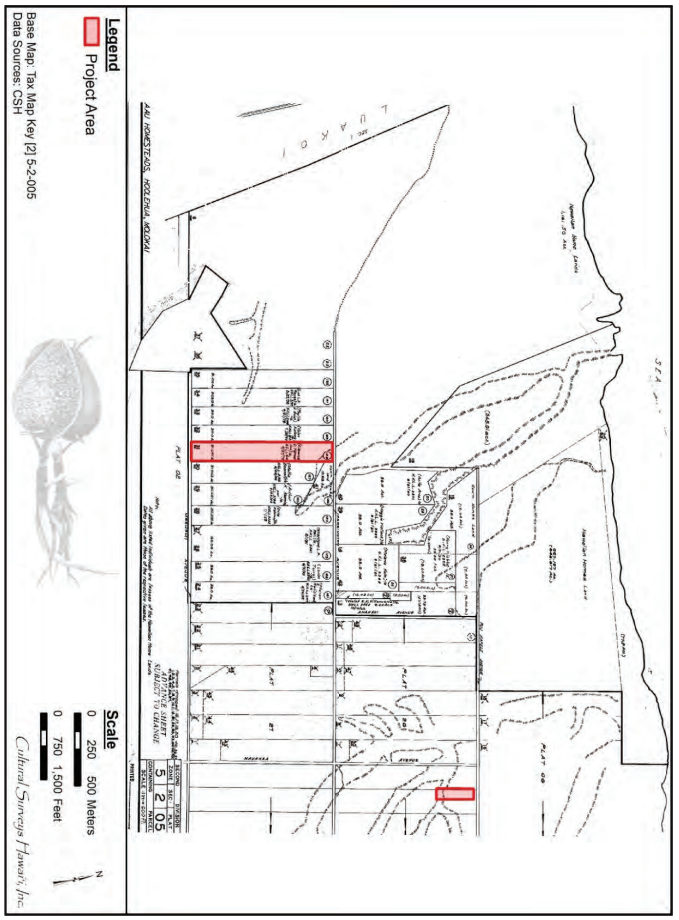


Figure 3. TMK: (2) 5-2-0005 showing the western TMK: (2) 5-2-005:031 portion of the project area (Hawai'i: TMK Service 2023)

Figure 5. 2013 aerial photograph (ESRI 2013) showing the project area(s) and surrounding lands

Figure 4. TMK: (2) 5-2-026 showing the eastern TMK: (2) 5-2-026:014 project area (Hawai'i TMK Service 2023)

Figure 6. 2013 aerial photograph (ESRI 2013) with an overlay of TMK parcels (mostly DHHL lots) showing the location(s) of the project area

1.3 Document Purpose

This CIA contains information gathered from archival research and consultation, compiled in order 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).

1.4 Natural Environment

1.4.1 *Nā Lepo* (Soils)

MacDonald et al. (1990:411) provide the following description for soil in West Moloka‘i:

> Long periods of weathering, accompanied by comparatively little stripping by erosion, have left a deep red soil cover over the top of West Molokai. In places recent erosion has cut through the upper horizon exposing the lower horizon, which locally exhibits pronounced iron enrichment in the form of masses of lateritic iron oxide. [MacDonald et al. 1990:411]

The “deep, red soil” described by MacDonald et al. (1990:411) is characteristic of the current project area and vicinity and is apparent in recent aerial imagery (see Figure 5).

According to the United States Department of Agriculture (USDA) Soil Survey Geographic (SSURGO) database (USDA 2006) and soil survey data gathered by Foote et al. (1972), the soils within the west project area consist of Molokai series soils including Molokai silty clay loam, 0 to 3% slopes (MuA), Molokai silty clay loam, 3 to 7% slopes (MuB), and Molokai silty clay loam, 7 to 15% slopes, severely eroded (MuC3) soils (Figure 7).

Molokai series soils are described as follows:

> […] well-drained soils on uplands on the islands of Maui, Lanai, Molokai, and Oahu. These soils formed in material weathered from basic igneous rock. They are nearly level to moderately steep. Elevations range mainly from nearly sea level to 1,000 feet […]
>
> These soils are used for sugarcane, pineapple, pasture, wildlife habitat, and homesites. The natural vegetation consists of kiawe, ilima, uhaloa, feather fingergrass, and buffelgrass. [Foote et al. 1972:96]

MuA soils are further described as follows:

> […] The material at depths between 35 and 64 inches is moderately compact in place. The substratum is soft, weathered rock. The soil is slightly ‘acid to neutral, except that areas used for pineapple are commonly very strongly acid or extremely acid in the surface layer.

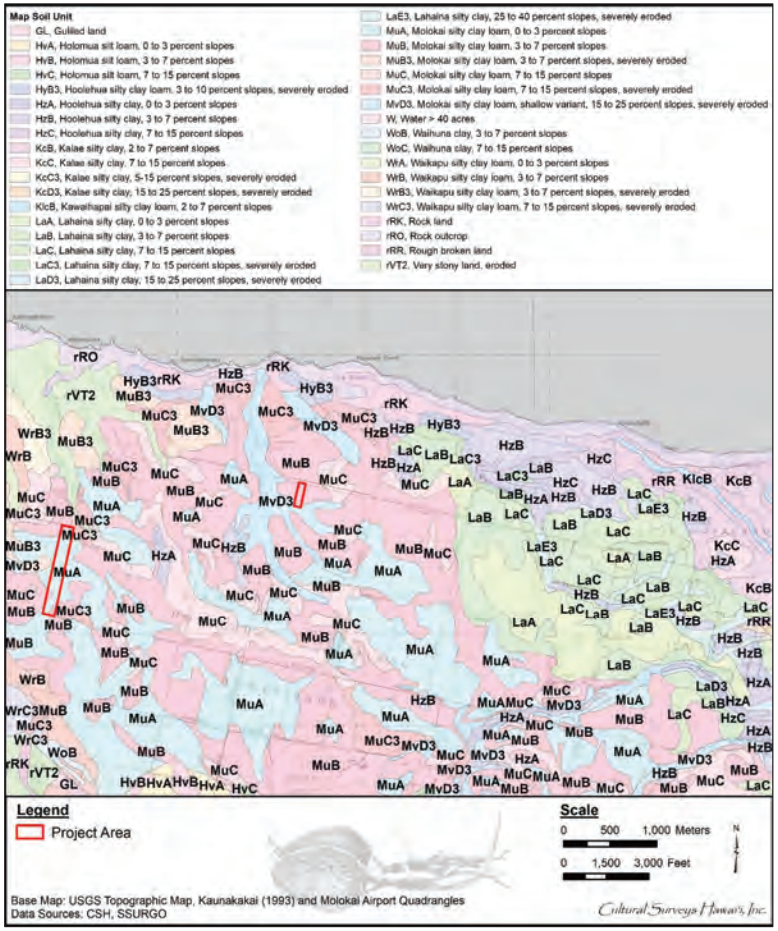


Figure 7. Portion of the 1993 Molokai Airport and Kaunakakai USGS 7.5-minute topographic quadrangles and overlay of Foote et al. (1972) *Soil Survey of Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii*, indicating soil types within and surrounding the project area(s) (USDA 2006)

> Permeability is moderate. Runoff is slow, and the erosion hazard is slight. [Foote et al. 1972:96]

MuB soils are further described as, “On this soil, runoff is slow to medium and the erosion hazard is slight to moderate. Included in mapping were a few small areas that are eroded to soft, weathered rock […]” (Foote et al. 1972:96).

MuC3 soils are further described as, “This soil occurs on knolls and sharp slope breaks. Runoff is medium; and the erosion hazard is moderate” (Foote et al. 1972:97).

The eastern project area includes MuB soils (described above) and Molokai silty clay loam, shallow variant, 15 to 25% slopes, severely eroded (MvD3) soils (see Figure 7). These soils are described as follows:

> This soil occurs on the sides of drainageways. In most places all of the surface layer and part of the subsoil have been removed, and about 12 to 20 inches of dark reddish-brown soil overlies the soft, weathered rock. In some places the soil is eroded to soft, weathered, rock and, as a result, is grayer or browner than is typical of the Molokai series. There are few to common stones and boulders on the surface. These are unweathered rock cores that have been exposed by erosion. Runoff is rapid, and the erosion hazard is severe. Workability is difficult. [Foote et al. 1972:97]

1.4.2 *Nā Ua* (Rains)

Precipitation is a major component of the water cycle and is responsible for depositing *wai* (fresh water) on local flora. Pre-Contact *kānaka* (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, *ho‘oilo* (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). Each small geographic area on Moloka‘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 distinguishable 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]

Nāulu is a rain associated with different *wahi pana* throughout Moloka‘i. In a *kanikau* (lament) for a person named Nuholani, it states that this rain rumbles across the expansive land of Pālā‘au.

Nā Lehua o Kā‘ana	The lehua of Kā‘ana
I ka noua e ka ua Nāulu	Pelted by the Nāulu rain
Kamumu akula i ke kaha o Pālā‘au	Rumbling across the expanse of Pālā‘au

[Akana and Gonzalez 2015:175]

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]

Malo has supplied a foundation of names for winds, however, there is an abundance of names in various stories and chants. The *mo‘olelo* called “The Wind Gourd of La‘amaomao” tells the story of Pāka‘a and his son Kuāpāka‘a who are descendants of the wind goddess La‘amaomao. With their possession of this special wind gourd, they could control and call forth the winds of Hawai‘i. Pāka‘a’s chant traces the winds of and surrounding Pālā‘au Ahupua‘a. Pāka‘a’s chant is listed below:

Ka hoolua o ka moae	Ho‘olua, Moa‘e
Kaele i Palaau	Ka‘ele are at Pālā‘au
Haualialia ilaila	Haualialia is there
Ka iki aea i Hoolehua	Kaiki-aea is of Hoolehua
[…]	Laumaomao is at Punakou
	Lawelawe-mālie is at Kekaha
	Haleolono is at Kaluako‘i
Ma ke kuapā maluna mai o Mo‘omomi	The Kuapā is at Mo‘omomi
[*Ka Hae Hawaii* 1861]	[Nakuina 1995:64]

Within this chant, there are various winds names mentioned which are associated with Pālā‘au. In the first three lines of the chant, indicated there are four main winds of Pālā‘au. These winds include, Ho‘olua, Moa‘e, Ka‘ele, and Hauali‘ali‘a. Another line, “*Ma ke kuapā ma luna mai o Mo‘omomi*,” indicates there is a wind called Kuapā at Mo‘omomi. Mo‘omomi is located within the Pālā‘au Ahupua‘a. Nakuina’s (1995) version of the chant contains wind names that were not originally included in *Ka Hae Hawaii* (1861), a Hawaiian language newspaper.

1.5 Built Environment

The built environment within and surrounding the project area is minimal. The project area mostly consists of undeveloped DHHL parcels. Active homesteads are sporadic throughout the project area, located particularly along the bounding roadways. The long, narrow west project area is bound by Farrington Avenue (a dirt road) on the north and Mo‘omomi Avenue (a dirt road) on the south. The eastern project area is on the south side of Pu‘u Kapele Avenue (a dirt road). Molokai Airport and associated infrastructure is located approximately 2 km southeast of the project area(s).

Section 2 CIA Methods

2.1 Archival Research

Research centers on Hawaiian activities including *ka‘ao*, *wahi pana*, *‘ōlelo no‘eau* (proverbs), *oli* (chants), *mele* (songs), traditional *mo‘olelo*, 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 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 2021), 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, in order to identify individuals with cultural expertise and/or knowledge of the *ahupua‘a* of Pālā‘au.

2.2.1 Community Outreach, Interview, and Transcription Methods

2.2.1.1 Scoping for Participants

We begin our consultation efforts with utilizing our in-house contact list from previous outreach efforts to facilitate the interview process. This list often includes *kūpuna*, *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. We also contact agencies such as SHPD, OHA, and the appropriate Island Burial Council where the proposed project is located for their response to 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.

2.2.1.2 “Talk Story” Sessions

Prior to the interview, CSH cultural researchers explain the role of a CIA, how the consent process works, the project purpose, the intent of the study, and how their *‘ike* (insight) and *mana‘o* (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 *kūkākūkā* [consultation, discussion] in participant’s choice of place over set interview questions) to the informal (e.g., 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 also conducts 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) providing missing details for *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.

2.2.1.3 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 them to make any necessary edits. Once the interviewee has made those edits, we incorporate 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. This is for the interviewee’s records.

It is important to CSH cultural researchers to cultivate and maintain community relationships. The CIA report may be completed, but CSH researchers continuously keep in touch with the community and interviewees throughout the year—such as checking in to say hello via email or by phone, volunteering with past interviewees on community service projects, and sending holiday cards to them and their *‘ohana* (family). CSH researchers feel this is an important component to building relationships and being part of an *‘ohana* and community.

“*I ulu no ka lālā i ke kumu*—the branches grow because of the trunk,” 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 informants if we have lost our *kūpuna*. CSH makes it a point to reach out to the *‘ohana* of our fallen *kūpuna* and pay our respects including sending all past transcriptions, interview summaries, and photos for families to have on file for genealogical and historical reference.

Section 3 Archival Research Results

3.1 Traditional Accounts

3.1.1 *Nā Ka‘ao a me Nā 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:IX). According to Pukui and Green (1995), 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*, 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 project 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 project 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.

3.1.1.1 Origin of Moloka‘i

Mo‘olelo provide varying accounts for the origin of Moloka‘i. Paku‘i, a historian in the time of Kamehameha I, wrote of the Hawaiian Islands having been born of Wākea and his wives.

According to this version, Wākea’s first wife, Papa, gave birth to Hawai‘i, Maui, and Kaho‘olawe before returning to Tahiti. Wākea took Kaulawahine as his second wife, and she gave birth to Lāna‘i. He then took a third wife:

Hoi ae O Wakea loaa Hina,	Then Wakea turned around and found Hina,
Loaa Hina he wahine moe na Wakea,	Hina was found as a wife for Wakea,
Hapai Hina ia Molokai, he moku,	Hina conceived Molokai, an island;
O Molokai a Hina he keiki moku.	Hina’s Molokai is an island child.

[Fornander 1916-1917:12–13]

The historian Kahako‘ikamoana recorded a different lineage for Moloka‘i:

Na Kuluwaiea o Haumea he kane,	Kuluwaiea of Haumea as the husband,
Na Hinanuialana he wahine	Of Hinanuiakalana as the wife
Loaa Molokai, ke akua, he kahuna,	Was born Molokai, a god, a priest,
He pualena no Nuumea,	The first morning light from Nuumea,

[Fornander 1916-1917:2–3]

3.1.1.2 Pā‘aka‘a and His Son Kū-a-Pā‘aka‘a

The following *mo‘olelo* recounts two chiefs, Pālā‘au and Ho‘olehua, which are also the names of the *ahupua‘a* in which the current project areas are located (Pālā‘au) and the adjacent *ahupua‘a* to the east (Ho‘olehua).

> On Molokai lived a very beautiful woman, Hikauhi, the daughter of Hoolehua [Ho‘olehua] and Ilali [‘Īloli]. Now it happened that the girl’s father had promised her hand to Palaau [Pālā‘au], the chief of that part of the island. But as soon as she had seen Paakaa [Pāka‘a], she forgot all about her former lover and demanded that the stranger be given to her. Palaau very generously consented, and so they all lived in peace. Paakaa cultivated the lands well, fished skillfully, and brought great prosperity to his wife and her family. [Handy 1922:76]

Hikauhi and Pāka‘a had a son, Kū-a-Pāka‘a (Nakuina 1992:29–30). Pāka‘a and Kuāpāka‘a are the caretakers of the wind gourd of La‘amaomao which could control and call forth the winds of Hawai‘i.

3.1.1.3 Hālena, the Yellowing

Ne (1992) tells of a story involving Kahekili, the ruling chief of Moloka‘i who lived on Maui, in which Pālā‘au is referenced. Although the story is about the naming of Hālena, a place on the southwest side of Moloka‘i, Pālā‘au is mentioned as a place known for its “fat” *āholehole* (Hawaiian flagtail, Kuhlia sandvicensis) and *‘ō‘io* (Ladyfish, bonefish, albula vulpes). In the story, Kahekili sends one of his chiefs to Pālā‘au to collect fish to supply his army as he made plans to invade O‘ahu. The following is an excerpt from Ne:

> When Kahekili was the ruling chief of Molokai, he lived on Maui. He made his plans and set out in his canoes to invade O‘ahu, stopping at Molokai to get a supply of fish for his journey. He sent Hulu, chief of a village, in his canoe to Pūko‘o for the fat mullet from the fishponds. He sent another canoe with another chief, Kuikai, to Pālā‘au, noted for its fat *āholehole* and *‘ō‘io.* [Ne 1992:47]

3.1.1.4 Pele’s Long Sleep

Westervelt's (1916) version of the story of Lohi‘au, the king of Kaua‘i, and his romance with Pele which includes an ancient chant with a reference to Pālā‘au:

> Lohiau watched her while he partook of the feast with his chiefs, and she was resting on the couch of mats. He was thinking of her marvelous, restful beauty, as given in the ancient chant known as ‘Lei Mauna Loa.’
> Lei of Mauna Loa, beautiful to look upon.
> The mountain honored by the winds.
> Known by the peaceful motion.
> Calm becomes the whirlwind.
> Beautiful is the sun upon the plain.
> Dark-leaved the trees in the midst of the hot sun
> Heat rising from the face of the moist lava.
> The sunrise mist lying on the grass,
> Free from the care of the strong wind.
> The bird returns to rest at Palaau.
> He who owns the right to sleep is at Palaau.
> I am alive for your love—
> For you indeed. [Westervelt 1916:77]

3.1.1.5 Sorcery on Moloka‘i

Kamakau (1991) recounts a story regarding the origin of sorcery use on Moloka‘i, in which the Ho‘olehua and Pālā‘au plains are mentioned:

> Kaiakea, a prominent man of Kala‘e and its vicinity, was said to have been a man without a god. He built a large new household below Kahanui and provided all kinds of food, such as poi, pig, *‘awa*, bananas, fish, and everything else necessary for a ‘house-warming’ (*o ka hale komo*). When the day came, Kaiakea’s wife and the other women were at the *hale noa*, the common house, and Kaiakea and the other men and the servers were at the *hale mua*, the men’s house. The *hale noa* was apart from the *hale mua*, which was surrounded by a lanai. Kaiakea was in the doorway of the *hale mua*, and while the feast was being prepared, he saw a long procession of women coming over the plains of Ho‘olehua to Pala‘au. They were dressed in yellow tapa skirts and yellow tapa shoulder coverings (*kihei*), with variegated (*papahi*) leis of *ma‘o* and *‘ilima* crowning their heads. There was one man among them. The procession went down to the spring, named Piliwale, and left their things (*he ukana*) there. These were a *puniu hulihuli*, or coconut-shell container, and the women's *‘alae* bird bodies. When Kaiakea saw the many beautiful women in that company, he called out to them to come in on the lanai, but they remained outside. Only the man who was with them approached and stood at the door of Kaiakea’s house and talked with him. Kaiakea offered them food, but the spirit man (*kanaka anela*) said they would not eat his food unless a leaf-thatched house, a *hale lau*, was built for them; then they would eat of his food. This man revealed that they were not humans, but ‘angels,’ and he told Kaiakea their names. Pua was his name, and Kauluimaunaloa (the-grove-at-Maunaloa, that is, Kapo) was

> the name of the chiefess who led the procession. He said they would become Kaiakea's gods if the *hale lau* was finished that day, and would give into his charge the *puniu hulihuli*, their visible form (*ko lakau kino ‘ike maka ‘ia*), and all the paraphernalia to do their work (*ka lakau mau hana a pau*), which was inside it. The *‘alae* birds were their bodies which they showed abroad (*kino ho‘ike ‘ia iwaho*). After revealing these things to Kaiakea, the being vanished. Kaiakea went to the spring to look for the *puniu*, and got it; the *‘alae* birds were resting there at the spring. That very day Kaiakea erected the *hale lau* and filled it with poi, *‘awa*, bananas, and tapas appropriate to these gods; that same evening it was dedicated (*ke kapu no ‘ia*). The food offerings (*ka ‘ai me ka i‘a*) and the *‘awa* were all consumed by the *‘alae* birds, and they were well content with the food provided for them.
>
> It was in this way that Kaiakea became the *kahu* of gods, and he became known as a man who had gods. He was the *kahu* of Kapo (Kauluimaunaloa) and Pua. Kaiakea, however, just took care (*malama pono*) of these gods. He did no harm to others, and did not send his gods to bring death (*ho‘aunauna e make*) to any man or to any chief. He just took care of his *akua ho‘ola‘a* (the spirits who had been made gods by his consecration and offerings). Upon his death he commanded his children to take care of the gods against the days of trouble; the gods would repay them with life (*ola*). But they were not to seek wealth from the gods through sorcery. [Kamakau1991:131–132]

3.1.2 *Nā 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* (a land division within an *ahupua‘a*), and man-made structures such as fishponds. In this way, the *wahi pana* of Pālā‘au tangibly link the *kama‘āina* of Pālā‘au 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 even 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* (waterway or ditch), house sites, intangible phenomena such as meteorological and atmospheric effects, *pōhaku* (stone), *pūnāwai* (freshwater springs), and many others. According to Landgraf (1994), Hawaiian *wahi pana* "physically and poetically describes an area while revealing its historical or legendary significance" (Landgraf 1994:v).

3.1.2.1 *Nā Inoa ‘Āina* (Place Names)

In the preface of *Place Names of Hawaii* (Pukui et al. 1974:x), Samuel Elbert offers the following description regarding place names:

> Hawaiians named taro patches, rocks and trees that represented deities and ancestors, sites of houses and heiau, canoe landings, fishing stations in the sea, resting places in the forests, and the tiniest spots where miraculous or interesting events are believed to have taken place.
>
> Place names are far from static […] names are constantly being given to new houses and buildings, land holdings, airstrips, streets, and towns and old names are replaced by new ones […] it is all the more essential, then to record the names and the lore associated with them [the ancient names] now. [Pukui et al. 1974:x]

Inherent in Elbert's statements is knowledge that the oldest place names held meaning and told the story of an area prior to European Contact. Many place names in the vicinity of the project area are provided in Figure 8. Literal translations of place names for land areas and divisions near the project area are listed in Table 1 and may provide insight into the area prior to Western Contact.

3.1.2.2 Pu‘u Ka Pe‘elua, Caterpillar Hill

Pu‘u Pe‘elua, also known as Pu‘u Kape‘elua or Caterpillar Hill, is located above Ho‘olehua. According to Harriet Ne (1992), the story of Pu‘u Pe‘elua involves Pele, the daughter of a chief of Pālā‘au, who fell in-love with Pe‘elua of Ho‘olehua, the *‘aumakua* of that district:

> A beautiful young girl named Pele, the daughter of a chief in the Pālā‘au area, encountered in the early twilight a handsome young man. They fell in love, and he courted her for almost a year. She concealed her love from her parents and lived only for the hours she spent with him.
>
> She did not know that he was the *pe‘elua* of the district, revered and loved by the people of Ho‘olehua—even worshipped. Nor did she know that he had the form of a young man only at night but that in the day he returned to the form of a caterpillar.
>
> As the days passed, Pele grew pale and listless. […] The *kahuna* perceived the problem at once. 'She is in love with the supreme manifestation of the caterpillar-Pe‘elua,' he told [her parents]. 'When he comes to her at night, it is in the form of a handsome young man; but his power is draining her strength. She is human. She cannot live with a magical being. To save her, you must kill him. You must destroy him completely.' [Ne et al. 1992:49–50]

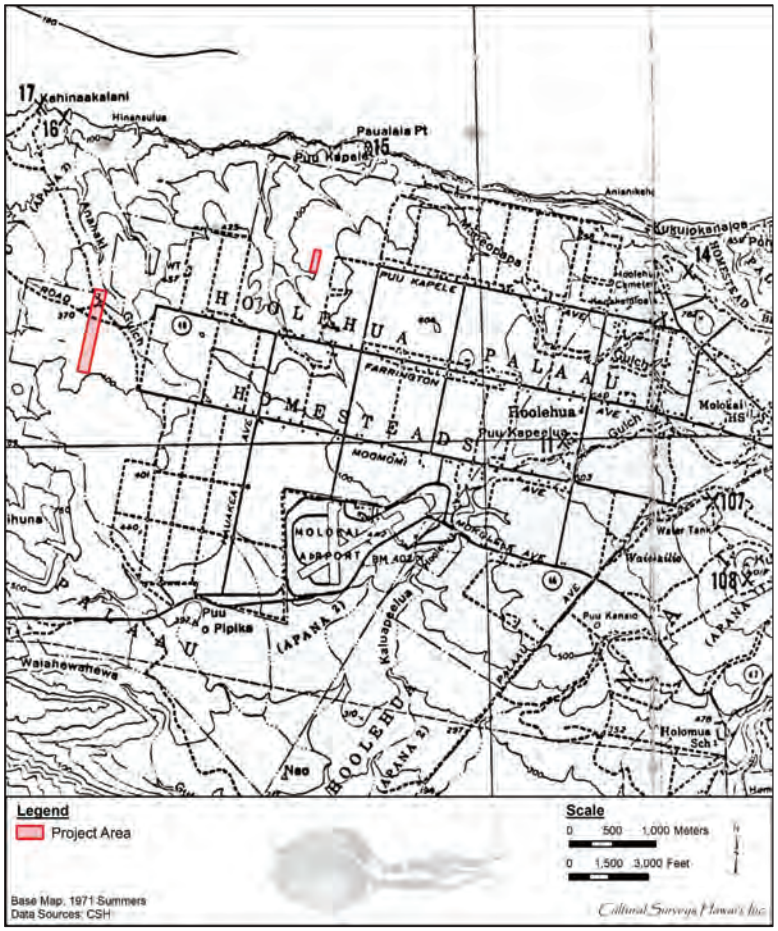


Figure 8. Map from Summers (1971) showing place names near the project area(s)

Table 1. Place names near the current project area(s)

Place Name	Description
Anahaki	Name of a gulch on the north side of the west project area. *Lit*. “Broken cave” (Pukui et al. 1974:12)
Anianikeha	Place along the sea cliff NW of the eastern project area. *Lit*. “blowing [on the] heights” (Pukui et al. 1974:12)
Hinanaulua	A point on the sea cliff north of the western project area. *Lit*. “inspired [by a god] *hinana* [Young of *ʻoʻopu* (Hawaiian freshwater goby; *Lentipes concolor*)] fish.” (Pukui et al. 1974:46)
Hoʻolehua	*Lit.* acting the expert. Village, land division, and Hawaiian homestead area near the Moloka‘i airport; said to be named for a chief (Pukui et al. 1974:51–52). Hoʻolehua Ahupuaʻa encompasses most of the current project area.
Kahinaakalani	A point on the sea cliff NW of the western project area. *Lit*. “the grayness of the sky, heaven” (Pukui et al. 1974:65)
Kāluapeʻelua	*Lit.* baked caterpillar. A caterpillar infestation was ended by baking the caterpillars (Pukui et al. 1974:79). Name of gulch within project area.
Kanakaloloa	Place NW of the eastern project area. *Lit*. “tall person” (Pukui et al. 1974:83)
Kualapuʻu	*Lit.* hill overturned. Hill, elementary school, reservoir, and Del Monte pineapple cannery village (Pukui et al. 1974:119). Summers Site 107, a *hōlua* (sled used on grassy slopes) slide, was documented on the SSW side of Kualapuʻu Hill (Summers 1971). This hill was formerly named Ka ʻUala Puʻu (the sweet potato hill) and appears on some maps as Mid Hill; the area had “many sweet potato patches […] defined by rows of stones” (Summers 1971:80). Other maps label the hill as Middle Hill.
Kukuiokanaloa	Name of a stretch of sea cliff N of the eastern project area. *Lit.* “light of Kanaloa” (Pukui et al. 1974:122)
Lepekaheo	According to Summers (1971:37), “Monsarrat referred to Lepekaheo as an ‘old heiau.’” This *heiau*, designated Summers Site 12, is located approx. 1.3 km north of the project area.
Manawainui	*Lit*. large water branch. Manawainui Gulch stream flows approx. 2.0 km SE of the project area. Manawainui also refers to an area S and adjacent to Hoʻolehua and Pālāʻau, which contains stone platforms used in the past by students of *hula* (dance), and a stone outcrop modified by Native Hawaiians in traditional times known as the “Sacrifice Stones” (Fowke 1922:181).
Maneʻopapa	Gulch NW of the western project area. Meaning uncertain.
Nāʻiwa	*Lit.* the frigate birds (perhaps named for the beauty of the birds) (Pukui et al. 1974:161). Nāʻiwa Ahupuaʻa comprises three *ʻāpana* (lots) in Moloka‘i. The largest section, Nāʻiwa 1, borders the project area E.

Place Name	Description
Pālā‘au	*Lit.* wooden fence or enclosure (Pukui et al. 1974:176). Pālā‘au comprises three land sections in north, central, and southwest Moloka‘i and along with Ho‘olehua, names the homesteads where the current project area is located. A western portion of the project area is in Pālā‘au 2, the largest *‘āpana,* of Pālā‘au Ahupua‘a.
Paualala	A point on the sea cliff N of the central project area. Meaning uncertain.
Pu‘u Kanaio	*Lit.* the pinworm hill. Hill on the slopes of Kuala pu‘u [hill] (Pukui et al. 1974:198). This hill is within 400 m E of the project area.
Pu‘u-Ka Pe‘elua	*Lit*. “hill of the caterpillar” (Pukui et al. 1974:198) (For *mo‘olelo* see subsection 3.1.2.2). Location of Summers Sites 11A and 11B/ State Inventory of Historic Places (SIHP) # 50-60-03-11, Kape‘elua Complex (see subsection 3.3.1).
Pu‘u ka Pele	Hill on the sea cliff N of the central project area. *Lit.* “the volcano hill” (Pukui et al. 1974:198).
Waiakailio	*Lit.* water used by the dog (Pukui et al. 1974:219). Area with a stream approx. 375 m northeast of the project area’s NE corner.

The same story is also told by Cooke (1949):

> […] this beautiful girl was visited each night by a lover who left before daylight. She was unable to discover who he was, this suspense told on her, and she began to waste away. A priest, consulted by her parents, advised the girl to attach a piece of white tapa to a wart on her lover’s back. In the morning, shreds of tapa helped to trace the demi-god lover to the hill Puu Peelua, in the middle of Hoolehua. The kahuna [priest] and friends of the family found a large peelua [caterpillar] asleep on the hill. The kahuna ordered the people to collect wood which was placed around the sleeping peelua, and a fire was lit. As the heat of the fire increased, the caterpillar burst into myriads of small caterpillars which were scattered over the plain. That accounts for the army-worm pest, called peelua. [Cooke 1949:102]

3.1.2.3 *Heiau*

Summers (1971:37–38) recorded four *heiau* in the Pālā‘au and Ho‘olehua Ahupua‘a including Lepekaheo Heiau and three unnamed *heiau*.

Lepekaheo Heiau, designated by Summers (1971:37) as Site 12, is located west of Kaluape‘elua Gulch on the boundary between Ho‘olehua 2 and Pālā‘au 2, approximately 1.3 km north of the project area. According to Summers (1971:37), “Monsarrat referred to Lepekaheo as an ‘old heiau.’” Summers also mentions another *heiau* (Site 10) in Ho‘olehua 2 located on east side of the “crest of ‘Eleuweue” (Summers 1971:37).

In Pālā‘au 2, Summers (1971:38) mentions a *heiau* (Site 16) located at the west side of the mouth of Anahaki Gulch at an elevation of 35 ft above mean sea level and another *heiau* (Site 14) located east of Ho‘olehua Cemetery in the pineapple fields west of the gulch at an elevation of 800 ft. (Summers 1971:38). Regarding Site 14, Summers (1971:38) states, “The structure was in ruins in 1957, however. Traces of paving could still be found, and the remains of a wall, 35 ft long from SE to NE; 13 ft. from the NE side was an upright stone 2 ft. high, 2 ft. wide, and 1 ft. thick.”

3.1.2.4 *Loko I‘a* (Fishponds)

A *loko i‘a* is a fishpond. There were two types of *loko i‘a,* mentioned by Catherine Summers. One is called a *loko kuapā* and the other is a *loko ‘umeiki*. The *loko kuapā* was made by building a wall on a reef (Pukui and Elbert 1986:171). *Kuapā* means wall, specifically for a fishpond which were entirely enclosed. The fishpond walls were usually built using coral or basalt. Within these types of fishponds, *mākāhā* or sluice gates (Pukui and Elbert 1986:225) were built into the rock walls made of sticks and beams. The purpose of a *mākāhā* was to create a gate-like contraption. This would allow gatekeepers to regulate the fishpond. The smaller fish were able to swim through the gate and dwell in the pond, while larger predators were kept outside the barriers (Summers 1964:8). These were exclusive to the Hawaiian Islands based on the physical features of its shores. As explained by Summers,

> Loko kuapa were owned by the kings and chiefs, and at their command, were built by the common people. The building of a pond was a communal project of the chiefs who, from their individual land sections (ahupua‘a), furnished the large number of people required for this work. [Summers 1964:2, 6]

A *loko ‘umeiki* drastically differs from a *loko kuapā.* The walls of a *loko ‘umeiki* were much lower and it essentially functioned as a fish trap (Summers 1964:12). Emma Beckley mentioned that this type of shore pond was

> […] surrounded by a low wall that is submerged at high tide and has openings, walled on each side like lanes, leading in or out of the pond [...] At night when the tide was coming in, a man or a woman waded out to the end of an inward lane. Here he, or she, sat on a raised stone platform which was situated at the end of one side of a lane. The fisherman held a net which was just wide and deep enough to cover the opening of the lane. The mouth of the net was faced toward the sea. [Beckley 1883:20]

Summers (1971) gives a lengthy description of Poho‘ele pond also known as Pālā‘au fishpond:

> This was the largest of the Moloka‘i fishponds: its size has been estimated as being from between 200 and 500 acres. Cobb referred to it as ‘Nameless extensive pond, in palaau, filled with mud’ (1902:429). On the 1897 Hawaiian Government Survey Map of Molokai, the broken walls of the pond are shown, although the pond itself is labelled ‘mud’; it is not shown on later maps. In 1922 portions of the stone wall could still be seen, ‘...and traces of an old-fashioned sluice gate.’
>
> A native writer gave the name of the pond as Poho‘ele, ‘Dark hollow,’ and said that it was built by Ho‘olepanui, a favorite of Kamehameha I, who came from Hawai‘i to live on Moloka‘i after Kamehameha had conquered O‘ahu.
>
> […] the men of Hawai‘i looked at the shoreline, the capes and nooks and then Ho‘olepanui’s ‘engineers’ planned to enclose some of the nooks from one point to another, thus converting them into fishponds [...]
>
> The men arose at the command of Ho‘olepanui and laid the stones along the sea from Pu‘apo‘o to Puhaka in Ho‘olehua, and the pond was given the name of Poho‘ele. This was a famous pond at Pala‘au and had gates that were skillfully made. All kinds of fish were caught in this pond at the time when it was being well cared for.
>
> The Hawai‘i people were indeed skilled workers. Let us notice this, it was said that the deepest part in the pond had a depth of five fathoms and was somewhat like the harbor of Kou (now Honolulu) in depth.
>
> Stokes was told the pond was a *loko po‘oiki*, but he considered this as a local term for *loko ‘umeiki* (1911). When he saw the pond in 1909, he found 27 lanes, all leading outward. The walls commenced on the W at the wall of Ho‘olehua Pond, and extended for a distance of over 6100 ft. [Summers 1971:77]

3.1.3 *Nā ‘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* (land), chiefs, plants, and places.

Several *‘ōlelo no‘eau* mention Moloka‘i. Other sayings regard powers associated with Moloka‘i, which was traditionally known for its sorcery-like *mana* (divine power).

3.1.3.1 ‘Ōlelo No‘eau #2194

The following *‘ōlelo no‘eau* references an origin story of the island of Moloka‘i:

> Moloka‘i nui a Hina.
>
> *Great Moloka‘i, land of Hina.*
>
> The goddess Hina is said to be the mother of Moloka‘i. [Pukui 1983:239]

3.1.3.2 ‘Ōlelo No‘eau #2193

The following *‘ōlelo no‘eau* describe the medicinal expertise associated with the *kahuna* (priest) of Moloka‘i.

> Moloka‘i ku‘i lā‘au
>
> *Moloka‘i, pounder of medicine.*
>
> The kahuna of Moloka‘i were said to be experts in compounding medicines and poisonous potions. Also, a stick dance bore this name. [Pukui 1983:239]

3.1.3.3 ‘Ōlelo No‘eau #2195

The following *‘ōlelo no‘eau* describe the magical powers associated with Moloka‘i.

> Moloka‘i pule o‘o.

Moloka‘i of the potent prayers.

Moloka‘i is noted for its sorcery, which can heal or destroy. [Pukui 1983:239]

3.1.3.4 ‘Ōlelo No‘eau #1935

The following *‘ōlelo no‘eau* mentions the *kioea* (Bristle-thighed curlew, *Numenius tahitiensis*) of Ho‘olehua:

Ku‘u manu lawelawe ō o Ho‘olehua

My bird of Ho‘olehua that cries out about food.

Said of the kioea, whose cry sounds like ‘Lawelawe ke ō! Lawelawe ke ō!’ (Take the food! Take the food!). The kioea is the bird that calls to the fishermen to set out to sea. [Pukui 1983:207]

3.1.3.5 ‘Ōlelo No‘eau #2164

The following *‘ōlelo no‘eau* describes the hot plain of Ho‘olehua:

Mo‘a nopu ka lā i ke kula o Ho‘olehua.

The sun scorches the plain of Ho‘olehua

Refers to Ho‘olehua, Moloka‘i. [Pukui 1983:235]

3.1.3.6 Pālā‘au *Lo‘i*

The following *‘ōlelo no‘eau* which appears in *Ka Nupepa Kuokoa* (1922) discusses the *lo‘i kalo* (taro terraces):

Kinikini wale na lo‘i ai o Palaau, ua like me na hoku o ka lani.

The taro patches of Pālā‘au are in abundance, resembling the stars in the sky.

[*Ka Nupepa Kuokoa* 1922]

It was said that after climbing atop Kaana, one could glance below to Pālā‘au and see the fertility of the soil through its numerous taro patches.

3.1.4 *Nā Oli* (Chants)

Oli, according to Mary Kawena Pukui (1995:xvi–xvii) are often grouped according to content. Chants often were imbued with *mana* (divine power); such *mana* was made manifest through the use of 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).”

3.1.4.1 *Ka Huaka‘i*

The following *oli* honors an “errand of mercy” in which Lot Kamehameha (Kamehameha V) delivered the “necessities of life, including native medicines as well as food,” to workers on his royal ranch at Hālawa on Moloka‘i (Pukui and Korn 1973:83–85). The *oli* states Kamehameha V’s ship, the *Kilauea*, stopped at Pālā‘au to unload cargo.

Ka Huaka‘i	Errand
Ia aloha ia Kilauea,	Kilauea, beloved ship, sea-roving steed
Lio kākele a o ka moana,	roams this ocean full-steam ahead
Holo mamua holo mahope.	backing and hauling, then the voyage home.
Kau pono ka ihu i ka makani,	Now Kilauea’s prow heads into the wind,
Haki nu‘a ka uwahi i ke kai,	smoke breaks from stack, ripples over the sea,
Nome a‘e ka huila malalo,	paddle wheel slowly revolves,
Halaeka lae o Ka-lā‘au,	passes Ka-lā‘au Point, Moloka‘i up ahead,
‘Oni ana Moloka‘i mamua,	Lā-hainā yonder awaiting freight,
Huli a‘e e eke alo i Lā-hainā,	and stops at Pā-lā‘au to unload cargo,
He ukana ka Kilauea,	heave-ho and shove down below.
Lū a‘e la i Pā-lā‘au,	Like a flock of seabirds upon a waste of sand
Ho‘okahi pahuna malalo.	a hungry horde races along this salt-encrusted shore.
Kohu ‘āuna manu i ke one,	Were it not for Chief Ka-mehameha
Ka hoholo i ke ālialia.	these creatures would be bereft of all supply,
E ‘oleo Ka-lani Mehameha	would be as sheep without forage, no shepherd
Ola ai nei pū‘ā hipa,	were it not for life-bringing Ka-ma‘i-pu‘u-pa‘a the Kahuna,

Nā hi pa a Ka-ma‘i-pu‘u-pa‘a.	wise in matters of sickness, life and death.
‘Ai ana i ka lau ‘oliwa.	Now let his famished flock feed on olive leaves given with a King’s love.
Ha‘ina ‘ia mai ka puana, *No Ka-lani Mehameha he inoa.* [Pukui and Korn 1973:83–85]	This is the end of my song in praise of Chief Ka-mehameha.

3.1.5 *Nā Mele* (Songs)

The following section draws from the Hawaiian art of *mele*, poetic song intended to create two styles of meaning:

> 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]

3.1.5.1 Aloha Moloka‘i

This *mele* by an unknown author was found in “Johnny Noble’s manuscript collection of Hawaiian Songs” by Robert M. Mondoy and translated by Puakea Nogelmeier and Robert M. Mondoy. The *mele* states that Maunaloa, a mountain in West Moloka‘i, “stands majestic” with the “broad expanse of Pālā‘au” (Mondoy 2018:62–63).

Nani wale ku‘u ‘ike kūmaka ‘eā *I ka nani kaulana moku a‘o Hina ‘eā*	It was glorious for me to behold The famed beauty of Hina’s isle
‘O ke kai hone a‘o Nalulua ‘eā *E pili a‘e nei me Kalama‘ula ‘eā*	The murmuring sea of Nalulua Joining with Kalama‘ula there.
Kūkilakila mai ‘o Maunaloa ‘eā *Ka waiho laulaha a‘o Pālā‘au ‘eā*	Maunaloa stands majestic With the broad expanse of Pālā‘au
Heahea mai ana ‘o Kala‘e ‘eā *E ho‘i i ka poli o Maunahui ‘eā*	Kala‘e is beckoning To return to the embrace Maunahui

(Originally “Maunahina”, a probable error)

‘Alawa i ka nani o Kalaupapa ‘eā *Ke ‘alohi a ke kai lana mālie ‘eā*	Gazing at the beauty of Kalaupapa The calm seas there sparkle
Ha‘ina ‘ia mai ana ka puana ‘eā *Aloha Moloka‘i Nui a Hina ‘eā*	The story be told in the refrain Beloved is Great Moloka‘i, isle of Hina Translation: Puakea Nogelmeier & Robert M. Mondoy

[Mondoy 2018:62–63]

3.1.5.2 Ho‘olehua

This *mele* was composed by Clarence Kinney; Ho‘olehua was his home. This *mele* is in honor of Ho‘olehua.

Ha‘aheo no ku‘u home lā *E ke kau mai la i ka la‘i* *Ho‘opulu ia mai ka ‘ehukai* *I ka nani o Ho‘olehua*	Proudly my home Repose in the calm Dampened by the sea spray In the beauty of Ho‘olehua
Ku‘u home i ka uka *I ka pā ka makani* *Ko aloha pumehana* *Mau ana no me ia‘u*	My home is in the uplands Where the wind blows The warmth of your love Will always be with you
Hu‘i lā koni lā *I ka uka ‘iu‘iu* *I ka pā kolonahe* *A ke kēhau*	Chilling, throbbing In the distant upland Where the wind wafts with the dew
Ku‘u home lā ho‘opulapula lā *Me ka nani o Ho‘olehua* *Me ka nani o Ho‘olehua* [Huapala n.d.]	My home, my homestead In the beauty of Ho‘olehua In the beauty of Ho‘olehua

Another *mele* titled *Ho‘olehua* [*‘Āina Ho‘opulapula*] (*Ho‘olehua, The Homestead Land*) was written Robert Niau Kamaunu Sr. and published in *A Collection of Popular Hawaiian Melodies* in 1929 (Mondoy 2018:62).

Kū kilakila mau ‘o Ho‘olehua *‘Āina nani i ka ho‘opulapula*	Ever-imposing and arising is Ho‘olehua A glorious land for the Hawaiian homestead
He pula kau maka na ka lehulehu *Ka uluwehiwehi a‘o ia uka*	Although an insignificant mote to most The countryside there is abundantly lush

Ka uka ‘iu‘iu me ke onaona	A countryside distant and alluring
A ka ‘ano‘i a‘e lei mau nei	With a longing like for a beloved child
Ho‘ohihi ka mana‘o ke ‘ike aku	A spreading hope is the vision there
Ka waiho kāhela i ka la‘i	Of a vista vast and expansive in tranquility
Ua la‘i ka nohona me ke aloha	Life is peaceful and filled with aloha
He home ho‘okipa i ka malihini	A home hospitable to the new-comer
Haina ‘ia mai ana ka puana	Repeat the refrain, tell the story
Ho‘olehua ē ka heke a‘o Moloka‘i	of Ho‘olehua and the great island of Moloka‘i
	(Translation: Robert Mondoy & Puakea Nogelmeier)

[Mondoy 2018:62]

3.1.5.3 Moloka‘i Hula

This *mele* for Moloka‘i was composed by Mary Robins, with music by John Noble to honor the various *wahi pana* of Moloka‘i.

One verse in particular references Ho‘olehua Ahupua‘a with the lines “*Ho‘olehua he ‘āina nani, kaulana ka inoa ho‘opulapula*. Ho‘olehua, a beautiful land, name of the famous Homestead” (Huapala n.d.). The composer of this *mele* explains that Ho‘olehua means no seed. This name was given to the land as the wind blew away the seeds that were planted (Huapala n.d.).

Hanohano ka inoa a‘o Moloka‘i lā	Distinguished, the name of Moloka‘i
Lei ana i ka pua o ke kukui	Adorned with a wreath of the kukui flower
O ka wehi kaulana o ku‘u ‘āina	Famous symbol of my land
O Moloka‘i nui a Hina	Moloka‘i, born of Great Hina
O Hālawa e ‘alawa iho	Hālawa, glance down
‘Ālawa ka ulua e ma alo nei	Look quickly, see the ulua on the upper surface
O Pūko‘o no‘u ko aloha	Pūko‘u, my love
Me ka ulu kukui o Lanikāula	With the kukui grove of Lanikāula
Ho‘olehua he ‘āina nani	Ho‘olehua, a beautiful land
Kaulana ka inoa ho‘opulapula	Name of the famous homestead
Kalama‘ula a he home nani	Kalama‘ula, oh, beautiful home
Ho mai ko lama ‘ai ala no‘u	Come, let us go there to eat

Hea aku no wau e ō mai ‘oe	I call to you, you answer
Lei ana i ka pua o ke kukui	Adorned with a wreath of the kukui flower.

[Huapala n.d.]

3.1.5.4 Nani Moloka‘i

Composed by Helen Smythe Ayat and Ida Hanakahi, this *mele* honors various *wahi pana* throughout Moloka‘i by showcasing attributes of these lands that make them so famous. In this *mele*, Ho‘olehua is honored by being famous for its *hala* (*Pandanus odoratissimus*) grove. Please note that *hala* is commonly defined as “pandanus fruit.” However, the translator of this *mele* defined “hala” as pineapple.

He nani Moloka‘i	Beautiful Moloka‘i
Nui a Hina	Child of Hina
I ka ulu kukui	And is famous kukui grove
A‘o Lanaikāula	of Lanikāula
He nani Hālawa	Beautiful Hālawa
I ka[‘]u ‘ike	In my sight
He wailele	The waterfall
A‘o Moa‘ula	Of Moa‘ula
He nani Kalama‘ula	Beautiful Kalama‘ula
I ka ulu o ka niu	with its coconut trees
He ‘āina ho‘opulapula	Homestead land
O Kalaniana‘ole	Of Kalaniana‘ole
He nani Ho‘olehua	Beautiful Ho‘olehua
I ka ulu o ka hala	with the pineapple
He waiwai ui	Brings wealth
Ke loa‘a mai	To the community
He nani Kalaupapa	Beautiful Kalaupapa
Ho‘okipa malihini	Welcomes visitors
Hā‘ina mai ka puana	tell the refrain
A he nani Moloka‘i	Beautiful Moloka‘i

[Huapala n.d.]

3.2 Archaeological and Historical Narrative

3.2.1 Pre-Contact and Early Post-Contact Period

Traditionally, Moloka‘i was divided into two *moku*: Kona and Ko‘olau. Kona Moku was comprised of the lands of the southern and western sections of the island (which included Pālā‘au and Ho‘olehua Ahupua‘a) and the Ko‘olau Moku which comprised the lands of the northeastern portion of the island from Hālawa Valley to the Kalaupapa Peninsula. In 1859, the traditional *moku*

of Kona and Ko‘olau were dropped and the island as a whole was referred to as the Moloka‘i district. In 1909, the island was again divided into two districts: Kalawao District, containing the lands of Kalaupapa, Kalawao, and Waikolu, and Moloka‘i District, comprising the remainder of the island (Coulters in Summers 1971:2), including the current project area.

The two project areas are both within Pālā‘au Ahupua‘a (Figure 9). Mrs. Pukui in Handy et al. (1991:47) described the subdistricts of Pālā‘au on Moloka‘i as *kalana* (division of land smaller than a *moku*). Today, the *kalana* of Pālā‘au consists of one major land division and two *lele* (a detached part or lot of land belonging to one *‘ili*, but located in another *‘ili*). Pālā‘au 1 is located at the southern shores of central Moloka‘i, while Pālā‘au 3 is in uplands, at the summit of the sea cliffs above Kalaupapa Peninsula. These two *lele* of Pālā‘au Ahupua‘a are significantly smaller than Pālā‘au 2—which includes the present project areas. Pālā‘au 2, the largest of the three land sections, is adjacent to the northwest of the *ahupua‘a* of Ho‘olehua (Dodge et al. 1897; Summers 1971:81, see Figure 9).

3.2.1.1 Subsistence and Settlement

During his archaeological survey of Moloka‘i in 1937, Southwick Phelps (1937) noted the following about West Moloka‘i:

> It is said that in former days western Molokai was not as devoid of forest as it is now. While this may be true to a limited extent, I think that the essential conditions have remained the same and that the western half was always a semi-arid region. One certainly finds there no extensive taro patches and no signs of dense population. We learn, furthermore, that it was traditionally a land of the sweet-potato, a plant that does not require much water. [Phelps 1937:6–7]

While exact boundaries for yam and sweet potato cultivation in Pālā‘au and Ho‘olehua are unknown, these tubers, along with fish, were staples of inhabitants in the area (Phelps 1937).

The region including Ho‘olehua was a fertile plain known particularly for the cultivation of *‘uala* (sweet potato). Summers (1971:38) cites Malihinihele who stated in 1876, “In the olden days this [Pālā‘au 2] was a good land with a fertile plain where plants grew. The population was large but today it is uninhabited.” Handy (1940:157) remarks, “In 1931 there were many flourishing patches on the Hawaiian homesteads at Hoolehua. It is said that Hoolehua and Palaau were noted for sweet potatoes in olden days” although Handy and Handy (1972:283) note that homesteaders in Ho‘olehua were growing the sweet potatoes on land that had not been planted in ancient times.

The importance of *‘uala* to the area is further suggested by place names such as Pu‘u Pe‘elua (hill of the caterpillar) and Kāluape‘elua (baked caterpillar), which illustrate the connection to the environment of the area (Pukui et al. 1974). The *pe‘elua* feeds on the sweet potato and is considered a pest by *‘uala* farmers of the region. Pukui et al. (1974) noted hilled sweet potatoes in the region south of Ho‘olehua and Pālā‘au known as Uala-pu‘e, which is also the name of a fishpond in that area. In addition to sweet potato, *‘olo* or *hokeo*, the long gourd used for holding fishing tackle and to make the *hula* drum, notably grew in Ho‘olehua (Handy et al. 1991:213).

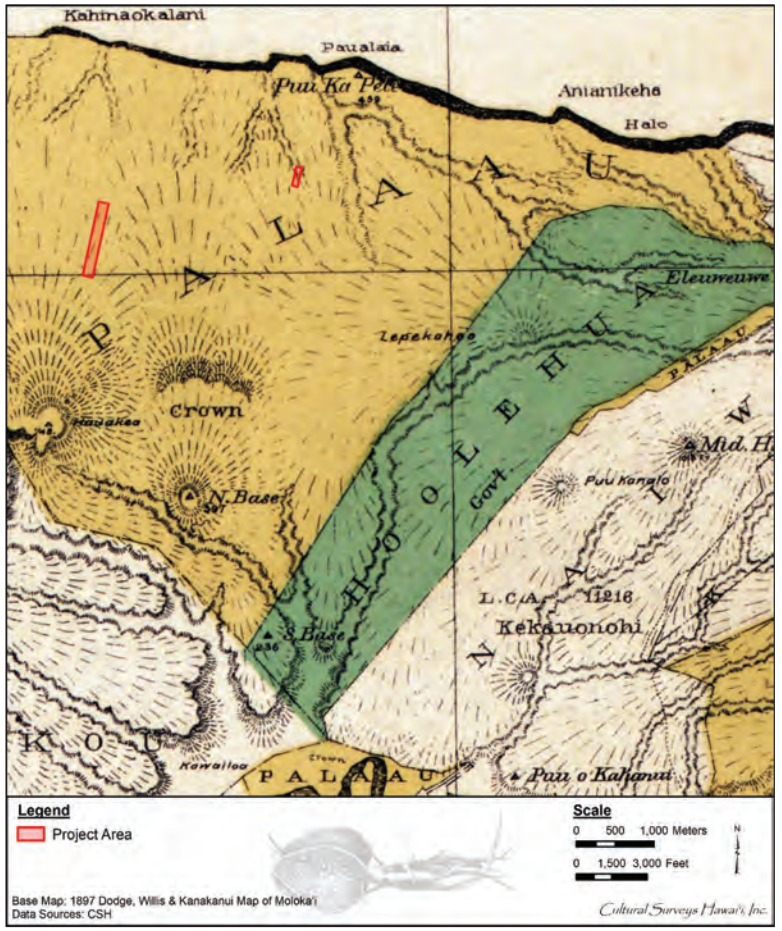


Figure 9. Portion of Dodge et al. (1897) map of Moloka‘i showing 1848 land divisions (Crown [yellow], government [green], LCAs [no color]); the western and eastern project areas as within Crown lands

The actual size of the pre-Contact Hawaiian population tending and supported by crops in central and western portions of Moloka‘i can only be conjectured. While the greater portion of the population resided on the eastern side of the island, a late nineteenth century anecdote by Abraham Fornander (1880) suggests a former substantial population that may have been widely dispersed:

> As an instance of the dense population, even a few years previous to Kamehameha's death, the author has often been told by a grand-niece of Kekaulike, who was a grown-up girl at the time, that when the chiefs trumpetshell sounded, over a thousand able-bodied men would respond to the call, within a circle described by Palaau, Naiwa, Kalae and Kaunakakai. Those lands together cannot muster a hundred men this day. [Fornander 1880:73 footnote]

3.2.2 Early Historic Period

Early historic accounts briefly mention Moloka‘i. Summers (1971:18) relates that in 1779 when Captain Cook visited Hawai‘i, the status of Moloka‘i was uncertain. However, Kamakau (1992) cites several reasons why Moloka‘i was as important as O‘ahu in the late 1700s, since both of the islands contained "rich lands, many walled fish-ponds, springs, and water taro patches. The island of Oahu was very fertile and Molokai scarcely less so" (Kamakau 1992:132–133).

Captain George Vancouver (1798), sailing along the southern coast of Moloka‘i in 1793, essayed a portrait of the island's geographic texture and distribution of Hawaiian population:

> Early the next morning, with a pleasant breeze from the N.E., we stood over towards the east point of Morotai, […] we sailed along to the westward, […] About half a league south of the east point of Morotai [...] lies a small barren rocky islet, called by the natives Modooenete […] In this direction east the land rises rather abruptly from the sea, towards the lofty mountains in the center of the east part of Morotai; and though the acclivity was great, yet the face of the country diversified by eminences and vallies; bore a verdant and fertile appearance. It seemed to be well inhabited, in a high state of cultivation, and presented not only a rich but a romantic prospect. To the westward of these cliffs, the shores terminated in the former direction, by a low point of land, called by the natives Crynoa […] From Crynoa the country assumes a dreary aspect. The mountains, forming the eastern part of the island, gradually descend to the westward, and like those of Mowee, terminate on a low isthmus, which appears to divide the island into two peninsulas […] the easternmost, which is far the largest is composed of very high land, but the westernmost does not rise to any elevation, beyond that of a mean height. The country from Crynoa rises from the sea by an ascent, uninterrupted with chasms, hills or vallies. This uniform surface, on advancing to westward, exhibited a gradual decrease in the population; it discovered an uncultivated barren soil, and a tract of land that gave residence only to a few of the lower orders of the islanders, who resort to the shores for the purpose of taking fish, with which they abound. Those so employed are obliged to fetch their fresh water from a great distance; none but what is brackish being attainable on the western parts of Morotai. [Vancouver 1798:201–202]

Early visitors and Hawaiian historians confirm Vancouver's perception of a wide-spread Hawaiian population throughout the eastern portion of the island and a much smaller population clustered along the shoreline within the western portion.

After conquering the island of Maui in 1790, Kamehameha I advanced on to Moloka‘i where he secured the allegiance of the chiefs. Archibald Menzies (1920), the naturalist who accompanied Captain George Vancouver to the Hawaiian Islands in the 1790s, relates that Kamehameha I "destroy[ed] the fields and plantations of the inhabitants" (Menzies 1920:115). He and his warriors remained on Moloka‘i for a year to prepare the attack on O‘ahu. He is said to have grown taro and "had all his canoes put in order. He drilled his warriors on the Hoolehua plain near where the airport is now" (Cooke 1949:112).

3.2.3 Early 1800s

The first Protestant missionaries arrived in Hawai‘i in 1820. In the following years, the ruling Hawaiian chiefs and governors established a network of public schools throughout the villages of the Hawaiian Islands. In September 1828, a group of missionaries travelled to Moloka‘i to determine the progress of the schools (Andrews 1829). After landing on the southeast side at Honomuni, they traveled west over the next two days to the villages of Hālawa, Halana, Makanalua (Kalaupapa Peninsula), and overland to Kaunakakai where they put up for the night:

> During the whole night, the people continued to arrive; and, about sunrising, the chiefs made their appearance […] Having examined a large school here, we walked on, and the chiefs followed, in canoes. We travelled along, on the sea shore, finding very little vegetation, on account of the drought. There is scarcely any water on this side of the island. [Andrews 1829:273]

They completed their examination of the schools on Moloka‘i the following day, noting that they "numbered nearly 700 houses, and think there are about 1,000 on the island" (Andrews 1829:274).

The United States Navy Exploring Expedition under the command of Captain Charles Wilkes visited the island of Moloka‘i in 1840 and described the island as follows:

> […] forty miles long, from east to west, and nine miles wide: the western portion, embracing about one third of the whole extent, is a barren waste; and the remaining two thirds is mountainous, in some places rising to the height of twenty-eight hundred feet, with the exception of a narrow strip of land on the south side, which has a most favorable exposure, and is highly productive. [Jenkins 1850:258]

3.2.3.1 The Māhele and the Kuleana Act

The Organic Acts of 1845 and 1846 initiated the process of the Māhele—the division of Hawaiian lands—that introduced private property into Hawaiian society. During the Māhele, all lands in the Kingdom of Hawai‘i were divided among *mō‘ī* (king), *ali‘i*, *konohiki* (overseer of an *ahupua‘a*), and *maka‘āinana* and passed into the western land tenure model of private ownership. In 1848, the crown and the *ali‘i* received their land titles. On 8 March 1848, Kauikeaouli (Kamehameha III) further divided his personal holdings into lands he would retain as private holdings (Crown Lands) and parcels he would give to the government. According to an 1897 Hawaiian Government Survey map of Moloka‘i showing 1848 divisions of land, the entire

ahupua‘a of Ho‘olehua was given to the government, and all of Pālā‘au Ahupua‘a (including the western and central project areas) was retained by the Crown (see Figure 9).

Native Hawaiians who desired to claim the lands on which they resided were required to present testimony before the Board of Commissioners to Quiet Land Titles. Upon acceptance of a claim the Board granted a Land Commission Award (LCA) to the individual. The awardee was then required to pay a cash amount equal to one-third of the total land value or to pay in unused land. Following this payment, a Royal Patent (RP) was issued giving full title of ownership to the tenant.

On 19 October 1849, the Hawaiian Privy Council adopted resolutions to protect the rights of Native tenants, the *maka‘āinana*. The *maka‘āinana* were offered fee-simple titles for their house lots and lands that they cultivated for themselves. *Kuleana* (land holding of the tenant residing in the *ahupua‘a*) awards for individual parcels within the *ahupua‘a* were subsequently granted through a land commission. These awards were first presented to Native Hawaiian tenants followed by the naturalized foreigners (non-Hawaiians born in the islands) or long-term resident foreigners who could prove occupancy on the parcels before 1845. No commutation fee was necessary to apply for a Royal Patent for a *kuleana* award as the commutation fee had presumably already been paid by *ali‘i*/*konohiki* who had been awarded the entire *ahupua‘a*, or an *‘ili* in which the Native tenant claimed his own small parcels (Chinen 1958:29–30).

No native tenant LCAs were awarded near the current project areas, and only one LCA and one Land Grant were awarded in the vicinity. Approximately 4.6 km southeast of the eastern project area, LCA 11216 (LCA 11216*Mo) was awarded to Kekauonohi (see Figure 9 and Figure 10) a member of the House of Kamehameha and a wife to King Kamehameha II. This LCA included 5,803-acres comprising approximately half of the *ahupua‘a* of Na‘iwa. Southwest of the project area, Grant 3146 was awarded to Charles R. Bishop (see Figure 10). No land use information is provided for Grant 3146 (Waihona ‘Aina 2021).

3.2.4 Mid- to Late 1800s

3.2.4.1 Cattle Ranching

Cattle were introduced to Moloka‘i in the 1840s. De Loach (1975) summarizes this first effort at commercial ranching:

> Rudolph W. Meyer, who was, [...] responsible, along with [Reverend] Hitchcock, for the introduction of cattle on the island, had come to Moloka‘i in the 1840s. He established a ranch stocked with longhorns in the Kala‘e [north central Moloka‘i] Area. A lucrative trade in cattle and hides was begun between Moloka‘i and Honolulu. The cattle were exported from the village of Pālā‘au on the southwestern shore, over the reef, and onto a waiting ship. Pālā‘au grew wealthy on cattle and dry land taro. All this came to an end, however, in the 1850s, when Meyer discovered that the number of cattle in the herd had diminished considerably. He found that almost every male in the village was guilty of rustling, and so all the men were shipped off to jail in Honolulu. The men’s families followed, And the village was deserted. Today Palaau sits abandoned in a kiawe forest, as no one ever returned to live there. [de Loach 1975:68]

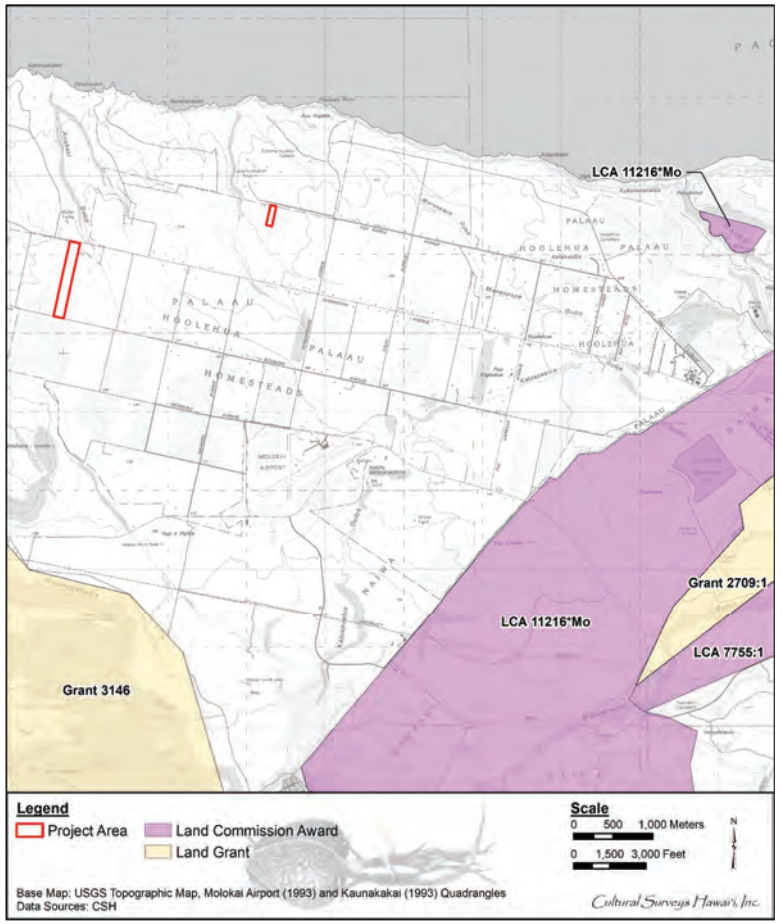


Figure 10. LCAs and Grants in the project area vicinity depicted on a portion of 1993 Molokai Airport and Kaunakakai USGS topographic quadrangles (none of the three project areas were close to a Native Tenant LCA or grant)

Despite these early setbacks, cattle (and sheep) ranching expanded greatly in the second half of the nineteenth century:

> During this period, cattle, sheep and goats were imported to the island in ever-increasing numbers. According to Judd, there were no cattle on the island in 1832 and by 1853 there were only 200 head, The 1866 census, however, revealed 2,586 head of cattle, 13,332 sheep and 196 goats on the island. […] In 1868, Kamehameha V released axis deer on the island. [de Loach 1975:86]

In 1855, Lot Kapuaiwa (King Kamehameha V) purchased the *ahupua‘a* of Kaunakakai for two hundred dollars (Interior Department Letter, July 1885) to maintain the value of a sheep station established there by his brother, Alexander Liholiho (King Kamehameha IV) (Kuykendall 1953:152). Lot Kapuaiwa also actively sought to increase his Moloka‘i holdings: “in the desire to have a country estate, he bought up land and cattle from the resident Hawaiians and used Moloka‘i as a vacation ground from his cares of State” (Judd 1936:9–10).

In 1868, King Kamehameha V was sent seven live axis deer from Hong Kong as a gift (Tomich 1986:127). He released the deer, adding to the free-roaming game population on the island but, consequently, also to the destruction of vegetation by the flourishing population of foraging animals. In a 1902 talk given in Japan on Hawaiian Forests, E.M. Griffith (1902) remarked on the already alarmingly denuded state of Moloka‘i:

> Cattle, goats and deer have totally destroyed the forests upon the larger portion of the island of Molokai so that the western half is practically destitute of any tree growth. It is possible that the algaroba forests which have secured such a strong hold along the coast near Kaunakakai may gradually spread over this end of the island […] The condition at present time is that the forest has been pushed back into the deeper and more inaccessible canyons and onto the highest slopes of the mountain. The effective watershed in respect to the conservation of the water supply has thus been greatly reduced and the careful protection of the remaining forests is an absolute necessity. [Griffith 1902:Appendix G]

An 1886 Government Survey map (Figure 11) depicts an approximate upper growth line of the algaroba (*kiawe*) forests approximately 3.5 km south of the present project areas. The western and eastern project areas are depicted as within the Momomi Paddock. Extensive pasture land is indicated with no other development suggested.

During the Māhele in 1848, Bernice Pauahi Bishop, daughter of Abner Pākī and Laura Konia and last descendant of the Kamehameha dynasty, inherited much of the lands which are now Molokai Ranch lands. Her husband, Charles R. Bishop, inherited the lands of Kaluako‘i in 1875. The Molokai Ranch was formed in 1897 when a *hui* purchased approximately 70,000 acres of central and western holdings from the Bishop Estate (Cooke 1949; Stearns and Macdonald 1947).

3.2.4.2 Agriculture

Mr. Harvey R. Hitchcock and Mrs. Rebecca H. Hitchcock became the first permanent missionaries on Moloka‘i. They established a Protestant church at Kalua‘aha in 1832, at which point the only agricultural crops they noted were bananas and taro grown in the valleys where water was most readily available. No “regular schools, churches, houses of permanent nature, no

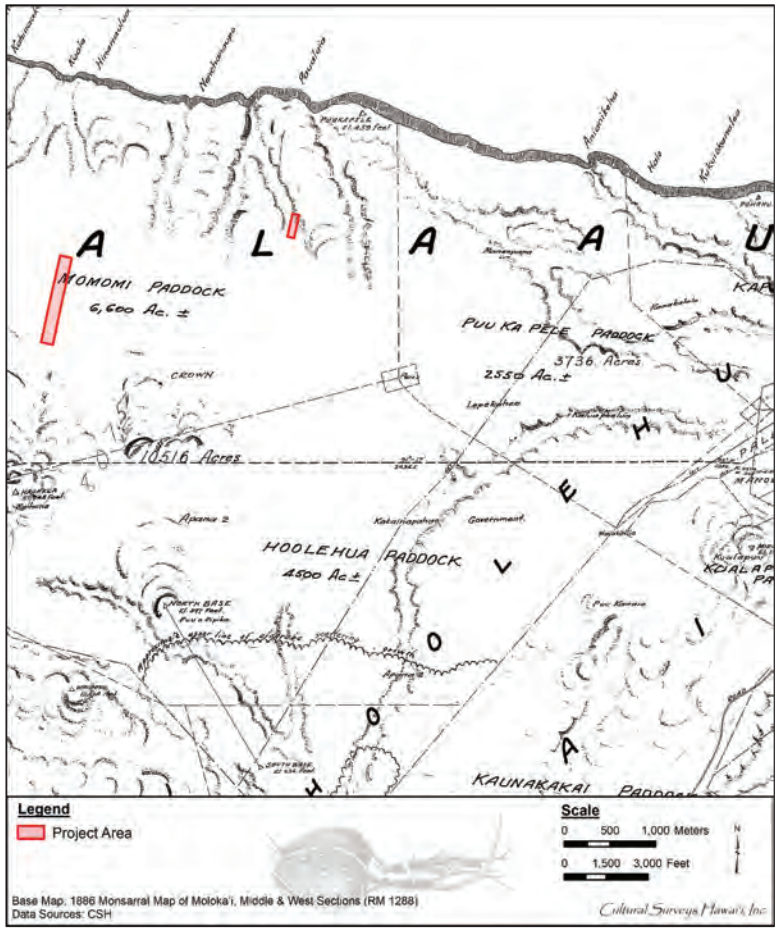


Figure 11. Portion of Monsarrat (1886) Hawaiian Government Survey Map of Molokai, Middle and West Sections (RM 1288); showing the western and eastern project areas as within the Momomi Paddock

garments, no cattle, only one horse, and home articles of the most primitive nature" were present then (Wiebke 1940). Twenty years later, the island had a number of churches, 1,000 students enrolled in 21 schools across the island, and livestock including goats, hogs, 400 horses, and cattle. Taro, potatoes, and grapes were "cultivated quite extensively" (Wiebke 1940:1).

In the early 1840s, the Meyer family in Kala‘e was growing and exporting coffee, corn, wheat, and potatoes to the mainland. The Meyer family started a sugar mill at Kala‘e in 1878 using 30 acres of land to grow cane. This was one of the few locations on Moloka‘i that had adequate rainfall to grow cane, but problems stemmed from the cane being planted at an elevation of 1,500 ft above sea level. Sugarcane matured slower at higher elevations, so yields were lower. The Meyer plantation produced 50 tons of sugar annually (Wiebke 1940). The sugar mill was closed in 1894, because it was too small to compete with larger operations.

Two other large sugar plantations were developed on Moloka‘i beginning in the late 1870s, one at Moa-nui in East Moloka‘i and one at Kaunakakai. Both of these plantations quickly failed and were abandoned (Wiebke 1940).

In 1898, American Sugar Company, Limited (ASCO) was incorporated by Molokai Ranch, which leased an additional 30,000 acres (Cooke 1949). Following the incorporation, a full-scale cane operation in central and western Moloka‘i began, including an attempt to develop the arid lands of the Ho‘olehua plain. "On the Hoolehua plain 750 acres were prepared in parallel trenches following the contours. 500 acres were actually planted in young cane shoots" (Judd 1936:12). Due to an inadequate water supply, this sugar enterprise was also unsuccessful. The well pumps, which had been installed in surface wells, were of such large capacity that they soon exhausted the fresh water, and irrigation ditches 8 miles long brought pumped water with such a high salt content that it could not be used to grow sugarcane:

> Wells were dug in the lowlands and water pumped into a system of irrigation ditches above. As the pumping increased, the salt content of the water gradually increased until it became detrimental to the cane. This plantation like the others was quickly abandoned. [Wiebke 1940:1]

The ASCO plantation at Kamalō was the only Moloka‘i sugar plantation to invest money in a railroad. Railroad tracks were constructed from Kaunakakai harbor "up through Palaau and Iloli to the middle of the Hoolehua plateau" (Judd 1936:11). After failed sugar cultivation efforts, "graded railroad bed cutting through the gulches of Palaau" and "irrigation ditches […] on the Hoolehua plain" were all that remained (Judd 1936:11–12). No locomotives were ever shipped to Moloka‘i. The tracks were removed and recycled into cattle guards. Today, stones mark the old railway route from Pālā‘au to Mahana (Strazar 2000).

By 1900, all sugar production on Moloka‘i had ceased (Stearns and Macdonald 1947:3). Regarding the ASCO plantation's demise, former Molokai Ranch manager, George C. Munro, recalled the following:

> Hawaiians claimed that the plantation was doomed from the start, because as the company constructed the railroad along the shore to Palaau it tore down an ancient fishing heiau near Kahunui. It used the rocks for the railroad bed and ran the rails through the center of the heiau. [Morse 1953:6]

3.2.5 1900s

3.2.5.1 Molokai Ranch

Molokai Ranch became a more organized operation in the early 1900s. By 1905, the ranch had transitioned from an open country system to the paddock system (Henke 1929). During the transition, wild deer and feral goat populations were reduced, a water distribution system was implemented, and a breeding program begun. Water from the East Moloka‘i mountains was gravity fed to a concrete reservoir and then piped down to the ranch. By 1929, Molokai Ranch had approximately 75 miles of water pipes and more than 100 miles of smooth wire fences. An 1886 Hawaiian Government Survey map shows several paddocks surrounding the current project area (see Figure 11). These labels were most likely added after the map's original creation, since the paddocks appear to indicate land use by Molokai Ranch, which wasn't established until 1897 and then transitioned to the paddock system from 1898 to 1905 (Henke 1929). The western and eastern project areas are within the Momomi Paddock.

In the 1920s, Molokai Ranch lands consisted of about 10,000 acres leased for pineapple cultivation, 8,000 acres of forest reserves, and 50,000 acres utilized for ranching (Henke 1929:52). Most ranching activities were associated with cattle. Beginning in 1923, Molokai Ranch imported Hereford bulls from the Parker Ranch on Hawai‘i Island, which resulted in a beef cattle population of over 4,500 head by 1929. In 1929, the ranch also had 400 swine and about 200 sheep. Sheep ranching was formerly more prevalent, with sheep numbers up to approximately 17,000 in 1907. However, the combination of sheep and cattle ranching caused over-pasturing, and since cattle ranching was more lucrative, sheep ranching began phasing out. In 1951, grazing land for sheep ranching remained a viable industry, despite its heyday being many decades prior (Carlson 1951). Cattle ranching remains an important industry on Moloka‘i.

Molokai Ranch also produced honey. In 1903, an Italian breed of bees was purchased and crossbred with the island's endemic species (Cooke 1949). In 1928, 350 tons of *kiawe* honey were produced on Molokai Ranch, most of which was sold to Germany (Henke 1929).

3.2.5.2 Hawaiian Homes Commission

In 1920, the U.S. Congress passed the Hawaiian Homes Commission Act to administer and manage some 200,000 acres of land that belonged to the government of the Kingdom of Hawai‘i or was recognized as Crown lands. Agricultural homesteads were to be leased to Native Hawaiians, with leasehold terms generally lasting 99 years at one dollar a year. The following year, the program began attracting people to Moloka‘i. Kalaniana‘ole Colony was the first homestead established under the Hawaiian Homestead Act of 1920. The settlement is located in Kalama‘ula Ahupua‘a, near the southern shores of Moloka‘i Island.

The Moloka‘i homestead program initially was impacted by many problems, including drought and high winds (McGregor 1990:37–38). Insect pests were also a discouraging impediment, at one point accounting for destruction of over 50% of many of the most desirable crops on the island (Wiebke 1940). A *Maui News* article from 1940 recounts the following:

> With the birth of the Hawaiian Homes commission, Hawaiian homesteaders began pouring into the Kala‘e and Ho‘olehua sections. For a number of years extensive truck crops of every kind were raised successfully, but today this project has become a sorrowful enigma. [Wiebke 1940:1]

The 1922 USGS map (Figure 12) shows the project areas as relatively undeveloped. An unimproved Moomomi Road passed through the western project area and a Waihii Pipeline and adjacent unimproved road passed to storage tanks 1.3 km southeast of the eastern project area. The pipelines reflect the burst of agricultural activity.

Despite such difficulties, people managed to cultivate their plots (McGregor 1990:37–38). For instance, at Kalaniana‘ole Colony, water for “bathing, laundry, and farming” was originally supplied by wooden flume from a spring in Kaunakakai, with drinking water provided by a spring in Kalama‘ula (Tomonari-Tuggle 1990:10). Farming was diversified and successful crops included corn, watermelons, cucumbers, sweet potatoes, eggplant, and papaya (Keesing 1936; Wiebke 1940). In addition, demand became high for Moloka‘i alfalfa and homestead tomatoes “controlled the Honolulu market” in 1924 (Keesing 1936:56).

Overall, the program succeeded and was expanded to include 11,400 acres of Pālā‘au-Ho‘olehua beginning in 1924. The current project area consists of approximately 36.4 acres (14.7 hectares) of these Pālā‘au-Ho‘olehua Homestead lands and includes Lots 17 and 104D-1. Due to the homestead program, the Pālā‘au-Ho‘olehua region had the largest population of Native Hawaiians in 1930. Of the 1,031 residents, 826 were Hawaiian (McGregor 1990:10).

In addition to agricultural pursuits, the Hawaiian Homes Commission encouraged raising livestock and ranching. Raising pigs brought the most revenue and economic value; however, a few families sold eggs and every family owned some cattle (Keesing 1936). In 1929, 54 homesteaders owned a total 358 cattle, including two Hereford bulls, 106 horses, 15 mules, and six donkeys (Henke 1929). Community pastures allowed each lot holder to graze up to 60 head of livestock. Additionally, three 250-acre pastures were reserved specifically for ranching. Pastures in Ho‘olehua and Pālā‘au totaled 6,630 acres. In 1935, 979 cattle, 72 horses, and 25 mules utilized the community pastures though less than half Ho‘olehua families had cattle on these lands.

The Hawaiian Homes Commission was also instrumental in the establishment and expansion of Moloka‘i High School, approximately 5.5 km east of the current eastern project area. The school gym was constructed between 1931 and 1932 by the Hawaiian Homes Commission and the county. Moloka‘i High School became the first and only high school on the island when it expanded from an intermediate school to a high school in 1939. Situated at Ho‘olehua on Hawaiian Homes Commission land, it opened to all students on the island with an enrollment of over 400. In 1950, the board of supervisors approved negotiation of the purchase of 40-acres of Hawaiian Homes Commission lands adjacent to the extant campus for construction of a new high school site (Maui News 1950).

3.2.5.3 Pineapple

Starting in 1918, independent pineapple growers tilled “the hillsides from Ualapua to Halawa, but due to high cost of operations these small plantations were short lived” (Wiebke 1940:1). The commercial pineapple industry arrived on Moloka‘i in the early 1920s, with Molokai Ranch owning a majority of the leased pineapple lands (Lee-Greig and Hammatt 2008). Pineapple cultivation began in Pālā‘au-Ho‘olehua in 1926, when Libby, McNeill and Libby signed up some homesteaders to grow pineapple on homestead land operated in leased blocks of several 35-acre homesteads, which were cultivated by Libby.

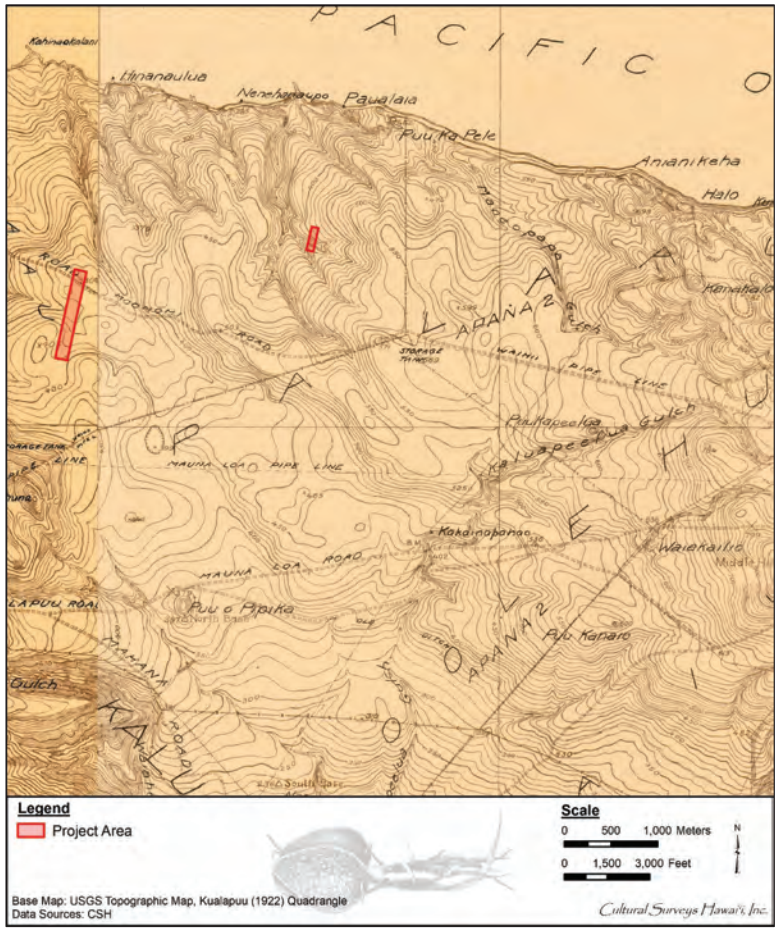


Figure 12. Portion of 1922 Kualapuu USGS topographic quadrangle, showing the project areas as relatively undeveloped (an unimproved Moomomi Road passed through the western project area and a Waihii Pipeline and adjacent unimproved road extended east to storage tanks southeast of the eastern project area)

By 1929, the California Packing Corporation (Calpac) had begun enlisting Native Hawaiian homesteaders in the Kualapu'u region, including areas near the current project area, to grow pineapple. The system adopted by both Libby McNeill & Libby and Calpac involved homesteaders growing pineapple in blocks of land leased by the plantation. Between 12 to 15 abutting homesteads were assembled by the pineapple plantation to form a contiguous area that was assigned a block number (Figure 13). Homesteaders under this block system planted, tended, and harvested to receive a proportionate share of the sale of fruit from each block. The harvested fruit was trucked by Calpac to a pier constructed at Kaunakakai, where it was crane-loaded onto barges and shipped to the Calpac cannery at Kahului, Maui (Larsen and Marks 2010:371–372). Homestead residents received almost two million dollars in cash payments for their efforts between 1929 and 1935.

Despite droughts, including one between 1944 and 1945 that caused the loss of the entire crop, pineapple production in the vicinity of the project area continued until the 1970s (Larsen and Marks 2010:379). Dole Pineapple, which had subsumed Libby, McNeill and Libby's operations, ceased pineapple cultivation in 1975. The California Packing Corporation had planned on closing the same year but continued cultivation until 1983, when a majority of its production ceased business on Moloka'i (Larsen and Marks 2010:382).

3.2.5.4 School Farm

In the early 1920s, Ho'olehua consisted of an undeveloped wide, grassy plain used for pasture with little development and no public school. Several families moved into the area when the land opened to Hawaiian homesteading and California Packing Corporation started their pineapple plantation at Kualapu'u, formerly a Molokai Ranch camp. Kalae School, a one-room schoolhouse at Kalae, eventually moved to the old recreation hall at Kualapu'u to better accommodate students coming from the ranch camp. As homesteads and pineapple cultivation expanded in the area, a new school was constructed at Ho'olehua to meet growing numbers of student enrollment; in 1926 the students at Kalae School moved to the new school. The staff originally consisted of three teachers, including an instructor of agriculture, but within three years the faculty grew to 15.

The school established a progressive agricultural department in 1930, which rapidly developed into a highly reputable agricultural training center. Modern methods of farming and animal husbandry were taught to male vocational students (numbering 70 in 1939). Students cultivated crops designed to give them needed experience and experimented with plantings to test for possible improved crops or strains for use on the island. About half of the vocational boys came from homesteads and the other half from Calpac-employed families. A cooperative program between Moloka'i High School and Calpac was initiated in 1948, where boys from the vocational program worked at the plantation in the mornings before school for seniority consideration for employment post-graduation (*Maui News* 1948).

Hawaiian Homes Commission provided a 26-acre farm (Figure 14) to the department for educational purposes on "well selected land […] makai [toward the sea] of the Hawaiian Homes Commission office in Ho'olehua" (*Maui News* 1940:1). The farm had chicken houses and pigpens built by the vocational students in the farm shop. "The instructor of agriculture and three classes of boys spent weeks with tractors and ropes clearing lantana" from the area to be cultivated (*Maui News* 1939:6). A 1939 news article describes the farm:

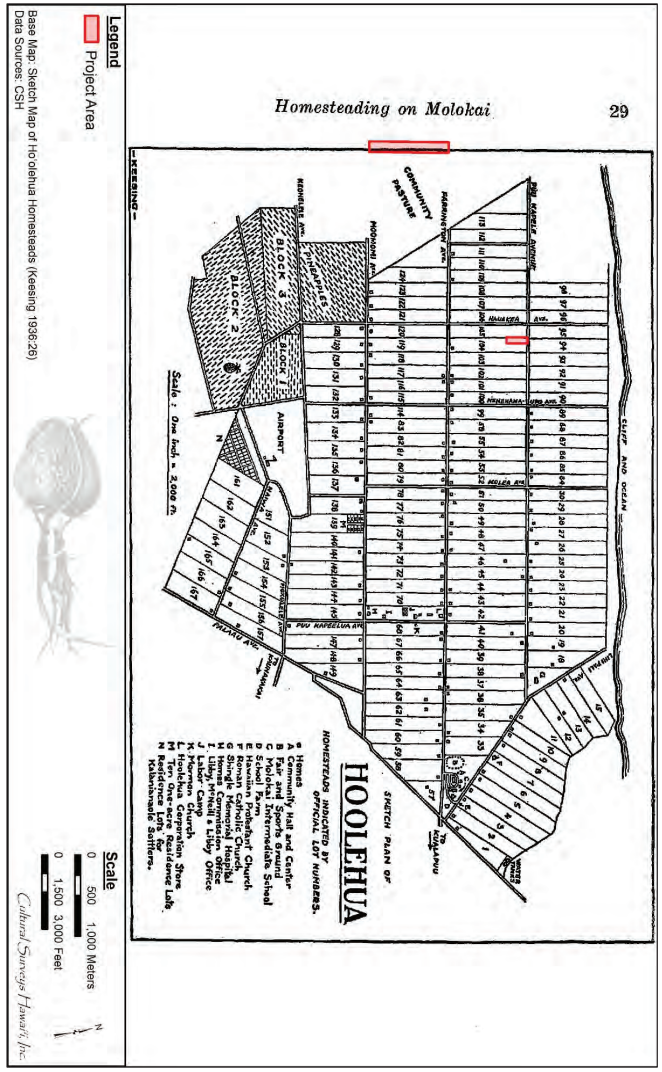


Figure 13. Sketch plan of Ho'olehua Homesteads (Keesing 1936:26) showing current project areas (the eastern lot was within the indicated Hoolehua Homesteads area while the western project area appears to have been in "Community Pasture")

Figure 14. Community Center for Ho‘olehua Homesteads including, from left to right, a hall, school, church, and farm, ca. 1939 (Keesing 1936:124)

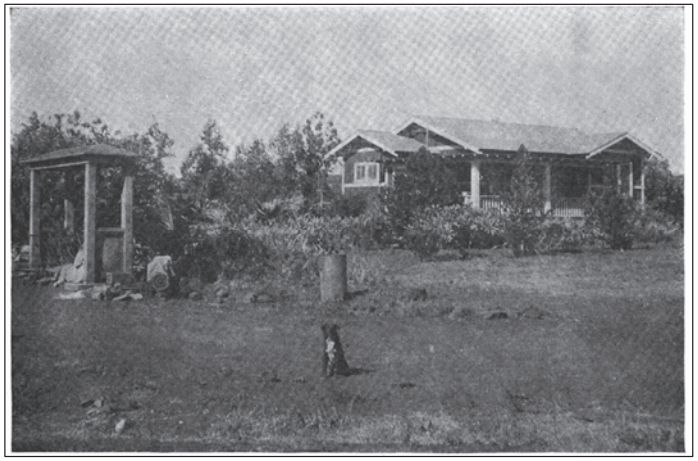


Figure 15. A Ho‘olehua homestead in 1939 (Keesing 1936:59)

> The farm is up to date and well equipped. It serves the community as a practice ground for students; a source of improved livestock, poultry and plans; an example to the community of good landscaping and agricultural methods and is an experimental ground for new crops. Here the boys are receiving thorough instruction in the fundamentals of good scientific farming coupled with training to farm management—increasingly important because of the vital necessity that the modern tiller of the soil have a good working knowledge of farm economics in Hawaii if local small scale agrarian enterprises are to be operated at a profit. [*Maui News* 1939:6]

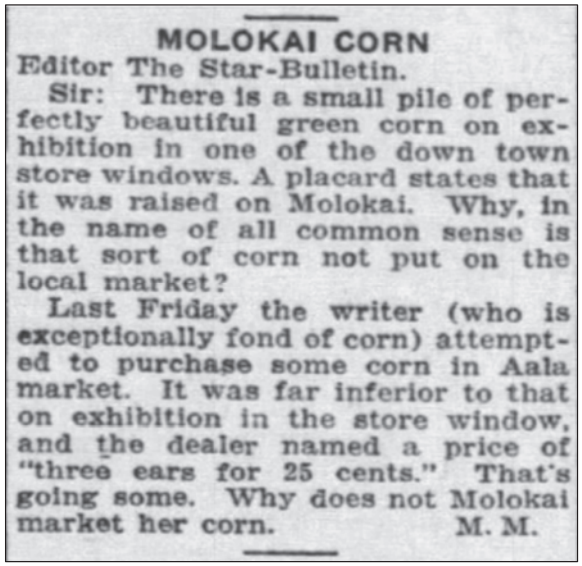
Figure 15 (above) illustrates a typical resident homestead lot in Ho‘olehua during the 1930s. Families farmed a variety of crops in Ho‘olehua, including corn, melons, tomatoes, cucumbers, pumpkins, sweet potatoes, squash, peanuts, beans, onions, and cabbage (Keesing 1936). Pumpkin *poi* (the Hawaiian staff of life, made from cooked taro corms) became a staple for these homesteaders. Though dryland agriculture had successes at Pālā‘au-Ho‘olehua Homesteads, constant care was needed to combat hardships caused by droughts, winds, and pests.

3.2.5.5 Corn

Corn was grown on Moloka‘i from as early as the 1920s. In a letter to the editor of the *Honolulu Star-Bulletin* in 1922, the writer comments quite fondly of Moloka‘i corn (Figure 16). In the 1940s, the Moloka‘i corn project was intended to provide a local source of food for livestock, since all feed corn was being imported (*Honolulu Advertiser* 1944a). Approximately 1,400 acres of field corn and 1,000 acres of milo maize were planted and harvested by resident high-schoolers and homesteaders. Homesteaders also grew feed corn separate from the Moloka‘i corn project (*Honolulu Advertiser* 1944b). In Ho‘olehua, large amounts of corn were sold or fed to livestock (Keesing 1926).

In 1967, Kaye Waldorf became a third partner in Hawaiian Research, Ltd. and moved from his 430-acre corn and soybean farm in Iowa to become resident manager of the company and grow corn on Moloka‘i (Lynch 1968) (Figure 17). Hawaiian Research, Ltd. began experimenting with seed corn on Moloka‘i in the winter of 1966; by autumn 1968, the company was growing over 900 strains of corn. Fertile soils, a year-long temperate albeit arid climate, a culturally diverse environment for his teenage children, and an “intellectual curiosity” attracted Waldorf to experimental agricultural farming on Moloka‘i (Lynch 1968:B-1).

The same State Department of Land and Natural Resources (DLNR), Water and Land Development Division irrigation project that supplied water to about 14,500 acres of pineapple fields in West Moloka‘i was also used to irrigate the corn fields, which comprised a portion of 1,500 acres of diversified agricultural land that also included “experimental potato plantings and some Hawaiian Homestead truck farm lands” (Lynch 1968:B-1). In October 1968, the final stages were underway for a project involving 5 miles of tunnel and additional miles of pipeline to transport water from the wet, northeastern Waikolu Valley to crops in West Moloka‘i. In addition, a 1.4-billion-gallon earth reservoir was being constructed at a central location in Kualapu‘u to store any excess water collected during the rainy winter season in order to provide a year-round supply of water to arid West Moloka‘i’s crops. Kualapu‘u Reservoir is located approximately 6 km southeast of the current eastern project area. While the lack of a natural water supply certainly



MOLOKAI CORN

Editor The Star-Bulletin.

Sir: There is a small pile of perfectly beautiful green corn on exhibition in one of the down town store windows. A placard states that it was raised on Molokai. Why, in the name of all common sense is that sort of corn not put on the local market?

Last Friday the writer (who is exceptionally fond of corn) attempted to purchase some corn in Aala market. It was far inferior to that on exhibition in the store window, and the dealer named a price of "three ears for 25 cents." That's going some. Why does not Molokai market her corn. M. M.

Figure 16. Letter to the editor praising the quality of Moloka‘i corn in 1922 (*Honolulu Star-Bulletin* 1922:6)

Figure 17. Experimental corn farmer, Kaye Waldorf, in West Moloka‘i; pipeline (left) transported water to his crops (Roll 1968:B-1)

created obstacles, Waldorf preferred the more controlled distribution of water to his crops via a pipeline (see Figure 17) to the unpredictable rains he experienced as a corn farmer in Iowa.

3.2.5.6 Infrastructure

In conjunction with agricultural, residential, and economic changes, the twentieth century also brought infrastructure improvements to the island of Moloka‘i. On 13 May 1909, a telephone line was authorized for Moloka‘i Island (*Maui News* 1926). In 1925, construction began on a road connecting Kaunakakai to Ho‘olehua, which was used regularly during Moloka‘i’s pineapple era to transport loads for export. Access roads within the homesteads were established and have been maintained by the Hawaiian Homes Commission without charge to homesteaders or Maui County (Keesing 1936:49). Aerial photographs and topographic maps show unpaved roadways traversing the current project area(s) vicinity in the 1950s and 1960s (Figure 18 through Figure 21). The 1950 aerial photograph (see Figure 18) shows pineapple cultivation neighboring, but not within, the project areas. The 1964 USGS aerial photograph (see Figure 20) indicates active cultivation of pineapple in the western project area.

In 1932, Molokai Electric Company was incorporated and established an electric generating station in Kaunakakai with one 200-horsepower diesel generator, which first supplied electricity to 59 customers in Kaunakakai Village that year (Young 1961). By the 1960s, the company serviced the entire island with nine generators channeling electricity through 80 miles of transmission lines (Young 1961).

Following the development of aerial combat in the First World War, the availability of war-surplus aircraft for civilian aviation in the Hawaiian Islands led to the establishment of a civilian airfield at Ho‘olehua in 1919 named Moloka‘i Field. In the 1930s, improvements were made at Moloka‘i Field including the construction of a terminal building for the use of Inter-Island Airways, the first commercial inter-island carrier. The segregation of part of the civilian airfield at Ho‘olehua for military use occurred when the U.S. Army Air Corps established a portion of the field as “Homestead Field,” beginning in September 1931 (Horvat 1966:38, 40–47). By the time the United States entered World War II in 1941, aircraft of the Fifth Bombardment Group were stationed at Homestead Field. Heavy rains caused water and mud to flow into the operating area of the airport until a drainage ditch was completed in 1953. In 1954, the sod-on-sand runway was replaced by a paved runway and the airport terminal was built in 1957. Figure 19 shows the airport during the 1950s prior to the construction of the terminal. Improvements to the airport continued from 1969 through 1993, including terminal expansions, perimeter security fence installation, a new FAA air traffic control tower, a fire protection system, and a maintenance base yard (State of Hawai‘i 2008).

A heliport associated with the United States Navy reservation, appears on a 1983 topographic map (Figure 22) and 1993 topographic map quadrangles (see Figure 1). However, this development does not appear in recent aerial imagery (see Figure 5).

3.2.5.7 Contemporary Land Use

Pineapple production on Moloka‘i phased out during the 1970s, with complete abandonment by the early 1980s. Tourism and service-related industries replaced commercial agriculture as the economic foundation of urban areas. The towns of Maunaloa and Kualapu‘u have continued to support sizeable populations, though Kaunakakai has remained the island’s major urban center.

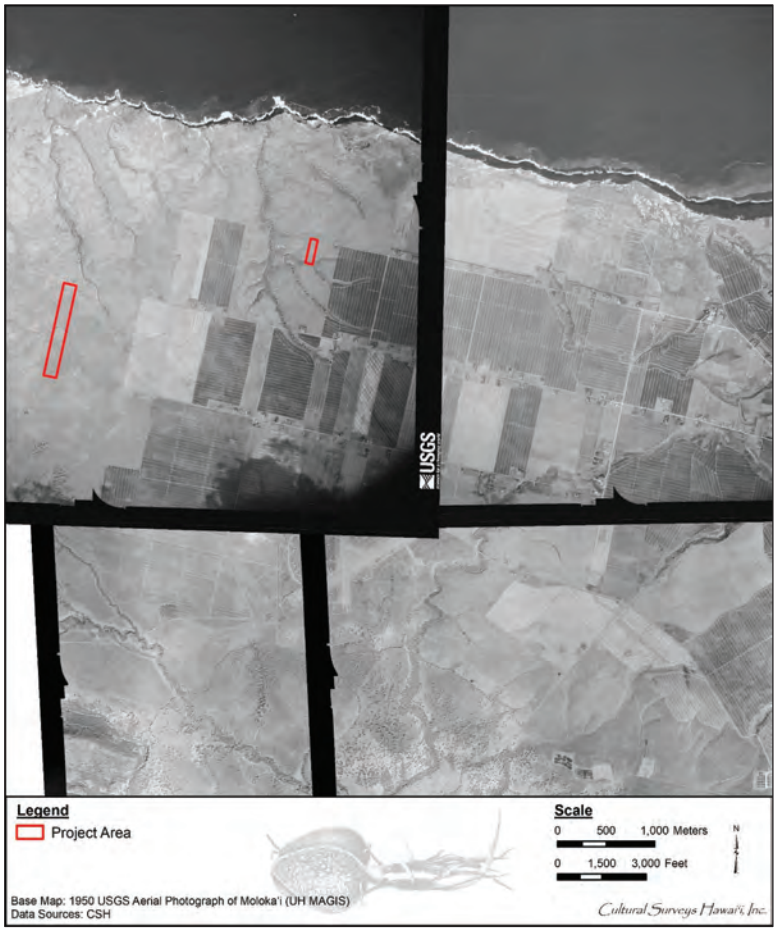


Figure 18. 1950 USGS aerial photograph of Molokai (UH MAGIS) showing pineapple cultivation neighboring, but not within, the project areas

Figure 19. Portion of 1952 Kaunakakai and Molokai Airport USGS topographic quadrangles showing unpaved roads are present within and surrounding the project area; the pipeline south of the project area(s) was used to transport water from East Moloka‘i

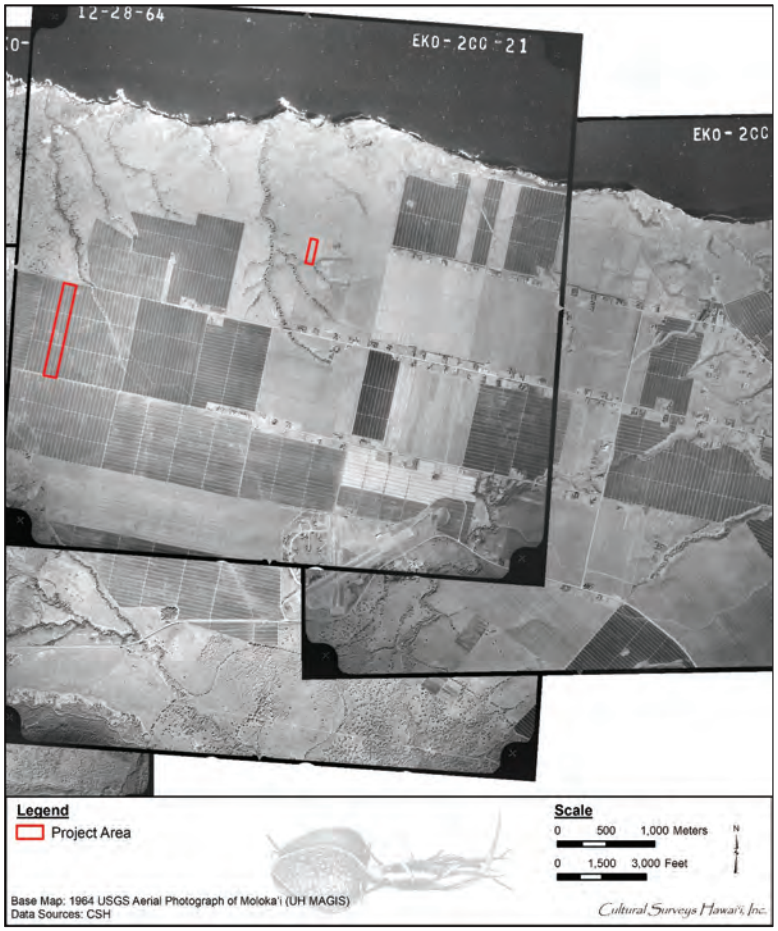


Figure 20. 1964 USGS aerial photograph of Moloka‘i showing the present project areas (note the general absence of trees in the project areas and the indicated active cultivation of pineapple in the western project area)

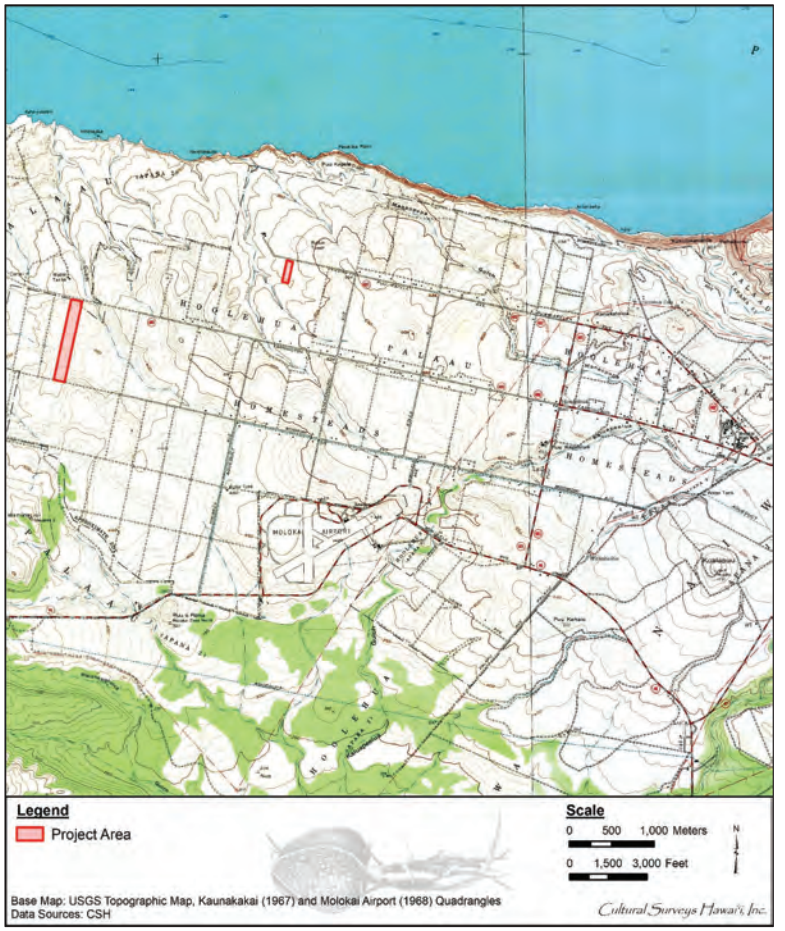


Figure 21. Portion of the 1967 Kaunakakai and 1968 Molokai Airport USGS topographic quadrangles showing unpaved roads abutting the project area(s) and an aqueduct crossing the Ho‘olehua Plain to the south

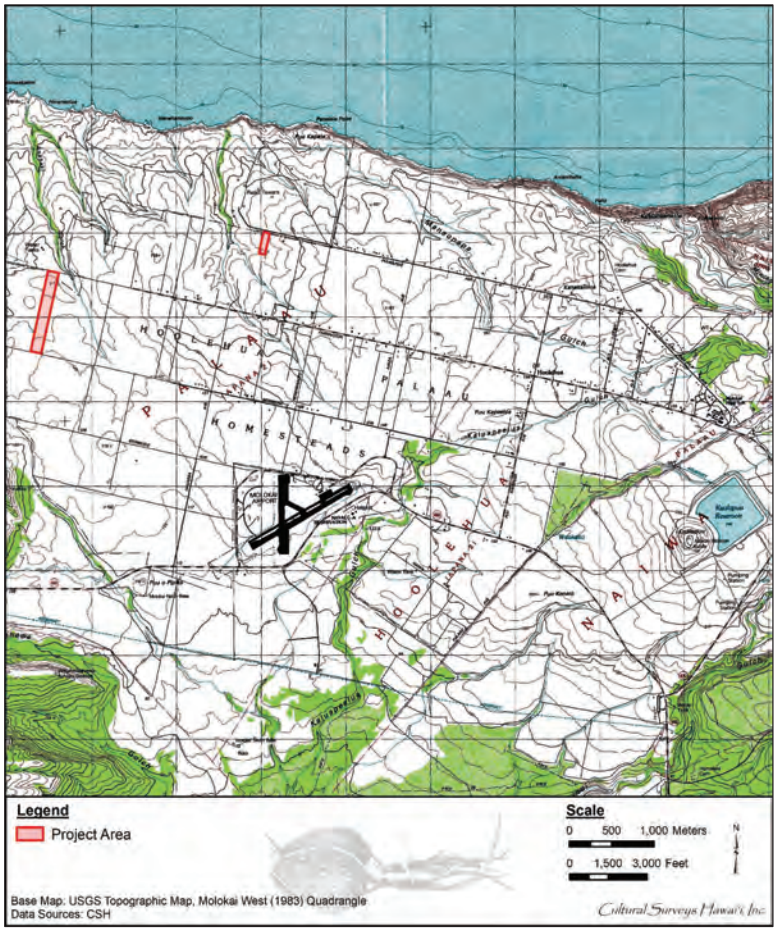


Figure 22. Portion of 1983 Molokai West USGS topographic quadrangle showing an aqueduct crossing the Ho‘olehua Plain to the south and the Kualapuu Reservoir southeast of the project area(s)

The development history of large land holdings on the island of Moloka‘i includes Molokai Ranch Company lands, some

> 55,575 acres, or 35 percent of the entire island. This ranch includes 20 miles of coastline and two hotel properties, the former Molokai Lodge and the former Kaluakoi Hotel, two golf courses, residential, agricultural and conservation land, as well as nearly 30 acres of commercial land near Kaunakakai and 85 acres of industrial land at Maunaloa and Kualapuu. [Magin 2017]

The company that owned all these properties, Molokai Properties Limited, ceased all operations on the island in 2008 (Mangieri 2019). These holdings have been listed for sale since 2017. While community interests actively desire purchasing the lands for residents and/or the state, the fate of these lands and, consequently Moloka‘i in general, is still unknown.

DHHL proposes to construct infrastructure improvements including clearing, grading, and installation of roadway, electrical, connections to domestic water, and irrigation water utilities. The proposed plan calls for ground-disturbing activities to be confined to the two subject parcels, but will extend to existing roadways for access and connection for utilities. These improvements will support DHHL beneficiaries through the provision of essential services necessary for agricultural homesteading. While installation of wastewater treatment systems will be the responsibility of the lessee, the environmental impacts are being considered as part of this action.

3.3 Archaeological and Historic Properties

A discussion of previously identified archaeological resources in the project area vicinity is included in this CIA to inform understandings of land and local communities from the initial Hawaiian discovery and settlement of the islands through the historic era, and to provide additional context for the historic documentation, traditional cultural practices, and oral histories associated with the project area and vicinity.

No historic properties have been previously identified within the project area, and few have been identified within the vicinity (Figure 23 and Table 2, and Table 3).

Figure 23. Previously identified historic properties in the project area vicinity depicted on a portion of the 1993 Kaunakakai and Molokai Airport USGS topographic quadrangles

3.3.1 Discussion and Overview of Archaeological Historic Properties in the Project Area Vicinity

Table 2. Archaeological historic properties in the project area vicinity

SIHP Number	Type	Description	Reference
50-60-02-00995	Agricultural shrine	Notes "sites consisting of enclosures, L-shapes, U-shapes on the low promontories along the coast," in addition to the shelter sites noted by Summers between sites 16 and 17 but her main focus was associated with an anomalous growth of ti plants and was described as including a wall segment, basalt flakes and a fragment of an adze blank and a rock with a flat surface, with a rectangular "basin" measuring about 8" x 14" pecked into it. She posits that "In addition to the practical purpose of the boulders for collecting rain water, it is possible that this site was an agricultural shrine for the worship of the god Lono."	Griffin 1993
50-60-02-01623	Two enclosures and dumps	SIHP # -01623, a site of unknown function, included two enclosures, each with minor amounts of marine shell and some modern refuse and 20th century rubbish dumps.	Major and Dixon 1995
50-60-02-01624	An enclosure and an artifact	SIHP # -01624, regarded as a pre-Contact dwelling consisted of an enclosure with marine shell deposits, fire-cracked rocks and a re-worked basalt flake.	Major and Dixon 1995
50-60-03-00011	Kape'elua Complex	The Kape'elua Complex consists of two sites: "Caterpillar Stones" (Summers Site 11A) and "Stone at Pu'u Kape'elua" (Summers Site 11B)	Summers 1971:37
Summers Site 9	"Kipu Ruins, Kipu"	The site is located on a headland about 800 ft S of the cliffs and N of Kapale Gulch, at an elevation of 1000 ft. Several structures are distributed over an area about 500 ft long and 250 (Structures "A" through "I" are described)	Summers 1971:34-36

SIHP Number	Type	Description	Reference
Summers Site 11A	“Caterpillar Stones”	The stones are on top of the hill; Pu‘u Kape‘elua, “The Caterpillar Hill.” (For *mo‘olelo* see subsection 3.1.2.2).	
Summers Site 11B	Stone at Pu‘u Kape‘elua Ho‘olehua 2	The stone is located just S of the Caterpillar Stones (Site 11A) on Pu‘u Kape‘elua. When seen in 1959, this fairly flat stone measured 6 ft N to S, and 7 ft E to W. It stood about 22 in. high on the N and 18 in. high on the S. On the face of the stone was a hollowed-out basin, 21 in. E to W, 8.5 in. N to S, and 3 in. deep. Leading from the N side of the surface into either side of the basin were two grooves 1 in. wide and 2.5 in. deep. Two more grooves led from the S side of the basin to another basin located on a shelf 5 in. below the face, on the S side of the stone. This basin, which was 1.75 in. deep, measured 18 in. E to W and 6 in. N to S. Numerous sea shells were found in the vicinity of the site. G.P. Cooke (personal communication) said the stone was used for sharpening adzes. K.P. Emory was of the opinion that, because this is an arid region, the stone may have been for collecting water.	Summers 1971:37
Summers Site 12	*Heiau* (Lepekaheo Heiau)	This site is located on the boundary of Ho‘olehua 2 and Pala‘au 2, W of Kaluape‘elua Gulch. Monsarrat referred to Lepekaheo as an “old heiau.”	Summers 1971:37
Summers Site 13	“Kahua Maika, Pala‘au 2” (*‘ulu maika* bowling course)	The *kahua maika* (*‘ulu maika* [stone used in *maika* (ancient Hawaiian game suggesting bowling) game] bowling course) was situated on a rise at a place called Akani; Monsarrat referred to it as an “old *kahua maika*”	Summers 1971:38

SIHP Number	Type	Description	Reference
Summers Site 14	“*Heiau,* Pala‘au 2”	“The site is located E of the Ho‘olehua Cemetery in the pineapple fields W of the gulch, at an elevation of 800 ft. Cartwright reported this (in 1922) as being a *heiau*. The structure was in ruins in 1957, however. Traces of paving could still be found, and the remains of a wall, 35 ft long NE to SE; 13 ft from the NE side was an upright stone 2 ft high, 2 ft wide, and l ft thick.”	Summers 1971:38
Summers Site 16	*Heiau* and house site	This *heiau* is located on the W side of the mouth of Anahaki Gulch at an elevation of about 50 ft above sea level. Cartwright (1922) reported the site as being a *heiau*. Originally the structure was an enclosure. The exterior measurements in 1964 were 43 ft N to S and 36 ft E to W; the maximum height of the eastern wall was 5 ft. The northern wall was probably this same height originally, but the wall on the S was lower. Both the S and W walls were badly damaged. An inner division on the N side of the enclosure measured 17 ft E to W and extended the entire width of the structure. The southern portion of the enclosure was paved. On the crest of the hill to the S of the above site was a house site or shelter, which had a 5-ft-high wall running N to S; the rest of the site was open. Adjoining the northern portion of the wall on the E side was a small, paved terrace.	Summers 1971:38
Summers Site 17 (02-0017)	“Sites at Kahinaokalani, Pala‘au 2”	“Emory reported seeing two house sites and a *ko‘a* [fishing shrine] at Kahinaokalani; the *ko‘a* was at the edge of the cliff. Phelps described a structure, which he called a canoe *halau* [long house], which was on a bluff about 30 ft above the sea”	Summers 1971:38

SIHP Number	Type	Description	Reference
Summers Site 107	“Holua slide at Kualapu‘u, Na‘iwa”	The slide was on the SSW side of Kualapu‘u hill, and traces of it can still be seen. No indications of paving could be found in 1966. Apparently it was similar to Site 3. On the S and W slopes of Kualapu‘u hill, there used to be many sweet potato patches, which were defined by rows of stones (Cooke 1949:121). According to Sophie J. Cooke (1964:58), the former name of Kualapu‘u was Ka ‘Uala Pu‘u, “The Sweet Potato Hill.” On some maps it is called “Mid Hill.”	Summers 1971:80
Isolated Find (IF)-01	Bowling game stone	An *‘ulu maika*	McIntosh et al. 2019

3.3.2 Overview of Architectural Historic Properties in the Project Area Vicinity

Table 3. Architectural historic properties in the project area vicinity

SIHP Number	Type	Significance	Reference
50-60-03-02521	Ranching infrastructure	Concrete tank stands associated with ranching	McIntosh et al. 2019

Fifteen historic properties are located in the project area vicinity. These include a few sites recorded by Summers (1971) north of the project areas and the legendary Kape‘elua Complex (SIHP # 50-60-03-00011) to the west. There appears to have been a locus of traditional Hawaiian activity in Anahaki Gulch north of the western project area (Figure 23) but this is suggested to relate to the micro-environment of that gulch and greater proximity to the coast. A World War II-era military feature complex adjacent to the western border of the current project area was documented, although it is not designated as a historic property (was not older than 50 years when studied) (AECOS Inc. 1980).

Based on background research, cultural deposits and features related to historic homesteading (i.e., agricultural and/or habitation features) are likely present at the current project area. However, potential also exists for encountering evidence of pre-Contact and post-Contact land use.

Section 4 Consultation Results

4.1 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, in order to identify individuals with cultural expertise and/or knowledge of the *ahupua‘a* of Pālā‘au. CSH initiated its outreach effort in November 2021 through letters, emails, and/or telephone calls. CSH completed consultation in September 2022.

4.2 Community Outreach Letter

Letters along with maps and aerial photographs (see Appendix A) of the project areas 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 Pālā‘au and Ho‘olehua Ahupua‘a.
>
> Consultation with traditional cultural practitioners, *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 Munekiyo Hiraga on behalf of the Department of Hawaiian Home Lands (DHHL), CSH is conducting a cultural impact assessment (CIA) for the DHHL Ho‘olehua Scattered Lots Subdivision and Improvements, Pālā‘au Ahupua‘a, Moloka‘i District, Moloka‘i Island, TMKs: (2) 5-2-005:031, Lot 17 and (2) 5-2-026:014, Lot 104D-1. The location and boundaries of the proposed project are delineated on a 1993 Kaunakakai and Molokai Airport U.S. Geological Survey (USGS) 7.5-minute topographic quadrangles (Figure 1) and a 2013 ESRI aerial map (Figure 2) attached to this invitation. The purpose of the project is to create additional homesteading opportunities for DHHL beneficiaries on the Moloka‘i Agriculture Waitlist. The DHHL proposes improvement and subdivision of two (2) parcels. The improvements include clearing, grading, and installation of roadway, electrical, and irrigation water utilities. The proposed plan calls for ground-disturbing activities to be confined to the two (2) subject parcels, but will extend to existing roadways for access and connection for utilities.
>
> Purpose of this Study
>
> The purpose of a CIA is to gather information on Hawai‘i’s cultural resources, practices, or beliefs that have occurred or still occur within the proposed project

area and Pālā‘au and Ho‘olehua 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 by the proposed project to the specific identified resources, practices, and beliefs in the project area and throughout Pālā‘au and Ho‘olehua Ahupua‘a. As a traditional cultural practitioner and holder of long-term 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 project area (shown on the attached Figures 1 and 2) are especially helpful and appreciated:

- Your knowledge of traditional cultural practices of the past within the proposed project area and Pālā‘au and Ho‘olehua Ahupua‘a
- Your specific traditional cultural practice and its connection to the proposed project area and Pālā‘au and Ho‘olehua 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 project area and Pālā‘au and Ho‘olehua Ahupua‘a
- Referrals to other *kūpuna*, *kama‘āīna*, and traditional cultural practitioners knowledgeable about the proposed project area and Pālā‘au and Ho‘olehua 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 project area and Pālā‘au and Ho‘olehua Ahupua‘a
- Your knowledge of cultural sites and *wahi pana* (storied places) within the proposed project area and Pālā‘au and Ho‘olehua Ahupua‘a
- Your comments or thoughts on the potential impacts the proposed project may have on cultural sites and *wahi pana* within the proposed project area and Pālā‘au and Ho‘olehua Ahupua‘a

Consultation Information

Consultation is an important and deeply valued part of the CIA and environmental review process. 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.

With your agreement to participate in this study, your contributions will become part of the comprehensive understanding of traditions of the area, and part of the public record; they will be available for future access through the Office of Environmental Quality Control (https://health.hawaii.gov/oeqc/) and at the State

Historic Preservation Division Library
(https://dlnr.hawaii.gov/shpd/about/research-resources-library).

As a part of this process, your knowledge may be used to inform future CIAs and other heritage studies of cultural practices and resources that need protection from impacts of proposed future projects. If you engage in consultation, and the *mana‘o* and *‘ike* you provide appears 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 platforms.

Your knowledge of the resources and potential effect of the project on traditional practices in the project area and Pālā‘au and Ho‘olehua Ahupua‘a focusing on the topics in the bullet points above can also be submitted in a written statement. CSH will provide return postage of 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 CSH Cultural Researchers, Kellen Tanaka, by email at […] or Chantellee Spencer at […] phone at […].

Mahalo nui loa for your time and attention to this request for consultation.

4.3 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	Comments
Buchanan, Lori L.	Coordinator at Molokai/Maui Invasive Species Committee	Letter and figures forwarded to Ms. Buchanan 5 November 2021 Ms. Buchanan replied via email 8 November 2021 requesting information regarding project area location, acreage and project specific plans CSH replied via email 8 November 2021 clarifying the project location and acreage
Feiteira, Blossom	President, Association of Hawaiians for Homestead Lands	Letter and figures sent via USPS 2 November 2021 Letter and figures sent via email 5 November 2021 Ms. Feiteira replied via email 5 November 2021

Name	Affiliation	Comments
		Ms. Feiteira forwarded letter and figures to Karen Poepoe, Sybil Lopez, Cora Schnackenberg, Lori Buchanan CSH thanked Ms. Feiteira 5 November 2021
Greaney, Malia	*Kama‘āina* of Pālā‘au	Letter and figures sent via email 5 November 2021 Ms. Greaney granted CSH permission to include summary from previous CIA
Nakahashi, Ikaika	Cultural Historian	Letter and figures sent via email 4 November 2021 Mr. Nakahashi replied via email 10 November 2021 suggesting utilizing the media to solicit information. Mr. Nakahashi also recommended meeting with “native tenants and people that currently live or previously lived in the *ahupua‘a*” CSH replied via email 10 November 2021
Phillips, Kealana	Burial Sites Specialist	Letter and figures sent via email 4 November 2021 Mr. Phillips replied via email 5 November 2021 Mr. Phillips forward request to members of Molokai Island Burial Council CSH thanked Mr. Phillips via email 8 November 2021
Purdy-Avelino, Kilia	*Kama‘āina*, daughter of Aunty Kammy	Letter and figures sent via email 5 November 2021 Ms. Purdy-Avelino granted CSH permission to include summary from previous CIA
Soares, Niles	Molokai Burial Council	Mr. Soares called CSH 15 December 2021 CSH returned phone call 16 December 2021 to answer Mr. Soares questions. Mr. Soares offered to ask others if they would like to participate.

4.4 *Kama‘āina* Interview Discussions

4.4.1 Kilia Purdy-Avelino and Justin Avelino

4.4.1.1 Interview synthesis

Kilia Purdy-Avelino was originally born on O‘ahu but lived in Ho‘olehua, Moloka‘i for most of her life. She is the fourth generation of her family to live in the Ho‘olehua-Pālā‘au Homestead. Her grandmother was one of the first Native Hawaiians to move into the Ho‘olehua-Pālā‘au Homestead. Now an educator, Mrs. Purdy-Avelino teaches multiple grade levels (K-12), college-level courses, and is currently obtaining her doctoral degree.

Justin Avelino was born and raised in Hilo, but has lived in Moloka‘i for many years with his wife, raising their children on the homestead. Mr. Avelino is dedicated to Hawaiian cultural protocols, which he first learned from his grandfather. He is an avid hunter and the unofficial caretaker of the lands in Ho‘olehua-Pālā‘au Homestead, helping out his fellow neighbors when they are in need, farming their lands, and guarding knowledge of various sacred sites and *mo‘olelo* of Moloka‘i.

On 5 November 2021, CSH reached out to Kilia Purdy-Avelino regarding the CIA for the DHHL Ho‘olehua Scattered Lots Subdivision and Improvements project. Mrs. Purdy-Avelino granted CSH permission to reuse information she previously shared for a cultural impact assessment pertaining to the Pālā‘au and Ho‘olehua Ahupua‘a. Mrs. Purdy-Avelino and Mr. Avelino discussed the various fruits and vegetables grown on their property in the Ho‘olehua-Pālā‘au Homestead and also shared their *‘ike* regarding *mo‘olelo* and *wahi pana* of the adjacent *ahupua‘a* of Ho‘olehua and Nā‘iwa. A summary of the interview is included in its entirety in Appendix B .

4.4.1.2 Individual’s specific traditional cultural practice and its connection to the proposed project area and greater *ahupua‘a*

Mrs. Purdy-Avelino shared that the original lease for their *‘ohana*’s homestead property (located in the *mauka* region of the Ho‘olehua-Pālā‘au Homestead) contained 40 acres of land. The original lease owner, Aunty Gladys (Mrs. Purdy-Avelino’s relative), leased her lands to aid the pineapple company (either Dole or Del Monte), however, the pineapple company pulled out and Aunty Gladys returned a portion of her lands back to DHHL and kept five acres.

In 1980, when Mrs. Purdy-Avelino’s father obtained the land from his cousin Frank Kupau, who was Aunty Gladys’ son., there was an acre of approximately 50 macadamia nut trees. Mrs. Purdy-Avelino believes they were planted during the 1920s. Now, there is a grove of macadamia nut trees that cover roughly five acres.

Mrs. Purdy-Avelino’s *‘ohana* received the remaining 35 acres of land in the original lease just a few months ago. With the increased land acreage, they plan to help reforest the lands, which will help the rain return to the area.

Currently, Mrs. Purdy-Avelino and Mr. Avelino grow various fruits and vegetables such as *‘ulu* (breadfruit), *kalo* (taro), papaya, *mai‘a* (banana), mango, and macadamia nut trees which feeds their family, as well as their livestock of pigs and chickens. Mrs. Purdy-Avelino also mentioned that her grandmother grew various floral plants on their property such as *‘ākulikuli* (*Sesuvium portulacastrum*), *‘awapuhi* (wild ginger, *Zingiber zerumbet*), *kīkā* (cigar flower, *Cuphea ignea*), *kīkānia* (*Solanum capsicoides*), and *kupaloke* (tuberose), which are used to make *lei* (garland). Mrs. Purdy-Avelino’s father also grows *gardenia*, orchids (*Orchidaceae*), bird-of-paradise (*Strelitzia reginae*), and *anthuriums*.

Mrs. Purdy-Avelino also recalled that during her childhood days, her father would take her down *makai* of Nā‘iwa (toward the project area) to pick up *‘uala* from an *‘ohana* who lived in the area. She remembers eating it raw in the back of the truck.

4.4.1.3 Legends, stories, or chants associated with the individual’s traditional cultural practices and their relationships to the proposed project area and greater *ahupua‘a*

Mrs. Purdy-Avelino shared a *mo‘olelo* she learned from her cousin about how the land of Nā‘iwa received its name. According to the *mo‘olelo*, a mother from Kalaupapa (located east of Pālā‘au), who was a very skilled *lei* maker, made a *lei* out of the *‘iwa‘iwa* (maidenhair fern) fern for her son who wanted to compete in a *lei* making competition held at the Makahiki festival and impress a *wahine* (woman) he was admiring. The son gave this *lei* to the *wahine* who loved it and wore it wherever she went. As she traveled, the spores from the *‘iwa‘iwa* ferns in the *lei* would fall and scatter across the land. Hence the name, Nā‘iwa.

4.4.1.4 Individual's knowledge of cultural sites and *wahi pana* within the proposed project area and greater *ahupua‘a*

Mr. Avelino emphasized the importance of understanding and respecting the spirituality and history of the land. He shared one of the lessons he learned while hunting is to open yourself to your surroundings. He pointed out that there are many ways in which nature and spirits communicate with us and when you are open to receiving such information, you will gain a deeper connection to the land. He recalled coming across areas while hunting where he could "feel the *mana* of the land" or sense that the area was "not *pono* [goodness]." In Ho‘olehua, he recalled encountering certain areas and/or certain objects, like *pōhaku*, that he knew were sacred. He mentioned coming across two *pōhaku* in the shape of a chair while following hunting missions.

Mr. Avelino also mentioned the *makahiki* (ancient festival) ground which are located in Nā‘iwa. He shared a *mo‘olelo* which stated that one of the chiefs of Moloka‘i looked toward the mountains of Nā‘iwa and noticed a cloud shaped like a finger which was pointing to a piece of land. A council of chiefs decided the area as the place that Makahiki ceremonies would be held. Makahiki ceremonies and activities continue to take place in this area and items such as *‘ulu maika* have been discovered. Mr. Avelino stressed that it is vital that no work be done to this area.

4.4.1.5 Individual's comments or thoughts on the potential impacts the proposed project may have on cultural sites and *wahi pana* within the proposed project area and greater *ahupua‘a*

Mrs. Purdy-Avelino shared her concerns related to the proposed project including:

1) Remember that *kūpuna* are always here in spirit and they will show themselves in various ways. It is up to us to make sure that we open ourselves up to receive their information.
2) Be mindful of sacred sites within and around the vicinity of work.
3) Do not *hana ‘ino* (harm) the land or anything that may be disturbed.

Mrs. Purdy-Avelino recommends that a cultural monitor should be on site during any work to help provide guidance in regard to Hawaiian sense of place, protection of sacred areas and objects, and to be a voice for *kūpuna*.

Mrs. Purdy-Avelino supports more homestead lots being developed so more homesteaders can get off the waitlist and into homes, however, she stressed that as more homestead developments occur (whether it may be from DHHL or homesteaders developing their own plots), we all need to make sure to continue to protect sacred sites.

Mrs. Purdy-Avelino also shared her concerns regarding the overall process of outreach to Native Hawaiian communities and how the information received is used.

1) Please make sure to reach out to Native Hawaiian communities in multiple ways and not just by an announcement in a newspaper or on the internet. That way, *kānaka* can be more *maka‘ala* (aware) of proposed projects that are happening in their community.
2) Please do not utilize Native Hawaiians and the *‘ike* that is shared just to "check a box." Native Hawaiians are sharing their *‘ike* of their ancestors to help with the proposed projects and to provide a Hawaiian perspective of the land, its history, and its spirit. Our words and concerns carry *mana*, and it is important that they are heard and the suggestions given are followed through.

3) Full disclosures of project and project details are a must. Developers need to provide transparency to work that will be conducted as well as any other supplemental or follow-up work that may be conducted.

4.4.2 Malia Lani Forbes Greaney

4.4.2.1 Interview synthesis

On 5 November 2021, CSH reached out to Malia Greaney regarding the CIA for the DHHL Ho‘olehua Scattered Lots Subdivision and Improvements project. Ms. Greaney granted CSH permission to reuse information she previously shared for a cultural impact assessment pertaining to the Pālā‘au and Ho‘olehua Ahupua‘a. In 2022, Ms. Greaney provided additional *‘ike*, *no‘ono‘o*, *no‘ono‘omua*, *ho‘oka‘ina mana‘o* (knowledge and experience hence learning, thoughts, considerations, anticipations, composed ideas) on Hawaiian traditions and history of Ho‘olehua, and Pālā‘au and Nā‘iwa Ahupua‘a in context of ancient Hawaiians, recent past, current situation, and future possibilities for Hawaiians living on homesteads in central Moloka‘i. She also shared information regarding continuous native practices of the area and some areas of concern related to the proposed project. A summary of the interview is included in its entirety in Appendix B .

Ms. Greaney recognizes her *kupuna* as her main source of Moloka‘i knowledge. She traces her genealogy on Moloka‘i for centuries through both maternal grandparents who helped raise her.

Ms. Greaney's *‘ohana* has resided on the same homestead for near a century. She continues to live and farm with her children who are fifth generation homesteaders. She inherited her homestead through her *manaleo* (Hawaiian is the first language) *tutu* lady (grandmother). Her grandmother was born in Waialua Valley in Mana‘e, also known as East End. Waialua's river still flows after sustaining many generations of her *‘ohana* on extensive *lo‘i* that produced high yields and quality of *kalo*.

One hundred years ago, Ms. Greaney's pure Hawaiian maternal great-grandmother, Emily Lani Cathcart (Maliu), moved her young family from Waialua Valley to the shores of Kalamaula, and became a participant in the pilot project for the first homesteads in Hawai‘i. Kalamaula was the test site for what would soon expand to Ho‘olehua, then be replicated throughout Hawai‘i after passage of the Hawaiian Homes Commission Act, a federal project in the Territory. Her grandma's mother settled at the shoreline approximately 100 yards from Kapuāiwa Coconut Grove, which her grandpa's grandfather had planted for King Kamehameha V. Ms. Greaney noted that in this protected place of royalty, *puna* (fresh water spring) filled small clear pools and shift close underground in continuous flow ending offshore.

Ms. Greaney's grandfather was born in the central *mauka* lands of Kala‘e which includes the uppermost portions of Nā‘iwa and other of *ahupua‘a*, shown on some family maps as long land divisions with typical tracts from mountain top to wider shoreline and sea. These *ahupua‘a* are also mapped as three detached parcels, when combined they provide varied environments common within *ahupua‘a* boundaries and allow sustainable land and ocean-based living with proper stewardship. Her grandfather's pure Hawaiian grandmother, High Chiefess Kalama Waha was raised near ‘Ili‘ili‘ōpae, Hawai‘i's second largest *heiau* which is located in Mapulehu, another river valley in Mana‘e. She moved to Kalua‘aha where she met and wed R.W. Meyer. He was from Germany via Tahiti, and they later created a settlement in Kala‘e with their 11 children.

R.W. Meyer was also fluent in Hawaiian, English, and other languages. He held many Moloka‘i leadership roles and was instantly appointed Superintendent of Health when the government suddenly began forcibly removing anyone suspected of possibly having Hanson’s Disease from their homes and society for quarantine. R..W Meyer also served Kamehameha IV, Kamehameha V, Princess Ruth Ke‘elikolani, and King Kalakaua in various capacities such as managing Moloka‘i Ranch. Princess Ruth Ke’elikolani selected Charles Reed Bishop and R.W. Meyer was co-executors of her Will which later made Princess Bernice Pauahi Bishop Hawai‘i’s largest private land owner and created Kamehameha Schools. Two-thirds of Kalama and R.W. Meyer’s land including 285 acres in Nā‘iwa and land in Kala‘e, Kahanui, Kīpū, and nearby, came from the princesses because of family ties with extremely close relationships, trust and understanding of the *kuleana* (rights, responsibility) to oversee these places that sustain life and fruitfulness of Hawaiian land and people. Ms. Greaney serves on the volunteer board of directors overseeing all remaining Meyer family land and is working toward collaboration with island farmers to create a more sustainable island future.

4.4.2.2 Individual’s knowledge of traditional cultural practices of the past within the proposed project area and greater *ahupua‘a*

Ms. Greaney noted that agricultural lease homesteaders have made concerted efforts as individuals, families, and groups with expert agricultural assistance to return to historic cultivation of native plants, despite difficulty obtaining public water access. She stated Ho‘olehua homesteaders are again successfully growing plants vital to Hawai‘i culture and bringing back to larger scale crops like dryland *kalo*, *‘uala*, and *‘awa* (kava; *Piper methysticum*) through continued propagation. She stressed that these and other plant resources are critically important because they are necessary in Hawaiian cultural traditions. Ms. Greaney believes the highest percentage of Hawaiians on Moloka‘i Island have helped residents perpetuate endangered plant-based interest, knowledge, and practices.

4.4.2.3 Individual’s specific traditional cultural practice and its connection to the proposed project area and greater *ahupua‘a*

Ms. Greaney continues to raise animals—and consistently pigs—and to grow crops on her homestead. Her *‘ohana* has a tropical fruit orchard and has grown and processed many diversified crops such as sugar, coffee, corn, potatoes. Ms. Greaney sees her homestead as the perfect place to promote indigenous health knowledge and continues to identify medicinal plants in the area which can be gathered or cultivated. Her mother, Yola Forbes, also grew food and medicinal trees on their homestead.

Ms. Greaney also noted that documents and family photos from the 1920s and forward record DHHL’s earliest farmers raised pigs and planted crops in the arid conditions of central Moloka‘i. She also mentioned that *mo‘olelo* tell of *puna* (fresh water spring) once located behind the house of a third-generation homesteader on very dry Olo‘olo Lane.

Ms. Greaney pointed out that Moloka‘i’s history of food abundance gave it the enduring name *Moloka‘i ‘Āina Momona* (rich, fat land). She noted that as recently as a 150 years ago, Moloka‘i was known for large quantities of agricultural and value-added exports such as *kalo* grown in *lo‘i* and dry land *māla* (gardens) along with *‘uala* and other food sources. Similar to current population numbers, in the past Moloka‘i routinely produced food in excess of its own needs and helped feed

the other islands. An elder explained to Ms. Greaney that so abundant was food on Moloka‘i that for hundreds of years Moloka‘i sent food grown in back valleys over the mountains to Kamalō and across the channel to Maui. Today only 2% of food purchased on island is from Moloka‘i, showing the island is capable of providing much more of Hawai‘i’s agriculture products if resources like water are prioritized accordingly.

This abundance also included aquaculture with Moloka‘i having the largest number of *loko ‘ia* in Hawai‘i including over 60 that are still recognizable. Ms. Greaney was first taken to fishponds alone by her grandfather who was proud to share this purely Hawaiian innovation to feed the people. As an adult she worked for many years with restoration efforts. Ms. Greaney hopes more people will join restoration efforts for abundance through restoration of aquaculture in Moloka‘i *loko ‘ia* and help support current *mahiai* (farmers) of Ho‘olehua Homesteads, and development of the next generations.

Ms. Greaney continues cultural practices which are important to physical and spiritual wellness. She noted that Nā‘iwa was widely known as an area of physical and spiritual healing, attracting injured, sick, and dying Hawaiians with their caregivers and loved ones in the past. At the start DHHL’s development, the first medical doctor’s clinic was placed as closely as possible to the ancient healing area. Shingle Hospital, Moloka‘i’s first hospital, opened a decade after the clinic and was also located as closely as possible to Ho‘olehua’s northernmost side approximating the middle of the Nā‘iwa *ahupua‘a*.

Ms. Greaney credits being raised in the place of centuries of Hawaiian healing for her teen choice of a health career and decades as a Registered Nurse (RN). Ms. Greaney learned traditional medicine, receiving some of her grandmother’s Hawaiian knowledge and continued under many other Hawaiian health practitioners and *kauka* (doctors). Her Aunty Charlene Tinau, a pure Hawaiian traditional healer with shared genealogical ties in Mana‘e came nearly every week for years, uniquely blending Hawaiian and western healthcare. She tended their plants, cultivated nearly a century, and shared her knowledge of what to gather for common ailments and emergency applications. She successfully healed bone fractures and many conditions using *la‘au lapa‘au* (plant-based medicine) for Hawaiians without insurance or preferring traditional medicine.

Ms. Greaney was taught starting at ten years old by her experienced Hawaiian grandfather, later her aunty and many expert Hawaiian healers. Her grandpa was first to teach her how to apply traditional techniques of *lomilomi* (body manipulation) to maintain health and for more effective healing. She was taught by Hawaiian elders in the practice of *ho‘oponopono* (Hawaiian conflict resolution), a guided technique for spiritual, self, and interpersonal relationship healing. She noted that unresolved conflict causes stress, physical inflammation, and may lead to severe illness. She has received intensive instruction on how to provide this service for Hawaiian families seeking reconciliation when facing terminal illness. She stressed that a necessary part of all Hawaiian healing methods is prayer and meditation during preparation like planting or gathering medicine and during application, through the healing process until it finishes. Powerful prayers affect body, mind and spirit, and are strengthened by connectedness to the spiritual nature of the place, plants, person being healed, and the healer.

Moloka‘i was of the highest spiritual importance to ancient Hawaiians as recognized in one of the island’s nicknames, Moloka‘i Pule O‘o (Moloka‘i of powerful prayer). Members of the House of Kamehameha saw Moloka‘i as the physical *piko* (naval, center, source) centralizing Hawai‘i’s

spiritual power which united people and place. The spiritual epicenter of Hawaii drew *ali‘i* and champions from outer islands who would travel to this hallowed place to compete for top honors and recognition in the annual Makahiki competitions. All manner of strength and skill were tested in physical, strategic, intelligence, talent, and metaphysical challenges. Makahiki was an integral part of life that allowed for peace, shared abundance, and continuation of the Hawaiian race. Each island had Makahiki grounds dedicated to Lono where offerings would be made in reverence, appreciation, and hopes of an abundance of food in the coming year. Lono is one of the four main Hawaiian gods with Kū (God of war), Kāne (creator of man), and Kanaloa (God of the ocean) with influences on time, spiritual and physical realms; inanimate things, plants, animals, and people; lessor gods, and each other. Varying powers and characteristics of each god have great complexity, as do their relationships, and in different ways and times may be oppositional, parallel, complementary, and overlapping. In the overarching belief system of Native Hawaiian life, influences of Lono were life sustaining, including for abundant agricultural crops. To this day the processional moves east to west to the sacred grounds of the god Lono, publicly known simply as Nā‘iwa.

Old Hawaiian historians recorded genealogies tied to the original Makahiki grounds. This includes the *ali‘i* credited for starting all Makahiki practices in Hawai‘i. He was called by the name of Lonoikamakahiki. One account says he came to Moloka‘i from Hawai‘i Island and from among all areas in Hawai‘i identified much earlier as high holy places, he decided this specific area was to be the primary place in the islands for honoring Lono. Early land records specify Lono descendants as *konohiki* and title holders in the region through the nineteenth century. The final third of the regional lands owned by R.W. Meyer and Kalama Waha, beyond the Nā‘iwa land, did not come from the princesses but rather 1,060 acres came from Lonowahine *ali‘i* in 1883.

Ms. Greaney mentioned there is an ancient *hula* site remaining in the Nā‘iwa Makahiki grounds near and above her homestead. Moloka‘i is the birthplace of the enduring ancient traditions of Kapo and Laka. *Hula* is celebrated in Ka Hula Piko, and Lua (a type of dangerous hand-to-hand fighting), for defense is sometimes referred to as a twin or sibling of dance. Ms. Greaney noted that neither practice was restricted to one gender and both perpetuate Hawaiian philosophies of spiritual and physical existence.

Makahiki was so important that it marked time and regulated people’s physical and religious life. Ms. Greaney insists no one can authentically recognize or celebrate the true spirit of Makahiki, and the peace and abundance it symbolizes for all of Hawai‘i, without also recognizing what began, endured, and exists in this particular physical space. It is a critical part of Moloka‘i’s role and record in history prior to Contact, including land use, religious culture, and the daily lives of the Hawaiian people. It played an important part in continuance of intergenerational and communal practices near extinction at the time of the Hawaiian Renaissance; and because of Moloka‘i it is again firmly rooted in annual calendars and celebrations statewide.

Ms. Greaney pointed out that the original Makahiki lands are also the only place of continuous practice of the social, physical, emotional and spiritual ritual, healing, and enlightenment associated with Makahiki. She noted that cultural experts on Moloka‘i still observe Makahiki with formal protocol, and all youth learn the traditional practices of their ancestors. Other islands ceased to honor these practices while the ancient knowledge continued only on Moloka‘i. School students throughout Hawai‘i have traveled for nearly a decade to participate in our Makahiki competitions,

including deades of annual representatives from Kamehameha Schools. It remains one of the island’s main annual social celebrations with generations carrying memories of Hawaiian sportsmanship as competitors and spectators.

4.4.2.4 Different natural resources associated with the individual’s specific traditional cultural practice

Ms. Greaney stated that Hawaiians intimately understood the relationship of people and *wai* with a necessity to maintain and protect clean water systems for health, wealth, and survival. She noted Ho‘olehua, including Nā‘iwa, is historically known for its dry and barren land, with little to no water available. She mentioned that homestead residents have been faced with high costs of water and limited access to water. She stated the proposed project is important as it will provide homestead residents the opportunity to use land for agricultural purposes; however, she stressed that it is also important to ensure access to the appropriate amount of water and at a reasonable cost. If this is not possible, residents who move into these agricultural lots may have difficulty growing crops.

Ms. Greaney also noted that during the months of Makahiki, southerly Kona storms are associated with Lono. Winter storms are stronger and more frequent, bringing rains to much dryer Leeward sides of southwest shores including the low elevations of Nā‘iwa and Pālā‘au. Most months of the year, prevailing trade winds blow from the northeast windward side, carrying rains of Kahanui, Nā‘iwa, and Pālā‘au in upland Kala‘e inland from the cliff tops to the upper regions of the Ho‘olehua homesteads at the mid-elevation of Nā‘iwa and Pālā‘au. These rains lighten as they travel to the Pālā‘au and Nā‘iwa foothills of Ms. Greaney’s homestead. The windward rains largely dissipate before reaching homesteads in the southern and western halves of the slowly sloping lowlands. In early morning hours, *ua poko* (passing showers) often travel along a small gulch along the length of her homestead.

Ms. Greaney stated that an immense *hau* (*Hibiscus tiliaceus*) tree has thrived in Nā‘iwa/Pālā‘au for unknown generations, including the last four of her family, and helped them to flourish. She believes the tree a living linkage to the past allowing continuation of endangered native practices and accompanying understanding. The ancient tree is located at the lower Makahiki grounds rather close to the cliff line.

The *hau* provides a windbreak, helping new crops grow without damage, reducing erosion from water coming down the gulch, and many more provisions. It is an irreplaceable source for of plant parts with medicinal properties for *la‘au lapa‘au* and tools for *lomilomi* made from *hau*’s strong, light branches with beneficial bends. It is also her *‘ohana*’s main resource to make *ko‘i* (adze) for hand carving *papa he‘e nalu* (surfboards).

Making surfboards in the way they were first made is a source of pride for Ms. Greaney’s *‘ohana*. Surfing was always their most enjoyed family bonding activity. Ms. Greaney noted that making surfboards involves several plants found in this area of Moloka‘i. She pointed out there are very few families that still know and can pass on this traditional practice.

Her *‘ohana* also all have a hand carving *papa ku‘i ‘ai* (pounding board such as to make *poi*) with handmade *pōhaku ku‘i ‘ai* (food pounding stone) for the preparation of many traditional and common foods. Ms. Greaney stressed it is very important that appropriate prayers are offered in creation of both types of *papa* (board), *pōhaku*, and all other implements. She also emphasized

that emotions and interactions must be positive because it is imbued in the creation process and will accordingly effect people using the product.

Hau can also be used for building fires. *Hau*’s straight branches provide light, strong wood for making spears. Ms. Greaney mentioned her son enjoys the sport of throwing and blocking spears which he was taught by Hawaiian *lua* elders, and he makes them from *hau* and other homestead trees. Young *hau* branches are also flexible enough to make the excellent kites flown during Makahiki. Ms. Greaney recalled frequently flying such kites as a girl upon the reliable trade winds over their rolling hills in this area of Nā‘iwa/Pālā‘au. Cordage made of *hau* was also used to make bows for hunting and sport, and for sling shots, the most preferred weapon of war for its long range and lethal power.

Ms. Greaney also noted the initiation of war was bound to spiritual guidance, and branches of *hau* were placed in front of advancing armies by a *kahuna* while others prayed throughout the battle. In the end the victor’s *hau* remained standing. *Hau* is also used in other spiritual practices, being important in *heiau* and *hula*. It was so integral to Hawaiian ritual and daily life that permission from *ali‘i* was required to cut one down.

Hau is also included in Hawaiian creation stories involving the great mother of Moloka‘i Island, Hina, and two of her demi-god sons, Maui and Kamapua‘a. In native religion, Kamapua‘a (the pig-God) oversees fertility, he is recognized on “pig alters” that mark *ahupua‘a* boundaries visited by priests in Makahiki protocol, and he is appears in many stories with the god Lono.

4.4.2.5 Legends, stories, or chants associated with the individual’s traditional cultural practices and their relationships to the proposed project area and greater *ahupua‘a*

Ms. Greaney stated that a large *hau* tree at the gulch edge supports oral and written histories on the origins of Ho‘olehua in connection with the Nā‘iwa Makahiki grounds. She mentioned *kupuna* recorded that an ancient *hau* tree identifies the location where a beloved *ali‘i* named Lehua lived in Ho‘olehua. Some believe she became the namesake of the area she overlooked. Ms. Greaney also discussed the more well-known naming history in which a beautiful *hula* dancer named Lehua was given a *lei* made of Nā‘iwa fern by a Makahiki champion. They married and the fern which had only grown in his Kalaupapa home continued to spread from the cliff line, giving Nā‘iwa its name.

Ms. Greaney also shared that another source of Ho‘olehua’s name is the soldiers leading the advance in war. She heard old stories of Night Marchers (spirits of dead Hawaiian warriors) traveling their path from mountains in Kala‘e toward the Makahiki grounds. They then make their way along the same boundary gulch toward the high school gym on Farrington Avenue. Some Hawaiians still testify to having seen them in this area as children. Kamehameha rested his troops in the food-abundant and spiritual Moloka‘i uplands while recuperating and training before going on to successfully capture O‘ahu.

Ms. Greaney recalled stories of Pu‘u Pe‘elua (Caterpillar Hill) in Ho‘olehua. Her mother shared that in certain years in the 1940s and 1950s, the entire lower area of Nā‘wa would be covered with caterpillars to the extent they could not walk to school as children without crushing them underfoot. *Mo‘olelo* about this area of central Moloka‘i include large caterpillars, indicating they have come at various times during history. Ms. Greaney also discussed Kualapu‘u (Sweet Potato Hill). She recalled that when she was in school the whole area around Kualapu‘u was planted in pineapple,

and from 50 years before that nearly all of Ho‘olehua’s homestead area was also used for growing pineapples. She mentioned that in the 1980s, there were so many small black beetles called “pineapple bugs” that electric zappers were placed in the school cafeterias to keep the numbers down, however, students still had to cover their plates or they would have them in their food. They disappeared in the years after the pineapple companies left.

Ms. Greaney mentioned that fruit flies have caused serious damage to fruit crops for decades. She noted her *‘ohana* participated in research to reduce their numbers in the 1980s and early 2000s. She also mentioned that over the past decade, there have been years when locusts and large black moth populations exploded such that a hundred could easily end up in the house and cover the lights if any doors were opened after dark. They caused major agricultural damage by eating and stinging the fruit, and significantly reduced viable crop yields. She isn’t sure if the more recent spikes in pest populations have been explained, whether they occurred naturally, were exacerbated by man’s actions, or if any of the infestations will occur cyclically.

4.4.2.6 Individual’s comments or thoughts on the potential impacts the proposed project may have on ongoing traditional cultural practices and natural resources within the proposed project area and greater *ahupua‘a*

Ms. Greaney sees great potential in reducing disproportionately high Hawaiian mortality and morbidity rates with traditional native diet, lifestyle, and healing techniques. She believes this will be eagerly adopted by residents of this area when it is affordable and readily available, as more Hawaiians are looking to the past for knowledge on how to have a high quality of life. She noted homesteaders interested in growing medicinal plants as crops have the benefit of high demand from people of all cultures who seek alternatives to “big pharma” and are willing to invest in their health by purchasing products offering more natural healing methods. She also noted that increasing homesteader’s income generation this way has the potential to raise socio-economic status and quality of life, continue cultural practices of this area, and maintain a rural community and traditional lifestyles.

Ms. Greaney expressed some hesitation regarding agricultural and housing development in the proposed project areas related to assuring new lessees would be aware of past use of the land and any possible health effects it may have directly on those using the land as well as for those who consume food grown in these and nearby areas. She pointed out that Hawaiian Home Lands were leased to plantations for a century and a half, and land in all areas continues to be leased to private companies including sugar, pineapple, and coffee plantations, as well as for research by large agricultural bioscience companies for designing products for pest control.

Ms. Greaney mentioned her master’s thesis in 2001 looked at possible public health effects of the copious pesticide use of chemicals that were made illegal in the U.S. which she found were applied by the pineapple plantations. She does not know what harsh chemicals may have been used by the other agri-businesses. Ms. Greaney strongly suggests the soil be well tested by third-party professionals for any presence of harmful chemical residue possibly remaining in the soil. This is a good safety precaution for farmers. She also suggested future studies look at nearshore areas off Pālā‘au to assess the presence of chemicals from runoff and any impacts.

Ms. Greaney insists that due to the special significance of this place in Hawaiian culture, historically and continuously, the homestead community should be notified well in advance of any

proposed developments that will occur on the Makahiki lands. She also insists homesteaders be individually consulted with if any proposed development involves their land since many lots have been occupied by the same family for a century.

4.4.2.7 Individual's knowledge of cultural sites and *wahi pana* (storied places) within the proposed project area and greater *ahupua‘a*

Ms. Greaney mentioned there are three *wahi pana* located near the center of Moloka‘i above the Kalaupapa cliff line, also called *piko*. At the highest elevation of Nā‘iwa is Pu‘uolelo (speaking hill). It is easy to identify from lower lands of Ho‘olehua and Nā‘iwa by a grove with pines trees which was planted by Mr. Meyer at the summit in the early 1800s. To the east is the high precipice, Kaohu (adorned in fog) and in the middle is Keālia Lake, commonly called Meyer Lake, one of few naturally occurring freshwater lakes in Hawai‘i. These three *wahi pana* form a line that passes procreative Ka‘ule o Nanahoa (Phallic Rock), the female fertility partner *pōhaku* sometimes called Waihuehue, and other sites of regeneration. Birthing stones for delivery of babies are still located in the area.

Ms. Greaney noted that Homelani and Ho‘olehua cemeteries, both chosen by Hawaiians as the final resting place for their beloved *‘ohana,* are located in proximity to *wahi pana*. She was also informed by *kupuna* about a *lele* (place of transition to the afterlife for souls/spirits) above her homestead where the physical and spiritual realm connect. She also mentioned a mapped *heiau* exists in that location.

4.4.2.8 Individual's comments or thoughts on the potential impacts the proposed project may have on cultural sites and *wahi pana* within the proposed project area and greater *ahupua‘a*

Ms. Greaney stated that if there are any future developments, it is important that in depth archaeological inventory surveys be conducted as it is known that many artifacts still exist in the *mauka* and central regions of Nā‘iwa and Pālā‘au. She pointed out that though not inhabited by such a large constant population year round like other areas near the coast and freshwater, this area supported thousands of Hawaiians who regularly occupied it for seasonal, ceremonial, celebratory, and other prime purposes.

She mentioned many *pōhaku* implements including *‘ulu maika* for ceremonial competitions and *ma‘a* (slingshot stones) for battles of sport and war have always been found in the area of her homestead and continued to be unearthed to this day. She noted more artifacts have been found recently and numerous more are likely to be present because of past heavy use of the area, however, they may not be immediately recognized if they do not have the obvious shape of *‘ulu maika*.

Section 5 Cultural Practices and Cultural Resources Identified During Consultation as Associated with the Project Area/ Greater Ahupua‘a

5.1 Agricultural and Gathering Practices

On their homestead property, located in the *mauka* region of the Ho‘olehua-Pālā‘au Homestead, Mrs. Purdy-Avelino and her husband Justin Avelino grow various fruits and vegetables such as *‘ulu*, *kalo,* papaya, *mai‘a*, mango, and macadamia nut trees which feed their *‘ohana*, as well as their livestock of pigs and chickens. Mrs. Purdy-Avelino's grandmother also grew various floral plants such as *‘ākulikuli*, *‘awapuhi*, *kīkā*, *kīkānia*, and *kupaloke* which are used to make *lei*. On their homestead today, Mrs. Purdy-Avelino's father also grows *gardenia*, orchids, bird-of-paradise, and *anthuriums*. During her childhood, her father also took her down *makai* of Nā‘iwa to pick up *‘uala* from an *‘ohana* who lived in the area. She recalled eating it raw in the back of the truck.

Recently, Mrs. Purdy-Avelino's *‘ohana* received the 35 acres of land that was in their original lease but had been returned to DHHL. They plan to reforest the lands which will also help the rain return to the area.

Ms. Greaney continues to raise animals including pigs and grow crops on her homestead. Her *‘ohana* also has a tropical fruit orchard and has grown and processed many diversified crops such as sugar, coffee, corn, potatoes. Ms. Greaney also continues to identify medicinal plants in the area which can be gathered or cultivated. Her mother, Yola Forbes, also grew food and medicinal trees on their homestead.

Ms. Greaney also noted that documents and family photos from the 1920s and forward record DHHL's earliest farmers raised pigs and planted crops in the arid conditions of central Moloka‘i. She also mentioned that *mo‘olelo* tell of *puna* (fresh water spring) once located behind the house of a third-generation homesteader on very dry Olo‘olo Lane.

Ms. Greaney noted that agricultural lease homesteaders have made concerted efforts to return to historic cultivation of native plants, despite difficulty obtaining public water access. She stated Ho‘olehua homesteaders are successfully growing plants vital to Hawai‘i culture and bringing back to larger scale crops like dryland *kalo*, *‘uala*, and *‘awa*. She stressed that these and other plant resources are critically important because they are necessary in Hawaiian cultural traditions. Ms. Greaney believes Moloka‘i's highest percentage of Hawaiians has helped residents perpetuate endangered plant-based interests, knowledge, and practices.

Ms. Greaney pointed out that Moloka‘i's history of food abundance gave it the enduring name *Moloka‘i ‘Āina Momona* (rich, fat land). She noted that as recently as a 150 years ago, Moloka‘i was known for large quantities of agricultural and value-added exports such as wet and dry land *kalo*, *‘uala,* and other foods. She recalled a *kupuna* explained that food on Moloka‘i was so abundant that Moloka‘i sent food grown in back valleys over the mountains to Kamalō and across the channel to Maui for hundreds of years. She also mentioned that currently, only 2% of food purchased on island is from Moloka‘i, showing that the island is capable of providing much more of Hawai‘i's agricultural products if resources like water are prioritized accordingly.

Ms. Greaney also recalled that when she was in school the whole area around Kualapu‘u was planted in pineapple, and from 50 years before that nearly all of Ho‘olehua’s homestead area was also used for growing pineapples.

Ms. Greaney stated an immense *hau* tree has thrived in Nā‘iwa/Pālā‘au for unknown generations, including the last four of her family, and helped them to flourish. She believes the tree is a living linkage to the past allowing continuation of endangered native practices and accompanying understanding. The ancient tree is located at the lower Makahiki grounds rather close to the cliff line.

Ms. Greaney shared the numerous uses of the *hau* tree. She stated that the *hau* tree provides a windbreak, helping new crops grow without damage, reduces erosion from water coming down the gulch, and many more provisions. *Hau* is also an irreplaceable source for plant parts with medicinal properties for *la‘au lapa‘au* and tools for *lomilomi* made from *hau*’s strong, light branches with beneficial bends. It is also her *‘ohana*’s main resource for making *ko‘i* for hand carving *papa he‘e nalu*. She noted that making surfboards involves several plants found in this area of Moloka‘i. *Hau* can also be used for building fires. *Hau*’s straight branches provide light, strong wood for making spears. Young *hau* branches are also flexible enough to make the excellent kites flown during Makahiki. Cordage made of *hau* was also used to make bows for hunting and sport, and for sling shots, the most preferred weapon of war for its long range and lethal power.

Ms. Greaney also noted the initiation of war was bound to spiritual guidance; branches of *hau* were placed in front of advancing armies by a *kahuna* while others prayed throughout the battle and in the end only the victor’s *hau* remained standing. *Hau* is also used in other spiritual practices, being important in *heiau* and *hula*. It was so integral to Hawaiian ritual and daily life that permission from *ali‘i* was required to cut one down.

Hau is also included in Hawaiian creation stories involving the great mother of Moloka‘i Island, Hina, and two of her demi-god sons, Maui and Kamapua‘a. In native religion, Kamapua‘a (the pig-God) oversees fertility, he is recognized on “pig alters” that mark *ahupua‘a* boundaries visited by priests in Makahiki protocol, and he is included in many stories with the god Lono.

5.2 Marine Resources

Ms. Greaney mentioned Moloka‘i has the largest number of *loko ‘ia* in Hawai‘i including over 60 that are still recognizable. She recalled being taken to fishponds alone by her grandfather who was proud to share this purely Hawaiian innovation to feed the people. As an adult, she worked for many years with restoration efforts. Ms. Greaney hopes more people will join restoration efforts for abundance through restoration of aquaculture in Moloka‘i *loko ‘ia*.

5.3 Recreational Activities

Ms. Greaney stated surfing was always her *‘ohana*’s most enjoyed family bonding activity. She noted that making surfboards in the way they were first made is a source of pride for them. She pointed out there are very few families that still know and can pass on this traditional practice.

Ms. Greaney mentioned that her son enjoys the sport of throwing and blocking spears. He was taught by Hawaiian *lua* elders, and he makes them from *hau* and other homestead trees. Ms.

Greaney recalled frequently flying kites as a girl upon the reliable trade winds over their rolling hills in this area of Nā‘iwa/Pālā‘au.

5.4 *Mo‘olelo* and *Wahi Pana*

Mrs. Purdy-Avelino also shared a *mo‘olelo* told to her by her cousin regarding the naming of the land of Nā‘iwa. According to the *mo‘olelo*, a mother from Kalaupapa, who was a very skilled *lei* maker, made a *lei* out of the *‘iwa‘iwa* fern for her son who wanted to compete in a *lei* making competition held at the Makahiki festival and to impress a *wahine* he admired. The son gave this *lei* to the *wahine*. She would wear it wherever she went and the spores from the *‘iwa‘iwa* ferns in the *lei* would fall and scatter across the land.

Mr. Avelino also shared a *mo‘olelo* regarding how the Makahiki Grounds was selected. According to the *mo‘olelo*, a chief of Moloka‘i looked toward the mountains of Nā‘iwa and noticed a cloud shaped like a finger which was pointing to a piece of land. A council of chiefs gathered and decided the Makahiki ceremonies would be held in that area. To this day, Makahiki ceremony and activities continue to take place there and items such as *‘ulu maika* have been encountered in this area.

Ms. Greaney also mentioned many *pōhaku* implements including *‘ulu maika* for ceremonial competitions and *ma‘a* for battles of sport and war have been found in the area of her homestead and continue to be unearthed to this day. She noted more artifacts have been found recently and numerous more are likely to be present because of past heavy use of the area, however, they may not be immediately recognized if they do not have the obvious shape of *‘ulu maika*.

Ms. Greaney noted that as the spiritual epicenter of Hawai‘i, Moloka‘i drew *ali‘i* and champions from outer islands who would travel to this hallowed place to compete for top honors and recognition in the annual Makahiki competitions. Makahiki was an integral part of life that allowed for peace, shared abundance, and continuation of the Hawaiian race. Each island had Makahiki grounds dedicated to Lono where offerings would be made in reverence, appreciation, and hopes of an abundance of food in the coming year. To this day the Makahiki processional moves east to west to the sacred grounds of the god Lono, commonly known simply as Nā‘iwa.

Ms. Greaney mentioned that old Hawaiian historians recorded genealogies tied to the original Makahiki grounds including Lonoikamakahiki, the *ali‘i* credited with starting all Makahiki practices in Hawai‘i. One account says he came to Moloka‘i from Hawai‘i Island and from among all areas in Hawai‘i identified much earlier as high holy places, he decided this specific area was to be the primary place in the islands for honoring Lono. Early land records specify Lono descendants as *konohiki* and title holders in the region through the nineteenth century.

Ms. Greaney mentioned there is an ancient *hula* site remaining in the Nā‘iwa Makahiki grounds near and above her homestead. Moloka‘i is the birthplace of the enduring ancient traditions of Kapo and Laka. *Hula* is celebrated in Ka Hula Piko, and *lua* for defense is sometimes referred to as a twin or sibling of dance. Ms. Greaney noted neither practice was restricted to one gender and both perpetuate Hawaiian philosophies of spiritual and physical existence.

Ms. Greaney stated that Makahiki was so important it marked time and regulated people’s physical and religious life. She insists no one can authentically recognize or celebrate the true spirit of Makahiki, and the peace and abundance it symbolizes for all of Hawai‘i, without also

recognizing what began, endured, and exists in this particular physical space. It is a critical part of Moloka‘i’s role and record in history prior to Contact, including land use, religious culture, and the daily lives of the Hawaiian people. It played an important part in continuance of intergenerational and communal practices near extinction at the time of the Hawaiian Renaissance; and because of Moloka‘i it is again firmly rooted in annual calendars and celebrations statewide.

Ms. Greaney pointed out that the original Makahiki lands are also the only place of continuous practice of the social, physical, emotional and spiritual ritual, healing, and enlightenment associated with Makahiki in existence. She noted cultural experts on Moloka‘i still observe Makahiki with formal protocol, and all youth learn the traditional practices of their ancestors. When other islands ceased to honor these practices the ancient knowledge continued only on Moloka‘i. School students throughout Hawai‘i have traveled for nearly a decade to participate in our Makahiki competitions, including decades of annual representatives from Kamehameha Schools. It remains one of Moloka‘i’s main annual social celebrations with generations carrying memories of Hawaiian sportsmanship as competitors and spectators.

Ms. Greaney stated that a large *hau* tree at the gulch edge supports oral and written histories on the origins of Ho‘olehua in connection with the Nā‘iwa Makahiki grounds. She mentioned *kupuna* recorded that an ancient *hau* tree identifies the location where a beloved *ali‘i* named Lehua lived in Ho‘olehua. Some believe she became the namesake of the area she overlooked. Ms. Greaney also discussed the more well-known naming history in which a beautiful *hula* dancer named Lehua was given a *lei* made of Nā‘iwa fern by a Makahiki champion. They married and the fern which had only grown in his Kalaupapa home continued to spread from the cliff line, giving Nā‘iwa its name.

Ms. Greaney also shared another source of Ho‘olehua’s name is the soldiers leading the advance in war. She heard old stories of Night Marchers traveling their path from mountains in Kala‘e toward the Makahiki grounds. They continued along the same boundary gulch toward the high school gym on Farrington Avenue. Some Hawaiians still testify to having seen them in this area as children. Kamehameha rested his troops in the food-abundant spiritual Moloka‘i uplands while recuperating and training before going on to successfully capture O‘ahu.

Ms. Greaney mentioned there are three *wahi pana* located near the *piko* of Moloka‘i above the Kalaupapa cliff line. At the highest elevation of Nā‘iwa is Pu‘uolelo (speaking hill). It is easy to identify from lower lands of Ho‘olehua and Nā‘iwa by a grove of pines trees planted by Mr. Meyer at the summit in the early 1800s. To the east is the high precipice, Kaohu (adorned in fog) and in the middle is Keālia Lake, commonly called Meyer Lake, one of few naturally occurring freshwater lakes in Hawai‘i. These three *wahi pana* form a line which passes procreative Ka‘ule o Nanahoa (Phallic Rock), the female fertility partner *pōhaku* sometimes called Waihuehue, and other sites of regeneration. Birthing stones for delivery of babies are also still located in the area.

Ms. Greaney recalled stories of Pu‘u Pe‘elua (Caterpillar Hill) in Ho‘olehua. Her mother shared that in certain years in the 1940s and 1950s, the entire lower area of Nā‘wa would be covered with caterpillars to the extent that they could not walk to school as children without crushing them underfoot. *Mo‘olelo* about this area of central Moloka‘i include large caterpillars, indicating they have come at various times during history.

5.5 Healing Practices

Ms. Greaney sees her homestead as the perfect place to promote indigenous health knowledge. She continues cultural practices that are important to physical and spiritual wellness.

Ms. Greaney noted that Nā‘iwa was widely known as an area of physical and spiritual healing, attracting injured, sick, and dying Hawaiians with their caregivers and loved ones in the past. She pointed out that at the start DHHL’s development, the first medical doctor’s clinic was placed as closely as possible to the ancient healing area and Moloka‘i’s first hospital, Shingle Hospital, was also located as closely as possible to Ho‘olehua’s northernmost side approximating the middle of the Nā‘iwa *ahupua‘a*.

Ms. Greaney credits being raised in the place of centuries of Hawaiian healing for her teen choice of a health career and decades as a Registered Nurse (RN). Ms. Greaney learned traditional medicine from her grandmother and many other Hawaiian health practitioners and *kauka*. She mentioned her Aunty Charlene Tinau, a pure Hawaiian traditional healer with shared genealogical ties in Mana‘e came nearly every week for years, uniquely blending Hawaiian and western healthcare. She tended their plants, cultivated nearly a century, and shared her knowledge of what to gather for common ailments and emergency applications. She successfully healed bone fractures and many conditions using *la‘au lapa‘au* for Hawaiians without insurance or who preferred traditional medicine.

At ten years old, Ms. Greaney was taught by her experienced Hawaiian grandfather, later her aunty, and many expert Hawaiian healers. Her grandpa was first to teach her how to apply traditional techniques of *lomilomi* to maintain health and for more effective healing. She was also taught the practice of *ho‘oponopono*, a guided technique for spiritual, self, and interpersonal relationship healing by *kupuna*. She also received intensive instruction on how to provide this service for Hawaiian families seeking reconciliation when facing terminal illness. She stressed that a necessary part of all Hawaiian healing methods is prayer and meditation during preparation like planting or gathering medicine and during application, through the healing process until it finishes. Powerful prayers affect body, mind, and spirit, and are strengthened by connectedness to the spiritual nature of the place, plants, the person being healed, and the healer.

Ms. Greaney also stressed it is very important that appropriate prayers are offered in creation of both types of *papa*, *pōhaku,* and all other implements. She also emphasized emotions and interactions must be positive because they are imbued in the creation process and will accordingly affect people using the product.

5.6 Religious Activities and Burials

Mr. Avelino discussed the importance of understanding and respecting the spirituality and history of the land. He noted that if you open yourself to your surroundings, listen to the nature and spirits, you can gain a deeper connection to the land. He also mentioned encountering certain areas and/or certain objects in Ho‘olehua that he knew were sacred. He shared that while hunting, he came across areas where he felt “the *mana* of the land” or a sense that the area was “not *pono*.” He also recalled encountering two *pōhaku* in the shape of a chair while he was hunting.

Ms. Greaney stated Moloka‘i was of the highest spiritual importance to ancient Hawaiians as recognized in one of the island’s nicknames, Moloka‘i Pule O‘o (Moloka‘i of powerful prayer).

She noted that members of the House of Kamehameha saw Moloka‘i as the physical *piko* centralizing Hawai‘i’s spiritual power which united people and place.

Ms. Greaney noted Homelani and Ho‘olehua cemeteries, both chosen by Hawaiians as the final resting place for their beloved *‘ohana,* are located in proximity to *wahi pana*. She was also informed by *kupuna* about a *lele* above her homestead where the physical and spiritual realms connect. She also mentioned a mapped *heiau* exists in that location.

Section 6 Summary and Recommendations

6.1 Summary of Cultural Practices and Resources Identified During Background Research and Consultation

Cultural practices and resources identified during background research and consultation are discussed below with cultural practices and resources identified during consultation summarized in Table 5.

6.1.1 Agricultural Practices and Gathering Practices

Archaeological sites identified in the vicinity of the project area provide evidence that lands of Pāla‘au Ahupua‘a were utilized for habitation, agricultural endeavors, and ceremonial purposes. Archaeological studies (Griffin 1993; Major and Dixon 1995; Summers 1971) have identified pre-Contact dwellings and enclosures (SIHP # 50-60-02-01624, -01623, Summers Site 9, 16, 17), *heiau* and shrines (Summers Site 12, 14, 16, 17), a *kahua maika* (Summers Site 13) and *holua* slide (Summers Site 107).

Historic accounts indicate a possible substantial pre-Contact population (Fornander 1880; Summers 1971), which would have subsisted on dryland agriculture consisting mostly of sweet potatoes. According to Handy (1940:157), “in 1931 there were many flourishing patches on the Hawaiian homesteads at Hoolehua” and “Hoolehua and Palaau were noted for sweet potatoes in olden days.” However, Handy and Handy (1972:283) note homesteaders in Ho‘olehua were growing the sweet potatoes on land that had not been planted in ancient times.

Craigshill Handy and Elizabeth Handy suggest the *ahupua‘a* of Pālā‘au was among the “many parts of the *kula* [plain, field, open country, pasture] land [that] used to be planted with both sweet potato and dry taro.” They note that:

> Kualapu‘u (sweet potato hill), the name of a hill [...] [located in Nā‘iwa], probably refers to sweet potato planting.
>
> It is said that Ho‘olehua and Pala‘au were noted for sweet potatoes in olden days. Any part of the pineapple lands westward from this section may have been used for sweet potatoes. However, much of western Molokai was formerly covered with trees. [Handy and Handy 1972:517]

Interviewee Malia Greaney recalled that when she was in school the whole area around Kualapu‘u was planted in pineapple, and from fifty years before that nearly all of Ho‘olehua’s homestead area was also used for growing pineapples.

Handy and Handy also cite Southwick Phelps who made an archaeological survey of Moloka‘i in 1937:

> For Pala‘au, Kaluakoi, and Punakou, Ho‘olehua, and Nā‘iwa, planting areas for yams and sweet potatoes cannot be delimited but it is known that these were grown in that general area and were, with fish, the staples of the inhabitants. [Phelps in Handy and Handy 1972:518]

Table 5. Cultural resources associated with the project area and vicinity identified during consultation

Consultee	Project Area Affiliation	Resource/Type/Area	Concerns/Opinions
Kilia Purdy-Avelino	*Kama‘āina* of Ho‘olehua	*Wahi pana*	Expressed concerns for sacred sites located in the vicinity of the project area. She emphasized the need to make sure to continue to protect sacred sites.
Justin Avelino	*Kama‘āina* of Ho‘olehua	*Wahi pana*	Stressed that no work be done to the Makahiki Grounds.
Malia Greaney	*Kama‘āina* of Pālā‘au	Agricultural practices	Ms. Greaney strongly suggests the soil be well tested by third party professionals for any presence of harmful chemical residue possibly remaining in the soil. This is a good safety precaution for farmers.
Malia Greaney	*Kama‘āina* of Pālā‘au	Marine resources	Ms. Greaney hopes more people will join restoration efforts for abundance through restoration of aquaculture in Moloka‘i *loko ‘ia*. She also suggested future studies may also look at nearshore areas off Pālā‘au to assess the presence of chemicals from runoff and any impacts.
Malia Greaney	*Kama‘āina* of Pālā‘au	*Wai*	Ms. Greaney expressed concern regarding the availability of water. She noted Ho‘olehua, including Nā‘iwa, is historically known for its dry and barren land, with little to no water available. She stressed it is also important to ensure access to the appropriate amount of water and at a reasonable cost.

Consultee	Project Area Affiliation	Resource/Type/Area	Concerns/Opinions
Malia Greaney	*Kama‘āina* of Pālā‘au	*Wahi pana*	Ms. Greaney insists the homestead community should be notified well in advance of any proposed developments that will occur on the Makahiki lands. Ms. Greaney also stated that if there are any future developments, it is important that in-depth archaeological inventory surveys be conducted as it is known that many artifacts still exist in the *mauka* and central regions of Nā‘iwa and Pālā‘au.

In the early 1900s, farming cultivation began to include a variety of crops, including watermelon, corn, beans, and others. Farmers also began raising livestock such as pigs, horses, and cattle.

Mrs. Kilia Purdy-Avelino and her husband Justin Avelino grow various fruits and vegetables such as *‘ulu*, *kalo,* papaya, *mai‘a*, mango, and macadamia nut trees on their homestead property. She recalled that her grandmother grew various floral plants such as *‘ākulikuli*, *‘awapuhi*, *kīkā*, *kīkānia*, and *kupaloka*, which are used to make *lei*. Today, her father also grows *gardenia*, orchids, bird-of-paradise, and *anthuriums*.

Mrs. Purdy-Avelino also recalled that during her childhood days, her dad would take her down *makai* of Nā‘iwa to pick up *‘uala* from an *‘ohana* who lived in the area which she recalled eating raw in the back of the truck.

Recently, Mrs. Purdy-Avelino’s *‘ohana* received the 35 acres of land that was in their original lease but had been returned to DHHL. They plan to reforest the lands which will also help the rain return to the area.

Ms. Greaney continues to raise animals including pigs and grow crops on her homestead. Her *‘ohana* also has a tropical fruit orchard and has grown and processed many diversified crops such as sugar, coffee, corn, potatoes. Ms. Greaney continues to identify medicinal plants in the area which can be gathered or cultivated. Her mother, Yola Forbes, also grew food and medicinal trees on their homestead.

Ms. Greaney noted that documents and family photos from the 1920s and forward record DHHL’s earliest farmers raised pigs and planted crops in the arid conditions of central Moloka‘i. She also mentioned that *mo‘olelo* tell of *puna* once located behind the house of a third-generation homesteader on very dry Olo‘olo Lane.

Ms. Greaney noted agricultural lease homesteaders have made concerted efforts to return to historic cultivation of native plants, despite difficulty obtaining public water access. She stated that Ho‘olehua homesteaders are successfully growing plants vital to Hawai‘i culture and bringing back to larger scale crops like dryland *kalo*, *‘uala*, and *‘awa*. She stressed that these and other plant resources are critically important because they are necessary in Hawaiian cultural traditions. Ms. Greaney believes the highest percentage of Hawaiians on Moloka‘i has helped residents perpetuate endangered plant-based interest, knowledge, and practices.

Ms. Greaney pointed out that Moloka‘i’s history of food abundance gave it the enduring name *Moloka‘i ‘Āina Momona* (rich, fat land). She noted that as recently as 150 years ago, Moloka‘i was known for large quantities of agricultural and value-added exports such as wet and dry land *kalo*, *‘uala,* and other food sources. She recalled a *kupuna* explained that food on Moloka‘i was so abundant that Moloka‘i sent food grown in back valleys over the mountains to Kamalō and across the channel to Maui for hundreds of years. She also mentioned that currently, only 2% of food purchased on island is from Moloka‘i, showing that the island is capable of providing much more of Hawaii’s agricultural products if resources like water are prioritized accordingly.

Ms. Greaney stated an immense *hau* tree has thrived in Nā‘iwa/Pālā‘au for unknown generations, including the last four of her family, and helped them to flourish. She believes the tree is a living linkage to the past allowing continuation of endangered native practices and

accompanying understanding. The ancient tree is located at the lower Makahiki grounds rather close to the cliff line.

Ms. Greaney shared the numerous uses of the *hau* tree. She stated the *hau* tree provides a windbreak, helping new crops grow without damage, reducing erosion from water coming down the gulch, and many more provisions. *Hau* is also an irreplaceable source for plant parts with medicinal properties for *la‘au lapa‘au* and tools for *lomilomi* made from *hau*’s strong, light branches with beneficial bends. It is also her *‘ohana*’s main resource to make *ko‘i* for hand carving *papa he‘e nalu*. She noted that making surfboards involves several plants found in this area of Moloka‘i. *Hau* can also be used for building fires. *Hau*’s straight branches provide light, strong wood for making spears. Young *hau* branches are also flexible enough to make the excellent kites flown during Makahiki. Cordage made of *hau* was used to make bows for hunting and sport, and for sling shots, the most preferred weapon of war for its long range and lethal power.

Ms. Greaney also noted the initiation of war was bound to spiritual guidance; branches of *hau* were placed in front of advancing armies by a *kahuna* while others prayed throughout the battle and in the end only the victor’s *hau* remained standing. *Hau* is used in other spiritual practices, being important in *heiau* and *hula*. It was so integral to Hawaiian ritual and daily life that permission from *ali‘i* was required to cut one down.

Hau is included in Hawaiian creation stories involving the great mother of Moloka‘i island, Hina, and two of her demi-god sons, Maui and Kamapua‘a. In native religion, Kamapua‘a (the pig-God) oversees fertility, he is recognized on “pig alters” that mark *ahupua‘a* boundaries visited by priests in Makahiki protocol, and included in many stories with the god Lono.

6.1.2 Marine Resources

Traditional accounts mention that Pālā‘au was known for its fat *āholehole* and *‘ō‘io*. According to *mo‘olelo*, the ruling chief of Moloka‘i, Kahekili, sent one of his chiefs, Kuikai, to Pālā‘au to collect fish for his army as they prepared to invade O‘ahu (Ne 1992:47).

Catherine Summers (1971:77) noted that Poho‘ele pond (Site 99), also known as Pālā‘au fishpond, was “the largest of the Moloka‘i fishponds” with an estimated size between “200 and 500 acres” and a “depth of five fathoms” at its “deepest part.” The pond had “gates that were skillfully made” and contained “[a]ll kinds of fish” (Summers 1971:77). Summers also reported a *ko‘a* observed “at the edge of the cliff” at Kahinaokalani (Site 17) (Summers 1971:38).

Ms. Greaney mentioned Moloka‘i has the largest number of *loko ‘ia* in Hawai‘i including over 60 that are still recognizable. She recalled being taken to fishponds alone by her grandfather who was proud to share this purely Hawaiian innovation to feed the people. As an adult, she worked for many years with restoration efforts. Ms. Greaney hopes more people will join restoration efforts for abundance through restoration of aquaculture in Moloka‘i *loko ‘ia*.

6.1.3 *Mo‘olelo* and *Wahi Pana*

Mo‘olelo plays a large role in Native Hawaiian culture. Many of these *mo‘olelo* contain valuable *‘ike* on/about the land, its naming, and the countless events that have transpired on these lands.

Mrs. Purdy-Avelino shared a *mo‘olelo* told to her by her cousin about how the land of Nā‘iwa received its name. According to the *mo‘olelo*, a mother from Kalaupapa, who was a very skilled

lei maker, made a *lei* out of the *‘iwa‘iwa* fern for her son who wanted to compete in a *lei* making competition held at the Makahiki festival, as well as to impress a *wahine* he admired. The son gave this *lei* to the *wahine*. She would wear it wherever she went and the spores from the *‘iwa‘iwa* ferns in the *lei* would fall and scatter across the land.

Ms. Greaney stated that a large *hau* tree at the gulch edge supports oral and written histories on the origins of Ho‘olehua in connection with the Nā‘iwa Makahiki grounds. She mentioned that *kupuna* recorded that an ancient *hau* tree identifies the location where a beloved *ali‘i* named Lehua lived in Ho‘olehua. Some believe she became the namesake of the area she overlooked. Ms. Greaney also discussed the more well-known naming history in which a beautiful *hula* dancer named Lehua was given a *lei* made of Nā‘iwa fern by a Makahiki champion. They married and the fern which had only grown in his Kalaupapa home continued to spread from the cliff line, giving Nā‘iwa its name.

Ms. Greaney also shared that another source of Ho‘olehua’s name is the soldiers leading the advance in war. She heard old stories of Night Marchers traveling their path from mountains in Kala‘e toward the Makahiki grounds. They continued along the same boundary gulch toward the high school gym on Farrington Avenue. Some Hawaiians still testify to having seen them in this area as children. Kamehameha rested his troops in the food-abundant spiritual Moloka‘i uplands while recuperating and training in this area before going on to successfully capture O‘ahu.

Mr. Avelino shared a *mo‘olelo* discussing how the area known as the Makahiki Grounds were selected. According to the *mo‘olelo*, a chief of Moloka‘i looked toward the mountains of Nā‘iwa and noticed a cloud shaped like a finger which was pointing to a piece of land. A council of chiefs gathered and decided the Makahiki ceremonies would be held in that area. To this day, Makahiki ceremonies and activities continue to take place. Items such as *‘ulu maika* have been discovered in this area. Mr. Avelino stated it is vital that no work be done to this area.

Ms. Greaney also mentioned many *pōhaku* implements including *‘ulu maika* for ceremonial competitions and *ma‘a* for battles of sport and war have been found in the area of her homestead and continued to be unearthed to this day. She noted more artifacts have been found recently and numerous more are likely to be present because of past heavy use of the area, however, they may not be immediately recognized if they do not have the obvious shape of *‘ulu maika*.

Ms. Greaney noted that as the spiritual epicenter of Hawai‘i, Moloka‘i drew *ali‘i* and champions from outer islands who would travel to this hallowed place to compete for top honors and recognition in the annual Makahiki competitions. Makahiki was an integral part of life that allowed for peace, shared abundance, and continuation of the Hawaiian race. Each island had Makahiki grounds dedicated to Lono where offerings would be made in reverence, appreciation, and hopes of an abundance of food in the coming year. To this day the Makahiki processional moves east to west to the sacred grounds of the god Lono, publicly known simply as Nā‘iwa.

Ms. Greaney mentioned old Hawaiian historians recorded genealogies tied to the original Makahiki grounds including Lonoikamakahiki, the *ali‘i* credited with starting all Makahiki practices in Hawai‘i. One account says he came to Moloka‘i from Hawai‘i Island and from among all areas in Hawai‘i identified much earlier as high holy places, he decided this specific area was to be the primary place in the islands for honoring Lono. Early land records specify Lono descendants as *konohiki* and title holders in the region through the nineteenth century.

Ms. Greaney mentioned there is an ancient *hula* site remaining in the Nā‘iwa Makahiki grounds near and above her homestead. Moloka‘i is the birthplace of the enduring ancient traditions of Kapo and Laka. *Hula* is celebrated in Ka Hula Piko, and *lua* for defense is sometimes referred to as a twin or sibling of dance. Ms. Greaney noted neither practice was restricted to one gender and both perpetuate Hawaiian philosophies of spiritual and physical existence.

Ms. Greaney stated Makahiki was so important that it marked time and regulated people’s physical and religious life. She insists no one can authentically recognize or celebrate the true spirit of Makahiki, and the peace and abundance it symbolizes for all of Hawai‘i, without also recognizing what began, endured, and exists in this particular physical space. It is a critical part of Moloka‘i’s role and record in history prior to Contact, including land use, religious culture, and the daily lives of the Hawaiian people. It played an important part in continuance of intergenerational and communal practices near extinction at the time of the Hawaiian Renaissance; and because of Moloka‘i it is again firmly rooted in annual calendars and celebrations statewide.

Ms. Greaney pointed out that the original Makahiki lands are also the only place of continuous practice of the social, physical, emotional and spiritual ritual, healing, and enlightenment associated with Makahiki in existence. She noted cultural experts on Moloka‘i still observe Makahiki with formal protocol, and all youth learn the traditional practices of their ancestors. When other islands ceased to honor these practices, the ancient knowledge continued only on Moloka‘i. School students throughout Hawai‘i have traveled for nearly a decade to participate in our Makahiki competitions, including representatives from Kamehameha Schools. It remains one of Moloka‘i’s main annual social celebrations with generations carrying memories of Hawaiian sportsmanship as competitors and spectators.

Previous archaeological work has identified three historic sites in the vicinity of the project area: the Kape‘elua Complex (SIHP # 50-6-03-00011), which is comprised of two sites, the “Caterpillar Stones” (Site 11A) and the “Stone at Pu‘u Kape‘elua” (Site 11B), and Lepekaheo Heiau (Site 12) (Summers 1971:37).

The “Caterpillar Stones” are associated with a *mo‘olelo* that involves Pele, the daughter of a chief of Pālā‘au, who fell in love with the a *pe‘elua* of Ho‘olehua, the *‘aumakua* of that district (Summers 1971:37; Cooke 1949:102; and Ne 1992:49–50). For full discussion regarding Pu‘u Pe‘elua, see Section 3.1.2.2. The “Stone at Pu‘u Kape‘elua” is located south of the “Caterpillar Stones.” Summers (1971:37) noted the stone may have been used for sharpening adzes or collecting water. Another theory states that due to the stone’s proximity to the “Caterpillar Stones,” it may have been used for offerings to propitiate the destructive caterpillars.

Ms. Greaney mentioned there are three *wahi pana* located near the *piko* of Moloka‘i above the Kalaupapa cliff line. At the highest elevation of Nā‘iwa is Pu‘uolelo (speaking hill). It is easy to identify from lower lands of Ho‘olehua and Nā‘iwa by a grove of pines trees planted by Mr. Meyer at the summit in the early 1800s. To the east is the high precipice, Kaohu (adorned in fog) and in the middle is Keālia Lake, commonly called Meyer Lake, one of few naturally occurring freshwater lakes in Hawai‘i. These three *wahi pana* form a line which passes procreative Ka‘ule o Nanahoa (Phallic Rock), the female fertility partner *pōhaku* sometimes called Waihuehue, and other sites of regeneration. Birthing stones for delivery of babies are also still located in the area.

Ms. Greaney recalled stories of Pu‘u Pe‘elua (Caterpillar Hill) in Ho‘olehua. Her mother shared that in certain years in the 1940s and 1950s, the entire lower area of Nā‘wa would be covered with caterpillars to the extent that they could not walk to school as children without crushing them underfoot. *Mo‘olelo* about this area of central Moloka‘i include large caterpillars, indicating they have come at various times during history.

6.1.4 Healing Practices

Kahuna of Moloka‘i were also “said to be experts in compounding medicine” (Pukui 1983:239). This expertise is described in the saying, “Moloka‘i ku‘i lā‘au. *Moloka‘i, pounder of medicine*” (Pukui 1983:239).

Ms. Greaney sees her homestead as the perfect place to promote indigenous health knowledge. She continues cultural practices which are important to physical and spiritual wellness.

Ms. Greaney noted Nā‘iwa was widely known as an area of physical and spiritual healing, attracting injured, sick, and dying Hawaiians with their caregivers and loved ones in the past. She pointed out that at the start DHHL’s development, the first medical doctor’s clinic was placed as closely as possible to the ancient healing area and Moloka‘i’s first hospital, Shingle Hospital, was also located as closely as possible to Ho‘olehua’s northernmost side approximating the middle of the Nā‘iwa *ahupua‘a*.

Ms. Greaney credits being raised in the place of centuries of Hawaiian healing with her teen choice of a health career and decades as a Registered Nurse (RN). Ms. Greaney learned traditional medicine from her grandmother and many other Hawaiian health practitioners and *kauka*. She mentioned her Aunty Charlene Tinau, a pure Hawaiian traditional healer with shared genealogical ties in Mana‘e, came nearly every week for years, uniquely blended Hawaiian and western healthcare. She tended their plants, cultivated nearly a century, and shared her knowledge of what to gather for common ailments and emergency applications. She successfully healed bone fractures and many conditions using *la‘au lapa‘au* for Hawaiians without insurance or those preferring traditional medicine.

At ten years old, Ms. Greaney was taught by her experienced Hawaiian grandfather, later her aunty, and many expert Hawaiian healers. Her grandpa was first to teach her how to apply traditional techniques of *lomilomi* to maintain health and for more effective healing. She was also taught the practice of *ho‘oponopono*, a guided technique for spiritual, self, and interpersonal relationship healing, by *kupuna*. She also received intensive instruction on how to provide this service for Hawaiian families seeking reconciliation when facing terminal illness. She stressed that a necessary part of all Hawaiian healing methods is prayer and meditation during preparation like planting or gathering medicine and during application, through the healing process until it finishes. Powerful prayers effect body, mind, and spirit, and are strengthened by connectedness to the spiritual nature of the place, plants, the person being healed, and the healer.

Ms. Greaney also stressed it is very important that appropriate prayers are offered in creation of both types of *papa*, *pōhaku,* and all other implements. She also emphasized that emotions and interactions must be positive because they are embedded in the creation process and will accordingly affect people using the product.

6.1.5 Religious Activities and Burials

Ms. Greaney stated that Moloka‘i was of the highest spiritual importance to ancient Hawaiians as recognized in one of the island’s nicknames, Moloka‘i Pule O‘o (Moloka‘i of powerful prayer). She noted that members of the House of Kamehameha saw Moloka‘i as the physical *piko* centralizing Hawai‘i’s spiritual power which united people and place.

Pālā‘au and Ho‘olehua are mentioned in a *mo‘olelo* discussing the origins of sorcery on Moloka‘i. According to the *mo‘olelo*, a man, Kaiakea, witnessed “a long procession of women coming over the plains of Ho‘olehua to Pala‘au” (Kamakau 1991:131–132). Among these women was a man named Pua who told Kaiakea that if he built a *hale lau* (leaf-thatched house) for them, “they would become Kaiakea’s gods” and they “would give into his charge the *puniu hulihuli*, their visible form (*ko lakau kino ‘ike maka ‘ia*), and all the paraphernalia to do their work (*ka lakau mau hana a pau*)” (Kamakau 1991:131–132). Kaiakea built the *hale lau* and “filled it with poi, *‘awa*, bananas, and tapas appropriate to these gods; that same evening it was dedicated (*ke kapu no ‘ia*)” (Kamakau 1991:131–132). Kaiakea became the *kahu* (care taker) of gods, Pua and Kapo (Kauluimaunaloa), “the chiefess who led the procession” of women (Kamakau 1991:131–132).

Kamakau noted that, “Kaiakea, however, just took care (*malama pono*) of these gods. He did no harm to others, and did not send his gods to bring death (*ho‘aunauna e make*) to any man or to any chief” (Kamakau 1991:131–132).

Summers (1971:37–38) recorded four *heiau* in the Pālā‘au and Ho‘olehua Ahupua‘a. Lepekaheo Heiau (Site 12) is located west of Kaluape‘elua Gulch on the boundary between Ho‘olehua 2 and Pālā‘au 2, approximately 1.3 km north of the project area. Another *heiau* (Site 10) is located on the east side of the “crest of ‘Eleuweue” in Ho‘olehua 2 (Summers 1971:37). Summers (1971:38) mentions a *heiau* (Site 16) located at the west side of the mouth of Anahaki Gulch at an elevation of 35 ft above mean sea level and another *heiau* (Site 14) located east of Ho‘olehua Cemetery in the pineapple fields west of the gulch at an elevation of 800 ft in Pālā‘au 2 (Summers 1971:38).

Mr. Avelino discussed the importance of understanding and respecting the spirituality and history of the land. He noted that if you open yourself to your surroundings, listen to the nature and spirits, you can gain a deeper connection to the land.

Mr. Avelino recalled encountering certain areas and/or certain objects he knew were sacred while passing through the lands of Ho‘olehua. He recalled coming across two *pōhaku* in the shape of a chair while he was hunting. He also shared that while hunting, he would come across areas in which he could “feel the *mana* of the land” or sense that the area was “not *pono*.”

Native Hawaiians are protective of their *iwi kūpuna*. As stated by the State Historic Preservation Division (SHPD),

> When departing kupuna was laid to rest there was never a doubt that their remains would empower their descendants until they themselves were reduced to earth. Some kupuna were covered by stacked stones while others were buried with no surface markers at all, frequently in sand dunes. [SHPD n.d.]

It is believed that the *mana* of a person is held within the *iwi* (bones). Therefore, *iwi kūpuna* were treated with upmost respect. For example, remains of a passing *ali‘i* were usually buried

under cover of night to protect the *iwi* from possible poachers, or those who might steal them to utilize the *mana* of the passing *ali‘i* (SHPD n,d.).

Ms. Greaney noted that Homelani and Ho‘olehua cemeteries, both chosen by Hawaiians as the final resting place for their beloved *‘ohana,* are located in proximity to *wahi pana*. She was also informed by *kupuna* about a *lele* above her homestead where the physical and spiritual realms connect. She mentioned a mapped *heiau* exists in that location.

6.2 Assessment of Impacts Posed to Cultural Practices and Cultural Resources

6.2.1 Individual’s comments or thoughts on the potential impacts the proposed project may have on ongoing traditional cultural practices and natural resources within the proposed project area and greater *ahupua‘a*

Ms. Greaney expressed concern regarding the availability of water. She stated that Hawaiians intimately understood the relationship of people and *wai* and the necessity to maintain and protect clean water systems for health, wealth, and survival. She noted Ho‘olehua, including Nā‘iwa, is historically known for its dry and barren land, with little to no water available. She mentioned homestead residents have been faced with high costs of water and limited access to water. She stated the proposed project is important as it will provide homestead residents the opportunity to use land for agricultural purposes, however, she stressed it is also important to ensure access to the appropriate amount of water at a reasonable cost. If this is not possible, residents who move into these agricultural lots may have difficulty growing crops.

Ms. Greaney also expressed some hesitation regarding agricultural and housing development in the proposed project areas related to alerting new lessees to be aware of past use of the land and any possible health effects it may have directly on those using the land as well as for those who consume food grown in these and nearby areas. She pointed out that Hawaiian Home Lands were leased to plantations for a century and a half, and land in all areas continues to be leased to private companies including sugar, pineapple, and coffee plantations, as well as for research by large agricultural bioscience companies for designing products for pest control.

Ms. Greaney mentioned her master’s thesis in 2001 looked at possible public health effects of the copious pesticide use of chemicals made illegal in the U.S. which she found were applied by the pineapple plantations. She does not know what harsh chemicals may have been used by the other agri-businesses.

6.2.2 Comments or thoughts on the potential impacts the proposed project may have cultural sites and *wahi pana* within the proposed project area and greater *ahupua‘a*

Mrs. Purdy-Avelino expressed concerns for sacred sites located in the vicinity of the project area. She supports the development of more homestead lots for homesteaders on the waitlist, however, she emphasized the need to continue to protect sacred sites.

Mr. Avelino stressed it is vital that no work be done to the Makahiki Grounds.

Ms. Greaney emphasized the importance of the Makahiki Grounds to the Hawaiian culture. She insists the homestead community should be notified well in advance of any proposed developments on the Makahiki Grounds. She also noted it is known that many artifacts still exist in the *mauka*

and central regions of Nā‘iwa and Pālā‘au. She insists it is important that in-depth archaeological inventory surveys be conducted if there are any future developments.

6.2.3 CSH Assessment of Impacts Posed to Cultural Practices and Cultural Resources, integrating perspectives from consultation, and evidence from background research

Cultural deposits and features related to historic homesteading (i.e., agricultural and/or habitation features) are likely present at the current project area. However, potential also exists for encountering evidence of pre-Contact and post-Contact land use.

Table 6. Potential impacts posed by the proposed project to cultural resources or activities within the project area vicinity

Cultural Resource or Activity	Potential Impacts	Explanation
Wahi pana		Mrs. Purdy-Avelino expressed concerns for sacred sites located in the vicinity of the project area. She emphasized the need to continue to protect sacred sites. Mr. Avelino stressed that no work be done to the Makahiki Grounds. Ms. Greaney also emphasized the importance of the Makahiki Grounds to the Hawaiian culture. She insists the homestead community should be notified well in advance of any proposed developments on the Makahiki Grounds. She also noted it is known that many artifacts still exist in the *mauka* and central regions of Nā‘iwa and Pālā‘au. She insists it is important that in-depth archaeological inventory surveys be conducted if there are any future developments.

6.2.4 Discussion of impacts to historic properties (i.e., cultural resources) identified during background research and consultation

No impacts to historic properties within the proposed project area and Pālā‘au Ahupua‘a were identified during the consultation process.

6.2.5 Discussion of impacts to cultural practices and resources identified during background research and consultation

No impacts to ongoing traditional cultural practices and natural resources within the proposed project area and Pālā‘au Ahupua‘a were identified during the consultation process.

6.3 Mitigation Possibilities Identified During Consultation and Background Research

Mrs. Purdy-Avelino recommends a cultural monitor should be on site during any work to help provide guidance in regard to Hawaiian sense of place, protection of sacred areas and objects, and to be a voice for *kūpuna*. She stated that people should remember *kūpuna* are always here in spirit and they will show themselves in various ways and it is up to us to make sure we open ourselves

up to receive their information. She also recommended project proponents should be mindful of sacred sites within and around the vicinity of work and that they not harm the land or anything that may be disturbed.

Mrs. Purdy-Avelino is supportive of more homestead lots being developed so more homesteaders can get off the waitlist and into homes, however, she noted that as more homestead developments occur (whether it may be from DHHL or homesteaders developing their own plots), we all need to make sure to continue to protect sacred sites.

Mrs. Purdy-Avelino also shared concerns regarding the overall process of outreach to Native Hawaiian communities and how information is shared. She recommends reaching out to Native Hawaiian communities in multiple ways and not just by an announcement in a newspaper or on the internet. That way, *kānaka* can be more *maka‘ala* of proposed projects happening in their community. She stated that full disclosures of projects and project details are a must. Developers need to provide transparency to work that will be conducted as well as any other supplemental or follow-up work that may be conducted. She requested that project proponents not utilize Native Hawaiians and the *‘ike* that is shared just to “check a box.” She noted Native Hawaiians are sharing their *‘ike* of their ancestors to help with the proposed projects and to provide a Hawaiian perspective of the land, its history, and its spirit. She stated their words and concerns carry *mana*, and it is important they are heard and the suggestions given are followed through.

Ms. Greaney insists that due to the special significance of this place to Hawaiian culture, historically and continuously, the homestead community should be notified well in advance of any proposed developments that will occur on the Makahiki lands. She also insists homesteaders be individually consulted with if any proposed developments involve their land since many lots have been occupied by the same families for a century.

Ms. Greaney stated that if there are any future developments, it is important that in-depth archaeological inventory surveys be conducted as it is known that many artifacts still exist in the *mauka* and central regions of Nā‘iwa and Pālā‘au. She pointed out that though not inhabited by such a large constant population year around like other areas near the coast and freshwater, this area supported thousands of Hawaiians who regularly occupied it for seasonal, ceremonial, celebratory, and other prime purposes.

Ms. Greaney strongly suggests the soil be well tested by third party professionals for any presence of harmful chemical residue possibly remaining in the soil. This is a good safety precaution for farmers. She also suggested future studies also look at nearshore areas off Pālā‘au to assess the presence of chemicals from runoff and any impacts.

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.

Non-Native Hawaiian human remains will undergo the process laid out under state law (HAR 13-300), however, Native Hawaiian human remains and cultural items found on DHHL lands are subject to the Native American Graves Protection and Repatriation Act (NAGPRA), 25 U.S.C. 3001 et seq and its implementing regulations (43 CFR Part 10). As 43 CFR § 10.2 provides, tribal lands include “All lands administered by the Department of Hawaiian Home Lands (DHHL) under

the Hawaiian Homes Commission Act of 1920 (HHCA, 42 Stat. 108) and Section 4 of the Act to Provide for the Admission of the State of Hawai‘i into the Union (73 Stat. 4), including “available lands” and “Hawaiian home lands.” Under NAGPRA, DHHL must prepare a plan of action (POA) prior to any planned activity that is likely to result in a discovery or excavation of human remains or cultural items. If not part of a planned activity, a POA is required after the discovery of human remains or cultural items. In developing a POA, DHHL will initiate consultation with lineal and cultural descendants, consult on the POA, and approve and sign the POA and provide a copy to all consulting parties. The 3-step process for drafting a POA pursuant to NAGPRA can be found in 43 CFR § 10.4(b).

Section 7 References Cited

AECOS Inc.
1980 Environmental Field Studies for the Moloka‘i Airport Master Plan. AECOS, Inc., Kailua, Hawai‘i.

Akana, Collette and Kiele Gonzalez
2015 *Hānau Ka Ua: Hawaiian Rain Names*. Kamehameha Publishing, Honolulu.

Alameida, Roy Kakulu
1993 Land Tenure and Land Use in Kawaihapai, O‘ahu. Master’s thesis in History. University of Hawai‘i at Mānoa, Honolulu.

Andrews, Lorrin
1829 Tour Around Morokai. In *The Missionary Herald*, Vol XXV. No. 50 Cornhill Crocker & Brewster, Printers, Boston, Massachusetts.

Ava Konohiki
2015 Ancestral Visions of ‘Āina website. Available online at http://www.avakonohiki.org/.

Beckwith, Martha
1970 *Hawaiian Mythology*. Originally published 1940. University of Hawaii Press, Honolulu.

Carlson, Norman K.
1951 Grazing Land Problems, Molokai Island, Territory of Hawaii. *Hawaiian Agricultural* Experiment *Station Bulletin*.

Chinen, Jon J.
1958 *The* Great *Mahele: Hawaii's Land Division of 1848*. University of Hawai‘i Press, Honolulu.

Cooke, George Paul
1949 *Moolelo o Molokai, A Ranch Story of Molokai*. Honolulu Star Bulletin, Honolulu.

de Loach, Lucille Fortunato
1975 Land and People on Molokai: An Overview. Master of Arts Thesis, University of Hawai‘i at Mānoa, Honolulu.

Dodge, F.S., C.J. Willis, and S.M. Kanakanui
1897 Molokai, 1:90000. Hawaiian Government Survey, Washington, D.C.

Emerson, N.B.
1965 *The Unwritten Literature of Hawaii: The Sacred Songs of the Hula*. Collected by Nathaniel B. Emerson. Charles E. Tuttle Company, Rutland, Vermont and Tokyo.

Environmental Council, State of Hawai‘i
1997 *Guidelines for Assessing Cultural Impacts Adopted by the Environmental Council, State of Hawai‘i, November 19, 1997*. Office of Environmental Quality Control, Hawai‘i.

Esri, Inc.
2013 Map Image Layer. Esri, Inc., Redlands, California.

Foote, Donald E., Elmer L. Hill, Sakuichi Nakamua, and Floyed Stephens
1972 Soil Survey of Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii. Soil Conservation Service, United States Department of Agriculture, Washington, D.C.

Fornander, Abraham
1880 *An Account of the Polynesian Race, its Origins and Migrations, and the Ancient History of the Hawaiian People to the Times of Kamehameha I*. 6 vols. Trubner & Company, London.

1916-1917 *Hawaiian Antiquities and Folk-Lore, The Hawaiian Account of the Formation of the Islands and Origin of their Race, with the Traditions of their Migrations, Etc., as Gathered from Original Sources. Memoirs of the Bernice Pauahi Bishop Museum.* Bishop Museum Press, Honolulu.

Fowke, Gerard
1922 Archaeological Work In Hawaii. In *Archaeological Investigations*. Bureau of American Ethnology, Bulletin 76. Smithsonian Institution, Washington, D.C.

Giambelluca, Thomas W., Michael A. Nullett, and Thomas A. Schroeder
1986 *Rainfall Atlas of Hawaii Report R76*. State of Hawai‘i, Department of Land and Natural Resources, Division of Water and Land Development, Honolulu

Griffin, Annie
1993 *Newly Identified Historic Site 60-02-995 Palaau Molokai TMK: 5-2-05:6 por*. State Historic Preservation Division, Department of Land and Natural Resources, State of Hawai‘i, Honolulu.

Griffith, E.M.
1902 *A Report of U.S. Forester E.M. Griffith on Hawaiian Forests.* Yokohama, Japan.

Handy, E.S. Craighill
1940 *The Hawaiian Planter*, Volume 1, Bulletin No. 161. Bishop Museum Press, Honolulu.

Handy, E.S. Craighill and Elizabeth Green Handy
1972 *Native Planters in Old Hawaii*. Bishop Museum Press, Honolulu.

Handy, E.S. Craighill, Elizabeth Green Handy, and Mary Kawena Pukui
1991 *Native Planters in Old Hawaii: Their Life, Lore, and Environment*. Revised edition. Bishop Museum Bulletin 233. Bishop Museum Press, Honolulu.

Handy, Willowdean Chatterson
1922 *Tattooing in the Marquesas*. Bishop Museum Bulletin I, Bayard Dominick Expedition, Publication Number 3. Bernice Pauahi Bishop Museum, Honolulu.

Hawaii TMK Service
2023 Tax Map Key (2) 5-2-004. Hawaii TMK Service, Honolulu.

Henke, L.A.
1929 A Survey of Livestock in Hawaii. In University of Hawaii Research Publication No. 5, pp. 82. University of Hawai‘i, Honolulu.

Honolulu Advertiser
1944a Molokai May Yield 1200 Tons of Corn if Conditions are O.K. *Honolulu Advertiser* 25 April.

1944b “Fair” Corn Crop Seen For Molokai By Julian Yates. *Honolulu Advertiser* 14 July.

Honolulu Star-Bulletin
1922 Molokai Corn. *Honolulu Star-Bulletin* 7 November.

Horvat, William J.
1966 *Above the Pacific.* AERO Publishers, Inc., Fallbrook, California.

Huapala
n.d Ho‘olehua .Electronic document, http://www.huapala.org/Ho/Hoolehua.html (accessed 5 May 2021).

n.d Moloka‘i Hula. Electronic document, http://www.huapala.org/Mo/Molokai Hula.html (accessed 5 May 2021).

n.d Nani Moloka‘i, Electronic document, http://www.huapala.org/nani/Nani_ Molokai.html (accessed 5 May 2021).

Jenkins, John S.
1850 *Voyage of the U.S. Exploring Squadron Commanded by Captain Charles Wilkes.* James M. Alden, New York.

Judd, Gerrit P.
1936 *Puleoo, The Story of Molokai.* Honolulu.

Ka Hae Hawaii
1861 He Wahi Moolelo Helu 5, *Ka Hae Hawaii*, 15 May.

Ka Nupepa Kuokoa
1922 He Wahi Moolelo o na Kona o Molokai, I ke Au o Kamehameha I, Ka Na‘i Aupuni, *Ka Nupepa Kuokoa*. 11 May, Volume LXI, Number 19.

Kamakau, Samuel Mānaiakalani
1991 *Ka Po‘e Kahiko: The People of Old*. Bishop Museum Press, Honolulu.

1992 *Ruling Chiefs of Hawaii*. Revised edition. Kamehameha Schools Press, Honolulu.

Keesing, Felix Maxwell
1936 *Hawaiian homesteading on Molokai*. Research publications, Vol. no. 12. University of Hawai‘i, Honolulu.

Kuykendall, R.S.
1953 *The Hawaiian Kingdom: 1854-1874*. University of Hawaii Press, Honolulu.

Landgraf, Anne Kapulani
1994 *Na Wahi Pana o Ko‘olau Poko: Legendary Places of Ko‘olau Poko*. Fred Kalani Meinecke translator. University of Hawaii Press, Honolulu.

Larsen, Jack L. and Thomas A. Marks
2010 *Hawaiian Pineapple Entrepreneurs*. Creative Company, Sheridan, Oregon.

Lee-Greig, Tanya L. and Hallett H. Hammatt
2008 *Archaeological Literature Review and Field Check Study of Four DOE Schools, Island of Moloka‘i Hawai‘i Inter-Island DOE Cesspool Project.* Cultural Surveys Hawai‘i, Inc., Wailuku, Hawai‘i.

Lynch, Russ
1968 An Iowa corn farmer on Molokai. *Honolulu Star-Bulletin* 5 October.

MacDonald, Gordon A., Agatin T. Abbot, and Frank L. Peterson
1990 *Volcanoes in the Sea: The Geology of Hawaii*. Second edition. University of Hawaii Press, Honolulu.

Magin, Janis L.
2017 Hawaii’s Molokai Ranch on the market for $260M. *Pacific Business News* 7 September 2017. Honolulu.

Major, Maurice and Boyd Dixon
1994 *A Final Technical Report, Archaeological Survey and Evaluation, USAF Receiver Station, Ho‘olehua, Moloka‘i, Maui County Hawai‘i.* Department of Anthropology, Bernice Pauahi Bishop Museum, Honolulu.

Malo, David
1898 *Hawaiian Antiquities: Mo‘olelo Hawai‘i.* Bernice Pauahi Bishop Museum, Honolulu.

Mangieri, Gina
2019 Molokai Ranch sale has community talking public, private options. Nexstar Broadcasting, Inc.

Maui News
1926 *Maui News Industrial Edition* 4 December. Wailuku, Hawai‘i.

1939 Molokai Hi Grows from Tiny School. *Maui News* 11 October. Wailuku, Hawai‘i.

1940 School Is Center For Ag Training. *Maui News* 30 March. Wailuku, Hawai‘i.

1948 Pine Co-op Plan Works On Molokai. *Maui News* 6 October. Wailuku, Hawai‘i.

1950 Hoolehua Is Selected As School Site. *Maui News* 22 July. Wailuku, Hawai‘i.

McGregor, Davianna Pomaika‘i
1990 Aina hoopulapula: Hawaiian Homesteading. *The Hawaiian Journal of History* 24.

1996 An Introduction to the Hoaaina and Their Rights, *The Hawaiian Journal of History,* Volume 30:1–28.

McIntosh, James D., Caleb C. Fechner, and Paul L. Cleghorn
2019 *Archaeological Inventory Survey for the Proposed Improvements to the Department Of Hawaiian Home Lands Water System on Moloka‘i Lands in Pala‘au, Ho‘olehua, Na‘iwa, Kahanui, and Kalama‘ula Ahupua’a Kona District, Island Of Moloka‘i*. Pacific Legacy, Inc., Kailua, Hawai‘i.

Menzies, Archibald
1920 *Hawaii Nei 128 Years Ago*. Unknown publisher.

Mondoy, Robert M.
2018 *Mele Aloha O Moloka‘i: Beloved Songs of Moloka‘i : A collection compiled, transcribed & edited by Robert M. Mondoy*. Electronic document. Available at: Molokai Songs Mele Aloha O Molokai (mondoymusic.com).

Monsarrat, M.D.
1886 Registered Map 1288. Hawai‘i Land Survey Division, Department of Accounting and General Services, Honolulu. Available online at http://dags.hawaii.gov/survey/search.php

Morse, Gordon
1953 Kamaiana Naturalist Recalls: Brackish Water, Old Heiau, Had Part In Molokai Sugar Failure. *Honolulu Advertiser*.

Nakuina, Moses K.
1995 *The Wind Gourd of La‘amaomao.* Second edition. Esther T. Mookini and Sarah Nākoa, Translators. Kalamakū Press, Honolulu

Ne, Harriet and Gloria L. Cronin
1992 *Tales of Molokai: The Voice of Harriet Ne.* The Institute for Polynesian Studies, Lā‘ie, Hawai‘i.

Office of Hawaiian Affairs
2015 *Papakilo Database*. Office of Hawaiian Affairs cultural and historical database. Electronic document, http://papakilodatabase.com/main/index.php.

Phelps, Southwick
1937 A Regional Study of Moloka‘i, Hawai‘i.

Pukui, Mary Kawena
1949 Songs (Meles) of Old Ka‘u, Hawaii. *Journal of American Folklore*, July-September: 247–258.

1983 *‘Ōlelo No‘eau: Hawaiian Proverbs & Poetical Sayings.* Bishop Museum Press, Honolulu, Hawai‘i.

1995 *Na Mele Welo: Songs of Our Heritage*. University of Hawai‘i Press, Honolulu.

Pukui, Mary K. and Samuel H. Elbert
1986 *Hawaiian Dictionary*. Second edition. University of Hawaii Press, Honolulu, Hawai‘i.

Pukui, Mary Kawena and Alfons L. Korn
1973 *The Echo of Our Song: Chants & Poems of the Hawaiians*. Translated and edited by Mary Kawena Pukui and Alfons L. Korn. University of Hawaii Press, Honolulu.

Pukui, Mary Kawena, Samuel H. Elbert and Esther T. Mookini
1974 *Place Names of Hawaii*. Revised and enlarged edition. University of Hawaii Press, Honolulu.

Pukui, Mary Kawena and Laura C.S. Green
1995 *Folktales of Hawai‘i*. Bishop Museum Press, Honolulu.

Roll, Warren
1968 Where the Tall Corn Grows. *Honolulu Star-Bulletin*.

State Historic Preservation Division (SHPD)
n.d *Hawaiian Burials*. Electronic document: https://dlnr.hawaii.gov/shpd/about/branches/ibc/hawaiian-burials/

State of Hawai‘i
2008 Molokai Airport. State of Hawai‘i website: http://hawaii.gov/hawaiiaviation/hawaii-airfields-airports/molokai/molokai-airport (accessed 2008).

Stearns, Harold T. and Gordon A. Macdonald
1947 *Geology and Ground-Water Resources of the Island of Molokai, Hawaii*. Vol. Bulletin 11. U.S. Geological Survey, United States Department of the Interior, Honolulu.

Strazar, Marie D.
2000 *Moloka‘i in History: A Guide to the Resources*. History and Humanities Program of the Hawai‘i State Foundation on Culture and the Arts, Honolulu.

Summers, Catherine C.
1964 *Hawaiian Fishponds.* Bishop Special Publication 52, Bernice Pauahi Bishop Museum, Honolulu.

1971 *Molokai: A Site Survey*. Anthropology Department, Bernice Pauahi Bishop Museum, Honolulu.

Tomich, Prosper Quentin
1986 *Mammals in Hawaii: A Synopsis and Notational Bibliography*. Second edition. Bishop Museum Press, Honolulu.

Tomonari-Tuggle, M.J.
1990 *Archaeological Inventory Survey of a Portion of Kalama‘ula. Island of Moloka‘i.* International Archaeological Research Institute, Inc., Honolulu.

Ulukau
2014 *Māhele Database.* Hawaiian Electronic Library, http://ulukau.org/cgi-bin/vicki?l=en..

USDA (U.S. Department of Agriculture, Natural Resources Conservation Service)
2006 Soil Survey Geographic (SSURGO) database for Island of Molokai, Hawaii (hi980). U.S. Department of Agriculture, Natural Resources Conservation Service.

USGS (U.S. Geological Survey)
1922 Kualapuu USGS 7.5-minute topographic quadrangle. USGS Information Services, Denver, Colorado.

1950 USGS aerial photograph of Molokai. USGS Information Services, Denver, Colorado.

1952 Kaunakakai and Molokai Airport USGS 7.5-minute topographic quadrangles. USGS Information Services, Denver, Colorado.

1964 USGS aerial photograph of Molokai. USGS Information Services, Denver, Colorado.

1967 Kaunakakai USGS 7.5-minute topographic quadrangle. USGS Information Services, Denver, Colorado.

1968 Molokai Airport USGS 7.5-minute topographic quadrangle. USGS Information Services, Denver, Colorado.

1983 Molokai West USGS 7.5-minute topographic quadrangle. USGS Information Services, Denver, Colorado.

1993 Kaunakakai and Molokai Airport USGS 7.5-minute topographic quadrangles. USGS Information Services, Denver, Colorado.

Vancouver, George

1798 *A Voyage of Discovery to the North Pacific Ocean and Around the World*. N. Israel, Amsterdam and De Capo Press, New York.

Waihona 'Aina

2021 *The Māhele Database*. Electronic document, http://waihona.com

Westervelt, William Drake

1916 *Hawaiian Legends of Volcanoes*. Ellis Press, Boston, Massachusetts and Constable & Company, London, Great Britain.

Wiebke, Henry

1940 History of Agriculture On Molokai is Presented. *Maui News* 30 March. Wailuku, Hawai'i.

Young, Charles C.

1961 Molokai Electric's George Will Has Guided Firm Since Inception. *Honolulu Star-Bulletin*. Honolulu.

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 Pālā'au and Ho'olehua Ahupua'a.

Consultation with traditional cultural practitioners, *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 Munekiyo Hiraga on behalf of the Department of Hawaiian Home Lands (DHHL), CSH is conducting a cultural impact assessment (CIA) for the DHHL Ho'olehua Scattered Lots Subdivision and Improvements, Pālā'au Ahupua'a, Moloka'i District, Moloka'i Island, TMKs: [2] 5-2-005:031, Lot 17 and [2] 5-2-026:014, Lot 104D-1. The location and boundaries of the proposed project are delineated on a 1993 Kaunakakai and Molokai Airport U.S. Geological Survey (USGS) 7.5-minute topographic quadrangles (Figure 1) and a 2013 ESRI aerial map (Figure 2) attached to this invitation. The purpose of the project is to create additional homesteading opportunities for DHHL beneficiaries on the Moloka'i Agriculture Waitlist. The DHHL proposes improvement and subdivision of two (2) parcels. The improvements include clearing, grading, and installation of roadway, electrical, and irrigation water utilities. The proposed plan calls for ground-disturbing activities to be confined to the two (2) subject parcels, but will extend to existing roadways for access and connection for utilities.

Purpose of this Study

The purpose of a CIA is to gather information on Hawai'i's cultural resources, practices, or beliefs that have occurred or still occur within the proposed project area and Pālā'au and Ho'olehua 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 by the proposed project to the specific identified resources, practices, and beliefs in the project area and throughout Pālā'au and Ho'olehua Ahupua'a. As a traditional cultural practitioner and holder of long-term 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 project area (shown on the attached Figures 1 and 2) are especially helpful and appreciated:

- Your knowledge of traditional cultural practices of the past within the proposed project area and Pālā'au and Ho'olehua Ahupua'a

PALAAU 11 - CIA for the DHHL Ho‘olehua Scattered Lots Subdivision and Improvements

- Your specific traditional cultural practice and its connection to the proposed project area and Pālā‘au and Ho‘olehua 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 project area and Pālā‘au and Ho‘olehua Ahupua‘a
- Referrals to other *kūpuna*, *kama‘āīna*, and traditional cultural practitioners knowledgeable about the proposed project area and Pālā‘au and Ho‘olehua 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 project area and Pālā‘au and Ho‘olehua Ahupua‘a
- Your knowledge of cultural sites and *wahi pana* (storied places) within the proposed project area and Pālā‘au and Ho‘olehua Ahupua‘a
- Your comments or thoughts on the potential impacts the proposed project may have on cultural sites and *wahi pana* within the proposed project area and Pālā‘au and Ho‘olehua Ahupua‘a

Consultation Information

Consultation is an important and deeply valued part of the CIA and environmental review process. 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.

With your agreement to participate in this study, your contributions will become part of the comprehensive understanding of traditions of the area, and part of the public record; they will be available for future access through the Office of Environmental Quality Control (https://health.hawaii.gov/oeqc/) and at the State Historic Preservation Division Library (https://dlnr.hawaii.gov/shpd/about/research-resources-library).

As a part of this process, your knowledge may be used to inform future CIAs and other heritage studies of cultural practices and resources that need protection from impacts of proposed future projects. If you engage in consultation, and the *mana‘o* and *‘ike* you provide appears 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 platforms.

Your knowledge of the resources and potential effect of the project on traditional practices in the project area and Pālā‘au and Ho‘olehua Ahupua‘a focusing on the topics in the bullet points above can also be submitted in a written statement. CSH will provide return postage of your written statement on request.

PALAAU 11 - CIA for the DHHL Ho‘olehua Scattered Lots Subdivision and Improvements

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 CSH Cultural Researchers, Kellen Tanaka, by email at ktanaka@culturalsurveys.com or Chantellee Spencer at cspencer@culturalsurveys.com phone at (808) 262-9972.

Mahalo nui loa for your time and attention to this request for consultation.

Yours with much aloha and appreciation,

Kellen Tanaka

CSH Cultural Researcher

Appendix B Consultee Interview Transcripts

B 1 Kilia Purdy-Avelino and Justin Avelino Summary

On 5 November 2021, Cultural Surveys Hawai‘i (CSH) reached out to Kilia Purdy-Avelino regarding the cultural impact assessment (CIA) for the DHHL Ho‘olehua Scattered Lots Subdivision and Improvements project. She granted CSH permission to reuse information she previously shared for a cultural impact assessment pertaining to the Pālā‘au and Ho‘olehua Ahupua‘a. The information was gathered from Mrs. Purdy Avelino and her husband, Justin Avelino.

Mrs. Purdy-Avelino was originally born on O‘ahu but lived in Ho‘olehua, Moloka‘i for most of her life. She is the fourth generation of her family to live in the Ho‘olehua-Pālā‘au Homestead. Her grandmother was one of the first Native Hawaiians to move into the Ho‘olehua-Pālā‘au Homestead. Now an educator, Mrs. Purdy-Avelino teaches multiple grade levels (K-12), college-level courses, and is currently obtaining her doctoral degree.

Mr. Avelino was born and raised in Hilo, but has lived in Moloka‘i for many years with his wife, raising their children on the homestead. Mr. Avelino is dedicated to Hawaiian cultural protocols, which he first learned from his grandfather. He is an avid hunter and the unofficial caretaker of the lands in Ho‘olehua-Pālā‘au Homestead, helping out his fellow neighbors when they are in need, farming their lands, and guarding knowledge of various sacred sites and *mo‘olelo* (stories) of Moloka‘i.

On their current 5-acre homestead property (located in the *mauka* [toward the mountain] region of the Ho‘olehua-Pālā‘au Homestead), you will find various fruits and vegetables such as *‘ulu* (breadfruit), *kalo* (taro), papaya, *mai‘a* (banana), mango, and macadamia nut trees. These produce yields not only feed the family, but also their livestock of pigs and chickens. Mrs. Purdy-Avelino shared that her grandmother grew various floral plants on their property such as *‘ākulikuli* (*Sesuvium portulacastrum*), *‘awapuhi* (wild ginger, *Zingiber zerumbet*), *kīkā* (cigar flower, *Cuphea ignea*), *kīkānia* (*Solanum capsicoides*), and *kupaloka* (tuberose), which are used to make *lei* (garland). On their homestead today, her father grows *gardenia*, orchids (*Orchidaceae*), bird-of-paradise (*Strelitzia reginae*), and *anthuriums*.

Mrs. Purdy-Avelino shared that the original lease contained 40 acres of land, and not just the 5 acres they currently have today. The original lease owner, Aunty Gladys (Mrs. Purdy-Avelino’s relative), leased her lands to aid the pineapple company (either Dole or Del Monte). When the pineapple company pulled out, instead of obtaining her lands, Aunty Gladys returned a portion of her lands back to DHHL and kept the current 5 acres. In 1980, Mrs. Purdy-Avelino’s father obtained the land from his cousin Frank Kupau, who was the successor of his mother, Gladys. When he got the land, although he needed to clean and clear the area, there was an acre of approximately 50 macadamia nut trees already planted and mature. Mrs. Purdy-Avelino believes they were planted during the 1920s. Now, there is a grove of macadamia nut trees that cover roughly 5 acres. Mrs. Purdy-Avelino shared that her family was able to receive the remaining 35 acres of land in the original lease just a few months ago. With their increased land acreage, their plans are to help reforest the lands, which will in turn help the rain return to the area.

Both Mrs. Purdy-Avelino and Mr. Avelino shared some *mo‘olelo* that were passed down from *kūpuna* (elders) and some they acquired themselves.

Mrs. Purdy-Avelino shared a *mo‘olelo* told to her by her cousin about how the land of Nā‘iwa received its name. The *mo‘olelo* starts off with a mother from Kalaupapa (located east of Pālā‘au), who was a very skilled *lei* maker. Her son wanted to compete in a *lei* making competition held at the Makahiki festival as well as to impress a *wahine* (woman) he was admiring. His mother, the skilled *lei* maker, made a *lei* out of the *‘iwa‘iwa* (maidenhair fern) fern. The boy ended up giving this *lei* to the *wahine* and she loved it. She would wear it wherever she went. As she traveled, the spores from the *‘iwa‘iwa* ferns in the *lei* would fall and scatter across the land. Hence the name, Nā‘iwa.

Mrs. Purdy-Avelino also recalled that during her childhood days, her dad would take her down *makai* of Nā‘iwa (toward the project area) to pick up *‘uala* from an *‘ohana* who lived in the area and she remembers eating it raw in the back of the truck.

Mr. Avelino shared some of his experiences while traversing through the *mauka* region of Nā‘iwa and the importance of understanding and respecting the spirituality and history of the land. One of the lessons Mr. Avelino learned while hunting is to open yourself to your surroundings. There are many ways in which nature and spirits communicate with us and when you are open to receiving such information, you will gain a deeper connection to the land.

While passing through the lands of Ho‘olehua, Mr. Avelino came across certain areas and/or certain objects, like *pōhaku* (stone) that he knew were sacred. While following a buck on one of his hunting missions, Mr. Avelino came across two *pōhaku* in the shape of a chair. On various hunting missions, Mr. Avelino would come across areas in which he could “feel the mana of the land” or sense that the area was “not pono.”

Another significant area in Nā‘iwa is known as the *makahiki* (ancient festival) ground. It was shared that in the past, one of the chiefs of Moloka‘i looked toward the mountains of Nā‘iwa and noticed a cloud shaped like a finger. The finger was pointing to a piece of land. A council of chiefs gathered and deemed the area as the place where Makahiki ceremonies would occur. To this day, Makahiki ceremony and activities continue to take place. In this area, items such as *‘ulu maika* (stone used in *maika* [ancient Hawaiian game suggesting bowling] game) have been discovered. Mr. Avelino shared that it is vital that no work be done to this area.

When asked about any concerns regarding the proposed project, Mrs. Purdy-Avelino shared valid concerns about the project as well as the overall process of reaching out to Native Hawaiians for their *‘ike* and *mana‘o* (opinion). The concerns directly related to the proposed project include the following:

1) Remember that *kūpuna* are always here in spirit and they will show themselves in various ways. It is up to us to make sure that we open ourselves up to receive their information.
2) Be mindful of sacred sites within and around the vicinity of work.
3) Do not *hana ‘ino* (harm) the land or anything that may be disturbed.

In order to help with these concerns, Mrs. Purdy-Avelino recommends that a cultural monitor should be on site during any work to help provide guidance in regard to Hawaiian sense of place, protection of sacred areas and objects, and to be a voice for *kūpuna*. Mrs. Purdy-Avelino is

supportive of more homestead lots being developed so that more homesteaders can get off the waitlist and into homes, however, as more homestead developments occur (whether it may be from DHHL or homesteaders developing their own plots), we all need to make sure to continue to protect sacred sites.

As mentioned, Mrs. Purdy-Avelino shared concerns that may not be directly related to the proposed project but are in regard to the overall process of outreach to Native Hawaiian communities and how information is shared.

1) Please make sure to reach out to Native Hawaiian communities in multiple ways and not just by an announcement in a newspaper or on the internet. That way, *kānaka* (Native Hawaiians) can be more *maka‘ala* (aware) of proposed projects that are happening in their community.
2) Please do not utilize Native Hawaiians and the *‘ike* that is shared just to “check a box.” Native Hawaiians are sharing their *‘ike* of their ancestors to help with the proposed projects and to provide a Hawaiian perspective of the land, its history, and its spirit. Our words and concerns carry *mana*, and it is important that they are heard and the suggestions given are followed through.
3) Full disclosures of project and project details are a must. Developers need to provide transparency to work that will be conducted as well as any other supplemental or follow-up work that may be conducted.

B 2 Malia Lani Forbes Greaney Summary

Informant, Ms. Malia Lani Forbes Greaney for the proposed DHHL Nā‘iwa/Pālā‘au Agricultural Subdivision Project: Cultural Surveys Hawai‘i, Inc., (CSH). Cultural Surveys Hawai‘i, Inc. (CSH) conducted an interview via Zoom (a video conferencing platform) with Ms. Greaney on 14 September 2021 with content summarized by CSH. In 2022, Ms. Greaney provided *‘ike*, *no‘ono‘o*, *no‘ono‘omua*, *ho‘oka‘ina mana‘o* (knowledge and experience hence learning, thoughts, considerations, anticipations, composed ideas) on Hawaiian traditions and history of Ho‘olehua, and Pālā‘au and Nā‘iwa in context of ancient Hawaiians, recent past, current situation, and future possibilities for Hawaiians living on homesteads in central Moloka‘i. Ms. Greaney relayed information on continuous native practices of the area, and some areas of concern related to the proposed project.

Ms. Greaney’s immediate family resided on the same homestead for near a century, where she continues to live and farm with her children who are fifth generation homesteaders. Ms. Greaney’s *‘ohana* (family) is almost to the middle of a two-hundred-year lease of Ho‘olehua Lot #1, Mo‘omomi Ave., which is off of Lihipali and Farrington Avenues. It is shown on many maps as a “finger” of land outstretched below the larger portion of Pālā‘au, with Ho‘olehua *ahupua‘a* on the West and Nā‘iwa on the East.

Ms. Greaney recognizes her *kupuna* as her main source of Moloka‘i knowledge and traces her genealogy on Moloka‘i for centuries through both maternal grandparents who helped raise her. Ms. Greaney inherited her homestead through her manaleo (Hawaiian is the 1st language) *tutu* lady (grandmother) who was a high school English teacher and rarely used Hawaiian diacritical markers as early written Hawaiian used context for pronunciation and meaning. Ms. Greaney uses them

less in common words and notes that translations into English provide partial definitions for complex Hawaiian meanings.

In the past, Ms. Greaney’s *‘ohana* lived in various regions of Moloka‘i determined largely by fresh water sources. Her grandmother was born in Waialua Valley in Mana‘e, also known as East End. Waialua’s river still flows after sustaining many generations of her *‘ohana* on extensive *lo‘i* (terraced ponds for taro cultivation) that produced high yields and quality of *kalo* (taro plants). King Kamehameha the Great shared the name of his uncle, known by Kamehameha‘ailuau, who was safely raised on this abundance. Hawaiians intimately understood the relationship of people and *wai* (fresh water) with a necessity to maintain and protect clean water systems for health, wealth and survival. The importance of traditional Hawaiian knowledge and practice cannot be overstated to the current general public just beginning to realize our interdependence.

Moloka‘i was of the highest spiritual importance to ancient Hawaiians as recognized in one of the island’s nicknames, Moloka‘i Pule O‘o (Moloka‘i of powerful prayer). On similar par with the most highly elevated places for rulers; members of the House of Kamehameha saw Moloka‘i as the physical *piko* (naval, center, source) centralizing Hawai‘i’s spiritual power which united people and place. Following loss of land control, finalized in overthrow of the Hawaiian Kingdom, Moloka‘i was selected as the birthplace of the Hawaiian Homelands initiative. It was a last effort by Prince Kūhiō to reunite Hawaiians suffering from physical and cultural separation from their *‘āina* (land). One hundred years ago, Ms. Greaney’s pure Hawaiian maternal great-grandmother found herself raising children alone with the opportunity to have land in her own name. Though a dry, barren place compared lush Waialua Valley, Emily Lani Cathcart (Maliu) moved her young family to the shores of Kalamaula, and became a participant in the pilot project for the first homesteads in Hawai‘i.

Kalamaula was the test site for what would soon expand to Ho‘olehua, then be replicated throughout Hawai‘i after passage of the Hawaiian Homes Commission Act, a federal project in the Territory. Documents and family photos from the 1920’s and forward record DHHL’s earliest farmers raising pigs and planting crops, in the arid conditions of central Moloka‘i. *Mo‘olelo* (traditional stories, oral history) tell of *puna* (fresh water spring) once located behind the house of a third-generation homesteader on very dry Olo‘olo Lane. There and nearby, Ms. Greaney’s *‘ohana* still have their first homesteads. Her grandma’s mother settled at the shoreline approximately 100 yards from Kapuāiwa Coconut Grove, which her grandpa’s grandfather had planted for King Kamehameha V. In this protected place of royalty, *puna* fill small clear pools and shift close underground in continuous flow ending offshore.

Ms. Greaney’s grandfather was born in the central *mauka* lands (upland, inland regions toward the mountains) of Kala‘e. It is usually mispronounced without the *okina* (glottal stop). Kala‘e includes the uppermost portions of Nā‘iwa and other of *ahupua‘a*, shown on some family maps as long land divisions with typical tracts from mountain top to wider shoreline and sea. These *ahupua‘a* are also mapped as three detached parcels, when combined they provide varied environments common within *ahupua‘a* boundaries and allow sustainable land and ocean-based living with proper stewardship. Her grandfather’s pure Hawaiian grandmother, High Chiefess Kalama Waha was raised near ‘Ili‘ili‘ōpae, Hawai‘i’s second largest *heiau* (a traditional Hawaiian sacred site of religious practice and worship, shrine) which is located in Mapulehu, another river

valley in Mana‘e. She moved to Kalua‘aha where she met and wed R.W. Meyer. He was from Germany via Tahiti, and they later created a settlement in Kala‘e with their eleven children.

R.W. Meyer was also fluent in Hawaiian, English and other languages. He held many Moloka‘i leadership roles and was instantly appointed Superintendent of Health when the government suddenly began forcibly removing anyone suspected of possibly having Hanson’s Disease from their homes and society for quarantine. Family severance was often immediate and usually against their will so Hawaiians called it the separating disease. Sick and healthy people were dumped off boats and made to swim ashore to Kalaupapa Peninsula, also known as Makanalua where escape was difficult. Hiding elsewhere was nearly impossible. R.W. worked frantically to obtain basic supplies from government officials in Honolulu who gave little to no forethought or concern for the human suffering of terminally ill people forced to survive with nothing, even shelter. Formerly called Lepers, and today, patients made their first settlement in Kalawao near where they were sent overboard. Above the sheer, towering cliffs of Kalaupapa sits the uppermost regions of several *ahupua‘a* including Pālā‘au and Nā‘iwa.

Meyer served Kamehameha IV, Kamehameha V, Princess Ruth Ke‘elikolani, and King Kalakaua in various capacities such as managing Moloka‘i Ranch. Princess Ruth Ke’elikolani selected Charles Reed Bishop and R.W. Meyer was co-executors of her Will which later made Princess Bernice Pauahi Bishop Hawai‘i’s largest private land owner and created Kamehameha Schools. Two-thirds of Kalama and R.W. Meyer’s land including 285 acres in Nā‘iwa and land in Kala‘e, Kahanui, Kīpū, and nearby, came from the princesses because of family ties with extremely close relationships, trust and understanding of the *kuleana* (rights, responsibility) to oversee these places that sustain life and fruitfulness of Hawaiian land and people. This land includes wetter zones of the cliff line above Kalaupapa’s Kalawao and prior to being assumed by the government to provide “Topside” with water, it also included parts of Waikolu Valley and Waihānau Valley, estimated to have been settled by earlier Hawaiians about a thousand years ago.

Situated in the middle of the island chain, Moloka‘i is once again known as the *piko* (center, naval) of Hawai‘i. There are three *wahipana* (sacred place) near the center of Moloka‘i above the Kalaupapa cliff line, also called *piko*. Pu‘uolelo (speaking hill) is sometimes mapped at Nā‘iwa of the highest elevation. It is easy to identify from lower lands of Ho‘olehua and Nā‘iwa by a grove with of pines trees Mr. Meyer planted at the summit in the early 1800’s. To the east is the high precipice, Kaohu (adorned in fog) and in the middle is one of few naturally occurring freshwater lakes in Hawai‘i. Ms. Greaney grew up with many oral traditions about Keālia Lake, publicly called Meyer Lake. The three *wahipana* form a line, westward it passes procreative Ka‘ule o Nanahoa (Phallic Rock), the female fertility partner *pōhaku* (rock) sometimes called Waihuehue, and other sites of regeneration. Birthing stones for delivery of babies are still located in the area.

Keālia is a name for the wooden sticks carried by *kahuna* (priests) in protocol for the religious season of Makahiki. To this day the processional moves east to west to the sacred grounds of the god Lono, publicly known simply as Nā‘iwa. The islands each had Makahiki grounds dedicated to Lono where offerings would be made in reverence, appreciation and hopes of an abundance of food in the coming year. The gifts would eventually be redistributed by rank, needs and contribution. Makahiki was so important that it marked time and regulated people’s physical and religious life. The spiritual epicenter of Hawaii drew *ali‘i* and champions from outer islands who would travel to this hallowed place to compete for top honors and recognition in annual

competitions. All manner of strength and skill were tested in physical, strategic, intelligence, talent, and metaphysical challenges. Makahiki was an integral part of life that allowed for peace, shared abundance, and continuation of the Hawaiian race. Ms. Greaney insists that no one can authentically recognize or celebrate the true spirit of Makahiki, and the peace and abundance it symbolizes for all of Hawai‘i, without also recognizing what began, endured and exists in this particular physical space. It is a critical part of Moloka‘i’s roll and record in history prior to contact, including land use, religious culture, and the daily lives of the Hawaiian people. It played an important part in continuance of intergenerational and communal practices near extinction at the time of the Hawaiian Renaissance; and because of Moloka‘i it is again firmly rooted in annual calendars and celebrations statewide.

In the months of Makahiki, southernly Kona storms are associated with Lono. Winter storms are stronger and more frequent, bringing rains to much dryer Leeward sides of southwest shores including the low elevations of Nā‘iwa and Pālā‘au. Most months of the year, prevailing trade winds blow from the northeast windward side, carrying rains of Kahanui, Nā‘iwa, and Pālā‘au in upland Kala‘e inland from the cliff tops to the upper regions of the Ho‘olehua homesteads at mid-elevation of Nā‘iwa and Pālā‘au. These rains lighten as they travel to the Pālā‘au and Nā‘iwa foothills of Ms. Greaney’s homestead. The windward rains largely dissipate before reaching homesteads in the south and west halves of the slowly sloping lowlands. In early morning hours, *ua poko* (passing showers) often travel along a small gulch along the length of her homestead. Ms. Greaney’s homestead lies on eastern edge of Ho‘olehua, west of privately owned land of Kualapu‘u.

A large *hau* tree (*Hibiscus tiliaceus*) at the gulch edge supports oral and written histories on the origins of Ho‘olehua in connection with the Nā‘iwa Makahiki grounds. Highly respected for their cultural practice and knowledge of Moloka‘i, *Kupuna* (elders) recorded that an ancient *hau* tree identifies where a beloved *ali‘i* named Lehua lived in Ho‘olehua. Some believe she became the namesake of the area she overlooked. A special type of fern is credited in a more well-known naming history in which a beautiful *hula* dancer named Lehua was given a lei made of Nā‘iwa fern by a Makahiki champion. They married and the fern which had only grown in his Kalaupapa home continued to spread from the cliff line, giving Nā‘iwa its name. Near above Ms. Greaney’s homestead is an ancient *hula* site remaining in the Nā‘iwa Makahiki grounds. Moloka‘i is the birthplace of the enduring ancient traditions of Kapo and Laka. *Hula* is celebrated in Ka Hula Piko, and Lua for defense is sometimes referred to as a twin or sibling. Neither practice was restricted to one gender and both perpetuated Hawaiian philosophies of spiritual and physical existence.

Hawaiian naming practices often include multiple meanings and another noted source of Ho‘olehua’s name is for the soldiers leading the advance in war. Ms. Greaney heard old stories of Night Marchers (spirits of dead Hawaiian warriors) traveling their path from mountains in Kala‘e toward the Makahiki grounds. They then make their way along the same boundary gulch toward the high school gym on Farrington Avenue. Some Hawaiians still testify having seen them in this area as children. Kamehameha rested his troops in the food abundant spiritual Moloka‘i uplands while recuperating and training in this area before going on to successfully capture O‘ahu. Initiation of war was bound to spiritual guidance, and branches of *hau* were placed in front of advancing armies by a *kahuna* while others prayed throughout the battle. In the end the victor’s *hau* remained standing. *Hau* is also used in other spiritual practices, being important in *heiau* and

hula. So integral was it to Hawaiian ritual and daily life that permission from *ali‘i* was required to cut one down.

Hau is included in Hawaiian creation stories involving the great mother of Molokai island, Hina, and two of her demi-god sons, Maui and Kamapua‘a. In native religion, Kamapua’a (the pig-God) oversees fertility, he is recognized on (pig alters) that mark *ahupua‘a* boundaries that are visited by priests in Makahiki protocol, and recounted in many stories with Lono. Lono is one of the four main Hawaiian gods with Kū (God of war), Kāne (creator of man) and Kanaloa (God of the ocean) with influences on time, spiritual and physical realms; inanimate things, plants, animals and people; lessor gods and each other. Varying powers and characteristics of each god has great complexity, as with their relationships, and in different ways and times may be oppositional, parallel, complementary, and overlapping. In the belief system overarching native Hawaiian life, influences of Lono were life sustaining, including for abundant agricultural crops.

Old Hawaiian historians recorded genealogies tied to the original Makahiki grounds. This includes the *ali‘i* credited for starting all Makahiki practices in Hawai‘i. He was called by the name of Lonoikamakahiki. One account says he came to Moloka‘i from Hawai‘i Island and from among all areas in Hawai‘i identified much earlier as high holy places, he decided this specific area was to be the primary place in the islands for honoring Lono. Early land records specify Lono descendants as *konohiki* (person in charge of an *ahupua‘a*) and title holders in the region through the 19th century. The final third of the regional lands owned by R.W. Meyer and Kalama Waha, beyond the Nā‘iwa land, did not come from the Princesses but rather 1,060 acres came from Lonowahine *ali‘i* in 1883. Ms. Greaney serves on the volunteer board of directors overseeing all remaining Meyer family land and is working toward collaboration with island farmers to create a more sustainable island future.

Ms. Greaney sees a critical importance in continuance of native practices. They are grounded in a belief system developed on astute Polynesian knowledge gained over thousands of years of scientific observation of the environment, and continued to grow for hundreds more, specific to places in Hawai‘i. Much has already been verified with modern science, instrumental innovation and other recent developments. Traditional land use identified areas for specific purposes that supported sustainable provision for a healthy population and ecosystem. To preserve traditional land use in her area, Ms. continues to raise animals and consistently pigs, grow crops, and many other cultural practices important to physical and spiritual wellness. She professes many influences on her spiritual faith which is rooted in the Christian beliefs she was raised in. She sees her Hawaiian spiritual beliefs and practices as complementary. She acknowledges daily influences of God, her *‘ohana* who have passed, ancestors, all of nature, and an unseen manifesting power specific to Moloka‘i and certain locations including the area of her homestead which had also been recognized by Hawaiians throughout history

Nā‘iwa was widely known as an area of physical and spiritual healing. In the past, it attracted injured, sick, and dying Hawaiians with their caregivers and loved ones. Hawaiians placed the first Medical Doctor’s clinic as closely as possible to the ancient healing area at the start DHHL’s development. Dr. Alsoberry Kaumuali‘i Hanchett was educated at Harvard Medical School, and as the very first Hawaiian MD to return to practice medicine in Hawai‘i, he built and held his clinic here. Moloka‘i’s first hospital, Shingle Hospital, opened a decade after the clinic and was also located as closely as possible to Ho‘olehua’s northern most side approximating the middle of the

Nā‘iwa *ahupua‘a*. Yola Forbes, Ms. Greaney’s mother was raised in the same home of Hawaiian healers in the Nā‘iwa foothills and was compelled to enroll in medical school the early 1960’s. On track to be the first female Hawaiian MD, she left medical school and her plans to practice obstetrics on Moloka‘i when planning for the birth of her first child and still on the mainland. Remaining in the health field, she attained a UC Davis PhD in endocrinology and was a physiology professor over a decade before returning, and later grew food and medicinal trees on Ho‘olehua Lot 1.

Ms. Greaney credits being raised in the place of centuries of Hawaiian healing in her teen choice of a health career and decades as an RN. Ms. Greaney learned traditional medicine, receiving some of her grandmother’s Hawaiian knowledge and continued under many other Hawaiian health practitioners and *kauka* (doctors). Her Aunty Charlene Tinau, a pure Hawaiian traditional healer with shared genealogical ties in Mana‘e came nearly every week for years, uniquely blending Hawaiian and western healthcare. She tended their plants, cultivated near a century, shared her knowledge of what to gather here and elsewhere for common ailments and emergency applications. She successfully healed bone fractures and many conditions using *la‘aulapa‘au* (plant-based medicine) for Hawaiians without insurance or preferring traditional medicine.

Ms. Greaney was taught starting at ten years old by her experienced Hawaiian grandfather, later her aunty and many expert Hawaiian healers. Her grandpa was first to teach her how to applying traditional techniques of *lomilomi* (body manipulation) to maintain health and for more effective healing. She was taught by Hawaiian elders in the practice of *Ho‘oponopono* (Hawaiian conflict resolution), a guided technique for spiritual, self and interpersonal relationship healing. Unresolved conflict causes stress, physical inflammation and may lead to severe illness. She received intensive instruction on how to provide this service for Hawaiian families seeking reconciliation when facing terminal illness. A necessary part of all Hawaiian healing methods are prayer and meditation during preparation like planting or gather medicine and during application, through the healing process until it finishes. Powerful prayers effect body, mind and spirit, and are strengthened by connectedness to the spiritual nature of the place, plants, person being healed, and the healer.

Ms. Greaney passed on some health knowledge she learned working on her master’s in Community Public Health. She taught basic *la‘aulapa‘au* and *lomilomi* techniques at Windward Community College, and expanded the Health Sciences’ food garden by starting a *la‘aulapa‘au mala* to teach students of the Native Hawaiian Nursing Pathway to provide more culturally appropriate care for *kupuna* patients. She sees her homestead as the perfect place to promote indigenous health knowledge and continues to identifying medicinal plants in the area which can be gathered or cultivated. Slightly higher altitude and rainfall, and a little less sun and lower temperatures in the foothill region and the homesteads to the northwest, varies some from lower Nā‘iwa and close by areas to the south and south west where most of Ho‘olehua is located. In the same way, most of Ho‘olehua and lowest Nā‘iwa varies from regions to west and southeast. Particular flora varieties tend to fair a little differently, with ideal growing conditions for specific food and medicinal plants.

Ms. Greaney sees great potential in reducing disproportionately high Hawaiian mortality and morbidity rates with traditional native diet, lifestyle and healing techniques. All of which she believes will be eagerly adopted by residents of this area when it is affordable and readily available,

as more Hawaiians are looking to the past for knowledge on how to have a high quality of life. Homesteaders interested in growing medicinal plants as crops have the benefit of high demand from people of all cultures who seeking alternatives to “big pharma” and are willing to invest in their health by purchasing products offering more natural healing methods. Increasing homesteader’ income generation this way has the potential to raise socio-economic status and quality of life, continue cultural practices of this area, and maintain a rural community and traditional lifestyles.

Experiences as Moloka‘i General Hospital’s community cancer program coordinator, a hospice nurse, with bereavement groups, added to Ms. Greaney’s interest in end-of-life beliefs and practices. She spent years seeking out information and documenting oral histories from Moloka‘i *kupuna*. She noted that Homelani and Ho‘olehua Cemeteries, both chosen by Hawaiians as the final resting place for their beloved *‘ohana* are located in proximity to *wahipana*. She was informed by *kupuna* about a *lele* (place of transition to the afterlife for souls/spirits) above her homestead where the physical and spiritual realm connect. A mapped *heiau* exists in that location. A continuum of traditions for the most significant of all human experiences, from reproduction of life until after death, was focused in this *piko* for potentially half a Millenia.

An immense *hau* tree has thrived in Nā‘iwa/Pālā‘au for unknown generations, including the last four of her family, and helped them to flourish, also. It is a living linkage to the past allowing continuation of endangered native practices and accompanying understanding. Hawaiian ways of knowing and interacting with all things on a deep and conscious level is reflected in specific behaviors. Now called protocol, instruction on correct actions, including when to do what and how were a routine part of being raised by *kupuna*. Standard actions include specific words, ways of speaking them, and also silence to convey necessary gratitude, humility and respect for all things. This is especially true towards everything that is older, including almost all of nature. It was critical not to waste or cause unnecessary damage to any resource. There is inherent value in all things so no matter how much you had, waste or avoidable damage was inacceptable. Such wrong action resulted from not being taught, taught incorrectly, or not following what you were taught. All you do or don’t do is based on *‘ike* and *‘imi* (knowledge and understanding), and is a direct reflection of your teacher and your family. Behaving wrongly resulted in repercussions that could imperil sustainability of life. Part of Native Hawaiian traditional practice of this understanding was correct access of natural resources for immediate, necessary use. Overharvesting, improper timing, and incorrect techniques and carelessness can injure resources and surroundings, and reduce the ability to reproduce and replentish.

The *hau* provides obvious examples providing a windbreak, helping new crops grow without damage, reducing erosion from water coming down the gulch, and many more provisions. It is an irreplaceable source for medicinal properties of plant parts for *La‘aulapa‘au*, her tools for *lomilomi* (Hawaiian healing utilizing massage technique) from *hau*’s strong, light branches with beneficial bends. It is her family’s main main resource to make *ko‘i* for for hand carving *papa he‘e nalu* (surfboards). It is significant for them because surfing was always their most enjoyed family bonding activity. It is a source of pride to make surfboards in the way they were first made. It involves several plants found in this area of Moloka‘i and there are very few families that still know and can pass on this traditional practice. Significance continues to grow as the sport created by Hawaiians became known throughout the world as an Olympic sport with a Hawaiian first gold medalist, who also calls Moloka‘i home. The family also all have a hand carving *papa ku‘i ‘ai*

(pounding board such as to make *poi*) with handmade pohaku *ku‘i ‘ai* (food pounding stone) for preparation of many traditional and common foods. It is very important that appropriate prayers are offered in creation of both types of *papa*, *pōhaku* and all other implements. Emotions and interactions must be positive because it is imbued in the creation process and will have according effect on people using the product.

The ancient tree is located at the lower Makahiki grounds. It can be used for building fires, and is located rather close to the cliff line. *Hau*’s straight branches provide light, strong wood for making spears. Among numerous Makahiki games of sportsmanship is a game of throwing flaming spears of *hau* wood over a cliff. Ms. Greaney's son loves the sport of throwing and blocking spears which he was taught by Hawaiian *lua* elders, and he makes them from *hau* and other homestead trees. Young branches are flexible enough to make the excellent kites flown during Makahiki. In this area of Nā‘iwa/Pālā‘au, Ms. Greaney frequently flew such kites as a girl upon the reliable trade winds over their rolling hills. Cordage made of *hau* was also used to make bows for hunting and sport, and for sling shots, the most preferred weapon of war for its long range and lethal power.

To many Hawaiians it is no surprise that the original Makahiki lands are also the only place of continuous practice of the social, physical, emotional and spiritual ritual, healing and enlightenment associated with Makahiki in existence. Cultural experts on Moloka‘i still observe Makahiki with formal protocol, and all youth learn the traditional practices of their ancestors. When other islands ceased to honor these practices while the ancient knowledge continued only on Moloka‘i. School students throughout Hawai‘i have traveled for nearly a decade to participate in our Makahiki competitions, including decades of annual representatives from Kamehameha Schools. It remains one of the island’s main annual social celebrations with generations carrying memories of Hawaiian sportsmanship as competitors and spectators.

Much physically remains in this area from the old days when the Hawaiian people are ready. Much knowledge was lost, but it can be relearned from all that is still left through written and physical remains, with dedication to reviving ancient ways of knowing and being. She cited Hokulea as a recent example of changing the future of a people by reviving ancient knowledge and practices. The science of wayfinding navigation was recovered a little at a time until it was brought back to a living art allowing circumnavigation based on learned observation of nature. Hawaiians regained pride as individuals knowing that they descend from a people with a great past of accomplishment. They see their part in the larger group of Polynesians whose knowledge of the natural world was in many ways unparalleled among all people. Modern science provides further evidence of the brilliant science of the past which has been lost for a period of time. Discoveries in archeology verified and continues to inform knowledge of the Pacific, like voyaging, and can continue to produce priceless keys of relearning ancient knowledge.

Many *pōhaku* implements (stone artifacts) such as *ulumaika* (wheel shaped stones) for ceremonial competitions and *ma‘a* (slingshot stones) for battles of sport and war have always been found in the area of Ms. Greaney’s homestead and unearthed to this day. More artifacts have been found recently and numerous more are likely to be present because of past heavy use of the area. They may not be immediately recognized if they do not have the obvious shape of *ulumaika*. An expert on Polynesian stone artifacts visited through Bishop Museum some years ago and borrowed a hammer stone that was found in order to scan it because he said it was the finest example he’d ever seen in Hawai‘i. It was not returned.

Due to the special significance of this place to Hawaiian culture, historically and continuously, the homestead community should be notified well in advance of any proposed developments that will occur on the Makahiki lands. Ms. Greaney also expressed concerns homesteaders be individually consulted if it involves their land since many lots have been occupied by the same family for a century. If there are any future developments, it is important that in depth archaeological inventory surveys be conducted as it is known that many artifacts still exist in the mauka and central regions of Nā‘iwa and Pālā‘au. Though not inhabited by such a large constant population year around like other areas near the coast and freshwater, this area supported thousands of Hawaiians who regularly occupied it for seasonal, ceremonial, celebratory, and other prime purposes. The primary use of this land was uncommon for other areas of Hawai‘i.

Ms. Greaney shared that at the time residents knew most of the land in Ho‘olehua was dry and lacked access to water and it would both challenging and difficult to be self-sufficient in the homestead. Ms. Greaney mentioned a letter between her grandfather and Charles Reed Bishop, stating concerns about the location of the homestead and that this pilot program was not setting up Native Hawaiians for success. The letter also questioned the purpose of those in charge and why the Native Hawaiians were receiving land that would be difficult to live on instead of land in areas with greater access to water and more natural abundance. There was a general lack of interest early on from Moloka‘i residents who did not want to live in the Ho‘olehua-Pālā‘au area due to lack of fresh water and distance from family and the coastline which was not quick to travel. Maui residents who didn’t have access to land on that island moved to fill remaining vacant lots becoming many of the first settlers of Ho‘olehua’s homesteads. Determined to create the prosperity they had lacked, the new homesteaders were called the “Moloka‘i Miracle” and provided needed evidence that Hawaiians could be rehabilitated through farming which allowed for continuation and expansion of the Hawaiian Homes project. Ms. Greaney sees ten decades of Moloka‘i homesteaders who have proven their dedication to making their lease lands productive through continuous investment of their resources and by pushing through natural and man-made barriers.

Moloka‘i Irrigation System was built specifically for residents of the Ho‘olehua homesteads and she stressed has been central to all planned land usage and settlement areas for Native Hawaiians, possibly no more important than on Moloka‘i. Ho‘olehua, including Nā‘iwa, is historically known for its dry and barren land, with little to no water available. Originally, the Moloka‘i Irrigation System was built specifically for residents of the homestead. In later years, the irrigation system expanded to serve other regions such as Kualapu‘u, lower Pālā‘au, as well as areas toward the west, like Moloka‘i Ranch and the golf courses. With the expansion of irrigation water, the homestead residents have been faced with high cost of water and limited access. The proposed project is important as it will provide homestead residents the opportunity to use land for agricultural purposes, however, it is also important to ensure access to the appropriate amount of water is available and at a reasonable cost. If this is not possible, residents who move into these agricultural lots may have difficulty growing crops

Ms. Greaney recalls stories of Pu‘u Pe‘elua (Caterpillar Hill) in Ho‘olehua, and Kualapu’u (Sweet Potato Hill) in the community named after the landmark. Her mother shared that in certain years in the 1940’s and 1950’s, the entire lower area of Nā‘wa would be covered with caterpillars to the extent they could not walk to school as children without crushing them underfoot. *Mo‘olelo* about this area of central Moloka‘i include large caterpillars, indicating they have come at various times during history. When Ms. Greaney was in school the whole area around Kualapu‘u was

planted in pineapple, and from fifty years before that nearly all of Ho‘olehua’s homestead area was also used for growing pineapples. In the 1980’s, there were so many small black beetles called “pineapple bugs”, electric zappers were placed in the school cafeterias to keep the numbers down, but students still had to cover their plates or have them in their food. They disappeared in the years after the pineapple companies left.

Fruit flies caused serious damage to fruit crops for decades, and her family participated in research to reduce their numbers in the 1980’s and early 2000’s. Over the past decade, there have been years when locusts and large black moth populations exploded such that a hundred could easily end up in the house and cover the lights if any doors were opened after dark. They caused major agricultural damage by eating and stinging the fruit, and significantly reduced viable crop yields. She isn’t sure if the more recent spikes in pest populations have been explained, if they occurred naturally, were exacerbated by man’s actions, or if any of the infestations will occur cyclically.

Most people on Moloka‘i know the history of food abundance that gave it the enduring name, *Moloka‘i ‘Āina Momona* (rich, fat land). As recently as a hundred and fifty years ago Moloka‘i was known for large quantities of agricultural and value-added exports such as *kalo* grown in *lo‘i* and dry land *māla* along with *‘uala* and other food sources. This includes aquaculture, and fish grown in the largest number of *loko‘ia* (fishponds, ocean aquaculture enclosures) in Hawai‘i, numbered over 60 that are still recognizable. Ms. Greaney was first taken to fishponds alone by her grandfather who was proud to share this purely Hawaiian innovation to feed the people. As an adult she worked for many years with restoration efforts. Her family has a tropical fruit orchard, and has grown and processed many diversified crops such as sugar, coffee, corn, potatoes. In Kala‘e, their family had *lo‘i kalo*, a peach orchard, a vineyard, a ranch, and a dairy. With very limited irrigation from catchment and a past small well, the crops were productive due to high levels of rainfall, allowing for regular export to O‘ahu and the Mainland, including butter preserved in banana leaves for transport. Similar to current population numbers, in the past Moloka‘i routinely produced food in excess of its own needs and helped feed the other islands. An elder explained to Ms. Greaney that so abundant was food on Moloka‘i that for hundreds of years Moloka‘i sent food grown in back valleys over the mountains to Kamalō and across the channel to Maui. Today only 2% of food purchased on island is from Moloka‘i, showing the island is capable of providing much more of Hawaii’s agriculture if resources like water prioritized accordingly.

Ms. Greaney voiced some hesitation in terms of agricultural and housing development in the proposed project areas related to assuring new lessees would be aware of past use of the land and any possible health effects it may have directly on those using the land as well as for those who consume food grown in these and nearby areas. Hawaiian Home Lands were leased to plantations for a century and a half, and land continues to be leased in all areas to private companies, as in Ho‘olehua. Here it was utilized by sugar, pineapple, and coffee plantations, as well as for research by large agricultural bioscience companies for designing products for pest control. Ms. Greaney’s master’s thesis in 2001 looked at possible public health effects of the copious pesticide use of chemicals that were made illegal in the U.S. which she found were applied by the pineapple plantations. She does not know what harsh chemicals may have been used by the other agri-businesses. Ms. Greaney strongly suggests the soil is well tested by third party professionals for any presence of harmful chemical residue possibly remaining in the soil. This is a good safety

precaution for farmers. Future studies may also look at nearshore areas off of Pālā‘au to assess for the presence of chemicals from runoff and any impacts.

A common Hawaiian saying is, *Ola i ka Wai* (water is life). Everywhere safe drinking water is necessary to sustain life. Above Ho‘olehua’s irrigation water storage, access and affordable usage; is safe drinking water storage, delivery, access for homesteader use. Her public health background in community health and nursing raised concern over the safety of the drinking water system for the homesteads. The current aged pipes were installed at the time the area was leased to Hawaiians with creation of the Ho‘olehua Water System early last century. Ho‘olehua’s drinking supply runs through pipes on Ms. Greaney’s homestead. Adverse impacts of asbestos on health have since become well known. Waterlines eventually degrade and asbestos shears off in splinters in old pipes, entering the water supply. DHHL is aware of the asbestos but current plans for improvement do not include budgeting for changing Ho‘olehua’s water storage tank and lines. Ms. Greaney and other homesteaders are working with DHHL, to discontinue use of water lines with asbestos and use safer materials for delivering drinking water to homesteaders. They think this budgeting adjustment can be made for Ho‘olehua because private lands in nearby *ahupua‘a* like Nā‘iwa and Kīpū are changing out asbestos pipes.

Ho‘olehua Lot #1 is the boundary that separates Hawaiian Home Lands from privately owned land in Kualapu‘u. Ms. Greaney’s homestead is the boarder marking the end of the public lands in long term leases to individual Hawaiians with restricted successor rights based on their family’s maintenance of specified Hawaiian blood quantum. All homestead lands are in trusted by the US government Department of the Interior (US DOI) to the State of Hawai‘i, managed by the Department of Hawaiian Home Lands under the Hawaiian Homes Commission with representatives from each island that is headed by a Chair Cabinet Member selected by the sitting governor. It is through this system that homesteaders will live and perpetuate Hawaiian culture through generational connection to their land. Agricultural Leases homesteaders have made concerted effort as individuals, families, and groups, with expert Ag. assistance, to return to historic cultivation of native plants, despite difficulty obtaining public water access. Ho‘olehua homesteaders are again successfully growing plants vital to Hawai‘i culture and bringing back to larger scale crops like dryland *kalo*, *‘uala*, and *‘awa* (called Pepper Plant in English) through continued propagation. These and other plant resources are critically important because they necessary in Hawaiian cultural traditions. Ms. Greaney believes the highest percentage of Hawaiians on Moloka‘i Island has helped residents perpetuate endangered plant-based interest, knowledge and practices.

Ms. Greaney sees a deep desire among many Hawaiians who want to reconnect with ancestral knowledge and believes the growing interest in traditional practices will lead more Hawaiians to live their culture and aid a return to the health and wellness that Hawaiians once had. Hawaiians were *pili* (cleave to as a close relationship) to the land knowing their own health was inexplicable tied to environmental health. Understanding the ecosystem as a whole was critical and acutely observed everything in the sky, from clouds over the mountain tops extending to the shoreline and out to into the ocean. Hawaiian lifestyle, cultural practices and beliefs, including religion and world view guided individual behavior and society. She believes the traditions Hawaiians developed from generations of knowledge of the connectedness and people’s interdependence with nature, created educated caretakers and skilled cultural practitioners’ which are able to provide sustainable health vital to both. This is only possible if the resources are still available and accessible to

Hawaiians. Ms. Greaney’s hope is more people will join restoration efforts for abundance through restoration of aquaculture in Moloka‘i *loko ‘ia* (fishponds) and help support current *mahiai* (farmers) of Ho‘olehua Homesteads, and development of the next generations.

SUPPLEMENTAL CULTURAL IMPACT ASSESSMENT REPORT

APPENDIX

F-2

Cultural Impact Assessment for the Department of Hawaiian Homelands (DHHL) Hoʻolehua Scattered Lots Expanded Project Area Project, Pālāʻau and Hoʻolehua Ahupuaʻa, Molokaʻi District, Molokaʻi Island TMKs: (2) 5-2-026:003, 016, and 017

Prepared for
Munekiyo Hiraga
on behalf of the
Department of Hawaiian Home Lands

Prepared by
Tehani Baculpo, B.A.,
and
Hallett H. Hammatt, Ph.D.

Cultural Surveys Hawaiʻi, Inc.
Kailua, Hawaiʻi
(Job Code: PALAAU 15)

July 2024

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 for Department of Hawaiian Home Lands Hoʻolehua Scattered Lots Expanded Project Area Project, Pālāʻau and Hoʻolehua Ahupuaʻa, Molokaʻi District, Molokaʻi Island, TMKs: (2) 5-2-026:003, 016, and 017 (Baculpo and Hammatt 2024)
Date	July 2024
Project Number(s)	Cultural Surveys Hawaiʻi, Inc. (CSH) Job Code: PALAAU 15
Agencies	Department of Hawaiian Home Lands (DHHL); State Office of Planning and Sustainable Development (OPSD), Environmental Review Program (ERP)
Land Jurisdiction	DHHL
Project Location	These three scattered subdivision project area parcels are within the DHHL Hoʻolehua-Pālāʻau Homesteads, and located within the north portion of the Hoʻolehua plain of central Molokaʻi, approximately 2.2 km northwest from Molokaʻi (Hoʻolehua) Airport. The contiguous parcels are bounded on the north by Puʻukapele Avenue and on the other sides by other DHHL parcels. The project area is depicted on a portion of the 1993 Molokai Airport and Kaunakakai U.S. Geological Survey (USGS) 7.5-minute topographic quadrangles (Figure 1 and Figure 2) and on the 2013 ESRI satellite photograph (Figure 4).
Project Description	The project entails subdividing five lots on DHHL-owned lands in the Hoʻolehua area into 12 lots to be designated for agriculture use and improving them for lease to DHHL beneficiaries. Improvements to be undertaken include creating access driveways to each of the newly created lots with connections for domestic water and irrigation water for each lot provided within the access driveways from existing systems in the neighboring roadways. The lots will be made available to DHHL beneficiaries currently on the waitlist for an agricultural lease on Molokaʻi. Once awarded, lessees will be able to construct homes on the lots, in addition to utilizing the lots for agricultural purposes.
Project Acreage	The project parcel size is as follows: (2) 5-2-026:003 is 4.719 acres (1.910 hectares). (2) 5-2-026:016 is 4.727 acres (1.913 hectares). (2) 5-2-026:017 is 5.826 acres (2.358 hectares). The total project area is 15.272 acres (6.181 hectares).
Document Purpose and Regulatory Context	This cultural impact assessment (CIA) supports compliance for the DHHL Hoʻolehua Scattered Lots Expanded Project Area project with: • the mandate set forth by the Hawaiʻi State Constitution (Articles IX and XII), courts, Hawaiʻi Revised Statutes (HRS), and Hawaiʻi Administrative Rules (HAR) and other Hawaiʻi 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); • and the State of Hawai‘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).
Results of Background Research	Background research for the proposed project yielded the following information: 1. Traditionally, Moloka‘i was divided into two *moku*, or districts: Kona and Ko‘olau. In 1859, the traditional *moku* of Kona and Ko‘olau were dropped and the island as a whole was referred to as the Moloka‘i district. In 1909, the island was again divided into two districts: Kalawao District, containing the lands of Kalaupapa, Kalawao, and Waikolu, and Moloka‘i District, comprising the remainder of the island (Coulters in Summers 1971:2), including the current project area. 2. The winds of Pālā‘au are Ho‘olua, Moa‘e, Ka‘ele, and Haualialia (Ka Hae Hawaii 1861; Nakuina 1995:64). The rain of the area is known as Nāulu (Akana and Gonzalez 2015:175). 3. The prominent *ka‘ao* (legends) of Pāka‘a and Kū-a-Pāka‘a originate from Moloka‘i (Handy 1922:76). Chief Ho‘olehua was married to ‘Īloli and they had a daughter named Hikauhi, who later became wife of Pāka‘a and mother of Kū-a-Pāka‘a, the

	caretakers of the wind gourd of La‘amaomao (Nakuina 1992:29–30). 4. Pu‘u Pe‘elua, or Caterpillar Hill, is located in Ho‘olehua and named after the *pe‘elua* (caterpillar). This *pe‘elua* was a *kupua* (demigod), who took the form of a caterpillar in the day and a handsome man at night. The *pe‘elua* became an *‘aumakua* (family or personal gods, deified ancestors) for the district of Ho‘olehua (Ne et al. 1992:49–50). 5. Four *heiau* (pre-Contact place of worship) were recorded in the Pālā‘au and Ho‘olehua Ahupua‘a including Lepekaheo Heiau and three unnamed *heiau* (Summers 1971:37–38). 6. Historical anecdotes and environmental data for this region indicate a possible substantial pre-Contact population (Fornander 1880; Summers 1971), which would have subsisted on dryland agriculture consisting mostly of sweet potatoes. 7. Historic properties previously identified in the vicinity are limited to a few sites recorded by Summers (1971), including the legendary Kape‘elua Complex (State Inventory of Historic Places [SIHP] # 50-60-03-00011). There appears to have been a locus of traditional Hawaiian activity in Anahaki Gulch north of the western project area but this is suggested to relate to the micro-environment of that gulch and greater proximity to the coast. 8. In the 1790s, Kamehameha I reportedly “drilled his warriors on the Hoolehua plain near where the airport is now” (Cooke 1949:112). These training grounds may have included the current project area. 9. Following the Māhele in 1848, the entire *ahupua‘a* (traditional land division usually extending from the mountains to the sea) of Ho‘olehua was given to the government, and all of Pālā‘au Ahupua‘a (including the western and central project areas) was “Crown lands” owned by Kamehameha III (Dodge et al. 1897). 10. Cattle were introduced to Moloka‘i in the 1840s (De Loach 1975:68). In the second half of the nineteenth century, cattle, sheep, and goat ranching expanded greatly. By 1866, there were “2,586 head of cattle, 13,332 sheep and 196 goats on the island” (de Loach 1975:86). 11. Molokai Ranch was formed in 1897 when a *hui* (group) of investors purchased approximately 70,000 acres of central and western holdings from the Bishop Estate (Cooke 1949; Stearns and Macdonald 1947). By 1905, the ranch had transitioned from an open country system to the paddock system (Henke 1929). The western and eastern project areas are within the Momomi Paddock. In the 1920s, Molokai Ranch lands consisted of about 10,000 acres leased for pineapple cultivation, 8,000 acres of

	forest reserves, and 50,000 acres utilized for ranching (Henke 1929:52). Cattle ranching remains an important industry on Moloka‘i. 12. In 1920, the U.S. Congress passed the Hawaiian Homes Commission Act to administer and manage some 200,000 acres of land that belonged to the government of the Kingdom of Hawai‘i or was recognized as Crown lands. The following year, the program began attracting people to Moloka‘i. Overall, the program succeeded and was expanded to include 11,400 acres of Pālā‘au-Ho‘olehua beginning in 1924. Parcels 31 and 14 consist of approximately 36.4 acres (14.7 hectares) of these Pālā‘au-Ho‘olehua Homestead lands and include Lots 17 and 104D-1. 13. The Moloka‘i homestead program initially was impacted by many problems, including drought and high winds (McGregor 1990:37–38). Despite such difficulties, people managed to cultivate their plots (McGregor 1990:37–38). Farming was diversified and successful crops included corn, watermelons, cucumbers, sweet potatoes, eggplant, and papaya (Keesing 1936; Wiebke 1940). In addition to agricultural pursuits, the Hawaiian Homes Commission encouraged raising livestock and ranching. Raising pigs brought the most revenue and economic value; however, a few families sold eggs and every family owned some cattle (Keesing 1936). 14. According to Handy (1940:157), “in 1931 there were many flourishing patches on the Hawaiian homesteads at Hoolehua” and “Hoolehua and Palaau were noted for sweet potatoes in olden days.” However, Handy and Handy (1972:283) note homesteaders in Ho‘olehua were growing the sweet potatoes on land that had not been planted in ancient times. 15. A civilian airfield was established in Ho‘olehua in 1919. In 1931, the U.S. Army Air Corps established a portion of this field as “Homestead Field” (Horvat 1966:38, 40–47). By the time the United States entered World War II in 1941, aircraft of the Fifth Bombardment Group were stationed at Homestead Field. A complex of World War II bunker sites was identified on the airport property well south of the present project areas in 1980 by AECOS Inc. (1980). 16. Fifteen archaeological studies were previously conducted within the project area vicinity, two of which included the project area (Pfennig et al. 2011; Shideler and Hammatt 2021). No historic properties have been identified within the project area, however, there are two terrace alignments (No SIHP # assigned) identified by Shideler and Hammatt (2021) within the southern portion of TMK: (2) 5-2-026:014, adjacent to the northern lots of the current project area.

	17. Seven previous cultural studies were conducted within the project area vicinity. The following cultural practices were mentioned by previous informants: agricultural and gathering practices for sustenance and *lei* making purposes, *mo‘olelo* and *wahi pana*, healing practices, cultural and historic properties, and burial sites.
Results of Community Consultation	CSH attempted to contact Hawaiian organizations, agencies, and community members as well as cultural and lineal descendants in order to identify individuals with cultural expertise and/or knowledge of the project area and vicinity. Community outreach letters were sent to 36 individuals or groups; six responded and two of these *kama‘āina* and/or *kūpuna* expressed their interest in participating in consultation for this study. Unfortunately, we were unable to schedule an interview in time before the deadline with one individual. The other individual participated in consultation for the previous companion CIA (Kaapana et al. 2023a), however, CSH was unable to receive their revisions and approval in time before the deadline.
Identification of Cultural Practices	Based on the results of background research conducted as part of this CIA, CSH has identified the following cultural resources and practices within Pālā‘au and Ho‘olehua Ahupua‘a: 1. Agricultural and gathering practices 2. Marine resources 3. *Mo‘olelo* (stories) and *wahi pana* (storied places) 4. Healing practices 5. Religious activities 6. Burial practices CSH has determined that no ongoing cultural practices were identified within the project area during background research and community consultation. However, the project area is located in the general vicinity of ongoing cultural practices such as agricultural and gathering activities, ceremonial activities, and traditional burial practices.
Identification of Impacts to Cultural Practices	No impacts to ongoing cultural practices were identified within the project area during background research and community consultation for this CIA. Consultation from the prior companion CIA (Kaapana et al. 2023a) identified a number of concerns related to the environment and the broader community: 1. Availability of water 2. Soil quality 3. Impacts to *‘uhane* (spirits) and *‘iwi kūpuna* (ancestral remains) 4. Impacts to *wahi pana* (storied places)
Mitigation Possibilities	The results of background research conducted for this CIA inform the following mitigation possibilities promoting and preserving cultural

Identified During Background Research and Consultation	beliefs, practices, and resources of Native Hawaiians and other ethnic groups: 1. A number of concerns expressed by the community during consultation from the prior CIA (Kaapana et al. 2023a), do not relate specifically to ongoing cultural practices within the project area, but nonetheless should be considered during project planning and development. These concerns include the following: a. Ms. Malia Lani Forbes Greaney expressed concern regarding the availability of water. She noted that Ho‘olehua, including Nā‘iwa, is historically known for its dry and barren land, with little to no water available. She stressed that it is also important to ensure access to the appropriate amount of water is available and at a reasonable cost. b. Ms. Greaney strongly suggests the soil be well tested by third party professionals for any presence of harmful chemical residue possibly remaining in the soil. This is a good safety precaution for farmers. c. Ms. Greaney also suggested future studies may also look at nearshore areas off Pālā‘au to assess for the presence of chemicals from runoff and any impacts. 2. Consultants from the prior CIA (Ka‘apana et al. 2023a) have recommended the following: a. Ms. Greaney insists the homestead community should be notified well in advance of any proposed developments that will occur on the Makahiki lands. b. Ms. Greaney also stated that if there are any future developments, it is important that in depth archaeological inventory surveys be conducted as it is known that many artifacts still exist in the *mauka* (toward the mountains) and central regions of Nā‘iwa and Pālā‘au. 3. 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. 4. Non-Native Hawaiian human remains will undergo the process laid out under state law (HAR 13-300), however, Native Hawaiian human remains and cultural items found on DHHL lands are subject to the Native American Graves Protection and Repatriation Act (NAGPRA), 25 U.S.C. 3001 et seq and its

	implementing regulations (43 CFR Part 10). As 43 CFR § 10.2 provides, tribal lands include “All lands administered by the Department of Hawaiian Home Lands (DHHL) under the Hawaiian Homes Commission Act of 1920 (HHCA, 42 Stat. 108) and Section 4 of the Act to Provide for the Admission of the State of Hawai‘i into the Union (73 Stat. 4), including “available lands” and “Hawaiian home lands.” Under NAGPRA, DHHL must prepare a plan of action (POA) prior to any planned activity that is likely to result in a discovery or excavation of human remains or cultural items. If not part of a planned activity, a POA is required after the discovery of human remains or cultural items. In developing a POA, DHHL will initiate consultation with lineal and cultural descendants, consult on the POA, and approve and sign the POA and provide a copy to all consulting parties. The 3-step process for drafting a POA pursuant to NAGPRA can be found in 43 CFR § 10.4(b).

Table of Contents

Management Summary ..... **i**

Section 1 Introduction **1**

1.1 Project Description 1
1.2 Regulatory Context 7
1.3 Document Purpose 7
1.4 Scope of Work 7
1.5 Natural Environment 8
1.5.1 *Nā Lepo* (Soils) 8
1.5.2 *Nā Ua* (Rains) 10
1.5.3 *Nā Makani* (Winds) 11
1.6 Built Environment 11

Section 2 Methods **13**

2.1 Archival Research 13
2.2 Consultation 13
2.2.1 Community Outreach, Interview, and Transcription Methods 13

Section 3 Traditional Background **15**

3.1 *Nā kaʻao a me Nā Moʻolelo* (Legends and Stories) 15
3.1.1 Origin of Molokaʻi 16
3.1.2 Hālena, the Yellowing 16
3.1.3 Pāʻakaʻa and His Son Kū-a-Pāʻakaʻa 16
3.1.4 Pele's Long Sleep 17
3.1.5 Sorcery on Molokaʻi 17
3.2 *Nā Wahi Pana* (Storied Places) 18
3.2.1 Puʻu Ka Peʻelua, Caterpillar Hill 19
3.2.2 *Heiau* 22
3.2.3 *Loko Iʻa* (Fishponds) 23
3.3 *Nā ʻŌlelo Noʻeau* (Proverbs) 24
3.3.1 *ʻŌlelo Noʻeau* #1935 25
3.3.2 *ʻŌlelo Noʻeau* #2164 25
3.3.3 *ʻŌlelo Noʻeau* #2193 25
3.3.4 *ʻŌlelo Noʻeau* #2194 25
3.3.5 *ʻŌlelo Noʻeau* #2195 25
3.3.6 Pālāʻau *Loʻi* 26
3.4 *Nā Oli* (Chants) 26
3.4.1 *Ka Huakaʻi* 26
3.5 *Nā Mele* (Songs) 28
3.5.1 Aloha Molokaʻi 28
3.5.2 Hoʻolehua 29
3.5.3 Molokaʻi Hula 30
3.5.4 Nani Molokaʻi 31

Section 4 Archaeological and Historical Narrative **32**

4.1 Pre-Contact and Early Post-Contact Period 32
4.1.1 Subsistence and Settlement 32

4.2 Early Historic Period 34
4.3 Early 1800s 35
4.4 The Māhele and the Kuleana Act 35
4.5 Mid- to Late 1800s 36
4.5.1 Cattle Ranching 36
4.6 1900s 41
4.6.1 Molokai Ranch 41
4.6.2 Hawaiian Homes Commission 41
4.6.3 Pineapple 44
4.6.4 School Farm 44
4.6.5 Corn 46
4.6.6 Infrastructure 49
4.7 Contemporary Land Use 54

Section 5 Previous Archaeological Research **56**

5.1 Overview 56
5.2 Previous Archaeological Studies within the Project Area (Pantaleo and Rotunno-Hazuka 2003; Pfennig et al. 2011; Shideler and Hammatt 2021) 56
5.3 Discussion of Historic Properties within the Project Area Vicinity 67

Section 6 Previous Cultural Research **68**

6.1 Overview 68
6.2 Kaʻuhane et al. 2009 68
6.3 Notman 2012 68
6.4 McElroy et al. 2015 68
6.5 Kahahane et al. 2016 71
6.6 McElroy and Duhaylonsod 2018 71
6.7 Kaapana et al. 2023a 71
6.8 Kaapana et al. 2023b 72

Section 7 Community Consultation **74**

7.1 Introduction 74
7.2 Community Outreach Letter 74
7.3 Community Outreach Table 77
7.4 Community Outreach Results 82

Section 8 Traditional Cultural Practices **84**

8.1 Agricultural and Gathering Practices 84
8.2 Coastal and Marine Resources 85
8.3 Moʻolelo and *Wahi Pana* 85
8.4 Healing Practices 86
8.5 Cultural and Historic Properties 86
8.6 Burials 87

Section 9 Summary and Recommendations **88**

9.1 Results of Background Research 88
9.2 Results of Community Consultation 90
9.3 Identification of Cultural Practices 90
9.4 Identification of Impacts to Cultural Practices 90

9.5 Mitigation Possibilities Identified During Background Research and Consultation 90
Section 10 References Cited 92
Appendix A Community Outreach Letter 102

List of Figures

Figure 1. Portion of the 1993 Molokai Airport and Kaunakakai USGS 7.5-minute topographic quadrangles showing the locations of the three “Scattered Lots” presently addressed (in red) as well as the two previously addressed “Scattered Lots” (in blue) 2
Figure 2. Portion of the 1993 Molokai Airport and Kaunakakai USGS 7.5-minute topographic quadrangles with an overlay of TMK parcels (mostly DHHL lots) showing the locations of the three “Scattered Lots” presently addressed (in red) as well as the two previously addressed “Scattered Lots” (in blue) 3
Figure 3. TMK: (2) 5-2-026 showing the location of the previously addressed TMK: (2) 5-2-026:014, Lot 104D-1 (in blue), and the three lots presently addressed (in red) (Hawai‘i TMK Service 2023) 4
Figure 4. 2013 satellite photograph (ESRI 2013) showing the three lots presently addressed (in red) and the two lots previously addressed (in blue) 5
Figure 5. 2013 aerial photograph (ESRI 2013) with an overlay of TMK parcels (mostly DHHL lots) showing the locations of the three lots presently addressed (in red) and the two lots previously addressed (in blue) 6
Figure 6. Portion of the 1993 Molokai Airport and Kaunakakai USGS 7.5-minute topographic quadrangles and overlay of Foote et al. (1972), indicating soil types within and surrounding the three lots presently addressed (USDA 2006) 9
Figure 7. Map from Summers (1971) showing place names near the project area(s) 20
Figure 8. Portion of Dodge et al. (1897) map of Moloka‘i showing 1848 land divisions (Crown [yellow], government [green], LCAs [no color]); the western and eastern project areas as within Crown lands 33
Figure 9. LCAs and Grants in the vicinity of the three lots presently addressed depicted on a portion of 1993 Molokai Airport and Kaunakakai USGS topographic quadrangles (the three lots presently addressed were not close to a Native Tenant LCA or grant) 37
Figure 10. Portion of Monsarrat (1886) Hawaiian Government Survey map of Moloka‘i, Middle and West Sections (RM 1288); showing the three lots presently addressed (and all five scattered lots) as within the Momomi Paddock 39
Figure 11. Portion of 1922 Kualapuu USGS topographic quadrangle, showing the three lots presently addressed as relatively undeveloped (an unimproved Moomomi Road passed to the south and a Waihii Pipeline and adjacent unimproved road extended east to storage tanks southeast of the project area) 43
Figure 12. Sketch plan of Ho‘olehua Homesteads (Keesing 1936:26) showing the three lots presently addressed as within the indicated Hoolehua Homesteads 45
Figure 13. Community Center for Ho‘olehua Homesteads including, from left to right, a hall, school, church, and farm, ca. 1939 (Keesing 1936:124) 47
Figure 14. A Ho‘olehua homestead in 1939 (Keesing 1936:59) 47
Figure 15. Letter to the editor praising the quality of Moloka‘i corn in 1922 (*Honolulu Star-Bulletin* 1922:6) 48
Figure 16. Experimental corn farmer, Kaye Waldorf, in West Moloka‘i; pipeline (left) transported water to his crops (Roll 1968:B-1) 48
Figure 17. 1950 USGS aerial photograph of Moloka‘i (UH MAGIS) showing pineapple cultivation neighboring, but not within, the project areas 50

Figure 18. Portion of 1952 Kaunakakai and Molokai Airport USGS topographic quadrangles showing unpaved roads present surrounding, but not immediately adjacent, to the three lots presently addressed 51
Figure 19. 1964 USGS aerial photograph of Moloka‘i showing pineapple cultivation neighboring, but not within, the three lots presently addressed (note the general absence of trees in the project area)....52
Figure 20. Portion of the 1967 Kaunakakai and 1968 Molokai Airport USGS topographic quadrangles showing unpaved roads in the general vicinity of the three lots presently addressed including Pu‘u Kapele Road on the north side of Lot TMK: (2) 5-2-026:016 .53
Figure 21. Portion of 1983 Molokai West USGS topographic quadrangle showing an aqueduct crossing the Ho‘olehua Plain to the south and the Kualapuu Reservoir well to the southeast of the three lots presently addressed 55
Figure 22. Previous archaeological studies in the vicinity of the three lots presently addressed depicted on a portion of the 1993 Kaunakakai and Molokai Airport USGS topographic quadrangles 57
Figure 23. Previously identified historic properties in the vicinity of the three lots presently addressed depicted on a portion of the 1993 Kaunakakai and Molokai Airport USGS topographic quadrangles 61
Figure 24. Previous cultural studies within the project area vicinity....69
Figure 25. Community outreach letter page one....102
Figure 26. Community outreach letter page two 103
Figure 27. Community outreach letter page three 104
Figure 28. Community outreach letter page four....105
Figure 29. Community outreach letter page five 106

List of Tables

Table 1. Place names within the vicinity of the project area 21
Table 2. Previous archaeological studies conducted in the vicinity of the three lots presently addressed....58
Table 3. Previously identified historic properties in the vicinity of the three lots presently addressed....62
Table 4. Summary of the previous cultural studies within the project area vicinity 70
Table 5. Summary of community consultation efforts 77

Section 1 Introduction

1.1 Project Description

At the request of Munekiyo Hiraga, and on behalf of the Department of Hawaiian Home Lands (DHHL), Cultural Surveys Hawai‘i (CSH) is conducting a cultural impact assessment (CIA) for the proposed DHHL Ho‘olehua Scattered Lots Expanded Project Area Project, Pālā‘au and Ho‘olehua Ahupua‘a, Moloka‘i District, Moloka‘i Island, including three parcels, TMK: (2) 5-2-026:003 (4.72 acres or 1.91 hectares), TMK: (2) 5-2-026:016 (4.73 acres or 1.91 hectares), and TMK: (2) 5-2-026:017 (5.83 acres or 2.36 hectares). These three scattered subdivision project area parcels are within the DHHL Ho‘olehua-Pālā‘au Homesteads and located within the north portion of the Ho‘olehua plain of central Moloka‘i, approximately 2.2 km northwest from Molokai (Ho‘olehua) Airport. The contiguous parcels are bounded on the north by Pu‘ukapele Avenue and on the other sides by other DHHL parcels. The project area is depicted on a portion of the 1993 Molokai Airport and Kaunakakai U.S. Geological Survey (USGS) 7.5-minute topographic quadrangles (Figure 1 and Figure 2 with an overlay of TMK parcels), on a tax map plat (Figure 3), and on 2012 ESRI satellite photographs (Figure 4 and Figure 5 with an overlay of TMK parcels).

The project entails subdividing five lots on DHHL-owned lands in the Ho‘olehua area into 12 lots to be designated for agriculture use and improving them for lease to DHHL beneficiaries. The five lots are hereafter referred to as “subject properties.” Two of these five lots— TMKs: (2) 5-2-005:031, Lot 17 and (2) 5-2-026:014, Lot 104D-1—were the subject of prior CIA work done by Kaapana et al. in September 2023. This current study is intended as a companion report to the CIA done by Kaapana et al. (2023a).

Improvements to be undertaken include creating access driveways to each of the newly created lots with connections for domestic water and irrigation water for each lot provided within the access driveways from existing systems in the neighboring roadways. The lots will be made available to DHHL beneficiaries currently on the waitlist for an agricultural lease on Moloka‘i. Once awarded, lessees will be able to construct homes on the lots, in addition to utilizing the lots for agricultural purposes. Additionally, it is noted that there is an existing abandoned home on Parcel 14 that records indicate was constructed in the 1970s as well as a greenhouse on Parcel 16 constructed in the early 2000s. Both the abandoned home on Parcel 14 and the greenhouse on Parcel 16 will be demolished as part of the proposed project. It is further noted that there is a third structure, a home that records indicate was built in the early 2000s, that is located on a portion of Parcel 16 and a portion of Parcel 3. The proposed subdivision action will revise the lot lines so the existing home is located in one TMK. The home will be reviewed for future lease as part of the lot it is located on.

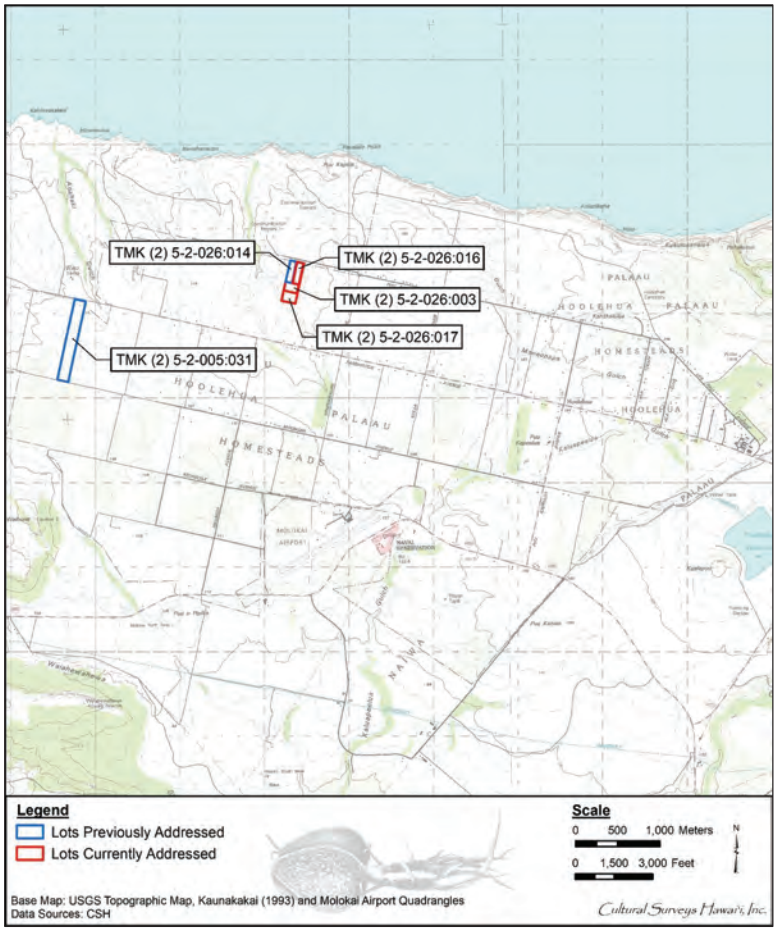


Figure 1. Portion of the 1993 Molokai Airport and Kaunakakai USGS 7.5-minute topographic quadrangles showing the locations of the three “Scattered Lots” presently addressed (in red) as well as the two previously addressed “Scattered Lots” (in blue)

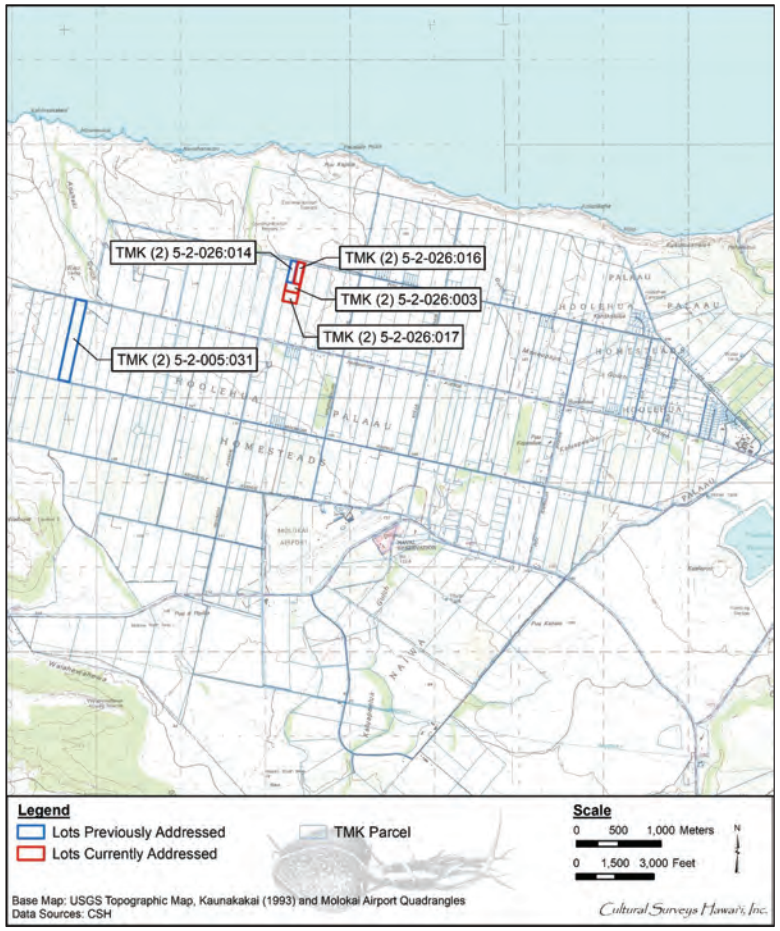


Figure 2. Portion of the 1993 Molokai Airport and Kaunakakai USGS 7.5-minute topographic quadrangles with an overlay of TMK parcels (mostly DHHL lots) showing the locations of the three “Scattered Lots” presently addressed (in red) as well as the two previously addressed “Scattered Lots” (in blue)

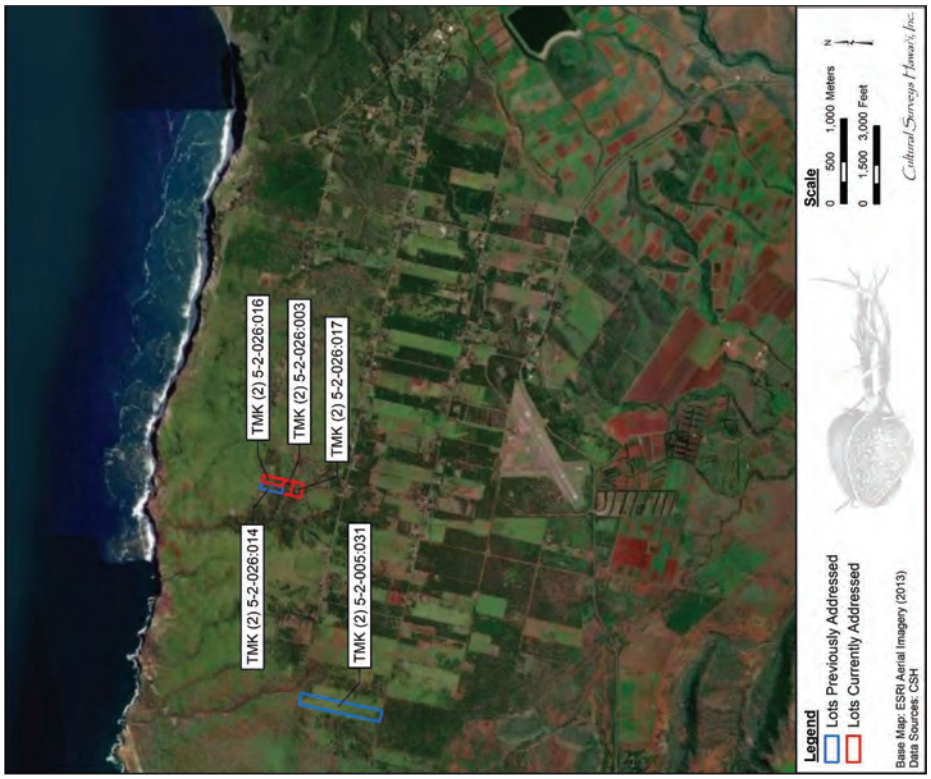


Figure 4. 2013 satellite photograph (ESRI 2013) showing the three lots presently addressed (in red) and the two lots previously addressed (in blue)

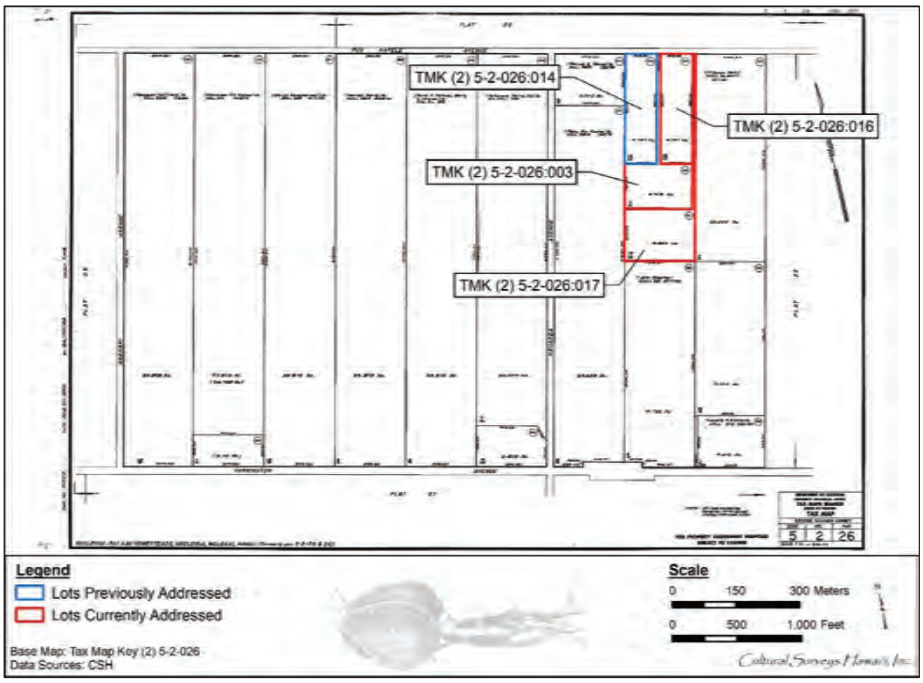


Figure 3. TMK: (2) 5-2-026 showing the location of the previously addressed TMK: (2) 5-2-026:014, Lot 104D-1 (in blue), and the three lots presently addressed (in red) (Hawai'i TMK Service 2023)

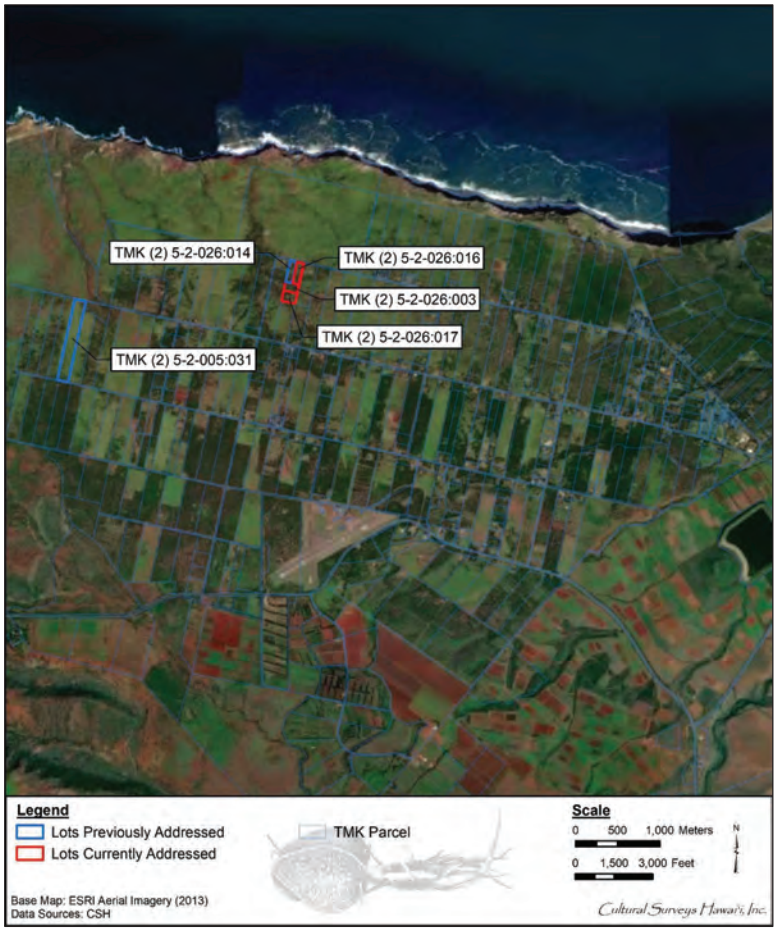


Figure 5. 2013 aerial photograph (ESRI 2013) with an overlay of TMK parcels (mostly DHHL lots) showing the locations of the three lots presently addressed (in red) and the two lots previously addressed (in blue)

1.2 Regulatory Context

This CIA supports compliance for the DHHL Ho‘olehua Scattered Lots Expanded Project Area 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); and,
- 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).

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).

1.4 Scope of Work

The scope of work for this cultural impact assessment includes the following:

1. Examination of cultural and historical resources, including Land Commission documents, historic maps, and previous research reports, with the specific purpose of identifying traditional Hawaiian activities including gathering of plant, animal, and other resources or agricultural pursuits as may be indicated in the historic record.
2. Review of previous archaeological work at and near the subject parcel that may be relevant to reconstructions of traditional land use activities; and to the identification and description of cultural resources, practices, and beliefs associated with the parcel.
3. Conduct oral interviews with persons knowledgeable about the historic and traditional practices in the project area and region.
4. Preparation of a report that summarizes the results of these research activities and provides recommendations based on findings.

1.5 Natural Environment

The three lots presently addressed are on relatively flat lands at approximately 40 m (130 foot [ft]) elevation above sea level in the north central portion of Moloka‘i Island, approximately 1.3 km (0.8 miles) inland (south) from Moloka‘i’s north shore sea cliffs. Due to its low elevation and partial shielding by the East Moloka‘i volcano from trade winds, the vicinity is arid with only shallow, intermittent stream gulches (MacDonald et al. 1990:411).

The three lots presently addressed are just east of an unnamed gulch. It is believed this gulch rarely runs with water and that there is no source of potable water nearby. The project area receives an approximate mean annual rainfall of 802 mm (32.83 inches) at the neighboring “Gage 34” station, according to the University of Hawai‘i Online Rainfall Atlas of Hawaii (Giambelluca et al. 2013) which is suggested to be insufficient for non-irrigated agriculture.

The project area vegetation consisted primarily of introduced species including exotic grasses, *koa haole* (*Leucaena leucocephala*), and some *kiawe* (*Prosopis pallida*), *klu* (*Acacia farnesiana*), and lantana (*Lantana camara*). The only native species identified in the project area were *‘ilima* (*Sida fallax*) and *‘uhaloa* (*Waltheria indica*). The surrounding area was largely undeveloped with scattered DHHL homesteads.

1.5.1 *Nā Lepo* (Soils)

MacDonald et al. (1990:411) provide the following description for soil in West Moloka‘i:

> Long periods of weathering, accompanied by comparatively little stripping by erosion, have left a deep red soil cover over the top of West Molokai. In places recent erosion has cut through the upper horizon exposing the lower horizon, which locally exhibits pronounced iron enrichment in the form of masses of lateritic iron oxide. [MacDonald et al. 1990:411]

The “deep, red soil” described by MacDonald et al. (1990:411) is characteristic of the current project area and vicinity and is apparent in recent aerial imagery (see Figure 4).

According to the 2006 United States Department of Agriculture (USDA) Soil Survey Geographic (SSURGO) database (USDA 2006) and soil survey data gathered by Foote et al. (1972), the soils within the west project area consist of Molokai series soils including Molokai silty clay loam, 3 to 7% slopes (MuB), and Molokai silty clay loam, shallow variant, 15 to 25% slopes, severely eroded (MvD3) soils (Figure 6).

Molokai series soils are described as follows:

> […] well-drained soils on uplands on the islands of Maui, Lanai, Molokai, and Oahu. These soils formed in material weathered from basic igneous rock. They are nearly level to moderately steep. Elevations range mainly from nearly sea level to 1,000 feet […]
>
> These soils are used for sugarcane, pineapple, pasture, wildlife habitat, and homesites. The natural vegetation consists of kiawe, ilima, uhaloa, feather fingergrass, and buffelgrass. [Foote et al. 1972:96]

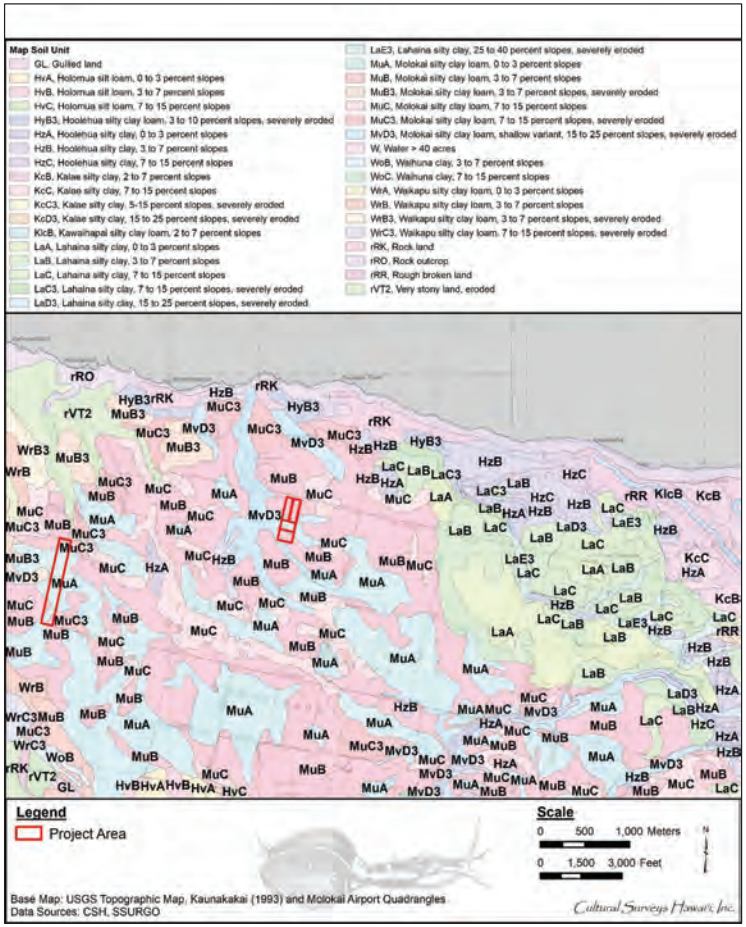


Figure 6. Portion of the 1993 Molokai Airport and Kaunakakai USGS 7.5-minute topographic quadrangles and overlay of Foote et al. (1972), indicating soil types within and surrounding the three lots presently addressed (USDA 2006)

MuB soils are further described as, “On this soil, runoff is slow to medium and the erosion hazard is slight to moderate. Included in mapping were a few small areas that are eroded to soft, weathered rock […]” (Foote et al. 1972:96).

MvD3 soils are further described as follows:

> This soil occurs on the sides of drainageways. In most places all of the surface layer and part of the subsoil have been removed, and about 12 to 20 inches of dark reddish-brown soil overlies the soft, weathered rock. In some places the soil is eroded to soft, weathered, rock and, as a result, is grayer or browner than is typical of the Molokai series. There are few to common stones and boulders on the surface. These are unweathered rock cores that have been exposed by erosion. Runoff is rapid, and the erosion hazard is severe. Workability is difficult. [Foote et al. 1972:97]

1.5.2 *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 Molokaʻi 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]

Pālāʻau and Hoʻolehua were no exception to this naming practice. The Nāulu rain is known to be associated with the *ahupuaʻa* (traditional land division usually extending from the mountains to the sea) of Pālāʻau. Nāulu is a rain associated with different *wahi pana* (storied places) throughout Molokaʻi. In a *kanikau* (lament) for a person named Nuholani, it states that this rain rumbles across the expansive land of Pālāʻau.

Nā Lehua o Kāʻana	The lehua of Kāʻana
I ka noua e ka ua Nāulu	Pelted by the Nāulu rain
Kamumu akula i ke kaha o Pālāʻau	Rumbling across the expanse of Pālāʻau
[Akana and Gonzalez 2015:175]	

1.5.3 *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]

Aʻe loa is a term given to the prevailing northeasterly trade winds (Nakuina 1992:138) along with *Aʻe* (Pukui and Elbert 1986:3), *Moaʻe*, and *Moaʻe Lehua* (Pukui and Elbert 1986:249).

In the traditional story *The Wind Gourd of Laʻamaomao*, Pākaʻa and his son Kūapākaʻa are descendants of the wind goddess Laʻamaomao whose traditional home was in a gourd that also contained all of the winds of Hawaiʻi. They control the winds of Hawaiʻi contained in the gourd by chanting their names. Pākaʻa’s chant traces the winds of and surrounding Hoʻolehua and Pālāʻau Ahupuaʻa. Pākaʻa’s chant is listed below:

Ka hoolua o ka moae	Hoʻolua, Moaʻe
Kaele i Palaau	Kaʻele are at Pālāʻau
Haualialia ilaila	Haualialia is there
Ka iki aea i Hoolehua	Kaiki-aea is of Hoolehua
[…]	Laumaomao is at Punakou
	Lawelawe-mālie is at Kekaha
	Haleolono is at Kaluakoʻi
Ma ke kuapā maluna mai o Moʻomomi	The Kuapā is at Moʻomomi
[*Ka Hae Hawaii* 1861]	[Nakuina 1995:64]

Within this chant, various wind names mentioned are associated with Pālāʻau and Hoʻolehua. In the first three lines of the chant indicated there are four main winds of Pālāʻau. These winds include Hoʻolua, Moaʻe, Kaʻele, and Haualiʻaliʻa, while Kaikiaea is of Hoʻolehua. Another line, “*Ma ke kuapā ma luna mai o Moʻomomi*,” indicates there is a wind called Kuapā at Moʻomomi. Moʻomomi is located within the Pālāʻau Ahupuaʻa. Nakuina’s (1995) version of the chant contains wind names that were not originally included in the *Ka Hae Hawaii* (1861) newspaper.

1.6 Built Environment

The built environment within and surrounding the project area is minimal. The project area vicinity mostly consists of undeveloped DHHL parcels. Active homesteads are sporadic throughout the vicinity, located particularly along the bounding roadways. The three-lot project area is bound by Puʻu Kapele Avenue (a dirt road) on the north side of parcel TMK: (2) 5-2-

026:016. There is a boarded-up home (understood as the “Hill Residence”) in the northwest corner of TMK: (2) 5-2-026:016. The home seems to be in relatively good shape. Certain outbuildings to the east of the home are dilapidated or completely collapsed. Molokai Airport and associated infrastructure is located approximately 2 km south of the project area(s).

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 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 2021), 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, in order to identify individuals with cultural expertise and/or knowledge of the *ahupua‘a* of Pālā‘au and Ho‘olehua.

2.2.1 Community Outreach, Interview, and Transcription Methods

2.2.1.1 Scoping for Participants

We begin our consultation efforts with utilizing our in-house contact list from previous outreach efforts to facilitate the interview process. This list often includes *kūpuna* (elders), *kama‘āina* (native born), 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. We also contact agencies such as SHPD, OHA, and the appropriate Island Burial Council where the proposed project is located for their response to 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.

2.2.1.2 Talk Story Sessions

Prior to the interview, CSH cultural researchers explain the role of a CIA, how the consent process works, the project purpose, the intent of the study, and how their *‘ike* (insight) and *mana‘o* (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 *kūkākūkā* [consultation, discussion] in participant’s choice of place over set interview questions) to the informal (e.g., 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 also conducts 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) providing missing details for *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.

2.2.1.3 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 them to make any necessary edits. Once the interviewee has made those edits, we incorporate 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. This is for the interviewee’s records.

It is important to CSH cultural researchers to cultivate and maintain community relationships. The CIA report may be completed, but CSH researchers continuously keep in touch with the community and interviewees throughout the year—such as checking in to say hello via email or by phone, volunteering with past interviewees on community service projects, and sending holiday cards to them and their *‘ohana* (family). CSH researchers feel this is an important component to building relationships and being part of an *‘ohana* and community.

“*I ulu no ka lālā i ke kumu*—the branches grow because of the trunk,” 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 informants if we have lost our *kūpuna*. CSH makes it a point to reach out to the *‘ohana* of our fallen *kūpuna* and pay our respects including sending all past transcriptions, interview summaries, and photos for families to have on file for genealogical and historical reference.

Section 3 Traditional Background

3.1 *Nā ka‘ao a me Nā 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:IX). According to Pukui and Green (1995), 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 DHHL Ho‘olehua Scattered Lots Expanded Project Area project area. Many relate an age of mythical characters whose epic adventures inadvertently led to the Hawaiian race of *ali‘i* and *maka‘āinana*. The *ka‘ao* in and around the project 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 Origin of Moloka‘i

Mo‘olelo provide varying accounts for the origin of Moloka‘i. Paku‘i, a historian in the time of Kamehameha I, wrote of the Hawaiian Islands having been born of Wākea and his wives. According to this version, Wākea’s first wife, Papa, gave birth to Hawai‘i, Maui, and Kaho‘olawe before returning to Tahiti. Wākea took Kaulawahine as his second wife, and she gave birth to Lāna‘i. He then took a third wife:

Hoi ae O Wakea loaa Hina,	Then Wakea turned around and found Hina,
Loaa Hina he wahine moe na Wakea,	Hina was found as a wife for Wakea,
Hapai Hina ia Molokai, he moku,	Hina conceived Molokai, an island;
O Molokai a Hina he keiki moku.	Hina’s Molokai is an island child.

[Fornander 1916-1917:12–13]

The historian Kahako‘ikamoana recorded a different lineage for Moloka‘i:

Na Kuluwaiea o Haumea he kane,	Kuluwaiea of Haumea as the husband,
Na Hinanuialana he wahine	Of Hinanuiakalana as the wife
Loaa Molokai, ke akua, he kahuna,	Was born Molokai, a god, a priest,
He pualena no Nuumea,	The first morning light from Nuumea,

[Fornander 1916-1917:2–3]

3.1.2 Hālena, the Yellowing

Ne (1992) tells of a story involving Kahekili, the ruling chief of Moloka‘i who lived on Maui, in which Pālā‘au is referenced. Although the story is about the naming of Hālena, a place on the southwest side of Moloka‘i, Pālā‘au is mentioned as a place known for its “fat” *āholehole* (Hawaiian flagtail, Kuhlia sandvicensis) and *‘ō‘io* (Ladyfish, bonefish, albula vulpes). In the story, Kahekili sends one of his chiefs to Pālā‘au to collect fish to supply his army as he made plans to invade O‘ahu. The following is an excerpt from Ne:

> When Kahekili was the ruling chief of Molokai, he lived on Maui. He made his plans and set out in his canoes to invade O‘ahu, stopping at Molokai to get a supply of fish for his journey. He sent Hulu, chief of a village, in his canoe to Pūko‘o for the fat mullet from the fishponds. He sent another canoe with another chief, Kuikai, to Pālā‘au, noted for its fat *āholehole* and *‘ō‘io.* [Ne 1992:47]

3.1.3 Pā‘aka‘a and His Son Kū-a-Pā‘aka‘a

The following *mo‘olelo* recounts two chiefs, Pālā‘au and Ho‘olehua, which are also the names of the *ahupua‘a* in which the current project areas are located (Pālā‘au) and the adjacent *ahupua‘a* to the east (Ho‘olehua).

> On Molokai lived a very beautiful woman, Hikauhi, the daughter of Hoolehua [Ho‘olehua] and Ilali [‘Īloli]. Now it happened that the girl’s father had promised her hand to Palaau [Pālā‘au], the chief of that part of the island. But as soon as she had seen Paakaa [Pāka‘a], she forgot all about her former lover and demanded that the stranger be given to her. Palaau very generously consented, and so they all lived in peace. Paakaa cultivated the lands well, fished skillfully, and brought great prosperity to his wife and her family. [Handy 1922:76]

Hikauhi and Pāka‘a had a son, Kū-a-Pāka‘a (Nakuina 1992:29–30). Pāka‘a and Kuāpāka‘a are the caretakers of the wind gourd of La‘amaomao which could control and call forth the winds of Hawai‘i.

3.1.4 Pele’s Long Sleep

Westervelt's (1916) version of the story of Lohi‘au, the king of Kaua‘i, and his romance with Pele which includes an ancient chant with a reference to Pālā‘au:

> Lohiau watched her while he partook of the feast with his chiefs, and she was resting on the couch of mats. He was thinking of her marvelous, restful beauty, as given in the ancient chant known as ‘Lei Mauna Loa.’
> Lei of Mauna Loa, beautiful to look upon.
> The mountain honored by the winds.
> Known by the peaceful motion.
> Calm becomes the whirlwind.
> Beautiful is the sun upon the plain.
> Dark-leaved the trees in the midst of the hot sun
> Heat rising from the face of the moist lava.
> The sunrise mist lying on the grass,
> Free from the care of the strong wind.
> The bird returns to rest at Palaau.
> He who owns the right to sleep is at Palaau.
> I am alive for your love—
> For you indeed. [Westervelt 1916:77]

3.1.5 Sorcery on Moloka‘i

Kamakau (1991) recounts a story regarding the origin of sorcery use on Moloka‘i, in which the Ho‘olehua and Pālā‘au plains are mentioned:

> Kaiakea, a prominent man of Kala‘e and its vicinity, was said to have been a man without a god. He built a large new household below Kahanui and provided all kinds of food, such as poi, pig, *‘awa*, bananas, fish, and everything else necessary for a ‘house-warming’ (*o ka hale komo*). When the day came, Kaiakea’s wife and the other women were at the *hale noa*, the common house, and Kaiakea and the other men and the servers were at the *hale mua*, the men’s house. The *hale noa* was apart from the *hale mua*, which was surrounded by a lanai. Kaiakea was in the doorway of the *hale mua*, and while the feast was being prepared, he saw a long procession of women coming over the plains of Ho‘olehua to Pala‘au. They were dressed in yellow tapa skirts and yellow tapa shoulder coverings (*kihei*), with variegated (*papahi*) leis of *ma‘o* and *‘ilima* crowning their heads. There was one man among them. The procession went down to the spring, named Piliwale, and left their things (*he ukana*) there. These were a *puniu hulihuli*, or coconut-shell container, and the women's *‘alae* bird bodies. When Kaiakea saw the many beautiful women in that company, he called out to them to come in on the lanai, but they remained outside. Only the man who was with them approached and stood at the door of Kaiakea’s house and talked with him. Kaiakea offered them food, but

> the spirit man (*kanaka anela*) said they would not eat his food unless a leaf-thatched house, a *hale lau*, was built for them; then they would eat of his food. This man revealed that they were not humans, but ‘angels,’ and he told Kaiakea their names. Pua was his name, and Kauluimaunaloa (the-grove-at-Maunaloa, that is, Kapo) was the name of the chiefess who led the procession. He said they would become Kaiakea’s gods if the *hale lau* was finished that day, and would give into his charge the *puniu hulihuli*, their visible form (*ko lakau kino ‘ike maka ‘ia*), and all the paraphernalia to do their work (*ka lakau mau hana a pau*), which was inside it. The *‘alae* birds were their bodies which they showed abroad (*kino ho‘ike ‘ia iwaho*). After revealing these things to Kaiakea, the being vanished. Kaiakea went to the spring to look for the *puniu*, and got it; the *‘alae* birds were resting there at the spring. That very day Kaiakea erected the *hale lau* and filled it with poi, *‘awa*, bananas, and tapas appropriate to these gods; that same evening it was dedicated (*ke kapu no ‘ia*). The food offerings (*ka ‘ai me ka i‘a*) and the *‘awa* were all consumed by the *‘alae* birds, and they were well content with the food provided for them.
>
> It was in this way that Kaiakea became the *kahu* of gods, and he became known as a man who had gods. He was the *kahu* of Kapo (Kauluimaunaloa) and Pua. Kaiakea, however, just took care (*malama pono*) of these gods. He did no harm to others, and did not send his gods to bring death (*ho‘aunauna e make*) to any man or to any chief. He just took care of his *akua ho‘ola‘a* (the spirits who had been made gods by his consecration and offerings). Upon his death he commanded his children to take care of the gods against the days of trouble; the gods would repay them with life (*ola*). But they were not to seek wealth from the gods through sorcery. [Kamakau 1991:131–132]

3.2 *Nā 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* (traditional land division smaller than an *ahupua‘a*), and man-made structures such as fishponds. In this way, the *wahi pana* of Pālā‘au and Ho‘olehua tangibly link the *kama‘āina* of Pālā‘au and Ho‘olehua 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 even 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*, *pūnāwai*, and many others. According to Landgraf (1994:v), Hawaiian *wahi pana* “physically and poetically describes an area while revealing its historical or legendary significance.”

In the preface of *Place Names of Hawaii* (Pukui et al. 1974:x), Samuel Elbert offers the following description regarding place names:

> Hawaiians named taro patches, rocks and trees that represented deities and ancestors, sites of houses and heiau, canoe landings, fishing stations in the sea, resting places in the forests, and the tiniest spots where miraculous or interesting events are believed to have taken place.
>
> Place names are far from static […] names are constantly being given to new houses and buildings, land holdings, airstrips, streets, and towns and old names are replaced by new ones […] it is all the more essential, then to record the names and the lore associated with them [the ancient names] now. [Pukui et al. 1974:x]

Inherent in Elbert’s statements is knowledge that the oldest place names held meaning and told the story of an area prior to European Contact. Many place names in the vicinity of the project area are provided in Figure 7. Literal translations of place names for land areas and divisions near the project area are listed in Table 1 and may provide insight into the area prior to Western Contact.

3.2.1 Pu‘u Ka Pe‘elua, Caterpillar Hill

Pu‘u Pe‘elua, also known as Pu‘u Kape‘elua or Caterpillar Hill, is located above Ho‘olehua. According to Harriet Ne (1992), the story of Pu‘u Pe‘elua involves Pele, the daughter of a chief of Pālā‘au, who fell in-love with Pe‘elua of Ho‘olehua, the *‘aumakua* of that district:

> A beautiful young girl named Pele, the daughter of a chief in the Pālā‘au area, encountered in the early twilight a handsome young man. They fell in love, and he courted her for almost a year. She concealed her love from her parents and lived only for the hours she spent with him.
>
> She did not know that he was the *pe‘elua* of the district, revered and loved by the people of Ho‘olehua—even worshipped. Nor did she know that he had the form of a young man only at night but that in the day he returned to the form of a caterpillar.

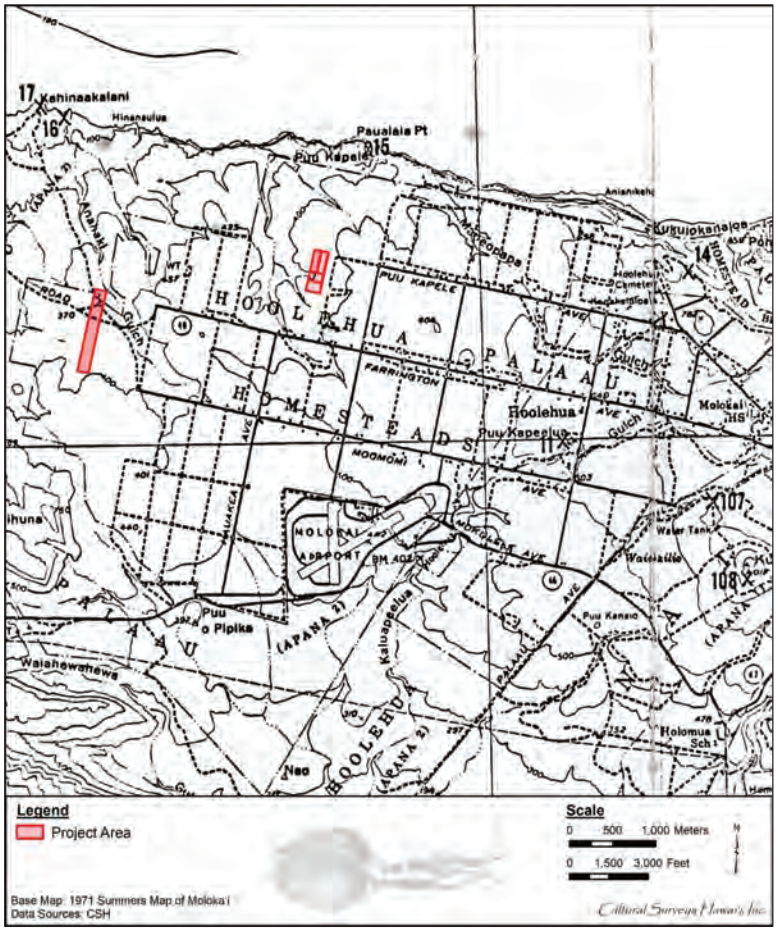


Figure 7. Map from Summers (1971) showing place names near the project area(s)

Table 1. Place names within the vicinity of the project area

Place Name	Description
Anahaki	Name of a gulch on the north side of the west project area. *Lit.* “Broken cave” (Pukui et al. 1974:12)
Anianikeha	Place along the sea cliff NW of the eastern project area. *Lit.* “blowing [on the] heights” (Pukui et al. 1974:12)
Hinanaulua	A point on the sea cliff north of the western project area. *Lit.* “inspired [by a god] *hinana* [Young of *ʻoʻopu* (Hawaiian freshwater goby; *Lentipes concolor*)] fish.” (Pukui et al. 1974:46)
Hoʻolehua	*Lit.* acting the expert. Village, land division, and Hawaiian homestead area near the Molokaʻi airport; said to be named for a chief (Pukui et al. 1974:51–52). Hoʻolehua Ahupuaʻa encompasses most of the current project area.
Kahinaakalani	A point on the sea cliff NW of the western project area. *Lit.* “the grayness of the sky, heaven” (Pukui et al. 1974:65)
Kāluapeʻelua	*Lit.* baked caterpillar. A caterpillar infestation was ended by baking the caterpillars (Pukui et al. 1974:79). Name of gulch within project area.
Kanakaloloa	Place NE of the eastern project area. *Lit.* “tall person” (Pukui et al. 1974:83)
Kualapuʻu	*Lit.* hill overturned. Hill, elementary school, reservoir, and Del Monte pineapple cannery village (Pukui et al. 1974:119). Summers Site 107, a *hōlua* (sled used on grassy slopes) slide, was documented on the SSW side of Kualapuʻu Hill (Summers 1971). This hill was formerly named Ka ʻUala Puʻu (the sweet potato hill) and appears on some maps as Mid Hill; the area had “many sweet potato patches […] defined by rows of stones” (Summers 1971:80). Other maps label the hill as Middle Hill.
Kukuiokanaloa	Name of a stretch of sea cliff N of the eastern project area. *Lit.* “light of Kanaloa” (Pukui et al. 1974:122)
Lepekaheo	According to Summers (1971:37), “Monsarrat referred to Lepekaheo as an ʻold heiau.ʼ” This *heiau*, designated Summers Site 12, is located approx. 1.3 km north of the project area.
Manawainui	*Lit.* large water branch. Manawainui Gulch stream flows approx. 2.0 km SE of the project area. Manawainui also refers to an area S and adjacent to Hoʻolehua and Pālāʻau, which contains stone platforms used in the past by students of *hula* (dance), and a stone outcrop modified by Native Hawaiians in traditional times known as the “Sacrifice Stones” (Fowke 1922:181).
Maneʻopapa	Gulch NW of the western project area. Meaning uncertain.
Nāʻiwa	*Lit.* the frigate birds (perhaps named for the beauty of the birds) (Pukui et al. 1974:161). Nāʻiwa Ahupuaʻa comprises three *ʻāpana* (lots) in Molokaʻi. The largest section, Nāʻiwa 1, borders the project area E.

Place Name	Description
Pālā‘au	*Lit.* wooden fence or enclosure (Pukui et al. 1974:176). Pālā‘au comprises three land sections in north, central, and southwest Moloka‘i and along with Ho‘olehua, names the homesteads where the current project area is located. A western portion of the project area is in Pālā‘au 2, the largest *‘āpana,* of Pālā‘au Ahupua‘a.
Paualala	A point on the sea cliff N of the central project area. Meaning uncertain.
Pu‘u Kanaio	*Lit.* the pinworm hill. Hill on the slopes of Kuala pu‘u [hill] (Pukui et al. 1974:198). This hill is within 400 m E of the project area.
Pu‘u-Ka Pe‘elua	*Lit*. “hill of the caterpillar” (Pukui et al. 1974:198) (For *mo‘olelo* see subsection 3.2.1). Location of Summers Sites 11A and 11B/ State Inventory of Historic Places (SIHP) # 50-60-03-11, Kape‘elua Complex (see subsection 5.2).
Pu‘u ka Pele	Hill on the sea cliff N of the central project area. *Lit*. “the volcano hill” (Pukui et al. 1974:198).
Waiakailio	*Lit.* water used by the dog (Pukui et al. 1974:219). Area with a stream approx. 375 m northeast of the project area’s NE corner.

> As the days passed, Pele grew pale and listless. […] The *kahuna* perceived the problem at once. ‘She is in love with the supreme manifestation of the caterpillar-Pe‘elua,’ he told [her parents]. ‘When he comes to her at night, it is in the form of a handsome young man; but his power is draining her strength. She is human. She cannot live with a magical being. To save her, you must kill him. You must destroy him completely.’ [Ne 1992:49–50]

The same story is also told by Cooke (1949):

> […] this beautiful girl was visited each night by a lover who left before daylight. She was unable to discover who he was, this suspense told on her, and she began to waste away. A priest, consulted by her parents, advised the girl to attach a piece of white tapa to a wart on her lover’s back. In the morning, shreds of tapa helped to trace the demi-god lover to the hill Puu Peelua, in the middle of Hoolehua. The kahuna [priest] and friends of the family found a large peelua [caterpillar] asleep on the hill. The kahuna ordered the people to collect wood which was placed around the sleeping peelua, and a fire was lit. As the heat of the fire increased, the caterpillar burst into myriads of small caterpillars which were scattered over the plain. That accounts for the army-worm pest, called peelua. [Cooke 1949:102]

3.2.2 *Heiau*

Summers (1971:37–38) recorded four *heiau* (pre-Christian place of worship) in the Pālā‘au and Ho‘olehua Ahupua‘a including Lepekaheo Heiau and three unnamed *heiau*.

Lepekaheo Heiau, designated by Summers (1971:37) as Site 12, is located west of Kaluape‘elua Gulch on the boundary between Ho‘olehua 2 and Pālā‘au 2, approximately 1.3 km north of the

project area. According to Summers (1971:37), “Monsarrat referred to Lepekaheo as an ‘old heiau.’” Summers also mentions another *heiau* (Site 10) in Ho‘olehua 2 located on east side of the “crest of ‘Eleuweue” (Summers 1971:37).

In Pālā‘au 2, Summers (1971:38) mentions a *heiau* (Site 16) located at the west side of the mouth of Anahaki Gulch at an elevation of 35 ft above mean sea level and another *heiau* (Site 14) located east of Ho‘olehua Cemetery in the pineapple fields west of the gulch at an elevation of 800 ft (Summers 1971:38). Regarding Site 14, Summers (1971:38) states, “The structure was in ruins in 1957, however. Traces of paving could still be found, and the remains of a wall, 35 ft long from SE to NE; 13 ft. from the NE side was an upright stone 2 ft. high, 2 ft. wide, and 1 ft. thick.”

3.2.3 *Loko I‘a* (Fishponds)

A *loko i‘a* is a fishpond. There were two types of *loko i‘a,* mentioned by Catherine Summers (1964). One is called a *loko kuapā* and the other is a *loko ‘umeiki*. The *loko kuapā* was made by building a wall on a reef (Pukui and Elbert 1986:171). *Kuapā* means wall, specifically for a fishpond which was entirely enclosed. The fishpond walls were usually built using coral or basalt. Within these types of fishponds, *mākāhā* or sluice gates (Pukui and Elbert 1986:225) were built into the rock walls made of sticks and beams. The purpose of a *mākāhā* was to create a gate-like contraption. This would allow gatekeepers to regulate the fishpond. The smaller fish were able to swim through the gate and dwell in the pond, while larger predators were kept outside the barriers (Summers 1964:8). These were exclusive to the Hawaiian Islands based on the physical features of its shores. As explained by Summers,

> Loko kuapa were owned by the kings and chiefs, and at their command, were built by the common people. The building of a pond was a communal project of the chiefs who, from their individual land sections (ahupua‘a), furnished the large number of people required for this work. [Summers 1964:2, 6]

A *loko ‘umeiki* drastically differs from a *loko kuapā.* The walls of a *loko ‘umeiki* were much lower and it essentially functioned as a fish trap (Summers 1964:12). Emma Beckley mentioned that this type of shore pond was

> […] surrounded by a low wall that is submerged at high tide and has openings, walled on each side like lanes, leading in or out of the pond [...] At night when the tide was coming in, a man or a woman waded out to the end of an inward lane. Here he, or she, sat on a raised stone platform which was situated at the end of one side of a lane. The fisherman held a net which was just wide and deep enough to cover the opening of the lane. The mouth of the net was faced toward the sea. [Beckley 1883:20]

Summers (1971) gives a lengthy description of Poho‘ele pond also known as Pālā‘au fishpond:

> This was the largest of the Moloka‘i fishponds: its size has been estimated as being from between 200 and 500 acres. Cobb referred to it as ‘Nameless extensive pond, in palaau, filled with mud’ (1902:429). On the 1897 Hawaiian Government Survey Map of Molokai, the broken walls of the pond are shown, although the pond itself is labelled ‘mud’; it is not shown on later maps. In 1922 portions of the stone wall could still be seen, ‘...and traces of an old-fashioned sluice gate.’

> A native writer gave the name of the pond as Poho‘ele, ‘Dark hollow,’ and said that it was built by Ho‘olepanui, a favorite of Kamehameha I, who came from Hawai‘i to live on Moloka‘i after Kamehameha had conquered O‘ahu.
>
> […] the men of Hawai‘i looked at the shoreline, the capes and nooks and then Ho‘olepanui’s ‘engineers’ planned to enclose some of the nooks from one point to another, thus converting them into fishponds [...]
>
> The men arose at the command of Ho‘olepanui and laid the stones along the sea from Pu‘apo‘o to Puhaka in Ho‘olehua, and the pond was given the name of Poho‘ele. This was a famous pond at Pala‘au and had gates that were skillfully made. All kinds of fish were caught in this pond at the time when it was being well cared for.
>
> The Hawai‘i people were indeed skilled workers. Let us notice this, it was said that the deepest part in the pond had a depth of five fathoms and was somewhat like the harbor of Kou (now Honolulu) in depth.
>
> Stokes was told the pond was a *loko po‘oiki*, but he considered this as a local term for *loko ‘umeiki* (1911). When he saw the pond in 1909, he found 27 lanes, all leading outward. The walls commenced on the W at the wall of Ho‘olehua Pond, and extended for a distance of over 6100 ft. [Summers 1971:77]

3.3 *Nā ‘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* (land), chiefs, plants, and places relative to Pālā‘au and Ho‘olehua Ahupua‘a and the larger Moloka‘i Moku. Several *‘ōlelo no‘eau* mention Moloka‘i. Other sayings regard powers associated with Moloka‘i, which was traditionally known for its sorcery-like *mana* (divine power).

3.3.1 *‘Ōlelo No‘eau* #1935

The following *‘ōlelo no‘eau* mentions the *kioea* (Bristle-thighed curlew, *Numenius tahitiensis*) of Ho‘olehua:

> Ku‘u manu lawelawe ō o Ho‘olehua
>
> *My bird of Ho‘olehua that cries out about food.*
>
> Said of the kioea, whose cry sounds like ‘Lawelawe ke ō! Lawelawe ke ō!’ (Take the food! Take the food!). The kioea is the bird that calls to the fishermen to set out to sea. [Pukui 1983:207]

3.3.2 *‘Ōlelo No‘eau* #2164

The following *‘ōlelo no‘eau* describes the hot plain of Ho‘olehua:

> Mo‘a nopu ka lā i ke kula o Ho‘olehua.
>
> *The sun scorches the plain of Ho‘olehua*
>
> Refers to Ho‘olehua, Moloka‘i. [Pukui 1983:235]

3.3.3 *‘Ōlelo No‘eau* #2193

The following *‘ōlelo no‘eau* describe the medicinal expertise associated with the *kahuna* (priest) of Moloka‘i.

> Moloka‘i ku‘i lā‘au
>
> *Moloka‘i, pounder of medicine.*
>
> The kahuna of Moloka‘i were said to be experts in compounding medicines and poisonous potions. Also, a stick dance bore this name. [Pukui 1983:239]

3.3.4 *‘Ōlelo No‘eau* #2194

The following *‘ōlelo no‘eau* references an origin story of the island of Moloka‘i:

> Moloka‘i nui a Hina.
>
> *Great Moloka‘i, land of Hina.*
>
> The goddess Hina is said to be the mother of Moloka‘i. [Pukui 1983:239]

3.3.5 *‘Ōlelo No‘eau* #2195

The following *‘ōlelo no‘eau* describe the magical powers associated with Moloka‘i.

> Moloka‘i pule o‘o.
>
> *Moloka‘i of the potent prayers.*

Moloka‘i is noted for its sorcery, which can heal or destroy. [Pukui 1983:239]

3.3.6 Pālā‘au *Lo‘i*

The following *‘ōlelo no‘eau* which appears in *Ka Nupepa Kuokoa* (1922) discusses the *lo‘i kalo* (taro terraces):

> Kinikini wale na lo‘i ai o Palaau, ua like me na hoku o ka lani.
>
> *The taro patches of Pālā‘au are in abundance, resembling the stars in the sky.*
>
> [*Ka Nupepa Kuokoa* 1922]

It was said that after climbing atop Kaana, one could glance below to Pālā‘au and see the fertility of the soil through its numerous taro patches.

3.4 *Nā 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 the use of 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 *Ka Huaka‘i*

The following *oli* honors an “errand of mercy” in which Lot Kamehameha (Kamehameha V) delivered the “necessities of life, including native medicines as well as food,” to workers on his royal ranch at Hālawa on Moloka‘i (Pukui and Korn 1973:83–85). The *oli* states Kamehameha V’s ship, the *Kilauea*, stopped at Pālā‘au to unload cargo.

Ka Huaka‘i	Errand
Ia aloha ia Kilauea,	Kilauea, beloved ship, sea-roving steed
Lio kākele a o ka moana,	roams this ocean full-steam ahead

Holo mamua holo mahope.	backing and hauling, then the voyage home.
Kau pono ka ihu i ka makani,	Now Kilauea’s prow heads into the wind,
Haki nu‘a ka uwahi i ke kai,	smoke breaks from stack, ripples over the sea,
Nome a‘e ka huila malalo,	paddle wheel slowly revolves,
Halaeka lae o Ka-lā‘au,	passes Ka-lā‘au Point, Moloka‘i up ahead,
‘Oni ana Moloka‘i mamua,	Lā-hainā yonder awaiting freight,
Huli a‘e e eke alo i Lā-hainā,	and stops at Pā-lā‘au to unload cargo,
He ukana ka Kilauea,	heave-ho and shove down below.
Lū a‘e la i Pā-lā‘au,	Like a flock of seabirds upon a waste of sand
Ho‘okahi pahuna malalo.	a hungry horde races along this salt-encrusted shore.
Kohu ‘āuna manu i ke one,	Were it not for Chief Ka-mehameha
Ka hoholo i ke ālialia.	these creatures would be bereft of all supply,
E ‘oleo Ka-lani Mehameha	would be as sheep without forage, no shepherd
Ola ai nei pū‘ā hipa,	were it not for life-bringing Ka-ma‘i-pu‘u-pa‘a the Kahuna,
Nā hi pa a Ka-ma‘i-pu‘u-pa‘a.	wise in matters of sickness, life and death.
‘Ai ana i ka lau ‘oliwa.	Now let his famished flock feed on olive leaves given with a King’s love.
Ha‘ina ‘ia mai ka puana,	This is the end of my song
No Ka-lani Mehameha he inoa.	in praise of Chief Ka-mehameha.

[Pukui and Korn 1973:83–85]

3.5 *Nā 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]

3.5.1 Aloha Moloka‘i

This *mele* by an unknown author was found in “Johnny Noble’s manuscript collection of Hawaiian Songs” by Robert M. Mondoy and translated by Puakea Nogelmeier and Robert M. Mondoy. The *mele* states that Maunaloa, a mountain in West Moloka‘i, “stands majestic” with the “broad expanse of Pālā‘au” (Mondoy 2018:62–63).

Nani wale ku‘u ‘ike kūmaka ‘eā	It was glorious for me to behold
I ka nani kaulana moku a‘o Hina ‘eā	The famed beauty of Hina’s isle
‘O ke kai hone a‘o Nalulua ‘eā	The murmuring sea of Nalulua
E pili a‘e nei me Kalama‘ula ‘eā	Joining with Kalama‘ula there.
Kūkilakila mai ‘o Maunaloa ‘eā	Maunaloa stands majestic
Ka waiho laulaha a‘o Pālā‘au ‘eā	With the broad expanse of Pālā‘au
Heahea mai ana ‘o Kala‘e ‘eā	Kala‘e is beckoning
E ho‘i i ka poli o Maunahui ‘eā	To return to the embrace Maunahui (Originally “Maunahina”, a probable error)
‘Alawa i ka nani o Kalaupapa ‘eā	Gazing at the beauty of Kalaupapa
Ke ‘alohi a ke kai lana mālie ‘eā	The calm seas there sparkle
Ha‘ina ‘ia mai ana ka puana ‘eā	The story be told in the refrain
Aloha Moloka‘i Nui a Hina ‘eā	Beloved is Great Moloka‘i, isle of Hina
	Translation: Puakea Nogelmeier & Robert M. Mondoy

[Mondoy 2018:62–63]

3.5.2 Ho‘olehua

This *mele* was composed by Clarence Kinney; Ho‘olehua was his home. This *mele* is in honor of Ho‘olehua.

Ha‘aheo no ku‘u home lā	Proudly my home
E ke kau mai la i ka la‘i	Repose in the calm
Ho‘opulu ia mai ka ‘ehukai	Dampened by the sea spray
I ka nani o Ho‘olehua	In the beauty of Ho‘olehua
Ku‘u home i ka uka	My home is in the uplands
I ka pā ka makani	Where the wind blows
Ko aloha pumehana	The warmth of your love
Mau ana no me ia‘u	Will always be with you
Hu‘i lā koni lā	Chilling, throbbing
I ka uka ‘iu‘iu	In the distant upland
I ka pā kolonahe	Where the wind wafts
A ke kēhau	with the dew
Ku‘u home lā ho‘opulapula lā	My home, my homestead
Me ka nani o Ho‘olehua	In the beauty of Ho‘olehua
Me ka nani o Ho‘olehua	In the beauty of Ho‘olehua

[Huapala n.d.a]

Another *mele* titled *Ho‘olehua* [*‘Āina Ho‘opulapula*] (*Ho‘olehua, The Homestead Land*) was written Robert Niau Kamaunu Sr. and published in *A Collection of Popular Hawaiian Melodies* in 1929 (Mondoy 2018:62).

Kū kilakila mau ‘o Ho‘olehua	Ever-imposing and arising is Ho‘olehua
‘Āina nani i ka ho‘opulapula	A glorious land for the Hawaiian homestead
He pula kau maka na ka lehulehu	Although an insignificant mote to most
Ka uluwehiwehi a‘o ia uka	The countryside there is abundantly lush
Ka uka ‘iu‘iu me ke onaona	A countryside distant and alluring
A ka ‘ano‘i a‘e lei mau nei	With a longing like for a beloved child
Ho‘ohihi ka mana‘o ke ‘ike aku	A spreading hope is the vision there
Ka waiho kāhela i ka la‘i	Of a vista vast and expansive in tranquility
Ua la‘i ka nohona me ke aloha	Life is peaceful and filled with aloha
He home ho‘okipa i ka malihini	A home hospitable to the new-comer

Haina ‘ia mai ana ka puana	Repeat the refrain, tell the story
Ho‘olehua ē ka heke a‘o Moloka‘i	of Ho‘olehua and the great island of Moloka‘i
	(Translation: Robert Mondoy and Puakea Nogelmeier)

[Mondoy 2018:62]

3.5.3 Moloka‘i Hula

This *mele* for Moloka‘i was composed by Mary Robins, with music by John Noble to honor the various *wahi pana* of Moloka‘i.

One verse in particular references Ho‘olehua Ahupua‘a with the lines “*Ho‘olehua he ‘āina nani, kaulana ka inoa ho‘opulapula*. Ho‘olehua, a beautiful land, name of the famous Homestead” (Huapala n.d.). The composer of this *mele* explains that Ho‘olehua means no seed. This name was given to the land as the wind blew away the seeds that were planted (Huapala n.d.b).

Hanohano ka inoa a‘o Moloka‘i lā	Distinguished, the name of Moloka‘i
Lei ana i ka pua o ke kukui	Adorned with a wreath of the kukui flower
O ka wehi kaulana o ku‘u ‘āina	Famous symbol of my land
O Moloka‘i nui a Hina	Moloka‘i, born of Great Hina
O Hālawa e ‘alawa iho	Hālawa, glance down
‘Ālawa ka ulua e ma alo nei	Look quickly, see the ulua on the upper surface
O Pūko‘o no‘u ko aloha	Pūko‘u, my love
Me ka ulu kukui o Lanikāula	With the kukui grove of Lanikāula
Ho‘olehua he ‘āina nani	Ho‘olehua, a beautiful land
Kaulana ka inoa ho‘opulapula	Name of the famous homestead
Kalama‘ula a he home nani	Kalama‘ula, oh, beautiful home
Ho mai ko lama ‘ai ala no‘u	Come, let us go there to eat
Hea aku no wau e ō mai ‘oe	I call to you, you answer
Lei ana i ka pua o ke kukui	Adorned with a wreath of the kukui flower.

[Huapala n.d.b]

3.5.4 Nani Moloka‘i

Composed by Helen Smythe Ayat and Ida Hanakahi, this *mele* honors various *wahi pana* throughout Moloka‘i by showcasing attributes of these lands that make them so famous. In this *mele*, Ho‘olehua is honored by being famous for its *hala* (*Pandanus odoratissimus*) grove. Please note that *hala* is commonly defined as “pandanus fruit.” However, the translator of this *mele* defined “hala” as pineapple.

He nani Moloka‘i	Beautiful Moloka‘i
Nui a Hina	Child of Hina
I ka ulu kukui	And is famous kukui grove
A‘o Lanaikāula	of Lanikāula
He nani Hālawa	Beautiful Hālawa
I ka[‘]u ‘ike	In my sight
He wailele	The waterfall
A‘o Moa‘ula	Of Moa‘ula
He nani Kalama‘ula	Beautiful Kalama‘ula
I ka ulu o ka niu	with its coconut trees
He ‘āina ho‘opulapula	Homestead land
O Kalaniana‘ole	Of Kalaniana‘ole
He nani Ho‘olehua	Beautiful Ho‘olehua
I ka ulu o ka hala	with the pineapple
He waiwai ui	Brings wealth
Ke loa‘a mai	To the community
He nani Kalaupapa	Beautiful Kalaupapa
Ho‘okipa malihini	Welcomes visitors
Hā‘ina mai ka puana	tell the refrain
A he nani Moloka‘i	Beautiful Moloka‘i

[Huapala n.d.c]

Section 4 Archaeological and Historical Narrative

4.1 Pre-Contact and Early Post-Contact Period

Traditionally, Moloka‘i was divided into two *moku* (district): Kona and Ko‘olau. Kona Moku was comprised of the lands of the southern and western sections of the island (which included Pālā‘au and Ho‘olehua Ahupua‘a) and the Ko‘olau Moku which comprised the lands of the northeastern portion of the island from Hālawa Valley to the Kalaupapa Peninsula. In 1859, the traditional *moku* of Kona and Ko‘olau were dropped and the island as a whole was referred to as the Moloka‘i district. In 1909, the island was again divided into two districts: Kalawao District, containing the lands of Kalaupapa, Kalawao, and Waikolu, and Moloka‘i District, comprising the remainder of the island (Coulters in Summers 1971:2), including the current project area.

The project areas are within Pālā‘au Ahupua‘a (Figure 8). Mrs. Pukui in Handy et al. (1991:47) described the subdistricts of Pālā‘au on Moloka‘i as *kalana* (division of land smaller than a *moku*). Today, the *kalana* of Pālā‘au consists of one major land division and two *lele* (a detached part or lot of land belonging to one *‘ili*, but located in another *‘ili*). Pālā‘au 1 is located at the southern shores of central Moloka‘i, while Pālā‘au 3 is in uplands, at the summit of the sea cliffs above Kalaupapa Peninsula. These two *lele* of Pālā‘au Ahupua‘a are significantly smaller than Pālā‘au 2—which includes the present project areas. Pālā‘au 2, the largest of the three land sections, is adjacent to the northwest of the *ahupua‘a* of Ho‘olehua (Dodge et al. 1897; Summers 1971:81, see Figure 8).

4.1.1 Subsistence and Settlement

During his archaeological survey of Moloka‘i in 1937, Southwick Phelps (1937) noted the following about West Moloka‘i:

> It is said that in former days western Molokai was not as devoid of forest as it is now. While this may be true to a limited extent, I think that the essential conditions have remained the same and that the western half was always a semi-arid region. One certainly finds there no extensive taro patches and no signs of dense population. We learn, furthermore, that it was traditionally a land of the sweet-potato, a plant that does not require much water. [Phelps 1937:6–7]

While exact boundaries for yam and sweet potato cultivation in Pālā‘au and Ho‘olehua are unknown, these tubers, along with fish, were staples of inhabitants in the area (Phelps 1937).

The region including Ho‘olehua was a fertile plain known particularly for the cultivation of *‘uala* (sweet potato). Summers (1971:38) cites Malihinihele who stated in 1876, “In the olden days this [Pālā‘au 2] was a good land with a fertile plain where plants grew. The population was large but today it is uninhabited.” Handy (1940:157) remarks, “In 1931 there were many flourishing patches on the Hawaiian homesteads at Hoolehua. It is said that Hoolehua and Palaau were noted for sweet potatoes in olden days” although Handy and Handy (1972:283) note homesteaders in Ho‘olehua were growing the sweet potatoes on land that had not been planted in ancient times.

The importance of *‘uala* to the area is further suggested by place names such as Pu‘u Pe‘elua (hill of the caterpillar) and Kāluape‘elua (baked caterpillar), which illustrate the connection to the environment of the area (Pukui et al. 1974). The *pe‘elua,* or the caterpillar, feeds on the sweet

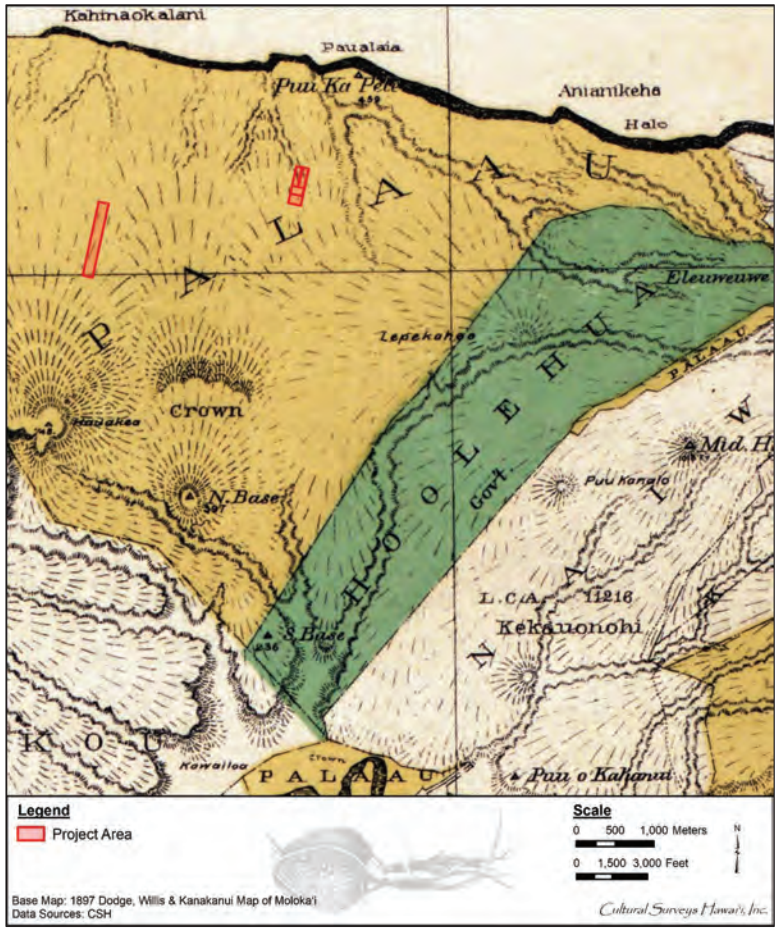


Figure 8. Portion of Dodge et al. (1897) map of Moloka‘i showing 1848 land divisions (Crown [yellow], government [green], LCAs [no color]); the western and eastern project areas as within Crown lands

potato and is considered a pest by *‘ualа* farmers of the region. Pukui et al. (1974) noted hilled sweet potatoes in the region south of Ho‘olehua and Pālā‘au known as Uala-pu‘e, which is also the name of a fishpond in that area. In addition to sweet potato, *‘olo* or *hokeo*, the long gourd used for holding fishing tackle and to make the *hula* drum, notably grew in Ho‘olehua (Handy et al. 1991:213).

The actual size of the pre-Contact Hawaiian population tending and supported by crops in central and western portions of Moloka‘i can only be conjectured. While the greater portion of the population resided on the eastern side of the island, a late nineteenth century anecdote by Abraham Fornander (1880) suggests a former substantial population that may have been widely dispersed:

> As an instance of the dense population, even a few years previous to Kamehameha's death, the author has often been told by a grand-niece of Kekaulike, who was a grown-up girl at the time, that when the chiefs trumpetshell sounded, over a thousand able-bodied men would respond to the call, within a circle described by Palaau, Naiwa, Kalae and Kaunakakai. Those lands together cannot muster a hundred men this day. [Fornander 1880:73 footnote]

4.2 Early Historic Period

Early historic accounts briefly mention Moloka‘i. Summers (1971:18) relates that in 1779 when Captain Cook visited Hawai‘i, the status of Moloka‘i was uncertain. However, Kamakau (1992b) cites several reasons why Moloka‘i was as important as O‘ahu in the late 1700s, since both of the islands contained “rich lands, many walled fish-ponds, springs, and water taro patches. The island of Oahu was very fertile and Molokai scarcely less so” (Kamakau 1992b:132–133).

Captain George Vancouver (1798), sailing along the southern coast of Moloka‘i in 1793, essayed a portrait of the island’s geographic texture and distribution of Hawaiian population:

> Early the next morning, with a pleasant breeze from the N.E., we stood over towards the east point of Morotai, […] we sailed along to the westward, […] About half a league south of the east point of Morotai [...] lies a small barren rocky islet, called by the natives Modooenete […] In this direction east the land rises rather abruptly from the sea, towards the lofty mountains in the center of the east part of Morotai; and though the acclivity was great, yet the face of the country diversified by eminences and vallies; bore a verdant and fertile appearance. It seemed to be well inhabited, in a high state of cultivation, and presented not only a rich but a romantic prospect. To the westward of these cliffs, the shores terminated in the former direction, by a low point of land, called by the natives Crynoa […] From Crynoa the country assumes a dreary aspect. The mountains, forming the eastern part of the island, gradually descend to the westward, and like those of Mowee, terminate on a low isthmus, which appears to divide the island into two peninsulas […] the easternmost, which is far the largest is composed of very high land, but the westernmost does not rise to any elevation, beyond that of a mean height. The country from Crynoa rises from the sea by an ascent, uninterrupted with chasms, hills or vallies. This uniform surface, on advancing to westward, exhibited a gradual decrease in the population; it discovered an uncultivated barren soil, and a tract of land that gave residence only to a few of the lower orders of the islanders, who

> resort to the shores for the purpose of taking fish, with which they abound. Those so employed are obliged to fetch their fresh water from a great distance; none but what is brackish being attainable on the western parts of Morotai. [Vancouver 1798:201–202]

Early visitors and Hawaiian historians confirm Vancouver’s perception of a widespread Hawaiian population throughout the eastern portion of the island and a much smaller population clustered along the shoreline within the western portion.

After conquering the island of Maui in 1790, Kamehameha I advanced on to Moloka‘i where he secured the allegiance of the chiefs. Archibald Menzies (1920), the naturalist who accompanied Captain George Vancouver to the Hawaiian Islands in the 1790s, relates that Kamehameha I “destroy[ed] the fields and plantations of the inhabitants” (Menzies 1920:115). He and his warriors remained on Moloka‘i for a year to prepare the attack on O‘ahu. He is said to have grown taro and “had all his canoes put in order. He drilled his warriors on the Hoolehua plain near where the airport is now” (Cooke 1949:112).

4.3 Early 1800s

The first Protestant missionaries arrived in Hawai‘i in 1820. In the following years, the ruling Hawaiian chiefs and governors established a network of public schools throughout the villages of the Hawaiian Islands. In September 1828, a group of missionaries travelled to Moloka‘i to determine the progress of the schools (Andrews 1829). After landing on the southeast side at Honomuni, they traveled west over the next two days to the villages of Hālawa, Halana, Makanalua (Kalaupapa Peninsula), and overland to Kaunakakai where they put up for the night:

> During the whole night, the people continued to arrive; and, about sunrising, the chiefs made their appearance […] Having examined a large school here, we walked on, and the chiefs followed, in canoes. We travelled along, on the sea shore, finding very little vegetation, on account of the drought. There is scarcely any water on this side of the island. [Andrews 1829:273]

They completed their examination of the schools on Moloka‘i the following day, noting that they “numbered nearly 700 houses, and think there are about 1,000 on the island” (Andrews 1829:274).

The United States Navy Exploring Expedition under the command of Captain Charles Wilkes visited the island of Moloka‘i in 1840 and described the island as follows:

> […] forty miles long, from east to west, and nine miles wide: the western portion, embracing about one third of the whole extent, is a barren waste; and the remaining two thirds is mountainous, in some places rising to the height of twenty-eight hundred feet, with the exception of a narrow strip of land on the south side, which has a most favorable exposure, and is highly productive. [Jenkins 1850:258]

4.4 The Māhele and the Kuleana Act

The Organic Acts of 1845 and 1846 initiated the process of the Māhele—the division of Hawaiian lands—that introduced private property into Hawaiian society. During the Māhele, all lands in the Kingdom of Hawai‘i were divided among *mō‘ī* (king), *ali‘i* (royalty), *konohiki* (overseer of an *ahupua‘a* [traditional land division]), and *maka‘āinana* (common people/tenants

of the land) and passed into the western land tenure model of private ownership. In 1848, the crown and the *ali‘i* received their land titles. On 8 March 1848, Kauikeaouli (Kamehameha III) further divided his personal holdings into lands he would retain as private holdings (Crown Lands) and parcels he would give to the government. According to an 1897 Hawaiian Government Survey map of Moloka‘i showing 1848 divisions of land, the entire *ahupua‘a* of Ho‘olehua was given to the government, and all of Pālā‘au Ahupua‘a (including the western and central project areas) was retained by the Crown (see Figure 9).

Native Hawaiians claiming the lands on which they resided were required to present testimony before the Board of Commissioners to Quiet Land Titles. Upon acceptance of a claim the Board granted a Land Commission Award (LCA) to the individual. The awardee was then required to pay a cash amount equal to one-third of the total land value or to pay that amount in unused land. Following this payment, a Royal Patent (RP) was issued giving full title of ownership to the tenant.

On 19 October 1849, the Hawaiian Privy Council adopted resolutions to protect the rights of Native tenants, the *maka‘āinana*. The *maka‘āinana* were offered fee-simple titles for their house lots and lands they cultivated for themselves. *Kuleana* awards for individual parcels within the *ahupua‘a* were subsequently granted through a land commission. These awards were first presented to Native Hawaiian tenants followed by the naturalized foreigners (non-Hawaiians born in the Islands) or long-term resident foreigners who could prove occupancy on the parcels before 1845. No commutation fee was necessary to apply for a Royal Patent for a *kuleana* award as the commutation fee had presumably already been paid by *ali‘i*/*konohiki* who had been awarded the entire *ahupua‘a*, or an *‘ili* (a land division within an *ahupua‘a*) in which the Native tenant claimed his own small parcels (Chinen 1958:29–30).

No native tenant LCAs were awarded near the three lots presently addressed, and only one LCA and one Land Grant were awarded in the vicinity. Approximately 4.6 km southeast of the three lots presently addressed, LCA 11216 (LCA 11216*Mo) was awarded to Kekauonohi (see Figure 8 and Figure 9) a member of the House of Kamehameha and a wife to King Kamehameha II. This LCA included 5,803 acres comprising approximately half of the *ahupua‘a* of Na‘iwa. Approximately 4.8 km southwest of the three lots presently addressed, Grant 3146 was awarded to Charles R. Bishop (see Figure 9). No land use information is provided for Grant 3146 (Waihona ‘Aina 2021).

4.5 Mid- to Late 1800s

4.5.1 Cattle Ranching

Cattle were introduced to Moloka‘i in the 1840s. De Loach (1975) summarizes this first effort at commercial ranching:

> Rudolph W. Meyer, who was, [...] responsible, along with [Reverend] Hitchcock, for the introduction of cattle on the island, had come to Moloka‘i in the 1840s. He established a ranch stocked with longhorns in the Kala‘e [north central Moloka‘i] Area. A lucrative trade in cattle and hides was begun between Moloka‘i and Honolulu. The cattle were exported from the village of Pālā‘au on the southwestern shore, over the reef, and onto a waiting ship. Pālā‘au grew wealthy on cattle and dry land taro. All this came to an end, however, in the 1850s, when Meyer

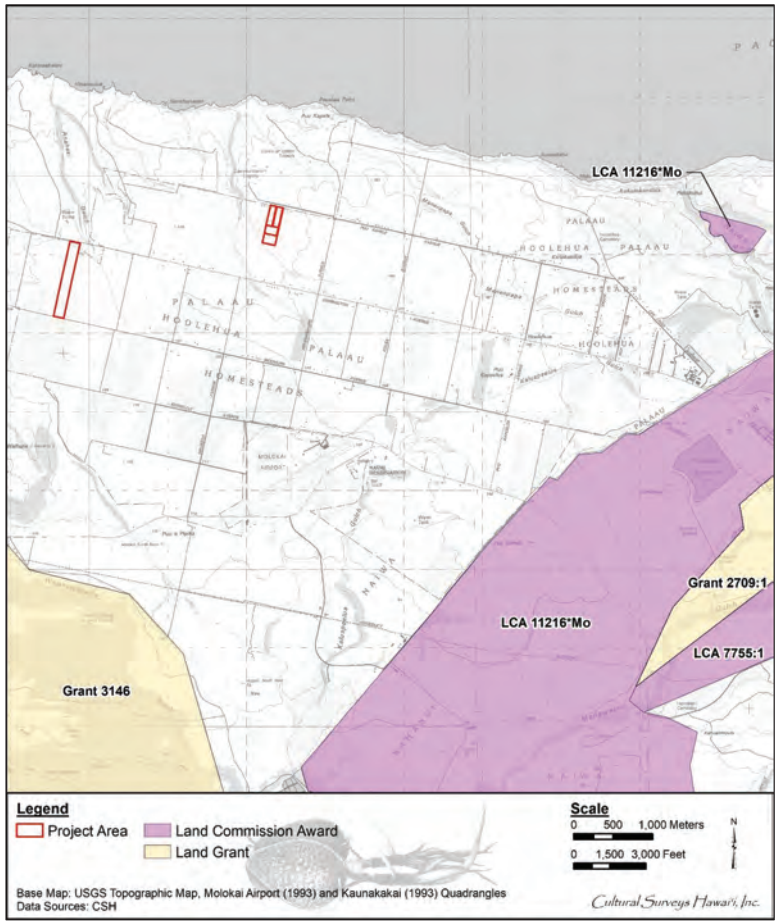


Figure 9. LCAs and Grants in the vicinity of the three lots presently addressed depicted on a portion of 1993 Molokai Airport and Kaunakakai USGS topographic quadrangles (the three lots presently addressed were not close to a Native Tenant LCA or grant)

> discovered that the number of cattle in the herd had diminished considerably. He found that almost every male in the village was guilty of rustling, and so all the men were shipped off to jail in Honolulu. The men's families followed, And the village was deserted. Today Palaau sits abandoned in a kiawe forest, as no one ever returned to live there. [de Loach 1975:68]

Despite these early setbacks, cattle (and sheep) ranching expanded greatly in the second half of the nineteenth century:

> During this period, cattle, sheep and goats were imported to the island in ever-increasing numbers. According to Judd, there were no cattle on the island in 1832 and by 1853 there were only 200 head, The 1866 census, however, revealed 2,586 head of cattle, 13,332 sheep and 196 goats on the island. […] In 1868, Kamehameha V released axis deer on the island. [de Loach 1975:86]

In 1855, Lot Kapuaiwa (King Kamehameha V) purchased the *ahupua‘a* of Kaunakakai for two hundred dollars (Interior Department Letter, July 1885) to maintain the value of a sheep station established there by his brother, Alexander Liholiho (King Kamehameha IV) (Kuykendall 1953:152). Lot Kapuaiwa also actively sought to increase his Moloka‘i holdings: "in the desire to have a country estate, he bought up land and cattle from the resident Hawaiians and used Moloka‘i as a vacation ground from his cares of State" (Judd 1936:9–10).

In 1868, King Kamehameha V was sent seven live axis deer from Hong Kong as a gift (Tomich 1986:127). He released the deer, adding to the free-roaming game population on the island but, consequently, also to the destruction of vegetation by the flourishing population of foraging animals. In a 1902 talk given in Japan on Hawaiian Forests, E.M. Griffith (1902) remarked on the already alarmingly denuded state of Moloka‘i:

> Cattle, goats and deer have totally destroyed the forests upon the larger portion of the island of Molokai so that the western half is practically destitute of any tree growth. It is possible that the algaroba forests which have secured such a strong hold along the coast near Kaunakakai may gradually spread over this end of the island […] The condition at present time is that the forest has been pushed back into the deeper and more inaccessible canyons and onto the highest slopes of the mountain. The effective watershed in respect to the conservation of the water supply has thus been greatly reduced and the careful protection of the remaining forests is an absolute necessity. [Griffith 1902:Appendix G]

An 1886 Government Survey map (Figure 10) depicts an approximate upper growth line of the algaroba (*kiawe*) forests approximately 3.5 km south of the present project areas. The western and eastern project areas are depicted as within the Momomi Paddock. Extensive pastureland is indicated with no other development suggested.

During the Māhele in 1848, Bernice Pauahi Bishop, daughter of Abner Pākī and Laura Konia and last descendant of the Kamehameha dynasty, inherited much of the lands which are now Molokai Ranch lands. Her husband, Charles R. Bishop, inherited the lands of Kaluako‘i in 1875. The Molokai Ranch was formed in 1897 when a *hui* (group of investors) purchased approximately 70,000 acres of central and western holdings from the Bishop Estate (Cooke 1949; Stearns and Macdonald 1947).

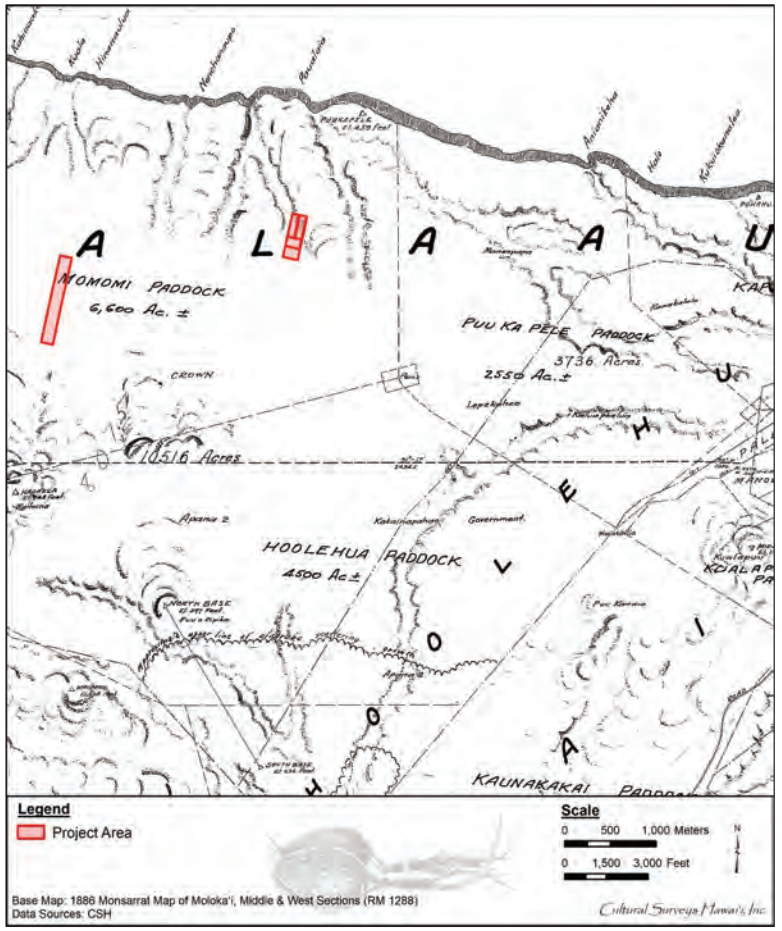


Figure 10. Portion of Monsarrat (1886) Hawaiian Government Survey map of Moloka‘i, Middle and West Sections (RM 1288); showing the three lots presently addressed (and all five scattered lots) as within the Momomi Paddock

4.5.1.1 Agriculture

Mr. Harvey R. Hitchcock and Mrs. Rebecca H. Hitchcock became the first permanent missionaries on Moloka‘i. They established a Protestant church at Kalua‘aha in 1832, at which point the only agricultural crops they noted were bananas and taro grown in the valleys where water was most readily available. No “regular schools, churches, houses of permanent nature, no garments, no cattle, only one horse, and home articles of the most primitive nature” were present then (Wiebke 1940). Twenty years later, the island had a number of churches, 1,000 students enrolled in 21 schools across the island, and livestock including goats, hogs, 400 horses, and cattle. Taro, potatoes, and grapes were “cultivated quite extensively” (Wiebke 1940:1).

In the early 1840s, the Meyer family in Kala‘e was growing and exporting coffee, corn, wheat, and potatoes to the mainland. The Meyer family started a sugar mill at Kala‘e in 1878 using 30 acres of land to grow cane. This was one of the few locations on Moloka‘i that had adequate rainfall to grow cane, but problems stemmed from the cane being planted at an elevation of 1,500 ft above sea level. Sugarcane matured slower at higher elevations, so yields were lower. The Meyer plantation produced 50 tons of sugar annually (Wiebke 1940). The sugar mill was closed in 1894, because it was too small to compete with larger operations.

Two other large sugar plantations were developed on Moloka‘i beginning in the late 1870s, one at Moa-nui in East Moloka‘i and one at Kaunakakai. Both of these plantations quickly failed and were abandoned (Wiebke 1940).

In 1898, American Sugar Company, Limited (ASCO) was incorporated by Molokai Ranch, which leased an additional 30,000 acres (Cooke 1949). Following the incorporation, a full-scale cane operation in central and western Moloka‘i began, including an attempt to develop the arid lands of the Ho‘olehua plain. “On the Hoolehua plain 750 acres were prepared in parallel trenches following the contours. 500 acres were actually planted in young cane shoots” (Judd 1936:12). Due to an inadequate water supply, this sugar enterprise was also unsuccessful. The well pumps, which had been installed in surface wells, were of such large capacity that they soon exhausted the fresh water, and irrigation ditches 8 miles long brought pumped water with such a high salt content that it could not be used to grow sugarcane:

> Wells were dug in the lowlands and water pumped into a system of irrigation ditches above. As the pumping increased, the salt content of the water gradually increased until it became detrimental to the cane. This plantation like the others was quickly abandoned. [Wiebke 1940:1]

The ASCO plantation at Kamalō was the only Moloka‘i sugar plantation to invest money in a railroad. Railroad tracks were constructed from Kaunakakai harbor “up through Palaau and Iloli to the middle of the Hoolehua plateau” (Judd 1936:11). After failed sugar cultivation efforts, “graded railroad bed cutting through the gulches of Palaau” and “irrigation ditches […] on the Hoolehua plain” were all that remained (Judd 1936:11–12). No locomotives were ever shipped to Moloka‘i. The tracks were removed and recycled into cattle guards. Today, stones mark the old railway route from Pālā‘au to Mahana (Strazar 2000).

By 1900, all sugar production on Moloka‘i had ceased (Stearns and Macdonald 1947:3). Regarding the ASCO plantation’s demise, former Molokai Ranch manager, George C. Munro, recalled the following:

> Hawaiians claimed that the plantation was doomed from the start, because as the company constructed the railroad along the shore to Palaau it tore down an ancient fishing heiau near Kahunui. It used the rocks for the railroad bed and ran the rails through the center of the heiau. [Morse 1953:6]

4.6 1900s

4.6.1 Molokai Ranch

Molokai Ranch became a more organized operation in the early 1900s. By 1905, the ranch had transitioned from an open country system to the paddock system (Henke 1929). During the transition, wild deer and feral goat populations were reduced, a water distribution system was implemented, and a breeding program begun. Water from the East Moloka‘i mountains was gravity fed to a concrete reservoir and then piped down to the ranch. By 1929, Molokai Ranch had approximately 75 miles of water pipes and more than 100 miles of smooth wire fences. An 1886 Hawaiian Government Survey map shows several paddocks surrounding the three lots presently addressed (see Figure 10). These labels were most likely added after the map’s original creation, since the paddocks appear to indicate land use by Molokai Ranch, which wasn’t established until 1897 and then transitioned to the paddock system from 1898 to 1905 (Henke 1929). The western and eastern project areas are within the Momomi Paddock.

In the 1920s, Molokai Ranch lands consisted of about 10,000 acres leased for pineapple cultivation, 8,000 acres of forest reserves, and 50,000 acres utilized for ranching (Henke 1929:52). Most ranching activities were associated with cattle. Beginning in 1923, Molokai Ranch imported Hereford bulls from the Parker Ranch on Hawai‘i Island, which resulted in a beef cattle population of over 4,500 head by 1929. In 1929, the ranch also had 400 swine and about 200 sheep. Sheep ranching was formerly more prevalent, with sheep numbers up to approximately 17,000 in 1907. However, the combination of sheep and cattle ranching caused over-pasturing, and since cattle ranching was more lucrative, sheep ranching began phasing out. In 1951, grazing land for sheep ranching remained a viable industry, despite its heyday being many decades prior (Carlson 1951). Cattle ranching remains a significant industry on Moloka‘i.

Molokai Ranch also produced honey. In 1903, an Italian breed of bees was purchased and crossbred with the island’s endemic species (Cooke 1949). In 1928, 350 tons of *kiawe* honey were produced on Molokai Ranch, most of which was sold to Germany (Henke 1929).

4.6.2 Hawaiian Homes Commission

In 1920, the U.S. Congress passed the Hawaiian Homes Commission Act to administer and manage some 200,000 acres of land that belonged to the government of the Kingdom of Hawai‘i or was recognized as Crown lands. Agricultural homesteads were to be leased to Native Hawaiians, with leasehold terms generally lasting 99 years at one dollar a year. The following year, the program began attracting people to Moloka‘i. Kalaniana‘ole Colony was the first homestead established under the Hawaiian Homestead Act of 1920. The settlement is located in Kalama‘ula Ahupua‘a, near the southern shores of Moloka‘i Island.

The Moloka‘i homestead program initially was impacted by many problems, including drought and high winds (McGregor 1990:37–38). Insect pests were also a discouraging impediment, at one

point accounting for destruction of over 50% of many of the most desirable crops on the island (Wiebke 1940). A *Maui News* article from 1940 recounts the following:

> With the birth of the Hawaiian Homes commission, Hawaiian homesteaders began pouring into the Kala‘e and Ho‘olehua sections. For a number of years extensive truck crops of every kind were raised successfully, but today this project has become a sorrowful enigma. [Wiebke 1940:1]

The 1922 USGS map (Figure 11) shows the area of the three lots presently addressed as relatively undeveloped. An unimproved Moomomi Road passed through the western project area and a Waihii Pipeline and adjacent unimproved road passed to storage tanks 1.3 km southeast of the three lots presently addressed. The pipelines reflect the burst of agricultural activity.

Despite such difficulties, people managed to cultivate their plots (McGregor 1990:37–38). For instance, at Kalaniana‘ole Colony, water for “bathing, laundry, and farming” was originally supplied by wooden flume from a spring in Kaunakakai, with drinking water provided by a spring in Kalama‘ula (Tomonari-Tuggle 1990:10). Farming was diversified and successful crops included corn, watermelons, cucumbers, sweet potatoes, eggplant, and papaya (Keesing 1936; Wiebke 1940). In addition, demand became high for Moloka‘i alfalfa, and homestead tomatoes “controlled the Honolulu market” in 1924 (Keesing 1936:56).

Overall, the program succeeded and was expanded to include 11,400 acres of Pālā‘au-Ho‘olehua beginning in 1924. The current project area consists of approximately 36.4 acres (14.7 hectares) of these Pālā‘au-Ho‘olehua Homestead lands and includes Lots 17 and 104D-1. Due to the homestead program, the Pālā‘au-Ho‘olehua region had the largest population of Native Hawaiians in 1930. Of the 1,031 residents, 826 were Hawaiian (McGregor 1990:10).

In addition to agricultural pursuits, the Hawaiian Homes Commission encouraged raising livestock and ranching. Raising pigs brought the most revenue and economic value; however, a few families sold eggs and every family owned some cattle (Keesing 1936). In 1929, 54 homesteaders owned a total 358 cattle, including two Hereford bulls, 106 horses, 15 mules, and six donkeys (Henke 1929). Community pastures allowed each lot holder to graze up to 60 head of livestock. Additionally, three 250-acre pastures were reserved specifically for ranching. Pastures in Ho‘olehua and Pālā‘au totaled 6,630 acres.

In 1935, 979 cattle, 72 horses, and 25 mules utilized the community pastures though less than half Ho‘olehua families had cattle on these lands.

The Hawaiian Homes Commission was also instrumental in the establishment and expansion of Moloka‘i High School, approximately 5.5 km east of the current eastern project area. The school gym was constructed between 1931 and 1932 by the Hawaiian Homes Commission and the county. Moloka‘i High School became the first and only high school on the island when it expanded from an intermediate school to a high school in 1939. Situated at Ho‘olehua on Hawaiian Homes Commission land, it opened to all students on the island with an enrollment of over 400. In 1950, the board of supervisors approved negotiation of the purchase of 40 acres of Hawaiian Homes Commission lands adjacent to the extant campus for construction of a new high school site (Maui News 1950).

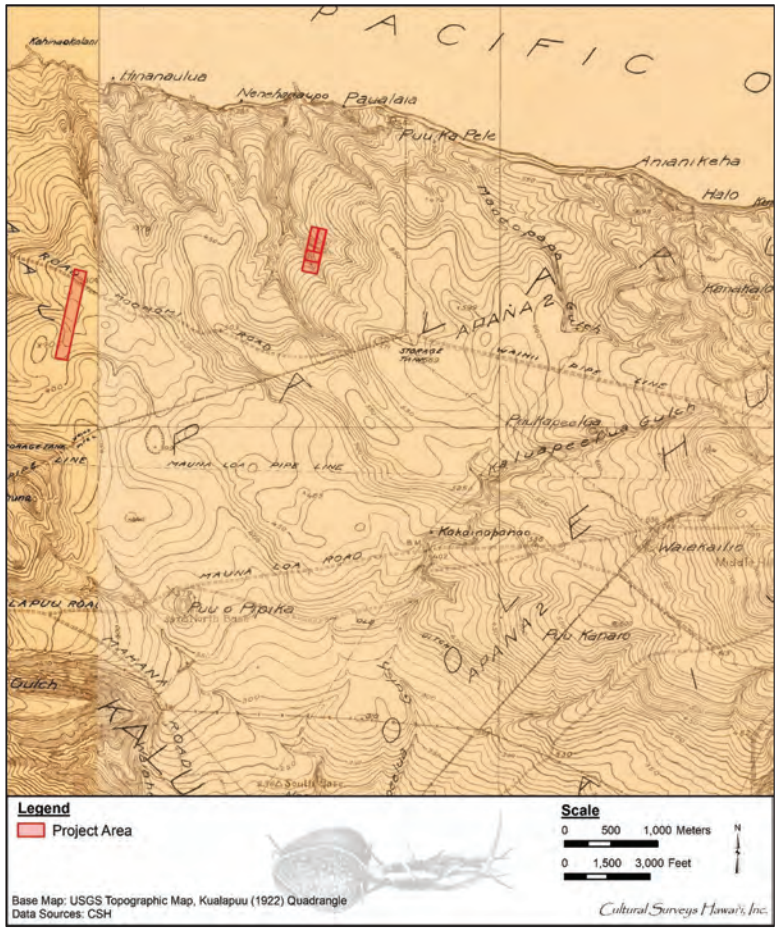


Figure 11. Portion of 1922 Kualapuu USGS topographic quadrangle, showing the three lots presently addressed as relatively undeveloped (an unimproved Moomomi Road passed to the south and a Waihii Pipeline and adjacent unimproved road extended east to storage tanks southeast of the project area)

4.6.3 Pineapple

Starting in 1918, independent pineapple growers tilled "the hillsides from Ualapua to Halawa, but due to high cost of operations these small plantations were short lived" (Wiebke 1940:1). The commercial pineapple industry arrived on Moloka'i in the early 1920s, with Molokai Ranch owning a majority of the leased pineapple lands (Lee-Greig and Hammatt 2008). Pineapple cultivation began in Pālā'au-Ho'olehua in 1926, when Libby, McNeill and Libby signed up some homesteaders to grow pineapple on homestead land operated in leased blocks of several 35-acre homesteads, which were cultivated by Libby.

By 1929, the California Packing Corporation (Calpac) had begun enlisting Native Hawaiian homesteaders in the Kualapu'u region, including areas near the current project area, to grow pineapple. The system adopted by both Libby McNeill & Libby and Calpac involved homesteaders growing pineapple in blocks of land leased by the plantation. Between 12 to 15 abutting homesteads were assembled by the pineapple plantation to form a contiguous area that was assigned a block number (Figure 12). Homesteaders under this block system planted, tended, and harvested to receive a proportionate share of the sale of fruit from each block. The harvested fruit was trucked by Calpac to a pier constructed at Kaunakakai, where it was crane-loaded onto barges and shipped to the Calpac cannery at Kahului, Maui (Larsen and Marks 2010:371–372). Homestead residents received almost two million dollars in cash payments for their efforts between 1929 and 1935.

Despite droughts, including one between 1944 and 1945 that caused the loss of the entire crop, pineapple production in the vicinity of the project area continued until the 1970s (Larsen and Marks 2010:379). Dole Pineapple, which had subsumed Libby, McNeill and Libby's operations, ceased pineapple cultivation in 1975. The California Packing Corporation had planned on closing the same year but continued cultivation until 1983, when a majority of its production ceased business on Moloka'i (Larsen and Marks 2010:382).

4.6.4 School Farm

In the early 1920s, Ho'olehua consisted of an undeveloped wide, grassy plain used for pasture with little development and no public school. Several families moved into the area when the land opened to Hawaiian homesteading and California Packing Corporation started their pineapple plantation at Kualapu'u, formerly a Molokai Ranch camp. Kalae School, a one-room schoolhouse at Kalae, eventually moved to the old recreation hall at Kualapu'u to better accommodate students coming from the ranch camp. As homesteads and pineapple cultivation expanded in the area, a new school was constructed at Ho'olehua to meet growing student enrollment; in 1926 the students at Kalae School moved to the new school. The staff originally consisted of three teachers, including an instructor of agriculture, but within three years the faculty grew to 15.

The school established a progressive agricultural department in 1930, which rapidly developed into a highly reputable agricultural training center. Modern methods of farming and animal husbandry were taught to male vocational students (numbering 70 in 1939). Students cultivated crops designed to give them needed experience and experimented with plantings to test for possible improved crops or strains for use on the island. About half of the vocational boys came from homesteads and the other half from Calpac-employed families. A cooperative program between

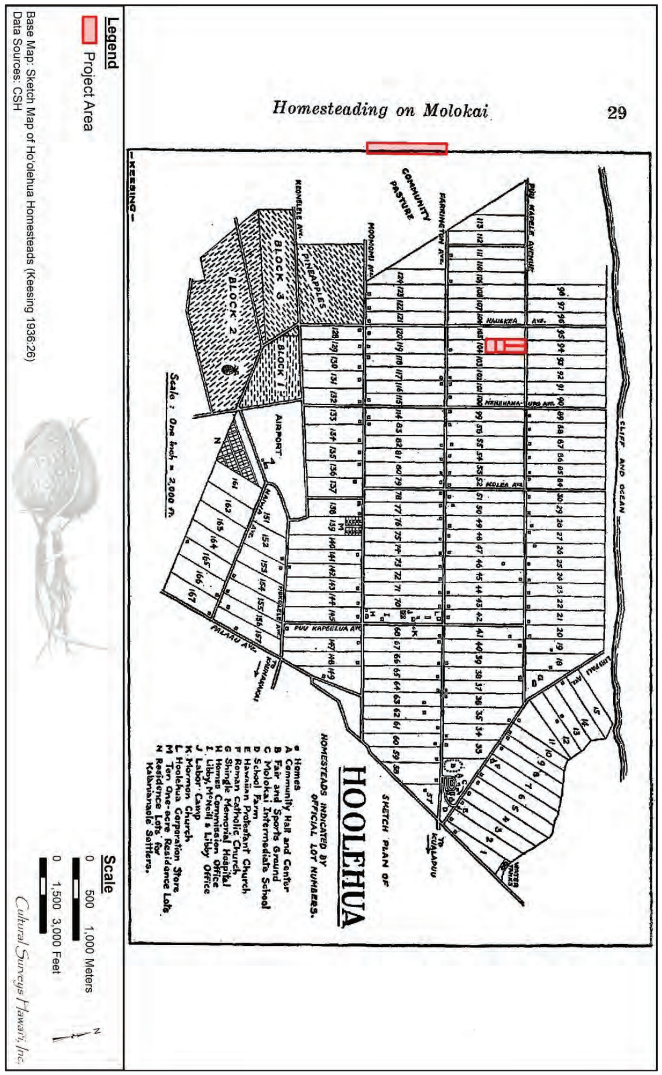


Figure 12. Sketch plan of Ho'olehua Homesteads (Keesing 1936:26) showing the three lots presently addressed as within the indicated Hoolehua Homesteads

Moloka‘i High School and Calpac was initiated in 1948, where boys from the vocational program worked at the plantation in the mornings before school for seniority consideration for employment post-graduation (*Maui News* 1948).

Hawaiian Homes Commission provided a 26-acre farm (Figure 13) to the department for educational purposes on “well selected land […] makai of the Hawaiian Homes Commission office in Ho‘olehua” (*Maui News* 1940:1). The farm had chicken houses and pigpens built by the vocational students in the farm shop. “The instructor of agriculture and three classes of boys spent weeks with tractors and ropes clearing lantana” from the area to be cultivated (*Maui News* 1939:6).

A 1939 news article describes the farm:

> The farm is up to date and well equipped. It serves the community as a practice ground for students; a source of improved livestock, poultry and plans; an example to the community of good landscaping and agricultural methods and is an experimental ground for new crops. Here the boys are receiving thorough instruction in the fundamentals of good scientific farming coupled with training to farm management—increasingly important because of the vital necessity that the modern tiller of the soil have a good working knowledge of farm economics in Hawaii if local small scale agrarian enterprises are to be operated at a profit. [*Maui News* 1939:6]

Figure 14 illustrates a typical resident homestead lot in Ho‘olehua during the 1930s. Families farmed a variety of crops in Ho‘olehua, including corn, melons, tomatoes, cucumbers, pumpkins, sweet potatoes, squash, peanuts, beans, onions, and cabbage (Keesing 1936). Pumpkin *poi* became a staple for these homesteaders. Though dryland agriculture had successes at Pālā‘au-Ho‘olehua Homesteads, constant care was needed to combat hardships caused by droughts, winds, and pests.

4.6.5 Corn

Corn was grown on Moloka‘i from as early as the 1920s. In a letter to the editor of the *Honolulu Star-Bulletin* in 1922, the writer comments quite fondly on Moloka‘i corn (Figure 15). In the 1940s, the Moloka‘i corn project was intended to provide a local source of food for livestock, since all feed corn was being imported (*Honolulu Advertiser* 1944a). Approximately 1,400 acres of field corn and 1,000 acres of milo maize were planted and harvested by resident high-schoolers and homesteaders. Homesteaders also grew feed corn separate from the Moloka‘i corn project (*Honolulu Advertiser* 1944b). In Ho‘olehua, large amounts of corn were sold or fed to livestock (Keesing 1936).

In 1967, Kaye Waldorf became a third partner in Hawaiian Research, Ltd. and moved from his 430-acre corn and soybean farm in Iowa to become resident manager of the company and grow corn on Moloka‘i (Lynch 1968) (Figure 16). Hawaiian Research, Ltd. began experimenting with seed corn on Moloka‘i in the winter of 1966; by autumn 1968, the company was growing over 900 strains of corn. Fertile soils, a year-long temperate albeit arid climate, a culturally diverse environment for his teenage children, and an “intellectual curiosity” attracted Waldorf to experimental agricultural farming on Moloka‘i (Lynch 1968:B-1).

The same State Department of Land and Natural Resources (DLNR), Water and Land Development Division irrigation project that supplied water to about 14,500 acres of pineapple

Figure 13. Community Center for Ho‘olehua Homesteads including, from left to right, a hall, school, church, and farm, ca. 1939 (Keesing 1936:124)

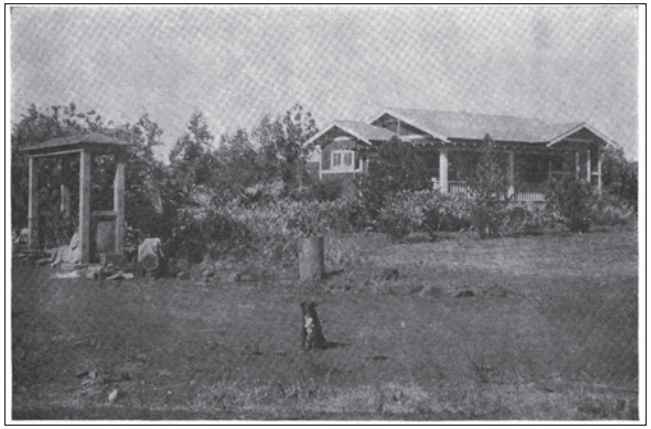
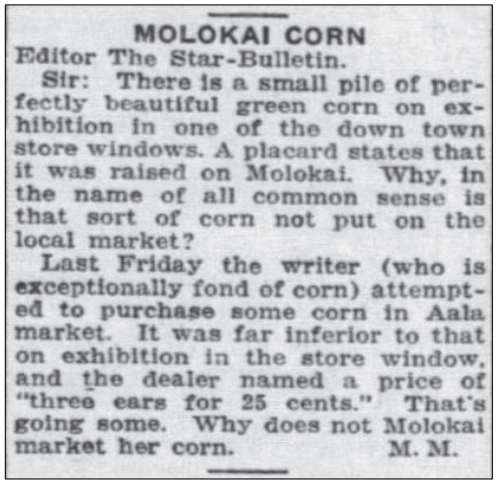


Figure 14. A Ho‘olehua homestead in 1939 (Keesing 1936:59)



MOLOKAI CORN

Editor The Star-Bulletin.

Sir: There is a small pile of perfectly beautiful green corn on exhibition in one of the down town store windows. A placard states that it was raised on Molokai. Why, in the name of all common sense is that sort of corn not put on the local market?

Last Friday the writer (who is exceptionally fond of corn) attempted to purchase some corn in Aala market. It was far inferior to that on exhibition in the store window, and the dealer named a price of "three ears for 25 cents." That's going some. Why does not Molokai market her corn. M. M.

Figure 15. Letter to the editor praising the quality of Moloka‘i corn in 1922 (*Honolulu Star-Bulletin* 1922:6)

Figure 16. Experimental corn farmer, Kaye Waldorf, in West Moloka‘i; pipeline (left) transported water to his crops (Roll 1968:B-1)

fields in West Moloka‘i was also used to irrigate the corn fields, which comprised a portion of 1,500 acres of diversified agricultural land that also included “experimental potato plantings and some Hawaiian Homestead truck farm lands” (Lynch 1968:B-1). In October 1968, the final stages were underway for a project involving 5 miles of tunnel and additional miles of pipeline to transport water from the wet, northeastern Waikolu Valley to crops in West Moloka‘i. In addition, a 1.4-billion-gallon earth reservoir was being constructed at a central location in Kualapu‘u to store any excess water collected during the rainy winter season in order to provide a year-round supply of water to arid West Moloka‘i’s crops. Kualapu‘u Reservoir is located approximately 6 km southeast of the current eastern project area. While the lack of a natural water supply certainly created obstacles, Waldorf preferred the more controlled distribution of water to his crops via a pipeline (see Figure 16) to the unpredictable rains he experienced as a corn farmer in Iowa.

4.6.6 Infrastructure

In conjunction with agricultural, residential, and economic changes, the twentieth century also brought infrastructure improvements to the island of Moloka‘i. On 13 May 1909, a telephone line was authorized for Moloka‘i Island (*Maui News* 1926). In 1925, construction began on a road connecting Kaunakakai to Ho‘olehua, which was used regularly during Moloka‘i’s pineapple era to transport loads for export. Access roads within the homesteads were established and have been maintained by the Hawaiian Homes Commission without charge to homesteaders or Maui County (Keesing 1936:49). Aerial photographs and topographic maps show unpaved roads in the general vicinity in the 1950s and 1960s (Figure 17 through Figure 20). It appears Pu‘u Kapele Avenue was extended west on the north side of TMK: (2) 5-2-026:016 between 1952 (Figure 18) and 1964 (Figure 19). The three lots presently addressed were something of an undeveloped island with significantly more development to the west, south, and east.

The 1950 and 1964 aerial photographs (see Figure 17 and Figure 19) show pineapple cultivation neighboring, but not within, the three lots.

In 1932, Molokai Electric Company was incorporated and established an electric generating station in Kaunakakai with one 200-horsepower diesel generator, which first supplied electricity to 59 customers in Kaunakakai Village that year (Young 1961). By the 1960s, the company serviced the entire island with nine generators channeling electricity through 80 miles of transmission lines (Young 1961).

Following the development of aerial combat in the First World War, the availability of war-surplus aircraft for civilian aviation in the Hawaiian Islands led to the establishment of a civilian airfield at Ho‘olehua in 1919 named Moloka‘i Field. In the 1930s, improvements were made at Moloka‘i Field including the construction of a terminal building for the use of Inter-Island Airways, the first commercial inter-island carrier. The segregation of part of the civilian airfield at Ho‘olehua for military use occurred when the U.S. Army Air Corps established a portion of the field as “Homestead Field,” beginning in September 1931 (Horvat 1966:38,40–47). By the time the United States entered World War II in 1941, aircraft of the Fifth Bombardment Group were stationed at Homestead Field. Heavy rains caused water and mud to flow into the operating area of the airport until a drainage ditch was completed in 1953. In 1954, the sod-on-sand runway was replaced by a paved runway and the airport terminal was built in 1957. Figure 17 shows the airport

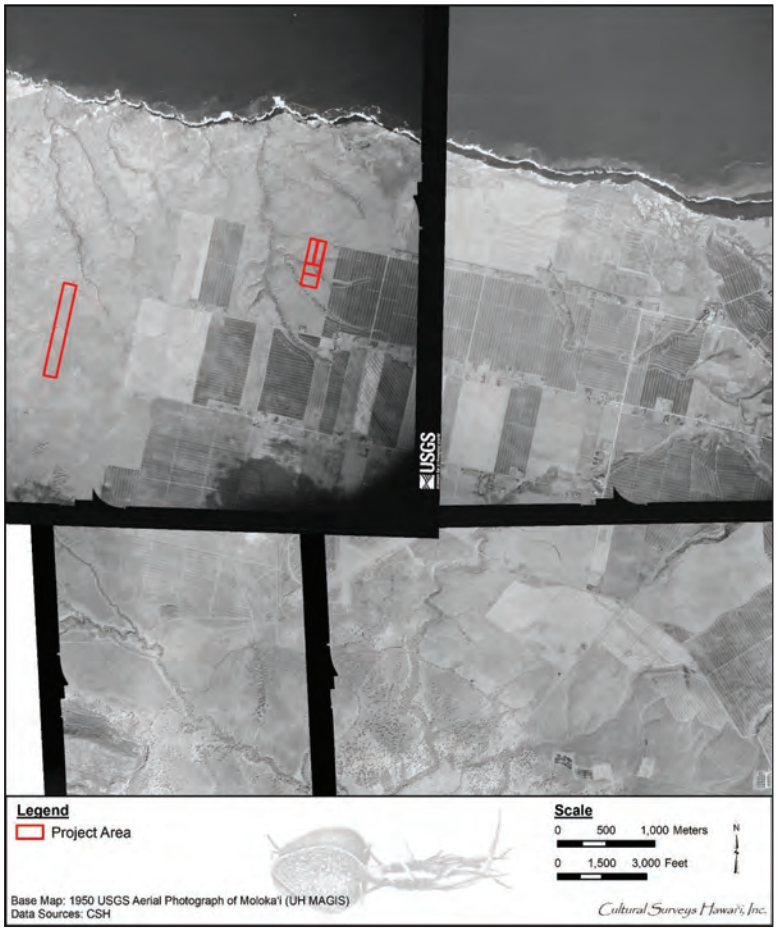


Figure 17. 1950 USGS aerial photograph of Moloka‘i (UH MAGIS) showing pineapple cultivation neighboring, but not within, the project areas

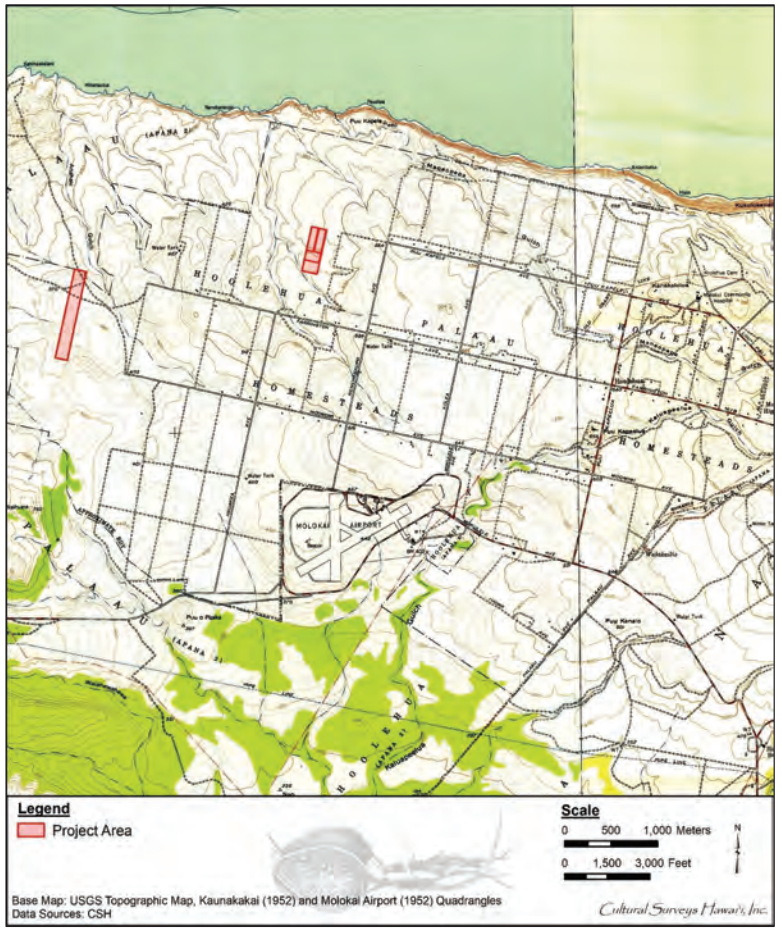


Figure 18. Portion of 1952 Kaunakakai and Molokai Airport USGS topographic quadrangles showing unpaved roads present surrounding, but not immediately adjacent, to the three lots presently addressed

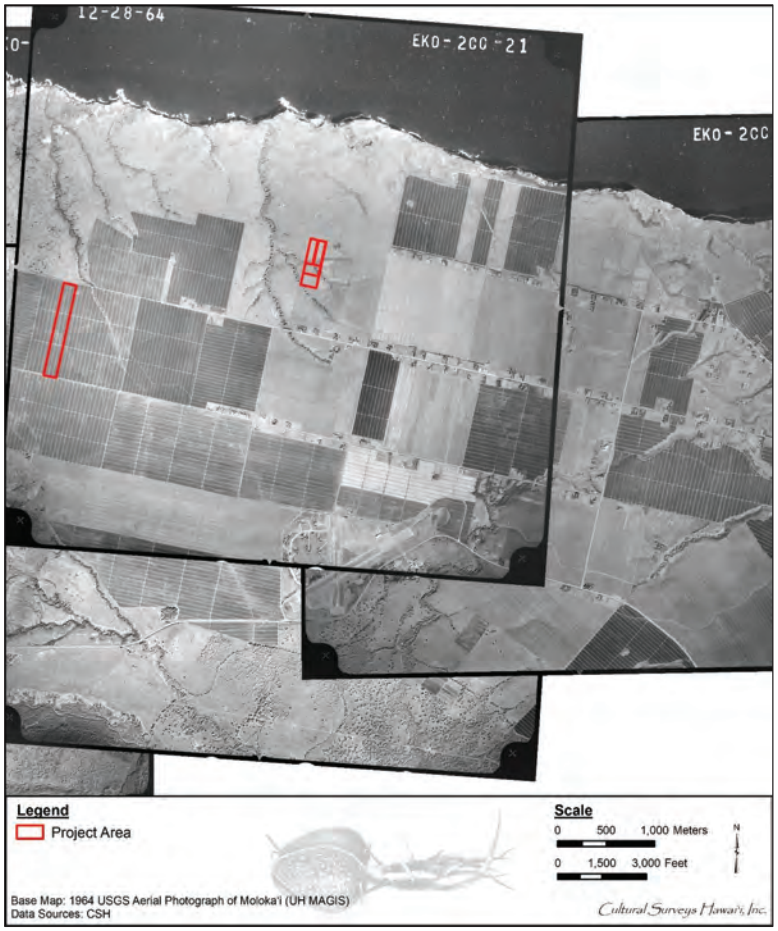


Figure 19. 1964 USGS aerial photograph of Moloka‘i showing pineapple cultivation neighboring, but not within, the three lots presently addressed (note the general absence of trees in the project area)

Figure 20. Portion of the 1967 Kaunakakai and 1968 Molokai Airport USGS topographic quadrangles showing unpaved roads in the general vicinity of the three lots presently addressed including Pu‘u Kapele Road on the north side of Lot TMK: (2) 5-2-026:016

during the 1950s prior to the construction of the terminal. Improvements to the airport continued from 1969 through 1993, including terminal expansions, perimeter security fence installation, a new FAA air traffic control tower, a fire protection system, and a maintenance base yard (State of Hawai‘i 2008).

A heliport associated with the United States Navy reservation, appears on a 1983 topographic map (Figure 21) and 1993 topographic map quadrangles (see Figure 1). However, this development does not appear in recent aerial imagery (see Figure 4).

4.7 Contemporary Land Use

Pineapple production on Moloka‘i phased out during the 1970s, with complete abandonment by the early 1980s. Tourism and service-related industries replaced commercial agriculture as the economic foundation of urban areas. The towns of Maunaloa and Kualapu‘u have continued to support sizeable populations, though Kaunakakai has remained the island’s major urban center.

The development history of large land holdings on the island of Moloka‘i includes Molokai Ranch Company lands, some

> 55,575 acres, or 35 percent of the entire island. This ranch includes 20 miles of coastline and two hotel properties, the former Molokai Lodge and the former Kaluakoi Hotel, two golf courses, residential, agricultural and conservation land, as well as nearly 30 acres of commercial land near Kaunakakai and 85 acres of industrial land at Maunaloa and Kualapuu. [Magin 2017]

The company that owned all these properties, Molokai Properties Limited, ceased all operations on the island in 2008 (Mangieri 2019). These holdings have been listed for sale since 2017. While community interests actively desire purchasing the lands for residents and/or the state, the fate of these lands, and consequently Moloka‘i in general, is still unknown.

DHHL proposes to construct infrastructure improvements including clearing, grading, and installation of roadway, electrical, connections to domestic water, and irrigation water utilities. The proposed plan calls for ground-disturbing activities to be confined to the two subject parcels but will extend to existing roadways for access and connection for utilities. These improvements will support DHHL beneficiaries through the provision of essential services necessary for agricultural homesteading. While installation of wastewater treatment systems will be the responsibility of the lessee, the environmental impacts are being considered as part of this action.

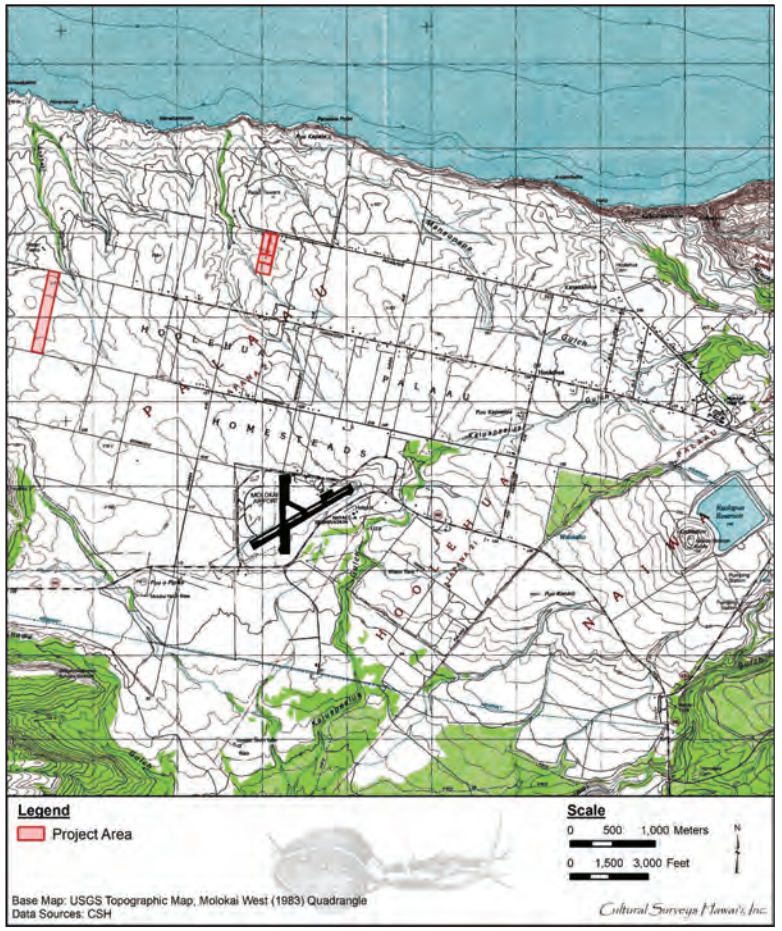


Figure 21. Portion of 1983 Molokai West USGS topographic quadrangle showing an aqueduct crossing the Ho‘olehua Plain to the south and the Kualapuu Reservoir well to the southeast of the three lots presently addressed

Section 5 Previous Archaeological Research

5.1 Overview

Previous archaeological studies conducted within approximately 3.0 km (1.9 miles) of the three lots presently addressed include archaeological reconnaissance, field inspections, inventory surveys, and monitoring programs (Figure 22 and Table 2). Fifteen archaeological studies were previously conducted within the project area vicinity, two of which included the project area (Pfennig et al. 2011; Shideler and Hammatt 2021). No historic properties have been previously identified within the three lots presently addressed, and few have been identified within the vicinity (Figure 23 and Table 3).

5.2 Previous Archaeological Studies within the Project Area (Pantaleo and Rotunno-Hazuka 2003; Pfennig et al. 2011; Shideler and Hammatt 2021)

Between September 2002 and February 2003, Archaeological Services Hawaii, LLC (ASH) conducted on-call archaeological monitoring and weekly site inspections for the Sandwich Isles Communications, Inc. (SIC) Moloka'i Rural Fiber Optics Duct Lines project, which connected DHHL properties to a modern, high-speed broad band telecommunications system (Pantaleo and Rotunno-Hazuka 2003). The study area was divided into six sections extending along state, DHHL, and county road rights-of-way from Ho'olehua uplands to coastal Kalama'ula. Sections 1 and 2 are in the current project area vicinity (see Figure 22) and it appears their project area extended along the north side of the eastern and western present project areas (although again the monitoring was only on-call with weekly spot-checks). No historic properties were encountered during the monitoring program; no additional archaeological work was recommended.

Pacific Legacy, Inc. (Pfennig et al. 2011) produced an archaeological literature review of 8,955 acres of DHHL Moloka'i lands including 8,055 acres at Ho'olehua Ahupua'a, including the three lots presently addressed. They discuss four sites discussed by Summers (1971): SIHP # 50-60-03-00011A, the caterpillar stones; SIHP # -00011B, the stone at Pu'u Kape'elua; SIHP # -00013, the Kahua Maika at a place called Akani; and SIHP # -00014, a *heiau* near the Ho'olehua Cemetery (Pfennig et al. 2011:73).

The authors note,

> […] archaeological sites appear more sparse on the Ho'olehua Plain, as the area lacks adequate rainfall to support the same population density as the southeast coastal region of Moloka'i. However, this vast plain contains several zones, particularly in the north and northeast, which boast a high concentration of religious sites and places associated with Traditional mythology. [Pfennig et al. 2011:81]

CSH (Shideler and Hammatt 2021) carried out an archaeological field inspection and literature review for a prior DHHL Ho'olehua Scattered Lots Subdivision project that included two widely separated lots (TMKs: [2] 5-2-005:031, Lot 17 and 5-2-026:014, Lot 104D-1). The TMK: (2) 5-2-026:014 parcel studied is in the immediate vicinity of the three lots presently addressed. No potential historic properties were identified at the more distant parcel (TMK: [2] 5-2-005:031). At

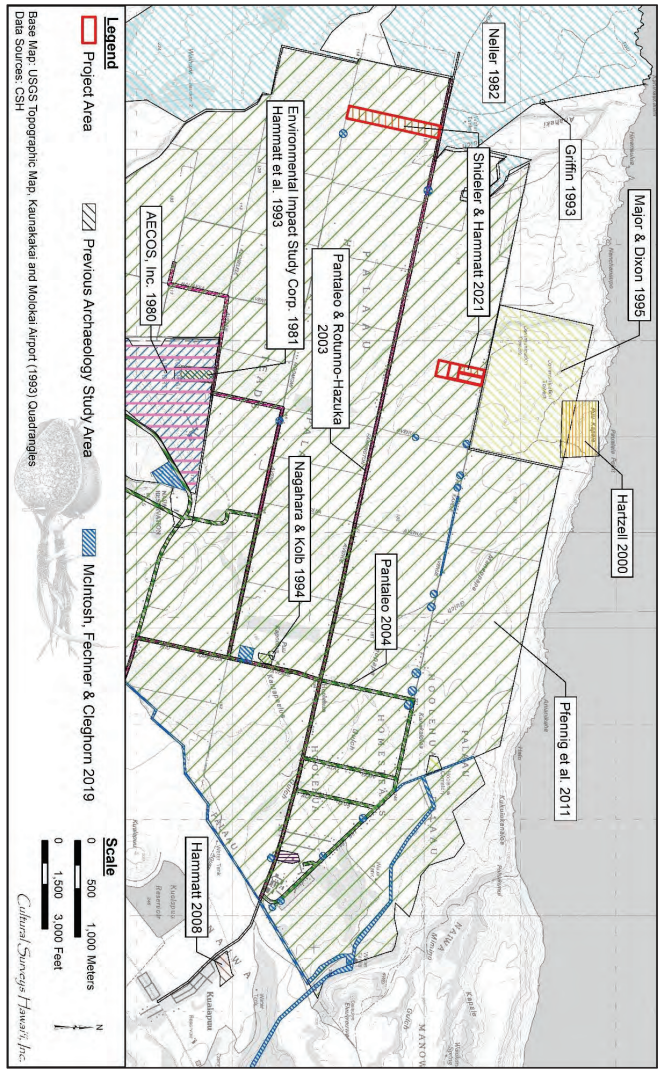


Figure 22. Previous archaeological studies in the vicinity of the three lots presently addressed depicted on a portion of the 1993 Kaunakakai and Molokai Airport USGS topographic quadrangles

Table 2. Previous archaeological studies conducted in the vicinity of the three lots presently addressed

Reference	Type of Study	Location	Results
Summers 1971	Site survey	Island-wide	Documented four sites in vicinity: 11A (SIHP # 50-60-03-00011A), Caterpillar Stones; Site 11B, Stone at Pu‘u Kape‘elua; Site 12, Lepekaheo Heiau; and Site 16, Heiau at Anahaki
AECOS Inc. 1980	Archaeological reconnaissance survey	Molokai Airport and proposed airport site near Mo‘omomi Beach	No historic properties identified in vicinity; however, complex of WWII-era (not historic at time of study) bunker sites identified near Molokai Airport, south of three lots presently addressed
Environmental Impact Study Corp. 1981	Biological and archaeological reconnaissance survey	90 acres by Cooke Land Co., Inc., TMK: (2) 5-2-011:007 por.	Failed to locate Summers Site 106 (petroglyphs) within their study area (likely buried or destroyed) but observed two remnant features that indicate possible agricultural use of seasonal stream flow in gulch
Neller 1982	Archaeological aerial reconnaissance	Ho‘olehua training Area, particularly north coastal Pālā‘au	Documented Summers Site 16 *heiau* at Anahaki and numerous stone walls and platforms near Kahinaokalani Point Neller associated with Summers Site 17
Griffin 1993	Archaeological reconnaissance	North/central Ho‘olehua uplands	Griffin notes, “sites consisting of enclosures, L-shapes, U-shapes on the low promontories along the coast, in addition to the shelter sites noted by Summers between sites 16 and 17”; main focus associated with anomalous growth of ti plants in area with a wall segment, and lithic scatter and featuring a boulder that showed evidence of human modification as a “basin”
Hammatt et al. 1993	Archaeological inventory survey	One parcel in Pālā‘au 2 adjacent to airport, and two parcels in Na‘iwa	No historic properties identified

Reference	Type of Study	Location	Results
Nagahara and Kolb 1994	Field inspection	Kape‘elua complex, Ho‘olehua-Pālā‘au Homesteads	Confirmed and GPS mapped Kape‘elua Complex, SIHP # 50-60-03-00011 (Summer Sites 11A and 11B)
Major and Dixon 1994	Archaeological inventory survey	364-acre (147.4-hectare) USAF Receiver Station near Ho‘olehua	Two previously unrecorded historic properties documented consisting of pre-Contact dwelling (SIHP # 50-60-02-01624) and another structure of unknown function (SIHP # 50-60-02-01623); SIHP # -01624 consisted of enclosure with marine shell deposits, fire-cracked rocks, and reworked basalt flake; SIHP # -01623 included two enclosures, each with minor amounts of marine shell and some modern refuse and 20th century rubbish dumps
Hartzell 2000	Archaeological inventory survey (supplemental)	USAF Molokai Receiver Station	Recorded 37 surface features for SIHP # 50-60-02-00843 (Pu‘ukaPele Rock Wall complex), consisting of 26 stacked-faced walls, five alignments, four enclosures, a depression, and a prominent, massive natural boulder; boundary or possibly religious function posited for 15 features with other features associated with water control/ diversion, habitation and a planting area
Pantaleo and Rotunno-Hazuka 2003	Archaeological monitoring	Ho‘olehua uplands to coastal Kalama‘ula	No historic properties identified (but monitoring on-call with spot-checks)
Pantaleo 2004	Archaeological monitoring	Ho‘olehua uplands	No historic properties identified
Hammatt 2008	Field inspection and literature review	DOE Molokai schools including Kualapu‘u Elementary School	No historic properties identified but monitoring program recommended

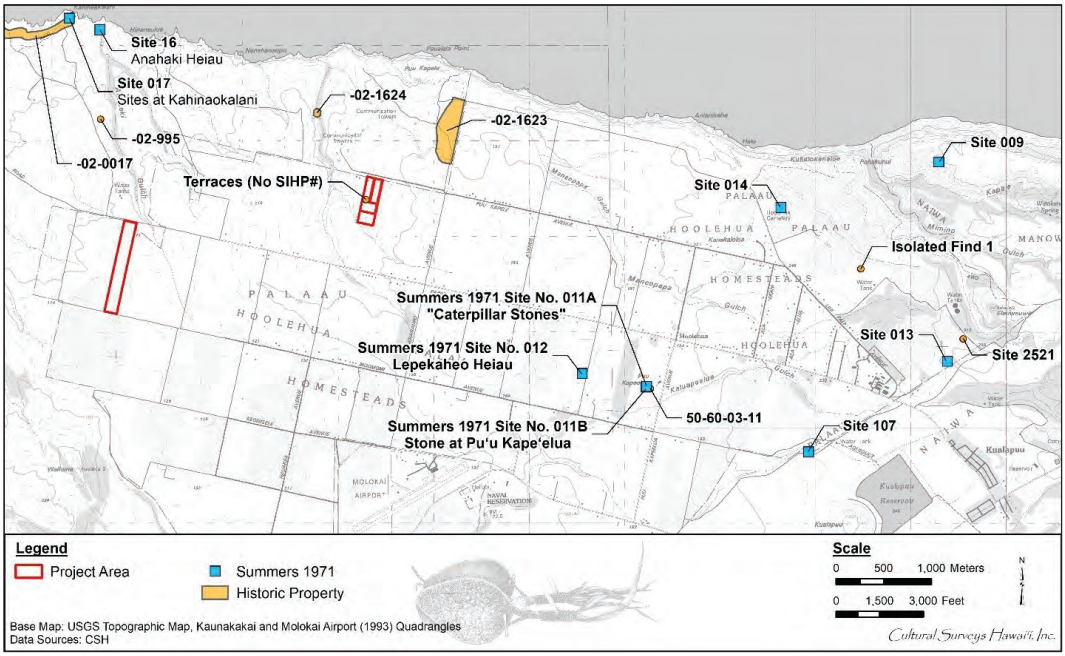


Figure 23. Previously identified historic properties in the vicinity of the three lots presently addressed depicted on a portion of the 1993 Kaunakakai and Molokai Airport USGS topographic quadrangles

Reference	Type of Study	Location	Results
Pfennig et al. 2011	Archaeological literature review	8,955 acres of DHHL Molokai lands including 8,055 acres at Ho'olehua Ahupua'a and present three-lot project area	Discusses four sites mentioned by Summers (1971): SIHP # 50-60-03-00011A, caterpillar stones; SIHP # -00011B, stone at Pu'u Kape'elua; SIHP # -00013, Kahua Maika at a place called Akani; and SIHP # -00014, *heiau* near Ho'olehua Cemetery
McIntosh et al. 2019	Archaeological inventory survey	DHHL lands, including in Ho'olehua	No historic properties identified in project area vicinity; of note identifications of SIHP # 50-60-03-02521, concrete tank stands associated with ranching and Isolated Find (IF)-01, an *'ulu maika* (game stone)
Shideler and Hammatt 2021	Archaeological literature review and field inspection	Two DHHL scattered lots including one adjacent to three lots presently addressed	No historic properties identified in more distant lot; in neighboring lot, two terrace alignments documented on south side of a natural drainage swale and interpreted as agricultural features to retain moisture; antiquity of these boulder alignments uncertain; and no SIHP # assigned

Table 3. Previously identified historic properties in the vicinity of the three lots presently addressed

SIHP #50-60-	Source	Site Type	Description
02-00995	Griffin 1993	Agricultural shrine	Notes “sites consisting of enclosures, L-shapes, U-shapes on the low promontories along the coast,” in addition to the shelter sites noted by Summers between sites 16 and 17 but her main focus was associated with an anomalous growth of ti plants and was described as including a wall segment, basalt flakes and a fragment of an adze blank and a rock with a flat surface, with a rectangular “basin” measuring about 8” x 14” pecked into it. She posits that “In addition to the practical purpose of the boulders for collecting rain water, it is possible that this site was an agricultural shrine for the worship of the god Lono.”
02-01623	Major and Dixon 1995	Two enclosures and dumps	SIHP # -01624, regarded as a pre-Contact dwelling consisted of an enclosure with marine shell deposits, fire-cracked rocks, and a re-worked basalt flake.
02-01624	Major and Dixon 1995	An enclosure and an artifact	SIHP # -01623, a site of unknown function, included two enclosures, each with minor amounts of marine shell and some modern refuse and 20th century rubbish dumps

SIHP #50-60-	Source	Site Type	Description
03-00011A	Summers 1971:37	“Caterpillar Stones,” Ho‘olehua 2	The stones are on top of the hill; Pu‘u Kape‘elua, “The Caterpillar Hill.” Cooke gave the following legend about these stones: “[…] this beautiful girl was visited each night by a lover who left before daylight. She was unable to discover who he was. This suspense told on her, and she began to waste away. A priest, consulted by her parents, advised the girl to attach a piece of white tapa to a wart on her lover’s back. In the morning, shreds of tapa helped to trace the demi-god lover to the hill Pu‘u Pe‘elua, in the middle or Ho‘olehua. The kahuna (priest) and friends of the family found a large *pe‘elua* (caterpillar) asleep on the hill. The kahuna ordered the people to collect wood which was placed around the sleeping *pe‘elua*, and a fire was lit. As the heat of the fire increased, the caterpillar burst into myriads of small caterpillars which were scattered over the plain. That accounts for the army-worm pest, called *pe‘elua*” (Cooke 1949:102). Akana (n.d.) told a legend similar to the one above and added, “Today, about January to the first of March, many caterpillars are seen around Pu‘u Pe‘elua.”

SIHP #50-60-	Source	Site Type	Description
03-00011B	Summers 1971:37	Stone at Pu‘u Kape‘elua Ho‘olehua 2	The stone is located just S of the Caterpillar Stones (Site 00011A) on Pu‘u Kape‘elua. When seen in 1959, this fairly flat stone measured 6 ft N to S, and 7 ft E to W. It stood about 22 in. high on the N and 18 in. high on the S. On the face of the stone was a hollowed-out basin, 21 in. E to W, 8.5 in. N to S, and 3 in. deep. Leading from the N side of the surface into either side of the basin were two grooves 1 in. wide and 2.5 in. deep. Two more grooves led from the S side of the basin to another basin located on a shelf 5 in. below the face, on the S side of the stone. This basin, which was 1.75 in. deep, measured 18 in. E to W and 6 in. N to S. Numerous sea shells were found in the vicinity of the site. G.P. Cooke (personal communication) said the stone was used for sharpening adzes. K.P. Emory was of the opinion that because this is an arid region, the stone may have been for collecting water.
03-02521	McIntosh et al. 2019	Ranching infrastructure	Concrete tank stands associated with ranching
Summers Site 9	Summers 1971:34–36	“Kipu Ruins, Kipu”	The site is located on a headland about 800 ft S of the cliffs and N of Kapale Gulch, at an elevation of 1000 ft. Several structures are distributed over an area about 500 ft long and 250 (Structures “A” through “I” are described)
Summers Site 12	Summers 1971:37	*Heiau* (Lepekaheo Heiau)	This site is located on the boundary of Ho‘olehua 2 and Pala‘au 2, W of Kaluape‘elua Gulch. Monsarrat referred to Lepekaheo as an “old heiau.”
Summers Site 13	Summers 1971:38	“Kahua Maika, Pala‘au 2” *(‘ulu maika* bowling course)	The *kahua maika* was situated on a rise at a place called Akani; Monsarrat referred to it as an “old *kahua maika*.”

SIHP #50-60-	Source	Site Type	Description
Summers Site 14	Summers 1971:38	“*Heiau,* Pala‘au 2”	“The site is located E of the Ho‘olehua Cemetery in the pineapple fields W of the gulch, at an elevation of 800 ft. Cartwright reported this (in 1922) as being a heiau. The structure was in ruins in 1957, however. Traces of paving could still be found, and the remains of a wall, 35 ft long NE to SE; 13 ft from the NE side was an upright stone 2 ft high, 2 ft wide, and l ft thick.”
Summers Site 16	Summers 1971:38	*Heiau* and house site	This *heiau* is located on the W side of the mouth of Anahaki Gulch at an elevation of about 50 ft above sea level. Cartwright (1922) reported the site as being a *heiau*. Originally the structure was an enclosure. The exterior measurements in 1964 were 43 ft N to Sand 36 ft E to W; the maximum height of the eastern wall was 5 ft. The northern wall was probably this same height originally, but the wall on the S was lower. Both the S and W walls were badly damaged. An inner division on the N side of the enclosure measured 17 ft E to W and extended the entire width of the structure. The southern portion of the enclosure was paved. On the crest of the hill to the S of the above site was a house site or shelter, which had a 5-ft-high wall running N to S; the rest of the site was open. Adjoining the northern portion of the wall on the E side was a small, paved terrace.
Summers Site 17 (02-0017)	Summers 1971:38	“Sites at Kahinaokalani, Pala‘au 2”	“Emory reported seeing two house sites and a *ko‘a* [fishing shrine] at Kahinaokalani; the *ko‘a* was at the edge of the cliff. Phelps described a structure, which he called a canoe *halau*, which was on a bluff about 30 ft above the sea”

SIHP #50-60-	Source	Site Type	Description
Summers Site 107	Summers 1971:80	“Holua slide at Kualapu‘u, Na‘iwa”	The slide was on the SSW side of Kualapu‘u hill, and traces of it can still be seen. No indications of paving could be found in 1966. Apparently it was similar to […] Site 3. On the S and W slopes of Kualapu‘u hill, there used to be many sweet potato patches, which were defined by rows of stones (Cooke 1949:121). According to Sophie J. Cooke (1964:58), the former name of Kualapu‘u was Ka ‘Uala Pu‘u, “The Sweet Potato Hill.” On some maps it is called “Mid Hill.”
Isolated Find (IF)-01	McIntosh et al. 2019	Bowling game stone	An *‘ulu maika*
No SIHP # assigned	Shideler and Hammatt 2021	Terraces	Two terrace alignments were documented on the south side of a natural drainage swale and were interpreted as agricultural features to retain moisture. The antiquity of these boulder alignments was uncertain and no SIHP # was assigned.

the neighboring parcel field inspection identified two terrace alignments on the south side of a natural drainage swale. These short sections of boulder alignments were interpreted as agricultural features to retain moisture, perhaps of an exploratory nature. The potential for subsurface deposits associated with these two terrace alignments was evaluated in the field to be very low. The antiquity of these boulder alignments was uncertain; it was posited they could be pre-Contact but might date to as late as the occupation of an adjacent abandoned house ca. 1980. No SIHP # was assigned.

5.3 Discussion of Historic Properties within the Project Area Vicinity

No historic properties have been identified by previous archaeological studies within the current project area. However, one historic property (no SIHP # assigned; two terrace alignments) was previously identified by Shideler and Hammatt (2021:77) within the southern portion of TMK: (2) 5-2-026:014, adjacent to the northern lots of the current project area. Shideler and Hammatt (2021) described the function of these two terrace alignments as retaining “[..] the slope on the south side of this small drainage swale and likely to retain moisture for plant propagation.” They further stated that these terraces were possibly “experimental in nature to assess the utility of possible further terracing prior to significant investment in labor” (Shideler and Hammatt 2021:77). It was located relatively far from the access road and likely location of any home development. They recommended preservation in the form of avoidance and protection of the two boulder alignments.

Historic properties previously identified in the vicinity are limited to a few sites recorded by Summers (1971) including the legendary Kape‘elua Complex (SIHP # 50-60-03-00011). There appears to have been a locus of traditional Hawaiian activity in Anahaki Gulch, 2.5 km west of the three lots presently addressed (see Figure 23) but this is suggested to relate to the micro-environment of that gulch and greater proximity to the coast.

Section 6 Previous Cultural Research

6.1 Overview

A review of previous cultural studies has been conducted for the project 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 Pālā'au and Ho'olehua, who live or had lived in the region or who, in the past, used the area for traditional and cultural purposes. Seven previous cultural studies were conducted in close proximity to the project area and are shown in Figure 24 and summarized below in Table 4.

6.2 Ka'uhane et al. 2009

CSH conducted a CIA for the Molokai Airport Aircraft Rescue and Firefighting Station Improvements (ARFF) project in Pālā'au Ahupua'a at Molokai Airport in 2009. Seventeen individuals/groups were contacted, and four individuals participated in an in-depth interview. No cultural practices were identified within the Molokai Airport ARFF project area. Concerns primarily focused on how this project could encourage future development or expansion of the Molokai Airport.

6.3 Notman 2012

Steve Notman conducted a CIA for a private hanger project at Molokai Airport in 2012. Twelve community members were contacted for this project and only three participated in a more in-depth interview. There were no cultural practices or resources identified within the project area, as it is an operating airport. However, one *kupuna* did state that:

> Pala'au Molokai has significant historical and cultural importance. Anciently it was a training site used by Kamehameha to train his warriors prior to his battle at Nu'uana O'ahu. Many cultural as well as spiritual activities were practiced anciently however no known cultural activities and or rites are practiced at this time. [Notman 2012]

6.4 McElroy et al. 2015

Keala Pono Archaeological Consulting, LLC conducted a CIA for the Kanakaloloa Cemtery in Pālā'au and Ho'olehua Ahupua'a in 2015. Four interviews were conducted for this project. Cultural practices in the area consisted of fishing and gathering *'opihi* (limpet) at the coast, hunting in the region, and *mo'olelo*. According to McElroy et al. (2015:46), "One story attributes the name Kanakaloloa to a thief who stole a special shell and was later caught and stretched his body in an attempt to escape. The cemetery is also associated with menehune and lapu." Concerns largely focused on security issues. Recommendations included allowing the community an opportunity to partake in the design of the pavilion and parking areas as well as allowing access to the graves.

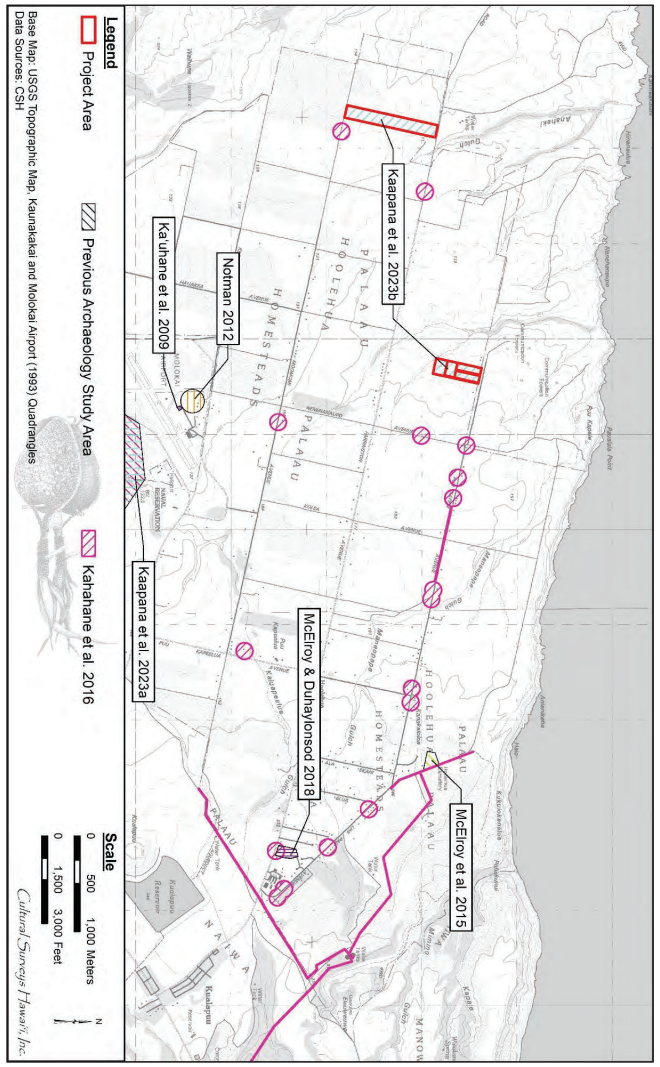


Figure 24. Previous cultural studies within the project area vicinity

Table 4. Summary of the previous cultural studies within the project area vicinity

Reference	Location	Community Participants	Traditional Cultural Practices Identified
Ka‘uhane et al. 2009	Molokai Airport	Halona Ka‘opuiki, James Keli‘ipio Kahea Mawae, Vanda Hanakahi, ‘Ōpu‘ulani Albino	N/A
Notman 2012	Molokai Airport	3	Ancient training site
McElroy et al. 2015	Kanakaloloa Cemetery; TMK: (2) 5-2-017:003	Geri Adolpho, Alex Bishaw, Nani Kawa‘a, and Mikiala Pescaia	Gathering *‘opihi* and fishing; hunting; *mo‘olelo*
Kahahane et al. 2016	Pālā‘au, Ho‘olehua, Nā‘iwa, Kahanui, and Kalama‘ula Ahupua‘a	N/A	Based on previous CIAs: gathering practices, marine resources, and plant resources
McElroy and Duhaylonsod 2018	Veteran’s and Resident’s Community Center; TMK: (2) 5-2-015:053; Ho‘olehua Ahupua‘a	Mikiala Pescaia, Pilipo Solatorio, Henry Tancayo Sr., and Pat Tancayo	N/A
Kaapana et al. 2023a	Nā‘iwa subdivision portion of Hawaiian Ho‘olehua-Pālā‘au Homesteads; TMKs: (2) 5-2-003:001, 5-3-004:001, 002, 004, 007, and 046	Louella ‘Ōpu‘ulani Albino, Kilia Purdy-Avelino and Justin Avelino, and Malia Lani Forbes Greaney	Agricultural and farming practices, marine resources, *mo‘olelo* and *wahi pana,* religious activities, and burial practices
Kaapana et al. 2023b	Ho‘olehua-Palā‘au Hawaiian Homesteads	Kilia Purdy-Avelino and Malia Lani Forbes Greaney	Agricultural and gathering practices, marine resources, *mo‘olelo* and *wahi pana,* healing practices, religious activities, and burial practices

6.5 Kahahane et al. 2016

Pacific Legacy, Inc. conducted a CIA for the proposed DHHL Water System Improvements project in the *ahupua‘a* of Pālā‘au, Ho‘olehua, Nā‘iwa, Kahanui, and Kalama‘ula in January 2016. No interviews were conducted for this project, however, previous CIAs have revealed that fishing, the gathering of ocean resources, hunting, raising animals, gardening, as well as forest and stream gathering occur within the vicinity of this study’s project area. It was recommended, based on various *mo‘olelo*, that any major event or construction-related activity be preceded with a traditional Hawaiian blessing ceremony by a *kahuna* (priest or priestess) or *kahu pule* (minister/preacher) (Kahahane et al. 2016:46).

6.6 McElroy and Duhaylonsod 2018

In 2018, Keala Pono Archaeological Consulting conducted a CIA for the proposed Veteran’s and Resident’s Center in Ho‘olehua Ahupua‘a. Four individuals participated in an interview for this project and it was concluded there were no traditional cultural practices in the project area. However, there is the possibility of archaeological or cultural sites if the project area is undisturbed. Concerns and recommendations focused on how this project would benefit the community. This included scoping out more community members, gaining a better understanding of the *‘āina* (land), constructing the building so that it doubles as a hurricane or bomb shelter, and keeping open areas for outdoor activities.

6.7 Kaapana et al. 2023a

This current study is intended as a companion report to the CIA done by Kaapana et al. (2023a) in September 2023. CSH reached out to 20 individuals or groups and only three individuals, Mrs. Kilia Purdy-Avelino and her husband Mr. Justin Avelino as well as Ms. Malia Lani Forbes Greany, participated in an in-depth interview. Cultural practices and resources identified include agricultural and gathering practices, marine resources, *mo‘olelo* and *wahi pana,* recreational activities, healing practices, religious activities, and burial practices. Community participants were concerned with impacts to cultural and archaeological sites. In-depth archaeological inventory surveys (AIS), having an on-site cultural monitor, and full disclosure of information about the project for the community was recommended.

Mrs. Purdy-Avelino and Mr. Avelino have mentioned growing various fruits and vegetables such as *‘ulu*, *kalo,* papaya, *mai‘a*, mango, and macadamia nut trees for sustenance purposes. Mrs. Purdy-Avelino’s grandmother also grew various floral plants such as *‘ākulikuli*, *‘awapuhi*, *kīkā*, *kīkānia*, and *kupaloka* which are used to make *lei*. On their homestead today, Mrs. Purdy-Avelino’s father also grows gardenia, orchids, bird-of-paradise, and anthuriums. During her childhood, her father also took her down *makai* of Nā‘iwa to pick up *‘uala* from an *‘ohana* who lived in the area.

Mrs. Purdy-Avelino shared a *mo‘olelo* about how the land of Nā‘iwa received its name. According to Mrs. Purdy-Avelino,

> […] a mother from Kalaupapa, who was a very skilled *lei* maker, made a *lei* out of the *‘iwa‘iwa* fern for her son who wanted to compete in a *lei* making competition that was held at the Makahiki festival and to impress a *wahine* that he admired. The son gave this *lei* to the *wahine*. She would wear it wherever she went and the spores

> from the *‘iwa‘iwa* ferns in the *lei* would fall and scatter across the land. [Kaapana et al. 2023a:91]

Mr. Avelino shared a *mo‘olelo* about how the Makahiki Grounds were selected. According to Mr. Avelino,

> […] a chief of Moloka‘i looked towards the mountains of Nā‘iwa and noticed a cloud shaped like a finger which was pointing to a piece of land. A council of chiefs gathered and decided that the Makahiki ceremonies would be held in that area. To this day, Makahiki ceremony and activities continue to take place there and items such as *ulu maika* have been encountered in this area. [Kaapana et al. 2023a:91]

Ms. Greaney mentioned that Ho‘olehua homesteaders are successfully growing dryland *kalo, ‘uala* (sweet potato; *Ipomoea batatas*), and *‘awa* (kava; *Piper methysticum*). She noted that as recently as 150 years ago, Moloka‘i was known for large quantities of agricultural and value-added exports such as *kalo* grown in *lo‘i* and dry land *māla* (gardens) along with *‘uala* and other food sources. *Hau* (pandanus; *Hibiscus tiliaceus*) was another plant resource mentioned that was utilized for a variety of purposes. For agricultural purposes, it was used to provide a windbreak and reduce erosion. For medicinal purposes, it is used for *lā‘au lapa‘au* (plant-based medicine) and tools for *lomilomi* (body manipulation). Another purpose is for tool production such as *ko‘i* (adze) for hand carving *papa he‘e nalu* (surfboards) and to make spears for *lua* (a type of dangerous hand-to-hand fighting).

She also mentioned that on her homestead she “continues to identify medicinal plants in the area which can be gathered or cultivated. Her mother, Yola Forbes, also grew food and medicinal trees on their homestead” (Kaapana et al. 2023a:67). In her interview she mentioned that she would use *lā‘au lapa‘au*, *lomilomi,* and *ho‘oponopono* (Hawaiian conflict resolution) as traditional healing methods.

According to Ms. Greaney, an ancient *hula* site is located in the Nā‘iwa Makahiki grounds. She further explained that “*Hula* is celebrated in Ka Hula Piko, and Lua, for defense is sometimes referred to as a twin or sibling of dance. Ms. Greaney noted that neither practice was restricted to one gender and both perpetuate Hawaiian philosophies of spiritual and physical existence” (Kaapana et al. 2023a:69). A *mo‘olelo* metioned by Ms. Greaney discusses a “*puna* (fresh water spring) once located behind the house of a third-generation homesteader on very dry Olo‘olo Lane” (Kaapana et al. 2023a:67).

6.8 Kaapana et al. 2023b

CSH conducted a CIA and Ka Pa‘akai Analysis for the proposed Nā‘iwa Agricultural Subdivision located at the Nā‘iwa subdivision portion of the Hawaiian Ho‘olehua-Pālā‘au Homesteads in November 2023. Twenty individuals/groups were contacted for this project and three did an in-depth interview. There are no valued cultural practices or resources within the proposed Nā‘iwa Agricultural Subdivision project area, however, ongoing agricultural practices for sustenance, gathering practices for *lei* making and medicinal purposes, cultural sites, *mo‘olelo* and *wahi pana,* and religious/burial practices occur within the vicinity of the current project area. Concerns were largely focused on the possibility of coming across *‘ilina* (burials) and cultural sites as well as full disclosure of past land use and project details. Ms. Albino recommended cultural protocols be in place throughout the entire process of development.

As information from the previous CIA study (Kaapana et al. 2023a) were included in this study, the only difference would be information from Ms. Albino. A cultural practice that occurred in Nā‘iwa Ahupua‘a included the traditional agricultural practice of harvesting and planting crops based on the different phases of the Hawaiian moon cycle. Ms. Albino stated that “Usually after planting their harvest, many of the farmers would head *makai*, toward the sea to Mo‘omomi to fish and relax while they waited for their produce to grow” (Kaapana et al. 2023b:72).

There were also many *mo‘olelo* shared by Ms. Albino in relation to Ho‘olehua. Within the vicinity of Ho‘olehua, there are several stories of *pōhaku* (stone) and people experiencing the effects of *‘uhane* (spirit). According to Kaapana et al. (2023b):

> Ms. Albino also noted that ‘Ho‘olehua was also the wife of ‘Iloli of Moloka‘i.’ Ho‘olehua and ‘Iloli were ali‘i of Moloka‘i. Their daughter, Hikauhi, married Pāka‘a and they had a son, Kuāpāka‘a. Pāka‘a and Kuāpāka‘a are descendants of the wind goddess La‘amaomao.
>
> Ms. Ablino shared another mo‘olelo regarding the meaning of Ho‘olehua in which two armies would meet in battle. Instead of the entire army engaging in war, each side would select their best warrior (their lehua) to represent their army and then engage in battle. [Kaapana et al. 2023b:72]

Section 7 Community Consultation

7.1 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, in order to identify individuals with cultural expertise and/or knowledge of the *ahupua‘a* of Pālā‘au and Ho‘olehua. CSH initiated its outreach effort in March 2024 through letters, emails, and/or telephone calls. CSH completed community consultation in June 2024. CSH reached out to 36 individuals/ organizations and six responded, two of which were interested in participating.

7.2 Community Outreach Letter

Letters along with maps and aerial photographs (Appendix A) of the area were sent with the following text:

Aloha mai kāua,

With this letter, Cultural Surveys Hawai‘i (CSH) humbly requests your *mana‘o* and *‘ike* (experience, insights, and perspectives) regarding historical and ongoing cultural practices, and resources within the Pālā‘au and Ho‘olehua Ahupua‘a.

Consultation with traditional cultural practitioners, *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.

At the request of Munekiyo Hiraga, and on behalf of the Department of Hawaiian Home Lands (DHHL), CSH is conducting a cultural impact assessment (CIA) for the proposed DHHL Ho‘olehua Scattered Lots Expanded Project Area Project, Pālā‘au and Ho‘olehua Ahupua‘a, Moloka‘i District, Moloka‘i Island, including three parcels, TMK: (2) 5-2-026:003 (4.72 acres or 1.91 hectares), TMK: (2) 5-2-026:016 (4.73 acres or 1.91 hectares), and TMK: (2) 5-2-026:017 (5.83 acres or 2.36 hectares). These three scattered subdivision project area parcels are within the DHHL Ho‘olehua-Pālā‘au Homesteads, and located within the north portion of the Ho‘olehua plain of central Moloka‘i, approximately 2.2 km northwest from Moloka‘i (Ho‘olehua) Airport. The contiguous parcels are bounded on the north by Pu‘ukapele Avenue and on the other sides by other DHHL parcels. The project area is depicted on a portion of the 1993 Molokai Airport and Kaunakakai U.S. Geological Survey (USGS) 7.5-minute topographic quadrangles (Figure 1) and on the 2013 ESRI satellite photograph (Figure 2).

The Project entails subdividing five (5) lots on DHHL-owned lands in the Ho‘olehua area into twelve (12) lots to be designated for subsistence agriculture use and improving them for lease to DHHL beneficiaries. The five (5) lots are hereafter referred to as “subject properties”. Two of these five lots TMKs: (2) 5-2-

005:031, Lot 17 and (2) 5-2-026:014, Lot 104D-1 were the subject of a prior CIA done by Tanaka and Hammatt in September 2023. This current study is intended as a companion report to the CIA done by Tanaka and Hammatt (2023).

Improvements to be undertaken include creating access driveways to each of the newly created lots with connections for domestic water and irrigation water for each lot provided within the access driveways from existing systems in the neighboring roadways. The lots will be made available to DHHL beneficiaries currently on the waitlist for an agricultural lease on Moloka‘i. Once awarded, lessees will be able to construct homes on the lots, in addition to utilizing the lots for agricultural purposes. Additionally, it is noted that there is an existing abandoned home on Parcel 14 that records indicate was constructed in the 1970’s as well as a greenhouse on Parcel 16 that was constructed in the early 2000’s. Both the abandoned home on Parcel 14 and the greenhouse on Parcel 16 will be demolished as part of the proposed project. It is further noted that there is a third structure, a home that records indicate was built in the early 2000‘s, that is located on a portion of Parcel 16 and a portion of Parcel 3. The proposed subdivision action will revise the lot lines so the existing home is located in one (1) TMK. The home will be reviewed for future lease as part of the lot it is located on.

Purpose of the CIA

The purpose of a CIA is to gather information on Hawai‘i’s cultural resources, practices, or beliefs that have occurred or still occur within the proposed project area and the Pālā‘au and Ho‘olehua 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 to the specific identified resources, practices, and beliefs in the project area and throughout the Pālā‘au and Ho‘olehua Ahupua‘a. As a traditional cultural practitioner and holder of long-term 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 project 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 project area and Pālā‘au and Ho‘olehua Ahupua‘a
- Your specific traditional cultural practice and its connection to the proposed project area and Pālā‘au and Ho‘olehua 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 project area and Pālā‘au and Ho‘olehua Ahupua‘a

- Referrals to other *kūpuna*, *kama‘āīna*, and traditional cultural practitioners knowledgeable about the proposed project area and Pālā‘au and Ho‘olehua 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 project area and Pālā‘au and Ho‘olehua Ahupua‘a
- Your knowledge of cultural sites and *wahi pana* (storied places) within the proposed project area and Pālā‘au and Ho‘olehua Ahupua‘a
- Your comments or thoughts on the potential impacts the proposed project may have on cultural sites and *wahi pana* within the proposed project area and Pālā‘au and Ho‘olehua Ahupua‘a

Consultation Information

Consultation is an important and deeply valued part of the CIA and environmental review process. 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.

With your agreement to participate in this study, your contributions will become part of the comprehensive understanding of traditions of the area and will be part of the public record. The study will be included as an appendix of the Environmental Assessment (EA), which is being prepared for the proposed project; the EA and CIA will be available for future access through the State Office of Planning and Sustainable Development (OPSD) Environmental Review Program (ERP) (https://planning.hawaii.gov/erp) and at the State Historic Preservation Division Library (https://dlnr.hawaii.gov/shpd/about/research-resources-library).

As a part of this process, your knowledge may be used to inform future CIAs and other heritage studies of cultural practices and resources that need protection from impacts of proposed future projects. If you engage in consultation, and the *mana‘o* and *‘ike* you provide appears 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 effect of the project on traditional practices in the project area and Pālā‘au 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.

7.3 Community Outreach Table

Cultural consultation outreach was initiated in November 2023. In most cases, two or three attempts were made to contact individuals, organizations, and agencies. Community outreach letters were sent to 36 individuals or groups. The results of the community consultation process are presented in Table 5.

Table 5. Summary of community consultation efforts

Name	Affiliation	Notes
	‘Āina Momona	Letter and figures sent via email on 4 March 2024 Second round letter and figures sent via email on 8 April 2024 ‘Āina Momona responded on 9 April 2024 with contact info for Mr. Kahekili Pā-Kalā and Mr. Kamaki Ritte-Managan. They also recommended contacting Walter Ritte. CSH responded same day thanking them for the contact info and recommendation.
Ainoa, Vivian L.	President, Kamiloloa One Ali‘i Homestead Association	Letter and figures sent via email on 4 March 2024 Second round letter and figures sent via email on 8 April 2024
Akutagawa, Malia	Hui ‘Aina Momona; *kama‘āina*	Letter and figures sent via email on 4 March 2024 *On sabbatical until June 2024* Second round letter and figures sent via email on 8 April 2024
Alapa, Luana	OHA Moloka‘i-Lāna‘i Trustee	Letter and figures sent via email on 4 March 2024 Second round letter and figures sent via email on 8 April 2024
Albino, ‘Ōpu‘ulani (Louella)	*Kama‘āina*	Letter and figures sent via email on 4 March 2024 with previous interview summary Second round letter and figures sent via email on 8 April 2024 with previous interview summary
Brown, Samson	President, Au Puni O Hawaii	Letter and figures sent via email on 4 March 2024 Second round letter and figures sent via email on 8 April 2024
Buchanan, Lori L.	Coordinator of the Molokai/Maui Invasive Species Committee	Letter and figures sent via email on 4 March 2024 Ms. Buchanan responded on 11 March 2024 stating that she wants to participate in consultation for this project. CSH responded same day requesting availability for an interview CSH sent a follow-up email on 8 April 2024 Ms. Buchanan responded on 9 April 2024 requesting project proposal to review

Name	Affiliation	Notes
		CSH responded same day with project proposal attached CSH sent a follow-up email on 3 June 2024
Busby-Neff, Luana	Hawaiian Force – Hawaiian Clothing Company	Letter and figures sent via email on 4 March 2024 Second round letter and figures sent via email on 8 April 2024
Cook, Tiani	Executive Director, Ka Honua Momona	Letter and figures forwarded by Tate Keli‘iho‘omalu from Maui Nui Makai Network on 5 March 2024 Second round letter and figures sent via email on 8 April 2024
Corpuz, Iolana	*Kama‘āina*	Letter and figures sent via email on 4 March 2024 Second round letter and figures sent via email on 8 April 2024 Second round letter and figures sent via USPS on 10 April 2024
Evans, Chelsie	Executive Director, Hawaiian Community Assets, Inc.	Letter and figures sent via email on 4 March 2024 Letter and figures sent via USPS on 6 March 2024 Second round letter and figures sent via email on 8 April 2024
Feiteira, Blossom	President, Association of Hawaiians for Homestead Lands	Letter and figures sent via email on 4 March 2024 Second round letter and figures sent via email on 8 April 2024
Ferreira, Kamakana	Compliance Lead, OHA – Compliance & Enforcement Unit	Letter and figures sent via email on 4 March 2024 Second round letter and figures sent via email on 8 April 2024
Gaspar, Doreen Pinky	Former President, Ahupua‘a o Moloka‘i	Letter and figures sent via email on 4 March 2024 Second round letter and figures sent via email on 8 April 2024
Greaney, Malia	*Kama‘āina*	Letter and figures sent via email on 4 March 2024 with previous interview summary Second round letter and figures sent via email on 8 April 2024 with previous interview summary
	Ho‘olehua Homesteaders Association	Letter and figures sent via email on 4 March 2024 Letter and figures sent via USPS 6 March 2024 Second round letter and figures sent via USPS on 10 April 2024
Keli‘ipa‘akaua, J. Kepo‘o	‘Ohana Keaweamahi	Letter and figures sent via email on 4 March 2024 Second round letter and figures sent via email on 8 April 2024
Kupu A‘e	Native Hawaiian-owned business	Letter and figures sent via email on 4 March 2024 Second round letter and figures sent via email on 8 April 2024

Name	Affiliation	Notes
		Second round letter and figures sent via USPS on 10 April 2024
Lauifi, Shaye	Executive Assistant, Ka Honua Momona	Letter and figures forwarded by Tate Keli‘iho‘omalu from Maui Nui Makai Network on 5 March 2024 Second round letter and figures sent via email on 8 April 2024
Lee, Wayde	Aha Moku Moloka‘i Pule ‘O‘o, Pālā‘au/Ko‘olau Rep	Letter and figures sent via email on 4 March 2024 Second round letter and figures sent via USPS on 10 April 2024
Lima, Pulama	Executive Director, Ka Ipu Makani	Letter and figures sent via email on 4 March 2024 Second round letter and figures sent via email on 8 April 2024
	Molokai Land Trust	Letter and figures sent via email on 4 March 2024 Second round letter and figures sent via email on 8 April 2024
Nakahashi, Ikaika	Cultural Historian for Maui, Lana‘i, Moloka‘i, Kaho‘olawe, and Hawai‘i	Letter and figures sent via email on 4 March 2024 Mr. Nakahashi responded on 8 March 2014: *Aloha Tehani,* *Mahalo for contacting me regarding the Cultural Impact Assessment for the DHHL Ho‘olehua Scattered Lots Expanded Project Area Project, Pālā‘au and Ho‘olehua Ahupua‘a, Moloka‘i.* *I recommend CSH to utilize the media (e.x. OHA’s Ka Wai Ola, etc.) to solicit additional information for this CIA.* *I recommend CSH minimally to meet with any native tenants and people that currently live or previously lived in the ahupua‘a listed above on Moloka‘i for information about the cultural resources and cultural practices for this CIA.* • *Walter Ritte* • *Malia Akutagawa* *Koe nae ke kuleana o na kanaka ma loko = reserving the rights of native tenants.* *Please let me know if I can assist with anything else.* *A hui hou* CSH responded on 10 March 2024 thanking Mr. Nakahashi for the recommendations
Nekaifes, Maraea	Nekaifes Ohana	Letter and figures sent via USPS on 6 March 2024

Name	Affiliation	Notes
		Second round letter and figures sent via USPS on 10 April 2024
Norman, Carolyn Keala	‘Ohana Keaweamahi	Letter and figures sent via email on 4 March 2024 Second round letter and figures sent via email on 8 April 2024
Opunui, Landon	Executive Director and Medical Director, Nā Pu‘uwai	Letter and figures sent via email on 4 March 2024 Second round letter and figures sent via email on 8 April 2024
Pā-Kalā, Kahekili	Kia‘i Loko I‘a - ‘Āina Momona	Letter and figures forwarded by ‘Āina Momona on 9 April 2024
Phillips, Kealana	Burial Sites Specialist for Maui, Moloka‘i, and Lana‘i	Letter and figures sent via email on 4 March 2024 Mr. Phillips responded on 6 March 2024 and forwarded the letter and figures to members of the Moloka‘i Buiral Council CSH responded on 7 March 2024 thanking Mr. Phillips
Poepoe, Kamalu	Aha Moku Moloka‘i Pule ‘O‘o	Letter and figures sent via email on 4 March 2024 Letter and figures sent via USPS 6 March 2024 Second round letter and figures sent via email on 8 April 2024 Second round letter and figures sent via USPS on 10 April 2024
Poepoe, Kelson “Mac”	Director and Resource Manager, Hui Mālama O Mo‘omomi; Subsistence fisherman; *Kama‘āina*	Letter and figures sent via email on 4 March 2024 Tate Keli‘iho‘omalu, Coordinator for Maui Nui Makai Network, responded on 5 March 2024 and forwarded the letter and figures to Uncle Mac, Tiani Cook, and Shaye Lauifi. CSH responded same day thanking Tate for the recommendations Second round letter and figures sent via email on 8 April 2024 Second round letter and figures sent via USPS on 10 April 2024
Poepoe, Mahina M.	Board President, Kupeke Ahupua‘a	Letter and figures sent via email on 4 March 2024 Second round letter and figures sent via email on 8 April 2024
Purdy, Kammy	President, Ahupua‘a o Moloka‘i	Letter and figures sent via email on 4 March 2024 Second round letter and figures sent via email on 8 April 2024
Purdy-Avelino, Kilia	*Kama‘āina*, daughter of Aunty Kammy	Letter and figures sent via email on 4 March 2024 Second round letter and figures sent via email on 8 April 2024 with previous interview summary Mrs. Purdy-Avelino responded on 21 April 2024: *Aloha e Tehani,*

Name	Affiliation	Notes
		I am so sorry for my delayed response. There has been a whirlwind of kuleana and I finally had a chance to read over your email and my our previous consultation. I don't know how I missed it the last time - probably busy as usual and just skimmed over it - but, there is a discrepancy in one of the ancient mo‘olelo that I am quoted on, the story of Na‘iwa about the boy. He was not entering a lei competition, he was entering the Makahiki events. There is a huge difference there, but apparently, I missed correcting it the first time. His mom was a skilled lei maker and so, made him a lei po‘o made of iwaiwa fern and left it in his puolo without him knowing. This is the lei he then gives to a girl at the event to wear and while she does, the spores from the iwaiwa fern falls about causing more of the fern to sprout in the area - hence the name Naiwa. This is one of the mo‘olelo of this place. *If you can change that portion, yes, you may use what we shared.* *Mahalo nui for asking and again, I'm sorry for the delay.* *ke aloha nui* CSH responded on 22 April 2024 thanking Mrs. Pudy-Avelino for allowing us to use her previous interview summary. CSH inquired about her concerns and recommendations for the current project. Mrs. Purdy-Avelino responded same day: *Aloha e Tehani,* *When is this due? As I re-read and things have taken place since, there are a few things I'd like to revise. We are at the DHHL commission meeting today, in which there is a decrease in the area we requested, though, we are still satisfied with the decision. But, with that, there are some things I need to amend.*

Name	Affiliation	Notes
		Please let me know your deadline. CSH responded same day with the deadline and stated that CSH will follow-up towards the end of May. CSH sent a follow-up email on 3 June 2024 CSH sent another follow-up email on 27 June 2024
Ritte, Walter	*Kama‘āina*, *Kupuna*, Advocate	Letter and figures sent via email on 4 March 2024 Second round letter and figures sent via email on 8 April 2024 with previous interview summary
Ritte-Managan, Kamaki	*Kama‘āina*	Letter and figures forwarded by ‘Āina Momona on 9 April 2024
Soares, Niles	Central Moloka‘i Representative, Moloka‘i Island Burial Council	Mr. Phillips forwarded letter and figures on 6 March 2024

7.4 Community Outreach Results

Community outreach letters were sent to 36 individuals or groups and six responded. Of the six that responded, two individuals expressed interest in participating, and four have provided recommendations or forwarded the consultation letter to others who may be interested in participating. Please see below for a summary of the responses received.

The four individuals/organizations that responded include ‘Āina Momona, Mr. Ikaika Nakahashi, the Maui Nui Makai Network, and Mr. Kealana Phillips. ‘Āina Momona responded on 9 April 2024 providing the contact information for Mr. Kahekili Pā-Kalā and Mr. Kamaki Ritte-Managan, Kia‘i Loko I‘a (Fishpond Guardians) for ‘Āina Momona. They also recommended contacting Mr. Walter Ritte, a *kama‘āina*, *kupuna*, and advocate for Moloka‘i. Mr. Nakahashi, Cultural Historian for Maui, Lāna‘i, Moloka‘i, Kaho‘olawe, and Hawai‘i Island, recommended “CSH to utilize the media (e.x. OHA‘s Ka Wai Ola, etc.) to solicit additional information for this CIA.” He further recommended contacting Mr. Ritte and Malia Akutagawa, a *kama‘āina* and member of Hui ‘Āina Momona. Ms. Tate Keli‘iho‘omalu, Coordinator of Maui Nui Makai Network, responded on 5 March 2024 providing the contact information for Mr. Mac Poepoe, a Native Hawaiian fisherman and community leader on Moloka‘i, and recommended Ms. Tiani Cook, Executive Director of Ka Honua Momona, and Ms. Shaye Lauifi, Executive Assistant of Ka Honua Momona, who both work closely with Mr. Poepoe. All three individuals were forwarded the consultation letter. Mr. Phillips responded on 6 March 2024 and forwarded the consultation letter to members of the Moloka‘i Burial Council.

Ms. Lori Buchanan, Coordinator for the Moloka‘i/Maui Invasive Species Committee, responded on 11 March 2024 that she wants to participate in consultation. On 9 April 2024, Ms. Buchanan requested the project details before conducting an interview via Zoom. CSH sent the project details on the same day via email. Unfortunately an interview was not scheduled in time

before the deadline. The other individual, Mrs. Kilia Purdy-Avelino, a *kama‘āina*, participated in the consultation for the previous companion CIA (Kaapana et al. 2023a). CSH reached out to Mrs. Purdy-Avelino and requested to use her previous interview summary in the current study. Unfortunately, we were unable to receive her revisions and approval in time before the deadline.

Section 8 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) and acknowledges the multicultural influences and entanglements that may "change" or "create" a tradition.

This section integrates information from Sections 1–7 in examining cultural resources and practices identified within or in proximity of the project area in the broader context of the encompassing Pālā‘au and Ho‘olehua landscape.

8.1 Agricultural and Gathering Practices

Archaeological sites identified in the vicinity of the project area provide evidence that lands of Pāla‘au Ahupua‘a were utilized for habitation, agricultural endeavors, and ceremonial purposes. Archaeological studies (Griffin 1993; Major and Dixon 1995; Summers 1971) have identified pre-Contact dwellings and enclosures (SIHP #s 50-60-02-01624, -01623, Summers Site 9, 16, 17), *heiau* and shrines (Summers Site 12, 14, 16, 17), a *kahua maika* (Summers Site 13) and a *holua* slide (Summers Site 107).

Historic accounts indicate a possible substantial pre-Contact population (Fornander 1880; Summers 1971), which would have subsisted on dryland agriculture consisting mostly of sweet potatoes. Phelps (1937:6-7) mentioned that West Moloka‘i is a semiarid region and traditionally a land of sweet potato, which does not require much water. According to Handy (1940:157), "in 1931 there were many flourishing patches on the Hawaiian homesteads at Hoolehua" and

"Hoolehua and Palaau were noted for sweet potatoes in olden days." However, Handy and Handy (1972:283) note homesteaders in Ho‘olehua were growing the sweet potatoes on land that had not been planted in ancient times.

Craighill Handy and Elizabeth Handy suggest the *ahupua‘a* of Pālā‘au was among the "many parts of the *kula* [plain, field, open country, pasture] land [that] used to be planted with both sweet potato and dry taro." They note that:

> Kualapu‘u (sweet potato hill), the name of a hill [...] [located in Nā‘iwa], probably refers to sweet potato planting.
>
> It is said that Ho‘olehua and Pala‘au were noted for sweet potatoes in olden days. Any part of the pineapple lands westward from this section may have been used for sweet potatoes. However, much of western Molokai was formerly covered with trees. [Handy and Handy 1972:517]

Mrs. Purdy-Avelino and Mr. Avelino have mentioned growing *‘ulu*, *kalo,* papaya, *mai‘a*, mango, and macadamia nut trees for sustenance. Pigs and chickens are also grown on the homesteads for sustenance. For *lei* making purposes, the following plant resources are gathered: *ākulikuli*, *‘awapuhi*, *kīkā*, *kīkānia,* and *kupaloke.* Other plant resources include gardenia, orchids, bird-of-paradise, *hau,* and anthuriums. According to Ms. Greaney, Ho‘olehua Homesteaders grow the crops mentioned by Mrs. Purdy-Avelino and Mr. Avelino, as well as *‘uala* and *‘awa*. For agricultural purposes, *hau* was used to provide windbreaks and reduce erosion. Ms. Albino shared that within Nā‘iwa Ahupua‘a, there is the traditional agricultural practice of harvesting and planting crops based on the different phases of the Hawaiian moon cycle.

8.2 Coastal and Marine Resources

Traditional accounts mention that Pālā‘au was known for its fat *āholehole* and *‘ō‘io*. According to *mo‘olelo*, the ruling chief of Moloka‘i, Kahekili, sent one of his chiefs, Kuikai, to Pālā‘au to collect fish for his army as they prepared to invade O‘ahu (Ne 1992:47).

Catherine Summers (1971:77) noted that Poho‘ele pond (Site 99), also known as Pālā‘au fishpond, was "the largest of the Moloka‘i fishponds." The pond had "gates that were skillfully made" and contained "[a]ll kinds of fish" (Summers 1971:77). Summers also reported a *ko‘a* observed "at the edge of the cliff" at Kahinaokalani (Site 17) (Summers 1971:38).

Previous informants have mentioned gathering *‘opihi* and salt, as well as fishing (Alex Bishaw and Mikiala Pescaia; McElroy et al. 2015:35; Henry Tancayo Senior; McElroy and Duhaylonsod 2018:31). Ms. Greaney mentioned Moloka‘i has the largest number of *loko ‘ia* in Hawai‘i including over 60 that are still recognizable. She recalled being taken to fishponds alone by her grandfather who was proud to share this purely Hawaiian innovation to feed the people.

8.3 Mo‘olelo and *Wahi Pana*

Many *mo‘olelo* and *wahi pana* were mentioned by previous informants. Many of these *mo‘olelo* contain valuable *‘ike* on/about the land, its naming, and the countless events that have transpired on these lands. Moloka‘i in general has been recognized as a highly spiritual island where many *mo‘olelo* mention sorcery. Pālā‘au and Ho‘olehua are mentioned in a *mo‘olelo* discussing the origins of sorcery on Moloka‘i. Kamakau (1991:131–132) shared that Kaiakea saw women coming

over the plains of Ho‘olehua to Pālā‘au with a man named Pua who told Kaiakea to build a *hale lua* for them and in exchange they would become his gods and give him their visible form and all the paraphernalia to do their work. Kaiakea built the *hale lua,* provided offerings, and became the *kahu* of the gods, Pua and Kapo.

Regarding Ho‘olehua, Ms. Albino mentioned Ho‘olehua was the name of the wife of ‘Iloli of Moloka‘i and the meaning of Ho‘olehua is a situation where instead of the entire army engaging in battle, each side would select their best warrior (their *lehua*) to represent them and engage in battle (Kaapana et al. 2023b:72). Another informant, Ms. Greaney, shared another story on the origins of Ho‘olehua in connection with the Nā‘iwa Makahiki grounds. The story recalls an ancient *hau* tree located where Lehua, an *ali‘i*, lived in Ho‘olehua and became the namesake of the area she overlooked.

Based on previous consultation, Nā‘iwa is where the Makahiki Grounds are located. There are many *mo‘olelo* in relation to the Makahiki Grounds and the origin of the name Nā‘iwa. According to Mr. Avelino, the Makahiki Grounds were chosen to be located in Nā‘iwa due to a chief of Moloka‘i who looked toward the mountains of Nā‘iwa and noticed a finger-shaped cloud pointing to a piece of land. Mrs. Purdy-Avelino shared an origin story of Nā‘iwa where a *lei* maker from Kalaupapa made a *lei* out of *‘iwa‘iwa* ferns for her son. The son gave the *lei* to the *wahine* he admired and the spores from that *lei* would fall and scatter across the land. Ms. Greaney further elaborated on this story by adding that the *lei* was given to a *hula* dancer named Lehua (Kaapana et al. 2023b:85).

Other *wahi pana* mentioned by previous informants included Pu‘ulelo, Kaohu, Keālia Lake, Ka‘ule o Nanahoa, and Pu‘u Pe‘elua. Pu‘uolelo (speaking hill) is located at the highest elevation of Nā‘iwa where a grove of pine trees were planted by Mr. Meyer in the early 1800s. Kaohu (adorned in fog) is located to the east and Keālia Lake, also known as Meyer Lake, is one of the few naturally occurring freshwater lakes in Hawai‘i. Ka‘ule o Nanahoa (Phallic Rock) is the female fertility partner *pōhaku*. Pu‘u Pe‘elua (Caterpillar Hill) is located in Ho‘olehua and there are many references in *mo‘olelo* of Central Moloka‘i having large caterpillars.

8.4 Healing Practices

Kahuna of Moloka‘i were also “said to be experts in compounding medicine” (Pukui 1983:239). This expertise is described in the saying, “Moloka‘i ku‘i lā‘au. *Moloka‘i, pounder of medicine*” (Pukui 1983:239). Previous informants have mentioned the following traditional healing methods are ongoing: *la‘au lapa‘au*, *lomilomi*, and *ho‘oponopono*. Although no specific plants were mentioned, Ms. Greaney did state that she grows and gathers medicinal plants on her homestead property. She also mentioned that Nā‘iwa was widely known as an area of physical and spiritual healing, attracting injured, sick, and dying Hawaiians with their caregivers and loved ones in the past.

8.5 Cultural and Historic Properties

Previous informants have mentioned various cultural sites in Nā‘iwa, Pālā‘au, and Ho‘olehua Ahupua‘a. In Nā‘iwa Ahupua‘a, there is the Makahiki Grounds where the Makahiki ceremonies and activities take place, such as *‘ulu maika*. Informants have also mentioned an ancient *hula* site at the Makahiki grounds. In Pālā‘au Ahupua‘a, informants have shared that it was an ancient

training site used by Kamehameha to train his warriors prior to his battle at Nu‘uana, O‘ahu (Notman 2012). In Ho‘olehua Ahupua‘a, Mr. Avelino mentioned coming across two *pōhaku* in the shape of a chair while he was hunting.

Based on historical and archaeological research, there are four *heiau* (Sites 10, 12, 14, and 16) in Pālā‘au and Ho‘olehua. This included Lepekaheo Heiau and three unnamed *heiau.* Lepekaheo Heiau (Site 12) is located southeast of the project area on the west side of Kaluape‘elua Gulch. Regarding the other three unnamed *heiau*, Site 10 is located in Ho‘olehua 2 and Site 14 is located in Pālā‘au 2. The third unnamed *heiau* is located on the west side of the mouth of Anahiki Gulch, northwest of the project area along the coast (Site 16).

Other historic and cultural properties located northwest of the project area include an agricultural shrine for Lono (SIHP # 50-60-02-00995) as well as two house sites and a *ko‘a* at Kahinaokalani (Site 17). North of the project area is a pre-Contact dwelling (SIHP # -02-01623) and two enclosures with unknown function (SIHP # -02-01624). Northeast of the project area are the Kipu Ruins (Site 9), *Kahua maika* (Site 13), *‘ulu maika* stone (Isolated Find 1), and a ranching infrastructure (SIHP # -03-02521). Southeast of the project area are the Caterpillar Stones on top of Pu‘u Kape‘elua (SIHP # -03-00011A), a stone on top of Pu‘u Kape‘elua possibly used for sharpening adzes or collecting water (SIHP # -03-00011B), and a *hōlua* slide on the southwest side of Kualapu‘u Hill (Site 107).

8.6 Burials

Native Hawaiians are protective of their *iwi kūpuna*. As stated by the State Historic Preservation Division (SHPD),

> When departing kupuna was laid to rest there was never a doubt that their remains would empower their descendants until they themselves were reduced to earth. Some kupuna were covered by stacked stones while others were buried with no surface markers at all, frequently in sand dunes. [SHPD n.d.]

It is believed that the *mana* of a person is held within the *iwi* (bones). Therefore, *iwi kūpuna* were treated with upmost respect. For example, remains of a passing *ali‘i* were usually buried under cover of night to protect the *iwi* from possible poachers, or those who might steal them to utilize the *mana* of the passing *ali‘i* (SHPD n,d.).

Northeast of the project area are two cemeteries, Kanakalola and Ho‘olehua. Ms. Greaney noted that Homelani (located in Kalama‘ula Ahupua‘a in southern central Moloka‘i) and Ho‘olehua cemeteries, both chosen by Hawaiians as the final resting place for their beloved *‘ohana,* are located in proximity to *wahi pana*. She was also informed by *kūpuna* about a *lele* above her homestead where the physical and spiritual realms connect.

Section 9 Summary and Recommendations

CSH undertook this CIA at the request of Munekiyo Hiraga, and on behalf of the DHHL. The research broadly covered the *ahupua‘a* of Pālā‘au and Ho‘olehua.

9.1 Results of Background Research

Background research for this project yielded the following information (presented in approximate chronological order):

1. Traditionally, Moloka‘i was divided into two *moku*, or districts: Kona and Ko‘olau. In 1859, the traditional *moku* of Kona and Ko‘olau were dropped and the island as a whole was referred to as the Moloka‘i district. In 1909, the island was again divided into two districts: Kalawao District, containing the lands of Kalaupapa, Kalawao, and Waikolu, and Moloka‘i District, comprising the remainder of the island (Coulters in Summers 1971:2), including the current project area.
2. The winds of Pālā‘au are Ho‘olua, Moa‘e, Ka‘ele, and Haualialia (*Ka Hae Hawaii* 1861; Nakuina 1995:64). The rain of the area is known as Nāulu (Akana and Gonzalez 2015:175).
3. The prominent *ka‘ao* of Pāka‘a and Kū-a-Pāka‘a originates from Moloka‘i (Handy 1922:76). Chief Ho‘olehua was married to ‘Īloli and they had a daughter named Hikauhi, who later became wife of Pāka‘a and mother of Kū-a-Pāka‘a, the caretakers of the wind gourd of La‘amaomao (Nakuina 1992:29–30).
4. Pu‘u Pe‘elua, or Caterpillar Hill, is located in Ho‘olehua and named after the *pe‘elua*. This *pe‘elua* was a *kupua* (demigod), who took the form of a caterpillar in the day and a handsome man at night. The *pe‘elua* became an *‘aumakua* for the district of Ho‘olehua (Ne et al. 1992:49–50).
5. Four *heiau* were recorded in the Pālā‘au and Ho‘olehua Ahupua‘a including Lepekaheo Heiau and three unnamed *heiau* (Summers 1971:37–38).
6. Historical anecdotes and environmental data for this region indicate a possible substantial pre-Contact population (Fornander 1880; Summers 1971), which would have subsisted on dryland agriculture consisting mostly of sweet potatoes.
7. Historic properties previously identified in the vicinity are limited to a few sites recorded by Summers (1971), including the legendary Kape‘elua Complex (SIHP # 50-60-03-00011). There appears to have been a locus of traditional Hawaiian activity in Anahaki Gulch north of the western project area but this is suggested to relate to the micro-environment of that gulch and greater proximity to the coast.
8. In the 1790s, Kamehameha I reportedly “drilled his warriors on the Hoolehua plain near where the airport is now” (Cooke 1949:112). These training grounds may have included the current project area.
9. Following the Māhele in 1848, the entire *ahupua‘a* of Ho‘olehua was given to the government, and all of Pālā‘au Ahupua‘a (including the western and central project areas) was “Crown lands” owned by Kamehameha III (Dodge et al. 1897).
10. Cattle were introduced to Moloka‘i in the 1840s (De Loach 1975:68). In the second half of the nineteenth century, cattle, sheep, and goat ranching expanded greatly. By 1866, there were “2,586 head of cattle, 13,332 sheep and 196 goats on the island” (de Loach 1975:86).
11. Molokai Ranch was formed in 1897 when a *hui* of investors purchased approximately 70,000 acres of central and western holdings from the Bishop Estate (Cooke 1949; Stearns and Macdonald 1947). By 1905, the ranch had transitioned from an open country system to the paddock system (Henke 1929). The western and eastern project areas are within the Momomi Paddock. In the 1920s, Molokai Ranch lands consisted of about 10,000 acres leased for pineapple cultivation, 8,000 acres of forest reserves, and 50,000 acres utilized for ranching (Henke 1929:52). Cattle ranching remains an important industry on Moloka‘i.
12. In 1920, the U.S. Congress passed the Hawaiian Homes Commission Act to administer and manage some 200,000 acres of land that belonged to the government of the Kingdom of Hawai‘i or was recognized as Crown lands. The following year, the program began attracting people to Moloka‘i. Overall, the program succeeded and was expanded to include 11,400 acres of Pālā‘au-Ho‘olehua beginning in 1924. Parcels 31 and 14 consist of approximately 36.4 acres (14.7 hectares) of these Pālā‘au-Ho‘olehua Homestead lands and include Lots 17 and 104D-1.
13. The Moloka‘i homestead program initially was impacted by many problems, including drought and high winds (McGregor 1990:37–38). Despite such difficulties, people managed to cultivate their plots (McGregor 1990:37–38). Farming was diversified and successful crops included corn, watermelons, cucumbers, sweet potatoes, eggplant, and papaya (Keesing 1936; Wiebke 1940). In addition to agricultural pursuits, the Hawaiian Homes Commission encouraged raising livestock and ranching. Raising pigs brought the most revenue and economic value; however, a few families sold eggs and every family owned some cattle (Keesing 1936).
14. According to Handy (1940:157), “in 1931 there were many flourishing patches on the Hawaiian homesteads at Hoolehua” and “Hoolehua and Palaau were noted for sweet potatoes in olden days.” However, Handy and Handy (1972:283) note homesteaders in Ho‘olehua were growing the sweet potatoes on land that had not been planted in ancient times.
15. A civilian airfield was established in Ho‘olehua in 1919. In 1931, the U.S. Army Air Corps established a portion of this field as “Homestead Field” (Horvat 1966:38, 40–47). By the time the United States entered World War II in 1941, aircraft of the Fifth Bombardment Group were stationed at Homestead Field. A complex of World War II bunker sites was identified on the airport property well south of the present project areas in 1980 by AECOS Inc. (1980).
16. Fifteen archaeological studies were previously conducted within the project area vicinity, two of which included the project area (Pfennig et al. 2011; Shideler and Hammatt 2021). No historic properties have been identified within the project area, however, there are two terrace alignments (no SIHP # assigned) identified by Shideler and Hammatt (2021) within the southern portion of TMK: (2) 5-2-026:014, adjacent to the northern lots of the current project area.
17. Seven previous cultural studies were conducted within the project area vicinity. The following cultural practices were mentioned by previous informants: agricultural and

gathering practices for sustenance and *lei* making purposes, *mo‘olelo* and *wahi pana*, healing practices, cultural and historic properties, and burial sites.

9.2 Results of Community Consultation

CSH attempted to contact Hawaiian organizations, agencies, and community members as well as cultural and lineal descendants in order to identify individuals with cultural expertise and/or knowledge of the project area and vicinity. Community outreach letters were sent to 36 individuals or groups; six responded and two of these *kama‘āina* and/or *kūpuna* expressed their interest in participating in consultation for this study. Unfortunately, we were unable to schedule an interview in time before the deadline with one individual. The other individual participated in consultation for the previous companion CIA (Kaapana et al. 2023a), however, CSH was unable to receive their revisions and approval in time before the deadline.

9.3 Identification of Cultural Practices

Based on the results of background research conducted as part of this CIA, CSH has identified the following cultural resources and practices within Pālā‘au and Ho‘olehua Ahupua‘a:

1. Agricultural and gathering practices
2. Marine resources
3. *Mo‘olelo* and *wahi pana*
4. Healing practices
5. Religious activities
6. Burial practices

CSH has determined that no ongoing cultural practices were identified within the project area during background research. However, the project area is located in the general vicinity of ongoing cultural practices such as agricultural and gathering activities, ceremonial activities, and traditional burial practices.

9.4 Identification of Impacts to Cultural Practices

No impacts to ongoing cultural practices were identified within the project area during background research and community consultation for this CIA. Consultation from the prior companion CIA (Kaapana et al. 2023a) identified a number of concerns related to the environment and the broader community:

1. Availability of water
2. Soil quality
3. Impacts to *‘uhane* (spirits) and *‘iwi kūpuna* (ancestral remains)
4. Impacts to *wahi pana*

9.5 Mitigation Possibilities Identified During Background Research and Consultation

The results of background research conducted for this CIA inform the following mitigation possibilities promoting and preserving cultural beliefs, practices, and resources of Native Hawaiians and other ethnic groups:

1. A number of concerns expressed by the community during consultation from the prior CIA (Kaapana et al. 2023a) do not relate specifically to ongoing cultural practices within the project area, but nonetheless should be considered during project planning and development. These concerns include the following:
    a. Ms. Greaney expressed concern regarding the availability of water. She noted that Ho‘olehua, including Nā‘iwa, is historically known for its dry and barren land, with little to no water available. She stressed it is also important to ensure access to the appropriate amount of water is available and at a reasonable cost.
    b. Ms. Greaney strongly suggests the soil be well tested by third party professionals for any presence of harmful chemical residue possibly remaining in the soil. This is a good safety precaution for farmers.
    c. Ms. Greaney also suggested future studies may also look at nearshore areas off Pālā‘au to assess for the presence of chemicals from runoff and any impacts.
2. Consultants from the prior CIA (Kaapana et al. 2023a) have recommended the following:
    a. Ms. Greaney insists the homestead community should be notified well in advance of any proposed developments that will occur on the Makahiki lands.
    b. Ms. Greaney also stated that if there are any future developments, it is important that in depth archaeological inventory surveys be conducted as it is known that many artifacts still exist in the *mauka* and central regions of Nā‘iwa and Pālā‘au.
3. 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.
4. Non-Native Hawaiian human remains will undergo the process laid out under state law (HAR 13-300), however, Native Hawaiian human remains and cultural items found on DHHL lands are subject to the Native American Graves Protection and Repatriation Act (NAGPRA), 25 U.S.C. 3001 et seq and its implementing regulations (43 CFR Part 10). As 43 CFR § 10.2 provides, tribal lands include “All lands administered by the Department of Hawaiian Home Lands (DHHL) under the Hawaiian Homes Commission Act of 1920 (HHCA, 42 Stat. 108) and Section 4 of the Act to Provide for the Admission of the State of Hawai‘i into the Union (73 Stat. 4), including “available lands” and “Hawaiian home lands.” Under NAGPRA, DHHL must prepare a plan of action (POA) prior to any planned activity that is likely to result in a discovery or excavation of human remains or cultural items. If not part of a planned activity, a POA is required after the discovery of human remains or cultural items. In developing a POA, DHHL will initiate consultation with lineal and cultural descendants, consult on the POA, and approve and sign the POA and provide a copy to all consulting parties. The 3-step process for drafting a POA pursuant to NAGPRA can be found in 43 CFR § 10.4(b).

Section 10 References Cited

AECOS Inc.
1980 *Environmental Field Studies for the Moloka‘i Airport Master Plan.* AECOS, Inc., Kailua, Hawai‘i.

Akana, Collette and Kiele Gonzalez
2015 *Hānau Ka Ua: Hawaiian Rain Names*. Kamehameha Publishing, Honolulu.

Akana, Francis
n.d. Legend of Pu‘u Pe‘elua (1938). (Ms. in possession of M.K. Pukui). In *Molokai a Site Survey*, Catherine C. Summers. Department of Anthropology, Bernice Pauahi Bishop Museum, Honolulu.

Alameida, Roy Kakulu
1993 Land Tenure and Land Use in Kawaihapai, O‘ahu. Master’s thesis in History. University of Hawai‘i at Mānoa, Honolulu.

Andrews, Lorrin
1829 Tour Around Morokai. In *The Missionary Herald*, Vol XXV. No. 50 Cornhill Crocker & Brewster, Printers, Boston, Massachusetts.

Ava Konohiki
2015 Ancestral Visions of ‘Āina website. Available online at http://www.avakonohiki.org/.

Beckley, Emma Metcalf
1883 *Hawaiian Fisheries and Methods of Fishing with an Account of the Fishing Implements used by the Natives of the Hawaiian Islands.* Advertiser Steam Print, Honolulu.

Beckwith, Martha
1970 *Hawaiian Mythology*. Originally published 1940. University of Hawaii Press, Honolulu.

Carlson, Norman K.
1951 Grazing Land Problems, Molokai Island, Territory of Hawaii. *Hawaiian Agricultural Experiment Station Bulletin*.

Cartwright, Bruce
1922 Letter to Dr. C.M. Cooke, Jr., Apr 20. Bernice Pauahi Bishop Museum, Honolulu.

Chinen, Jon J.
1958 *The* Great *Mahele: Hawaii's Land Division of 1848*. University of Hawaii Press, Honolulu.

Cipolla, Craig N.
2013 Native American Historical Archaeology and the Trope of Authenticity. *Historical Archaeology.* Vol. 47, ed. 3:12–22.

Cooke, George Paul
1949 *Moolelo o Molokai, A Ranch Story of Molokai.* Honolulu Star-Bulletin, Honolulu.

Cooke Sophie J.
1964 *Sincerely, Sophie.* Tongg Publishing Company, Ltd., Honolulu.

de Loach, Lucille Fortunato
1975 Land and People on Molokai: An Overview. Master of Arts Thesis, University of Hawai‘i at Mānoa, Honolulu.

Dodge, F.S., C.J. Willis, and S.M. Kanakanui
1897 Molokai, 1:90000. Hawaiian Government Survey. Washington, D.C.

Emerson, N.B.
1965 *The Unwritten Literature of Hawaii: The Sacred Songs of the Hula*. Collected by Nathaniel B. Emerson. Charles E. Tuttle Company, Rutland, Vermont and Tokyo.

Emory, Kenneth, P.
n.d. Field Notebook (1922). Department of Anthropology, Bernice Pauahi Bishop Museum, Honolulu.

Environmental Council, State of Hawai‘i
1997 *Guidelines for Assessing Cultural Impacts Adopted by the Environmental Council, State of Hawai‘i, November 19, 1997*. Office of Environmental Quality Control, Hawai‘i.

Environmental Impact Study Corp.
1981 *PROPOSED INDUSTRIAL SITE: BIOLOGICAL AND ARCHAEOLOGICAL EVALUATION Naiwa, Molokai, Hawaii.* Environment Impact Study Corp., Honolulu and Maui, Hawai‘i.

ESRI, Inc.
2013 Map Image Layer. Esri, Inc., Redlands, California.

Foote, Donald E., Elmer L. Hill, Sakuichi Nakamua, and Floyed Stephens
1972 *Soil Survey of Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii*. Soil Conservation Service, United States Department of Agriculture, Washington, D.C.

Fornander, Abraham
1880 *An Account of the Polynesian Race, its Origins and Migrations, and the Ancient History of the Hawaiian People to the Times of Kamehameha I*. 6 vols. Trubner & Company, London.

1916-1917 *Hawaiian Antiquities and Folk-Lore, The Hawaiian Account of the Formation of the Islands and Origin of their Race, with the Traditions of their Migrations, Etc., as Gathered from Original Sources. Memoirs of the Bernice Pauahi Bishop Museum.* Bishop Museum Press, Honolulu.

Fowke, Gerard
1922 Archaeological Work In Hawaii. In *Archaeological Investigations*. Bureau of American Ethnology, Bulletin 76. Smithsonian Institution, Washington, D.C.

Giambelluca, T., M. Nullet, and T. Schroeder
1986 *Rainfall Atlas of Hawaii Report R76.* State of Hawai‘i, Department of Land and Natural Resources, Division of Water and Land Development, Honolulu

Giambelluca, Thomas W., Q. Chen, A.G. Frazier, J.P. Price, Y.L. Chen, P.S. Chu, J.K. Eischeid, and D.M. Delparte
2013 The Rainfall Atlas of Hawai‘i. In *Bull. Amer.Meteor. Soc.*, pp. 313–316. Vol. 94. University of Hawai‘i at Mānoa, Honolulu.

Griffin, Annie
1993 *Newly Identified Historic Site 60-02-995 Palaau Molokai TMK: 5-2-05:6 por*. State Historic Preservation Division, Department of Land and Natural Resources, State of Hawai‘i, Honolulu.

Griffith, E.M.
1902 *A Report of U.S. Forester E.M. Griffith on Hawaiian Forests.* Yokohama, Japan.

Hammatt, Hallett H.
2008 *Archaeological Literature Review and Field Check Study of Four DOE Schools, Island of Moloka‘i Hawai‘i Inter-Island DOE Cesspool Project.* Cultural Surveys Hawai‘i, Inc., Wailuku, Hawai‘i.

Hammatt, Hallett H., Tamara Craddock, and William H. Folk
1993 *Archaeological Inventory Survey of Three 15-Acre Parcels in the Ahupua‘a of Pala‘au and Na‘iwa, Island of Moloka‘i (TMK 5-2-1l:por.29; TMK 5-2-1l:por.I2; TMK 5-2-04:por.84)*. Cultural Surveys Hawai‘i, Kailua, Hawai‘i.

Handy, E.S. Craighill
1940 *The Hawaiian Planter*. Bishop Museum Bulletin Volume 1, No. 161. Bernice Pauahi Bishop Museum, Honolulu.

Handy, E.S. Craighill and Elizabeth G. Handy
1972 *Native Planters in Old Hawaii: Their Life, Lore, and Environment*. Bishop Museum Bulletin 233. Bishop Museum Press, Honolulu.

Handy, E.S. Craighill, Elizabeth Green Handy, and Mary Kawena Pukui
1991 *Native Planters in Old Hawaii: Their Life, Lore, and Environment*. Revised edition. Bishop Museum Bulletin 233. Bishop Museum Press, Honolulu.

Handy, Willowdean Chatterson
1922 *Tattooing in the Marquesas*. Bishop Museum Bulletin I, Bayard Dominick Expedition, Publication Number 3. Bernice Pauahi Bishop Museum, Honolulu.

Hartzell, Leslie L.
2000 *Pu‘u Kapele Rock Wall Complex: Supplemental Archaeological Inventory Survey at the USAF Molokai Receiver Station, Island of Moloka‘i, Maui County, Hawai’i (TMK: 5-2-06:63, 69).* Department of Anthropology, Bernice Pauahi Bishop Museum, Honolulu.

Hawaii TMK Service
2023 Tax Map Key (2) 5-2-026. Hawaii TMK Service, Honolulu.

Henke, L.A.
1929 A Survey of Livestock in Hawaii. In *University of Hawaii Research Publication No. 5*, pp. 82. University of Hawai‘i, Honolulu.

Honolulu Advertiser
1944a Molokai May Yield 1200 Tons of Corn if Conditions are O.K. *Honolulu Advertiser* 25 April.

1944b “Fair” Corn Crop Seen For Molokai By Julian Yates. *Honolulu Advertiser* 14 July.

Honolulu Star-Bulletin
1922 Molokai Corn. *Honolulu Star-Bulletin* 7 November.

Horvat, William J.
1966 *Above the Pacific*. AERO Publishers, Inc., Fallbrook, California.

Huapala
n.d.a Ho‘olehua. Electronic document, http://www.huapala.org/Ho/Hoolehua.html (accessed 5 May 2021).

n.d.b Moloka‘i Hula. Electronic document, http://www.huapala.org/Mo/Molokai Hula.html (accessed 5 May 2021).

n.d.c Nani Moloka‘i, Electronic document, http://www.huapala.org/nani/Nani_ Molokai.html (accessed 5 May 2021).

Jenkins, John S.
1850 *Voyage of the U.S. Exploring Squadron Commanded by Captain Charles Wilkes*. James M. Alden, New York.

Judd, Gerrit P.
1936 *Puleoo, The Story of Molokai.* Honolulu.

Ka Hae Hawaii
1861 He Wahi Moolelo Helu 5, *Ka Hae Hawaii*, 15 May.

Ka Nupepa Kuokoa
1922 He Wahi Moolelo o na Kona o Molokai, I ke Au o Kamehameha I, Ka Na‘i Aupuni, *Ka Nupepa Kuokoa*. 11 May, Volume LXI, Number 19.

Kaapana, Kamuela, Kellen Tanaka, and Hallett H. Hammatt
2023a *Cultural Impact Assessment for the Department of Hawaiian Home Lands Nā‘iwa Agricultural Subdivision Project, Pālā‘au and Ho‘olehua Ahupua‘a, Moloka‘i District, Moloka‘i Island TMKs: (2) 5-2-003:001, 5-3-004:001, 002, 004, 007, and 046.* Cultural Surveys Hawai‘i, Inc., Kailua, Hawai‘i.

2023b *DRAFT Cultural Impact Assessment for the Department of Hawaiian Home Lands Ho‘olehua Scattered Lots Subdivision and Improvements Project, Pālā‘au Ahupua‘a, Moloka‘i District, Moloka‘i Island, TMKs: (2) 5-2-005:031 and 5-2-026:014*. Cultural Surveys Hawai‘i, Inc., Kailua, Hawai‘i.

Kahahane, Elizabeth L., James D. McIntosh, and Paul L. Cleghorn
2016 *Cultural Impact Assessment for the Proposed Improvements to the Department of Hawaiian Home Lands Water System, Pālā‘au, Ho‘olehua, Nā‘iwa, Kahanui, and Kalama‘ula Ahupua‘a, Moloka‘i Island [TMK (2) 5-2-002:999; (2) 5-2-005:999; (2) 5-2-006:999; (2) 5-2-007 por.; (2)5-2-008 por.; (2)5-2-009 por.; (2) 5-2-010 por.; (2) 5-2-012 por.; (2) 5-2-013 por.; (2) 5-2-021:999; (2) 5-2-023:009; (2) 5-2-024:999; (2) 5-2-025:999; (2) 5-2-032 por.; and (2) 5-2-033 por.]*. Pacific Legacy, Inc., Kailua, Hawai‘i.

Kamakau, Samuel Mānaiakalani
1991 *Ka Po‘e Kahiko: The People of Old*. Bishop Museum Press, Honolulu.

1992a *Ka Po‘e Kahiko: The People of Old*. Bishop Museum Press, Honolulu.

1992b *Ruling Chiefs of Hawaii*. Revised edition. Kamehameha Schools Press, Honolulu.

Ka‘uhane, Lehua, Mishalla Spearing, Randy Groza, and Hallett H. Hammatt
2009 *Cultural Impact Assessment for the Moloka‘i Airport Aircraft Rescue and Firefighting Station Improvements (ARFF) Project, Pālā‘au Ahupua‘a, Kona District, Moloka‘i Island, TMK (2) 5-2-008:082 & 83*. Cultural Surveys Hawai‘i, Inc., Kailua, Hawai‘i.

Kawelu, Kathleen L.
2015 *Kuleana and Commitment: Working Toward a Collaborative Hawaiian Archaeology*. University of Hawai‘i Press, Honolulu.

Keesing, Felix Maxwell
1936 *Hawaiian homesteading on Molokai*. Research publications, Vol. no. 12. University of Hawai‘i, Honolulu.

Kuykendall, R.S.
1953 *The Hawaiian Kingdom: 1854-1874*. University of Hawaii Press, Honolulu.

Landgraf, Anne Kapulani
1994 *Na Wahi Pana o Ko‘olau Poko: Legendary Places of Ko‘olau Poko*. Fred Kalani Meinecke translator. University of Hawaii Press, Honolulu.

Larsen, Jack L. and Thomas A. Marks
2010 *Hawaiian Pineapple Entrepreneurs*. Creative Company, Sheridan, Oregon.

Lee-Greig, Tanya and Hallett H. Hammatt
2008 *Archaeological Monitoring Plan for Three Schools within the Molokai School Complex Hawaii Inter-Island DOE Cesspool Project (TMK [2] 5-3-002:052; 5-6-02: 008; 5-2-013:027).* Cultural Surveys Hawai‘i, Inc., Kailua, Hawai‘i.

Lynch, Russ
1968 An Iowa corn farmer on Molokai. *Honolulu Star-Bulletin,* 5 October.

MacDonald, Gordon A., Agatin T. Abbot, and Frank L. Peterson
1990 *Volcanoes in the Sea: The Geology of Hawaii*. Second edition. University of Hawaii Press, Honolulu.

Magin, Janis L.
2017 Hawaii’s Molokai Ranch on the market for $260M. *Pacific Business News,* 7 September.

Major, Maurice and Boyd Dixon
1994 *A Final Technical Report, Archaeological Survey and Evaluation, USAF Receiver Station, Ho‘olehua, Moloka‘i, Maui County Hawai‘i.* Department of Anthropology, Bernice Pauahi Bishop Museum, Honolulu.

Malo, David
1951 *Hawaiian Antiquities.* Nathaniel B. Emerson, translator (1898). Bishop Museum Special Publication 2. Second edition. Bishop Museum Press, Honolulu.

Mangieri, Gina
2019 *Molokai Ranch sale has community talking public, private options.* Nexstar Broadcasting, Inc.

Maui News
1926 *Maui News Industrial Edition* 4 December. Wailuku, Hawai‘i.

1939 Molokai Hi Grows from Tiny School. *Maui News* 11 October. Wailuku, Hawai‘i.

1940 School Is Center For Ag Training. *Maui News* 30 March. Wailuku, Hawai‘i.

1948 Pine Co-op Plan Works On Molokai. *Maui News* 6 October. Wailuku, Hawai‘i.

1950 Hoolehua Is Selected As School Site. *Maui News* 22 July. Wailuku, Hawai‘i.

McElroy, Windy and Dietrix Duhaylonsod
2018 *FINAL—Cultural Impact Assessment for the Proposed Veteran‘s and Resident‘s Center Ho‘olehua Ahupua‘a, Kona District, Island of Moloka‘i TMK: (2) 5-2-015:053, Hawai‘i.* Keala Pono Archaeological Consulting LLC, Kaneohe, Hawai‘i.

McElroy, Windy, Dietrix Duhaylonsod, and Pūlama Lima
2015 *FINAL—Cultural Impact Assessment for Kanakaloloa Cemetery, Pālā‘au and Ho‘olehua Ahupua‘a, Kona District, Island of Moloka‘i, Hawai‘i. TMK: (2) 5-2-017:003.* Keala Pono Archaeological Consulting, LLC, Kaneohe, Hawai‘i.

McGregor, Davianna Pomaika‘i
1990 Aina hoopulapula: Hawaiian Homesteading. *The Hawaiian Journal of History* 24.

1996 An Introduction to the Hoaaina and Their Rights, *The Hawaiian Journal of History,* Volume 30:1–28.

McIntosh, James D., Caleb C. Fechner, and Paul L. Cleghorn
2019 *Archaeological Inventory Survey for the Proposed Improvements to the Department Of Hawaiian Home Lands Water System on Moloka‘i Lands in Pala‘au, Ho‘olehua, Na‘iwa,* Kahanui, *and Kalama‘ula Ahupua‘a Kona District, Island Of Moloka‘i*. Pacific Legacy, Inc., Kailua, Hawai‘i.

Menzies, Archibald
1920 *Hawaii Nei 128 Years Ago*. Unknown publisher.

Mondoy, Robert M.
2018 *Mele Aloha O Moloka‘i: Beloved Songs of Moloka‘i : A collection compiled, transcribed & edited by Robert M. Mondoy*. Electronic document. Available at: Molokai Songs Mele Aloha O Molokai (mondoymusic.com).

Monsarrat, M.D.
1886 Registered Map 1288. Hawai‘i Land Survey Division, Department of Accounting and General Services, Honolulu. Available online at http://dags.hawaii.gov/survey/search.php

Morse, Gordon
1953 Kamaiana Naturalist Recalls: Brackish Water, Old Heiau, Had Part In Molokai Sugar Failure. *Honolulu Advertiser*.

Nagahara, Valerie and Michael Kolb
1994 *Field Inspection and Location of Site 50-60-03-11, Kape' elua Complex Hoolehua, Molokai (TMK 5-2-23:30).* State of Hawai‘i, State Historic Preservation Division, Honolulu.

Nakuina, Moses K.
1992 *The Wind Gourd of La‘amaomao.* Second edition. Esther T. Mookini and Sarah Nākoa, translators. Kalamakū Press, Honolulu.

1995 *The Wind Gourd of La‘amaomao.* Second edition. Esther T. Mookini and Sarah Nākoa, Translators. Kalamakū Press, Honolulu

Ne, Harriet
1992 *Tales of Molokai.* The Institute for Polynesian Studies, Lā‘ie, Hawai‘i.

Neller, Earl (Buddy)
1982 *An Archaeological Reconnaissance of Proposed Marine Corps Training Areas on Molokai: Palaau (Hoolehua), Kalamaula, and Kaapakea, and Kaapakea-Kamiloloa, TMK: 5-2 var, 5-3 var, and 5-4 var.* State Historic Preservation Division, Department of Land and Natural Resources, Honolulu.

Notman, Steve
2012 *Cultural Impact Assessment for the Private Hangar Project on Molokai Airport, Pala‘au Ahupua‘a, Kona District, Moloka‘i Island TMK (2) 5-2-008*. Maunaloa, Hawai‘i.

Office of Hawaiian Affairs
2015 *Papakilo Database.* Office of Hawaiian Affairs cultural and historical database. Electronic document, http://papakilodatabase.com/main/index.php.

Pantaleo, Jeffrey
2004 *Addendum Archaeological Monitoring Report for the Sandwich Isles Communications, Inc.* Phase *II Moloka‘i Rural Fiber Optics Duct Line TMK S-2-03, 04, 06,07, 15, 17, 21, 22,23 Naiwa and Palaau Ahupua‘a Island of Molokai*. Archaeological Services Hawaii, LLC, Honolulu.

Pantaleo, Jeffrey and Lisa Rotunno-Hazuka
2003 *Archaeological Monitoring Report for the Sandwich Isles Communications, Inc. Moloka‘i Rural Fiber Optics Duct Lines Hoolehua 2, Naiw A 1, Kalama‘ula Ahupua‘a Moloka‘i Island, State Of Hawaii (Tmk 5-2-04,07).* Archaeological Services Hawaii, LLC, Wailuku, Hawai‘i.

Pauketat, Timothy R.
2001 *The Archaeology of Traditions*. University Press of Florida, Gainesville, Florida.

Pfennig, Kelene, Kimberly M. Mooney, Elizabeth L. Kahahane, and Paul L. Cleghorn
2011 *Literature Review of Previous Archaeological Work within 8,955 Acres Owned by the Department of Hawaiian Home Lands on the Island of Moloka‘i.* Pacific Legacy, Inc., Kailua Hawai‘i.

Phelps, S.
1937 *A Regional Study of Molokai.* On file at Bernice Pauahi Bishop Museum Archives, Honolulu.

Pukui, Mary Kawena
1949 Songs (Meles) of Old Ka‘u, Hawaii. *Journal of American Folklore*, July-September: 247–258.

1983 *‘Ōlelo No‘eau: Hawaiian Proverbs & Poetical Sayings.* Bishop Museum Press, Honolulu.

1995 *Na Mele Welo: Songs of Our Heritage*. University of Hawai‘i Press, Honolulu.

Pukui, Mary K. and Samuel H. Elbert
1986 *Hawaiian Dictionary*. Second edition. University of Hawaii Press, Honolulu.

Pukui, Mary Kawena, Samuel H. Elbert, and Esther T. Mookini
1974 *Place Names of Hawaii*. Revised and enlarged edition. University of Hawaii Press, Honolulu.

Pukui, Mary Kawena and Laura C.S. Green
1995 *Folktales of Hawai‘i*. Bishop Museum Press, Honolulu.

Pukui, Mary Kawena and Alfons L. Korn
1973 *The Echo of Our Song: Chants & Poems of the Hawaiians*. Translated and edited by Mary Kawena Pukui and Alfons L. Korn. University of Hawaii Press, Honolulu.

Roll, Warren
1968 Where the Tall Corn Grows. *Honolulu Star-Bulletin*.

Shideler, David W. and Hallett H. Hammatt
2021 *Archaeological Field Inspection and Literature Review to Support Consultation with SHPD for the Department of Hawaiian Home Lands Ho‘olehua Scattered Lots Subdivision and Improvements Project, Pālā‘au Ahupua‘a, Moloka‘i District, Moloka‘i Island,TMKs: [2] 5-2-005:031, Lot 17 and [2] 5-2-026:014, Lot 104D-1.* Cultural Surveys Hawai‘i, Inc., Kailua, Hawai‘i.

State of Hawai‘i
2008 Molokai Airport. State of Hawai‘i website: http://hawaii.gov/hawaiiaviation/hawaii-airfields-airports/molokai/molokai-airport (accessed 2008).

Stearns, Harold T. and Gordon A. Macdonald
1947 *Geology and Ground-Water Resources of the Island of Molokai, Hawaii*. Vol. Bulletin 11. U.S. Geological Survey, United States Department of the Interior, Honolulu.

Stokes, John F.G.
1909 Heiaus of Molokai, Molokai Survey Field Notebook, Honolulu.

Strazar, Marie D.
2000 *Moloka‘i in History: A Guide to the Resources*. History and Humanities Program of the Hawai‘i State Foundation on Culture and the Arts, Honolulu.

Summers, Catherine C.
1964 *Hawaiian Fishponds.* Bishop Special Publication 52, Bernice Pauahi Bishop Museum, Honolulu.
1971 *Molokai: A Site Survey*. Anthropology Department, Bernice Pauahi Bishop Museum, Honolulu.

Tomich, Prosper Quentin
1986 *Mammals in Hawaii: A Synopsis and Notational Bibliography*. Second edition. Bishop Museum Press, Honolulu.

Tomonari-Tuggle, M.J.
1990 *Archaeological Inventory Survey of a Portion of Kalama‘ula. Island of Moloka‘i*. International Archaeological Research Institute, Inc., Honolulu.

Ulukau
2014 *Māhele Database.* Hawaiian Electronic Library, http://ulukau.org/cgi-bin/vicki?l=en.

USDA (U.S. Department of Agriculture, Natural Resources Conservation Service)
2006 Soil Survey Geographic (SSURGO) database for Island of Molokai, Hawaii (hi980). U.S. Department of Agriculture, Natural Resources Conservation Service.

USGS (U.S. Geological Survey)
1922 Kualapuu USGS 7.5-minute topographic quadrangle. USGS Information Services, Denver, Colorado.
1950 USGS aerial photograph of Molokai. USGS Information Services, Denver, Colorado.
1952 Kaunakakai and Molokai Airport USGS 7.5-minute topographic quadrangles. USGS Information Services, Denver, Colorado.
1964 USGS aerial photograph of Molokai. USGS Information Services, Denver, Colorado.
1967 Kaunakakai USGS 7.5-minute topographic quadrangle. USGS Information Services, Denver, Colorado.
1968 Molokai Airport USGS 7.5-minute topographic quadrangle. USGS Information Services, Denver, Colorado.
1983 Molokai West USGS 7.5-minute topographic quadrangle. USGS Information Services, Denver, Colorado.

1993 Kaunakakai and Molokai Airport 7.5-minute topographic quadrangles. USGS Information Services, Denver, Colorado.

Vancouver, George
1798 *A Voyage of Discovery to the North Pacific Ocean, and Round the World; in Which the Coast of North-West America Has Been Carefully Examined and Accurately Surveyed. Undertaken by His Majesty’s Command, Principally with a View to Ascertain the Existence of Any Navigable* Communication *between the North Pacific and North Atlantic Oceans; and Performed in the Years 1790, 1791, 1792, 1793, 1794, and 1795, in the “Discovery” Sloop of War, and Armed Tender “Chatham.”* Three vols. G. G. & J. Robinson, Paternaster Row; and J. Edwards, Pall-Mall., London.

Vizenor, Gerald
1999 *Manifest Manners: Narratives on Postindian Survivance*. University of Oklahoma Press, Lincoln, Oklahoma.

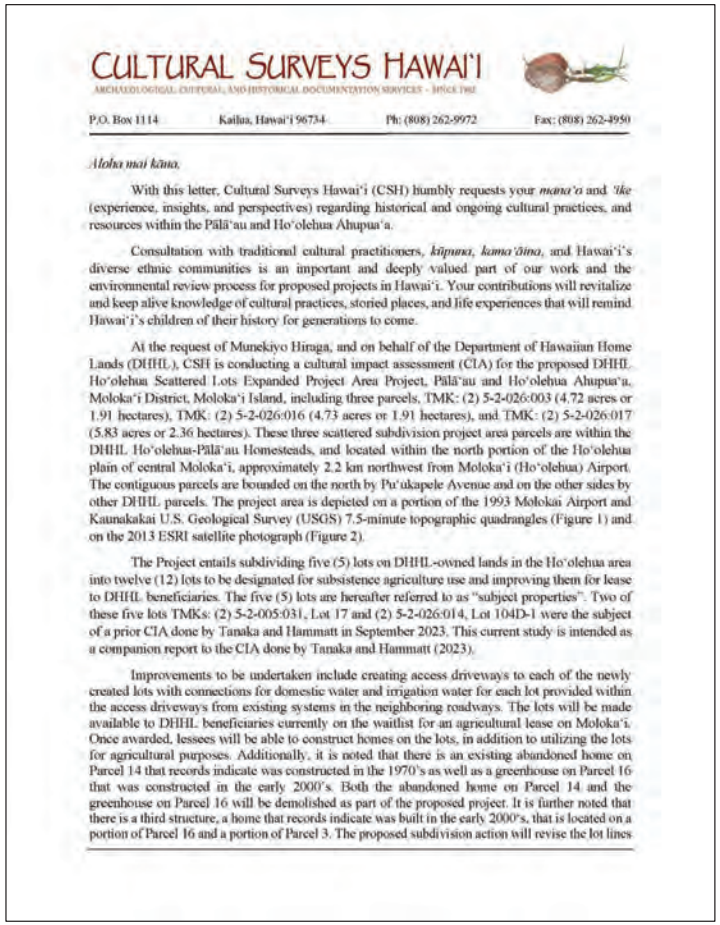
Waihona ‘Aina
2021 Mahele Database. Waihona ‘Aina Corporation.

Westervelt, William Drake
1916 *Hawaiian Legends of Volcanoes.* Ellis Press, Boston, Massachusetts and Constable & Company, London, Great Britain.

Wiebke, Henry
1940 History Of Agriculture On Molokai Is Presented. *Maui News* 30 March. Wailuku, Hawai‘i.

Young, Charles C.
1961 Molokai Electric's George Will Has Guided Firm Since Inception. *Honolulu Star-Bulletin.* Honolulu

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 kāua,

With this letter, Cultural Surveys Hawai'i (CSH) humbly requests your *mana'o* and *'ike* (experience, insights, and perspectives) regarding historical and ongoing cultural practices, and resources within the Pālā'au and Ho'olehua Ahupua'a.

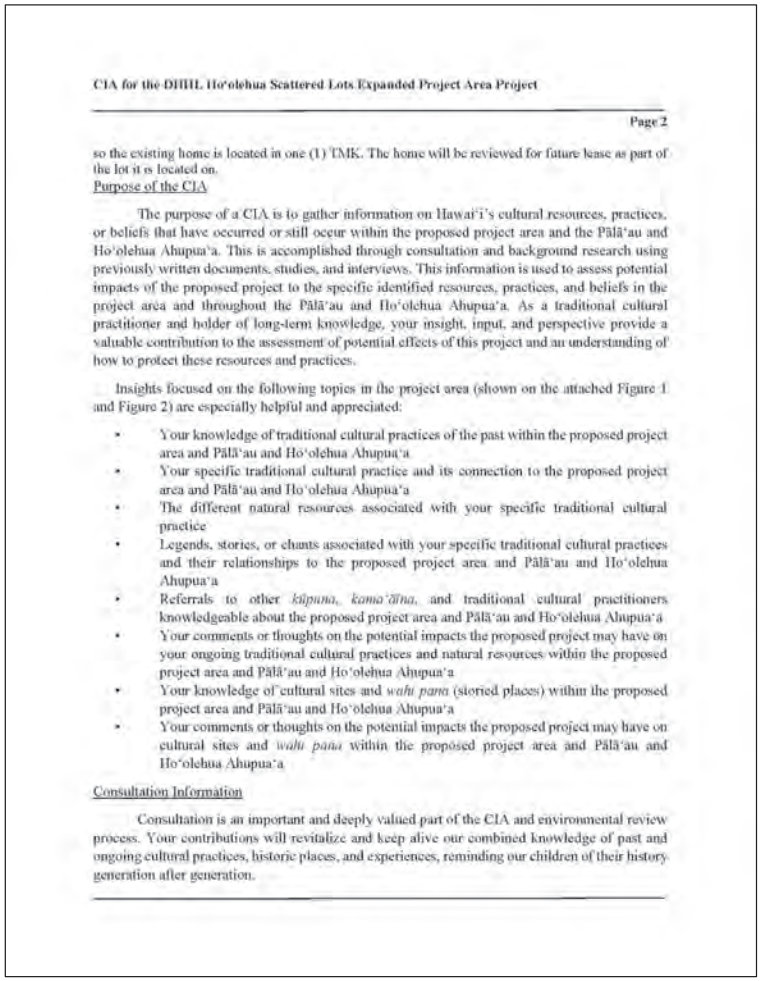
Consultation with traditional cultural practitioners, *kūpuna*, *kama'āina*, and Hawai'i's diverse ethnic communities is an important and deeply valued part of our work and the environmental review process for proposed projects in Hawai'i. Your contributions will revitalize and keep alive knowledge of cultural practices, storied places, and life experiences that will remind Hawai'i's children of their history for generations to come.

At the request of Munekiyo Hiraga, and on behalf of the Department of Hawaiian Home Lands (DHHL), CSH is conducting a cultural impact assessment (CIA) for the proposed DHHL Ho'olehua Scattered Lots Expanded Project Area Project, Pālā'au and Ho'olehua Ahupua'a, Moloka'i District, Moloka'i Island, including three parcels, TMK: (2) 5-2-026:003 (4.72 acres or 1.91 hectares), TMK: (2) 5-2-026:016 (4.73 acres or 1.91 hectares), and TMK: (2) 5-2-026:017 (5.83 acres or 2.36 hectares). These three scattered subdivision project area parcels are within the DHHL Ho'olehua-Pālā'au Homesteads, and located within the north portion of the Ho'olehua plain of central Moloka'i, approximately 2.2 km northwest from Moloka'i (Ho'olehua) Airport. The contiguous parcels are bounded on the north by Pu'ukapele Avenue and on the other sides by other DHHL parcels. The project area is depicted on a portion of the 1993 Molokai Airport and Kaunakakai U.S. Geological Survey (USGS) 7.5-minute topographic quadrangles (Figure 1) and on the 2013 ESRI satellite photograph (Figure 2).

The Project entails subdividing five (5) lots on DHHL-owned lands in the Ho'olehua area into twelve (12) lots to be designated for subsistence agriculture use and improving them for lease to DHHL beneficiaries. The five (5) lots are hereafter referred to as "subject properties". Two of these five lots TMKs: (2) 5-2-005:031, Lot 17 and (2) 5-2-026:014, Lot 104D-1 were the subject of a prior CIA done by Tanaka and Hammatt in September 2023. This current study is intended as a companion report to the CIA done by Tanaka and Hammatt (2023).

Improvements to be undertaken include creating access driveways to each of the newly created lots with connections for domestic water and irrigation water for each lot provided within the access driveways from existing systems in the neighboring roadways. The lots will be made available to DHHL beneficiaries currently on the waitlist for an agricultural lease on Moloka'i. Once awarded, lessees will be able to construct homes on the lots, in addition to utilizing the lots for agricultural purposes. Additionally, it is noted that there is an existing abandoned home on Parcel 14 that records indicate was constructed in the 1970's as well as a greenhouse on Parcel 16 that was constructed in the early 2000's. Both the abandoned home on Parcel 14 and the greenhouse on Parcel 16 will be demolished as part of the proposed project. It is further noted that there is a third structure, a home that records indicate was built in the early 2000's, that is located on a portion of Parcel 16 and a portion of Parcel 3. The proposed subdivision action will revise the lot lines

Figure 25. Community outreach letter page one



CIA for the DHHL Ho'olehua Scattered Lots Expanded Project Area Project

Page 2

so the existing home is located in one (1) TMK. The home will be reviewed for future lease as part of the lot it is located on.

Purpose of the CIA

The purpose of a CIA is to gather information on Hawai'i's cultural resources, practices, or beliefs that have occurred or still occur within the proposed project area and the Pālā'au and Ho'olehua 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 to the specific identified resources, practices, and beliefs in the project area and throughout the Pālā'au and Ho'olehua Ahupua'a. As a traditional cultural practitioner and holder of long-term 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 project 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 project area and Pālā'au and Ho'olehua Ahupua'a
- Your specific traditional cultural practice and its connection to the proposed project area and Pālā'au and Ho'olehua 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 project area and Pālā'au and Ho'olehua Ahupua'a
- Referrals to other *kūpuna*, *kama'āina*, and traditional cultural practitioners knowledgeable about the proposed project area and Pālā'au and Ho'olehua 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 project area and Pālā'au and Ho'olehua Ahupua'a
- Your knowledge of cultural sites and *wahi pana* (storied places) within the proposed project area and Pālā'au and Ho'olehua Ahupua'a
- Your comments or thoughts on the potential impacts the proposed project may have on cultural sites and *wahi pana* within the proposed project area and Pālā'au and Ho'olehua Ahupua'a

Consultation Information

Consultation is an important and deeply valued part of the CIA and environmental review process. 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.

Figure 26. Community outreach letter page two

CIA for the DHHL Ho‘olehua Scattered Lots Expanded Project Area Project

Page 3

With your agreement to participate in this study, your contributions will become part of the comprehensive understanding of traditions of the area and will be part of the public record. The study will be included as an appendix of the Environmental Assessment (EA), which is being prepared for the proposed project; the EA and CIA will be available for future access through the State Office of Planning and Sustainable Development (OPSD) Environmental Review Program (ERP) (https://planning.hawaii.gov/erp) and at the State Historic Preservation Division Library (https://dlnr.hawaii.gov/shpd/about/research-resources-library).

As a part of this process, your knowledge may be used to inform future CIAs and other heritage studies of cultural practices and resources that need protection from impacts of proposed future projects. If you engage in consultation, and the *mana‘o* and *‘ike* you provide appears 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 effect of the project on traditional practices in the project area and Pālā‘au 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 Tehani Baculpo by email at tbaculpo@culturalsurveys.com or phone at (808) 965-6478.

Mahalo nui loa for your time and attention to this request for consultation.

Tehani Baculpo

CSH Cultural Researcher

Figure 27. Community outreach letter page three

CIA for the DHHL Ho‘olehua Scattered Lots Expanded Project Area Project

Page 4

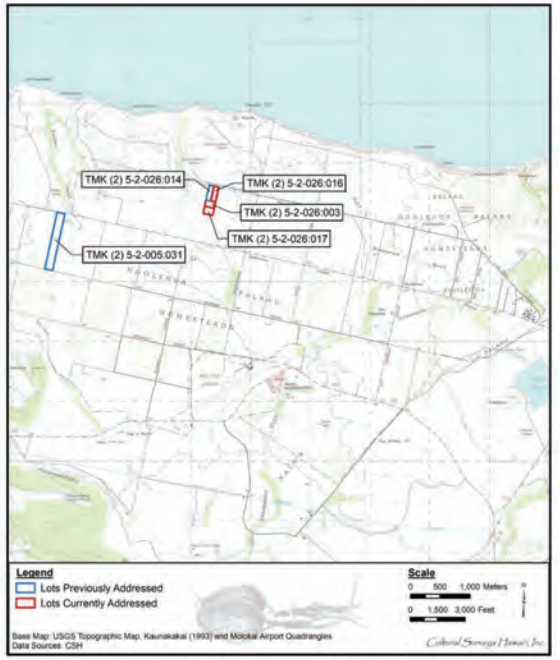


Figure 1. Portion of the 1993 Molokai Airport and Kaunakakai USGS 7.5-minute topographic quadrangles showing the location(s) of the three “Scattered Lots” presently addressed (in red) as well as the two previously addressed “Scattered Lots” (in blue)

Figure 28. Community outreach letter page four

Figure 29. Community outreach letter page five

APPENDIX

G

LIMITED HAZARDOUS MATERIAL SURVEY

Letter Report

Limited Hazardous Materials Survey

Old Residence and Greenhouse
4011 Puu Kapele Avenue,
Kaunakakai, Molokai, Hawaii

PREPARED FOR:
State of Hawaii, Department of Hawaiian Home Lands
91-5420 Kapolei Parkway
Kapolei, Hawaii 96707

UNDER SUBCONTRACT TO:
R.M. Towill Corporation
2024 North King Street, Suite 200
Honolulu, Hawaii 96819

PREPARED BY:
Element Environmental, LLC
98-030 Hekaha Street, Unit 9
Aiea, Hawaii 96701

element environmental llc
environmental · engineering · water resources

September 21, 2023

Mr. Gordon Ring, P.E.
R. M. Towill Corporation
2024 North King Street, Suite 200
Honolulu, Hawaii 96819

Subject: **Letter Report: Limited Hazardous Materials Survey**
Old Residence and Greenhouse, 4011 Puu Kapele Avenue
Kaunakakai, Molokai, Hawaii

Dear Mr. Ring:

Element Environmental, LLC (E2) is pleased to submit this Limited Hazardous Materials Survey letter report describing the targeted activities completed to evaluate the presence/absence of select hazardous materials within the old residence and greenhouse (to be demolished) located at 4011 Puu Kapele Avenue in Kaunakakai, Molokai, Hawaii (hereinafter referred to as *the project site*). E2 was subcontracted by R.M. Towill Corporation (RMTC), who is contracted by the State of Hawaii, Department of Hawaiian Home Lands (DHHL). E2 conducted fieldwork on June 29, 2023. Site access was granted by the DHHL through coordination with the RMTC.

Aside from real property assessment records for the new residence (to remain) and greenhouse, no pertinent documents and available previous survey reports were provided by the DHHL or RMTC. The greenhouse, primarily constructed with wood, was listed as being approximately 3,196 square feet (sf) in size with a 596-sf Storage and 84-sf Refrigerator (walk-in type).

The limited hazardous materials survey included sampling and testing of suspect asbestos-containing materials (ACM), arsenic in suspect canec panels, and lead in paint; and visual inventory for polychlorinated biphenyls (PCBs) and mercury in fluorescent light fixtures. The survey was limited to samples that could be collected from only readily observable and safely accessible materials. Invasive inspections, such as opening up wall cavities or the destruction of materials to access hidden materials, were not performed. E2 did not enter confined spaces, or any areas deemed to present a risk to health and safety. Only construction materials incorporated into the structure of the buildings were surveyed. Much of the roofing at the old residence had caved in, so areas under the unstable roofing were not accessed. The fieldwork did not include the inspection or inventory of any of the debris (e.g., machinery, tires, containers, etc.) or any soil sampling at the project site.

Sample data tables, location figures, and photographs are provided in Appendices A, B, and C, respectively. Analytical laboratory reports are provided in Appendix D.

1.0 ASBESTOS SURVEY

The limited asbestos survey was conducted in general accordance with U.S. Environmental Protection Agency (EPA) 40 Code of Federal Regulations (CFR) 763 Asbestos and the State of Hawaii, Department of Health (HDOH), Hawaii Administrative Rules (HAR) 11-501 Asbestos Requirements. The asbestos survey consisted of the collection of bulk samples from observed accessible suspect building components. HAs,

which are suspect ACM that appear uniform in color, texture, and function, were identified. The asbestos inspectors (Joshua Agpaoa [HIASB-4791] and Bernice Balete [HIASB-0449]) are certified in accordance with the inspector training requirements of the Asbestos Hazard Emergency Response Act (AHERA) and the HDOH Asbestos Inspector Certification Program HAR 11-504. E2 is registered with the HDOH, Asbestos Section, as an asbestos entity (#A-0120).

SGS Forensic Laboratories (SGS) in Carson, California, who analyzed the bulk samples, is registered with the HDOH, Asbestos Section, as an asbestos laboratory (#L-06-002). SGS is accredited by the American Industrial Hygiene Association (AIHA, #101629) under the Industrial Hygiene Laboratory Accreditation Program (IHLAP) for asbestos/fiber microscopy core, and the National Voluntary Laboratory Accreditation Program (NVLAP, #101459-1) for bulk asbestos fiber analysis. Samples were analyzed by polarized light microscopy (PLM) with dispersion staining, in accordance with EPA Method 600/R-93/116, Visual Area Estimation, for standard building materials.

Results were compared to the standard presence/absence criteria for asbestos, i.e., materials containing over 1% asbestos are considered ACM. No asbestos was detected in the samples collected from the following eight HAs.

- concrete floors and pads at the Old Residence and Greenhouse Storage
- concrete cover on the Septic Tank
- walls sealant at the Greenhouse Storage
- wall (and ceiling) insulation (labeled Thermal and Sound Control) in the walk-in Refrigerator at the Greenhouse Storage
- fiberboard walls (fallen) at the Old Residence
- asphalt shingle roofing/tar paper at the Old Residence and Greenhouse Shed

Inaccessible and/or hidden suspect materials not sampled during this field effort, or uncovered during the demolition work, should be assumed ACM and managed as such until sampled and proven otherwise. ACM that will be encountered and/or generated during future demolition at the project site will require proper handling, removal, and/or disposal by trained workers in accordance with the Occupational Safety and Health Administration (OSHA) Asbestos Standard 29 CFR 1926.1101, Hawaii Occupational Safety and Health (HIOSH) rules and regulations, EPA National Emission Standard for Asbestos 40 CFR 61-Subpart M, and 40 CFR 763 Asbestos. At least ten (10) working days before demolition or disturbance of friable asbestos above reportable quantities, a "Notification of Demolition and Renovation" must be sent to the HDOH. The proposed landfill should be consulted as to their requirements and procedures for the disposal of ACM at their facility.

2.0 LEAD PAINT SURVEY

The limited paint survey was conducted in general accordance with U.S. Department of Housing and Urban Development (HUD) Guidelines for the Evaluation and Control of lead-based paint (LBP) Hazards in Housing and HAR Chapter 11-41. The limited lead paint survey consisted of the collection of paint samples of building components with paint in poor condition only. Five paint chip samples were collected. The paint inspectors (Joshua Agpaoa [PB-1137] and Bernice Balete [PB-0449]) are certified by the HDOH Lead Activities Inspector Certification Program. E2 is registered with the HDOH as an LBP activities entity (#PBF-0032).

SGS Carson, California, who analyzed the paint chip samples, is accredited by the AIHA under the Environmental Laboratory Accreditation Program (ELAP, #1366). Samples were analyzed for total lead by Inductively Coupled Plasma – Atomic Emission Spectrometry (ICP-AES), in accordance with EPA Methods 3050B/6010B.

Results were compared to standard presence/absence criteria for lead, i.e., paint containing 0.5% or more by weight or 5,000 milligrams per kilogram (mg/kg) or more of total lead were considered LBP. Paint with any detectable amount of lead is considered lead-containing paint (LCP). Both LBP and LCP are worker protection issues. The paint samples, collected from paint in poor condition, contained detectable concentrations of lead ranging from 0.009 to 2 mg/kg and are considered LCP. (For comparison, the U.S. Consumer Product Safety Improvement Act, 16 CFR 1303.101 allows no more than 100 mg/kg or 0.01% of total lead content in accessible parts of children's products.)

Lead paint/debris that will be encountered and/or generated at the project site will require proper handling, removal, and/or disposal in accordance with OSHA Lead in Construction Standard 29 CFR 1926.62 and HIOSH rules and regulations. Appropriate worker protection measures for lead should be taken during the demolition work to limit lead exposure of personnel and releases to the environment.

Metal debris (with intact paint) should be recycled when possible to decrease the amount of waste taken to the landfill and to possibly minimize the likelihood of the Toxicity Characteristic Leaching Procedure (TCLP) samples exceeding leaching criteria, 40 CFR 261 Identification and Listing of Hazardous Waste. A representative TCLP sample(s) of the remaining waste stream(s) will need to be collected and analyzed prior to landfill acceptance. The landfill should be consulted as to their requirements and procedures for the disposal of lead-contaminated waste and debris at their facility.

3.0 CANEC SURVEY

Canec is the common name for a fiberboard building material that was made from sugar cane bagasse, the residual fiber that remains after the juice has been extracted from the sugar cane. Canec contains arsenic in the range of approximately 1,000 to 4,000 mg/kg. Canec was not observed at the project site at the time of the field effort.

Inaccessible and/or hidden suspect arsenic-containing materials not sampled during this field effort should be presumed arsenic-containing until sampled and proven otherwise. Prior to demolition, arsenic-containing canec should be removed whole, segregated, wrapped in plastic or placed in plastic bags during transportation, and disposed of similarly to asbestos at a permitted landfill facility. Canec building materials are exempt from State laws requiring a hazardous waste determination to be made prior to disposal. As a result of this exemption, testing canec for arsenic content or leaching characteristics is not required by the State for disposal. The exemption applies whenever canec building materials are segregated from other building materials and disposed of separately. When canec is mixed with other building demolition waste, the combined waste could be subject to hazardous waste determination before disposal. The permitted landfill should be notified prior to disposal of canec materials so the canec can be appropriately segregated or handled in a manner to prevent landfill employees from being exposed during their operations.

4.0 FLUORESCENT LIGHT FIXTURE VISUAL INVENTORY

The Toxic Substances Control Act (TSCA) banned the production of PCBs in 1976 in the U.S. In fluorescent light fixtures, PCBs are usually found in ballasts either within small capacitors or in the form of a black tar like compound. The following guidelines are used to determine if the ballasts contain PCBs:

- All ballasts manufactured before July 1, 1978 are assumed to contain PCBs;
- Ballasts manufactured after July 1, 1978 that do not contain PCBs should be labeled "No PCBs" by the manufacturer in accordance with the federal regulations; and
- If a ballast is not labeled "No PCBs", it is best to assume that it contains PCBs.

E2 conducted a visual inventory for suspect PCBs in fluorescent light fixture ballasts and the accompanying mercury-containing fluorescent lamps or compact fluorescent light (CFL) bulbs. Only one fluorescent light fixture was observed in the greenhouse; it contained a ballast that was labeled "No PCBs" and one green-banded lamp, which has lower amounts of mercury than regular fluorescent lamps.

If a ballast is not labeled "No PCBs", it is assumed to contain PCBs. PCB debris encountered and/or generated at the project site will require proper handling, removal, and/or disposal in accordance with OSHA PCB Standards 29 CFR 1910.1000 and 40 CFR 761. Appropriate worker protection measures should be taken during the demolition work to limit PCBs and mercury exposure of personnel and releases to the environment. In general, materials containing 50 mg/kg or greater PCBs are regulated under TSCA.

5.0 SUMMARY OF FINDINGS AND RECOMMENDATIONS

The following provides a brief summary of findings and recommendations:

- **Asbestos** was not found in the samples collected during this field effort. No further action is required regarding asbestos unless suspect asbestos materials are uncovered during demolition. Suspect asbestos should be assumed ACM and managed as such until sampled and proven otherwise. Asbestos can be accepted at the Molokai Landfill by appointment only.
- **Lead** levels were very low, ranging from 0.009 to 2 mg/kg, and are considered LCP. Although the paint was peeling, the majority of building components were not painted. Painted metal components can be recycled at Molokai Metals Facility at Molokai Landfill. Otherwise, the demolition debris can be disposed of at Molokai Landfill after TCLP sampling and testing concentrations pass thresholds listed in 40 CFR 261.
- **Canec** was not found in the samples collected during this field effort. No further action is required regarding canec unless uncovered during demolition. Canec should be removed whole, segregated, wrapped in plastic or placed in plastic bags during transportation, and disposed of similarly to asbestos at the Molokai Landfill.
- **Light ballasts** without "No PCBs" labels were not observed during the field effort. Fluorescent lamps and CFLs should be triple bagged and taken to the Molokai Landfill.
- **Other debris:** Propane tanks, tires, auto batteries, and appliances/white goods can be taken to the Molokai Metals Facility at the Molokai Landfill. Used motor oil, paint, computers and TVs, and household batteries can be taken to Recycle Molokai at the Molokai Landfill.

APPENDIX A

Tables

Residence & Greenhouse,
4011 Puu Kapele Avenue
Kaunakakai, Molokai, Hawaii

Laboratory Lead Results

Limited Hazardous Material Survey
Survey Date: June 29, 2023

Sample ID	Sample Location	Sample Description	Condition	Lead (wt%)
4011PKA-P01	Greenhouse	White wood window frame	Poor	ND (< 0.002)
4011PKA-P02	Greenhouse	White fiberboard sump/floor panel	Poor	2
4011PKA-P03	Greenhouse	White wood wall frame	Poor	0.0047
4011PKA-P04	Residence	Yellow wood exterior siding	Poor	0.0009
4011PKA-P05	Residence	Yellow wood exterior siding	Poor	0.002

Residence & Greenhouse,
4011 Puu Kapele Avenue
Kaunakakai, Molokai, Hawaii

Laboratory Asbestos Results

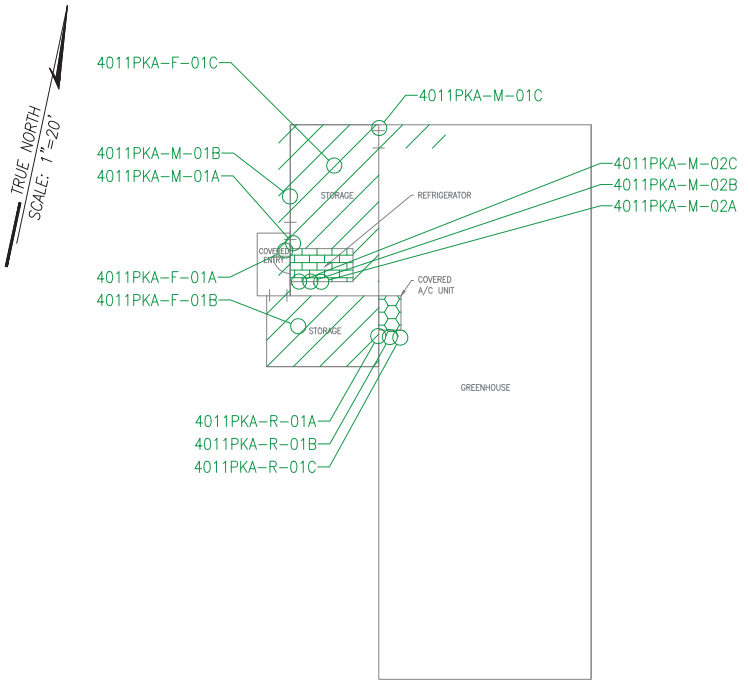
Limited Hazardous Materials Survey
Survey Date: June 29, 2023

Homogeneous Area	Material Type	Material Description	Sample Location	Friable	Condition	Sample ID	Layer (% of Combined Sample)	Asbestos %
4011PKA-F-01	Miscellaneous	Concrete Floor/Pads	Greenhouse Storage	NF	Damaged	4011PKA-F-01A 4011PKA-F-01B 4011PKA-F-01C	100% Grey Cementitious Material with Debris	ND
4011PKA-F-02	Miscellaneous	Concrete Cover	Septic Tank	NF	Intact	4011PKA-F-02A 4011PKA-F-02B 4011PKA-F-02C	100% Grey Cementitious Material with Debris	ND
4011PKA-F-03	Miscellaneous	Concrete Floor/Pads	Residence	NF	Damaged	4011PKA-F-03A 4011PKA-F-03B 4011PKA-F-03C	100% Grey Cementitious Material with Debris	ND
4011PKA-W-01	Miscellaneous	Fiberboard Interior Wall	Residence	Friable	Significantly Damaged	4011PKA-W-01A 4011PKA-W-01B 4011PKA-W-01C	100% Tan Fibrous Material with Debris	ND
4011PKA-M-01	Miscellaneous	Wall Sealant (orange foam)	Greenhouse Storage	Friable	Significantly Damaged	4011PKA-M-01A 4011PKA-M-01B 4011PKA-M-01C	100% Yellow Foam with Debris	ND
4011PKA-M-02	TSI	Wall Insulation (plastic liner over white foam)	Greenhouse Storage	Friable	Significantly Damaged	4011PKA-M-02C	97% White Fibrous Material	ND
							3% Tan Fibrous Mat'l with Tar	ND
						4011PKA-M-02A	97% White Fibrous Material	ND
							3% Tan Fibrous Mat'l with Tar	ND
						4011PKA-M-02B	95% White Fibrous Material	ND
							5% Tan Fibrous Mat'l with Tar	ND
4011PKA-R-01	Miscellaneous	Asphalt Shingle Roofing/Tar Paper (gray)	Greenhouse Shed	NF	Intact	4011PKA-R-01A	100% Black Roof Shingle	ND
						4011PKA-R-01B	75% Black Roof Shingle	ND
							25% Black Felt	ND
						4011PKA-R-01C	93% Black Roof Shingle	ND
							7% Black Tar	ND
4011PKA-R-02	Miscellaneous	Asphalt Shingle Roofing/Tar Paper (gray over tan)	Residence	NF	Significantly Damaged	4011PKA-R-02C	68% Red-Brown Roof Shingle	ND
							30% Black Felt	ND
							2% Black Tar	ND
						4011PKA-R-02A	70% Red-Brown Roof Shingle	ND
							30% Black Tar	ND
						4011PKA-R-02B	70% Red-Brown Roof Shingle	ND
							30% Black Tar	ND

APPENDIX B

Figures

HazMat Survery Puu Kapele Ave.dwg – 8/27/2023 10:47:24 PM



HOMOGENEOUS AREAS.

	F-01	CONCRETE FLOOR/PADS
N/A	M-01	WALL SEALANT (ORANGE FOAM)
	M-02	WALL & CEILING INSULATION (PLASTIC LINER OVER WHITE FOAM)
	R-01	ASPHALTIC SHINGLE ROOFING AND TAR PAPER (GRAY)

SAMPLE LOCATIONS

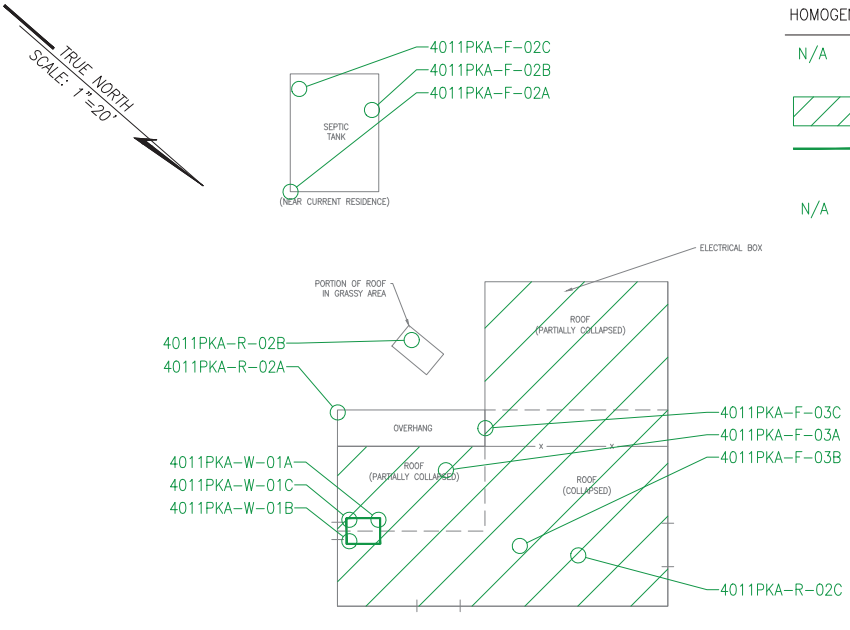
○ NEGATIVE ASBESTOS

20' 0 20' 40'

SCALE: 1"=20'

SURVEY DATE: JUNE 29, 2023	PROJECT TITLE: LIMITED HAZARDOUS MATERIALS SURVEY 4011 PUU KAPELE AVENUE KAUNAKAKAI, MOLOKAI, HAWAII	
FIGURE TITLE: GREENHOUSE APPROXIMATE ASBESTOS BULK SAMPLE LOCATIONS & RESULTS		FIGURE NO.: 1-2

HazMat Survery Puu Kapele Ave.dwg – 8/27/2023 10:45:11 PM



HOMOGENEOUS AREAS.

N/A	F-02	CONCRETE COVER FOR SEPTIC TANK
	F-03	CONCRETE FLOOR/PADS
	W-01	FIBERBOARD INTERIOR WALL (FALLEN ON FLOOR)
N/A	R-02	ASPHALTIC SHINGLE ROOFING AND TAR PAPER (GRAY OVER TAN)

SAMPLE LOCATIONS

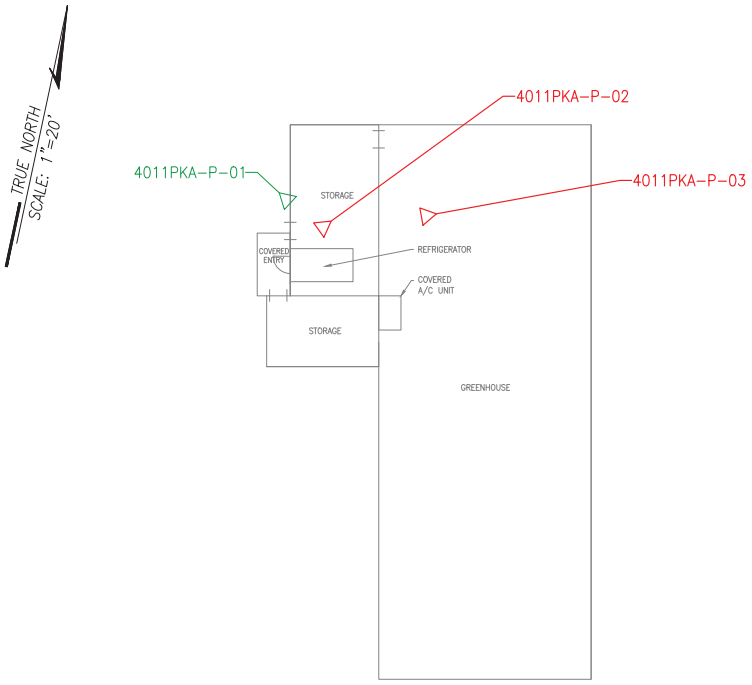
○ NEGATIVE ASBESTOS

20' 0 20' 40'

SCALE: 1"=20'

SURVEY DATE: JUNE 29, 2023	PROJECT TITLE: LIMITED HAZARDOUS MATERIALS SURVEY 4011 PUU KAPELE AVENUE KAUNAKAKAI, MOLOKAI, HAWAII	
FIGURE TITLE: RESIDENCE & SEPTIC TANK APPROXIMATE ASBESTOS BULK SAMPLE LOCATIONS & RESULTS		FIGURE NO.: 1-1

HazMat Survery Puu Kapele Ave.dwg – 8/27/2023 10:43:41 PM



PAINT SAMPLES

P-01	WHITE WOOD WINDOW FRAME
P-02	WHITE FIBERBOARD PANEL SUMP/FLOOR PANEL
P-03	WHITE WOOD WALL FRAME

SAMPLE LOCATIONS

△ NON-LEAD

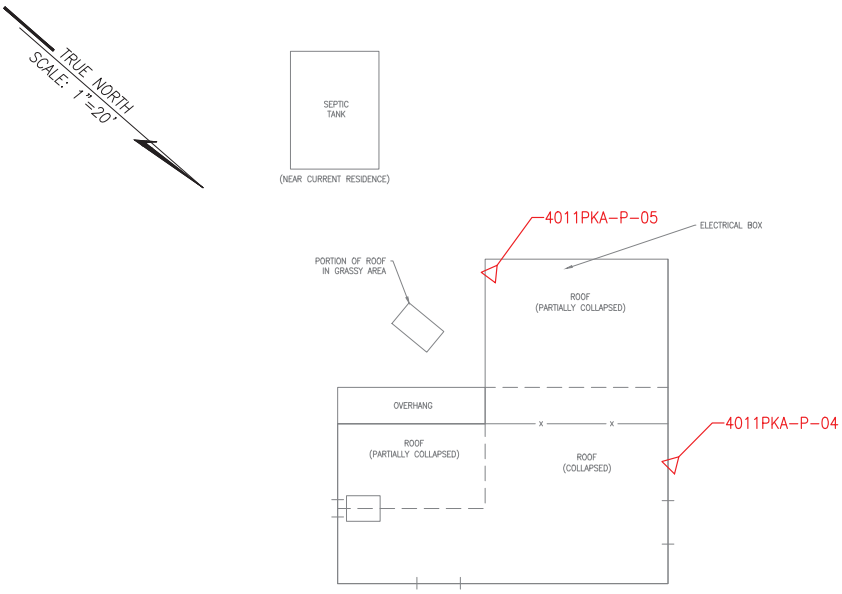
△ LEAD-CONTAINING PAINT

20' 0 20' 40'

SCALE: 1"=20'

	SURVEY DATE: JUNE 29, 2023	PROJECT TITLE: LIMITED HAZARDOUS MATERIALS SURVEY 4011 PUU KAPELE AVENUE KAUNAKAKAI, MOLOKAI, HAWAII
	FIGURE TITLE: GREENHOUSE APPROXIMATE PAINT CHIP SAMPLE LOCATIONS & RESULTS	FIGURE NO.: 1-4

HazMat Survery Puu Kapele Ave.dwg – 8/27/2023 11:52:21 PM



PAINT SAMPLES

P-04	YELLOW WOOD EXTERIOR SIDING
P-05	YELLOW WOOD EXTERIOR SIDING

SAMPLE LOCATIONS

△ LEAD-CONTAINING PAINT

20' 0 20' 40'

SCALE: 1"=20'

	SURVEY DATE: JUNE 29, 2023	PROJECT TITLE: LIMITED HAZARDOUS MATERIALS SURVEY 4011 PUU KAPELE AVENUE KAUNAKAKAI, MOLOKAI, HAWAII
	FIGURE TITLE: RESIDENCE APPROXIMATE PAINT CHIP SAMPLE LOCATIONS & RESULTS	FIGURE NO.: 1-3

APPENDIX C

Photographs

Greenhouse, 4011 Puu Kapele Avenue,
Molokai, Hawaii (June 29, 2023)

Photo 1 - 4011PKA-F-01A (Close-up)
[JA\JA003521.JPG]

Photo 2 - 4011PKA-F-01A (Panoramic)
[JA\JA003523.JPG]

Photo 3 - 4011PKA-F-01B (Close-up)
[JA\JA003524.JPG]

Photo 4 - 4011PKA-F-01B (Panoramic)
[JA\JA003526.JPG]

Photo 5 - 4011PKA-F-01C (Close-up)
[JA\JA003529.JPG]

Photo 6 - 4011PKA-F-01C (Panoramic)
[JA\JA003530.JPG]

Septic Tank, 4011 Puu Kapele Avenue,
Molokai, Hawaii (June 29, 2023)

Photo 7 - 4011PKA-F-02A (Close-up)
[JA\JA003552.JPG]

Photo 8 - 4011PKA-F-02A (Panoramic)
[JA\JA003553.JPG]

Photo 9 - 4011PKA-F-02B (Close-up)
[JA\JA003554.JPG]

Photo 10 - 4011PKA-F-02B (Panoramic)
[JA\JA003556.JPG]

Photo 11 - 4011PKA-F-02C (Close-up)
[JA\JA003558.JPG]

Photo 12 - 4011PKA-F-02C (Panoramic)
[JA\JA003559.JPG]

Residence, 4011 Puu Kapele Avenue,
Molokai, Hawaii (June 29, 2023)

Photo 13 - 4011PKA-F-03A (Close-up)
[JA\JA003580.JPG]

Photo 14 - 4011PKA-F-03A (Panoramic)
[JA\JA003581.JPG]

Photo 15 - 4011PKA-F-03B (Close-up)
[JA\JA003563.JPG]

Photo 16 - 4011PKA-F-03B (Panoramic)
[JA\JA003565.JPG]

Photo 17 - 4011PKA-F-03C (Close-up)
[JA\JA003567.JPG]

Photo 18 - 4011PKA-F-03C (Panoramic)
[JA\JA003569.JPG]

Residence, 4011 Puu Kapele Avenue,
Molokai, Hawaii (June 29, 2023)

Photo 19 - 4011PKA-W-01A (Close-up)
[BB\DSCN9838.JPG]

Photo 20 - 4011PKA-W-01ABC (Panoramic)
[BB\DSCN9842.JPG]

Photo 21 - 4011PKA-W-01B (Panoramic)
[BB\DSCN9839.JPG]

Photo 22 - 4011PKA-W-01C (Close-up)
[BB\DSCN9840.JPG]

Greenhouse, 4011 Puu Kapele Avenue,
Molokai, Hawaii (June 29, 2023)

Photo 23 - 4011PKA-M-01A (Close-up)
[BB\DSCN9805.JPG]

Photo 24 - 4011PKA-M-01A (Panoramic)
[BB\DSCN9808.JPG]

Photo 25 - 4011PKA-M-01B (Close-up)
[BB\DSCN9809.JPG]

Photo 26 - 4011PKA-M-01B (Panoramic)
[BB\DSCN9810.JPG]

Photo 27 - 4011PKA-M-01C (Close-up)
[BB\DSCN9812.JPG]

Photo 28 - 4011PKA-M-01C (Panoramic)
[BB\DSCN9813.JPG]

Greenhouse, 4011 Puu Kapele Avenue,
Molokai, Hawaii (June 29, 2023)

Photo 29 - 4011PKA-M-02A (Close-up)
[JA\JA003538.JPG]

Photo 30 - 4011PKA-M-02ABC (Panoramic)
[JA\JA003541.JPG]

Photo 31 - 4011PKA-M-02B (Close-up)
[JA\JA003539.JPG]

Photo 32 - 4011PKA-M-02C (Close-up)
[JA\JA003540.JPG]

Greenhouse, 4011 Puu Kapele Avenue,
Molokai, Hawaii (June 29, 2023)

Photo 33 - 4011PKA-R-01A (Close-up)
[JA\JA003545.JPG]

Photo 34 - 4011PKA-R-01ABC (Panoramic)
[JA\JA003551.JPG]

Photo 35 - 4011PKA-R-01B (Close-up)
[JA\JA003546.JPG]

Photo 36 - 4011PKA-R-01C (Close-up)
[JA\JA003547.JPG]

Residence, 4011 Puu Kapele Avenue,
Molokai, Hawaii (June 29, 2023)

Photo 37 - 4011PKA-R-02A (Close-up)
[JA\JA003578.JPG]

Photo 38 - 4011PKA-R-02A (Panoramic)
[JA\JA003577.JPG]

Photo 39 - 4011PKA-R-02B (Close-up)
[JA\JA003572.JPG]

Photo 40 - 4011PKA-R-02B (Panoramic)
[JA\JA003573.JPG]

Photo 41 - 4011PKA-R-02C (Close-up)
[JA\JA003575.JPG]

Photo 42 - 4011PKA-R-02C (Panoramic)
[JA\JA003579.JPG]

Greenhouse, 4011 Puu Kapele Avenue,
Molokai, Hawaii (June 29, 2023)

Photo 43 - 4011PKA-P-01 (Close-up)
[BB\DSCN9796.JPG]

Photo 44 - 4011PKA-P-01 (Panoramic)
[BB\DSCN9797.JPG]

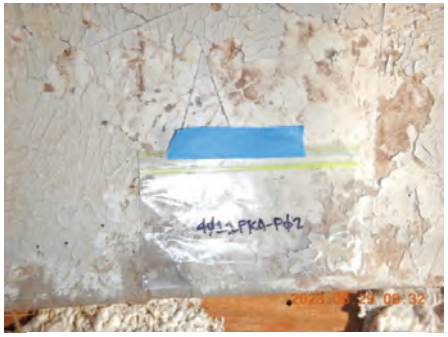


Photo 45 - 4011PKA-P-02 (Close-up)
[BB\DSCN9798.JPG]

Photo 46 - 4011PKA-P-02 (Panoramic)
[BB\DSCN9799.JPG]

Photo 47 - 4011PKA-P-03 (Close-up)
[BB\DSCN9802.JPG]

Photo 48 - 4011PKA-P-03 (Panoramic)
[BB\DSCN9803.JPG]

Residence, 4011 Puu Kapele Avenue,
Molokai, Hawaii (June 29, 2023)

Photo 49 - 4011PKA-P-04 (Close-up)
[BB\DSCN9834.JPG]

Photo 50 - 4011PKA-P-04 (Panoramic)
[BB\DSCN9835.JPG]

Photo 51 - 4011PKA-P-05 (Close-up)
[BB\DSCN9836.JPG]

Photo 52 - 4011PKA-P-05 (Panoramic)
[BB\DSCN9837.JPG]

APPENDIX D

Laboratory Reports

SGS FORENSIC LABORATORIES

Final Report

Bulk Asbestos Analysis

(EPA Method 40CFR, Part 763, Appendix E to Subpart E and EPA 600/R-93-116, Visual Area Estimation)
NVLAP Lab Code: 101459-1

Element Environmental, LLC
Bernice Balete
98-030 Hekaha Street
Unit 9
Aiea, HI 96701

Client ID: L1617
Report Number: B350008
Date Received: 07/17/23
Date Analyzed: 07/31/23
Date Printed: 07/31/23
First Reported: 07/31/23

Job ID/Site: 230035; 4011 Puu Kapele Avenue, Molokai, Hawaii

SGSFL Job ID: L1617
Total Samples Submitted: 24
Total Samples Analyzed: 24

Date(s) Collected: 06/29/2023

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
4011PKA-F-01A	51677663						
Layer: Grey Cementitious Material with Debris			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
4011PKA-F-01B	51677664						
Layer: Grey Cementitious Material with Debris			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
4011PKA-F-01C	51677665						
Layer: Grey Cementitious Material with Debris			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
4011PKA-F-02A	51677666						
Layer: Grey Cementitious Material with Debris			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
4011PKA-F-02B	51677667						
Layer: Grey Cementitious Material with Debris			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
4011PKA-F-02C	51677668						
Layer: Grey Cementitious Material with Debris			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
4011PKA-F-03A	51677669						
Layer: Grey Cementitious Material with Debris			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
4011PKA-F-03B	51677670						
Layer: Grey Cementitious Material with Debris			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					

20535 South Belshaw Avenue, Carson, CA 90746 | phone: 310.763.2374 / 800.813.9417 Fax: 310.763.4450 | https://falaboratories.sgs.com

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
4011PKA-F-03C	51677671						
Layer: Grey Cementitious Material with Debris			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
4011PKA-W-01A	51677672						
Layer: Tan Fibrous Material with Debris			**ND**				
Total Composite Values of Fibrous Components: Cellulose (95 %)		**Asbestos (ND)**					
4011PKA-W-01B	51677673						
Layer: Tan Fibrous Material with Debris			**ND**				
Total Composite Values of Fibrous Components: Cellulose (95 %)		**Asbestos (ND)**					
4011PKA-W-01C	51677674						
Layer: Tan Fibrous Material with Debris			**ND**				
Total Composite Values of Fibrous Components: Cellulose (95 %)		**Asbestos (ND)**					
4011PKA-M-01A	51677675						
Layer: Yellow Foam with Debris			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
4011PKA-M-01B	51677676						
Layer: Yellow Foam with Debris			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
4011PKA-M-01C	51677677						
Layer: Yellow Foam with Debris			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
4011PKA-M-02C	51677678						
Layer: White Fibrous Material			**ND**				
Layer: Tan Fibrous Mat'l with Tar			**ND**				
Total Composite Values of Fibrous Components: Cellulose (3 %) Fibrous Glass (95 %)		**Asbestos (ND)**					
4011PKA-M-02A	51677679						
Layer: White Fibrous Material			**ND**				
Layer: Tan Fibrous Mat'l with Tar			**ND**				
Total Composite Values of Fibrous Components: Cellulose (3 %) Fibrous Glass (95 %)		**Asbestos (ND)**					
4011PKA-M-02B	51677680						
Layer: White Fibrous Material			**ND**				
Layer: Tan Fibrous Mat'l with Tar			**ND**				
Total Composite Values of Fibrous Components: Cellulose (3 %) Fibrous Glass (95 %)		**Asbestos (ND)**					

20535 South Belshaw Avenue, Carson, CA 90746 | phone: 310.763.2374 / 800.813.9417 Fax: 310.763.4450 | https://falaboratories.sgs.com

Client Name: Element Environmental, LLC

Report Number: B350008
Date Printed: 07/31/23

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
4011PKA-R-01A	51677681						
Layer: Black Roof Shingle			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace) Fibrous Glass (45 %)		**Asbestos (ND)**					
4011PKA-R-01B	51677682						
Layer: Black Roof Shingle			**ND**				
Layer: Black Felt			**ND**				
Total Composite Values of Fibrous Components: Cellulose (15 %) Fibrous Glass (30 %)		**Asbestos (ND)**					
4011PKA-R-01C	51677683						
Layer: Black Roof Shingle			**ND**				
Layer: Black Tar			**ND**				
Total Composite Values of Fibrous Components: Cellulose (3 %) Fibrous Glass (40 %)		**Asbestos (ND)**					
4011PKA-R-02C	51677684						
Layer: Red-Brown Roof Shingle			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Total Composite Values of Fibrous Components: Cellulose (40 %)		**Asbestos (ND)**					
4011PKA-R-02A	51677685						
Layer: Red-Brown Roof Shingle			**ND**				
Layer: Black Tar			**ND**				
Total Composite Values of Fibrous Components: Cellulose (40 %)		**Asbestos (ND)**					
4011PKA-R-02B	51677686						
Layer: Red-Brown Roof Shingle			**ND**				
Layer: Black Tar			**ND**				
Total Composite Values of Fibrous Components: Cellulose (40 %)		**Asbestos (ND)**					

Tiffani Ludd, Laboratory Supervisor, Carson Laboratory

Note: Limit of Quantification ('LOQ') = 1%. 'Trace' denotes the presence of asbestos below the LOQ. 'ND' = 'None Detected'.

Analytical results and reports are generated by SGS Forensic Laboratories (SGSFL) at the request of and for the exclusive use of the person or entity (client) named on such report. Results, reports or copies of same will not be released by SGSFL to any third party without prior written request from client. This report applies only to the sample(s) tested. Supporting laboratory documentation is available upon request. This report must not be reproduced except in full, unless approved by SGSFL. The client is solely responsible for the use and interpretation of test results and reports requested from SGSFL. This report must not be used by the client to claim product endorsement by NVLAP or any other agency of the U.S. Government. SGSFL is not able to assess the degree of hazard resulting from materials analyzed. SGS Forensic Laboratories reserves the right to dispose of all samples after a period of thirty (30) days, according to all state and federal guidelines, unless otherwise specified. All samples were received in acceptable condition unless otherwise noted.

20535 South Belshaw Avenue, Carson, CA 90746 | phone: 310.763.2374 / 800.813.9417 Fax: 310.763.4450 | https://falaboratories.sgs.com

SGS FORENSIC LABORATORIES

Final Report

Metals Analysis of Bulks - TTLC

(AIHA-LAP, LLC Accreditation, Lab ID #101629)

Element Environmental, LLC
Bernice Balete
98-030 Hekaha Street
Unit 9
Aiea, HI 96701

Client ID: L1617
Report Number: M253437
Date Received: 07/17/23
Date Analyzed: 09/05/23
Date Printed: 09/05/23
First Reported: 09/05/23

Job ID / Site: 230035; 4011 Puu Kapale Avenue, Molokai, Hawaii
Date(s) Collected: 06/26/2023

SGSFL Job ID: L1617
Total Samples Submitted: 1
Total Samples Analyzed: 1

Sample Number	Lab Number	Analyte	Result	Result Units	Reporting Limit*	Method Reference
4011PKA-W-01A	LM254874	As	< 4	mg/kg	4	EPA 3050B/6010B

* The Reporting Limit represents the lowest amount of analyte that the laboratory can confidently detect in the sample, and is not a regulatory level. The Units for the Reporting Limit are the same as the Units for the Final Results.

Beatriz Hinojosa, Laboratory Supervisor, Carson Laboratory

Analytical results and reports are generated by SGS Forensic Laboratories at the request of and for the exclusive use of the person or entity (client) named on such report. Results, reports or copies of same will not be released by SGS Forensic Laboratories to any third party without prior written request from client. This report applies only to the sample(s) tested. Supporting laboratory documentation is available upon request. This report must not be reproduced except in full, unless approved by SGS Forensic Laboratories. The client is solely responsible for the use and interpretation of test results and reports requested from SGS Forensic Laboratories. SGS Forensic Laboratories is not able to assess the degree of hazard resulting from materials analyzed. SGS Forensic Laboratories reserves the right to dispose of all samples after a period of thirty (30) days, according to all state and federal guidelines, unless otherwise specified. Any modifications that have been made to referenced test methods are documented in SGS Forensic Laboratories' Standard Operating Procedures Manual. Sample results have not been blank corrected. Quality control and sample receipt condition were acceptable unless otherwise noted.

Note* Sampling data used in this report was provided by the client as noted on the associated chain of custody form.

20535 South Belshaw Avenue, Carson, CA 90746 | phone: 310.763.2374 / 800.813.9417 Fax: 310.763.4450 | https://falaboratories.sgs.com

SGS FORENSIC LABORATORIES

Analysis Request Form (COC)

Client Name & Address: Element Environmental, LLC
98-030 Hekaha Street, Unit 9
Aiea, Hawaii 96701

Client No.: L1617

PO / Job#: 230035

Date: 6/29/2023

Turn Around Time: Same Day / 1Day / 2Day / 3Day / 4Day / 5Day

☐ PCM: ☐ NIOSH 7400A / ☐ NIOSH 7400B ☐ Rotometer

☒ PLM: ☒ Standard / ☐ Point Count 400 - 1000 / ☐ CARB 435

Contact: Bernice Balete

Phone: (808) 389-4792

E-mail: bbalete@e2hi.com

☐ TEM Air: ☐ AHERA / ☐ Yamate2 / ☐ NIOSH 7402
☐ TEM Bulk: ☐ Quantitative / ☐ Qualitative / ☐ Chatfield
☐ TEM Water: ☐ Potable / ☐ Non-Potable / ☐ Weight %
☐ TEM Dust: ☐ D5755 (microvac) / ☐ D6480 (wipe)

Site Name: 4011 Puu Kapele Avenue

☐ IAQ Particle Identification (PLM LAB) ☐ PLM Opaques/Soot
☐ Particle Identification (TEM LAB) ☐ Special Project

Site Location: Molokai, Hawaii

☐ Metals Analysis Matrix: Method: Analytes:

Comments: **See attached asbestos table for sample information.**

☐ Silica in Air ☐ w/Gravimetry
☐ Quartz Only

Sample ID	Date / Time	Sample Location / Description	FOR AIR SAMPLES ONLY				Sample Area / Air Volume
			Type	Time On/Off	Avg LPM	Total Time	
			A P C				
			A P C				
			A P C				
			A P C				
			A P C				
			A P C				
			A P C				
			A P C				
			A P C				
			A P C				

Sampled By: Josh Agpaoa, BB Date/Time: 6/29/2023 Shipped Via: ☒ Fed Ex ☐ UPS ☐ US Mail ☐ Courier ☐ Drop Off ☐ Other:

Relinquished By: Bernice Balete	Relinquished By:	Relinquished By:
Date / Time: 7/15/2023 @ 1400	Date / Time:	Date / Time:
Received By: Yazmine Cynthia	Received By:	Received By:
Date / Time: 7/17/23 @ 9:30am	Date / Time:	Date / Time:
Condition Acceptable? ☐ Yes ☐ No	Condition Acceptable? ☐ Yes ☐ No	Condition Acceptable? ☐ Yes ☐ No

SGS Forensic Laboratories may subcontract client samples to other SGSFL locations to meet client requests.
San Francisco Office: 3777 Depot Road, Suite 409, Hayward, CA 94545-2761 • Phone: 510/887-8828 • 800/827-3274
Los Angeles Office: 20535 South Belshaw Ave., Carson, CA 90746 • Phone: 310/763-2374 • 888/813-9417
Las Vegas Office: 6765 S. Eastern Avenue, Suite 3, Las Vegas, NV 89119 • Phone: 702/784-0040
Chicago Office: 3020 Woodcreek Drive, Suite C, Downers Grove, IL 60515 • Phone: 341/485-2464

4011 Puu Kapele Avenue,
Molokai, Hawaii
(Asbestos Bulk Samples)

Sample ID	Sample Date	Sample Location	Sample Description
4011PKA-F-01A	6/29/2023	Greenhouse Storage	Concrete Floor/Pads
4011PKA-F-01B	6/29/2023	Greenhouse Storage	Concrete Floor/Pads
4011PKA-F-01C	6/29/2023	Greenhouse Storage	Concrete Floor/Pads
4011PKA-F-02A	6/29/2023	Septic Tank	Concrete Cover
4011PKA-F-02B	6/29/2023	Septic Tank	Concrete Cover
4011PKA-F-02C	6/29/2023	Septic Tank	Concrete Cover
4011PKA-F-03A	6/29/2023	Residence	Concrete Floor/Pads
4011PKA-F-03B	6/29/2023	Residence	Concrete Floor/Pads
4011PKA-F-03C	6/29/2023	Residence	Concrete Floor/Pads
4011PKA-W-01A	6/29/2023	Residence	Fiberboard Interior Wall
4011PKA-W-01B	6/29/2023	Residence	Fiberboard Interior Wall
4011PKA-W-01C	6/29/2023	Residence	Fiberboard Interior Wall
4011PKA-M-01A	6/29/2023	Greenhouse Storage	Wall Sealant (orange foam)
4011PKA-M-01B	6/29/2023	Greenhouse Storage	Wall Sealant (orange foam)
4011PKA-M-01C	6/29/2023	Greenhouse Storage	Wall Sealant (orange foam)
4011PKA-M-02C	6/29/2023	Greenhouse Storage	Wall Insulation (plastic liner over white foam)
4011PKA-M-02A	6/29/2023	Greenhouse Storage	Wall Insulation (plastic liner over white foam)
4011PKA-M-02B	6/29/2023	Greenhouse Storage	Wall Insulation (plastic liner over white foam)
4011PKA-R-01A	6/29/2023	Greenhouse Shed	Asphalt Shingle Roofing/Tar Paper (gray)
4011PKA-R-01B	6/29/2023	Greenhouse Shed	Asphalt Shingle Roofing/Tar Paper (gray)
4011PKA-R-01C	6/29/2023	Greenhouse Shed	Asphalt Shingle Roofing/Tar Paper (gray)
4011PKA-R-02C	6/29/2023	Residence	Asphalt Shingle Roofing/Tar Paper (gray over tan)
4011PKA-R-02A	6/29/2023	Residence	Asphalt Shingle Roofing/Tar Paper (gray over tan)
4011PKA-R-02B	6/29/2023	Residence	Asphalt Shingle Roofing/Tar Paper (gray over tan)

Metals Analysis of Paints

(AIHA-LAP, LLC Accreditation, Lab ID #101629)

Element Environmental, LLC
Bernice Balete
98-030 Hekaha Street
Unit 9
Aiea, HI 96701

Client ID: L1617
Report Number: M252611
Date Received: 07/17/23
Date Analyzed: 08/01/23
Date Printed: 08/02/23
First Reported: 08/02/23

Job ID / Site: 230035;4011 PUU Kapele Avenue; Molokai, Hawaii
Date(s) Collected: 06/29/2023

SGSFL Job ID: L1617
Total Samples Submitted: 5
Total Samples Analyzed: 5

Sample Number	Lab Number	Analyte	Result	Result Units	Reporting Limit*	Method Reference
4011PKA-P01	LM252894	Cd	< 0.002	wt%	0.002	EPA 3050B/6010B
		Cr	< 0.004	wt%	0.004	EPA 3050B/6010B
		Pb	< 0.002	wt%	0.002	EPA 3050B/6010B
Comment:	Insufficient sample mass submitted for Hg analysis.					
4011PKA-P02	LM252895	Cd	< 0.04	wt%	0.04	EPA 3050B/6010B
		Cr	< 0.1	wt%	0.1	EPA 3050B/6010B
		Hg	N/A	N/A	N/A	
		Pb	2.0	wt%	0.05	EPA 3050B/6010B
4011PKA-P03	LM252896	Cd	< 0.0003	wt%	0.0003	EPA 3050B/6010B
		Cr	0.0033	wt%	0.0008	EPA 3050B/6010B
		Pb	0.0047	wt%	0.0004	EPA 3050B/6010B
Comment:	Insufficient sample mass submitted for Hg analysis.					
4011PKA-P04	LM252897	Cd	< 0.0003	wt%	0.0003	EPA 3050B/6010B
		Cr	0.0009	wt%	0.0006	EPA 3050B/6010B
		Pb	0.0009	wt%	0.0003	EPA 3050B/6010B
Comment:	Insufficient sample mass submitted for Hg analysis.					
4011PKA-P05	LM252898	Cd	< 0.0008	wt%	0.0008	EPA 3050B/6010B
		Cr	< 0.002	wt%	0.002	EPA 3050B/6010B
		Pb	0.002	wt%	0.001	EPA 3050B/6010B
Comment:	Insufficient sample mass submitted for Hg analysis.					

20535 South Belshaw Avenue, Carson, CA 90746 | phone: 310.763.2374 / 800.813.9417 Fax: 310.763.4450 | https://falaboratories.sgs.com

Final Report

Metals Analysis of Paints

(AIHA-LAP, LLC Accreditation, Lab ID #101629)

Element Environmental, LLC
Bernice Balete
98-030 Hekaha Street
Unit 9
Aiea, HI 96701

Client ID: L1617
Report Number: M252611
Date Received: 07/17/23
Date Analyzed: 08/01/23
Date Printed: 08/02/23
First Reported: 08/02/23

Job ID / Site: 230035;4011 PUU Kapele Avenue; Molokai, Hawaii
Date(s) Collected: 06/29/2023

SGSFL Job ID: L1617
Total Samples Submitted: 5
Total Samples Analyzed: 5

Sample Number	Lab Number	Analyte	Result	Result Units	Reporting Limit*	Method Reference

* The Reporting Limit represents the lowest amount of analyte that the laboratory can confidently detect in the sample, and is not a regulatory level. The Units for the Reporting Limit are the same as the Units for the Final Results.

Beatriz Hinojosa, Laboratory Supervisor, Carson Laboratory

Analytical results and reports are generated by SGS Forensic Laboratories at the request of and for the exclusive use of the person or entity (client) named on such report. Results, reports or copies of same will not be released by SGS Forensic Laboratories to any third party without prior written request from client. This report applies only to the sample(s) tested. Supporting laboratory documentation is available upon request. This report must not be reproduced except in full, unless approved by SGS Forensic Laboratories. The client is solely responsible for the use and interpretation of test results and reports requested from SGS Forensic Laboratories. SGS Forensic Laboratories is not able to assess the degree of hazard resulting from materials analyzed. SGS Forensic Laboratories reserves the right to dispose of all samples after a period of thirty (30) days, according to all state and federal guidelines, unless otherwise specified. Any modifications that have been made to referenced test methods are documented in SGS Forensic Laboratories' Standard Operating Procedures Manual. Sample results have not been blank corrected. Quality control and sample receipt condition were acceptable unless otherwise noted.
Note* Sampling data used in this report was provided by the client as noted on the associated chain of custody form.

20535 South Belshaw Avenue, Carson, CA 90746 | phone: 310.763.2374 / 800.813.9417 Fax: 310.763.4450 | https://falaboratories.sgs.com

SGS FORENSIC LABORATORIES

Analysis Request Form (COC)

Client Name & Address: Element Environmental, LLC 98-030 Hekaha Street, Unit 9 Aiea, Hawaii 96701	Client No.: L1617
PO / Job#: 230035	Date: 6/29/2023
Turn Around Time: Same Day / 1Day / 2Day / 3Day / 4Day / 5Day (5Day ☒)	
☐ PCM: ☐ NIOSH 7400A / ☐ NIOSH 7400B ☐ Rotometer	
☐ PLM: ☐ Standard / ☐ Point Count 400 - 1000 / ☐ CARB 435	
Contact: Bernice Balete	Phone: (808) 389-4792
☐ TEM Air: ☐ AHERA / ☐ Yamate2 / ☐ NIOSH 7402 ☐ TEM Bulk: ☐ Quantitative / ☐ Qualitative / ☐ Chatfield ☐ TEM Water: ☐ Potable / ☐ Non-Potable / ☐ Weight % ☐ TEM Microvac: ☐ Qual / ☐ D5755(str/area) / ☐ D5756(str/mass)	
E-mail: bbalete@e2hi.com	
Site Name: 4011 Puu Kapele Avenue	☐ IAQ Particle Identification (PLM LAB) ☐ PLM Opaques/Soot ☐ Particle Identification (TEM LAB) ☐ Special Project
Site Location: Molokai, Hawaii	☒ Metals Analysis Matrix: Paint Chip Method: EPA 3050B/7000B Analytes: Lead, Cadmium, Chromium, Mercury
Comments: **Page 1 of 1**	☐ Silica in Air ☐ w/Gravimetry ☐ Quartz Only

Sample ID	Date / Time	Sample Location / Description	FOR AIR SAMPLES ONLY				Sample Area / Air Volume
			Type	Time On/Off	Avg LPM	Total Time	
4011PKA-P01	6/29/23	Greenhouse / White wood window frame	A P C				
4011PKA-P02	6/29/23	Greenhouse / White fiberboard sump/floor panel	A P C				
4011PKA-P03	6/29/23	Greenhouse / White wood wall frame	A P C				
4011PKA-P04	6/29/23	Residence / Yellow wood exterior siding	A P C				
4011PKA-P05	6/29/23	Residence / Yellow wood exterior siding	A P C				
			A P C				
			A P C				
			A P C				
			A P C				
			A P C				

Sampled By: BB,Josh Agpaoa Date/Time: 6/29/2023 Shipped Via: ☒ Fed Ex ☐ UPS ☐ US Mail ☐ Courier ☐ Drop Off ☐ Other:

Relinquished By: Bernice Balete Date / Time: 7/15/2023 @ 1400	Relinquished By: Date / Time:	Relinquished By: Date / Time:
Received By: Jasmine Contreras Date / Time: 7/17/23 @ 8:30 am Condition Acceptable? ☐ Yes ☐ No	Received By: Date / Time: Condition Acceptable? ☐ Yes ☐ No	Received By: Date / Time: Condition Acceptable? ☐ Yes ☐ No

SGS Forensic Laboratories may subcontract client samples to other SGSFL locations to meet client requests.

San Francisco Office: 3777 Depot Road, Suite 409, Hayward, CA 94545-2761 • Phone: 510/887-8828 • 800/827-3274
Los Angeles Office: 20535 South Belshaw Ave., Carson, CA 90746 • Phone: 310/763-2374 • 888/813-9417
Las Vegas Office: 6765 S. Eastern Avenue, Suite 3, Las Vegas, NV 89119 • Phone: 702/784-0040

ANALYSIS OF PROJECT APPLICABILITY TO HAWAIʻI STATE PLAN

APPENDIX

H-1

APPENDIX H-1

Analysis of Project Applicability to Hawai'i State Plan

Chapter 226, HRS, also known as the Hawai'i State Plan, is a long-range comprehensive plan which serves as a guide for the future long-term development of the State by identifying goals, objectives, policies, and priorities, as well as implementation mechanisms. The Plan consists of three (3) parts. Part I includes the Overall Theme, Goals, Objectives, and Policies; Part II includes Planning, Coordination, and Implementation; and Part III establishes Priority Guidelines. Inasmuch as Part II of the State Plan covers its administrative structure and implementation process, discussion of the proposed project's applicability to Part II is not appropriate. Below is an analysis of the project's applicability to Part I and Part III of the Hawai'i State Plan.

The methodology for the analysis involves examining the project's applicability to the Hawai'i State Plan's goals, objectives, and policies. "Applicability" refers to a project's need, purpose and effects, and how these advance or promote a particular set of goals, objectives and priority guidelines. In assessing the relationship between a proposed action and the Hawai'i State Plan, an action may be categorized in one of the following groups:

1. **Directly applicable**: the action and its potential effects directly advance or promote the objective, policy or priority guideline.

   Example: A county project to develop a new water source and related transmission facilities would be directly applicable to the objectives and policies for Facility Systems-Water (HRS 226-16) which states: *(5) Support water supply services to areas experiencing critical water problems.*

2. **Indirectly applicable**: the action and its potential effects indirectly support or advance the objective, policy or priority guideline.

   Example: The county water source project cited above supports other related objectives and policies for the economy (HRS 226-6, General), which, by example, states: *(9) Strive to achieve a level of construction activity responsive to, and consistent with, state growth objectives.* In this case, the principle purpose of the project was not to create new construction activities, but nonetheless, supports this policy by creating temporary construction activity during the implementation of the project. In this instance, the proposed action may be deemed to be indirectly applicable to the objective and policy of the Hawai'i State Plan.

3. **Not applicable**: the action and its potential effects have no direct or indirect relationship to the objectives and policies of the Hawai'i State Plan.

Example: That same county water source improvement project referenced above, may not have direct or indirect linkage to objectives and policies for the economy-Federal Expenditures (HRS 226-9) which states: *(1) Encourage the sustained flow of federal expenditures in Hawaii that generates long-term government civilian employment*. From the standpoint of the agency proposing the water system improvement, and assuming no Federal Funding for the project, there is an unlikely intent that the proposed water source project would be connected to or reliant upon the foregoing policy. Hence, from the standpoint of judiciously applied policy analysis, the proposed action would be considered not applicable to the policy.

In general, a proposed action's applicability the objectives, policies and priority guidelines of the Hawai'i State Plan is judged on the basis of the action's direct or indirect relationship to the respective objectives, policies and priority directions. It is recognized that the categorization of "applicability" is subject to interpretation and should be appropriately considered in the context of local and regional conditions.

Hawai'i State Plan, Chapter 226, HRS Part I. Overall Themes, Goals, Objectives and Policies **Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable**	**DA**	**IA**	**NA**
HRS 226-1: Findings and Purpose			
HRS 226-2: Definitions			
HRS 226-3: Overall Theme			
HRS 226-4: State Goals. In order to ensure, for the present and future generations, those elements of choice and mobility that ensure that individuals and groups may approach their desired levels of self-reliance and self determination, it shall be the goal of the State to achieve: (1) A strong, viable economy, characterized by stability, diversity, and growth, that enables the fulfillment of the needs and expectations of Hawaii's present and future generations. (2) A desired physical environment, characterized by beauty, cleanliness, quiet, stable natural systems, and uniqueness, that enhances the mental and physical well-being of the people. (3) Physical, social, and economic well-being, for individuals and families in Hawaii, that nourishes a sense of community responsibility, of caring, and of participation in community life.			
Analysis: **The proposed project provides additional agricultural homestead opportunities for Department of Hawaiian Home Lands (DHHL) beneficiaries while maintaining the rural character of Moloka'i.**			
Chapter 226-5 Objective and Policies for Population			
Objective:			
(a) It shall be the objective in planning for the State's population to guide population growth to be consistent with the achievement of physical, economic and social objectives contained in this chapter.	✓		
Policies:			
(b) To achieve the population objective, it shall be the policy of this State to:			
(1) Manage population growth statewide in a manner that provides increased opportunities for Hawaii's people to pursue their physical, social, and economic aspirations while recognizing the unique needs of each county.	✓		

Hawai'i State Plan, Chapter 226, HRS Part I. Overall Themes, Goals, Objectives and Policies Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable	DA	IA	NA
(2) Encourage an increase in economic activities and employment opportunities on the neighbor islands consistent with community needs and desires.	✓		
(3) Promote increased opportunities for Hawaii's people to pursue their socio-economic aspirations throughout the islands.	✓		
(4) Encourage research activities and public awareness programs to foster an understanding of Hawaii's limited capacity to accommodate population needs and to address concerns resulting from an increase in Hawaii's population.			✓
(5) Encourage federal actions and coordination among major governmental agencies to promote a more balanced distribution of immigrants among the states, provided that such actions do not prevent the reunion of immediate family members.			✓
(6) Pursue an increase in federal assistance for states with a greater proportion of foreign immigrants relative to their state's population.			✓
(7) Plan the development and availability of land and water resources in a coordinated manner so as to provide for the desired levels of growth in each geographic area.		✓	
Analysis: **The proposed project directly supports the objectives and policies for population as it will be implemented in an area suitable for subsistence agricultural production, thus providing opportunities for DHHL beneficiaries to pursue their physical, social and economic aspirations.**			
Chapter 226-6 Objectives and policies for the economy – – in general			
Objectives:			
(a) Planning for the State's economy in general shall be directed toward achievement of the following objectives:			
(1) Increased and diversified employment opportunities to achieve full employment, increased income and job choice, and improved living standards for Hawaii's people, while at the same time stimulating the development and expansion of economic activities capitalizing on defense, dual-use, and science and technology assets, particularly on the neighbor islands where employment opportunities may be limited.	✓		
(2) A steadily growing and diversified economic base that is not overly dependent on a few industries, and includes the development and expansion of industries on the neighbor islands.			✓
Policies:			
(b) To achieve general economic objectives, it shall be the policy of this State to:			
(1) Promote and encourage entrepreneurship within Hawaii by residents and nonresidents of the State.			✓
(2) Expand Hawaii's national and international marketing, communication, and organizational ties, to increase the State's capacity to adjust to and capitalize upon economic changes and opportunities occurring outside the State.			✓
(3) Promote Hawaii as an attractive market for environmentally and socially sound investment activities that benefit Hawaii's people.			✓

Hawai'i State Plan, Chapter 226, HRS Part I. Overall Themes, Goals, Objectives and Policies Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable	DA	IA	NA
(4) Transform and maintain Hawaii as a place that welcomes and facilitates innovative activity that may lead to commercial opportunities.			✓
(5) Promote innovative activity that may pose initial risks, but ultimately contribute to the economy of Hawaii.			✓
(6) Seek broader outlets for new or expanded Hawaii business investments.			✓
(7) Expand existing markets and penetrate new markets for Hawaii's products and services.			✓
(8) Assure that the basic economic needs of Hawaii's people are maintained in the event of disruptions in overseas transportation.			✓
(9) Strive to achieve a level of construction activity responsive to, and consistent with, state growth objectives.	✓		
(10) Encourage the formation of cooperatives and other favorable marketing arrangements at the local or regional level to assist Hawaii's small scale producers, manufacturers, and distributors.			✓
(11) Encourage labor-intensive activities that are economically satisfying and which offer opportunities for upward mobility.			✓
(12) Encourage innovative activities that may not be labor-intensive, but may otherwise contribute to the economy of Hawaii.			✓
(13) Foster greater cooperation and coordination between the government and private sectors in developing Hawaii's employment and economic growth opportunities.			✓
(14) Stimulate the development and expansion of economic activities which will benefit areas with substantial or expected employment problems.			✓
(15) Maintain acceptable working conditions and standards for Hawaii's workers.			✓
(16) Provide equal employment opportunities for all segments of Hawaii's population through affirmative action and nondiscrimination measures.			✓
(17) Stimulate the development and expansion of economic activities capitalizing on defense, dual-use, and science and technology assets, particularly on the neighbor islands where employment opportunities may be limited.			✓
(18) Encourage businesses that have favorable financial multiplier effects within Hawaii's economy, particularly with respect to emerging industries in science and technology.			✓
(19) Promote and protect intangible resources in Hawaii, such as scenic beauty and the aloha spirit, which are vital to a healthy economy.			✓
(20) Increase effective communication between the educational community and the private sector to develop relevant curricula and training programs to meet future employment needs in general, and requirements of new or innovative potential growth industries in particular.			✓
(21) Foster a business climate in Hawaii--including attitudes, tax and regulatory policies, and financial and technical assistance programs-- that is conducive to the expansion of existing enterprises and the creation and attraction of new business and industry.			✓

Hawai'i State Plan, Chapter 226, HRS Part I. Overall Themes, Goals, Objectives and Policies Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable	DA	IA	NA
Analysis: **The proposed action directly supports the general objectives and policies for the economy by supporting design and construction activity which contributes to increased employment opportunities, job choices, and living standards. Businesses positively affected by the project are those which support design and construction such as engineers and material suppliers.**			
Chapter 226-7 Objectives and policies for the economy – – agriculture.			
Objectives:			
(a) Planning for the State's economy with regard to agriculture shall be directed towards achievement of the following objectives:			
(1) Viability of Hawaii's sugar and pineapple industries.			✓
(2) Growth and development of diversified agriculture throughout the State.	✓		
(3) An agriculture industry that continues to constitute a dynamic and essential component of Hawaii's strategic, economic, and social well-being.	✓		
Policies:			
(b) To achieve the agriculture objectives, it shall be the policy of this State to:			
(1) Establish a clear direction for Hawaii's agriculture through stakeholder commitment and advocacy.	✓		
(2) Encourage agriculture by making the best use of natural resources.	✓		
(3) Provide the governor and the legislature with information and options needed for prudent decision-making for the development of agriculture.			✓
(4) Establish strong relationships between the agricultural and visitor industries for mutual marketing benefits.			✓
(5) Foster increased public awareness and understanding of the contributions and benefits of agriculture as a major sector of Hawaii's economy.			✓
(6) Seek the enactment and retention of federal and state legislation that benefits Hawaii's agricultural industries.			✓
(7) Strengthen diversified agriculture by developing an effective promotion, marketing, and distribution system between Hawaii's food producers and consumers in the State, nation, and world.			✓
(8) Support research and development activities that strengthen economic productivity in agriculture, stimulate greater efficiency, and enhance the development of new products and agricultural by-products.			✓
(9) Enhance agricultural growth by providing public incentives and encouraging private initiatives.			✓
(10) Assure the availability of agriculturally suitable lands with adequate water to accommodate present and future needs.	✓		
(11) Increase the attractiveness and opportunities for an agricultural education and livelihood.	✓		
(12) In addition to the State's priority on food, expand Hawaii's agricultural base by promoting growth and development of flowers, tropical fruits and plants, livestock, feed grains, forestry, food crops, aquaculture, and other potential enterprises.	✓		

Hawai'i State Plan, Chapter 226, HRS Part I. Overall Themes, Goals, Objectives and Policies Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable	DA	IA	NA
(13) Promote economically competitive activities that increase Hawaii's agricultural self-sufficiency, including the increased purchase and use of Hawaii-grown food and food products by residents, businesses, and governmental bodies as defined under section 103D-104.			✓
(14) Promote and assist in the establishment of sound financial programs for diversified agriculture.			✓
(15) Institute and support programs and activities to assist the entry of displaced agricultural workers into alternative agricultural or other employment.			✓
(16) Facilitate the transition of agricultural lands in economically nonfeasible agricultural production to economically viable agricultural uses.	✓		
(17) Perpetuate, promote, and increase use of traditional Hawaiian farming systems, such as the use of loko i'a, māla, and irrigated lo'i, and growth of traditional Hawaiian crops, such as kalo, 'uala, and 'ulu.	✓		
(18) Increase and develop small-scale farms.			✓
Analysis: **The proposed project directly supports the objectives and policies for the agricultural economy through the subdivision of land for subsistent agricultural use. The proposed action also includes the construction of infrastructure to access irrigation water, allowing for the land's agricultural use.**			
Chapter 226-8 Objective and policies for the economy – – visitor industry.			
Objective:			
(a) Planning for the State's economy with regard to the visitor industry shall be directed towards the achievement of the objective of a visitor industry that constitutes a major component of steady growth for Hawaii's economy.			✓
Policies:			
(b) To achieve the visitor industry objective, it shall be the policy of this State to:			
(1) Support and assist in the promotion of Hawaii's visitor attractions and facilities.			✓
(2) Ensure that visitor industry activities are in keeping with the social, economic, and physical needs and aspirations of Hawaii's people.			✓
(3) Improve the quality of existing visitor destination areas by utilizing Hawaii's strengths in science and technology.			✓
(4) Encourage cooperation and coordination between the government and private sectors in developing and maintaining well-designed, adequately serviced visitor industry and related developments which are sensitive to neighboring communities and activities.			✓
(5) Develop the industry in a manner that will continue to provide new job opportunities and steady employment for Hawaii's people.			✓
(6) Provide opportunities for Hawaii's people to obtain job training and education that will allow for upward mobility within the visitor industry.			✓
(7) Foster a recognition of the contribution of the visitor industry to Hawaii's economy and the need to perpetuate the aloha spirit.			✓
(8) Foster an understanding by visitors of the aloha spirit and of the unique and sensitive character of Hawaii's cultures and values.			✓

Hawai'i State Plan, Chapter 226, HRS Part I. Overall Themes, Goals, Objectives and Policies Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable	DA	IA	NA
Analysis: **The proposed action is neither directly or indirectly applicable to the objective and policies for the visitor industry. The proposed action has no implications for enhancement or growth of the visitor industry.**			
Chapter 226-9 Objective and policies for the economy – – federal expenditures.			
Objective:			
(a) Planning for the State's economy with regard to federal expenditures shall be directed towards achievement of the objective of a stable federal investment base as an integral component of Hawaii's economy.			✓
Policies:			
(b) To achieve the federal expenditures objective, it shall be the policy of this State to:			
(1) Encourage the sustained flow of federal expenditures in Hawaii that generates long-term government civilian employment;			✓
(2) Promote Hawaii's supportive role in national defense, in a manner consistent with Hawaii's social, environmental, and cultural goals by building upon dual-use and defense applications to develop thriving ocean engineering, aerospace research and development, and related dual-use technology sectors in Hawaii's economy;			✓
(3) Promote the development of federally supported activities in Hawaii that respect statewide economic concerns, are sensitive to community needs, and minimize adverse impacts on Hawaii's environment;			✓
(4) Increase opportunities for entry and advancement of Hawaii's people into federal government service;			✓
(5) Promote federal use of local commodities, services, and facilities available in Hawaii;			✓
(6) Strengthen federal-state-county communication and coordination in all federal activities that affect Hawaii; and			✓
(7) Pursue the return of federally controlled lands in Hawaii that are not required for either the defense of the nation or for other purposes of national importance, and promote the mutually beneficial exchanges of land between federal agencies, the State, and the counties.			✓
Analysis: **The proposed action is not reliant on federal funding, and does not directly or indirectly advance the objective and policies for strengthening or increasing federal expenditures for the betterment of Hawai'i's economy.**			
Chapter 226-10 Objective and policies for the economy – – potential growth and innovative activities.			
Objective:			
(a) Planning for the State's economy with regard to potential growth and innovative activities shall be directed towards achievement of the objective of development and expansion of potential growth and innovative activities that serve to increase and diversify Hawaii's economic base.	✓		
Policies:			
(b) To achieve the potential growth and innovative activity objective, it shall be the policy of this State to:			

Hawai'i State Plan, Chapter 226, HRS Part I. Overall Themes, Goals, Objectives and Policies Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable	DA	IA	NA
(1) Facilitate investment and employment growth in economic activities that have the potential to expand and diversify Hawaii's economy, including but not limited to diversified agriculture, aquaculture, renewable energy development, creative media, health care, and science and technology-based sectors;	✓		
(2) Facilitate investment in innovative activity that may pose risks or be less labor-intensive than other traditional business activity, but if successful, will generate revenue in Hawaii through the export of services or products or substitution of imported services or products;			✓
(3) Encourage entrepreneurship in innovative activity by academic researchers and instructors who may not have the background, skill, or initial inclination to commercially exploit their discoveries or achievements;			✓
(4) Recognize that innovative activity is not exclusively dependent upon individuals with advanced formal education, but that many self-taught, motivated individuals are able, willing, sufficiently knowledgeable, and equipped with the attitude necessary to undertake innovative activity;			✓
(5) Increase the opportunities for investors in innovative activity and talent engaged in innovative activity to personally meet and interact at cultural, art, entertainment, culinary, athletic, or visitor-oriented events without a business focus;			✓
(6) Expand Hawaii's capacity to attract and service international programs and activities that generate employment for Hawaii's people;			✓
(7) Enhance and promote Hawaii's role as a center for international relations, trade, finance, services, technology, education, culture, and the arts;			✓
(8) Accelerate research and development of new energy-related industries based on wind, solar, ocean, underground resources, and solid waste;			✓
(9) Promote Hawaii's geographic, environmental, social, and technological advantages to attract new or innovative economic activities into the State;			✓
(10) Provide public incentives and encourage private initiative to attract new or innovative industries that best support Hawaii's social, economic, physical, and environmental objectives;			✓
(11) Increase research and the development of ocean-related economic activities such as mining, food production, and scientific research;			✓
(12) Develop, promote, and support research and educational and training programs that will enhance Hawaii's ability to attract and develop economic activities of benefit to Hawaii;			✓
(13) Foster a broader public recognition and understanding of the potential benefits of new or innovative growth-oriented industry in Hawaii;			✓
(14) Encourage the development and implementation of joint federal and state initiatives to attract federal programs and projects that will support Hawaii's social, economic, physical, and environmental objectives;			✓
(15) Increase research and development of businesses and services in the telecommunications and information industries;			✓
(16) Foster the research and development of nonfossil fuel and energy efficient modes of transportation; and			✓

Hawai'i State Plan, Chapter 226, HRS Part I. Overall Themes, Goals, Objectives and Policies Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable	DA	IA	NA
(17) Recognize and promote health care and health care information technology as growth industries.			✓
Analysis: **The proposed project is directly applicable to the objective and policy for growth and innovative activities through investment and encouragement of small-scale agricultural activity.**			
Chapter 226-10.5 Objectives and policies for the economy – – information industry.			
Objective:			
(a) Planning for the State's economy with regard to telecommunications and information technology shall be directed toward recognizing that broadband and wireless communication capability and infrastructure are foundations for an innovative economy and positioning Hawaii as a leader in broadband and wireless communications and applications in the Pacific Region.			✓
Policies:			
(b) To achieve the information industry objective, it shall be the policy of this State to:			
(1) Promote efforts to attain the highest speeds of electronic and wireless communication within Hawaii and between Hawaii and the world, and make high speed communication available to all residents and businesses in Hawaii;			✓
(2) Encourage the continued development and expansion of the telecommunications infrastructure serving Hawaii to accommodate future growth and innovation in Hawaii's economy;			✓
(3) Facilitate the development of new or innovative business and service ventures in the information industry which will provide employment opportunities for the people of Hawaii;			✓
(4) Encourage mainland- and foreign-based companies of all sizes, whether information technology-focused or not, to allow their principals, employees, or contractors to live in and work from Hawaii, using technology to communicate with their headquarters, offices, or customers located out-of-state;			✓
(5) Encourage greater cooperation between the public and private sectors in developing and maintaining a well-designed information industry;			✓
(6) Ensure that the development of new businesses and services in the industry are in keeping with the social, economic, and physical needs and aspirations of Hawaii's people;			✓
(7) Provide opportunities for Hawaii's people to obtain job training and education that will allow for upward mobility within the information industry;			✓
(8) Foster a recognition of the contribution of the information industry to Hawaii's economy; and			✓
(9) Assist in the promotion of Hawaii as a broker, creator, and processor of information in the Pacific.			✓
Analysis: **The proposed action does not directly or indirectly affect Hawai'i's capacity to be a leader in the broadband wireless communication industries, nor does it affect innovative industries from advancing Hawai'i's economic position or influence in the Pacific Region.**			

Hawai'i State Plan, Chapter 226, HRS Part I. Overall Themes, Goals, Objectives and Policies Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable	DA	IA	NA
Chapter 226-11 Objectives and policies for the physical environment – – land based, shoreline, and marine resources.			
Objectives:			
(a) Planning for the State's physical environment with regard to land-based, shoreline, and marine resources shall be directed towards achievement of the following objectives:			
(1) Prudent use of Hawaii's land-based, shoreline, and marine resources.		✓	
(2) Effective protection of Hawaii's unique and fragile environmental resources.			✓
Policies:			
(b) To achieve the land-based, shoreline, and marine resources objectives, it shall be the policy of this State to:			
(1) Exercise an overall conservation ethic in the use of Hawaii's natural resources.		✓	
(2) Ensure compatibility between land-based and water-based activities and natural resources and ecological systems.		✓	
(3) Take into account the physical attributes of areas when planning and designing activities and facilities.		✓	
(4) Manage natural resources and environs to encourage their beneficial and multiple use without generating costly or irreparable environmental damage.			✓
(5) Consider multiple uses in watershed areas, provided such uses do not detrimentally affect water quality and recharge functions.			✓
(6) Encourage the protection of rare or endangered plant and animal species and habitats native to Hawaii.			✓
(7) Provide public incentives that encourage private actions to protect significant natural resources from degradation or unnecessary depletion.			✓
(8) Pursue compatible relationships among activities, facilities, and natural resources.		✓	
(9) Promote increased accessibility and prudent use of inland and shoreline areas for public recreational, educational, and scientific purposes.			✓
Analysis: **The proposed project will utilize Best Management Practices (BMPs) to ensure that natural resources such as the coastal environment is not impacted by construction activities. The use of BMPs also ensures compatibility between land-based and water-based functions, resources, and ecological systems.**			
Chapter 226-12 Objective and policies for the physical environment – – scenic, natural beauty, and historic resources.			
Objective:			
(a) Planning for the State's physical environment shall be directed towards achievement of the objective of enhancement of Hawaii's scenic assets, natural beauty, and multi-cultural/historical resources.		✓	

Hawai'i State Plan, Chapter 226, HRS Part I. Overall Themes, Goals, Objectives and Policies Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable	DA	IA	NA
Policies:			
(b) To achieve the scenic, natural beauty, and historic resources objective, it shall be the policy of this State to:			
(1) Promote the preservation and restoration of significant natural and historic resources.			✓
(2) Provide incentives to maintain and enhance historic, cultural, and scenic amenities.			✓
(3) Promote the preservation of views and vistas to enhance the visual and aesthetic enjoyment of mountains, ocean, scenic landscapes, and other natural features.			✓
(4) Protect those special areas, structures, and elements that are an integral and functional part of Hawaii's ethnic and cultural heritage.			✓
(5) Encourage the design of developments and activities that complement the natural beauty of the islands.		✓	
Analysis: **The proposed project indirectly supports the objective and policy for the enhancement of Hawai'i's natural beauty through the encouragement of agricultural development in an area near lands of similar use.**			
Chapter 226-13 Objectives and policies for the physical environment – – land, air, and water quality.			
Objectives:			
(a) Planning for the State's physical environment with regard to land, air, and water quality shall be directed towards achievement of the following objectives.			
(1) Maintenance and pursuit of improved quality in Hawaii's land, air, and water resources.		✓	
(2) Greater public awareness and appreciation of Hawaii's environmental resources.			✓
Policies:			
(b) To achieve the land, air, and water quality objectives, it shall be the policy of this State to:			
(1) Foster educational activities that promote a better understanding of Hawaii's limited environmental resources.			✓
(2) Promote the proper management of Hawaii's land and water resources.		✓	
(3) Promote effective measures to achieve desired quality in Hawaii's surface, ground, and coastal waters.		✓	
(4) Encourage actions to maintain or improve aural and air quality levels to enhance the health and well-being of Hawaii's people.		✓	
(5) Reduce the threat to life and property from erosion, flooding, tsunamis, hurricanes, earthquakes, volcanic eruptions, and other natural or man-induced hazards and disasters.		✓	
(6) Encourage design and construction practices that enhance the physical qualities of Hawaii's communities.			✓
(7) Encourage urban developments in close proximity to existing services and facilities.			✓

Hawai'i State Plan, Chapter 226, HRS Part I. Overall Themes, Goals, Objectives and Policies Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable	DA	IA	NA
(8) Foster recognition of the importance and value of the land, air, and water resources to Hawaii's people, their cultures and visitors.			✓
Analysis: **The proposed project indirectly advances the pursuit of improved land, air, and water quality through the use of construction BMPs to manage and control erosion to minimize downstream water quality impacts. Work on the project is not anticipated to be affected by natural hazards, and industry standard design and construction practices will be employed for the project.**			
Chapter 226-14 Objective and policies for facility systems – – in general.			
Objective:			
(a) Planning for the State's facility systems in general shall be directed towards achievement of the objective of water, transportation, sustainable development, climate change adaptation, sea level rise adaptation, waste disposal, and energy and telecommunication systems that support statewide social, economic, and physical objectives.	✓		
Policies:			
(b) To achieve the general facility systems objective, it shall be the policy of this State to:			
(1) Accommodate the needs of Hawaii's people through coordination of facility systems and capital improvement priorities in consonance with state and county plans.		✓	
(2) Encourage flexibility in the design and development of facility systems to promote prudent use of resources and accommodate changing public demands and priorities.		✓	
(3) Ensure that required facility systems can be supported within resource capacities and at reasonable cost to the user.		✓	
(4) Pursue alternative methods of financing programs and projects and cost-saving techniques in the planning, construction, and maintenance of facility systems.			✓
(5) Identify existing and planned state facilities that are vulnerable to sea level rise, flooding impacts, and natural hazards.			✓
(6) Assess a range of options to mitigate the impacts of sea level rise to existing and planned state facilities.			✓
Analysis: **The proposed action is directly applicable to the objective and policies for facility systems as it involves the construction of driveways to access the subdivided lots and will connect the lots to domestic and irrigation water.**			
Chapter 226-15 Objectives and policies for facility systems – – solid and liquid waste.			
Objectives:			
(a) Planning for the State's facility systems with regard to solid and liquid wastes shall be directed towards the achievement of the following objectives:			
(1) Maintenance of basic public health and sanitation standards relating to treatment and disposal of solid and liquid wastes.			✓

Hawai'i State Plan, Chapter 226, HRS Part I. Overall Themes, Goals, Objectives and Policies Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable	DA	IA	NA
(2) Provision of adequate sewerage facilities for physical and economic activities that alleviate problems in housing, employment, mobility, and other areas.			✓
Policies:			
(b) To achieve solid and liquid waste objectives, it shall be the policy of this State to:			
(1) Encourage the adequate development of sewerage facilities that complement planned growth.			✓
(2) Promote reuse and recycling to reduce solid and liquid wastes and employ a conservation ethic.			✓
(3) Promote research to develop more efficient and economical treatment and disposal of solid and liquid wastes.			✓
Analysis: **The proposed project is neither directly or indirectly applicable to the objectives and policies for solid and liquid waste facility systems and will not affect the provision of sewerage facilities or the treatment of solid and liquid waste.**			
Chapter 226-16 Objective and policies for facility systems – – water.			
Objective:			
(a) Planning for the State's facility systems with regard to water shall be directed towards achievement of the objective of the provision of water to adequately accommodate domestic, agricultural, commercial, industrial, recreational, and other needs within resource capacities.	✓		
Policies:			
(b) To achieve the facility systems water objective, it shall be the policy of this State to:			
(1) Coordinate development of land use activities with existing and potential water supply.	✓		
(2) Support research and development of alternative methods to meet future water requirements well in advance of anticipated needs.			✓
(3) Reclaim and encourage the productive use of runoff water and wastewater discharges.			✓
(4) Assist in improving the quality, efficiency, service, and storage capabilities of water systems for domestic and agricultural use.			✓
(5) Support water supply services to areas experiencing critical water problems.			✓
(6) Promote water conservation programs and practices in government, private industry, and the general public to help ensure adequate water to meet long-term needs.			✓
Analysis: **The proposed project directly supports the objective and policies for the provision of domestic and agricultural water by connecting the affected lots to the DHHL Ho'olehua Water System and the Moloka'i Irrigation System.**			
Chapter 226-17 Objectives and policies for facility systems – – transportation.			
Objectives:			
(a) Planning for the State's facility systems with regard to transportation shall be directed towards the achievement of the following objectives:			

Hawai'i State Plan, Chapter 226, HRS Part I. Overall Themes, Goals, Objectives and Policies Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable	DA	IA	NA
(1) An integrated multi-modal transportation system that services statewide needs and promotes the efficient, economical, safe, and convenient movement of people and goods.			✓
(2) A statewide transportation system that is consistent with and will accommodate planned growth objectives throughout the State.			✓
Policies:			
(b) To achieve the transportation objectives, it shall be the policy of this State to:			
(1) Design, program, and develop a multi-modal system in conformance with desired growth and physical development as stated in this chapter;			✓
(2) Coordinate state, county, federal, and private transportation activities and programs toward the achievement of statewide objectives;			✓
(3) Encourage a reasonable distribution of financial responsibilities for transportation among participating governmental and private parties;			✓
(4) Provide for improved accessibility to shipping, docking, and storage facilities;			✓
(5) Promote a reasonable level and variety of mass transportation services that adequately meet statewide and community needs;			✓
(6) Encourage transportation systems that serve to accommodate present and future development needs of communities;			✓
(7) Encourage a variety of carriers to offer increased opportunities and advantages to interisland movement of people and goods;			✓
(8) Increase the capacities of airport and harbor systems and support facilities to effectively accommodate transshipment and storage needs;			✓
(9) Encourage the development of transportation systems and programs which would assist statewide economic growth and diversification;			✓
(10) Encourage the design and development of transportation systems sensitive to the needs of affected communities and the quality of Hawaii's natural environment;			✓
(11) Encourage safe and convenient use of low-cost, energy-efficient, non-polluting means of transportation;			✓
(12) Coordinate intergovernmental land use and transportation planning activities to ensure the timely delivery of supporting transportation infrastructure in order to accommodate planned growth objectives; and			✓
(13) Encourage diversification of transportation modes and infrastructure to promote alternate fuels and energy efficiency.			✓
Analysis: **The proposed project does not directly or indirectly support the objectives and policy for transportation systems.**			
Chapter 226-18 Objectives and policies for facility systems – – energy.			
Objectives:			
(a) Planning for the State's facility systems with regard to energy shall be directed toward the achievement of the following objectives, giving due consideration to all:			
(1) Dependable, efficient, and economical statewide energy systems capable of supporting the needs of the people;			✓

Hawai'i State Plan, Chapter 226, HRS Part I. Overall Themes, Goals, Objectives and Policies Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable	DA	IA	NA
(2) Increased energy security and self-sufficiency through the reduction and ultimate elimination of Hawaii's dependence on imported fuels for electrical generation and ground transportation.			✓
(3) Greater diversification of energy generation in the face of threats to Hawaii's energy supplies and systems;			✓
(4) Reduction, avoidance, or sequestration of greenhouse gas emissions from energy supply and use; and			✓
(5) Utility models that make the social and financial interests of Hawaii's utility customers a priority.			✓
Policies:			
(b) To achieve the energy objectives, it shall be the policy of this State to ensure the short- and long-term provision of adequate, reasonably prices, and dependable energy services to accommodate demand.			✓
(c) To further achieve the energy objectives, it shall be the policy of this State to:			
(1) Support research and development as well as promote the use of renewable energy sources;			✓
(2) Ensure that the combination of energy supplies and energy-saving systems is sufficient to support the demands of growth;			✓
(3) Base decisions of least-cost supply-side and demand-side energy resource options on a comparison of their total costs and benefits when a least-cost is determined by a reasonably comprehensive, quantitative, and qualitative accounting of their long-term, direct and indirect economic, environmental, social, cultural, and public health costs and benefits;			✓
(4) Promote all cost-effective conservation of power and fuel supplies through measures, including:			
(A) Development of cost-effective demand-side management programs;			✓
(B) Education;			✓
(C) Adoption of energy-efficient practices and technologies; and			✓
(D) Increasing energy efficiency and decreasing energy use in public infrastructure			✓
(5) Ensure, to the extent that new supply-side resources are needed, that the development or expansion of energy systems uses the least-cost energy supply option and maximizes efficient technologies; and			✓
(6) Support research, development, demonstration, and use of energy efficiency, load management, and other demand-side management programs, practices, and technologies;			✓
(7) Promote alternate fuels and transportation energy efficiency;			✓
(8) Support actions that reduce, avoid, or sequester greenhouse gases in utility, transportation, and industrial sector applications;			✓
(9) Support actions that reduce, avoid, or sequester Hawaii's greenhouse gas emissions through agriculture and forestry initiatives;			✓

Hawai'i State Plan, Chapter 226, HRS Part I. Overall Themes, Goals, Objectives and Policies Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable	DA	IA	NA
(10) Provide priority handling and processing for all state and county permits required for renewable energy projects;			✓
(11) Ensure that liquefied natural gas is used only as a cost-effective transitional, limited-term replacement of petroleum for electricity generation and does not impede the development and use of other cost-effective renewable energy sources; and			✓
(12) Promote the development of indigenous geothermal energy resources that are located on public trust land as an affordable and reliable source of firm power for Hawaii.			✓
Analysis: **The proposed project is neither directly or indirectly applicable to the objectives and policies for energy facility systems and will not be an energy generator. In addition, the proposed action does not lessen dependence on fossil fuels and does not further research for alternative energy sources.**			
Chapter 226-18.5 Objectives and policies for facility systems – – telecommunications.			
Objectives:			
(a) Planning for the State's telecommunications facility systems shall be directed towards the achievement of dependable, efficient, and economical statewide telecommunications systems capable of supporting the needs of the people.			✓
Policies:			
(b) To achieve the telecommunications objective, it shall be the policy of this State to ensure the provision of adequate, reasonably priced, and dependable telecommunications services to accommodate demand.			✓
(c) To further achieve the telecommunications objective, it shall be the policy of this State to:			
(1) Facilitate research and development of telecommunications systems and resources;			✓
(2) Encourage public and private sector efforts to develop means for adequate, ongoing telecommunications planning;			✓
(3) Promote efficient management and use of existing telecommunications systems and services; and			✓
(4) Facilitate the development of education and training of telecommunications personnel.			✓
Analysis: **The proposed action does not directly or indirectly affect telecommunications systems dependability, efficiency, and cost parameters. In particular, the project does not promote research and development of telecommunications systems and resources and does not advance efficient management and use of existing telecommunications systems and services.**			
Chapter 226-19 Objectives and policies for socio-cultural advancement – – housing.			
Objectives:			
(a) Planning for the State's socio-cultural advancement with regard to housing shall be directed toward the achievement of the following objectives:	✓		

Hawai'i State Plan, Chapter 226, HRS Part I. Overall Themes, Goals, Objectives and Policies Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable	DA	IA	NA
(1) Greater opportunities for Hawaii's people to secure reasonably priced, safe, sanitary, and livable homes, located in suitable environments that satisfactorily accommodate the needs and desires of families and individuals, through collaboration and cooperation between government and nonprofit and for-profit developers to ensure that more rental and for sale affordable housing is made available to very low-, extremely low, lower-, moderate-, and above moderate-income segments of Hawaii's population.	✓		
(2) The orderly development of residential areas sensitive to community needs and other land uses.			✓
(3) The development and provision of affordable rental housing by the State to meet the housing needs of Hawaii's people.			✓
Policies:			
(b) To achieve the housing objectives, it shall be the policy of this State to:			
(1) Effectively accommodate the housing needs of Hawaii's people.	✓		
(2) Stimulate and promote feasible approaches that increase affordable rental and for sale housing choices for extremely low-, very low-, lower-, moderate-, and above moderate-income households.	✓		
(3) Increase homeownership and rental opportunities and choices in terms of quality, location, cost, densities, style, and size of housing.			✓
(4) Promote appropriate improvement, rehabilitation, and maintenance of existing rental and for sale housing units and residential areas.			✓
(5) Promote design and location of housing developments taking into account the physical setting, accessibility to public facilities and services, and other concerns of existing communities and surrounding areas.			✓
(6) Facilitate the use of available vacant, developable, and underutilized urban lands for housing.			✓
(7) Foster a variety of lifestyles traditional to Hawaii through the design and maintenance of neighborhoods that reflect the culture and values of the community.	✓		
(8) Promote research and development of methods to reduce the cost of housing construction in Hawaii.			✓
Analysis: **The proposed project is directly applicable to the objectives and policies related to housing as it provides additional homestead opportunities to DHHL beneficiaries. Although the project does not provide physical housing, DHHL beneficiaries are able to reside on the subdivided lots, indirectly supporting the objective and policies for increased housing opportunities.**			
Chapter 226-20 Objectives and policies for socio-cultural advancement – – health.			
Objectives:			
(a) Planning for the State's socio-cultural advancement with regard to health shall be directed towards achievement of the following objectives:			
(1) Fulfillment of basic individual health needs of the general public.			✓

Hawai'i State Plan, Chapter 226, HRS Part I. Overall Themes, Goals, Objectives and Policies Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable	DA	IA	NA
(2) Maintenance of sanitary and environmentally healthful conditions in Hawaii's communities.			✓
(3) Elimination of health disparities by identifying and addressing social determinants of health.			✓
Policies:			
(b) To achieve the health objectives, it shall be the policy of this State to:			
(1) Provide adequate and accessible services and facilities for prevention and treatment of physical and mental health problems, including substance abuse.			✓
(2) Encourage improved cooperation among public and private sectors in the provision of health care to accommodate the total health needs of individuals throughout the State.			✓
(3) Encourage public and private efforts to develop and promote statewide and local strategies to reduce health care and related insurance costs.			✓
(4) Foster an awareness of the need for personal health maintenance and preventive health care through education and other measures.			✓
(5) Provide programs, services, and activities that ensure environmentally healthful and sanitary conditions.			✓
(6) Improve the State's capabilities in preventing contamination by pesticides and other potentially hazardous substances through increased coordination, education, monitoring, and enforcement.			✓
(7) Prioritize programs, services, interventions, and activities that address identified social determinants of health to improve native Hawaiian health and well-being consistent with the United States Congress' declaration of policy as codified in title 42 United States Code section 11702, and to reduce health disparities of disproportionately affected demographics, including native Hawaiians, other Pacific Islanders, and Filipinos. The prioritization of affected demographic groups other than native Hawaiians may be reviewed every ten years and revised based on the best available epidemiological and public health data.			✓
Analysis: **The proposed action does not directly or indirectly affect the objectives and policies for health. The proposed action does not affect individual health needs, sanitation and health conditions, and health disparities.**			
Chapter 226-21 Objectives and policies for socio-cultural advancement – – education.			
Objective:			
(a) Planning for the State's socio-cultural advancement with regard to education shall be directed towards achievement of the objective of the provision of a variety of educational opportunities to enable individuals to fulfill their needs, responsibilities, and aspirations.		✓	
Policies:			
(b) To achieve the education objective, it shall be the policy of this State to:			
(1) Support educational programs and activities that enhance personal development, physical fitness, recreation, and cultural pursuits of all groups.		✓	

Hawai'i State Plan, Chapter 226, HRS Part I. Overall Themes, Goals, Objectives and Policies Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable	DA	IA	NA
(2) Ensure the provision of adequate and accessible educational services and facilities that are designed to meet individual and community needs.		✓	
(3) Provide appropriate educational opportunities for groups with special needs.			✓
(4) Promote educational programs which enhance understanding of Hawaii's cultural heritage.		✓	
(5) Provide higher educational opportunities that enable Hawaii's people to adapt to changing employment demands.			✓
(6) Assist individuals, especially those experiencing critical employment problems or barriers, or undergoing employment transitions, by providing appropriate employment training programs and other related educational opportunities.			✓
(7) Promote programs and activities that facilitate the acquisition of basic skills, such as reading, writing, computing, listening, speaking, and reasoning.			✓
(8) Emphasize quality educational programs in Hawaii's institutions to promote academic excellence.			✓
(9) Support research programs and activities that enhance the education programs of the State.			✓
Analysis: **The proposed action indirectly supports the objectives and policies for education. The DHHL offers educational programs and assistance to DHHL agricultural lessees, which indirectly promotes policies for educational programs for Native Hawaiian beneficiaries.**			
Chapter 226-22 Objective and policies for socio-cultural advancement – – social services.			
Objective:			
(a) Planning for the State's socio-cultural advancement with regard to social services shall be directed towards the achievement of the objective of improved public and private social services and activities that enable individuals, families, and groups to become more self-reliant and confident to improve their well-being.	✓		
Policies:			
(a) To achieve the social service objective, it shall be the policy of the State to:			
(1) Assist individuals, especially those in need of attaining a minimally adequate standard of living and those confronted by social and economic hardship conditions, through social services and activities within the State's fiscal capacities.	✓		
(2) Promote coordination and integrative approaches among public and private agencies and programs to jointly address social problems that will enable individuals, families, and groups to deal effectively with social problems and to enhance their participation in society.			✓
(3) Facilitate the adjustment of new residents, especially recently arrived immigrants, into Hawaii's communities.			✓
(4) Promote alternatives to institutional care in the provision of long-term care for elder and disabled populations.			✓
(5) Support public and private efforts to prevent domestic abuse and child molestation, and assist victims of abuse and neglect.			✓

Hawai'i State Plan, Chapter 226, HRS Part I. Overall Themes, Goals, Objectives and Policies Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable	DA	IA	NA
(6) Promote programs which assist people in need of family planning services to enable them to meet their needs.			✓
Analysis: **The objective and policies for improving public and private social services are directly supported by the proposed action through the provision of homestead opportunities to beneficiaries of the State DHHL, which allow Native Hawaiians to become more self-reliant and improve their wellbeing.**			
Chapter 226-23 Objective and policies for socio-cultural advancement – – leisure.			
Objective:			
(a) Planning for the State's socio-cultural advancement with regard to leisure shall be directed towards the achievement of the objective of the adequate provision of resources to accommodate diverse cultural, artistic, and recreational needs for present and future generations.			✓
Policies:			
(b) To achieve the leisure objective, it shall be the policy of this State to:			
(1) Foster and preserve Hawaii's multi-cultural heritage through supportive cultural, artistic, recreational, and humanities-oriented programs and activities.			✓
(2) Provide a wide range of activities and facilities to fulfill the cultural, artistic, and recreational needs of all diverse and special groups effectively and efficiently.			✓
(3) Enhance the enjoyment of recreational experiences through safety and security measures, educational opportunities, and improved facility design and maintenance.			✓
(4) Promote the recreational and educational potential of natural resources having scenic, open space, cultural, historical, geological, or biological values while ensuring that their inherent values are preserved.			✓
(5) Ensure opportunities for everyone to use and enjoy Hawaii's recreational resources.			✓
(6) Assure the availability of sufficient resources to provide for future cultural, artistic, and recreational needs.			✓
(7) Provide adequate and accessible physical fitness programs to promote the physical and mental well-being of Hawaii's people.			✓
(8) Increase opportunities for appreciation and participation in the creative arts, including the literary, theatrical, visual, musical, folk, and traditional art forms.			✓
(9) Encourage the development of creative expression in the artistic disciplines to enable all segments of Hawaii's population to participate in the creative arts.			✓
(10) Assure adequate access to significant natural and cultural resources in public ownership.			✓

Hawai'i State Plan, Chapter 226, HRS Part I. Overall Themes, Goals, Objectives and Policies Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable	DA	IA	NA
Analysis: **The project proposes the subdivision of agricultural lands for homestead opportunities and is, therefore, not directly or indirectly applicable to the objectives or policies for leisure.**			
Chapter 226-24 Objective and policies for socio-cultural advancement – – individual rights and personal well-being.			
Objective:			
(a) Planning for the State's socio-cultural advancement with regard to individual rights and personal well-being shall be directed towards achievement of the objective of increased opportunities and protection of individual rights to enable individuals to fulfill their socio-economic needs and aspirations.			✓
Policies:			
(b) To achieve the individual rights and personal well-being objective, it shall be the policy of this State to:			
(1) Provide effective services and activities that protect individuals from criminal acts and unfair practices and that alleviate the consequences of criminal acts in order to foster a safe and secure environment.			✓
(2) Uphold and protect the national and state constitutional rights of every individual.			✓
(3) Assure access to, and availability of, legal assistance, consumer protection, and other public services which strive to attain social justice.			✓
(4) Ensure equal opportunities for individual participation in society.			✓
Analysis: **The proposed action is not directly or indirectly applicable to the objective and policies for individual rights and personal well-being. Specifically, the proposed project does not provide services that protect individuals from criminal acts or assure access to legal assistance, consumer protection or related public services.**			
Chapter 226-25 Objective and policies for socio-cultural advancement – – culture.			
Objective:			
(a) Planning for the State's socio-cultural advancement with regard to culture shall be directed toward the achievement of the objective of enhancement of cultural identities, traditions, values, customs, and arts of Hawaii's people.	✓		
Policies:			
(b) To achieve the culture objective, it shall be the policy of this State to:			
(1) Foster increased knowledge and understanding of Hawaii's ethnic and cultural heritages and the history of Hawaii.		✓	
(2) Support activities and conditions that promote cultural values, customs, and arts that enrich the lifestyles of Hawaii's people and which are sensitive and responsive to family and community needs.		✓	
(3) Encourage increased awareness of the effects of proposed public and private actions on the integrity and quality of cultural and community lifestyles in Hawaii.			✓

Hawai'i State Plan, Chapter 226, HRS Part I. Overall Themes, Goals, Objectives and Policies Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable	DA	IA	NA
(4) Encourage the essence of the aloha spirit in people's daily activities to promote harmonious relationships among Hawaii's people and visitors.			✓
Analysis: **A Cultural Impact Assessment (CIA) was prepared for this project as part of the environmental review process. The CIA fosters increased knowledge of Native Hawaiian cultural practices, as well as the history of the project area. In this context, the proposed action indirectly advances the objective and policies related to culture. The proposed action also indirectly supports conditions that enrich the lifestyles of Hawai'i's that is sensitive and responsive to community needs through the provision of homesteading opportunities for DHHL beneficiaries.**			
Chapter 226-26 Objectives and policies for socio-cultural advancement – – public safety.			
Objectives:			
(a) Planning for the State's socio-cultural advancement with regard to public safety shall be directed towards the achievement of the following objectives:			
(1) Assurance of public safety and adequate protection of life and property for all people.			✓
(2) Optimum organizational readiness and capability in all phases of emergency management to maintain the strength, resources, and social and economic well-being of the community in the event of civil disruptions, wars, natural disasters, and other major disturbances.			✓
(3) Promotion of a sense of community responsibility for the welfare and safety of Hawaii's people.			✓
Policies (Public Safety):			
(b) To achieve the public safety objectives, it shall be the policy of this State to:			
(1) Ensure that public safety programs are effective and responsive to community needs.			✓
(2) Encourage increased community awareness and participation in public safety programs.			✓
Policies (Public Safety-Criminal Justice):			
(c) To further achieve public safety objectives related to criminal justice, it shall be the policy of this State to:			
(1) Support criminal justice programs aimed at preventing and curtailing criminal activities.			✓
(2) Develop a coordinated, systematic approach to criminal justice administration among all criminal justice agencies.			✓
(3) Provide a range of correctional resources which may include facilities and alternatives to traditional incarceration in order to address the varied security needs of the community and successfully reintegrate offenders into the community.			✓
Policies (Public Safety – Emergency Management):			
(d) To further achieve public safety objectives related to emergency management, it shall be the policy of this State to:			
(1) Ensure that responsible organizations are in a proper state of readiness to respond to major war-related, natural, or technological disasters and civil disturbances at all times.			✓

Hawai'i State Plan, Chapter 226, HRS Part I. Overall Themes, Goals, Objectives and Policies Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable	DA	IA	NA
(2) Enhance the coordination between emergency management programs throughout the State.			✓
Analysis: **The proposed action does not directly or indirectly affect the objectives and policies for public safety. In particular, the project does not address protection of life and property parameters, organizational readiness and capacity, and community responsibility for peoples' welfare and safety.**			
Chapter 226-27 Objectives and policies for socio-cultural advancement – – government.			
Objectives:			
(a) Planning the State's socio-cultural advancement with regard to government shall be directed towards the achievement of the following objectives:			
(1) Efficient, effective, and responsive government services at all levels in the State.	✓		
(2) Fiscal integrity, responsibility, and efficiency in the state government and county governments.			✓
Policies:			
(b) To achieve the government objectives, it shall be the policy of this State to:			
(1) Provide for necessary public goods and services not assumed by the private sector.			✓
(2) Pursue an openness and responsiveness in government that permits the flow of public information, interaction, and response.	✓		
(3) Minimize the size of government to that necessary to be effective.			✓
(4) Stimulate the responsibility in citizens to productively participate in government for a better Hawaii.			✓
(5) Assure that government attitudes, actions, and services are sensitive to community needs and concerns.			✓
(6) Provide for a balanced fiscal budget.			✓
(7) Improve the fiscal budgeting and management system of the State.			✓
(8) Promote the consolidation of state and county governmental functions to increase the effective and efficient delivery of government programs and services and to eliminate duplicative services wherever feasible.			✓
Analysis: **The proposed action has direct applicability to the objectives and policies for government. In particular, the project will comply with regulatory requirements which advance transparency in the flow of project-related information to the public. Such requirements include the Chapter 343, HRS environmental review process.**			

Hawai'i State Plan, Chapter 226, HRS Part III. Priority Guidelines Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable	DA	IA	N/A
Chapter 226-101: Purpose. The purpose of this part is to establish overall priority guidelines to address areas of statewide concern. **Chapter 226-102: Overall direction.** The State shall strive to improve the quality of life for Hawaii's present and future population through the pursuit of desirable courses of action in seven major areas of statewide concern which merit priority attention: economic development, population growth and land resource management, affordable housing, crime and criminal justice, quality education, principles of sustainability, and climate change adaptation. **Chapter 226-103: Economic priority guidelines.**			
(a) Priority guidelines to stimulate economic growth and encourage business expansion and development to provide needed jobs for Hawaii's people and achieve a stable and diversified economy:	✓		
(1) Seek a variety of means to increase the availability of investment capital for new and expanding enterprises.			✓
(A) Encourage investments which:			✓
(i) Reflect long term commitments to the State;			✓
(ii) Rely on economic linkages within the local economy;			✓
(iii) Diversify the economy;	✓		
(iv) Reinvest in the local economy;	✓		
(v) Are sensitive to community needs and priorities; and			✓
(vi) Demonstrate a commitment to provide management opportunities to Hawaii residents; and			✓
(B) Encourage investments in innovative activities that have a nexus to the State, such as:			✓
(i) Present or former residents acting as entrepreneurs or principals;			✓
(ii) Academic support from an institution of higher education in Hawaii;			✓
(iii) Investment interest from Hawaii residents;			✓
(iv) Resources unique to Hawaii that are required for innovative activity; and			✓
(v) Complementary or supportive industries or government programs or projects.			✓
(2) Encourage the expansion of technological research to assist industry development and support the development and commercialization of technological advancements.			✓
(3) Improve the quality, accessibility, and range of services provided by government to business, including data and reference services and assistance in complying with governmental regulations.			✓
(4) Seek to ensure that state business tax and labor laws and administrative policies are equitable, rational, and predictable.			✓
(5) Streamline the processes for building and development permit and review, and telecommunication infrastructure installation approval and eliminate or consolidate other burdensome or duplicative governmental requirements imposed on business, where scientific evidence indicates that public health, safety and welfare would not be adversely affected.			✓

Hawai'i State Plan, Chapter 226, HRS Part III. Priority Guidelines Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable	DA	IA	N/A
(6) Encourage the formation of cooperatives and other favorable marketing or distribution arrangements at the regional or local level to assist Hawaii's small-scale producers, manufacturers, and distributors.			✓
(7) Continue to seek legislation to protect Hawaii from transportation interruptions between Hawaii and the continental United States.			✓
(8) Provide public incentives and encourage private initiative to develop and attract industries which promise long-term growth potentials and which have the following characteristics:			✓
(A) An industry that can take advantage of Hawaii's unique location and available physical and human resources.			✓
(B) A clean industry that would have minimal adverse effects on Hawaii's environment.			✓
(C) An industry that is willing to hire and train Hawaii's people to meet the industry's labor needs at all levels of employment.			✓
(D) An industry that would provide reasonable income and steady employment.			✓
(9) Support and encourage, through educational and technical assistance programs and other means, expanded opportunities for employee ownership and participation in Hawaii business.			✓
(10) Enhance the quality of Hawaii's labor force and develop and maintain career opportunities for Hawaii's people through the following actions:			✓
(A) Expand vocational training in diversified agriculture, aquaculture, information industry, and other areas where growth is desired and feasible.			✓
(B) Encourage more effective career counseling and guidance in high schools and post-secondary institutions to inform students of present and future career opportunities.			✓
(C) Allocate educational resources to career areas where high employment is expected and where growth of new industries is desired.			✓
(D) Promote career opportunities in all industries for Hawaii's people by encouraging firms doing business in the State to hire residents.			✓
(E) Promote greater public and private sector cooperation in determining industrial training needs and in developing relevant curricula and on-the-job training opportunities.			✓
(F) Provide retraining programs and other support services to assist entry of displaced workers into alternative employment.			✓
(b) Priority guidelines to promote the economic health and quality of the visitor industry:			✓
(1) Promote visitor satisfaction by fostering an environment which enhances the aloha spirit and minimizes inconveniences to Hawaii's residents and visitors.			✓
(2) Encourage the development and maintenance of well-designed, adequately serviced hotels and resort destination areas which are sensitive to neighboring communities and activities and which provide for adequate shoreline setbacks and beach access.			✓

Hawai'i State Plan, Chapter 226, HRS Part III. Priority Guidelines Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable	DA	IA	N/A
(3) Support appropriate capital improvements to enhance the quality of existing resort destination areas and provide incentives to encourage investment in upgrading, repair, and maintenance of visitor facilities.			✓
(4) Encourage visitor industry practices and activities which respect, preserve, and enhance Hawaii's significant natural, scenic, historic, and cultural resources.			✓
(5) Develop and maintain career opportunities in the visitor industry for Hawaii's people, with emphasis on managerial positions.			✓
(6) Support and coordinate tourism promotion abroad to enhance Hawaii's share of existing and potential visitor markets.			✓
(7) Maintain and encourage a more favorable resort investment climate consistent with the objectives of this chapter.			✓
(8) Support law enforcement activities that provide a safer environment for both visitors and residents alike.			✓
(9) Coordinate visitor industry activities and promotions to business visitors through the state network of advanced data communication techniques.			✓
(c) Priority guidelines to promote the continued viability of the sugar and pineapple industries:			✓
(1) Provide adequate agricultural lands to support the economic viability of the sugar and pineapple industries.			✓
(2) Continue efforts to maintain federal support to provide stable sugar prices high enough to allow profitable operations in Hawaii.			✓
(3) Support research and development, as appropriate, to improve the quality and production of sugar and pineapple crops.			✓
(d) Priority guidelines to promote the growth and development of diversified agriculture and aquaculture:	✓		
(1) Identify, conserve, and protect agricultural and aquacultural lands of importance and initiate affirmative and comprehensive programs to promote economically productive agricultural and aquacultural uses of such lands.	✓		
(2) Assist in providing adequate, reasonably priced water for agricultural activities.	✓		
(3) Encourage public and private investment to increase water supply and to improve transmission, storage, and irrigation facilities in support of diversified agriculture and aquaculture.	✓		
(4) Assist in the formation and operation of production and marketing associations and cooperatives to reduce production and marketing costs.			✓
(5) Encourage and assist with the development of a waterborne and airborne freight and cargo system capable of meeting the needs of Hawaii's agricultural community.			✓
(6) Seek favorable freight rates for Hawaii's agricultural products from interisland and overseas transportation operators.			✓
(7) Encourage the development and expansion of agricultural and aquacultural activities which offer long-term economic growth potential and employment opportunities.	✓		

Hawai'i State Plan, Chapter 226, HRS Part III. Priority Guidelines Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable	DA	IA	N/A
(8) Continue the development of agricultural parks and other programs to assist small independent farmers in securing agricultural lands and loans.	✓		
(9) Require agricultural uses in agricultural subdivisions and closely monitor the uses in these subdivisions.	✓		
(10) Support the continuation of land currently in use for diversified agriculture.			✓
(11) Encourage residents and visitors to support Hawaii's farmers by purchasing locally grown food and food products.			✓
(e) Priority guidelines for water use and development:	✓		
(1) Maintain and improve water conservation programs to reduce the overall water consumption rate.			✓
(2) Encourage the improvement of irrigation technology and promote the use of nonpotable water for agricultural and landscaping purposes.	✓		
(3) Increase the support for research and development of economically feasible alternative water sources.			✓
(4) Explore alternative funding sources and approaches to support future water development programs and water system improvements.			✓
(f) Priority guidelines for energy use and development:			✓
(1) Encourage the development, demonstration, and commercialization of renewable energy sources.			✓
(2) Initiate, maintain, and improve energy conservation programs aimed at reducing energy waste and increasing public awareness of the need to conserve energy.			✓
(3) Provide incentives to encourage the use of energy conserving technology in residential, industrial, and other buildings.			✓
(4) Encourage the development and use of energy conserving and cost-efficient transportation systems.			✓
(g) Priority guidelines to promote the development of the information industry:			✓
(1) Establish an information network, with an emphasis on broadband and wireless infrastructure and capability that will serve as the foundation of and catalyst for overall economic growth and diversification in Hawaii.			✓
(2) Encourage the development of services such as financial data processing, a products and services exchange, foreign language translations, telemarketing, teleconferencing, a twenty-four-hour international stock exchange, international banking, and a Pacific Rim management center.			✓
(3) Encourage the development of small businesses in the information field such as software development; the development of new information systems, peripherals, and applications; data conversion and data entry services; and home or cottage services such as computer programming, secretarial, and accounting services.			✓
(4) Encourage the development or expansion of educational and training opportunities for residents in the information and telecommunications fields.			✓
(5) Encourage research activities, including legal research in the information and telecommunications fields.			✓

Hawai'i State Plan, Chapter 226, HRS Part III. Priority Guidelines Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable	DA	IA	N/A
(6) Support promotional activities to market Hawaii's information industry services.			✓
(7) Encourage the location or co-location of telecommunication or wireless information relay facilities in the community, including public areas, where scientific evidence indicates that the public health, safety, and welfare would not be adversely affected.			✓
Analysis: **The proposed action directly supports the economic priority guidelines by supporting the growth and development of diversified agriculture through the creation of additional subsistence agricultural lots with connections to domestic water and irrigation water. In addition, the proposed project supports the economic priority guidelines by construction activity which contributes to increased employment opportunities, job choices, and living standards.**			
Chapter 226-104: Population growth and land resources priority guidelines.			
(a) Priority guidelines to effect desired statewide growth and distribution:			✓
(1) Encourage planning and resource management to insure that population growth rates throughout the State are consistent with available and planned resource capacities and reflect the needs and desires of Hawaii's people.			✓
(2) Manage a growth rate for Hawaii's economy that will parallel future employment needs for Hawaii's people.			✓
(3) Ensure that adequate support services and facilities are provided to accommodate the desired distribution of future growth throughout the State.			✓
(4) Encourage major state and federal investments and services to promote economic development and private investment to the neighbor islands, as appropriate.			✓
(5) Explore the possibility of making available urban land, low-interest loans, and housing subsidies to encourage the provision of housing to support selective economic and population growth on the neighbor islands.			✓
(6) Seek federal funds and other funding sources outside the State for research, program development, and training to provide future employment opportunities on the neighbor islands.			✓
(7) Support the development of high technology parks on the neighbor islands.			✓
(b) Priority guidelines for regional growth distribution and land resource utilization:	✓		
(1) Encourage urban growth primarily to existing urban areas where adequate public facilities are already available or can be provided with reasonable public expenditures, and away from areas where other important benefits are present, such as protection of important agricultural land or preservation of lifestyles.			✓
(2) Make available marginal or nonessential agricultural lands for appropriate urban uses while maintaining agricultural lands of importance in the agricultural district.			✓
(3) Restrict development when drafting of water would result in exceeding the sustainable yield or in significantly diminishing the recharge capacity of any groundwater area.			✓
(4) Encourage restriction of new urban development in areas where water is insufficient from any source for both agricultural and domestic use.			✓

Hawai'i State Plan, Chapter 226, HRS Part III. Priority Guidelines Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable	DA	IA	N/A
(5) In order to preserve green belts, give priority to state capital-improvement funds which encourage location of urban development within existing urban areas except where compelling public interest dictates development of a noncontiguous new urban core.			✓
(6) Seek participation from the private sector for the cost of building infrastructure and utilities, and maintaining open spaces.			✓
(7) Pursue rehabilitation of appropriate urban areas.			✓
(8) Support the redevelopment of Kakaako into a viable residential, industrial, and commercial community.			✓
(9) Direct future urban development away from critical environmental areas or impose mitigating measures so that negative impacts on the environment would be minimized.			✓
(10) Identify critical environmental areas in Hawaii to include but not be limited to the following: watershed and recharge areas; wildlife habitats (on land and in the ocean); areas with endangered species of plants and wildlife; natural streams and water bodies; scenic and recreational shoreline resources; open space and natural areas; historic and cultural sites; areas particularly sensitive to reduction in water and air quality; and scenic resources.			✓
(11) Identify all areas where priority should be given to preserving rural character and lifestyle.			✓
(12) Utilize Hawaii's limited land resources wisely, providing adequate land to accommodate projected population and economic growth needs while ensuring the protection of the environment and the availability of the shoreline, conservation lands, and other limited resources for future generations.	✓		
(13) Protect and enhance Hawaii's shoreline, open spaces, and scenic resources.			✓
Analysis: **The subdivision of five (5) noncontiguous lots into twelve (12) lots and related improvements for lease to DHHL beneficiaries is directly supportive of the priority guideline for the sensible use of Hawai'i's limited resources and the provision of homesteading opportunities to meet the needs of DHHL beneficiaries and future generations.**			
Chapter 226-105: Crime and criminal justice.			
Priority guidelines in the area of crime and criminal justice:			✓
(1) Support law enforcement activities and other criminal justice efforts that are directed to provide a safer environment.			✓
(2) Target state and local resources on efforts to reduce the incidence of violent crime and on programs relating to the apprehension and prosecution of repeat offenders.			✓
(3) Support community and neighborhood program initiatives that enable residents to assist law enforcement agencies in preventing criminal activities.			✓
(4) Reduce overcrowding or substandard conditions in correctional facilities through a comprehensive approach among all criminal justice agencies which may include sentencing law revisions and use of alternative sanctions other than incarceration for persons who pose no danger to their community.			✓

Hawai'i State Plan, Chapter 226, HRS Part III. Priority Guidelines Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable	DA	IA	N/A
(5) Provide a range of appropriate sanctions for juvenile offenders, including community-based programs and other alternative sanctions.			✓
(6) Increase public and private efforts to assist witnesses and victims of crimes and to minimize the costs of victimization.			✓
Analysis: **The proposed action does not directly or indirectly support the priority guidelines for crime and criminal justice and will not affect law enforcement efficacy, conditions of correctional facilities, or provide alternative sanctions within the criminal justice system.**			
Chapter 226-106: Affordable housing.			
Priority guidelines for the provision of affordable housing:			✓
(1) Seek to use marginal or nonessential agricultural land and public land to meet housing needs of extremely low-, very low-, lower-, moderate-, and above and moderate-income households.			✓
(2) Encourage the use of alternative construction and development methods as a means of reducing production costs.			✓
(3) Improve information and analysis relative to land availability and suitability for housing.			✓
(4) Create incentives for development which would increase home ownership and rental opportunities for Hawaii's low-, very low-, lower-, and moderate-income households and residents with special needs.			✓
(5) Encourage continued support for government or private housing programs that provide low interest mortgages to Hawaii's people for the purchase of initial owner-occupied housing.			✓
(6) Encourage public and private sector cooperation in the development of rental housing alternatives.			✓
(7) Encourage improved coordination between various agencies and levels of government to deal with housing policies and regulations.			✓
(8) Give higher priority to the provision of quality housing that is affordable for Hawaii's residents and less priority to development of housing intended primarily for individuals outside of Hawaii.			✓
Analysis: **The proposed action does not directly or indirectly support the priority guidelines for affordable housing. Although the proposed project involves the provision of homesteading opportunities, it does not involve the provision of housing.**			
Chapter 226-107: Quality education.			
Priority guidelines to promote quality education:			✓
(1) Pursue effective programs which reflect the varied district, school, and student needs to strengthen basic skills achievement;			✓
(2) Continue emphasis on general education "core" requirements to provide common background to students and essential support to other university programs;			✓
(3) Initiate efforts to improve the quality of education by improving the capabilities of the education work force;			✓
(4) Promote increased opportunities for greater autonomy and flexibility of educational institutions in their decision making responsibilities;			✓
(5) Increase and improve the use of information technology in education by the availability of telecommunications equipment for:			✓

Hawai'i State Plan, Chapter 226, HRS Part III. Priority Guidelines Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable	DA	IA	N/A
(A) The electronic exchange of information;			✓
(B) Statewide electronic mail; and			✓
(C) Access to the Internet.			✓
(6) Encourage programs that increase the public's awareness and understanding of the impact of information technologies on our lives;			✓
(7) Pursue the establishment of Hawaii's public and private universities and colleges as research and training centers of the Pacific;			✓
(8) Develop resources and programs for early childhood education;			✓
(9) Explore alternatives for funding and delivery of educational services to improve the overall quality of education; and			✓
(10) Strengthen and expand educational programs and services for students with special needs.			✓
Analysis: **The proposed action is not directly or indirectly applicable to the priority guidelines and principles for quality education and does not affect the improvement or development of educational programs and resources.**			
CHAPTER 226-108: Sustainability			
Priority guidelines and principles to promote sustainability shall include:	✓		
(1) Encouraging balanced economic, social, community, and environmental priorities;	✓		
(2) Encouraging planning that respects and promotes living within the natural resources and limits of the State;	✓		
(3) Promoting a diversified and dynamic economy;	✓		
(4) Encouraging respect for the host culture;			✓
(5) Promoting decisions based on meeting the needs of the present without compromising the needs of future generations;	✓		
(6) Considering the principles of the ahupua'a system; and			✓
(7) Emphasizing that everyone, including individuals, families, communities, businesses, and government, has the responsibility for achieving a sustainable Hawaii.			✓
Analysis: **The proposed project directly supports the priority guidelines for sustainability by providing needed homestead opportunities to DHHL beneficiaries for subsistent agricultural use. The encouragement of agricultural activity indirectly promotes living within the natural resources and limits of the State and directly promotes a diversified economy.**			
CHAPTER 226-109: Climate change adaptation priority guidelines			
Priority guidelines to prepare the State to address the impacts of climate change, including impacts to the areas of agriculture; conservation lands; coastal and nearshore marine areas; natural and cultural resources; education; energy; higher education; health; historic preservation; water resources; the built environment, such as housing, recreation, transportation; and the economy shall:			✓
(1) Ensure that Hawaii's people are educated, informed, and aware of the impacts climate change may have on their communities;			✓
(2) Encourage community stewardship groups and local stakeholders to participate in planning and implementation of climate change policies;			✓

Hawai'i State Plan, Chapter 226, HRS Part III. Priority Guidelines Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable	DA	IA	N/A
(3) Invest in continued monitoring and research of Hawaii's climate and the impacts of climate change on the State;			✓
(4) Consider native Hawaiian traditional knowledge and practices in planning for the impacts of climate change;			✓
(5) Encourage the preservation and restoration of natural landscape features, such as coral reefs, beaches and dunes, forests, streams, floodplains, and wetlands, that have the inherent capacity to avoid, minimize, or mitigate the impacts of climate change;			✓
(6) Explore adaptation strategies that moderate harm or exploit beneficial opportunities in response to actual or expected climate change impacts to the natural and built environments;			✓
(7) Promote sector resilience in areas such as water, roads, airports, and public health, by encouraging the identification of climate change threats, assessment of potential consequences, and evaluation of adaptation options;			✓
(8) Foster cross-jurisdictional collaboration between county, state, and federal agencies and partnerships between government and private entities and other nongovernmental entities, including nonprofit entities;			✓
(9) Use management and implementation approaches that encourage the continual collection, evaluation, and integration of new information and strategies into new and existing practices, policies, and plans; and			✓
(10) Encourage planning and management of the natural and built environments that effectively integrate climate change policy.			✓
Analysis: **The proposed project does not directly or indirectly support the climate change priority guidelines.**			

ANALYSIS OF PROJECT APPLICABILITY TO COUNTYWIDE POLICY PLAN

APPENDIX

H-2

APPENDIX H-2

Analysis of Project Applicability to Countywide Policy Plan

The Countywide Policy Plan was adopted in March 2010 and is a comprehensive policy document for the islands of Maui County to the year 2030. The plan replaces the *General Plan of the County of Maui 1990 Update* and provides the policy framework for the development of the forthcoming Maui Island Plan as well as for updating the nine detailed Community Plans.

The Countywide Policy Plan provides broad goals, objectives, policies and implementing actions that portray the desired direction of the County's future. Goals are intended to describe a desirable condition of the County by the year 2030 and are intentionally general. Objectives tend to be more specific and may be regarded as milestones to achieve the larger goals. Policies are not intended as regulations, but instead provide a general guideline for County decision makers, departments, and collaborating organizations toward the attainment of goals and objectives. Implementing actions are specific tasks, procedures, programs, or techniques that carry out policy.

Discussion of how the proposed project conforms to the relevant goals, objectives, policies, and implementing actions of the Countywide Policy Plan is provided below. The methodology for assessing a project's relationship to the Countywide Policy Plan involves examining the project's applicability to the Plan's goals, objectives, and policies. "Applicability" refers to a project's need, purpose and effects, and how they advance or promote a particular set of goals, objectives and policies. In assessing the relationship between a proposed action and the Countywide Policy Plan, an action may be categorized in one of the following groups:

1. **Directly applicable:** the action and its potential effects directly advance, promote or affect the relevant goal, objective, or policy.

   Example: A County project to develop a new water source and related transmission facilities would be directly applicable to improving physical infrastructure. The relevant objective states: *Improve water systems to assure access to sustainable, clean, reliable, and affordable sources of water* (Objective I.1). A policy within this objective category states: *Ensure that adequate supplies of water are available prior to approval of subdivision or construction documents* (Policy I.1.a).

   In this instance, the proposed action is considered to be directly applicable to the cited objective and policy.

2. **Indirectly applicable:** the action and its potential effects indirectly support, advance or affect the objective, policy or priority guideline.

   Example: The county water source project cited above supports the objective to: *Improve land use management and implement a directed-growth strategy* (Objective J.1). A related policy encompassed by this objective states: *Direct new development in and around communities with existing infrastructure and service capacity, and protect natural, scenic, shoreline, and cultural resources* (Policy J.1.h). In this case, the principle purpose of the project is not to create a water source specifically intended to improve land use management. Nonetheless, the proposed action indirectly supports the Countywide Policy Plan's directives relating to appropriate locations for new development.

3. **Not applicable:** the action and its potential effects have no direct or indirect relationship to the objectives and policies of the Countywide Policy Plan.

   Example: The county water source improvement project referenced above, may not have direct or indirect linkage to Objective D.1, which states: *In cooperation with the Federal and State governments and nonprofit agencies, broaden access to social and healthcare services and expand options to improve the overall wellness of the people of Maui County*. Hence, from a policy analysis and linkage standpoint, the proposed action would be considered not applicable to this set of objectives and policies.

   It is recognized that policy analysis is subject to interpretation and is best considered in the context of the proposed action's local and regional conditions.

COUNTYWIDE POLICY PLAN (Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable)	DA	IA	NA
A. PROTECT THE NATURAL ENVIRONMENT			
Goal: Maui County's natural environment and distinctive open spaces will be preserved, managed, and cared for in perpetuity.	✓		
Objective:			
(1) Improve the opportunity to experience the natural beauty and native biodiversity of the islands for present and future generations.	✓		
Policies:			
(a) Perpetuate native Hawaiian biodiversity by preventing the introduction of invasive species, containing or eliminating existing noxious pests, and protecting critical habitat areas.			✓
(b) Preserve and reestablish indigenous and endemic species' habitats and their connectivity.			✓
(c) Restore and protect forests, wetlands, watersheds, and stream flows, and guard against wildfires, flooding, and erosion.			✓
(d) Protect baseline stream flows for perennial streams, and support policies that ensure adequate stream flow to support Native Hawaiian aquatic species, traditional kalo cultivation, and self-sustaining ahupua'a.			✓
(e) Protect undeveloped beaches, dunes, and coastal ecosystems, and restore natural shoreline processes.			✓
(f) Protect the natural state and integrity of unique terrain, valued natural environments, and geological features.			✓
(g) Preserve and provide ongoing care for important scenic vistas, view planes, landscapes, and open-space resources.			✓

COUNTYWIDE POLICY PLAN (Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable)	DA	IA	NA
(h) Expand coordination with the State and nonprofit agencies and their volunteers to reduce invasive species, replant indigenous species, and identify critical habitat.			✓
Implementing Actions:			
(a) Develop island-wide networks of greenways, watercourses, and habitat corridors.			✓
Analysis: **The proposed project is directly supportive of the goal and objective for the natural environment through the provision of subsistence agricultural lands for homesteading, thereby increasing opportunities for DHHL beneficiaries to experience the natural beauty and native biodiversity of the islands for present and future generations.**			
Objective:			
(2) Improve the quality of environmentally sensitive, locally valued natural resources and native ecology of each island.	✓		
Policies:			
(a) Protect and restore nearshore reef environments and water quality.			✓
(b) Protect marine resources and valued wildlife.			✓
(c) Improve the connection between urban environments and the natural landscape, and incorporate natural features of the land into urban design.			✓
(d) Utilize land-conservation tools to ensure the permanence of valued open spaces.			✓
(e) Mitigate the negative effects of upland uses on coastal wetlands, marine life, and coral reefs.	✓		
(f) Strengthen coastal-zone management, re-naturalization of shorelines, where possible, and filtration or treatment of urban and agricultural runoff.			✓
(g) Regulate the use and maintenance of stormwater-treatment systems that incorporate the use of native vegetation and mimic natural systems.			✓
(h) Advocate for stronger regulation of fishing, boating, cruise ship, and ecotourism activities.			✓
(i) Restore watersheds and aquifer-recharge areas to healthy and productive status, and increase public knowledge about the importance of watershed stewardship, water conservation, and groundwater protection.			✓
Implementing Actions:			
(a) Develop regulations to minimize runoff of pollutants into nearshore waters and reduce nonpoint and point source pollution.			✓
Analysis: **The proposed project will utilize Best Management Practices (BMPs) to ensure that natural resources such as the coastal environment is not impacted by construction activities. The use of BMPs also ensures compatibility between land-based and water-based functions, resources, and ecological systems.**			
Objective:			
(3) Improve the stewardship of the natural environment.	✓		

COUNTYWIDE POLICY PLAN (Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable)	DA	IA	NA
Policies:			
(a) Preserve and protect natural resources with significant scenic, economic, cultural, environmental, or recreational value.			✓
(b) Improve communication, coordination, and collaboration among government agencies, nonprofit organizations, communities, individuals, and land owners that work for the protection of the natural environment.			✓
(c) Evaluate development to assess potential short-term and long-term impacts on land, air, aquatic, and marine environments.	✓		
(d) Improve efforts to mitigate and plan for the impact of natural disasters, human influenced emergencies, and global warming.			✓
(e) Regulate access to sensitive ecological sites and landscapes.			✓
(f) Reduce air, noise, light, land, and water pollution, and reduce Maui County's contribution to global climate change.			✓
(g) Plan and prepare for and educate visitors and residents about the possible effects of global warming.			✓
(h) Provide public access to beaches and shorelines for recreational and cultural purposes where appropriate.			✓
(i) Educate the construction and landscape industries and property owners about the use of best management practices to prevent erosion and nonpoint source pollution.	✓		
(j) Support the acquisition of resources with scenic, environmental, and recreational value, and encumber their use.			✓
(k) Improve enforcement activities relating to the natural environment.			✓
(l) For each shoreline community, identify and prioritize beach-conservation objectives, and develop action plans for their implementation.			✓
Implementing Actions:			
(a) Document, record, and monitor existing conditions, populations, and locations of flora and fauna communities.			✓
(b) Implement Federal and State policies that require a reduction of greenhouse-gas emissions.			✓
(c) Establish a baseline inventory of available natural resources and their respective carrying capacities.			✓
Analysis: **The proposed project directly meets the objective of improving the stewardship of the natural environment. The project will employ BMPs to prevent impacts from construction, including temporary erosion control, storm water management, and dust control. In addition, the EA thoroughly evaluated the proposed action's potential impacts on the environment, and where applicable, advances measures aimed at reducing impacts to the environment.**			
Objective:			
(4) Educate residents and visitors about responsible stewardship practices and the interconnectedness of the natural environment and people.			✓
Policies:			
(a) Expand education about native flora, fauna, and ecosystems.			✓

COUNTYWIDE POLICY PLAN (Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable)	DA	IA	NA
(b) Align priorities to recognize that the health of the natural environment and the health of people are inextricably linked.			✓
(c) Promote programs and incentives that decrease greenhouse-gas emissions and improve environmental stewardship.			✓
Analysis: **The proposed project does not have direct or indirect relationships to the objective of educating residents and visitors about responsible stewardship practices and the interconnectedness of the natural environment and people. However, this objective is an integral value to Native Hawaiians who are beneficiaries of this project.**			
B. PRESERVE LOCAL CULTURES AND TRADITIONS			
Goal: Maui County will foster a spirit of pono and protect, perpetuate, and reinvigorate its residents multi-cultural values and traditions to ensure that current and future generations will enjoy the benefits of their rich island heritage.	✓		
Objective:			
(1) Perpetuate the Hawaiian culture as a vital force in the lives of residents.	✓		
Policies:			
(a) Protect and preserve access to mountain, ocean, and island resources for traditional Hawaiian cultural practices.			✓
(b) Prohibit inappropriate development of cultural lands and sites that are important for traditional Hawaiian cultural practices, and establish mandates for the special protection of these lands in perpetuity.	✓		
(c) Promote the use of ahupua'a and moku management practices.			✓
(d) Encourage the use of traditional Hawaiian architecture and craftsmanship.			✓
(e) Promote the use of the Hawaiian language.			✓
(f) Recognize and preserve the unique natural and cultural characteristics of each ahupua'a or district.			✓
(g) Encourage schools to promote broader incorporation of Hawaiian and other local cultures' history and values lessons into curriculum.			✓
(h) Ensure the protection of Native Hawaiian rights.			✓
(i) Promote, encourage, and require the correct use of traditional place names, particularly in government documents, signage, and the tourism industry.			✓
Implementing Actions:			
(a) Establish alternative land use and overlay zoning designations that recognize and preserve the unique natural and cultural characteristics of each ahupua'a or district.			✓
(b) Develop requirements for all County applicants to perpetuate and use proper traditional place names in all applications submitted.			✓
Analysis: **The proposed project will directly benefit native Hawaiian people for generations and ensure the perpetuation of Hawaiian culture. This development is an appropriate development of lands for native Hawaiians. A Cultural Impact Assessment (CIA) was prepared for the proposed project as part of the environmental review process. The CIA fosters increased knowledge of Native Hawaiian cultural practices, as well as the history of the project area.**			

COUNTYWIDE POLICY PLAN (Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable)	DA	IA	NA
Objective:			
(2) Emphasize respect for our island lifestyle and our unique local cultures, family, and natural environment.	✓		
Policies:			
(a) Acknowledge the Hawaiian culture as the host culture, and foster respect and humility among residents and visitors toward the Hawaiian people and their practices.			✓
(b) Perpetuate a respect for diversity, and recognize the historic blending of cultures and ethnicities.			✓
(c) Encourage the perpetuation of each culture's unique cuisine, attire, dance, music, and folklore, and other unique island traditions and recreational activities.			✓
(d) Recognize the interconnectedness between the natural environment and the cultural heritage of the islands.	✓		
(e) Protect and prioritize funding for recreational activities that support local cultural practices, such as surfing, fishing, and outrigger-canoe paddling.			✓
Analysis: **The project directly supports this objective and policy as the CIA acknowledges the relationship between the natural environment and cultural resources found in the project vicinity.**			
Objective:			
(3) Preserve for present and future generations the opportunity to know and experience the arts, culture, and history of Maui County.			✓
Policies:			
(a) Foster teaching opportunities for cultural practitioners to share their knowledge and skills.			✓
(b) Support the development of cultural centers.			✓
(c) Broaden opportunities for public art and the display of local artwork.			✓
(d) Foster the Aloha Spirit by celebrating the Hawaiian host culture and other Maui County cultures through support of cultural-education programs, festivals, celebrations, and ceremonies.			✓
(e) Support the perpetuation of Hawaiian arts and culture.			✓
(f) Support programs and activities that record the oral and pictorial history of residents.			✓
(g) Support the development of repositories for culture, history, genealogy, oral history, film, and interactive learning.			✓
Implementing Actions:			
(a) Establish incentives for the display of public art.			✓
(b) Establish centers and programs of excellence for the perpetuation of Hawaiian arts and culture.			✓
Analysis: **The proposed project does not have direct or indirect relationships to the objective of preserving the arts, culture, and history of Maui County for present and future generations. This is a subdivision project for Native Hawaiians that will provide additional homesteading opportunities.**			

COUNTYWIDE POLICY PLAN (Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable)	DA	IA	NA
Objective:			
(4) Preserve and restore significant historic architecture, structures, cultural sites, cultural districts, and cultural landscapes.		✓	
Policies:			
(a) Support the development of island-wide historic, archaeological, and cultural resources inventories.		✓	
(b) Promote the rehabilitation and adaptive reuse of historic sites, buildings, and structures to perpetuate a traditional sense of place.			✓
(c) Identify a sustainable rate of use and set forth specific policies to protect cultural resources.			✓
(d) Protect and preserve lands that are culturally or historically significant.			✓
(e) Support programs that protect, record, restore, maintain, provide education about, and interpret cultural districts, landscapes, sites, and artifacts in both natural and museum settings.			✓
(f) Perpetuate the authentic character and historic integrity of rural communities and small towns.			✓
(g) Seek solutions that honor the traditions and practices of the host culture while recognizing the needs of the community.			✓
(h) Support the development of an Archaeological District Ordinance.			✓
(i) Protect summits, slopes, and ridgelines from inappropriate development.			✓
(j) Support the registering of important historic sites on the State and Federal historic registers.			✓
(k) Provide opportunities for public involvement with restoration and enhancement of all types of cultural resources.			✓
(l) Foster partnerships to identify and preserve or revitalize historic and cultural sites.			✓
Implementing Actions:			
(a) Identify, develop, map, and maintain an inventory of locally significant natural. cultural, and historical resources for protection.		✓	
(b) Prepare, continually update, and implement a cultural-management plan for cultural sites, districts, and landscapes, where appropriate.			✓
(c) Enact an Archaeological District Ordinance.			✓
(d) Nominate important historic sites to the State and Federal historic registers.			✓
Analysis: **The proposed action is indirectly applicable to these objectives and related policies and implementing actions. Historic preservation consultation and coordination for the proposed action are aimed at ensuring the preservation of historic resources, which may be impacted by the project.**			
C. IMPROVE EDUCATION			
Goal: Residents will have access to lifelong formal and informal educational options enabling them to realize their ambitions.		✓	

COUNTYWIDE POLICY PLAN (Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable)	DA	IA	NA
Objective:			
(1) Encourage the State to attract and retain school administrators and educators of the highest quality.			✓
Policies:			
(a) Encourage the State to provide teachers with nationally competitive pay and benefit packages.			✓
(b) Encourage the State to ensure teachers will have the teaching tools and support staff needed to provide students with an excellent education.			✓
(c) Explore Maui County district- and school-based decision making in public education.			✓
Analysis: **Indirectly, this project meets the goal of giving residents access to lifelong formal and informal educational options. This is a homestead development and improvements project in proximity to Moloka'i High School and Moloka'i Middle School, which are the only middle school and high school on island. DHHL beneficiaries and their children residing on the homesteads will be put closer to schools, allowing for easier access to education. However, the project is neither directly or indirectly applicable to the objective of attracting or retaining school administrators and educators.**			
Objective:			
(2) Provide nurturing learning environments that build skills for the 21st century.			✓
Policies:			
(a) Expand professional-development opportunities in disciplines that support the economic-development goals of Maui County.			✓
(b) Plan for demographic, social, and technological changes in a timely manner.			✓
(c) Encourage collaborative partnerships to improve conditions of learning environments.			✓
(d) Promote development of neighborhood schools and educational centers.			✓
(e) Integrate schools, community parks, and playgrounds, and expand each community's use of these facilities.			✓
(f) Support coordination between land use and school-facility planning agencies.			✓
(g) Encourage the upgrade and ongoing maintenance of public-school facilities.			✓
(h) Encourage the State Department of Education to seek reliable, innovative, and alternative methods to support a level of per-pupil funding that places Hawai'i among the top tier of states nationally for its financial support of public schools.			✓
(i) Encourage the State to promote healthier, more productive learning environments, including by providing healthy meals, more physical activity, natural lighting, and passive cooling.			✓
(j) Encourage the State to support the development of benchmarks to measure the success of Hawai'i's public-education system and clarify lines of accountability.			✓

COUNTYWIDE POLICY PLAN (Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable)	DA	IA	NA
(k) Design school and park facilities in proximity to residential areas.			✓
(l) Support technology- and natural-environment-based learning.			✓
(m) Encourage the State to support lower student-teacher ratios in public schools.			✓
(n) Encourage alternative learning and educational opportunities.			✓
Implementing Actions:			
(a) Develop safe walking and bicycling programs for school children.			✓
Analysis: **The proposed project is neither directly or indirectly applicable to the objective or policies for environments that promote 21st century skills and does not impact conditions of learning environments.**			
Objective:			
(3) Provide all residents with educational opportunities that can help them better understand themselves and their surroundings and allow them to realize their ambitions.		✓	
Policies:			
(a) Encourage the State to improve Maui Community College as a comprehensive community college that will serve each community.			✓
(b) Broaden the use of technology and telecommunications to improve educational opportunities throughout the County.			✓
(c) Attract graduate-level research programs and institutions.			✓
(d) Promote the teaching of traditional practices, including aquaculture; subsistence agriculture; Pacific Island, Asian, and other forms of alternative health practices; and indigenous Hawaiian architecture.		✓	
(e) Integrate cultural and environmental values in education, including self-sufficiency and sustainability.			✓
(f) Foster a partnership and ongoing dialogue between business organizations, formal educational institutions, and vocational training centers to tailor learning and mentoring programs to County needs.			✓
(g) Ensure teaching of the arts to all ages.			✓
(h) Expand and develop vocational learning opportunities by establishing trade schools.			✓
(i) Encourage the State to integrate financial and economic literacy in elementary, secondary, and higher-education levels.			✓
Implementing Actions:			
(a) Encourage the State to establish a four-year university, and support the development of other higher-education institutions to enable residents to obtain bachelor degrees and postgraduate degrees in Maui County.			✓
Analysis: **The proposed project indirectly supports the objective and policies as it will afford many Native Hawaiian families the opportunity to practice subsistence agriculture. Furthermore, the DHHL has partnered with the University of Hawai'i College of Agriculture and Human Resources (CTAHR) to provide technical assistance and training to DHHL agricultural lessees.**			
Objective:			
(4) Maximize community-based educational opportunities.		✓	

COUNTYWIDE POLICY PLAN (Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable)	DA	IA	NA
Policies:			
(a) Encourage the State and others to expand pre-school, after-school, and homebased (parent-child) learning.			✓
(b) Support public-private partnerships to develop youth-internship, -apprenticeship, and -mentoring programs.			✓
(c) Support the development of a wide range of informal educational and cultural programs for all residents.		✓	
(d) Improve partnerships that utilize the skills and talents at Hawai'i's colleges and universities to benefit the County.		✓	
(e) Support career-development and job-recruitment programs and centers.			✓
(f) Attract learning institutions and specialty schools to diversify and enhance educational opportunities.			✓
(g) Expand education of important life skills for the general public.			✓
(h) Support community facilities such as museums, libraries, nature centers, and open spaces that provide interactive-learning opportunities for all ages.			✓
Analysis: **The project indirectly maximizes community-based educational opportunities. As mentioned, the DHHL has partnered with the University of Hawai'i CTAHR, thereby improving partnerships that utilize the skills and talents of Hawai'i's universities to benefit the County. In addition, the DHHL has established a community-based Agricultural Advisory Committee made of beneficiaries to advise the CTAHR agent on the curriculum and activities for agricultural training.**			
D. STRENGTHEN SOCIAL AND HEALTHCARE SERVICES			
Goal: Health and social services in Maui County will fully and comprehensively serve all segments of the population.	✓		
Objective:			
(1) In cooperation with the Federal and State governments and nonprofit agencies, broaden access to social and healthcare services and expand options to improve the overall wellness of the people of Maui County.			✓
Policies:			
(a) Work with other levels of government and the nonprofit sector to expand services to address hunger, homelessness, and poverty.			✓
(b) Support the improvement of opportunities for disadvantaged youth, encourage the tradition of hanai relatives, and support expanded opportunities for foster care.			✓
(c) Support expanded long-term-care options, both in institutions and at home, for patients requiring ongoing assistance and medical attention.			✓
(d) Encourage the expansion and improvement of local hospitals, facilitate the establishment of new healthcare facilities, and facilitate prompt and high-quality emergency- and urgent-care services for all.			✓
(e) Support broadened access to affordable health insurance and health care, and recognize the unique economic challenges posed to families when healthcare services are provided off-island.			✓
(f) Encourage equal access to social and healthcare services through both technological and traditional means.			✓

COUNTYWIDE POLICY PLAN (Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable)	DA	IA	NA
Analysis: **Directly, the proposed project will directly support access to services. By providing homestead opportunities to families near the central core of Hoʻolehua and in proximity to the town center of Kaunakakai, they will have easier access to utilize social and healthcare services, if needed.**			
Objective:			
(2) Encourage the Federal and State governments and the private sector to improve the quality and delivery of social and healthcare services.			✓
Policies:			
(a) Strengthen partnerships with government, nonprofit, and private organizations to provide funding and to improve counseling and other assistance to address substance abuse, domestic violence, and other pressing social challenges.			✓
(b) Encourage the State to improve the quality of medical personnel, facilities, services, and equipment.			✓
(c) Encourage investment to improve the recruitment of medical professionals and the quality of medical facilities and equipment throughout Maui County.			✓
(d) Promote the development of continuum-of-care facilities that provide assisted living, hospice, home-care, and skilled-nursing options allowing the individual to be cared for in a manner congruent with his or her needs and desires.			✓
(e) Support improved social, healthcare, and governmental services for special needs populations.			✓
(f) Plan for the needs of an aging population and the resulting impacts on social services, housing, and healthcare delivery.			✓
(g) Improve coordination among the police, the courts, and the public in the administration of social and healthcare services.			✓
(h) Support programs that address needs of veterans.			✓
(i) Support programs that address the needs of immigrants.			✓
Implementing Actions:			
(a) Invest in programs designed to improve the general welfare and quality of life of Native Hawaiians.	✓		
(b) Assist and facilitate the State Department of Public Safety and others in efforts to strengthen programs and facilities that will improve the mental and social health of incarcerated people and assist in prison inmates' successful transition back into Maui County communities.			✓
(c) Develop and maintain a comprehensive index that will measure the health and wellness needs of families.			✓
(d) Provide heliports countywide for emergency health and safety purposes.			✓
Analysis: **While most of these policies are not directly or indirectly applicable to the project, one of the implementing actions of investing in programs designed to improve the general welfare and quality of life of Native Hawaiians holds merit. This project directly affects Native Hawaiians and aspires to improve their quality of life by providing additional homestead opportunities.**			

COUNTYWIDE POLICY PLAN (Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable)	DA	IA	NA
Objective:			
(3) Strengthen public-awareness programs related to healthy lifestyles and social and medical services.			✓
Policies:			
(a) Expand public awareness about personal safety and crime prevention.			✓
(b) Encourage residents to pursue education and training for careers in the healthcare, social services, and community-development fields.			✓
(c) Expand public awareness and promote programs to achieve healthy eating habits and drug-free lifestyles.			✓
Analysis: **The objective and policies related to strengthening public-awareness programs related to healthy lifestyles and social and medical services are not directly or indirectly applicable to this project.**			
E. EXPAND HOUSING OPPORTUNITIES FOR RESIDENTS			
Goal: Quality, island-appropriate housing will be available to all residents.	✓		
Objective:			
(1) Reduce the affordable housing deficit for residents.			✓
Policies:			
(a) Ensure that an adequate and permanent supply of affordable housing, both new and existing units, is made available for purchase or rental to our resident and/or workforce population, with special emphasis on providing housing for low- to moderate-income families, and ensure that all affordable housing remains affordable in perpetuity.			✓
(b) Seek innovative ways to lower housing costs without compromising the quality of our island lifestyle.			✓
(c) Seek innovative methods to secure land for the development of low- and moderate- income housing.			✓
(d) Provide the homeless population with emergency and transitional shelter and other supportive programs.			✓
(e) Provide for a range of senior-citizen and special needs housing choices on each island that affordably facilitates a continuum of care and services.			✓
(f) Support the Department of Hawaiian Home Lands' development of homestead lands.	✓		
(g) Manage property-tax burdens to protect affordable resident homeownership.			✓
(h) Explore taxation mechanisms to increase and maintain access to affordable housing.			✓
(i) Improve awareness regarding available affordable homeowner's insurance.			✓
(j) Redevelop commercial areas with a mixture of affordable residential and business uses, where appropriate.			✓
(k) Ensure residents are given priority to obtain affordable housing units developed in their communities, consistent with all applicable regulations.			✓

COUNTYWIDE POLICY PLAN (Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable)	DA	IA	NA
(l) Establish pricing for affordable housing that is more reflective of Maui County's workforce than the United States Housing and Urban Development's median-income estimates for Maui County.			✓
(m) Develop neighborhoods with a mixture of accessible and integrated community facilities and services.			✓
(n) Provide alternative regulatory frameworks to facilitate the use of Kuleana lands by the descendants of Native Hawaiians who received those lands pursuant to the Kuleana Act of 1850.			✓
(o) Work with lending institutions to expand housing options and safeguard the financial security of homeowners.			✓
(p) Promote the use of the community land trust model and other land-lease and land- financing options.	✓		
(q) Support the opportunity to age in place by providing accessible and appropriately designed residential units.			✓
Analysis: **The proposed project directly advances the policies for supporting DHHL's development of homestead lands. Although the proposed project does not involve the construction of housing, it will add infrastructure that will make the homesteads suitable for lease to DHHL beneficiaries.**			
Objective:			
(2) Increase the mix of housing types in towns and neighborhoods to promote sustainable land use planning, expand consumer choice, and protect the County's rural and small town character.			✓
Policies:			
(a) Seek innovative ways to develop 'ohana cottages and accessory-dwelling units as affordable housing.			✓
(b) Design neighborhoods to foster interaction among neighbors.			✓
(c) Encourage a mix of social, economic, and age groups within neighborhoods.			✓
(d) Promote infill housing in urban areas at scales that capitalize on existing infrastructure, lower development costs, and are consistent with existing or desired patterns of development.			✓
(e) Encourage the building industry to use environmentally sustainable materials, technologies, and site planning.			✓
(f) Develop workforce housing in proximity to job centers and transit facilities.			✓
(g) Provide incentives to developers and owners who incorporate green building practices and energy-efficient technologies into their housing developments.			✓
Implementing Actions:			
(a) Revise laws to support neighborhood designs that incorporate a mix of housing types that are appropriate for island living.			✓
Analysis: **The proposed project is neither directly or indirectly applicable to the objective and policies for increasing the housing types as it does not involve the construction of housing or dwelling units.**			

COUNTYWIDE POLICY PLAN (Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable)	DA	IA	NA
Objective:			
(3) Increase and maintain the affordable housing inventory.		✓	
Policies:			
(a) Recognize housing as a basic human need, and work to fulfill that need.			✓
(b) Prioritize available infrastructure capacity for affordable housing.			✓
(c) Improve communication, collaboration, and coordination among housing providers and social-service organizations.			✓
(d) Study future projected housing needs, monitor economic cycles, and prepare for future conditions on each island.			✓
(e) Develop public-private and nonprofit partnerships that facilitate the construction of quality affordable housing.			✓
(f) Streamline the review process for high-quality, affordable housing developments that implement the goals, objectives, and policies of the General Plan.			✓
(g) Minimize the intrusion of housing on prime, productive, and potentially productive agricultural lands and regionally valuable agricultural lands.	✓		
(h) Encourage long-term residential use of existing and future housing to meet residential needs.			✓
Implementing Actions:			
(a) Develop policies to even out the peaks and valleys in Maui County's construction-demand cycles.			✓
Analysis: **The proposed project will create additional subsistence agricultural lots on prime and valuable agricultural lands, maintaining the land for agriculture. Housing structures will not be constructed as part of this project, however, residential occupancy is optional.**			
Objective:			
(4) Expand access to education related to housing options, homeownership, financing, and residential construction.		✓	
Policies:			
(a) Broaden access to information about County, State, and Federal programs that provide financial assistance to renters and home buyers.			✓
(b) Expand access to information about opportunities for homeownership and self-help housing.			✓
(c) Educate residents about making housing choices that support their individual needs, the needs of their communities, and the health of the islands' natural systems.			✓
(d) Improve home buyers' education on all aspects of homeownership.		✓	
Analysis: **Indirectly, this project will help to educate the DHHL beneficiaries' knowledge about housing options and financing. The DHHL provides educational programs for beneficiaries regarding financing and financial planning. If lessees choose to reside on the property, they will need to educate themselves about home ownership thereby increasing their knowledge base.**			

COUNTYWIDE POLICY PLAN (Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable)	DA	IA	NA
F. STRENGTHEN THE LOCAL ECONOMY			
Goal: Maui County's economy will be diverse, sustainable, and supportive of community values.	✓		
Objective:			
(1) Promote an economic climate that will encourage diversification of the County's economic base and a sustainable rate of economic growth.		✓	
Policies:			
(a) Support economic decisions that create long-term benefits.		✓	
(b) Promote lifelong education, career development, and technical training for existing and emerging industries.			✓
(c) Invest in infrastructure, facilities, and programs that foster economic diversification.		✓	
(d) Support and promote locally produced products and locally owned operations and businesses that benefit local communities and meet local demand.			✓
(e) Support programs that assist industries to retain and attract more local labor and facilitate the creation of jobs that offer a living wage.			✓
(f) Encourage work environments that are safe, rewarding, and fulfilling to employees.			✓
(g) Support home-based businesses that are appropriate for and in character with the community.			✓
(h) Encourage businesses that promote the health and well-being of the residents, produce value-added products, and support community values.			✓
(i) Foster an understanding of the role of all industries in our economy.			✓
(j) Support efforts to improve conditions that foster economic vitality in our historic small towns.			✓
(k) Support and encourage traditional host-culture businesses and indigenous agricultural practices.		✓	
(l) Support public and private entities that assist entrepreneurs in establishing locally operated businesses.			✓
Implementing Actions:			
(a) Develop regulations and programs that support opportunities for local merchants, farmers, and small businesses to sell their goods and services directly to the public.			✓
(b) Monitor the carrying capacity of the islands' social, ecological, and infrastructure systems with respect to the economy.			✓
Analysis: **The proposed project is directly supportive of the County's goal, objective, and policies for a diversified and sustainable economy through the promotion of agriculture and indigenous agricultural practices and the provision of land to Native Hawaiians that is suitable for agricultural use.**			
Objective:			
(2) Diversify and expand sustainable forms of agriculture and aquaculture.	✓		

COUNTYWIDE POLICY PLAN (Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable)	DA	IA	NA
Policies:			
(a) Support programs that position Maui County's agricultural products as premium export products.			✓
(b) Prioritize the use of agricultural land to feed the local population, and promote the use of agricultural lands for sustainable and diversified agricultural activities.	✓		
(c) Capitalize on Hawai'i's economic opportunities in the ecologically sensitive aquaculture industries.			✓
(d) Assist farmers to help make Maui County more self-sufficient in food production.	✓		
(e) Support ordinances, programs, and policies that keep agricultural land and water available and affordable to farmers.	✓		
(f) Support a tax structure that is conducive to the growth of the agricultural economy.			✓
(g) Enhance County efforts to monitor and regulate important agricultural issues.			✓
(h) Support education, research, and facilities that strengthen the agricultural industry.			✓
(i) Maintain the genetic integrity of existing food crops.			✓
(j) Encourage healthy and organic farm practices that contribute to land health and regeneration.			✓
(k) Support cooperatives and other types of nontraditional communal farming and efforts.			✓
(l) Encourage methods of monitoring and controlling genetically modified crops to prevent adverse effects.			✓
(m) Work with the State to ease the permitting process for the revitalization of traditional fish ponds.			✓
Implementing Actions:			
(a) Redirect efforts in the Office of Economic Development to further facilitate the development of the agricultural section and to monitor agricultural legislation and issues.			✓
(b) Publicly identify, with signage and other means, the field locations of all genetically modified crops.			✓
(c) Create agricultural parks in areas distant from genetically modified crops.			✓
Analysis: **The proposed project directly advances the objective and policies for diversified and sustainable agriculture by providing DHHL beneficiaries with land for subsistent agriculture. The project supports agricultural activity and encourages self-sufficiency through farming.**			
Objective:			
(3) Support a visitor industry that respects the resident culture and the environment.			✓

COUNTYWIDE POLICY PLAN (Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable)	DA	IA	NA
Policies:			
(a) Promote traditional Hawaiian practices in visitor-related facilities and activities.			✓
(b) Encourage and educate the visitor industry to be sensitive to island lifestyles and cultural values.			✓
(c) Encourage a spirit of welcome for residents at visitor facilities, such as by offering kama'aina incentives and discount programs.			✓
(d) Support the renovation and enhancement of existing visitor facilities.			✓
(e) Support policies, programs, and a tax structure that redirect the benefits of the visitor industry back into the local community.			✓
(f) Encourage resident ownership of visitor-related businesses and facilities.			✓
(g) Develop partnerships to provide educational and training facilities to residents employed in the visitor industry.			✓
(h) Foster an understanding of local cultures, customs, and etiquette, and emphasize the importance of the Aloha Spirit as a common good for all.			✓
(i) Support the diversification, development, evolution, and integration of the visitor industry in a way that is compatible with the traditional, social, economic, spiritual, and environmental values of island residents			✓
(j) Improve collaboration between the visitor industry and the other sectors of Maui County's economy.			✓
(k) Perpetuate an authentic image of the Hawaiian culture and history and an appropriate recognition of the host culture.			✓
(l) Support the programs and initiatives outlined in the Maui County Tourism Strategic Plan 2006-2015.			✓
(m) Promote water conservation, beach conservation, and open-space conservation in areas providing services for visitors.			✓
(n) Recognize the important contributions that the visitor industry makes to the County's economy, and support a healthy and vibrant visitor industry.			✓
Analysis: **As a DHHL homestead project for DHHL beneficiaries, the proposed project will not impact the objectives and policies for the visitor and tourism industry.**			
Objective:			
(4) Expand economic sectors that increase living-wage job choices and are compatible with community values.			✓
Policies:			
(a) Support emerging industries, including the following: • Health and wellness industry; • Sports and recreation industry; • Film and entertainment industry; • Arts and culture industry; • Renewable-energy industry; • Research and development industry; • High-technology and knowledge-based industries; • Education and training industry; • Ecotourism industry; and • Agritourism industry.			✓

COUNTYWIDE POLICY PLAN (Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable)	DA	IA	NA
Analysis: **Although the proposed project supports the economic goals related to agriculture and sustainability, the project is neither directly or indirectly supportive of emerging industries.**			
G. IMPROVE PARKS AND PUBLIC FACILITIES			
Goal: A full range of island-appropriate public facilities and recreational opportunities will be provided to improve the quality of life for residents and visitors.			✓
Objective:			
(1) Expand access to recreational opportunities and community facilities to meet the present and future needs of residents of all ages and physical abilities.			✓
Policies:			
(a) Protect, enhance, and expand access to public shoreline and mountain resources.			✓
(b) Expand and enhance the network of parks, multi-use paths, and bikeways.			✓
(c) Assist communities in developing recreational facilities that promote physical fitness.			✓
(d) Expand venue options for recreation and performances that enrich the lifestyles of Maui County's people.			✓
(e) Expand affordable recreational and after-school programs for youth.			✓
(f) Encourage and invest in recreational, social, and leisure activities that bring people together and build community pride.			✓
(g) Promote the development and enhancement of community centers, civic spaces, and gathering places throughout our communities.			✓
(h) Expand affordable access to recreational opportunities that support the local lifestyle.			✓
Implementing Actions:			
(a) Identify and reserve lands for cemeteries, and preserve existing cemeteries on all islands, appropriately accommodating varying cultural and, faith-based traditions.			✓
Analysis: **The proposed action involves the subdivision of land and infrastructure improvements to provide homestead opportunities to DHHL beneficiaries and will not impact recreational opportunities, parks or public facilities for recreation and leisure activities.**			
Objective:			
(2) Improve the quality and adequacy of community facilities.			✓
Policies:			
(a) Provide an adequate supply of dedicated shelters and facilities for disaster relief.			✓
(b) Provide and maintain community facilities that are appropriately designed to reflect the traditions and customs of local cultures.			✓
(c) Ensure that parks and public facilities are safe and adequately equipped for the needs of all ages and physical abilities to the extent reasonable.			✓

COUNTYWIDE POLICY PLAN (Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable)	DA	IA	NA
(d) Maintain, enhance, expand, and provide new active and passive recreational facilities in ways that preserve the natural beauty of their locations.			✓
(e) Redesign or retrofit public facilities to adapt to major shifts in environmental or urban conditions to the extent reasonable.			✓
Analysis: **The objective and policies for improving the quality or adequacy of community facilities is not applicable to the proposed project.**			
Objective:			
(3) Enhance the funding, management, and planning of public facilities and park lands.			✓
Policies:			
(a) Identify and encourage the establishment of regulated and environmentally sound campgrounds.			✓
(b) Manage park use and control access to natural resources in order to rest sensitive places and utilize the resources in a sustainable manner.			✓
(c) Provide public-recreational facilities that are clean and well-maintained.			✓
(d) Develop partnerships to ensure proper stewardship of the islands' trails, public lands, and access systems.			✓
(e) Ensure that there is an adequate supply of public restrooms in convenient locations.			✓
Implementing Actions:			
(a) Encourage the State to allow for overnight fishing along the shoreline in accordance with management plans and regulations.			✓
(b) Develop and regularly update functional plans, including those relating to public facilities, parks, and campgrounds.			✓
(c) Develop and adopt local level-of service standards for public facilities and parks.			✓
(d) Identify, acquire, and develop lands for parks, civic spaces, and public uses.			✓
Analysis: **The proposed agricultural homestead project is neither directly or indirectly applicable to the funding, management or planning of parks and public facilities.**			
H. DIVERSIFY TRANSPORTATION OPTIONS			
Goal: Maui County will have an efficient, economical, and environmentally sensitive means of moving people and goods.			✓
Objective:			
(1) Provide an effective, affordable, and convenient ground-transportation system that is environmentally sustainable.			✓
Policies:			
(a) Execute planning strategies to reduce traffic congestion.			✓
(b) Plan for the efficient relocation of roadways for the public benefit.			✓

COUNTYWIDE POLICY PLAN (Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable)	DA	IA	NA
(c) Support the use of alternative roadway designs, such as traffic-calming techniques and modern roundabouts.			✓
(d) Increase route and mode options in the ground-transportation network.			✓
(e) Ensure that roadway systems are safe, efficient, and maintained in good condition.			✓
(f) Preserve roadway corridors that have historic, scenic, or unique physical attributes that enhance the character and scenic resources of communities.			✓
(g) Design new roads and roadway improvements to retain and enhance the existing character and scenic resources of the communities through which they pass.			✓
(h) Promote a variety of affordable and convenient transportation services that meet countywide and community needs and expand ridership of transit systems.			✓
(i) Collaborate with transit agencies, government agencies, employers, and operators to provide planning strategies that reduce peak-hour traffic.			✓
(j) Develop and expand an attractive, island-appropriate, and efficient public transportation system.			✓
(k) Provide and encourage the development of specialized transportation options for the young, the elderly, and persons with disabilities.			✓
(l) Evaluate all alternatives to preserve quality of life before widening roads.			✓
(m) Encourage businesses in the promotion of alternative transportation options for resident and visitor use.			✓
(n) Support the development of carbon-emission standards and an incentive program aimed at achieving County carbon-emission goals.			✓
Implementing Actions:			
(a) Create incentives and implement strategies to reduce visitor dependence on rental cars.			✓
(b) Establish efficient public-transit routes between employment centers and primary workforce residential areas.			✓
(c) Create attractive, island-appropriate, conveniently located park-and-ride and ride- share facilities.			✓
Analysis: **The proposed action involves the construction of driveways to provide DHHL lessees access to homesteads, however, the objectives and policies for public ground transportation will not be impacted by this project.**			
Objective:			
(2) Reduce the reliance on the automobile and fossil fuels by encouraging walking, bicycling, and other energy-efficient and safe alternative modes of transportation.			✓
Policies:			
(a) Make walking and bicycling transportation safe and easy between and within communities.			✓
(b) Require development to be designed with the pedestrian in mind.			✓

COUNTYWIDE POLICY PLAN (Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable)	DA	IA	NA
(c) Design new and retrofit existing rights-of-way with adequate sidewalks, bicycle lanes, or separated multi-use transit corridors.			✓
(d) Support the development of a countywide network of bikeways, equestrian trails, and pedestrian paths.			✓
(e) Support the reestablishment of traditional trails between communities, to the ocean, and through the mountains for public use.			✓
(f) Encourage educational programs to increase safety for pedestrians and bicyclists.			✓
Implementing Actions:			
(a) Design, build, and modify existing bikeways to improve safety and separation from automobiles.			✓
(b) Increase enforcement to reduce abuse of bicycle and pedestrian lanes by motorized vehicles.			✓
(c) Identify non-motorized transportation options as a priority for new sources of funding.			✓
Analysis: **The proposed project is not directly or indirectly applicable to the objective and policies for reducing reliance on automobiles and fossil fuels and will not involve the design of pedestrian paths, bikeways or equestrian trails.**			
Objective:			
(3) Improve opportunities for affordable, efficient, safe, and reliable air transportation.			✓
Policies:			
(a) Discourage private helicopter and fixed-wing landing sites to mitigate environmental and social impacts.			✓
(b) Encourage the use of quieter aircraft and noise-abatement procedures for arrivals and departures.			✓
(c) Encourage the modernization and maintenance of air-transportation facilities for general-aviation activities.			✓
(d) Encourage a viable and competitive atmosphere for air carriers to expand service and ensure sufficient intra-County flights and affordable fares for consumers.			✓
(e) Continue to support secondary airports, and encourage the State to provide them with adequate funding.			✓
(f) During Community Plan updates, explore the use of the smaller airports.			✓
(g) Encourage the State to provide efficient, adequate, and affordable parking and transit connections within and around airports.			✓
Analysis: **The objective and policies for improving opportunities for affordable, efficient, safe, and reliable air transportation is not directly or indirectly applicable to the proposed project.**			
Objective:			
(4) Improve opportunities for affordable, efficient, safe, and reliable ocean transportation.			✓

COUNTYWIDE POLICY PLAN (Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable)	DA	IA	NA
Policies:			
(a) Support programs and regulations that reduce the disposal of maritime waste and prevent spills into the ocean.			✓
(b) Encourage the upgrading of harbors to resist damage from natural hazards and disasters.			✓
(c) Encourage the State to study the use of existing harbors and set priorities for future use.			✓
(d) Explore all options to protect the traditional recreational uses of harbors, and mitigate harbor-upgrade impacts to recreational uses where feasible.			✓
(e) Encourage the upgrading of harbors and the separation of cargo and bulk materials from passenger and recreational uses.			✓
(f) Encourage the State to provide for improved capacity at shipping, docking, and storage facilities.			✓
(g) Encourage the State to provide adequate parking facilities and transit connections within and around harbor areas.			✓
(h) Encourage the redevelopment and revitalization of harbors while preserving historic and cultural assets in harbor districts.			✓
(i) Encourage the State to provide adequate facilities for small-boat operations, including small-boat launch ramps, according to community needs.			✓
(j) Support the maintenance and cleanliness of harbor facilities.			✓
(k) Support the redevelopment of harbors as pedestrian-oriented gathering places.			✓
Analysis: **The proposed action will not directly or indirectly support the objective and policies for ocean transportation and will not impact harbor or boating facilities.**			
Objective:			
(5) Improve and expand the planning and management of transportation systems.			✓
Policies:			
(a) Encourage progressive community design and development that will reduce transportation trips.			✓
(b) Require new developments to contribute their pro rata share of local and regional infrastructure costs.			✓
(c) Establish appropriate user fees for private enterprises that utilize public transportation facilities for recreational purposes.			✓
(d) Support the revision of roadway-design criteria and standards so that roads are compatible with surrounding neighborhoods and the character of rural areas.			✓
(e) Plan for multi-modal transportation and utility corridors on each island.			✓
(f) Support designing all transportation facilities, including airport, harbor, and mass- transit stations, to reflect Hawaiian architecture.			✓
(g) Utilize transportation-demand management as an integral part of transportation planning.			✓

COUNTYWIDE POLICY PLAN (Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable)	DA	IA	NA
(h) Accommodate the planting of street trees and other appropriate landscaping in all public rights-of-way.			✓
Analysis: **The proposed project is neither directly or indirectly applicable to the objective or polices for the planning and management of transportation systems and does not have implications for public transportation facilities or public right-of-ways.**			
I. IMPROVE PHYSICAL INFRASTRUCTURE			
Goal: Maui County's physical infrastructure will be maintained in optimum condition and will provide for and effectively serve the needs of the County through clean and sustainable technologies.	✓		
Objective:			
(1) Improve water systems to assure access to sustainable, clean, reliable, and affordable sources of water.	✓		
Policies:			
(a) Ensure that adequate supplies of water are available prior to approval of subdivision or construction documents.	✓		
(b) Develop and fund improved water-delivery systems.	✓		
(c) Ensure a reliable and affordable supply of water for productive agricultural uses.	✓		
(d) Promote the reclamation of gray water, and enable the use of reclaimed, gray, and brackish water for activities that do not require potable water.			✓
(e) Retain and expand public control and ownership of water resources and delivery systems.			✓
(f) Improve the management of water systems so that surface-water and groundwater resources are not degraded by overuse or pollution.			✓
(g) Explore and promote alternative water-source-development methods.			✓
(h) Seek reliable long-term sources of water to serve developments that achieve consistency with the appropriate Community Plans.			✓
Implementing Actions:			
(a) Develop a process to review all applications for desalination.			✓
Analysis: **The proposed project involves infrastructure improvements to connect DHHL homesteads to domestic water and irrigation water, directly supporting the objective and policies for access to water systems. The State-owned Molokaʻi Irrigation System (MIS) and the DHHL's Hoʻolehua Public Water System No. 230 will provide irrigation and potable water to Hoʻolehua. Coordination with the State and DHHL will be undertaken to ensure there is an adequate water supply to service the project.**			
Objective:			
(2) Improve waste-disposal practices and systems to be efficient, safe, and as environmentally sound as possible.			✓
Policies:			
(a) Provide sustainable waste-disposal systems and comprehensive, convenient recycling programs to reduce the flow of waste into landfills.			✓
(b) Support innovative and alternative practices in recycling solid waste and wastewater and disposing of hazardous waste.			✓

COUNTYWIDE POLICY PLAN (Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable)	DA	IA	NA
(c) Encourage vendors and owners of automobile, appliance, and white goods to participate in the safe disposal and recycling of such goods, and ensure greater accountability for large waste producers.			✓
(d) Develop strategies to promote public awareness to reduce pollution and litter, and encourage residents to reduce, reuse, recycle, and compost waste materials.			✓
(e) Pursue improvements and upgrades to existing wastewater and solid-waste systems consistent with current and future plans and the County's Capital Improvement Program.			✓
Implementing Actions:			
(a) Establish recycling, trash-separation, and materials recovery programs and facilities to reduce the flow of waste into landfills.			✓
(b) Study the feasibility of developing environmentally safe waste-to-energy facilities.			✓
(c) Utilize taxes and fees as means to encourage conservation and recycling.			✓
(d) Implement and regularly update the Integrated Solid Waste Management Plan.			✓
(e) Phase out the use of injection wells.			✓
Analysis: **The proposed project does not involve improvements to waste-disposal practices and systems and is, therefore, not directly or indirectly applicable to the objective or policies for waste-disposal.**			
Objective:			
(3) Significantly increase the use of renewable and green technologies to promote energy efficiency and energy self-sufficiency.			✓
Policies:			
(a) Promote the use of locally renewable energy sources, and reward energy efficiency.			✓
(b) Consider tax incentives and credits for the development of sustainable- and renewable-energy sources.			✓
(c) Expand education about energy conservation and self-sufficiency.			✓
(d) Encourage small-scale energy generation that utilizes wind, sun, water, biowaste, and other renewable sources of energy.			✓
(e) Expand renewable-energy production.			✓
(f) Develop public-private partnerships to ensure the use of renewable energy and increase energy efficiency.			✓
(g) Require the incorporation of locally appropriate energy-saving and green building design concepts in all new developments by providing energy efficient urban design guidelines and amendments to the Building Code.			✓
(h) Encourage the use of sustainable energy to power vehicles.			✓
(i) Promote the retrofitting of existing buildings and new development to incorporate energy-saving design concepts and devices.			✓

COUNTYWIDE POLICY PLAN (Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable)	DA	IA	NA
(j) Encourage green footprint practices.			✓
(k) Reduce Maui County's dependence on fossil fuels and energy imports.			✓
(l) Support green building practices such as the construction of buildings that aim to minimize carbon dioxide production, produce renewable energy, and recycle water.			✓
(m) Promote and support environmentally friendly practices in all energy sectors.			✓
Implementing Actions:			
(a) Adopt an energy-efficiency policy for Maui County government as a model for other jurisdictions.			✓
(b) Adopt a Green Building Code, and support green building practices.			✓
Analysis: **The proposed project is neither directly or indirectly applicable to the objective and policies for significantly increasing the use of renewable energy and will not impact the promotion of sustainable energy.**			
Objective:			
(4) Direct growth in a way that makes efficient use of existing infrastructure and to areas where there is available infrastructure capacity.	✓		
Policies:			
(a) Capitalize on existing infrastructure capacity as a priority over infrastructure expansion.	✓		
(b) Planning for new towns should only be considered if a region's growth is too large to be directed into infill and adjacent growth areas.			✓
(c) Utilize appropriate infrastructure technologies in the appropriate locations.			✓
(d) Promote land use patterns that can be provided with infrastructure and public facilities in a cost-effective manner.	✓		
(e) Support catchment systems and on-site wastewater treatment in rural areas and aggregated water and wastewater systems in urban areas if they are appropriately located.			✓
Implementing Actions:			
(a) Develop a streamlining system for urban infill projects.			✓
(b) Identify appropriate areas for urban expansion of existing towns where infrastructure and public facilities can be provided in a cost-effective manner.			✓
Analysis: **The project is located in Hoʻolehua, which is serviced by existing water sources, directing growth in a way that makes efficient use of existing infrastructure capacity.**			
Objective:			
(5) Improve the planning and management of infrastructure systems.	✓		
Policies:			
(a) Provide a reliable and sufficient level of funding to enhance and maintain infrastructure systems.	✓		

COUNTYWIDE POLICY PLAN (Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable)	DA	IA	NA
(b) Require new developments to contribute their pro rata share of local and regional infrastructure costs.			✓
(c) Improve coordination among infrastructure providers and planning agencies to minimize construction impacts.			✓
(d) Maintain inventories of infrastructure capacity, and project future infrastructure needs.			✓
(e) Require social-justice and -equity issues to be considered during the infrastructure-planning process.			✓
(f) Discourage the development of critical infrastructure systems within hazard zones and the tsunami-inundation zone to the extent practical.			✓
(g) Ensure that infrastructure is built concurrent with or prior to development.	✓		
(h) Ensure that basic infrastructure needs can be met during a disaster.			✓
(i) Locate public facilities and emergency services in appropriate locations that support the health, safety, and welfare of each community and that minimize delivery inefficiencies.			✓
(j) Promote the undergrounding of utility and other distribution lines for health safety, and aesthetic reasons.			✓
Implementing Actions:			
(a) Develop and regularly update functional plans for infrastructure systems.			✓
(b) Develop, adopt, and regularly update local or community-sensitive level-of service standards for infrastructure systems.			✓
Analysis: **The proposed project will connect DHHL agricultural lots to the existing MIS and the DHHL's Hoʻolehua Public Water System No. 230, directly promoting the planning and management of infrastructure systems. The proposed project will also provide funding to enhance the wastewater system.**			
J. PROMOTE SUSTAINABLE LAND USE AND GROWTH MANAGEMENT			
Goal: Community character, lifestyles, economies, and natural assets will be preserved by managing growth and using land in a sustainable manner.	✓		
Objective:			
(1) Improve land use management and implement a directed-growth strategy.	✓		
Policies:			
(a) Establish, map, and enforce urban- and rural-growth limits.			✓
(b) Direct urban and rural growth to designated areas.			✓
(c) Limit the number of visitor-accommodation units and facilities in Community Plan Areas.			✓
(d) Maintain a sustainable balance between the resident, part-time resident, and visitor populations.			✓
(e) Encourage redevelopment and infill in existing communities on lands intended for urban use to protect productive farm land and open-space resources.			✓

COUNTYWIDE POLICY PLAN (Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable)	DA	IA	NA
(f) Discourage new entitlements for residential, resort, or commercial development along the shoreline.			✓
(g) Restrict development in areas that are prone to natural hazards, disasters, or sea-level rise.			✓
(h) Direct new development in and around communities with existing infrastructure and service capacity, and protect natural, scenic, shoreline, and cultural resources.	✓		
(i) Establish and maintain permanent open space between communities to protect each community's identity.			✓
(j) Support the dedication of land for public uses.			✓
(k) Preserve the public's rights of access to and continuous lateral access along all shorelines.			✓
(l) Enable existing and future communities to be self-sufficient through sustainable land use planning and management practices.		✓	
(m) Protect summits, slopes, and ridgelines from inappropriate development.			✓
Implementing Actions:			
(a) Regularly update urban- and rural-growth boundaries and their maps.			✓
(b) Establish transfer and purchase of development rights programs.			✓
(c) Develop and adopt a green infrastructure plan.			✓
(d) Develop studies to help determine a sustainable social, environmental, and economic carrying capacity for each island.			✓
(e) Identify and define resort-destination areas.			✓
Analysis: **The proposed project directly supports the objective and policies for land-use management and directed growth by maintaining agriculturally zoned land for agricultural use. Additionally, the project will be implemented in area serviced by basic infrastructure. Improvements to the DHHL's agricultural lots for lease to beneficiaries directly enables self-sufficiency in the community.**			
Objective:			
(2) Improve planning for and management of agricultural lands and rural areas.		✓	
Policies:			
(a) Protect prime, productive, and potentially productive agricultural lands to maintain the islands' agricultural and rural identities and economies.		✓	
(b) Provide opportunities and incentives for self-sufficient and subsistence homesteads and farms.			✓
(c) Discourage developing or subdividing agriculturally designated lands when non- agricultural activities would be primary uses.			✓
(d) Conduct agricultural-development planning to facilitate robust and sustainable agricultural activities.	✓		
Implementing Actions:			
(a) Inventory and protect prime, productive, and potentially productive agricultural lands from competing non-agricultural land uses.		✓	

COUNTYWIDE POLICY PLAN (Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable)	DA	IA	NA
Analysis: **The proposed project indirectly advances the goal, objective, and policies for maintaining community character and managing agricultural lands and rural areas. The DHHL's Hoʻolehua agricultural lots on prime and productive agricultural lands will be preserved for agricultural use while maintaining the island's rural identity and economy.**			
Objective:			
(3) Design all developments to be in harmony with the environment and to protect each community's sense of place.	✓		
Policies:			
(a) Support and provide incentives for green building practices.			✓
(b) Encourage the incorporation of green building practices and technologies into all government facilities to the extent practicable.			✓
(c) Protect and enhance the unique architectural and landscape characteristics of each Community Plan Area, small town, and neighborhood.			✓
(d) Ensure that adequate recreational areas, open spaces, and public-gathering places are provided and maintained in all urban centers and neighborhoods.			✓
(e) Ensure business districts are distinctive, attractive, and pedestrian-friendly destinations.			✓
(f) Use trees and other forms of landscaping along rights-of-way and within parking lots to provide shade, beauty, urban-heat reduction, and separation of pedestrians from automobile traffic in accordance with community desires.			✓
(g) Where appropriate, integrate public-transit, equestrian, pedestrian, and bicycle facilities, and public rights-of-way as design elements in new and existing communities.			✓
(h) Ensure better connectivity and linkages between land uses.	✓		
(i) Adequately buffer and mitigate noise and air pollution in mixed-use areas to maintain residential quality of life.			✓
(j) Protect rural communities and traditional small towns by regulating the footprint, locations, site planning, and design of structures.	✓		
(k) Support small-town revitalization and preservation.			✓
(l) Facilitate safe pedestrian access, and create linkages between destinations and within parking areas.			✓
Implementing Actions:			
(a) Establish design guidelines and standards to enhance urban and rural environments.			✓
(b) Provide funding for civic-center and civic-space developments.			✓
(c) Establish and enhance urban forests in neighborhoods and business districts.			✓
Analysis: **The proposed project directly supports the objective and policies for protecting the community's sense of place and protecting rural communities by providing roadway access to subsistence agricultural lots for DHHL beneficiaries.**			

COUNTYWIDE POLICY PLAN (Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable)	DA	IA	NA
Objective:			
(4) Improve and increase efficiency in land use planning and management.	✓		
Policies:			
(a) Assess the cumulative impact of developments on natural ecosystems, natural resources, wildlife habitat, and surrounding uses.	✓		
(b) Ensure that new development projects requiring discretionary permits demonstrate a community need, show consistency with the General Plan, and provide an analysis of impacts.	✓		
(c) Encourage public and private partnerships to preserve lands of importance, develop housing, and meet the needs of residents.		✓	
(d) Promote creative subdivision designs that implement best practices in land development, sustainable management of natural and physical resources, increased pedestrian and bicycle functionality and safety, and the principles of livable communities.	✓		
(e) Coordinate with Federal, State, and County officials in order to ensure that land use decisions are consistent with County plans and the vision local populations have for their communities.			✓
(f) Enable greater public participation in the review of subdivisions.			✓
(g) Improve land use decision making through the use of land- and geographic information systems.			✓
Implementing Actions:			
(a) Institute a time limit and sunsetting stipulations on development entitlements and their implementation.			✓
Analysis: **The proposed project entails the subdivision of land for subsistent agricultural use to meet the needs of DHHL beneficiaries and will provide road access and access to water to create livable communities. In addition, the environmental review processes involved detailed analysis of the proposed project's potential impacts on the environment, infrastructure, and socio-economic conditions.**			
K. STRIVE FOR GOOD GOVERNANCE			
Goal: Government services will be transparent, effective, efficient, and responsive to the needs of residents.	✓		
Objective:			
(1) Strengthen governmental planning, coordination, consensus building, and decision making.	✓		
Policies:			
(a) Plan and prepare for the effects of social, demographic, economic, and environmental shifts.			✓
(b) Plan for and address the possible implications of Hawaiian sovereignty.			✓
(c) Encourage collaboration among government agencies to reduce duplication of efforts and promote information availability and exchange.	✓		
(d) Expand opportunities for the County to be involved in and affect State and Federal decision making.			✓
(e) Plan and prepare for large-scale emergencies and contingencies.			✓

COUNTYWIDE POLICY PLAN (Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable)	DA	IA	NA
(f) Improve public awareness about preparing for natural hazards, disasters, and evacuation plans.			✓
(g) Improve coordination among Federal, State, and County agencies.			✓
Implementing Actions:			
(a) Develop policies, regulations, and programs to protect and enhance the unique character and needs of the County's various communities.			✓
(b) Evaluate and if necessary, recommend modifications to the County Charter that could result in a possible change to the form of governance for Maui County.			✓
(c) Study and evaluate the feasibility and implications of voting in Maui County Council elections.			✓
(d) Study and evaluate the feasibility of authorizing town governments in Maui County.			✓
Analysis: **The objective of strengthening governmental planning, coordination, consensus building, and decision making along with the policies that support this objective is directly applicable to the proposed project. DHHL and HHC meet regularly with beneficiaries and Homestead communities to review plans and receive comments on environmental assessments to promote good governance. It is important to note that continuing coordination between government entities is critical to the success of the project, directly strengthening governmental planning and collaboration.**			
Objective:			
(2) Promote civic engagement.	✓		
Policies:			
(a) Foster consensus building through in-depth, innovative, and accessible public participatory processes.	✓		
(b) Promote and ensure public participation and equal access to government among all citizens.			✓
(c) Encourage a broad cross-section of residents to volunteer on boards and commissions.			✓
(d) Encourage the State to improve its community-involvement processes.			✓
(e) Support community-based decision making.	✓		
(f) Expand advisory functions at the community level.			✓
(g) Expand opportunities for all members of the public to participate in public meetings and forums.	✓		
(h) Facilitate the community's ability to obtain relevant documentation.			✓
(i) Increase voter registration and turnout.			✓
Implementing Actions:			
(a) Implement two-way communication using audio-visual technology that allows residents to participate in the County's planning processes.			✓
(b) Ensure and expand the use of online notification of County business and public meetings, and ensure the posting of all County board and commission meeting minutes.			✓

COUNTYWIDE POLICY PLAN (Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable)	DA	IA	NA
(c) Explore funding mechanisms to improve participation by volunteers on boards and commissions.			✓
(d) Develop a project-review process that mandates early and ongoing consultation in and with communities affected by planning and land use activities.			✓
Analysis: **As mentioned previously, the design and environmental review processes involved opportunities for the public to provide input throughout the environmental review process. Public meetings and requests for comments were included to acquire community input to guide this project. Additionally, the Hawaiian Homes Commission meetings are open to the public.**			
Objective:			
(3) Improve the efficiency, reliability, and transparency of County government's internal processes and decision making.			✓
Policies:			
(a) Use advanced technology to improve efficiency.			✓
(b) Simplify and clarify the permitting process to provide uniformity, reliability, efficiency, and transparency.			✓
(c) Improve communication with Lana'i and Moloka'i through the expanded use of information technologies, expanded staffing, and the creation and expansion of government-service centers.			✓
(d) Ensure that laws, policies, and regulations are internally consistent and effectuate the intent of the General Plan.			✓
Implementing Actions:			
(a) Update the County Code to be consistent with the General Plan.			✓
(b) Identify and update County regulations and procedures to increase the productivity and efficiency of County government.			✓
(c) Develop local level-of-service standards for infrastructure, public facilities, and services.			✓
(d) Implement plans through programs, regulations, and capital improvements in a timely manner.			✓
(e) Expand government online services.			✓
Analysis: **The objective and policies as it relates to improving the efficiency, reliability, and transparency of County government's internal processes and decision-making is not applicable to the proposed project.**			
Objective:			
(4) Adequately fund in order to effectively administer, implement, and enforce the General Plan.			✓
Policies:			
(a) Adequately fund, staff, and support the timely update and implementation of planning policy, programs, functional plans, and enforcement activities.			✓
(b) Ensure that the County's General Plan process provides for efficient planning at the County, island, town, and neighborhood level.			✓
(c) Encourage ongoing professional development, education, and training of County employees.			✓

COUNTYWIDE POLICY PLAN (Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable)	DA	IA	NA
(d) Encourage competitive compensation packages for County employees to attract and retain County personnel.			✓
(e) Enable the County government to be more responsive in implementing our General Plan and Community Plans.			✓
(f) Review discretionary permits for compliance with the Countywide Policy Plan.			✓
(g) Strengthen the enforcement of County, State, and Federal land use laws.			✓
Implementing Actions:			
(a) Establish penalties to ensure compliance with County, State, and Federal land use laws.			✓
Analysis: **The objective and policies regarding the funding of the General Plan do not apply to the proposed action.**			
Objective:			
(5) Strive for County government to be a role model for implementing cultural and environmental policies and practices.			✓
Policies:			
(a) Educate residents on the benefits of sustainable practices.			✓
(b) Encourage the retention and hiring of qualified professionals who can improve cultural and environmental practices.			✓
(c) Incorporate environmentally sound and culturally appropriate practices in government operations and services.			✓
(d) Encourage all vendors with County contracts to incorporate environmentally sound and culturally appropriate practices.			✓
Analysis: **The objective and policies regarding the County of Maui implementing cultural and environmental practices does not apply to the proposed DHHL project.**			
L. MITIGATE CLIMATE CHANGE AND WORK TOWARD RESILIENCE			
Goal: Minimize the causes and negative effects of climate change.			✓
Objective:			
(1) Lower carbon emissions levels to mitigate climate change impacts and limit the rate of global warming.			✓
Policies:			
(a) Increase reforestation efforts by encouraging residents and visitors to plant non-invasive gardens and trees.			✓
(b) Improve communication, coordination, and collaboration among those that work to mitigate climate change impacts.			✓
(c) Promote the teaching and use of regenerative agriculture.			✓
(d) Invest in infrastructure that is not dependent on fossil fuels and utilizes renewable energy.			✓
(e) Improve efforts to mitigate and plan for the impact of natural disasters and global warming.			✓

COUNTYWIDE POLICY PLAN (Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable)	DA	IA	NA
(f) Encourage the building industry to use environmentally sustainable materials, technology, and site planning.			✓
(g) Reduce air, noise, light, land, and water pollution, and reduce Maui County's contribution to global climate change.			✓
(h) Plan and prepare for and educate visitors and residents about the possible effects of global warming.			✓
(i) Promote programs and incentives that decrease greenhouse-gas emissions and improve environmental stewardship.			✓
(j) Support the development of carbon-emission standards and an incentive program aimed at achieving County carbon-emission goals.			✓
Implementing Actions:			
(a) Implement Federal and State policies that require a reduction of greenhouse-gas emissions.			✓
(b) Establish a Countywide Climate Action Plan			✓
(c) Develop programs that assist residents and businesses with obtaining access to renewable energy sources.			✓
(d) Revise laws to support neighborhood designs that incorporate the use of renewable energy sources that are appropriate for island living.			✓
(e) Incorporate planting of native and indigenous trees as a major component of Urban Design to both cool neighborhoods and reduce carbon dioxide.			✓
(f) Coordinate with State, County, and private landowners in the development of forestry and prioritizing of native and indigenous trees to reduce carbon dioxide.			✓
(g) Strongly support efforts to restore and improve Maui County's watersheds for the purpose of improving the water supply, controlling carbon dioxide levels, decreasing soil runoff, and reducing coastal flooding.			✓
Analysis: **DHHL acknowledges the importance of resiliency to the impacts of climate change. However, the proposed homestead improvements are not applicable to the goal and objectives to minimize causes and effects of climate change.**			
Objective:			
(2) Reduce the impacts of sea-level rise by acknowledging climate change, adapting, mitigating, and planning accordingly.		✓	
Policies:			
(a) Evaluate development to assess potential short-term and long-term sea-level rise impacts on nearshore environments.		✓	
(b) Improve efforts to mitigate and plan for the impact of sea-level rise.			✓
(c) Protect undeveloped beaches, dunes, and ecosystems, and restore natural shoreline processes.			✓
(d) Develop an inventory of private wastewater systems (septic systems, cesspools) that may be affected by sea-level rise.			✓
(e) Strengthen coastal-zone management, re-naturalization of shorelines, where possible, and filtration or treatment of urban and agricultural runoff.			✓

COUNTYWIDE POLICY PLAN (Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable)	DA	IA	NA
(f) Educate the construction and landscape industries and property owners about the use of best management practices to prevent erosion and nonpoint source pollution.			✓
(g) Discourage beach hardening processes such as building sea walls and revetments that block movement of the shoreline and can accelerate erosion.			✓
(h) Discourage new entitlements for residential, resort, or commercial development along the shoreline.			✓
(i) Restrict development in areas that are prone to sea-level rise.			✓
(j) Move or rebuild public facilities away from nearshore environments to account for sea-level rise to the extent reasonable.			✓
(k) Move or rebuild roads that are in sea-level rise inundation zones to the extent reasonable.			✓
(l) Ensure that public or affordable housing projects include siting and design standards that promote equity and resilience for vulnerable populations.			✓
(m) Identify, research, and evaluate innovative and sustainable financing to support mitigation and adaptation to sea level rise.			✓
Implementing Actions:			
(a) Develop programs to help transition shoreline property owners out of their nearshore locations and develop a long-term plan to stay out of the way of natural beach migration.			✓
(b) Identify buildings, roads, and other infrastructure that are in sea-level rise inundation zones and assist in adaptive efforts, including nature-based solutions, elevation, or moving them away from such zones.			✓
(c) Identify disaster redevelopment alternatives that support resilience-focused adaptation to sea level rise in the event of a catastrophic coastal event.			✓
Analysis: **This EA prepared for the proposed action acknowledges and evaluates the potential impacts of sea level rise to the project area, indirectly advancing the objective of planning for the impacts of climate change.**			
Objective:			
(3) Significantly increase the use of renewable and green technologies to. promote energy efficiency and energy self-sufficiency.			✓
Policies:			
(a) Promote the use of locally renewable energy sources, and reward energy efficiency.			✓
(b) Consider tax incentives and credits for the development of sustainable- and renewable-energy sources.			✓
(c) Expand education about energy conservation and self-sufficiency.			✓
(d) Encourage small-scale energy generation that utilizes wind, sun, water, biowaste, and other renewable sources of energy.			✓
(e) Expand renewable-energy production.			✓
(f) Develop public-private partnerships to ensure the use of renewable energy and increase energy efficiency.			✓

COUNTYWIDE POLICY PLAN (Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable)	DA	IA	NA
(g) Require the incorporation of locally appropriate energy-saving and green building design concepts in all new developments by providing energy-efficient urban design guidelines and amendments to the Building Code.			✓
(h) Encourage the use of sustainable energy to power vehicles.			✓
(i) Promote the retrofitting of existing buildings and new development to incorporate energy-saving design concepts and devices.			✓
(j) Encourage green footprint practices.			✓
(k) Reduce Maui County's dependence on fossil fuels and energy imports.			✓
(l) Support green building practices such as the construction of buildings that aim to minimize carbon dioxide production, produce renewable energy, and recycle water.			✓
(m) Promote and support environmentally friendly practices in all energy sectors.			✓
Implementing Actions:			
(a) Adopt an energy-efficiency policy for Maui County government as a model for other jurisdictions.			✓
(b) Adopt a Green Building Code and support green building practices.			✓
Analysis: **The proposed action is not directly or indirectly applicable to the objective to significantly increase the use of renewable and green technologies to promote energy efficiency and energy self-sufficiency.**			

MUNEKIYO HIRAGA

Planning. Project Management. Sustainable Solutions.