KAUAʻI COUNTY HOUSING AGENCY
ADAM ROVERSI, DIRECTOR

DEREK S.K. KAWAKAMI, MAYOR
REIKO MATSUYAMA, MANAGING DIRECTOR

January 22, 2025

Mary Alice Evans, Director
State of Hawaiʻi Office of Planning and Sustainable Development
Environmental Review Program
235 S. Beretania Street, Room 702
Honolulu, Hawaiʻi 96813

Subject: Publication of the Final Environmental Assessment for the Proposed Lima Ola Subdivision Off-Site Water System Improvements
ʻEleʻele, Kauaʻi
TMK (4) 2-1-001: 049 & 046

With this letter, the Kauaʻi County Housing Agency hereby transmits the Final Environmental Assessment and Finding of No Significant Impact (FEA-FONSI) for the subject project. The FEA-FONSI has been prepared pursuant to Chapter 343, Hawaii Revised Statutes, and Chapter 11-200.1, Hawaiʻi Administrative Rules.

Please publish the FEA-FONSI in the next available issue of the State Environmental Notice. In addition to this letter, we are submitting the electronic Environmental Review Program Publication Form, and all required attachments.

If there are any questions, please contact me at (808) 241-4444.

Sincerely,

Adam P. Roversi
Housing Director

From: webmaster@hawaii.gov
To: DBEDT OPSD Environmental Review Program
Subject: New online submission for The Environmental Notice
Date: Wednesday, January 29, 2025 10:00:38 AM

Action Name

Lima Ola Subdivision Off-Site Water System Improvements

Type of Document/Determination

Final environmental assessment and finding of no significant impact (FEA-FONSI)

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

Kōloa, Kauaʻi

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

(4) 2-1-001: 049; (4) 2-1-001: 046

Action type

Agency

Other required permits and approvals

HRS 6E Compliance, County Grubbing and Grading Permit, County Building Permit, 24 CFR Part 58 Compliance

Proposing/determining agency

County of Kauai Housing Agency

Agency jurisdiction

County of Kauaʻi

Agency contact name

Adam Roversi

Agency contact email (for info about the action)

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Email address for receiving comments

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Agency contact phone

(808) 241-4440

Agency address

4444 Rice Street, Suite 330
Lihue, HI 96766
United States
Map It

Is there a consultant for this action?

Yes

Consultant

Kaimana Environmental Solutions LLC

Consultant contact name

Max Solmssen

Consultant contact email

max@kaimanaenv.com

Consultant contact phone

(808) 341-3546

Consultant address

PO Box 11890
Honolulu, HI 96828
United States
Map It

Action summary

The proposed project includes the design and construction of one (1) 0.3 million gallon County municipal water storage tank that would be located adjacent to the existing 0.2 million gallon County municipal water storage tank within TMK parcel (4) 2-1-001: 049. The proposed project also includes the upsizing of two existing booster pumps that serve the two existing 0.4 million gallon water storage tanks, which are located approximately 2,200 feet southwest of the existing 0.2 million gallon water tank, along Kaumuali'i Highway, within TMK parcel (4) 2-1-001: 046. The booster pumps are planned to be upsized from 120 gallons per minute to 350 gallons per minute. The planned project includes required potable water service upgrades as part of the County of Kaua'i Lima Ola affordable housing subdivision, which is located southwest of the project site.

Reasons supporting determination

Please refer to Section 3 of the FEA-FONSI document.

Attached documents (signed agency letter & EA/EIS)

- Lima-Ola-Water-Tank-FEA-Publication-Letter.pdf
- Lima-Ola-Water-Tank-FEA_FONSI.pdf

Shapefile

- The location map for this Final EA is the same as the location map for the associated Draft EA.

Action location map

- Lima-Ola-Water-Tank-Site.kmz_.zip

Authorized individual

Max Solmssen

Authorization

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

Final Environmental Assessment

for the

Lima Ola Subdivision Off-Site Water System Improvements

‘Ele‘ele, Kaua‘i, Hawai‘i

***Prepared for**:*
The County of Kauai Housing Agency

February 2025

Prepared by:

KAIMANA
environmental solutions

www.kaimanaenv.com

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List of Acronyms

BMPs	best management practices
CDP	Census Designated Place
DEA	Draft Environmental Assessment
DOH	State of Hawaiʻi Department of Health
DLNR	State of Hawaiʻi Department of Land and Natural Resources
DOFAW	State of Hawaiʻi DLNR Division of Forestry and Wildlife
FEA	Final Environmental Assessment
FEMA	Federal Emergency Management Agency
FONSI	finding of no significant impact
GHG	greenhouse gases
HAR	Hawaiʻi Administrative Rules
HRS	Hawaiʻi Revised Statutes
IPCC	Intergovernmental Panel on Climate Change
NOAA	National Oceanic and Atmospheric Administration
SAAQS	State Ambient Air Quality Standards
SHPD	State of Hawaiʻi DLNR State Historic Preservation Division
SMA	Special Management Area
TMK	Tax Map Key
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service

1 Introduction

This final Environmental Assessment and Finding of No Significant Impact (FEA-FONSI) was prepared in accordance with Hawai‘i Revised Statutes (HRS) 343, and its implementing regulations; Hawai‘i Administrative Rules (HAR) 11-200.1. This FEA-FONSI also complies with the National Environmental Policy Act (NEPA) of 1969 (42 United States Code (USC) §4321 et seq.) as implemented by the Council on Environmental Quality regulations (40 Code of Federal Regulations (CFR) Parts 1500-1508). NEPA compliance is required for this project due to federal funding from the United States Department of Housing and Urban Development (HUD). An EA Determinations and Compliance Findings for HUD -assisted Projects in compliance with 24 CFR Part 58 is included as Appendix E of this EA.

1.1 Project Information Summary

Project Name:	Lima Ola Subdivision Off-Site Water System Improvements
Address:	None
Tax Map Key (TMK):	(4) 2-1-001: 049 & 046
Project Area Size	Approximately 22,000 Square feet
Document Type	Final Environmental Assessment
Proposing / ApprovingAgency	County of Kaua‘i Housing Agency Contact: Adam Roversi, Director 4444 Rice Street, Suite 330 Līhu‘e HI 96766 aroversi@kauai.gov (808) 241-4440
Consultant:	Kaimana Environmental Solutions LLC Contact: Max Solmssen, Environmental Planner PO Box 11890 Honolulu, HI 96828 max@kaimanaenv.com (808) 341-3546
HRS 343 Trigger:	Use of County Lands or Funds
State Land Use Zoning:	Agricultural
County Zoning:	Agricultural
Flood Zone Designation:	Zone X – Determined to be outside the 500-year flood plain

Special Management Area (SMA):	Outside SMA
Determination:	Finding of No Significant Impact
Permits/Approvals:	HRS 343 Compliance HRS 6E Compliance County Grubbing and Grading Permit County Building Permit NEPA Compliance 24 CFR Part 58 Compliance
Estimated Project Cost	$5,000,000.00
Estimated Project Construction Duration Schedule	1 Year

1.2 Location and Project Description

The project site is located on the southwest side of the Island of Kaua‘i, northeast of the town of ‘Ele‘ele (Figure 1), and includes two Kaua‘i County-owned parcels of land currently developed for municipal water tank pumping and storage. One (1) existing 0.2 million gallon municipal water storage tank is located within Tax Map Key (TMK) parcel (4) 2-1-001: 049, and two (2) 0.4 million gallon county municipal water storage tanks are located at TMK parcel (4) 2-1-001: 046 (project site). The project site is bordered to the north by Kaumuali‘i Highway, across which is open land that descends to Hanapēpē Valley. The project site is bordered to the west by Kapa Reservoir, and to the south and east by commercial agricultural coffee fields operated by Kaua‘i Coffee Company (Figure 2).

The proposed project includes the design and construction of one (1) 0.3 million gallon County municipal water storage tank that would be located adjacent to the existing 0.2 million gallon County municipal water storage tank within TMK parcel (4) 2-1-001: 049. The proposed project also includes the upsizing of two existing booster pumps that serve the two existing 0.4 million gallon water storage tanks, which are located approximately 2,200 feet southwest of the existing 0.2 million gallon water tank, along Kaumuali‘i Highway, within TMK parcel (4) 2-1-001: 046. The booster pumps are planned to be upsized from 120 gallons per minute to 350 gallons per minute. The planned project includes required potable water service upgrades as part of the County of Kaua‘i Lima Ola affordable housing subdivision, which is located southwest of the project site.

The Kaua‘i County Housing Agency Lima Ola Workforce Housing Development is in progress and planned to consist of approximately 550 new affordable housing units comprised of both single-family and multi-family homes that will be both for rent and for sale. The development will also include open space. The Lima Ola Work Force Housing Development Final Environmental Assessment-Finding of No Significant Impact (FEA-FONSI) completed by Community Planning and Engineering, dated June 2016 provides the project details, as well as the projected environmental impacts from the development, as well as recommended mitigation measures (CPE, 2016).

1.3 Purpose and Need for the Proposed Action

The purpose of the proposed project is to provide additional water storage capacity to support the need generated by the County of Kaua‘i Lima Ola affordable housing subdivision.

Figure 1: Project General Location Map

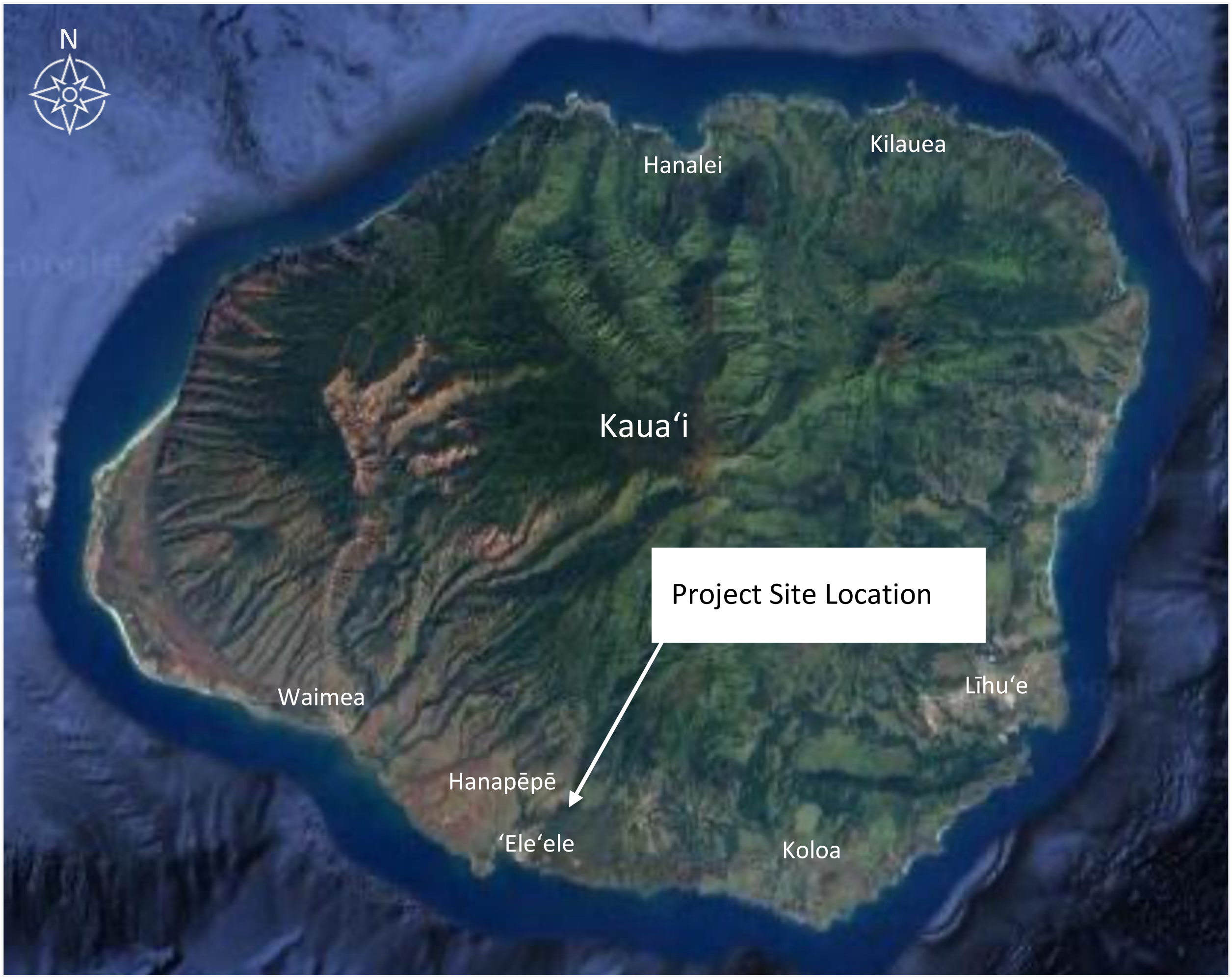


Figure 2: Project Location Detail Map

1.4 Environmental Assessment Distribution and Consultation

Table 1 includes the Kauaʻi County, State and Federal agencies and utility providers that were engaged for as part of the environmental review process. Table 1 also includes a distribution list of those that received the draft and final EA publication notice, as well as those that provided comments on the draft EA. All comments on the draft EA, and responses to draft EA comments are included in Appendix C of this FEA-FONSI.

Table 1: Environmental Assessment Distribution and Draft EA Comments and Responses

Agency/Group Affiliation	Agency/Group	Draft EA Comments Received / Response to Comments Sent	FEA Publication Notice Sent
Federal Agencies	Department of the Interior United States Fish and Wildlife Service		**X**
State of Hawaiʻi Agencies	Office of Planning	**X**	**X**
	DLNR Division of Forestry and Wildlife		**X**
	DLNR Land Division	**X**	**X**
	DLNR Engineering Division	**X**	**X**
	DLNR State Historic Preservation Division	**X**	**X**
	Office of Hawaiian Affairs		**X**
	Department of Transportation-Highways Division		**X**
	Department of Education		**X**
County of Kauaʻi Agencies	Department of Water		**X**

Agency/Group Affiliation	Agency/Group	Draft EA Comments Received / Response to Comments Sent	FEA Publication Notice Sent
	Transportation Agency		**X**
	Department of Public Works		**X**
	County Council		**X**
	Department of Parks and Recreation		**X**
	Planning Department		**X**
	Highways Division		**X**
	Fire Department		**X**
	Police Department		**X**
	Kaua'i Community College		
Utility Companies	Hawaiian Electric Company		**X**
	Hawaiian Telcom		**X**
	Spectrum		**X**
	Hawaii Gas		**X**

Agency/Group Affiliation	Agency/Group	Draft EA Comments Received / Response to Comments Sent	FEA Publication Notice Sent
Utility Companies (cont.)	Kaua‘i Island Utility Cooperative		X
	Puhi Sewer and Water Company / Aqua Engineers		X
Libraries/Repositories	Līhu‘e Public Library		X

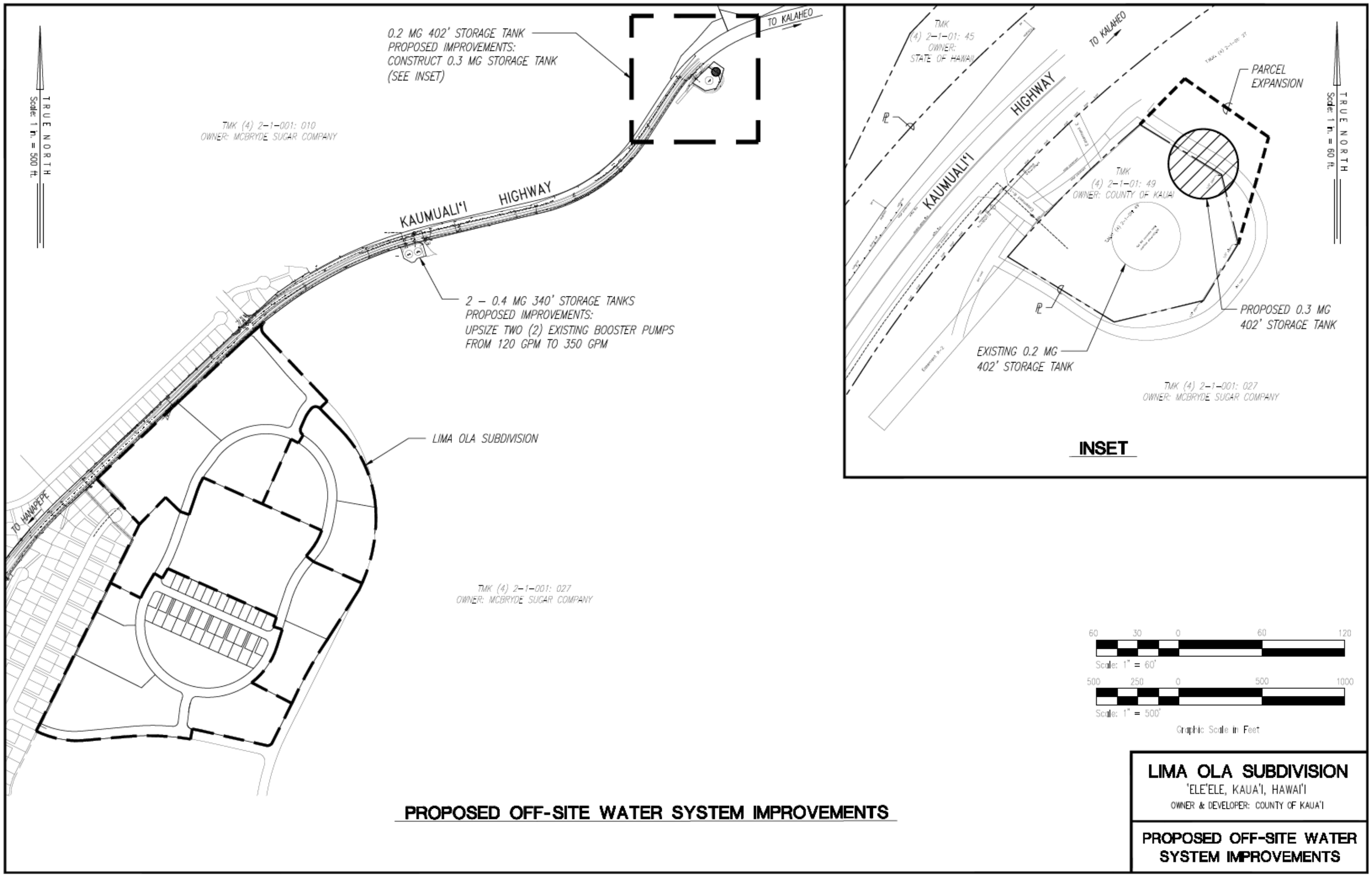
1.5 Overview of Alternatives Considered and Description of the Proposed Action

Alternative 1: No Action – Under Alternative 1, the proposed water system upgrades would not be implemented. Although the no action alternative does not address the project purpose and need, it was carried forward for analysis in this EA in compliance with the provisions of NEPA.

Alternative 2: Reduced System Upgrades – Under Alternative 2, the proposed water system upgrades would include an increase in booster pumping capacity of the existing system, but no development of a new water storage tank. This alternative was eliminated from further consideration since it would not fulfill the project purpose and need to deliver adequate potable water supply storage to the affected community.

Alternative 3 (Proposed Action) –The proposed water system upgrades would be implemented as planned; which would include a new water storage tank and and upsizing of two existing booster pumps (Figure 2 & Figure 3). Alternative 3 was carried forward for analysis in this EA since it best fulfills the project purpose and need to provide the required water supply to the affected community.

Figure 3: Site Plan-The Proposed Action



2 Environmental Setting, Potential Impacts, and Mitigation Measures

The environmental, social, and economic setting of the existing environment and the probable impacts of the Proposed Action, and mitigation measures are described in this section of the EA. Impacts are evaluated as to whether they constitute a “significant effect” on a particular environmental setting. Impacts are described as having No Impact, Significant Adverse Impact, or Beneficial Impact to the environment. The terms “impact” and “effect” are used synonymously in this EA. Impacts may apply to the full range of natural, aesthetic, historic, cultural, and economic resources.

Following the environmental impact analysis for all resource areas in this section, an overall summary evaluation of the environmental impact significance criteria included in HAR 11-200.1-13, including discussion of cumulative impacts, is provided at the end of this section of the EA.

2.1 Climate and Air Quality

Existing Conditions

The project site is located in a tropical zone along just northeast of ‘Ele’ele on the southwest portion Kaua‘i. The predominate wind pattern within the vicinity of the project area is northeast trade winds generated from the North Pacific high pressure system northeast of the Hawaiian Islands. Trade winds persist for most of the year, while winds from the south and southwest known as Kona Winds also occur (Fletcher et. al, 2002). Average annual rainfall within the vicinity of the project site is 29.53 inches (Giambelluca et. al, 2013). The average annual temperature within the vicinity of the project site is 80.6 degrees Fahrenheit (Giambelluca et. al, 2014).

Ambient air quality in an area is evaluated based on its compliance with National Ambient Air Quality Standards (NAAQS), as well as State Ambient Air Quality Standards (SAAQS). The criteria pollutants that are measured by federal and state standards include carbon monoxide, nitrogen dioxide, sulfur dioxide, lead, ozone, and particulate matter. Based on data gathered by the State of Hawai‘i DOH Clean Air Branch, the entire State of Hawai‘i is in compliance (attainment) for all the above criteria pollutants, except on the Big Island during times of naturally occurring impacts from volcanic activity. There is only one DOH air quality measurement station in Niumalu, near Nawiliwili Harbor (DOH, 2024).

2.1.1 Sea Level Rise and Climate Change

The Intergovernmental Panel on Climate Change (IPCC) is the United Nations body for assessing the science related to climate change. The IPCC predicts an approximately 2 meter global sea level rise by the year 2100, as well as increased extreme whether events related to climate change (IPCC, 2022). The Pacific Islands Ocean Observing System is a tool created and managed by the University of Hawai‘i, and funded in part by the National Oceanic and Atmospheric Administration (NOAA) that provides updated coastal and ocean information, tools and services. One of the tools provided by the Pacific Islands Ocean Observing System is the State of Hawai‘i Sea Level Rise Viewer, which provides an interactive mapping tool that models coastal inundation based on different sea level rise scenarios. Figure 4 shows the project site during the 3.2 foot (highest) sea level rise scenario. The project site would not be directly affected by the modeled sea level rise scenario (PacIOOS, 2024).

Figure 4: Sea Level Rise Exposure Scenario

Potential Impacts and Mitigation Measures

Alternative 1: No Action

Under the no action alternative no construction or land disturbance would occur, and there would be no additional impact to air quality.

Alternative 3: Proposed Action

Dust would be generated on a short-term basis during construction site work. In order to mitigate airborne dust (particulate matter) impacts to the surrounding environment, all construction activities would need to adhere to County of Kaua'i DPW Interim Construction Best Management Practices (BMPs) for Sediment and Erosion Control. BMPs include watering active work areas and unpaved work roads; use of dust fences; establishment of a routine road cleaning and tire washing program; establishment of landscaping or hardened surface early in the construction schedule; and monitoring dust at the project boundary during construction (COK, 2004). With these mitigation measures in place there would be no significant impact to air quality from the proposed action during construction. Once completed, it is not anticipated that there would be any significant long-term air quality impacts from the operation of the proposed water tank and booster pumps since there would be no significant source of dust or other air emissions during operation of the planned water system improvements.

2.2 Geological Resources

Existing Conditions

Lava flows of the Kōloa Series, which underlie the project site, cover about half the surface of the eastern part of Kauaʻi; they form the entire floor of the Līhuʻe basin except for two small kīpukas (exposed mounds or depressions left uncovered by a lava flow) of Waimea Canyon Series volcanics (Macdonald et al., 1960).

Soil at the project site includes Makaweli silty clay loam, 0 to 6% slopes (MgB). This soil is a dusky-red to dark reddish-brown, friable silty clay loam or stony silty clay loam surfaced layer with a dusky-red, friable silt loam and silty clay loam subsoil. MgB has moderate permeability, slow runoff and a slight erosion hazard (USDA, 2024)

Potential Impacts and Mitigation Measures

Alternative 1: No Action

Under the no action alternative no construction or land disturbance would occur, and there would be no additional impact to site soils or other geological resources.

Alternative 3: Proposed Action

The proposed action would result in short-term less than significant impacts to soils during construction from grading, site work, utility, and water tank installation. Soils would be temporarily excavated and stockpiled onsite during the construction period. Exposed soils are susceptible to erosion, especially if it rains heavily during site work periods.

Adverse impacts from soil erosion and runoff would be minimized as a result of erosion and sedimentation control measures that would be implemented during construction. Proposed construction would need to comply with Kauaʻi County BMP standards addressing soil and erosion control (e.g., silt fencing, covering and protecting soil stockpiles with tarps and filter socks, surface revegetation as soon as possible) (COK, 2004). These mitigation measures would minimize soil migration from the proposed construction area. The topography of the project site would remain similar to existing conditions following construction.

All work shall comply with all applicable provisions of the Kauaʻi County Sediment and Erosion Control Ordinance No. 808 (Chapter 22, Article 7 of the Kauaʻi County Code) to safeguard public health, safety, and welfare, to protect property, and to control soil erosion and sedimentation.

Once completed, the proposed water tank would not include a significant amount of hardened surfaces, if any. The project site may need appropriate drainage features in compliance with County code (i.e., drywells, swales and drainage culverts). As a result, soil and topography impacts are anticipated to be short-term and insignificant.

2.3 Noise

Existing Conditions

The project site is located in a rural area along the Kaumuali‘i Highway, which produces the highest level of noise in the area from traffic. Vehicles and heavy equipment involved in the operation of Kaua‘i Coffee Company are present in the area from time to time, and emit noise during periodically. ‘Ele‘ele Heights subdivision is located to the southwest of the project site, and emits normal residential noise. There are no other significant human-generated noise sources in the area since directly surrounding land use include coffee fields and undeveloped land.

Potential Impacts and Mitigation Measures

Alternative 1: No Action

Under the no action alternative no construction or noise-generating activity would occur, and there would be no additional impact to noise receptors at or surrounding the project area.

Alternative 3: Proposed Action

Under the proposed action, short-term noise impacts from construction activities would occur. Development of the water tank would involve excavation, grading, and use of typical mechanized construction equipment/tools. Table 2 below shows typical construction noise levels by phase.

Based on the maximum generalized outdoor noise levels at the nearest residences to the project site (‘Ele‘ele Heights), the HDOH Community Noise Rule criteria is not anticipated to be exceeded during construction. The contractor should use reasonable and standard practices to mitigate noise, such as using mufflers on diesel and gasoline engines, using properly tuned and balanced machines, etc.

Maximum noise levels at any one receptor will be short-term and vary with the phase of construction and equipment actually used on site. Therefore, significant construction noise impacts are not expected at any receptor during the construction of the proposed water tank and booster pump upgrades.

There would be no significant long-term noise impacts from the operation of proposed water tank and booster pumps.

Table 2: Typical Construction Phase Noise Levels

Construction Phase	Noise Level at 50 Feet (L_{eq} dBA)
Ground Clearing	84
Excavation	89
Foundation	78
Structure Erection	87
Finishing	89

L_{eq} dBA = equivalent continuous sound level in decibels

2.4 Biological Resources

Existing Conditions

LeGrande Biological Surveys Inc. conducted a biological resources survey of the project site that included a field inspection and review of relevant publicly available literature and data relevant to the biological resources in and near the project site. Evaluated resources included previous survey reports, environmental assessments and environmental impact statements, public datasets, scientific journals and reports, as well as available, unpublished data that are relevant to the natural history and ecology of the area. In addition, available geospatial data, aerial photographs, and topographic maps of the area were reviewed to identify occurrences of federally or state listed or otherwise rare species, or habitats that could harbor these species.

A field survey of the project area was conducted by a trained biologist on February 27, 2024. The field survey methodology included inspection of the project site and recordation of the existing plant and animal species and/or species habitats observed. The survey found that vegetation at the project area is dominated by introduced (non-native) plant species. Coffee plantation and weedy scrub species dominate the site. Two native plant species were documented at the project site, both questionably indigenous; pōpolo and ʻuhaloa. Both of these species are considered widespread throughout the Hawaiian Islands.

A total of 12 bird species, representing 8 separate families, were recorded during the station count. Avian diversity and densities were in keeping with the location and vegetation present within the study site. Three species—Scaly-breasted munia (*Lonchura punctulata*), Zebra Dove (*Geopelia striata*), and Cattle Egret (*Bulbucus ibis*) were the most abundant species observed. No terrestrial mammalian species were detected during this survey. It is most likely that non-native animals such as dogs (*Canis lupus familiaris*), cats (*Felis catus*), and pigs (*Sus scrofa*) transit the general area from time to time.

No federally or state protected species were observed in the project area during the biological survey. Although not observed in the project area during the survey, several federally or state listed animal species may occasionally occur in or traverse the project area. No designated critical habitat occurs in the project area (LeGrande, 2024).

Potential Impacts and Mitigation Measures

Alternative 1: No Action

Under the no action alternative no construction or land disturbance would occur, and there would be no additional impact to biological species within or surrounding the project area.

Alternative 3: Proposed Action

Plants

The implementation of invasive species minimization measures to avoid the unintentional introduction or transport of new invasive species to the area during water tank construction is recommended. This includes utilizing on-site gravel, rock, and soil (or purchasing from a local supplier) when practicable; utilizing certified, weed-free seed mixes; and washing construction equipment and/or visually inspecting for excessive dirt, debris, plant materials, and invasive or harmful non-native species as appropriate. Consult with Kauaʻi Invasive Species Committee if needed.

To minimize spread of the fungal pathogen responsible for Rapid ʻŌhiʻa Death, follow the most recent Rapid Ōhiʻa Death decontamination protocols recommended by USFWS and DOFAW.

Wildlife

All the animal species recorded in the project area are not native to the Hawaiian Islands. However, as described above, several listed wildlife species have the potential to occur in or transit through the project area. The following general measures are recommended to avoid and minimize potential impacts to listed wildlife species:

Establish a wildlife education and observation program for all construction and operational personnel. Staff should be trained to identify listed wildlife that may be found on-site (including listed waterbirds and seabirds, and the Hawaiian goose) and to take appropriate steps if listed wildlife species are found.

If downed listed species are observed at the project area, notify USFWS and DOFAW. Implement speed limits on site to reduce the risk of collision to listed wildlife.

In accordance with Section 7 of the Endangered Species Act, consultation with the USFWS, including a request for species list, has been initiated. The Endangered Species Act applies due to federal HUD funding.

The USFWS IPaC portal produced the following 11 animal species: One reptile species, Green sea turtle (*Cheldonia mydas*), one mammalian species Hawaiian hoary bat (*Lasiurus cinsereus semotus*), and eight avian species were listed: Band-rumped Storm-Petrel (*Oceanodroma castro*), Hawaiian Duck (*Anas wyvilliana*), Hawaiian Common Gallinule (*Gallinula galeata sandvicensis*), Hawaiian Coot (*Fulica americana alai*), Hawaiian Goose (*Branta sandvicensis*), Hawaiian Petrel (*Pterodroma sandwichensis*), Hawaiian Stilt (*Himatopus mexicanus knudseni*), and Newell's Townsends Shearwater (*Puffinus auricularis newelli*) (USFWS, 2024).

Of the 10 species identified in the formal IPaC as potentially being present in the project area or could potentially be impacted by construction; one, Green sea turtle, is not present and there is no suitable habitat to support the species. The following identified species were not documented during the survey but are discussed below.

Nēnē

Nēnē geese were not observed within the project area or in the general surrounding areas. The habitat is not conducive for foraging and/or loafing. Generally human impacts to this species revolve around vehicular interactions, human feeding, and disturbance to nesting birds, eggs, chicks, and goslings. These potential threats can be minimized to the maximum extent practicable by implementing the following minimization measures:

- Don’t feed birds especially if they approach for handouts.
- Secure all food rubbish in close trash receptacles.
- Establish a 15 mile an hour speed limit within the site.

Listed Water Birds

None of the four extant endemic endangered waterbird species or subspecies were observed at the project site. They are Hawaiian Duck, Hawaiian Coot (*Fulica alai*), the Hawaiian endemic sub-species of both the Common Gallinule, and the Black-necked Stilt. The drainage canal to the southwest of the project site was surveyed for any signs of these species as irrigation canals are often used for foraging, loafing and possibly nesting by these species. No waterbirds were observed within or near the project area during the survey. Potential human impacts to these four species during clearing and grubbing are the same as those posed by these activities to Nēnē.

Listed Seabirds

It is likely that the endangered Hawaiian Petrel, Band-rumped Storm-Petrel (*Hydrobates castro*), and the threatened Newell’s Shearwater (*Puffinus newelli*) over-fly the project area 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 Hawai‘i is thought to be predation by alien mammalian species at the nesting colonies. Collision with manmade structures is considered the second most significant cause of mortality of these seabird species in Hawai‘i. 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.

These species have been recovered along roadways and in facilities adjacent to the project area. No suitable nesting habitat exists within or close to the project area for any of these three seabird species. The principal potential impact that current habitat modifications or changes pose 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 nighttime construction activities; or, 2) following build-out, security lighting is operated during the seabird nesting season.

If night-time construction activity or equipment maintenance is proposed during any construction phases of the project, 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. Deleterious impacts to transiting seabirds can be avoided if construction occurs during daylight hours and all outdoor lighting installed is fully “dark sky compliant” in accordance with State DLNR definitions. DLNR recommends avoiding construction-related nighttime lighting between September 15 and December 15.

Hawaiian Hoary Bat

It is probable that the ʻōpeʻapeʻa – the endemic Hawaiian hoary bat (*Lasiurus cinereus semotus*) overfly the project area on a seasonal basis as they are regularly recorded in the lowland areas on Kauaʻi that still contain trees. The removal of coffee trees within the project area should not have adverse affects on bats as they are all smaller in stature than the typical tree size that bats utilize 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. Do not use barbed wire fencing.

Coconut rhinoceros beetle

The Coconut rhinoceros beetle (*Oryctes rhinoceros*) is an invasive beetle species from South East Asia that has become established on Oʻahu and is now spreading to other Islands in Hawaiʻi. The beetles feed on palm species and are a threat to our coconut trees as well as native Pritchardia species and other ornamental palms. The Coconut Rhinoceros Beetle Response (crbhawaii.org) recommends best management practices including limiting mulch, compost, and decaying plant material build up in thick piles or layers as it creates breeding material for the beetle larvae. Spreading mulch 2 inches in depth or less helps to keep the material dry which is not favorable for the beetle larvae.

2.5 Water Resources

Existing Conditions

Surface Water

There are no natural surface water features within the project site. Several historical human-made irrigation ditches and the Kapa Reservoir are located in close proximity to the project site; Pump Ditch 2 runs directly east of the portion of the project site planned for booster pump upgrades, and the Kapa Reservoir is located directly west of this same portion of the project site. Pump Ditch 3 runs approximately 150 feet south of the proposed new water tank build site (Figure 2).

The Hanapēpē River is located 0.27 miles northwest of the project site, in Hanapēpē Valley. And Wahiawa Stream is located approximately 0.59 miles southeast of the project site.

Groundwater

The project area is associated with two underlying aquifers (upper and lower aquifer). The aquifers are part of the Waimea aquifer sector, within the Hanapēpē system. The upper aquifer is classified as basal (fresh water in contact with seawater), unconfined, and is a flank aquifer type. This aquifer has potential use for drinking water, is fresh, irreplaceable, and has a high vulnerability to contamination. The lower aquifer is part of the same aquifer sector and system, and is classified as basal, confined, dike type. This lower aquifer has potential use for drinking water, is fresh, irreplaceable and has a low vulnerability to contamination (Mink and Lau, 1992).

Existing Potable Water System

The Kaua‘i County Department of Water operates and maintains three active potable water wells within the the County Hanapēpē-‘Ele‘ele water system, where the project area is located. The Hanapēpē and ‘Ele‘ele water systems are interconnected; water is drawn to ‘Ele‘ele through a booster pump connection in Hanapepe Valley. A new 16-inch potable water line was recently completed and brought into service by the County that further connects potable water flow within the Hanapēpē-‘Ele‘ele water system.

Based on the project site topography, the groundwater flow may be towards the southwest. Mean annual rainfall at the project site is approximately 22 inches (NOAA, 2024).

Flood Plains

The project site is located in Federal Emergency Management Agency (FEMA) Flood Zone X: area of minimal flood hazard (FEMA, 2024).

Tsunami Hazards

The project site is located in the Safe Zone, at an elevation well above (outside) the Extreme Tsunami Evacuation Zone, and the Tsunami Evacuation Zone (Figure 5, NOAA, 2024).

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

Surface Water

Construction activities have the potential to result in short-term impacts to surface water quality since soils will be disturbed and may be stockpiled temporarily onsite during construction, which could lead to sediment stormwater runoff on and offsite. Other construction site pollutants may include fertilizers, pesticides, oil and grease, concrete truck washout, and construction debris.

In order to mitigate sediment and other pollutant runoff from construction activities, the contractor will be required to install and maintain construction BMPs in compliance with Kaua‘i County BMP standards. Stormwater BMPs include, but are not limited to; sediment basins/ traps; filter fabric silt fences; straw bale, sandbag, or gravel bag barriers; stormwater drain inlet protection, and stabilized construction entrances (COK, 2004). The project will also comply with State water quality regulations HAR Chapters 11-54 and 11-55.

Figure 5: Tsunami Evacuation Zone Map

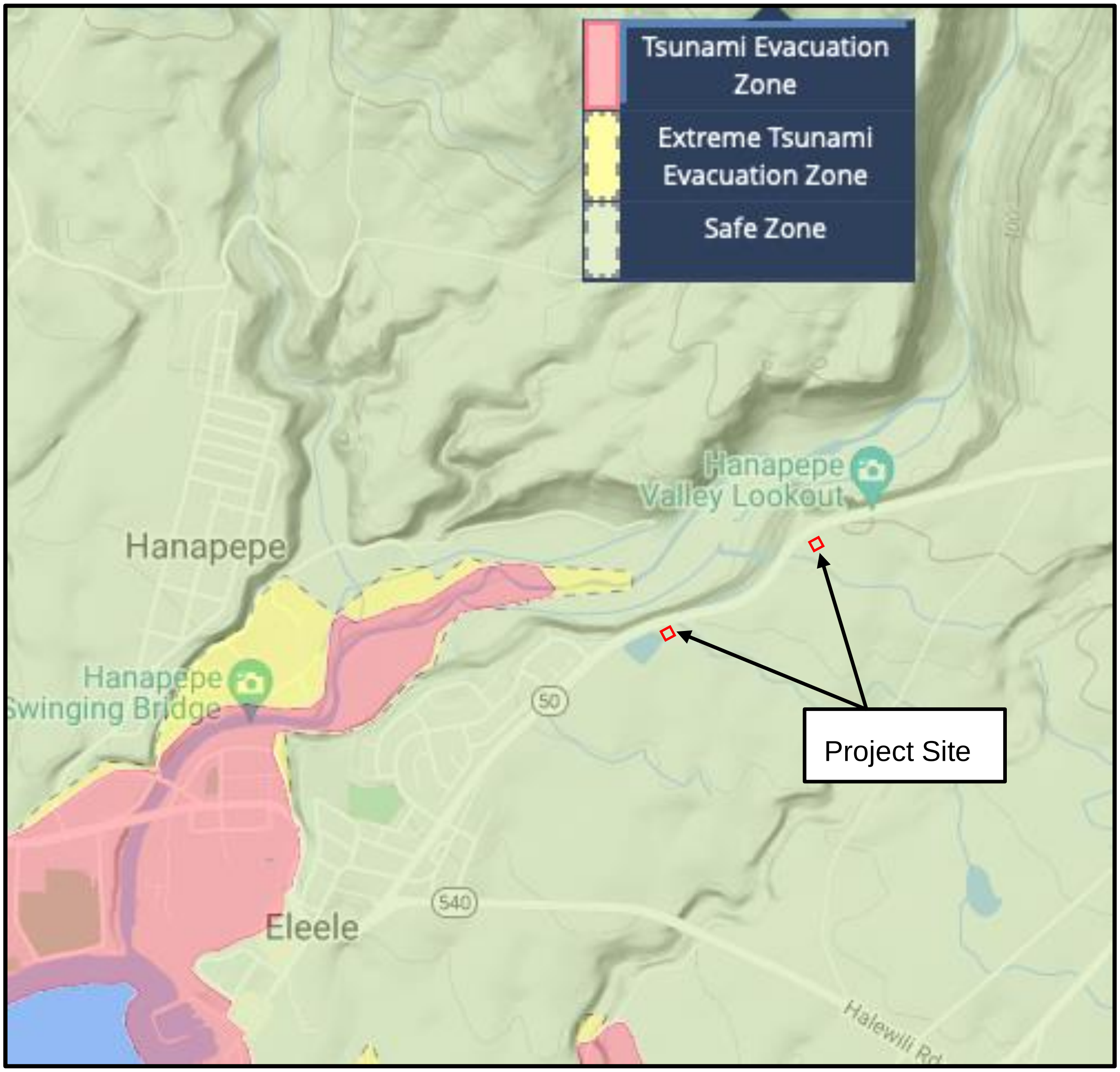


Figure Reference: NOAA, 2024

A permanent stormwater management system would be implemented at the proposed development that would adequately manage stormwater in accordance with County rules.

The proposed project would not result in increased risk of tsunami danger to the affected human environment since it would be constructed outside the Tsunami Evacuation Area in accordance with the Kauaʻi County Building Code.

Groundwater

The proposed project would include minor grading and compaction to prepare the foundational support for the proposed water tank. Site grading for the proposed deveopment would occur well above groundwater level.

During construction the contractor would need to supply sanitary portable toilets that would be serviced regularly.

According to the Lima Ola Water Master Plan (Appendix D), the proposed water tank and booster pumps would draw water from the existing Hanapēpē-‘Ele‘ele Water System wells that currently provide potable water service to the area. The wells and transmission lines are managed and operated by the Kaua‘i County Department of Water. Currently the existing water demand for the Hanapēpē-‘Ele‘ele Water System is approximately 830,960 gallons per day on average (CPE, 2024).

At full build out, it is estimated that the proposed Lima Ola Development would increase the water demand of the Hanapēpē-‘Ele‘ele Water System by approximately 340,560 gallons per day on an average. The existing pumping capacity and source availability are adequate to accommodate the demand for Phase 1 of the Lima Ola Development. With the additional water storage tank and booster pumps planned as part of the proposed action, there would be adequate pumping capacity and source through Phase 2 of the Lima Ola Development. However, the pumping capacity and source availability for subsequent phases would need to be re-evaluated when planning for each phase is implemented (CPE, 2024).

If additional source and/or capacity is needed for subsequent phases, then a well permit application would need to be submitted to the County of Kaua‘i Department of Water, the State DOH, and the State DLNR Commission on Water Resource Management to assure that any new source (i.e., new water well) is allowed and compliant with county rules, as well as HAR 13-168: Water Use, Wells, and Stream Diversion Works. Since the proposed action would only produce adequate water up to Phase 2 of the planned Lima Ola Development, there would be no commitment of water resources for any developments outside Lima Ola through Phase 2.

Since development of any additional source and storage will be closely analyzed and regulated by the County of Kaua‘i Department of Water, State DOH, and the State DLNR Commission on Water Resource Management, no significant impact to the underlying groundwater resources are anticipated from the proposed action.

During construction of the proposed water tank and booster pumps, the contractor would need to follow the County of Kaua‘i Department of Water Administrative Rules relating to potable water development. This would mitigate potential contamination of the water supply when bringing the proposed water system upgrades on line.

The following are mitigation measures are recommended by the State Commission on Water Resources Management:

- *BMPs for stormwater management are recommended to minimize the impact of the project to the existing area's hydrology while maintaining on-site infiltration and* *preventing polluted runoff from storm events. Stormwater management BMPs may earn credit toward LEED certification. More information on stormwater BMPs can be found at http://planning.hawaii.gov/czm/initiatives/low-impact-development/*

- *There may be the potential for ground or surface water degradation/contamination and recommend that approvals for this project be conditioned upon a review by the State Department of Health and the developer's acceptance of any resulting requirements related to water quality.*

2.6 Solid and Hazardous Waste

Existing Conditions

There is no solid waste currently generated at the project site. Since a portion of the project site has been used for commercial agricultural fields, it is possible that soils onsite may contain elevated levels of pesticides and/or arsenic. It is recommended that soil is tested for these target chemicals prior to disturbance. There are no other known sources of hazardous materials/wastes at the project site.

Potential Impacts and Mitigation Measures

Alternative 1: No Action

Under the no action alternative no construction or land disturbance would occur, and there would be no additional solid or hazardous waste generated at the project site.

Alternative 3: Proposed Action

During construction of the proposed water tank, native soil will be exposed and generated from grading activities. Construction materials, such as concrete, sheet metal, paints and coatings will also be used onsite during construction. Since the project site has been used for commercial agricultural fields, it is possible that soils onsite may contain elevated levels of pesticides and/or arsenic. It is recommended that soil is tested for these target chemicals prior to disturbance. If soil is shown to contain elevated levels of these target chemicals, worker and environmental protection measures must be implemente in accordance with DOH and OSHA rules.

Construction vehicles and earth moving equipment fueled by petroleum products will be used onsite. The contractor would need to conduct regular inspections and maintenance of vehicles and equipment to assure that no petroleum spills or leaks occur. Any excess soil and construction materials generated onsite will be recycled or properly disposed at the Kekaha Landfill or another approved facility in accordance with County rules.

Once in operation, the proposed action would not generate or store any significant quantities of hazardous materials. Small quantities of petroleum, paints and coatings may be utilized by County Department of Water maintenance staff. All potentially hazardous materials would need to be properly stored out of the sun/elements in flammable lockers within secure designated maintenance areas. The proposed water infrastructure improvements would not generate any significant quantifies of solid waste. There would be no significant short-term or long-term impacts to the affected environment from solid or hazardous waste.

2.7 Traffic, Access and Parking

Existing Conditions

The project site is located along Kaumuali‘i Highway, which is a main transportation corridor from the west and southwest side of Kaua‘i to job centers on the south and eastern portions of Kaua‘i County. There are no public access roads to the project site, which include secure county water facilities.

Potential Impacts and Mitigation Measures

Alternative 1: No Action

Under the no action alternative no addtional vehicular trips would occur to or from the project site, and there would be no additional impact to traffic volume from activities at the project site.

Alternative 3: Proposed Action

During construction of the proposed water system improvements, there may be short traffic delays to allow trucks to deliver construction materials to the project site. However, these delays are projected to be short-term an insignificant. Once in operation, the only vehicles allowed onsite would be County Department of Water employees and/or their designated contractors. Therefore, the proposed action would not result in any significant additional traffic impacts to the local traffic network.

2.8 Historic and Cultural Resources

Existing Conditions

An Archaeological Literature Review and Field Inspection was conducted by Pacific Legacy Historic Preservation from January through March 2024. This consisted of a pedestrian field inspection of the project site and a review of State Historic Preservation Division (SHPD) and other published archaeological records within within the vicinity of the project site.

The archaeological literature review found that the dry plains of ‘Ele‘ele, in which the proposed project area is located, formed a peripheral zone within the traditional Hawaiian settlement and land use patterns of Hanapēpē Ahupua‘a, which focused along Hanapēpē River. Intensive disturbance of the dry plains of ‘Ele‘ele began in the late nineteenth century with the establishment of the ‘Ele‘ele Plantation, and subsequently the McBryde Sugar Company, which operated from 1899 to 1996 (Pacific Legacy, 2024)

The field inspection did not identify any potential historic properties within the project area (Pacific Legacy, 2024). However, as identified in the Archaeological Report (Appendix B), and via comment letter received from SHPD during the draft EA comment period, the following documented post-contact historical features are present in close proximity to the project site:

- SIHP #50-30-09-00690 ("Kapa Reservoir")
- SIHP #50-30-09-00691 (Irrigation Ditch)
- SIHP #50-30-09-00693 (Irrigation Ditch)
- SIHP #50-30-09-00694 (Irrigation Ditch)
- SIHP #50-30-09-00689 (Irrigation Ditch)

The Archaeological Report is included as Appendix B of this EA.

The project site includes County-owned secured public water facilities that do not include any public lands used for Native Hawaiian or other cultural practices.

Potential Impacts and Mitigation Measures

Alternative 1: No Action

Under the no action alternative no construction or land disturbance would occur, and there would be no additional impact to any potential historical or cultural resources at or surrounding the project site.

Alternative 3: Proposed Action

The Archaeological Literature Review and Field Inspection Report did not find evidence of any potential existing historical or cultural resources at the project site. Several documented post-contact historical features are present in close proximity to the project site, and are listed on the previous page. The proposed project does not include any ground disturbance outside the project area that could potentially affect these documented historical features. Therefore, no archaeolgical monitoring, or other mitigation measures are recommended during construction of the proposed water tank, where ground disturbance is planned.

Since U.S. federal funds are being sought for the proposed project, compliance with the U.S. National Historical Preservation Act (NHPA) is required. The County Housing Agency has initiated consultation with the State SHPD and other key stakeholders in accordance with Section 106 of the NHPA.

There are no adverse impacts anticipated to historical or cultural resources/practices due to the proposed project.

2.9 Socioeconomic Resources

Existing Conditions

The project site is located within Census Tract 407.02 that includes Kalaheo and 'Ele'ele. The population of this Census Tract as of the 2020 Census was 6,315. 77.9 precent of the Census Tract population is aged 18 and over, and 21.3 percent of the population is aged 65 and over (US Census Bureau, 2020).

Potential Impacts and Mitigation Measures

Alternative 1: No Action

Under the no action alternative no construction or land disturbance would occur, and there would be no beneficial or adverse socioeconomic impacts.

Alternative 3: Proposed Action

The proposed project would result in the creation of short-term jobs during the construction of the proposed water tank, and booster pump upgrades. Once in operation, the water system upgrades would create additional potable water storage and transmission capabilities to County residents in the area.

The proposed project is not anticipated to result in any short or long-term adverse impacts to socioeconomic conditions since it would not cause loss of any jobs or housing, and would not result in tax revenue loss. The project would have beneficial economic and social impacts since it would result in job creation and needed potable water service infrastructure development.

2.10 Recreational Resources

Existing Conditions

The project site is currently used as County-owned secured public water facilities that do not include any public parks or recreational facilities, or access to any public or recreational facilities. The closest County park is ‘Ele‘ele Park, located approximately 0.77 miles southwest of the project site. The Hanapēpē Valley Lookout is located approximately 938 feet northeast of the project site, along Kaumuali‘i Highway.

Potential Impacts and Mitigation Measures

Alternative 1: No Action

Under the no action alternative no construction or land disturbance would occur, and there would be no impact to recreational resources.

Alternative 3: Proposed Action

Since the project site includes County-owned secured public water facilities that do not include any public parks or recreational facilities, or access to any public or recreational facilities, the proposed action would not result in any impact to existing recreational resources within the vicinity of the project site.

2.11 Visual and Scenic Resources

Existing Conditions

The project site is located in gently sloping area along Kaumuali‘i Highway. The visual environment at and surrounding project site includes views of commercial coffee trees to the east and south, and high trees and shrubs to the north. The Hanapēpē Valley Lookout is located approximately 938 feet northeast of the project site, along Kaumuali‘i Highway, which includes views down to Hanapēpē Valley, as well as views of the Kaua‘i central mountains in the distance. Port Allen Harbor and the Pacific Ocean are visible in the distance to the southwest. Powerlines are visible running along Kaumualiʻi Highway, and the three existing Kauaʻi County potable water tanks and pump houses are visible at the project site.

Potential Impacts and Mitigation Measures

Alternative 1: No Action

Under the no action alternative no construction or land disturbance would occur, and there would be no additional buildings or development that would impact view plains in the area.

Alternative 3: Proposed Action

During construction, heavy equipment, trucks and construction materials would be visible at the project site from the highway. However, these impacts would be short-term, and dust fences around the work site would reduce visual distractions caused by construction. Once complete, the proposed 0.3 million-gallon water tank would be visible from Kaumualiʻi Highway and the adjacent coffee fields. This would represent a change to the existing visual environment, however it would not represent a significant visual impact since there are existing similar sized water tanks and pump houses already present within the project site, and since the tank would not block any significant views of the mountains or ocean in the distance. Therefore, there are no significant impacts anticipated to visual and scenic resources from the proposed project.

2.12 Utilities and Infrastructure

The project site includes County municipal water pumping and storage areas. The County water system is powered by existing overhead electric lines. Potable water lines and a private septic wastewater tank are also present at the project site, within the pump house that services one bathroom used by County Department of Water maintenence workers onsite. There are no planned utility upgrades as part of the proposed action.

Kauaʻi Island Utility Cooperative (KIUC) requests that when electrical service is requested for this project, that the service be installed underground from existing KIUC facilities or extended underground if new electrical facilities are to be installed within the property. Underground electrical facilities will reduce the chances of threatened Newell Shearwater seabird collision on new overhead lines. In addition, should there be a requirement for KIUC to install overhead electric poles, the height of the poles above ground shall not be higher than 45 feet.

2.13 Cumulative and Secondary Impacts

HAR 11-200.1 defines cumulative impact as "[*t]he impact on the environment that 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"* (HAR 11-200.1-2).

The proposed water service infrastructure upgrades are planned as part of the Kauaʻi County Housing Agency Lima Ola Affordable Housing Development, which is a stand alone project being initiated based on the needs of the community. The proposed action would represent an incremental increase in long-term ptable water resource use. However, the proposed action would not represent a significant source of greenhouse gas emissions, and would not result in a commitment of potable water use for development outside, or in addition to the planned Lima Ola subdivision. There are no significant adverse cumulative impacts anticipated from the proposed action.

2.14 Relationship to Plans and Policies

This section of the EA analyzes the proposed project in relation to local and State plans and policies. These land use plans and policies include the Hawai‘i State Plan, Hawai‘i State Land Use Districts Zoning, Kaua‘i County Zoning Code, and the General Plan for the County of Kaua‘i. The project site is within the State Agricultural land use district (Figure 6). The project site parcel is located within the County Agricultural Zoning District (Figure 7).

The Kaua‘i County Housing Agency is in the process of expanding county ownership of TMK Parcel (4) 2-1-001: 049 to include a portion of adjacent TMK Parcel (4) 2-1-001: 027 in order to make room for the new 0.3 million gallon water tank. The parcel expansion area is shown in Figure 3. Table 3 provides an analysis of the proposed action in relation to the policies and objectives of the Hawai‘i State Plan.

Figure 6: State Land Use Map

Source: histategis.maps.arcgis.com

Figure 7: County Zoning Map

Source: kauaigis.maps.arcgis.com

2.14.1 Hawaiʻi State Plan

Table 3: Hawaiʻi State Plan Analysis

Hawaiʻi Revised Statutes Chapter 226- Hawaiʻi State Plan Analysis **Part I: Overall Themes, Goals, Objectives and Policies** **S = Supportive, N/S = Not Supportive, N/A = Not Applicable**	**S**	**N/S**	**N/A**
HRS 226-1: Findings and Purpose			
HRS 226-2: Definitions			
HRS 226-3: Overall Theme			
HRS 226-4: State Goals In order to guarantee, 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: 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. 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. 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.	**X**		
Discussion: The proposed development would increase self reliance and self determination for local community members by providing essential potable water service to the affected community.			
HRS 226-5: Objectives and Policies for Population 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.	**X**		
Manage population growth statewide in a manner that provides increased opportunities for Hawaiʻi's people to pursue their physical, social and economic aspirations while recognizing the unique needs of each county.	**X**		
Encourage an increase in economic activities and employment opportunities on the neighbor islands consistent with community needs-and desires.	**X**		
Promote increased opportunities for Hawaiʻi's people to pursue their socioeconomic aspirations throughout the islands	**X**		
Encourage research activities and public awareness programs to foster and understanding of Hawaiʻi's limited capacity to accommodate population			**X**

Hawai‘i Revised Statutes Chapter 226- Hawai‘i State Plan Analysis **Part I: Overall Themes, Goals, Objectives and Policies** **S = Supportive, N/S = Not Supportive, N/A = Not Applicable**	**S**	**N/S**	**N/A**
needs and to address concerns resulting from an increase in Hawai‘i's population.			
Encourage federal actions and coordination among major governmental agencies to promote a more balanced distribution of immigrants among states, provided that such actions do not prevent the reunion of immediate family members.			**X**
Pursue an increase in federal assistance for states with a greater proportion of foreign immigrants relative to their state’s population.			**X**
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.	**X**		
Discussion: The proposed project includes vital infastructure development that will provide the adjacent affordable housing subdivision with adequate potable water storage in a central location where existing utilites, housing, jobs and other services are readily available in close proximity. The proposed project would promote an increase in economic activities and employment opportunities by creating an increase in available potable water in the area.			
Chapter 226-6 Objectives and policies for the economy in general			
Planning for the State’s economy in general shall be directed toward achievement of the following objectives:			
Increased and diversified employment opportunities to achieve full employment, increased income and job choice, and improved living standards for Hawai‘i's people.	**X**		
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			**X**
These objectives shall be achieved through implementation of the following Policies:			
Promote and encourage entrepreneurship within Hawai‘i by residents and nonresidents of the State.			**X**
Expand Hawai‘i'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.			**X**
Promote Hawai‘i as an attractive market for environmentally and socially sound investment activities that benefit Hawai‘i's people			**X**

Hawai‘i Revised Statutes Chapter 226- Hawai‘i State Plan Analysis Part I: Overall Themes, Goals, Objectives and Policies S = Supportive, N/S = Not Supportive, N/A = Not Applicable	**S**	**N/S**	**N/A**
Transform and maintain Hawai‘i as a place that welcomes and facilitates innovative activity that may lead to commercial opportunities.			**X**
Promote innovative activity that may pose initial risks, but ultimately contribute to the economy of Hawai‘i			**X**
Seek broader outlets for new or expanded Hawai‘i business investments.			**X**
Expand existing markets and penetrate new markets for Hawai‘i's products and services.			**X**
Assure that the basic economic needs of Hawai‘i's people are maintained in the event of disruptions in overseas transportation.			**X**
Strive to achieve a level of construction activity responsive to, and consistent with, state growth objectives.	**X**		
Encourage the formation of cooperatives and other favorable marketing arrangements at the local or regional level to assist Hawai‘i's small-scale producers, manufacturers, and distributors.			**X**
Encourage labor-intensive activities that are economically satisfying, and which offer opportunities for upward mobility.			**X**
Encourage innovative activities that may not be labor-intensive, but may otherwise contribute to the economy of Hawai‘i.			**X**
Foster greater cooperation and coordination between the government and private sectors in developing Hawai‘i's employment and economic growth opportunities.			**X**
Stimulate the development and expansion of economic activities which will benefit areas with substantial or expected employment problems.			**X**
Maintain acceptable working conditions and standards for Hawai‘i's workers.			**X**
Provide equal employment opportunities for all segments of Hawai‘i's population through affirmative action and nondiscrimination measures.			**X**
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.			**X**
Encourage businesses that have favorable financial multiplier effects within Hawai‘i's economy.			**X**

Hawaiʻi Revised Statutes Chapter 226- Hawaiʻi State Plan Analysis **Part I: Overall Themes, Goals, Objectives and Policies** **S = Supportive, N/S = Not Supportive, N/A = Not Applicable**	**S**	**N/S**	**N/A**
Promote and protect intangible resources in Hawaiʻi, such as scenic beauty and the aloha spirit, which are vital to a healthy economy.			**X**
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, potential growth industries in particular.			**X**
Foster a business climate in Hawaiʻi, 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.			**X**
Discussion: The proposed development would represent vital infrastructure development that is necessary for proper planned development in accordance with State goals.			
HAR 226-7: Objectives and policies for the economy - Agriculture			
Planning for the State's economy with regard to agriculture shall be directed towards achievement of the following objectives:			
Viability of Hawaiʻi's sugar and pineapple industries.			**X**
Growth and development of diversified agriculture throughout the State.			**X**
An agriculture industry that continues to constitute a dynamic and essential component of Hawaiʻi's strategic, economic, and social well-being.			**X**
To achieve the agriculture objectives, the following policies shall be implemented:			
Establish a clear direction for Hawaiʻi's agriculture through stakeholder commitment and advocacy.			**X**
Encourage agriculture by making best use of natural resources.			**X**
Provide the governor and the legislature with information and options needed for prudent decision making for the development of agriculture.			**X**
Establish strong relationships between the agricultural and visitor industries for mutual marketing benefits.			**X**
Foster increased public awareness and understanding of the contributions and benefits of agriculture as a major sector of Hawaiʻi's economy.			**X**
Seek the enactment and retention of federal and state legislation that benefits Hawaiʻi's agricultural industries			**X**

Hawaiʻi Revised Statutes Chapter 226- Hawaiʻi State Plan Analysis Part I: Overall Themes, Goals, Objectives and Policies S = Supportive, N/S = Not Supportive, N/A = Not Applicable	**S**	**N/S**	**N/A**
Strengthen diversified agriculture by developing an effective promotion, marketing, and distribution system between Hawaiʻi's producers and consumer markets locally, on the continental United States, and internationally.			**X**
Support research and development activities that provide greater efficiency and economic productivity in agriculture.			**X**
Enhance agricultural growth by providing public incentives and encouraging private initiatives.			**X**
Assure the availability of agriculturally suitable lands with adequate water to accommodate present and future needs.			**X**
Increase the attractiveness and opportunities for an agricultural education and livelihood.			**X**
Expand Hawaiʻi'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.			**X**
Promote economically competitive activities that increase Hawaiʻi's agricultural self-sufficiency, including the increased purchase and use of Hawaiʻi-grown food and food products by residents, businesses, and governmental bodies as defined under section 103D-104.			**X**
Promote and assist in the establishment of sound financial programs for diversified agriculture.			**X**
Institute and support programs and activities to assist the entry of displaced agricultural workers into alternative agricultural or other employment.			**X**
Facilitate the transition of agricultural lands in economically nonfeasible agricultural production to economically viable agricultural uses.			**X**
Perpetuate, promote, and increase use of traditional Hawaiian farming systems, such as the use of loko iʻa, māla, and irrigated loʻi, and growth of traditional Hawaiian crops, such as kalo, ʻuala, and ʻulu.			**X**
Increase and develop small-scale farms.			**X**
Discussion: Not applicable to the proposed project.			

Hawai'i Revised Statutes Chapter 226- Hawai'i State Plan Analysis **Part I: Overall Themes, Goals, Objectives and Policies** **S = Supportive, N/S = Not Supportive, N/A = Not Applicable**	**S**	**N/S**	**N/A**
HAR 226-8: Objectives and policies for the economy- visitor industry			
Objective: 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 Hawai'i's economy.			X
Policies			
Support and assist in the promotion of Hawai'i's visitor attractions and facilities			**X**
Ensure that visitor industry activities are in keeping with the social, economic, and physical needs and aspirations of Hawai'i's people.			**X**
Improve the quality of existing visitor destination areas by utilizing Hawai'i's strengths in science and technology.			**X**
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.			**X**
Develop the industry in a manner that will continue to provide new job opportunities and steady employment for Hawai'i's people.			**X**
Provide opportunities for Hawai'i's people to obtain job training and education that will allow for upward mobility within the visitor industry.			**X**
Foster a recognition of the contribution of the visitor industry to Hawai'i's economy and the need to perpetuate the aloha spirit.			**X**
Foster an understanding by visitors of the aloha spirit and of the unique and sensitive character of Hawai'i's cultures and values.			**X**
Discussion: Not applicable to the proposed project.			
Chapter 226-9 Objective and policies for the economy – federal expenditures			
Objective: 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 Hawai'i's economy	**X**		
Policies			
Encourage the sustained flow of federal expenditures in Hawai'i that generates long-term government civilian employment;	**X**		
Promote Hawai'i's supportive role in national defense, in a manner consistent with Hawai'i's social, environmental, and cultural goals by building upon dual-use and defense applications to develop thriving ocean			**X**

Hawai‘i Revised Statutes Chapter 226- Hawai‘i State Plan Analysis Part I: Overall Themes, Goals, Objectives and Policies S = Supportive, N/S = Not Supportive, N/A = Not Applicable	**S**	**N/S**	**N/A**
engineering, aerospace research and development, and related dual-use technology sectors in Hawai‘i’s economy;			
Promote the development of federally supported activities in Hawai‘i that respect statewide economic concerns, are sensitive to community needs, and minimize adverse impacts on Hawai‘i’s environment;	**X**		
Increase opportunities for entry and advancement of Hawai‘i’s people into federal government service;			**X**
Promote federal use of local commodities, services, and facilities available in Hawai‘i:			**X**
Strengthen federal-state-county communication and coordination in all federal activities that affect Hawai‘i;	**X**		
Pursue the return of federally controlled lands in Hawai‘i 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			**X**
Discussion: The development of the proposed project is planned to be funded by federal funds. Therefore, federal investment will result in increased infrastructure development that would serve the local community.			
Chapter 226-10 Objective and policies for the economy – potential growth and innovative activities.			
Objective: 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 Hawai‘i’s economic base.			**X**
Policies			
Facilitate investment and employment growth in economic activities that have the potential to expand and diversify Hawai‘i’s economy, including but not limited to diversified agriculture, aquaculture, renewable energy development, creative media, health care, and science and technology-based sectors;			**X**
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 Hawai‘i through the export of services or products or substitution of imported services or products;			**X**
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;			**X**
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;			**X**

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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;			**X**
Expand Hawaiʻi's capacity to attract and service international programs and activities that generate employment for Hawaiʻi's people;			**X**
Enhance and promote Hawaiʻi's role as a center for international relations, trade, finance, services, technology, education, culture, and the arts;			**X**
Accelerate research and development of new energy-related industries based on wind, solar, ocean, underground resources, and solid waste;			**X**
Promote Hawaiʻi's geographic, environmental, social, and technological advantages to attract new or innovative economic activities into the State;			**X**
Provide public incentives and encourage private initiative to attract new or innovative industries that best support Hawaiʻi's social, economic, physical, and environmental objectives;			**X**
Increase research and the development of ocean-related economic activities such as mining, food production, and scientific research;			**X**
Develop, promote, and support research and educational and training programs that will enhance Hawaiʻi's ability to attract and develop economic activities of benefit to Hawaiʻi;			**X**
Foster a broader public recognition and understanding of the potential benefits of new or innovative growth-oriented industry in Hawaiʻi;			**X**
Encourage the development and implementation of joint federal and state initiatives to attract federal programs and projects that will support Hawaiʻi's social, economic, physical, and environmental objectives;			**X**
Increase research and development of businesses and services in the telecommunications and information industries;			**X**
Foster the research and development of nonfossil fuel and energy efficient modes of transportation;			**X**
Recognize and promote health care and health care information technology as growth industries			**X**
Discussion: Not applicable to the proposed project			
Chapter 226-10.5 Objectives and policies for the economy – information industry			
Objective: 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 Hawaiʻi as a leader in broadband and wireless communications and applications in the Pacific Region.			**X**
Policies			
Promote efforts to attain the highest speeds of electronic and wireless communication within Hawaiʻi and between Hawaiʻi and the world, and			**X**

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make high speed communication available to all residents and businesses in Hawaiʻi;			
Encourage the continued development and expansion of the telecommunications infrastructure serving Hawaiʻi to accommodate future growth and innovation in Hawaiʻi's economy;			**X**
Facilitate the development of new or innovative business and service ventures in the information industry which will provide employment opportunities for the people of Hawaiʻi;			**X**
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 Hawaiʻi, using technology to communicate with their headquarters, offices, or customers located out-of state;			**X**
Encourage greater cooperation between the public and private sectors in developing and maintaining a well-designed information industry;			**X**
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 Hawaiʻi's people;			**X**
Provide opportunities for Hawaiʻi's people to obtain job training and education that will allow for upward mobility within the information industry;			**X**
Foster a recognition of the contribution of the information industry to Hawaiʻi's economy;			**X**
Assist in the promotion of Hawaiʻi as a broker, creator, and processor of information in the Pacific.			**X**
Discussion: Not applicable to the proposed project.			
Chapter 226-11 Objectives and policies for the physical environment – land based, shoreline, and marine resources			
Objectives: 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:			**X**
Prudent use of Hawaiʻi's land-based, shoreline, and marine resources.			**X**
Effective protection of Hawaiʻi's unique and fragile environmental resources			**X**
Policies			
Exercise an overall conservation ethic in the use of Hawaiʻi's natural resources.			**X**
Ensure compatibility between land-based and water-based activities and natural resources and ecological systems.			**X**
Take into account the physical attributes of areas when planning and designing activities and facilities.	**X**		
Manage natural resources and environs to encourage their beneficial and	**X**		

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multiple use without generating costly or irreparable environmental damage.			
Consider multiple uses in watershed areas, provided such uses do not detrimentally affect water quality and recharge functions.	**X**		
Encourage the protection of rare or endangered plant and animal species and habitats native to Hawaiʻi.	**X**		
Provide public incentives that encourage private actions to protect significant natural resources from degradation or unnecessary depletion.			**X**
Pursue compatible relationships among activities, facilities, and natural resources.	**X**		
Promote increased accessibility and prudent use of inland and shoreline areas for public recreational, educational, and scientific purposes.			**X**
Discussion: The proposed project includes expansion of vital natural resource use (potable water). All development shall be closely coordinated with, and approved by the County Department of Water, and any other applicable State and Federal agencies to assure that the pumping and storage of potable water is executed without significant impacts to the environment.			
Chapter 226-12 Objective and policies for the physical environment – scenic, natural beauty, and historic resources.			
Objective: Planning for the State's physical environment shall be directed towards achievement of the objective of enhancement of Hawaiʻi's scenic assets, natural beauty, and multi-cultural/historical resources			**X**
Policies			
Promote the preservation and restoration of significant natural and historic Resources.			**X**
Provide incentives to maintain and enhance historic, cultural, and scenic amenities.			**X**
Promote the preservation of views and vistas to enhance the visual and aesthetic enjoyment of mountains, ocean, scenic landscapes, and other natural features.			**X**
Protect those special areas, structures, and elements that are an integral and functional part of Hawaiʻi's ethnic and cultural heritage.			**X**
Encourage the design of developments and activities that complement the natural beauty of the islands.			**X**
Discussion: Not applicable to the proposed project.			
Chapter 226-13 Objectives and policies for the physical environment – land, air, and water quality.			
Objectives: Planning for the State's physical environment with regard to land, air, and water quality shall be directed towards achievement of the following objectives:			

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Maintenance and pursuit of improved quality in Hawai'i's land, air, and water resources.	**X**		
Greater public awareness and appreciation of Hawai'i's environmental resources.			**X**
Policies			
Foster educational activities that promote a better understanding of Hawai'i's limited environmental resources.			**X**
Promote the proper management of Hawai'i's land and water resources.	**X**		
Promote effective measures to achieve desired quality in Hawai'i's surface, ground, and coastal waters.	**X**		
Encourage actions to maintain or improve aural and air quality levels to enhance the health and well-being of Hawai'i's people.	**X**		
Reduce the threat to life and property from erosion, flooding, tsunamis, hurricanes, earthquakes, volcanic eruptions, and other natural or man-induced hazards and disasters.	**X**		
Encourage design and construction practices that enhance the physical qualities of Hawai'i's communities.	**X**		
Encourage urban developments in close proximity to existing services and facilities.	**X**		
Foster recognition of the importance and value of the land, air, and water resources to Hawai'i's people, their cultures and visitors.	**X**		
Discussion: Development of the proposed project would be completed to carefully manage water resources in accordance with County and State regulations. The project site is located outside the Extreme Tsunami Evacuation Zone, and no natural waterways pass throught the project site.			
Chapter 226-14 Objective and policies for facility systems – in general			
Objective: Planning for the State's facility systems in general shall be directed towards achievement of the objective of water, transportation, waste disposal, and energy and telecommunication systems that support statewide social, economic, and physical objectives	**X**		
Policies			
Accommodate the needs of Hawai'i's people through coordination of facility systems and capital improvement priorities in consonance with state and county plans.	**X**		
Encourage flexibility in the design and development of facility systems to promote prudent use of resources and accommodate changing public demands and priorities.	**X**		
Ensure that required facility systems can be supported within resource capacities and at reasonable cost to the user.	**X**		

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Pursue alternative methods of financing programs and projects and cost saving techniques in the planning, construction, and maintenance of facility systems.			**X**
Analysis: The proposed project represents the proper management of water resources by developing water system infrastructure in accordance with the underlying aquifer sustainable yield.			
Chapter 226-15 Objectives and policies for facility systems – solid and liquid waste			
Objectives: Planning for the State's facility systems with regard to solid and liquid wastes shall be directed towards the achievement of the following objectives			**X**
Maintenance of basic public health and sanitation standards relating to treatment and disposal of solid and liquid wastes.			**X**
Provision of adequate sewerage facilities for physical and economic activities that alleviate problems in housing, employment, mobility, and other areas.			**X**
Policies			
Encourage the adequate development of sewerage facilities that complement planned growth.			**X**
Promote re-use and recycling to reduce solid and liquid wastes and employ a conservation ethic.			**X**
Promote research to develop more efficient and economical treatment and disposal of solid and liquid wastes			**X**
Discussion: Not applicable to the proposed project.			
Chapter 226-16 Objective and policies for facility systems – water			
Objective: 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	**X**		
Policies			
Coordinate development of land use activities with existing and potential water supply.	**X**		
Support research and development of alternative methods to meet future water requirements well in advance of anticipated needs.	**X**		
Reclaim and encourage the productive use of runoff water and wastewater discharges.			**X**
Assist in improving the quality, efficiency, service, and storage capabilities of water systems for domestic and agricultural use.	**X**		
Support water supply services to areas experiencing critical water problems.			**X**

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Promote water conservation programs and practices in government, private industry, and the general public to help ensure adequate water to meet long-term needs.	**X**		
Discussion: The proposed water system improvements project is based on research, consultation with the County Department of Water, and the County Department of Water Rules to ensure that water resource use is managed in a sustainable manner.			
Chapter 226-17 Objectives and policies for facility systems – transportation			
Objectives: Planning for the State's facility systems with regard to transportation shall be directed towards the achievement of the following objectives:			
An integrated multi-modal transportation system that services statewide needs and promotes the efficient, economical, safe, and convenient movement of people and goods.			**X**
A statewide transportation system that is consistent with and will accommodate planned growth objectives throughout the State			**X**
Policies			
Design, program, and develop a multi-modal system in conformance with desired growth and physical development as stated in this chapter;			**X**
Coordinate state, county, federal, and private transportation activities and programs toward the achievement of statewide objectives;			**X**
Encourage a reasonable distribution of financial responsibilities for transportation among participating governmental and private parties;			**X**
Provide for improved accessibility to shipping, docking, and storage Facilities;			**X**
Promote a reasonable level and variety of mass transportation services that adequately meet statewide and community needs;			**X**
Encourage transportation systems that serve to accommodate present and future development needs of communities;			**X**
Encourage a variety of carriers to offer increased opportunities and advantages to interisland movement of people and goods			**X**
Increase the capacities of airport and harbor systems and support facilities to effectively accommodate transshipment and storage needs;			**X**
Encourage the development of transportation systems and programs which would assist statewide economic growth and diversification;			**X**
Encourage the design and development of transportation systems sensitive to the needs of affected communities and the quality of Hawai'i's natural environment;			**X**
Encourage safe and convenient use of low-cost, energy-efficient, nonpolluting means of transportation;			**X**
Coordinate intergovernmental land use and transportation planning activities to ensure the timely delivery of supporting transportation infrastructure in order to accommodate planned growth objectives;			**X**

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Encourage diversification of transportation modes and infrastructure to promote alternate fuels and energy efficiency.			**X**
Discussion: Not applicable to the proposed project.			
Chapter 226-18 Objectives and policies for facility systems – energy.			
Objectives: 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:			
Dependable, efficient, and economical statewide energy systems capable of supporting the needs of the people;			**X**
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.			**X**
Increased energy security and self-sufficiency through the reduction and ultimate elimination of Hawai‘i’s dependence on imported fuels for electrical generation and ground transportation.			**X**
Greater diversification of energy generation in the face of threats to Hawai‘i’s energy supplies and systems;			**X**
Reduction, avoidance, or sequestration of greenhouse gas emissions from energy supply and use;			**X**
Utility models that make the social and financial interests of Hawai‘i’s utility customers a priority.			**X**
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.			**X**
Policies			
Support research and development as well as promote the use of renewable energy sources;			**X**
Ensure that the combination of energy supplies and energy-saving systems is sufficient to support the demands of growth;			**X**
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;			**X**
Promote all cost-effective conservation of power and fuel supplies through measures, including: • Development of cost-effective demand-side management programs; • Education; • Adoption of energy-efficient practices and technologies; and • Increasing energy efficiency and decreasing energy use in public infrastructure			**X**

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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;			**X**
Support research, development, demonstration, and use of energy efficiency, load management, and other demand-side management programs, practices, and technologies;			**X**
Promote alternate fuels and transportation energy efficiency;			**X**
Support actions that reduce, avoid, or sequester greenhouse gases in utility, transportation, and industrial sector applications;			**X**
Support actions that reduce, avoid, or sequester Hawaiʻi's greenhouse gas emissions through agriculture and forestry initiatives;			**X**
Provide priority handling and processing for all state and county permits required for renewable energy projects;			**X**
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 are located on public trust land as an affordable and reliable source of firm power for Hawaiʻi.			**X**
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 Hawaiʻi.			**X**
Discussion: Not applicable to the proposed project.			
Chapter 226-18.5 Objectives and policies for facility systems – telecommunications			
Objectives			
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.			**X**
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.			**X**
Policies			
Facilitate research and development of telecommunications systems and resources;			**X**
Encourage public and private sector efforts to develop means for adequate, ongoing telecommunications planning;			**X**
Promote efficient management and use of existing telecommunications systems and services;			**X**
Facilitate the development of education and training of telecommunications personnel.			**X**

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Discussion: Not applicable to the proposed project.			
Chapter 226-19 Objectives and policies for socio-cultural advancement – housing.			
Objectives: Planning for the State's socio-cultural advancement with regard to housing shall be directed toward the achievement of the following objectives:			
Greater opportunities for Hawai'i'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 Hawai'i's population.	X		
The orderly development of residential areas sensitive to community needs and other land uses.			X
The development and provision of affordable rental housing by the State to meet the housing needs of Hawai'i's people.	X		
Policies			
Effectively accommodate the housing needs of Hawai'i's people.	X		
Stimulate and promote feasible approaches that increase housing choices for low-income, moderate-income, and gap-group households.	X		
Increase homeownership and rental opportunities and choices in terms of quality, location, cost, densities, style, and size of housing.	X		
Promote appropriate improvement, rehabilitation, and maintenance of existing housing units and residential areas.	X		
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.	X		
Facilitate the use of available vacant, developable, and underutilized urban lands for housing.	X		
Foster a variety of lifestyles traditional to Hawai'i through the design and maintenance of neighborhoods that reflect the culture and values of the community.	X		
Promote research and development of methods to reduce the cost of housing construction in Hawai'i.	X		
Discussion: the proposed project would provide vital infrastructure support to a County affordable housing project that would offer much needed housing units located in a central location close to jobs, public transportation, schools and other essential services, such as health care, grocery stores and restaurants.			

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Chapter 226-20 Objectives and policies for socio-cultural advancement – health			
Objectives: Planning for the State’s socio-cultural advancement with regard to health shall be directed towards achievement of the following objectives:			
Fulfillment of basic individual health needs of the general public.			**X**
Maintenance of sanitary and environmentally healthful conditions in Hawai‘i’s communities.			**X**
Elimination of health disparities by identifying and addressing social determinants of health.			**X**
Policies			
Provide adequate and accessible services and facilities for prevention and treatment of physical and mental health problems, including substance abuse.			**X**
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.			**X**
Encourage public and private efforts to develop and promote statewide and local strategies to reduce health care and related insurance costs.			**X**
Foster an awareness of the need for personal health maintenance and preventive health care through education and other measures.			**X**
Provide programs, services, and activities that ensure environmentally healthful and sanitary conditions.			**X**
Improve the State’s capabilities in preventing contamination by pesticides and other potentially hazardous substances through increased coordination, education, monitoring, and enforcement.			**X**
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.			**X**
Discussion: Not applicable to the proposed project.			
Chapter 226-21 Objectives and policies for Socio-cultural advancement – education.			
Objective: 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			

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Policies			
Support educational programs and activities that enhance personal development, physical fitness, recreation, and cultural pursuits of all groups.			**X**
Ensure the provision of adequate and accessible educational services and facilities that are designed to meet individual and community needs.			**X**
Provide appropriate educational opportunities for groups with special needs.			**X**
Promote educational programs which enhance understanding of Hawaiʻi's cultural heritage.			**X**
Provide higher educational opportunities that enable Hawaiʻi's people to adapt to changing employment demands.			**X**
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.			**X**
Promote programs and activities that facilitate the acquisition of basic skills, such as reading, writing, computing, listening, speaking, and reasoning.			**X**
Emphasize quality educational programs in Hawaiʻi's institutions to promote academic excellence.			**X**
Support research programs and activities that enhance the education programs of the State.			**X**
Discussion: Not applicable to the proposed project.			
Chapter 226-22 Objective and policies for socio-cultural advancement – social services			
Objective: 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.			**X**
Policies			
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.			**X**
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.			**X**
Facilitate the adjustment of new residents, especially recently arrived immigrants, into Hawaiʻi's communities.			**X**
Promote alternatives to institutional care in the provision of long-term care for elder and disabled populations.			**X**

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Support public and private efforts to prevent domestic abuse and child molestation, and assist victims of abuse and neglect.			**X**
Promote programs which assist people in need of family planning services to enable them to meet their needs			**X**
Discussion: Not applicable to the proposed proeject.			
Chapter 226-23 Objective and policies for socio-cultural advancement – leisure			
Policies			
Objective: 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.			**X**
Foster and preserve Hawaiʻi's multi-cultural heritage through supportive cultural, artistic, recreational, and humanities-oriented programs and activities.			**X**
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.			**X**
Enhance the enjoyment of recreational experiences through safety and security measures, educational opportunities, and improved facility design and maintenance.			**X**
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.			**X**
Ensure opportunities for everyone to use and enjoy Hawaiʻi's recreational resources.			**X**
Assure the availability of sufficient resources to provide for future cultural, artistic, and recreational needs.			**X**
Provide adequate and accessible physical fitness programs to promote the physical and mental well-being of Hawaiʻi's people.			**X**
Increase opportunities for appreciation and participation in the creative arts, including the literary, theatrical, visual, musical, folk, and traditional art forms.			**X**
Encourage the development of creative expression in the artistic disciplines to enable all segments of Hawaiʻi's population to participate in the creative arts.			**X**
Assure adequate access to significant natural and cultural resources in public ownership.			**X**
Discussion: Not applicable to the proposed project.			

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Chapter 226-24 Objective and policies for socio-cultural advancement – individual rights and personal well-being			
Objective: 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.			**X**
Policies			
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.			**X**
Uphold and protect the national and state constitutional rights of every individual.			**X**
Assure access to, and availability of, legal assistance, consumer protection, and other public services which strive to attain social justice.			**X**
Ensure equal opportunities for individual participation in society.			**X**
Discussion: Not applicable to the proposed project.			
Chapter 226-25 Objective and policies for socio-cultural advancement – culture.			
Objective: 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 Hawai'i's people.			**X**
Policies			
Foster increased knowledge and understanding of Hawai'i's ethnic and cultural heritages and the history of Hawai'i.			**X**
Support activities and conditions that promote cultural values, customs, and arts that enrich the lifestyles of Hawai'i's people and which are sensitive and responsive to family and community needs.			**X**
Encourage increased awareness of the effects of proposed public and private actions on the integrity and quality of cultural and community lifestyles in Hawai'i.			**X**
Encourage the essence of the aloha spirit in people's daily activities to promote harmonious relationships among Hawai'i's people and visitors.			**X**
Discussion: Not applicable to the proposed project.			
Chapter 226-26 Objectives and policies for socio-cultural advancement – public safety			
Objective: Planning for the State's socio-cultural advancement with regard to public safety shall be directed towards the achievement of the following objectives:			

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Assurance of public safety and adequate protection of life and property for all people.			**X**
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.			**X**
Promotion of a sense of community responsibility for the welfare and safety of Hawaiʻi's people.			**X**
Policies (Public Safety)			
Ensure that public safety programs are effective and responsive to community needs.			**X**
Encourage increased community awareness and participation in public safety programs.			**X**
Policies (Public Safety-Criminal Justice)			
Support criminal justice programs aimed at preventing and curtailing criminal activities.			**X**
Develop a coordinated, systematic approach to criminal justice administration among all criminal justice agencies.			**X**
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.			**X**
Policies (Public Safety-Emergency Management)			
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.			**X**
Enhance the coordination between emergency management programs throughout the State.			**X**
Discussion: Not applicable to the proposed project.			
Chapter 226-27 Objectives and policies for socio-cultural advancement – government			
Objectives: Planning the State's socio-cultural advancement with regard to government shall be directed towards the achievement of the following objectives:			
Efficient, effective, and responsive government services at all levels in the State.			**X**
Fiscal integrity, responsibility, and efficiency in the state government and county governments.			**X**
Policies			
Provide for necessary public goods and services not assumed by the private sector.			**X**

Hawaiʻi Revised Statutes Chapter 226- Hawaiʻi State Plan Analysis Part I: Overall Themes, Goals, Objectives and Policies S = Supportive, N/S = Not Supportive, N/A = Not Applicable	**S**	**N/S**	**N/A**
Pursue an openness and responsiveness in government that permits the flow of public information, interaction, and response			**X**
Minimize the size of government to that necessary to be effective.			**X**
Stimulate the responsibility in citizens to productively participate in government for a better Hawaiʻi.			**X**
Assure that government attitudes, actions, and services are sensitive to community needs and concerns.			**X**
Provide for a balanced fiscal budget.			**X**
Improve the fiscal budgeting and management system of the State.			**X**
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.			**X**
Discussion: Not applicable to the proposed project.			

Hawaiʻi State Plan, HRS Chapter 226 – Part III. Priority Guidelines **S = Supportive, N/S = Not Supportive, N/A = Not Applicable**	**S**	**N/S**	**N/A**
Chapter 226-101: Purpose. The purpose of this part is to establish overall priority guidelines to address areas of statewide concern			
Chapter 226-103: Economic priority guidelines			
Priority guidelines to stimulate economic growth and encourage business expansion and development to provide needed jobs for Hawaiʻi'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.			X
(A) Encourage investments which:			
(i) Reflect long term commitments to the State;			X
(ii) Rely on economic linkages within the local economy;			X
(iii) Diversify the economy;			X
(iv) Reinvest in the local economy;			X
(v) Are sensitive to community needs and priorities;			X
(vi) Demonstrate a commitment to provide management opportunities to Hawaiʻi residents; and			X

Hawaiʻi State Plan, HRS Chapter 226 – Part III. Priority Guidelines **S = Supportive, N/S = Not Supportive, N/A = Not Applicable**	**S**	**N/S**	**N/A**
(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;			X
(ii) Academic support from an institution of higher education in Hawaiʻi;			X
(iii) Investment interest from Hawaiʻi residents;			X
(iv) Resources unique to Hawaiʻi that are required for innovative activity; and			X
(v) Complementary or supportive industries or government programs or projects.			X
(2) Encourage the expansion of technological research to assist industry development and support the development and commercialization of technological advancements.			X
(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.			X
(4) Seek to ensure that state business tax and labor laws and administrative policies are equitable, rational, and predictable.			X
(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.			X
(6) Encourage the formation of cooperatives and other favorable marketing or distribution arrangements at the regional or local level to assist Hawaiʻi's small-scale producers, manufacturers, and distributors.			X
(7) Continue to seek legislation to protect Hawaiʻi from transportation interruptions between Hawaiʻi and the continental United States.			X
(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 Hawaiʻi's unique location and available physical and human resources			X
(B) A clean industry that would have minimal adverse effects on Hawaiʻi's environment.			X
(C) An industry that is willing to hire and train Hawaiʻi's people to meet the industry's labor needs at all levels of employment.			X

Hawai‘i State Plan, HRS Chapter 226 – Part III. Priority Guidelines **S = Supportive, N/S = Not Supportive, N/A = Not Applicable**	**S**	**N/S**	**N/A**
(D) An industry that would provide reasonable income and steady employment			X
(9) Support and encourage, through educational and technical assistance programs and other means, expanded opportunities for employee ownership and participation in Hawai‘i business.			X
(10) Enhance the quality of Hawai‘i’s labor force and develop and maintain career opportunities for Hawai‘i’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.			X
(B) Encourage more effective career counseling and guidance in high schools and post-secondary institutions to inform students of present and future career opportunities.			X
(C) Allocate educational resources to career areas where high employment is expected and where growth of new industries is desired.			X
(D) Promote career opportunities in all industries for Hawai‘i’s people by encouraging firms doing business in the State to hire residents.			X
(E) Promote greater public and private sector cooperation in determining industrial training needs and in developing relevant curricula and on the-job training opportunities.			X
(F) Provide retraining programs and other support services to assist entry of displaced workers into alternative employment.			X
(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 Hawai‘i’s residents and visitors.			X
(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.			X
(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.			X
(4) Encourage visitor industry practices and activities which respect, preserve, and enhance Hawai‘i’s significant natural, scenic, historic, and cultural resources.			X

Hawai'i State Plan, HRS Chapter 226 – Part III. Priority Guidelines **S = Supportive, N/S = Not Supportive, N/A = Not Applicable**	**S**	**N/S**	**N/A**
(5) Develop and maintain career opportunities in the visitor industry for Hawai'i's people, with emphasis on managerial positions.			X
(6) Support and coordinate tourism promotion abroad to enhance Hawai'i's share of existing and potential visitor markets.			X
(7) Maintain and encourage a more favorable resort investment climate consistent with the objectives of this chapter.			X
(8) Support law enforcement activities that provide a safer environment for both visitors and residents alike.			X
(9) Coordinate visitor industry activities and promotions to business visitors through the state network of advanced data communication techniques.			X
(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.			X
(2) Continue efforts to maintain federal support to provide stable sugar prices high enough to allow profitable operations in Hawai'i.			X
(3) Support research and development, as appropriate, to improve the quality and production of sugar and pineapple crops.			X
(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.			X
(2) Assist in providing adequate, reasonably priced water for agricultural activities.			X
(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.			X
(4) Assist in the formation and operation of production and marketing associations and cooperatives to reduce production and marketing costs.			X
(5) Encourage and assist with the development of a waterborne and airborne freight and cargo system capable of meeting the needs of Hawai'i's agricultural community.			X

Hawai‘i State Plan, HRS Chapter 226 – Part III. Priority Guidelines **S = Supportive, N/S = Not Supportive, N/A = Not Applicable**	**S**	**N/S**	**N/A**
(6) Seek favorable freight rates for Hawai‘i’s agricultural products from interisland and overseas transportation operators.			X
(7) Encourage the development and expansion of agricultural and aquacultural activities which offer long-term economic growth potential and employment opportunities.			X
(8) Continue the development of agricultural parks and other programs to assist small independent farmers in securing agricultural lands and loans.			X
(9) Require agricultural uses in agricultural subdivisions and closely monitor the uses in these subdivisions.			X
(10) Support the continuation of land currently in use for diversified agriculture.			X
(11) Encourage residents and visitors to support Hawai‘i’s farmers by purchasing locally grown food and food products.			X
(e) Priority guidelines for water use and development:			
(1) Maintain and improve water conservation programs to reduce the overall water consumption rate.			X
(2) Encourage the improvement of irrigation technology and promote the use of nonpotable water for agricultural and landscaping purposes.			X
(3) Increase the support for research and development of economically feasible alternative water sources.			X
(4) Explore alternative funding sources and approaches to support future water development programs and water system improvements.			X
(f) Priority guidelines for energy use and development:			
(1) Encourage the development, demonstration, and commercialization of renewable energy sources.			X
(2) Initiate, maintain, and improve energy conservation programs aimed at reducing energy waste and increasing public awareness of the need to conserve energy.			X
(3) Provide incentives to encourage the use of energy conserving technology in residential, industrial, and other buildings.			X
(4) Encourage the development and use of energy conserving and cost-efficient transportation systems.			X

Hawai'i State Plan, HRS Chapter 226 – Part III. Priority Guidelines **S = Supportive, N/S = Not Supportive, N/A = Not Applicable**	**S**	**N/S**	**N/A**
(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 Hawai'i.			X
(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.			X
(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.			X
(4) Encourage the development or expansion of educational and training opportunities for residents in the information and telecommunications fields.			X
(5) Encourage research activities, including legal research in the information and telecommunications fields.			X
(6) Support promotional activities to market Hawai'i's information industry services.			X
(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.			X
Discussion: Not applicable for the proposed project.			
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 ensure that population growth rates throughout the State are consistent with available and planned resource capacities and reflect the needs and desires of Hawai'i's people.	**X**		
2) Manage a growth rate for Hawai'i's economy that will parallel future employment needs for Hawai'i's people.	**X**		

Hawai'i State Plan, HRS Chapter 226 – Part III. Priority Guidelines **S = Supportive, N/S = Not Supportive, N/A = Not Applicable**	**S**	**N/S**	**N/A**
(3) Ensure that adequate support services and facilities are provided to accommodate the desired distribution of future growth throughout the State.			**X**
(4) Encourage major state and federal investments and services to promote economic development and private investment to the neighbor islands, as appropriate.	**X**		
(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.	**X**		
(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.	**X**		
(7) Support the development of high technology parks on the neighbor islands.			**X**
(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.	**X**		
2) Make available marginal or nonessential agricultural lands for appropriate urban uses while maintaining agricultural lands of importance in the agricultural district.			**X**
(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.	X		
(4) Encourage restriction of new urban development in areas where water is insufficient from any source for both agricultural and domestic use.			**X**
(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.			**X**
(6) Seek participation from the private sector for the cost of building infrastructure and utilities, and maintaining open spaces.			**X**
(7) Pursue rehabilitation of appropriate urban areas.			**X**

Hawai'i State Plan, HRS Chapter 226 – Part III. Priority Guidelines S = Supportive, N/S = Not Supportive, N/A = Not Applicable	S	N/S	N/A
(8) Support the redevelopment of Kaka'ako into a viable residential, industrial, and commercial community.			X
(9) Direct future urban development away from critical environmental areas or impose mitigating measures so that negative impacts on the environment would be minimized.	X		
(10) Identify critical environmental areas in Hawai'i 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.			X
(11) Identify all areas where priority should be given to preserving rural character and lifestyle.			X
(12) Utilize Hawai'i'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.			X
(13) Protect and enhance Hawai'i's shoreline, open spaces, and scenic resources.			X
Discussion: The proposed project would include infrastructure development within a developed area within close proximity to jobs, and other critical service centers. All water development use would be conducted in accordance with County and State sustainability regulatory guidelines.			
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.			X
(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.			X
(3) Support community and neighborhood program initiatives that enable residents to assist law enforcement agencies in preventing criminal activities.			X
(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			X

Hawai'i State Plan, HRS Chapter 226 – Part III. Priority Guidelines S = Supportive, N/S = Not Supportive, N/A = Not Applicable	S	N/S	N/A
use of alternative sanctions other than incarceration for persons who pose no danger to their community.			
(5) Provide a range of appropriate sanctions for juvenile offenders, including community-based programs and other alternative sanctions.			X
(6) Increase public and private efforts to assist witnesses and victims of crimes and to minimize the costs of victimization.			X
Discussion: Not applicable to the proposed project.			
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 low- and moderate-income and gap-group households.	X		
(2) Encourage the use of alternative construction and development methods as a means of reducing production costs.			X
(3) Improve information and analysis relative to land availability and suitability for housing.			X
(4) Create incentives for development which would increase home ownership and rental opportunities for Hawai'i's low- and moderate income households, gap-group households, and residents with special needs.			X
(5) Encourage continued support for government or private housing programs that provide low interest mortgages to Hawai'i's people for the purchase of initial owner-occupied housing.	X		
(6) Encourage public and private sector cooperation in the development of rental housing alternatives.			X
(7) Encourage improved coordination between various agencies and levels of government to deal with housing policies and regulations.			X
(8) Give higher priority to the provision of quality housing that is affordable for Hawai'i's residents and less priority to development of housing intended primarily for individuals outside of Hawai'i.	X		
Discussion: The proposed project would include infrastructure improvements in support of a government-funded low income housing development that would provide low and moderate income families and individuals with much needed affordable housing.			
Chapter 226-107: Quality education			
Priority guidelines to promote quality education:			

Hawai'i State Plan, HRS Chapter 226 – Part III. Priority Guidelines **S = Supportive, N/S = Not Supportive, N/A = Not Applicable**	**S**	**N/S**	**N/A**
(1) Pursue effective programs which reflect the varied district, school, and student needs to strengthen basic skills achievement;			X
(2) Continue emphasis on general education "core" requirements to provide common background to students and essential support to other university programs;			X
(3) Initiate efforts to improve the quality of education by improving the capabilities of the education work force;			X
(4) Promote increased opportunities for greater autonomy and flexibility of educational institutions in their decision making responsibilities;			X
(5) Increase and improve the use of information technology in education by the availability of telecommunications equipment for:			X
(A) The electronic exchange of information			X
(B) Statewide electronic mail; and			X
(C) Access to the Internet.			X
(6) Encourage programs that increase the public's awareness and understanding of the impact of information technologies on our lives;			X
(7) Pursue the establishment of Hawai'i's public and private universities and colleges as research and training centers of the Pacific;			X
(8) Develop resources and programs for early childhood education;			X
(9) Explore alternatives for funding and delivery of educational services to improve the overall quality of education; and			X
(10) Strengthen and expand educational programs and services for students with special needs.			X
Discussion: Not applicable to the proposed project.			
Chapter 226-108: Sustainability			
Priority guidelines and principles to promote sustainability shall include:			
(1) Encouraging balanced economic, social, community, and environmental priorities;	X		
(2) Encouraging planning that respects and promotes living within the natural resources and limits of the State;	X		
(3) Promoting a diversified and dynamic economy;			X
(4) Encouraging respect for the host culture;			X

Hawai'i State Plan, HRS Chapter 226 – Part III. Priority Guidelines **S = Supportive, N/S = Not Supportive, N/A = Not Applicable**	**S**	**N/S**	**N/A**
(5) Promoting decisions based on meeting the needs of the present without compromising the needs of future generations;	**X**		
(6) Considering the principles of the ahupua'a system; and			**X**
(7) Emphasizing that everyone, including individuals, families, communities, businesses, and government, has the responsibility for achieving a sustainable Hawai'i.	**X**		
Discussion: The proposed project would practice sustainable practices by adhering to current Kaua'i County building codes and State rules with regards to water consumption.			
CHAPTER 226-109: Climate change adaptation			
Priority guidelines and principles to promote climate change adaptation shall include:			
(1) Ensure that Hawai'i's people are educated, informed, and aware of the impacts climate change may have on their communities;			**X**
(2) Encourage community stewardship groups and local stakeholders to participate in planning and implementation of climate change policies;			**X**
(3) Invest in continued monitoring and research of Hawai'i's climate and the impacts of climate change on the State;			**X**
(4) Consider native Hawaiian traditional knowledge and practices in planning for the impacts of climate change;			**X**
(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;			**X**
(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;			**X**
(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;			**X**
(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;			**X**
(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			**X**

Hawaiʻi State Plan, HRS Chapter 226 – Part III. Priority Guidelines **S = Supportive, N/S = Not Supportive, N/A = Not Applicable**	**S**	**N/S**	**N/A**
(10) Encourage planning and management of the natural and built environments that effectively integrate climate change policy.			**X**
Discussion: Not applicable to the proposed project.			

2.14.2 State of Hawaiʻi Land Use Law Chapter 205, HRS

Chapter 205, HRS promulgates the State Land Use Law. This law is intended to preserve, protect, and encourage the development of lands in the State of Hawaiʻi for uses that are best suited to the public health and welfare of its people. The LUC classifies all land into four districts: Urban, Conservation, Agriculture, and Rural.

Discussion: The project site is designated within the State LUC Agricultural District. The proposed project includes municipal potable water development, which is allowed in the Agricultural District, per Chapter 205-4.5 (7). Therefore, the Proposed Action would comply with its State LUC designation.

2.14.3 Hawaiʻi 2050 Sustainability Plan

The long-term strategy of the Hawaiʻi 2050 Sustainability Plan, Charting a Course for the Decade of Action (2020-2030) (Sustainability 2050 Plan) includes a number of Sustainability Development Goals that focus on key areas of sustainable planning for Hawaiʻi's future. Below are sustainability goals that the proposed project would support:

Sustainability Goal 1: No Poverty

This sustainability goal works to address the struggle of many Hawaii residents to afford housing, utilities, transportation, healthcare, and food.

Sustainability Goal 11: Sustainable Cities and Communities

This sustainability goal works to make cities and human settlements inclusive, safe, resilient, and sustainable. The core tenets of an "inclusive, safe, resilient, and sustainable" city or community include affordable housing, access to public spaces, sustainable transportation systems, including public transport…

The Sustainability 2050 Plan goes on to list the 2021-2030 Recommended Actions.

One of the Recommended Actions is to Advance Equity. Strategy 25 within this Recommended Action includes the recommendation to continue to improve economic and social sustainability of individuals through access to affordable housing. And Strategy 29 recommends integrating land use planning to address Hawaiʻi's competing uses of land to mutually obtain local food production goals, affordable housing needs, sustainable energy goals, and conservation.

Discussion : The proposed development would provide much needed affordable housing to Hawaiʻi residents. The proposed development would be designed and constructed in compliance with Kaua'i County Code, which requires the responsible and sustainable development, use and management of natural resources; such as water, electricity and visual and scenic resources.

The proposed action would improve climate resilience by increasing potable water storage capacity. The proposed action would support the advancement of sustainable communities since the Lima Ola development that it will service is located within a central location adjacent to a town center and existing housing in ‘Ele‘ele and Hanapēpē. The proposed action would support advancement of equity since it is a key component in a County affordable housing project that would provide below market rate housing to qualified Kaua‘i County residents. The proposed action would work to protect and manage watersheds since this water system development would be closely managed and regulated by the County Department of Water and the State DOH and Commission on Water Resource Management to assure proper use and management of existing groundwater resources.

2.14.4 Hawai‘i Coastal Zone Management Program

The Coastal Zone Management Act of 1972 (16 USC §1451), as amended through Public Law 104-150, created the coastal management program and the National Estuarine Research Reserve system. The coastal states are authorized to develop and implement a state coastal zone management (CZM) program. Hawai‘i CZM Program received federal approval in the late 1970’s. The objectives of the Hawai‘i CZM Program, HRS §205A-2, are to protect valuable and vulnerable coastal resources such as coastal ecosystems, special scenic and cultural values and recreational opportunities. The objectives of the program are also to reduce coastal hazards and to improve the review process for activities proposed within the coastal zone.

The Hawai‘i CZM law requires each County to designate and administer the SMA within the State’s coastal areas that extends inland from the shoreline. Development within the SMA is subject to County approval to ensure the proposal is consistent with the policies and objectives of the Hawai‘i CZM Program. The following are objectives of the Hawai‘i CZM Program and the Project’s impacts relative to the State CZM objectives and policies:

Objectives

(1) Recreational resources;

(A) Provide coastal recreational opportunities accessible to the public.

Discussion: Not applicable since the project site is located outside the shoreline and SMA Area.

(2) Historic resources;

(A) 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.

Discussion: An archaeolgical survey and background research was completed for the proposed project as part of the EA process. Consultation with SHPD and local Native Hawaiian groups has been initiated, and will continue throughout the planning and development process to comply with HRS 6E, as well as Section 106 of the U.S. NHPA, since federal funding are being sought.

(3) Scenic and open space resources;

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

Discussion: The proposed project will not significantly impact any existing open spaces.

(4) Coastal ecosystems;

(A) Protect valuable coastal ecosystems, including reefs, from disruption and minimize adverse impacts on all coastal ecosystems.

Discussion: Not applicable since the proposed project is not proposed at or near the coastal shoreline area/SMA.

(5) Economic uses;

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

Discussion: The proposed project is planned in a suitable central location readily accessible to the local community.

(6) Coastal hazards;

(A) Reduce hazard to life and property from tsunami, storm waves, stream flooding, erosion, subsidence, and pollution.

Discussion: The proposed project site is located outside the tsunami evacuation zone and the State SMA. The project site is located within FEMA Flood Zone X: Area of minimal flood hazard. During construction, BMPs will be implemented to reduce/eliminate any on or off-site runoff/pollution.

(7) Managing development;

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

Discussion: The proposed project is going through the environmental review process in compliance with the State Hawai'i Environmental Policy Act. A public review/comment period was conducted during the environmental review process, which has allowed for public participation/agency communication.

(8) Public participation;

(A) Stimulate public awareness, education, and participation in coastal management.

Discussion: As stated above, the proposed project is going through the environmental review process and includes a public review/comment period, which allows for public participation/agency communication. Additional public awareness and education in matters of coastal management are not applicable to the proposed project.

9) Beach protection;

(A) Protect beaches for public use and recreation.

Discussion: Not applicable for the proposed project which is located outside the shoreline/SMA.

10) Marine resources;

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

Discussion: Not applicable for the proposed project which is located outside the shoreline/SMA.

Policies

(1) Recreational resources;

(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 replacement of coastal resources having significant recreational value including, but not limited to, surfing sites, fishponds, and sand beaches, when such resources will be unavoidably damaged by development; or requiring reasonable monetary compensation to the State for recreation when replacement 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 such dedication against the requirements of section 46-6.

Discussion: None of the policies are applicable to the proposed project since it would not include the creation of, or conversion of recreational areas.

(2) Historic resources;

(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.

Discussion: An archaeolgical survey and background reaseach was completed as part of the environmental review process to ensure proper analysis, information retention and protection of any historic or cultural resources. No evidence of potential historic resources are expected to present at the project site.

(3) Scenic and open space resources;

(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 such 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.

Discussion: The proposed water tank would be compatible with the existing visual environment since it would be sited next to an existing water tank, and would not significantly impact any view planes in the area .

(4) Coastal ecosystems;

(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, including reefs, of significant biological or economic importance;

(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.

Discussion: The proposed project represents a technical water quality planning approach that balances development need with available sustainable yield.

5) Economic uses;

(A) Concentrate coastal dependent development in appropriate areas;

(B) Ensure that coastal dependent development such as harbors and ports, and coastal related development such as visitor industry facilities and energy generating facilities, are located, designed, and constructed to minimize adverse social, visual, and environmental impacts in the coastal zone management area; and

(C) Direct the location and expansion of coastal dependent developments to areas presently designated and used for such developments and permit reasonable long-term growth at such areas, and permit coastal dependent development outside of presently designated areas when:

(i) Use of presently designated locations is not feasible;

(ii) Adverse environmental effects are minimized; and

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

Discussion: Not applicable since the proposed development is not proposed in the shoreline area/SMA.

(6) Coastal hazards;

(A) Develop and communicate adequate information about storm wave, tsunami, flood, erosion, subsidence, and point and nonpoint source pollution hazards;

(B) Control development in areas subject to storm wave, tsunami, flood, erosion, hurricane, wind, subsidence, and point and nonpoint source pollution hazards;

(C) Ensure that developments comply with requirements of the Federal Flood Insurance Program; and

(D) Prevent coastal flooding from inland projects.

Discussion: The proposed project site is located outside the tsunami evacuation zone and the SMA. The project site is located within FEMA Flood Zone X: Area of minimal flooding.

(7) Managing development;

(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.

Discussion: Not applicable since the proposed development is not proposed in the shoreline area/SMA

(8) Public participation;

(A) Promote public involvement in coastal zone management processes;

(B) Disseminate information on coastal management issues by means of educational materials, published reports, staff contact, and public workshops for persons and organizations concerned with coastal issues, developments, and government activities; and

(C) Organize workshops, policy dialogues, and site-specific mediations to respond to coastal issues and conflicts.

Discussion: A public review/comment period has been conducted during the environmental review process, which has allowed for public participation/agency communication.

(9) Beach protection;

(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; and

(C) Minimize the construction of public erosion-protection structures seaward of the shoreline.

Discussion: Not applicable since the proposed project is not planned in the shoreline/SMA.

(10) Marine resources;

(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 processes, marine life, and other ocean resources in order to acquire and inventory information necessary to understand how ocean development activities relate to and impact upon ocean and coastal resources; and

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

Discussion: Not applicable since the proposed project is not planned in the shoreline/SMA.

2.14.5 The General Plan for The County of Kaua’i

The General Plan for the County of Kaua’i was updated in 2018 and provides broad goals, objectives, policies, and implementing actions that outline the direction of the County's future. The General Plan provides the policy framework for future development within Kaua‘i County.

Section 1.4 of the Kaua’i County General Plan includes the following policies to guide future growth that are relevant to the proposed project:

Policy #1: Manage Growth to Preserve Rural Character

Policy #2: Provide Affordable Housing While Facilitating a Diversity of Privately-Developed Housing for Local Families

Policy #4: Design Healthy and Complete Neighborhoods

Policy #6: Reduce the Cost of Living

Policy #10: Help Business Thrive

Policy: 14: Prepare for Climate Change

Discussion: The proposed project would support the Lima Ola development, which will be located adjacent to existing housing, a commercial center and public transportation. The proposed action supports an affordable housing project that would reduce the cost of living for low-income Kaua’i residents by reducing housing cost. The proposed action would result in new construction jobs, and is sited in a location away from the shoreline, and outside flood zones where climate change impacts are generally less severe.

Section 2.1 of the General Plan includes the following Future Land Use Objectives:

1. *To accommodate Kaua‘i’s projected population growth and housing needs.*
2. *To meet future housing needs through “missing middle” housing types that are affordable by design and located near job centers.*
3. *To protect rural character by ensuring new growth is designed to be compact and focused around existing town centers.*
4. *To manage land use and development in a manner that respects the unique character of a place.*
5. *To locate residential growth in and near major jobs centers.*
6. *To increase overall commuity health through design that supports safe and accessible parks, streets, and other shared spaces.*
7. *To increase resiliency by limiting development in areas impacted by future sea level rise.*

Discussion: The proposed project supports development of affordable housing adjacent to the urban mixed use area of ‘Ele‘ele. The project site is located well above the shoreline area, increasing its future resiliency to sea level rise impacts.

2.14.6 ‘Ele‘ele and Port Allen Town Plan

Within the West Kaua‘i Community Plan, dated October 30, 2020, the ‘Ele‘ele and Port Allen Town Plan discusses the planned growth in this area, that includes the Lima Ola affordable housing development.

Discussion: The proposed project is congruent with the goals of the ‘Ele‘ele and Port Allen Town Plan since the proposed development incudes the creation of the needed potable water storage required for development of Lima Ola.

3 Environmental Impact Significance Criteria Analysis

HAR 11-200.1-13 includes an environmental significance criteria assessment that requires the agency or applicant conducting an EA or EIS to screen a proposed project against 13 environmental significance criteria. The 11-200.1-13 environmental significance criteria assessment for this project is presented below:

(1) Irrevocably commit a natural, cultural, or historic resource

Discussion: Based on the environmental studies completed, there are no known significant natural, historic or cultural resources present at the project site that would be committed.

(2) Curtail the range of beneficial uses of the environment

Discussion*:* It is not anticipated that the proposed project would curtail beneficial uses of the affected environment since it would include a relatively small footprint on secured County-owned land.

(3) Conflict with the State’s environmental policies or long-term environmental goals established by law

Discussion: The proposed project would not conflict with any State environmental policies or long-term goals. The proposed development would be planned and constructed in accordance with County and State laws and procedures. This EA represents compliance with State environmental regulation HRS 343. And the proposed project would comply with HRS 344: State Environmental Policy since there would be no misuse or overuse of natural resources, or pollution to the environment, which would help to safeguard the State’s unique natural environmental characteristics.

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

Discussion: The proposed project would have a beneficial effect on the economic welfare of the community and State since it would result in construction jobs, as well as as provide much needed water system development required for affordable housing that would lower economic costs for Kauaʻi residents. There are no known significant cultural practices that occur at the project site that would be impacted.

(5) Have a substantial adverse effect on public health

Discussion: The proposed project would not have a substantial adverse effect on public health since it would result in providing potable water service to the local community.

(6) Involve adverse secondary impacts, such as population changes or effects on public facilities

Discussion: The proposed project would provide additional water storage, allowing for the development of Lima Ola, which would result in a population increase as new residents move to the Lima Ola housing development. However, this growth is in line with the County General Plan, as well as the West Kauaʻi Community Plan, as discussed above in this section.

(*7) Involve a substantial degradation of environmental quality*

Discussion: The proposed project is not anticipated to involve a substantial degradation of environmental quality. During construction, BMPs will be implemented to reduce/eliminate sediment and construction material runoff. The operation of the water system improvements would not result in any significant emissions or use /generate hazardous materials, and would incorporate stormwater management elements to reduce/eliminate runoff to the affected environment.

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

Discussion: The proposed project supports the stand-alone Lima Ola affordabe housing project initiated by the County Housing Agency, and would not result in adverse effects on the environment, or commitment for larger actions.

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

Discussion: The proposed project is not anticipated to have an effect on any sensitive biological resources or habitat. A biological resources survey of the project area, including background research into the surrounding area was conducted for the proposed project. The mitigation measures discussed earlier in this EA would reduce any potential impacts to sensitive biological resources to a level of insignificance.

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

Discussion: The proposed project is not anticipated to have a substantial adverse effect on air or water quality or ambient noise levels. During construction, there is the potential for temporary, short-term impacts on existing air quality, noise conditions in the immediate vicinity of the project site. Construction work would comply with County regulations during construction and would implement BMPs to minimize temporary impacts. Once in operation, there would be no significant air emissions, water runoff or noise pollution from the water system upgrade facilities.

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

Discussion: The proposed project site is not located in a sensitive area such as the SMA or shoreline area. It is located outside the Tsunami Evacuation Zone, and is located in FEMA Flood Zone X: Area of Minimal Flood Hazard. There are no geologic hazards, or waterways located at the project site.

(*12) Have a substantial adverse effect on scenic vistas and view planes, during day or night, identified in county or state plans or studies*

Discussion: During construction, dust fences, construction materials and equipment would be visible. However, these impacts would be short-term, and dust fences around the work site would reduce visual distractions caused by construction. Once complete, the proposed water tank would be situated adjacent to an existing water tank, and would not impact any vistas or view planes in the area.

(13) Require substantial energy consumption or emit substantial greenhouse gases

Discussion: The proposed water system improvements would use electricity to power pumps. However, there would be no significant GHG emissions generated from the proposed development.

3.1 Project Environmental Determination

Based on the research, studies and outreach conducted as part of this FEA, it is determined that the proposed project would not result in a significant environmental impact. Therefore, a finding of no significant impact (FONSI) is anticipated for this project.

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Appendix A: Biological Resources Survey Report

A Natural Resources Assessment for the Proposed Lima Ola Subdivision Off-Site Water System Improvements, ʻEleʻele, Island of Kauaʻi

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June 20, 2024

Introduction

TMK (4) 2-1-01:49 owned by the County of Kauaʻi, located in ʻEleʻele on the island of Kauaʻi is proposed for a new water tank build. The project area is located just to the southeast of Kaumualiʻi Highway. LeGrande Biological Surveys Inc. (LBSInc) was tasked with providing a report outlining the current plant and animal species extant within the Project Area (PA) and providing recommendations for native species that are located within the parcel as well as any that could possibly be utilizing the habitat.

Site Description

The PA parcel is located on the south shore of Kauaʻi Island and is dominated by the existing water tank and surrounding coffee fields. Figure 1 shows a drawing of the PA with boundaries and location in proximity to Kaumualiʻi Highway. Soils are defined as Makaweli silty clay loam (MgB) for the entirety of the PA (NRCS 2024).

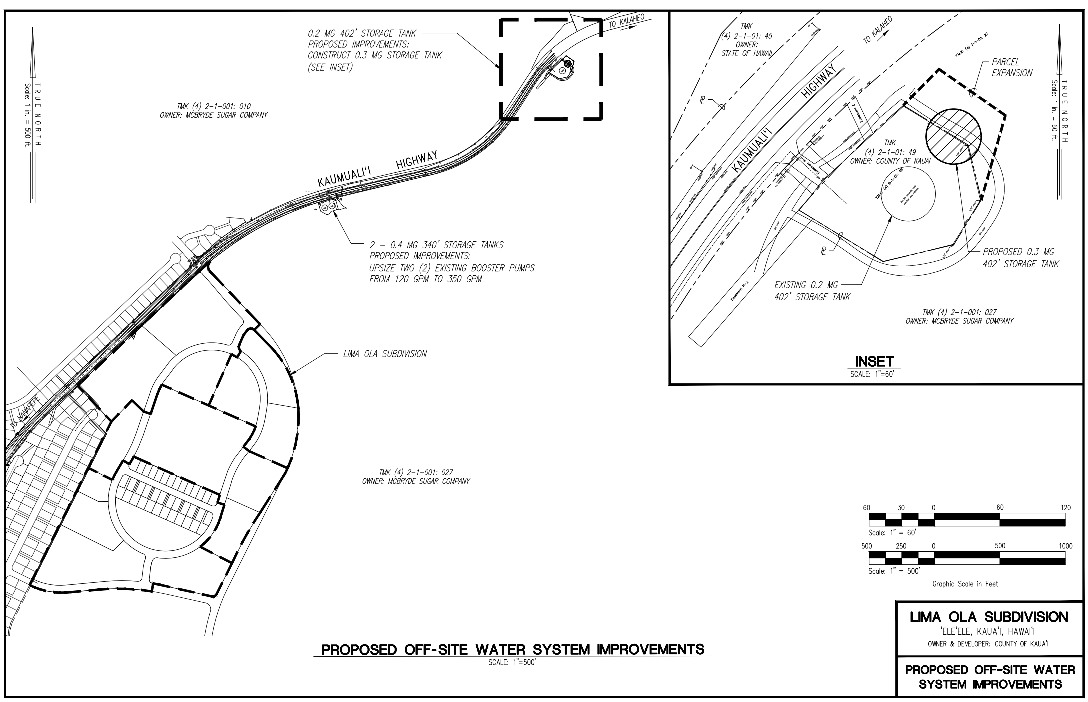

Figure 1. New Lima Ola watertank location enlarged at inset.

Methods

Botanical Survey

Maya LeGrande surveyed the PA on February 27, 2024. Plant species were identified as they were encountered during meandering walking transects through the PA 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 Hawaiʻi* (Wagner, Herbst, & Sohmer, 1990; Wagner & Herbst, 1999) for native and naturalized flowering plants, and *A Tropical Garden Flora* (Staples & Herbst, 2005) for ornamental plants. More recent name changes for naturalized plant species follow Imada (2019). A full plant species list is provided in Table 1.

Terrestrial Vertebrates Survey

Avian Survey

A bird survey was conducted in the morning hours of February 27, 2024. Birds were identified by visual observations aided by Leica 8 X 42 binoculars, and by listening for vocalizations. Two six-minute avian point-count stations were sighted at the western and eastern ends the PA. Weather conditions were ideal with unlimited visibility, no precipitation, and winds at about 15 kilometers per hour. The avian phylogenetic order and nomenclature used in this report follows the AOU *Check-List of North and Middle American Birds* 2023, and the 64th supplement to the checklist (Chesser et al., 2023).

Mammalian Survey

A list was made of any mammals encountered during the survey. Indicators of mammalian presence, such as tracks, scat, and additional signs were noted. Mammalian phylogenetic order and nomenclature follow *Mammal Species of the World* (Wilson and Reeder, 2005).

Figure 2. Kaumualiʻi Highway on the right with Guinea grass hedgeline and access road opening to the PA.

Figure 3. Access gate to PA with dirt access road and non-native grasses and shrubs on either side.

Results

Vegetation

The vegetation is dominated by introduced (non-native) plant species over the entire PA. The coffee plantation and weedy scrub species dominate the site. A total of 41 plant species (Table 1) were documented with two being native (indigenous) and the remaining 39 non-native. The following section describes the dominant species.

Flora

The access entrance along Kaumualiʻi Highway is dominated by a hedge of Guinea grass (*Megathyrsus maximus*), koa haole (*Leucaena leucocephala*) shrubs and Java plum (*Syzygium cumini*). Various additional weedy species along the roadsides include natal redtop (*Melinis repens*), bermuda grass (*Cynodon dactylon*), little bell (*Ipomoea triloba*), spiny amaranth (*Amaranthus spinosus*), castor bean (*Ricinus communis*), and false ragweed (*Parthenium hysterophorus*). The area within the chain link fence that encompasses the exisiting water tank is almost exclusively populated with swollen fingergrass (*Chloris barbata*). Vines of balsam pear (*Momordica charantia*) were also observed within the fenced area. The two indigenous species, pōpolo (*Solanum americanum*) and ʻuhaloa (*Waltheria indica*), were observed infrequently along the dirt access roads. Rows of coffee (*Coffea arabica*) plants are growing in the eastern section of the PA.

Figure 4. Guinea grass dominates the agricultural roadsides to the west.

Table 1. Plant Species Observed at the Lima Ola Water Tank Project Area

Monocotyledons		
CYPERACEAE		
Cyperus rotundus L.	nut grass	Nat
POACEAE		
Cenchrus ciliaris L.	buffelgrass	Nat
Chloris barbata Sw.	swollen fingergrass	Nat
Cynodon dactylon (L.) Pers.	Bermuda grass	Nat
Leptochloa virgata (L.) P.Beauv.	sprangletop	Nat
Megathyrsus maximus (Jacq.) B.K. Simon & W.L. Jacobs	Guinea grass	Nat
Melinis repens (Willd.) Zizka	Natal redtop	Nat
Dicotyledons		
AMARANTHACEAE		
Amaranthus spinosus L.	spiny amaranth	Nat
ASTERACEAE (COMPOSITAE)		
Bidens pilosa L.	Spanish needle	Nat
Conyza bonariensis (L.) Cronq.	hairy horseweed	Nat
Crassocephalum crepidioides (Benth.) S. Moore	redflower ragweed	Nat
Emilia fosbergii Nicolson	pualele	Nat
Parthenium hysterophorus L.	false ragweed	Nat
Sonchus oleraceus L.	sow thistle	Nat
Tridax probumbens L.	coat buttons	Nat
Verbesina encelioides (Cav.) Benth.&Hook.	golden crown-beard	Nat
Youngia japonica (L.) DC.	Oriental hawksbeard	Nat
BORAGINACEAE		
Heliotropium procumbens Mill. var. *depressum* (Cham.) Fosberg		Nat
CONVOLVULACEAE		
Ipomoea obscura (L.) Ker-Gawl.	---	Nat
Ipomoea triloba L.	little bell	Nat
CUCURBITACEAE		
Momordica charantia L.	balsam pear	Nat
EUPHORBIACEAE		
Euphorbia hirta L.	garden spurge	Nat
Euphorbia prostrata Alton	prostrate spurge	Nat
Ricinus communis L.	castor bean	Nat

FABACEAE		
Canavalia cathartica Thouars	maunaloa	Nat
Chamaecrista nictitans (L.) Moench	partridge pea	Nat
Crotalaria incana L.	fuzzy rattlepod	Nat
Desmanthus pernambucanus (L.) Thell.	slender mimosa	Nat
Leucaena leucocephala (Lam.) de Wit subsp. *leucocephala*	koa haole	Nat
Senna occidentalis (L.) Link	coffee senna	Nat
LAMIACEAE		
Leonotis nepetifolia (L.) R.Br.	lion's ear	Nat
Mesophaerum pectinatum (L.) Kuntze	comb hyptis	Nat
MALVACEAE		
Abutilon grandifolium (Willd.) Sweet	hairy abutilon	Nat
Malvastrum coromandelianum (L.) Garke	false mallow	Nat
Sida rhombifolia L.	Cuba jute	Nat
Sidastrum micranthum (A.St.-Hill.)Fryxell	-	Nat
MYRTACEAE		
Syzygium cumini (L.) Skeels	Java plum	Nat
NYCTAGINACEAE		
Boerhavia coccinea Mill.	scarlet boerhavia	Nat
RUBIACEAE		
Coffea arabica L.	arabian coffee	Nat
SOLANACEAE		
Solanum americanum Mill.	pōpolo	**Ind**?
STERCULIACEAE		
Waltheria indica L.	ʻuhaloa	**Ind**?

Legend to Table 1

STATUS = distributional status for the Hawaiian Islands:

Ind?= questionably indigenous to Hawaiʻi, data is unclear as the exact arrival in the Hawaiian Islands.

Nat = naturalized, exotic, plant introduced to the Hawaiian Islands since the arrival of Cook Expedition in 1778, and well-established outside of cultivation.

Figure 5. Guinea grass and koa haole between the highway and PA.
Exisiting water tank fencing to the right.

Avian Fauna

A total of 12 bird species, representing 8 separate families, were recorded during the station count (Table 2). No additional species were recorded wile transiting the site between survey points.

Avian diversity and densities were in keeping with the location and vegetation present within the study site. Three species—Scaly-breasted munia (*Lonchura punctulata*), Zebra Dove (*Geopelia striata*), and Cattle Egret (*Bulbucus ibis*) were the most abundant species observed.

Mammalian Fauna

No terrestrial mammalian species were detected during this survey. It is most likely that non-native animals such as dogs (*Canis lupus familiaris*), cats (*Felis catus*), and pigs (*Sus scrofa*) transit the general area from time to time.

Table 2. Avian Species Detected- Lima Ola Water Tank Project Area- February 2024

Common Name	Species	Order Family	Status
		COLUMBIFORMES	
		COLUMBIDAE - Pigeons & Doves	
Spotted Dove	*Streptopelia chinensis*		A
Zebra Dove	*Geopelia striata*		A
Mourning Dove	*Zenaida macroura*		A
		PELECANIFORMES	
		ARDEIDAE - Herons, Bitterns & Allies	
Cattle Egret	*Bubulcus ibis*		A
		PASSERIFORMES	
		CETTIIDAE - Cettia Warblers & Allies	
Japanese Bush-Warbler	*Horomis diphone*		A
		ZOSTEROPIDAE - White-eyes	
Warbling White-eye	*Zosterops japonicus*		A
		STURNIDAE - Starlings	
Common Myna	*Acridotheres tristis*		A
		MUSICAPIDAE - Old World Flycatchers	
White-rumped Shama	*Copsychus malabaricus*		A
		ESTRILDIDAE - Estrildid Finches	
African Silverbill	*Euodice cantans*		A
Scaly-breasted Munia	*Lonchura punctulata*		A
Common Waxbill	*Estrilda astrild*		A
		PASSERIDAE - Old World Sparrows	
House Sparrow	*Passer domesticus*		A

Legend to Table 1

Status

A Alien – introduced by humans, naturalized

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 various agricultural uses over time and is presently dominated by the coffee plantation and non-native species. Two native species were documented at the site, both questionably indigenous; pōpolo and ʻuhaloa. Both of these species are considered widespread throughout the Hawaiian Islands. 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 2024b).

None of the fourteen Endangered plant species listed by the informal USFWS Information for Planning and Consultation (IPaC) for the PA location were observed during the survey. A formal IPaC was generated on 6/18/2024 (USFWS 2024-1) with the same list of federally protected species whose historical or present range includes the Project Area but are not necessarily found within the Project Area. They are; ʻaiea (*Nothocestrum latifolium*), ʻāwikiwiki (*Canavalia napaliensis* and *C. pubescens*), Carterʻs panicgrass (*Panicum faurei* var. *carteri*), dwarf iliau (*Wilkesia hobdyi*), honohono (*Haplostachys haplostachya*), ʻihi (*Portulaca villosa*), makou (*Peucedanum sandwicense*), ʻohai (*Sesbania tomentosa*), *Schiedea spergulina* var. *leiopoda* and *S. spergulina* var. *spergulina*, *Spermolepis hawaiiensis*, uhihi (*Mezoneuron kavaiense*), and *Microlepia strigosa* var. *mauiensis* (USFWS, 2024). Owing to the highly degraded nature of the site, none of these species were expected in the area.

Faunal Resources

We consulted with the USFWS IPaC portal (USFWS 2024 & 2024-1)– The list produced the following 11 animal species: One reptile species, Green sea turtle (*Cheldonia mydas*), one mammalian species Hawaiian hoary bat (*Lasiurus cinsereus semotus*), and eight avian species were listed: Band-rumped Storm-Petrel (*Oceanodroma castro*), Hawaiian Duck (*Anas wyvilliana*), Hawaiian Common Gallinule (*Gallinula galeata sandvicensis*), Hawaiian Coot (*Fulica americana alai*), Hawaiian Goose (*Branta sandvicensis*), Hawaiian Petrel (*Pterodroma sandwichensis*), Hawaiian Stilt (*Himatopus mexicanus knudseni*), and Newell's Townsends Shearwater (*Puffinus auricularis newelli*) (USFWS, 2024).

Of the 10 species identified in the formal IPaC as potentially being present in the PA or could potentially be impacted by construction; one, Green sea turtle, is not present and there is no suitable habitat to support the species. The following nine species were not documented during the survey but are discussed in the following three sections.

Avian Resources

Nēnē

Nēnē were not observed within the PA or in the general surrounding areas. The habitat is not conducive for foraging and/or loafing. Generally human impacts to this species revolve around vehicular interactions, human feeding, and disturbance to nesting birds, eggs, chicks, and goslings. These potential threats can be minimized to the maximum extent practicable by implementing the following minimization measures:

- Don't feed birds especially if they approach for handouts.
- Secure all food rubbish in close trash receptacles.
- Establish a 15 mile an hour speed limit within the site.

Waterbirds

None of the four extant endemic endangered waterbird species or subspecies were recorded on the site. They are Hawaiian Duck, Hawaiian Coot (*Fulica alai*)[1], the Hawaiian endemic sub-species of both the Common Gallinule, and the Black-necked Stilt. The drainage canal to the southwest (outside of the PA) was surveyed for any signs of these species as irrigation canals are often used for foraging, loafing and possibly nesting by these species. No waterbirds were observed within or near the PA during this survey. Potential human impacts to these four species during clearing and grubbing are the same as those posed by these activities to Nēnē.

Seabirds

It is likely that the endangered Hawaiian Petrel, Band-rumped Storm-Petrel (*Hydrobates castro*), and the threatened Newell's Shearwater (*Puffinus newelli*) over-fly the PA 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.,

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[1] In this report we use the most current names for all avian species follow: AOU Check-List of North and Middle American Birds 2021, and the 63rd supplement to the checklist (Chesser et al., 2021, 2022).

2001; Hue et al., 2001; Day et al., 2003). These species have been recovered along roadways and in facilities adjacent to the PA (SOS, 2023). No suitable nesting habitat exists within or close to the PA for any of these three seabird species.

The principal potential impact that current habitat modifications or changes pose 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.

- If night-time construction activity or equipment maintenance is proposed during any construction phases of the project, 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; Tellfer 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).

Mammalian Resources

The findings of the mammalian survey are consistent with the location and habitat present on the property. Although no rodents were recorded it is likely that some of the four established Muridae found on Kauaʻi 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 PA 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 Hawaiʻi endangered species programs were detected during this survey (DLNR, 2015; USFWS, nd-a).

Hawaiian hoary bat

It is probable that the ʻōpeʻapeʻa – the endemic Hawaiian hoary bat (*Lasiurus cinereus semotus*), currently recognized as an endemic species *Lasiurus semotus* (Pinzari et al. 2020) overfly the PA on a seasonal basis as they are regularly recorded in the lowland areas on Kauaʻi that still contain trees (Pinzari et al. 2020; David, 2023). The removal of coffee trees within the PA should not have adverse affects on bats as they are all smaller in stature than the typical tree size that bats utilize 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.
- Do not use barbed wire fencing.

Other Resources of Potential Concern

Critical Habitat

No federally delineated Critical Habitat for any species occurs within the PA (USFWS, 2024c). There is no equivalent designation under State of Hawaiʻi endangered species statutes.

Coconut rhinoceros beetle

The Coconut rhinoceros beetle (CRB) *Oryctes rhinoceros* is an invasive beetle species from South East Asia that has become established on Oʻahu and is now spreading to other Islands in Hawaiʻi. The beetles feed on palm species and are a threat to our coconut trees as well as native *Pritchardia* species and other ornamental palms. The Coconut Rhinoceros Beetle Response (crbhawaii.org) recommends best management practices including limiting mulch, compost, and decaying plant material build up in thick piles or layers as it creates breeding material for the CRB larvae. Spreading mulch 2 inches in depth or less helps to keep the material dry which is not favorable for the beetle larvae.

Wetlands/Riparian Habitat

Our surveys did not include wetland delineations but we did observe and note wetland indicators within the PA and none were noted. The irrigation canal, shown on the National Wetland Inventory (NWI) map (figure 6), was surveyed outside of the western project boundary and appeared to be mostly dry at the time. No significant flora or fauna was observed in the canal area.

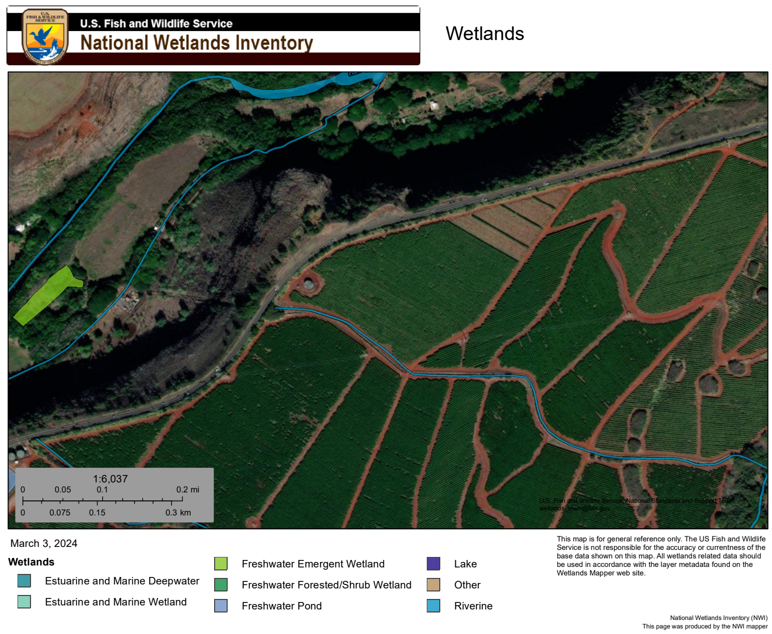

Figure 6. USFWS NWI wetland map showing an irrigation canal to the southwest of the existing water tank at the project area.

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Appendix B: Archaeological Report

Pacific Legacy

Historic Preservation

LITERATURE REVIEW AND FIELD INSPECTION FOR THE PROPOSED OFF-SITE WATER SYSTEM IMPROVEMENTS PROJECT FOR THE LIMA OLA SUBDIVISION, ‘ELE‘ELE, HANAPĒPĒ AHUPUA‘A, KONA MOKU, KAUA‘I ISLAND

[TMK: (4) 2-1-001:027 (POR.)]

CULTURAL RESOURCES CONSULTANTS

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Pacific Legacy: Exploring the past, informing the present, enriching the future.

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LITERATURE REVIEW AND FIELD INSPECTION FOR THE PROPOSED OFF-SITE WATER SYSTEM IMPROVEMENTS PROJECT FOR THE LIMA OLA SUBDIVISION, ‘ELE‘ELE, HANAPĒPĒ AHUPUA‘A, KONA MOKU, KAUA‘I ISLAND

[TMK: (4) 2-1-001:027 (POR.)]

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ABSTRACT

At the request of Kaimana Environmental Solutions, LLC, Pacific Legacy, Inc. conducted a Literature Review and Field Inspection (LRFI) for the proposed Off-Site Water System Improvements Project for the Lima Ola Subdivision in ʻEleʻele, Hanapēpē Ahupuaʻa, Kona Moku, Kauaʻi Island [TMK: (4) 2-1-001:027 (por.)]. The purpose of the LRFI was to investigate previous land use of the proposed project area and to determine whether any undocumented historic properties exist in the proposed project area.

The investigation was two-fold, consisting of historical background research and a field inspection:

1. Background research involved a review of historical documents; historical maps and aerial photographs; reference materials, including online databases; and archaeological reports produced in the vicinity of the proposed project area.
2. A one-day field inspection was carried out by two Pacific Legacy archaeologists with the purpose of determining whether undocumented historic properties exist within the proposed project area.

The literature review found that the dry plains of ʻEleʻele, in which the proposed project area is located, formed a peripheral zone within the traditional Hawaiian settlement and land use patterns of Hanapēpē Ahupuaʻa, which focused along Hanapēpē River. Intensive disturbance of the dry plains of ʻEleʻele began in the late nineteenth century with the establishment of the ʻEleʻele Plantation, and subsequently the McBryde Sugar Company, which operated from 1899 to 1996. The field inspection did not identify any potential historic properties within the 18,700-sq. ft proposed project area. The proposed project area is currently planted with commercial coffee.

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Note: In this report, the spellings and the use of diacritical marks (glottal stops and macrons) follow conventions issued by Pukui and Elbert (1986) and Pukui et al. (1974) with limited exceptions – spellings and diacritical marks are used as the original sources used them in quotations, titles, and proprietary names. English translations for Hawaiian words are derived from Pukui and Elbert (1986) unless otherwise specified.

Cover Image: *Rows of commercial coffee within the proposed project area (view to west).*

1.0 INTRODUCTION

At the request of Kaimana Environmental Solutions, LLC, Pacific Legacy, Inc. conducted a Literature Review and Field Inspection (LRFI) for the proposed Off-Site Water System Improvements Project for the Lima Ola Subdivision in ʻEleʻele, Hanapēpē Ahupuaʻa, Kona Moku, Kauaʻi Island, TMK: (4) 2-1-001:027 (por.) (Figure 1 through Figure 3).

The purpose of this LRFI was to investigate previous land use of the proposed project area and to determine whether any undocumented historic properties exist in the proposed project area. The work was also designed to facilitate historic preservation review by the State Historic Preservation Division (SHPD) under Hawaiʻi Revised Statutes (HRS) Chapter 6E.

1.1 METHODS & SCOPE

The background research conducted for this LRFI involved a review of historical documents, historical maps and aerial photographs, and reference materials. Relevant archaeological reports were obtained from the SHPD library. Historical maps were obtained from the Hawaiʻi State Department of Accounting and General Services (DAGS) and Pacific Legacy's internal database. Online sources of information included the United States Department of Agriculture (USDA), the Office of Hawaiian Affairs' (OHA) Kīpuka and Papakilo Databases, Ancestral Visions of ʻĀina (AVA) Konohiki, and Waihona ʻAina.

In addition to background research, Pacific Legacy, Inc. conducted a one-day field inspection on February 16, 2024. The inspection was conducted by Pacific Legacy archaeologists Ena Sroat, B.A., and Emmaline Irvine, M.A., under the overall supervision of Mara Mulrooney, Ph.D. (Principal Investigator). The field inspection consisted of a reconnaissance pedestrian survey and photo documentation of the proposed project area.

1.2 PROJECT BACKGROUND

The proposed Off-Site Water System Improvements Project will provide increased water capacity for the Lima Ola Subdivision. The Lima Ola Subdivision is located along the south side of Kaumualiʻi Highway within the *ʻili* (land division) of ʻEleʻele. It was developed between 2020 and 2024 as part of the County of Kauaʻi's Lima Ola Workforce Housing Development Project, envisioned to provide affordable housing units of both single-family and multi-family homes to working families and seniors. An Environmental Assessment (EA) was prepared for the Lima Ola Workforce Housing Development Project in 2016. The EA included a Cultural Impact Assessment (CIA) (Dagher and Spear 2014) and an Archaeological Inventory Survey (AIS) (Powell and Dega 2017).

The proposed project area is located approximately 230 m (755 ft) northeast of the Lima Ola Subdivision along the south side of Kaumualiʻi Highway on a portion of a parcel currently owned by the Kauai Coffee Company. The project will entail the installation of a new 0.3 MG (million gallon) 402' water storage tank immediately northeast of an existing 0.2 MG 402' water storage tank, substantially increasing the water supply capacity for the subdivision. Installation of the new tank will necessitate a 18,700-sq. ft expansion to the northeast of the land parcel containing the current water tank (Figure 4).

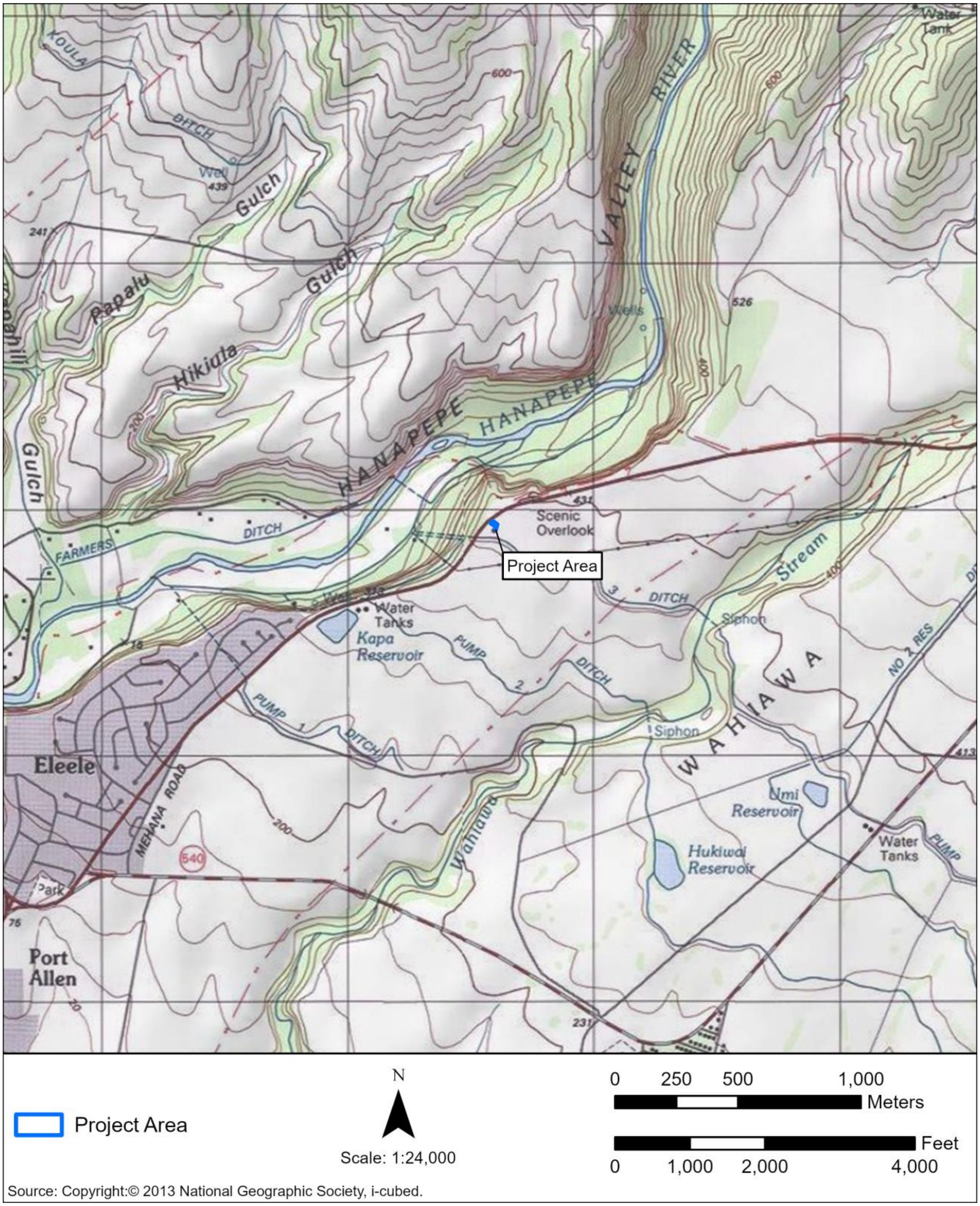

Figure 1. Location of the proposed Off-Site Water System Improvements Project Area, ‘Ele‘ele, Hanapēpē Ahupua‘a (base map: National Geographic Society 2013).

Figure 2. Location of the proposed Off-Site Water System Improvements Project Area (base map: Esri World Imagery 2021).

Figure 3. Location of the proposed Off-Site Water System Improvements Project Area within TMK: (4) 2-1-001:027 (source: State of Hawaiʻi, Department of Accounting and General Services, Land Survey Division, Esri World Imagery 2021).

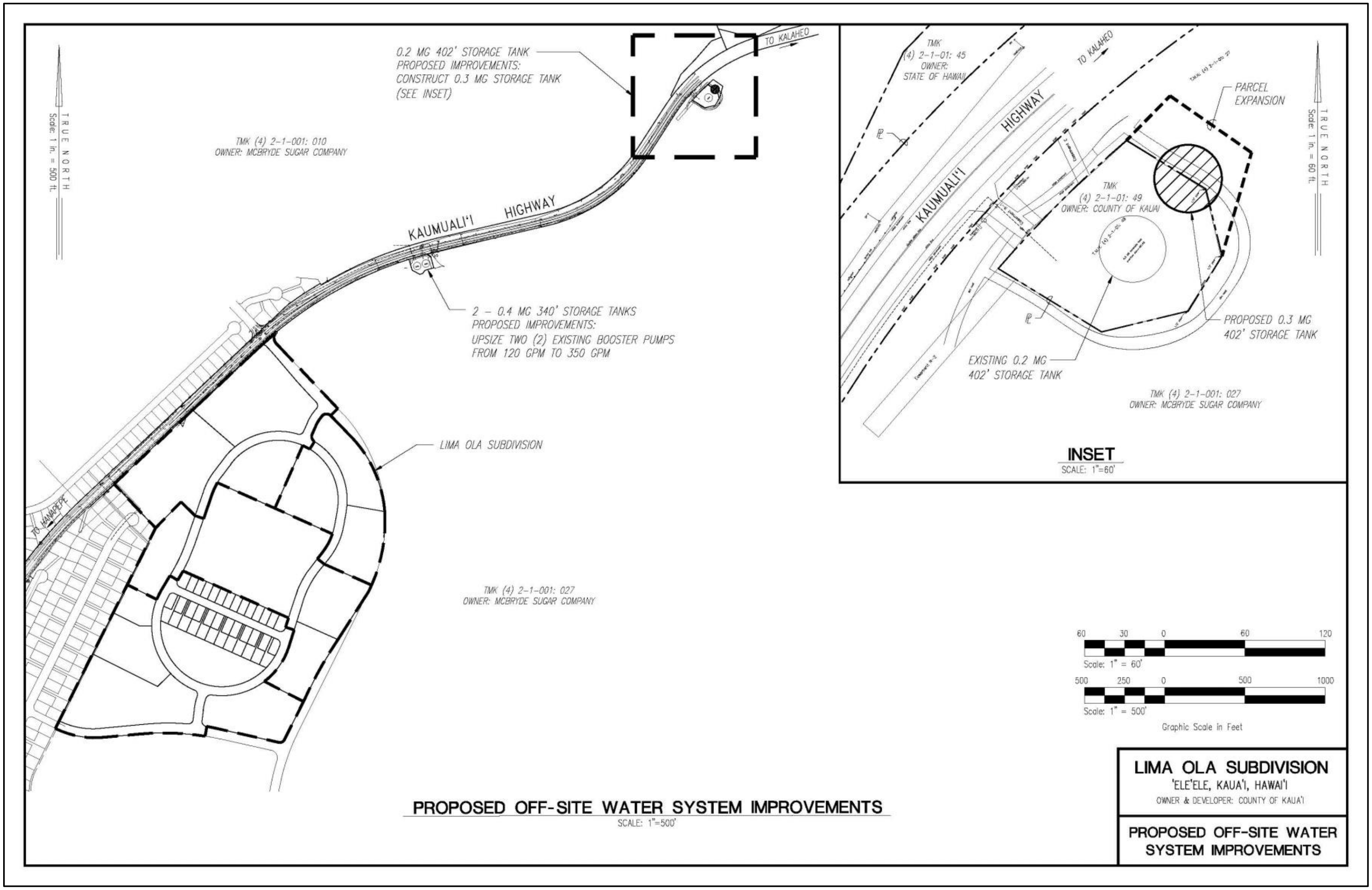

Figure 4. Site plans for the proposed Off-Site Water System Improvements Project (courtesy of Kaimana Environmental Solutions, LLC, 2024).

1.3 PROJECT LOCATION AND ENVIRONMENT

The proposed project area is located on the south side of the island of Kauaʻi within the *ahupuaʻa* (land division) of Hanapēpē within the *moku* (island district) of Kona. It is situated on the *makai* (ocean) side of Kaumualiʻi Highway approximately 230 m northeast of the Lima Ola Subdivision.

The proposed project area topography consists of a gently sloping plain flanked on the north by a *pali* (cliff) that drops to the Hanapēpē Valley floor and Hanapēpē River, and on the south by a gulch containing Wahiawa Stream. These freshwater resources are largely fed by rainfall within the mountain interior of the island (ca. 9989 millimeters [mm], or 393 in., per year). The proposed project area receives only roughly 925 mm (36 in.) of rainfall per year, with the driest months consisting of April through September (1.59–2.45 in. per month) and the wettest months consisting of October through March (3.66–4.84 in. per month) (Giambelluca et al. 2013).

According to the U.S. Department of Agriculture (USDA) Soil Survey for Kauaʻi and the State of Hawaiʻi's Natural Resources Conservation Service (NRCS), the soils within the proposed project area consist of Makaweli silty clay loam, 0 to 6 percent slopes (MgB) (Figure 5). Makaweli silty clay loam is found on hill slopes and is considered "Prime farmland if irrigated" (USDA Web Soil Survey 2022, MgB:1).

Vegetation observed in the proposed project area includes non-native grasses and weeds as well as coffee (Rubiacae) trees associated with the Kauai Coffee Company. Native plant species are absent within the proposed project area surroundings due to post-Contact land alterations for previous sugar cane production.

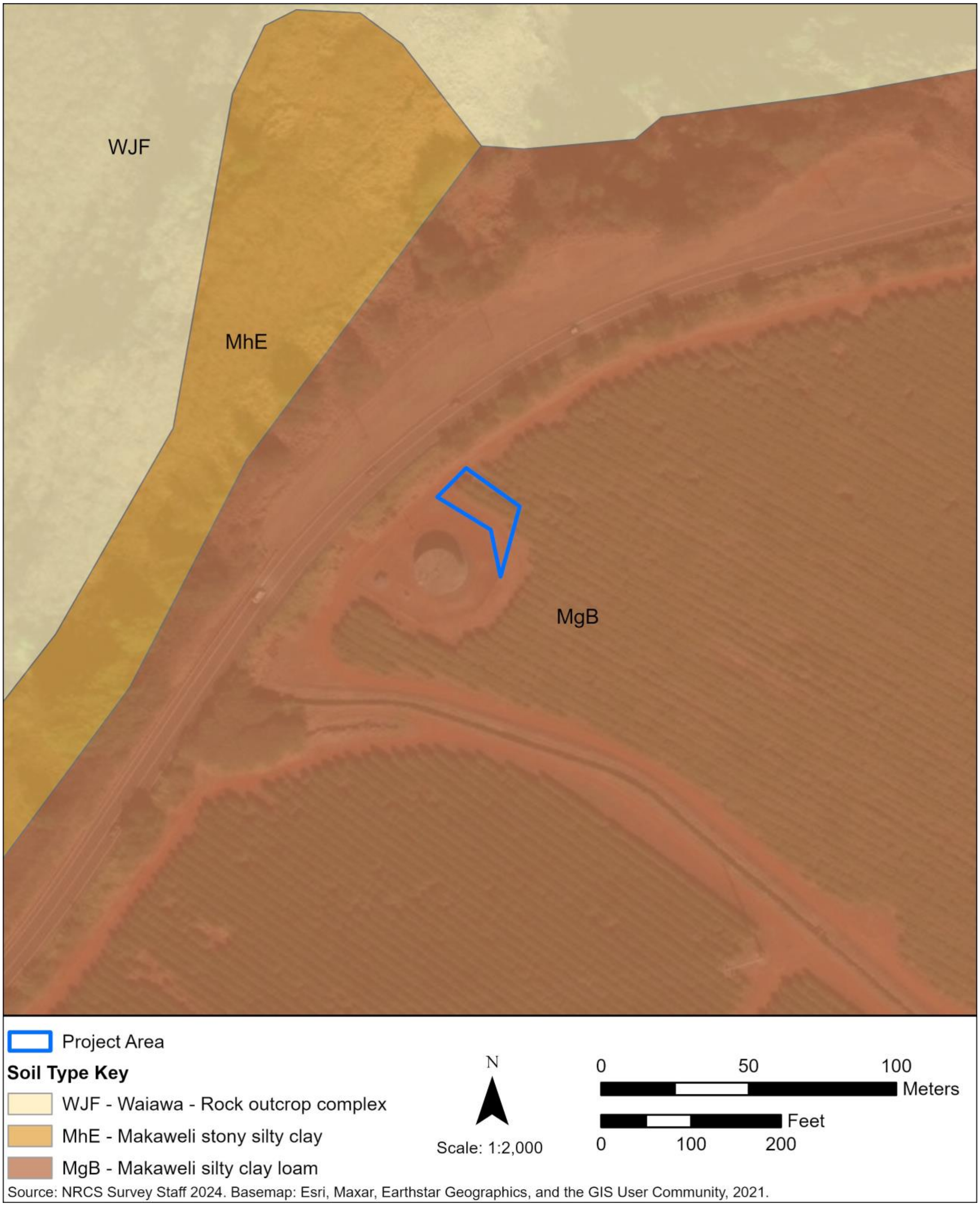

Figure 5. Map of soil types within the vicinity of the proposed Off-Site Water System Improvements Project Area (data from Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture 2024).

2.0 BACKGROUND RESEARCH

The proposed project area is located within the *ʻili* (smaller land division, often within an *ahupuaʻa*) of ʻEleʻele, within Hanapēpē Ahupuaʻa in the *moku* of Kona on the south side of Kauaʻi. Hanapēpē Ahupuaʻa is centrally situated within Kona Moku and is bounded by Wahiawa Ahupuaʻa on the east and Makaweli Ahupuaʻa on the west.

Hanapēpē Ahupuaʻa encompasses the entire length of the Hanapēpē River, the third longest river on the island. The waters of Hanapēpē River originate on Kawaikini, the highest peak of Mount Waiʻaleʻale, and empty into Hanapēpē Bay. The copious fresh water flowing from the summit and numerous side valleys forms a series of great waterfalls interspersed with flatter regions and bracketed by steep *pali*. This resource of fresh water along with rich alluvial soils provided optimal conditions for the cultivation of wetland *kalo* (taro; *Colocasia esculenta*), the staple Hawaiian food crop.

In 1824, Reverend Hiram Bingham visited the island of Kauaʻi and described the lush and cultivated setting of Hanapēpē:

> For the first half mile from the sea, the valley seems sterile, and is little cultivated, but has a pleasant grove of cocoanut trees. The rest of the valley, more fertile and more cultivated, is sprinkled with trees and shrubs, embracing a few orange trees, and being walled up on the east and west by bold, precipitous bluffs, rising higher and higher towards the mountains, from fifty feet to fifteen hundred, appears from one of the *palis*, like an extensive, well-watered plantation, interspersed with *kalo* beds and one hundred and forty cottages, and furnishes employment and sustenance to some seven hundred inhabitants. (Bingham 1847:219)

According to E.S. Craighill and Elizabeth Green Handy, who travelled throughout the Hawaiian Islands and studied Hawaiian agricultural practices in the mid-twentieth century:

> Next to Waimea, Hanapepe Valley must in ancient times have supported the largest population in the *kona* section. It is a magnificent steep-walled valley winding far into the uplands, but flatlands along the large streams offer ideal locations for wet taro for six miles or more inland…Bennett, who explored Hanapepe for some distance inland, reports that "the taro terraces are everywhere that the land is irrigable." (Handy and Handy 1972:429)
>
> In 1964 we were able to explore the whole length of Hanapepe Valley, which is about nine miles long, from its mouth to the waterfall at the head. As far in as seven miles, every level area along the rushing stream showed traces of old *loʻi* and house sites. The steep sides of the small gulches and valleys down which little streams cascade, were, wherever we examined them, built up with tier upon tier of stone-faced *loʻi*, some of them with walls five or more feet high. *Auwai* tapped the streams above the highest *loʻi* and the water then ran down over successive stepped terraces. (Handy and Handy 1972:431)

The *ʻili* of ʻEleʻele, literally translated as "black" (Pukui et al. 1974:27), is located along the eastern side of Hanapēpē Ahupuaʻa (Figure 6 through Figure 11). It encompasses a portion of the Hanapēpē River coastal floodplain, zigzagging from the eastern bank to the western bank and back, the cliffs along the eastern edge of the river, and the dry plateau on the eastern boundary with Wahiawa Ahupuaʻa (see Figure 11).

According to an 1872 survey (see Figure 6) and associated 1873 petition to define the boundaries of ʻEleʻele by John Dominis on behalf of the recently deceased King Kamehameha V (Lot Kapuāiwa), the *ʻili* was demarcated by several prominent landmarks:

> Commences at a rocky point on the sea shore at the junction of Kuiloa [ʻIli] Boundary and called Kupuhili, and thence mauka along the Hanapepe river and Boundary of Kuiloa to a place on the river bank called Palemo. Thence turning East to an old Auwai that formerly led to a fish pond Kualaau. Thence through rice fields to a hole in the side of the Pale [*pali*] called Nihouana. Thence up in a straight line to top of ridge and mauka along ridge to Kaneohia. Thence continuing along top of ridge and pale [*pali*] to opposite and down to a large hole in side of cliff called Heana. Thence to an old Heau [*heiau*] where the Boundary again joins the Mauka or NE corner of Kuiloa at a place called Kaluea where there is a large Pride of India tree. Thence across the Hanapepe river to Hailiili. Thence up along the old bed of river to loi [*loʻi*] Puuhau. Thence to Kuhuna. Thence to ridge of stones across river called Waipa. Thence to head of auwai of Eleele at a place called Akeahi. Thence up face of high cliff to top of ridge and along ridge and pale [*pali*] to Rowells stone wall and following said stone wall to junction with the Boundary of Wahiawa. Thence makai along the Wahiawa Boundary in all its windings and turnings to a rocky point on the sea shore called Kenakua and then West along sea shore to Kupuhele the place of commencement. (Certificate of the Boundaries of the Land of Eleele, District of Waimea, Island of Kauai, as verified by the Fourth Judicial Circuit 1873; see Appendix A)

The proposed project area is located within the eastern, or upper plateau, portion of ʻEleʻele. This area was described in the informal notes of the 1872 land surveyor, Janus Gay, as "chiefly adapted for grazing purposes" and "very stony" (Gay 1873:4). This notation echoes an earlier description of the coastal plateau lands of southern Kauaʻi by Charles Wilkes of the United States Exploring Expedition, which visited the Hawaiian Islands annually during the years 1838-1842:

> The whole distance between Koloa and Waimea was found to be a series of sunburnt hills and barren plains, sloping gradually from the base of the mountains to the ocean, and now and then intersected with ravines, or, as they are called in the Hawaiian Islands, "gulches." Only a few coarse grasses are met with, quite unfit for pasture. (Wilkes 1845:64-65)

In 1824, the dry plains of ʻEleʻele were the site of an uprising of Kauaʻi *aliʻi* (chiefs) led by George Humehume, son of the recently deceased Kaumualiʻi, the last independent *mōʻī* (ruler) of Kauaʻi. The Kauaʻi forces desired to restore the sovereignty of Kauaʻi Island, which had been absorbed into the Kingdom of Hawaiʻi under Kamehameha I in 1810:

> Fittingly, on the plains of ʻEleʻele, "black," the battle that ended the separate kingdom of Kauaʻi was fought. On one side were the Kauaʻi chiefs still loyal to their dead king Kaumualiʻi, armed with wooden war clubs, spears, daggers, and slings. Opposite them were the Kamehameha forces armed with rifles and cannon. In August 1824 the two armies fought. The Kauaʻi army was destroyed, and for two weeks before amnesty was declared the Kamehameha forces sought out all the *aliʻi* they could find and killed them–men, women, and children. (Bingham 1847, as paraphrased in Wichman 1998:30)

During the 1848 Mahele instituted by King Kamehameha III (Kauikeaouli), wherein traditional Hawaiian land tenure was converted to property ownership based on Western legal principles, the *ahupuaʻa* of Hanapēpē was claimed by Kamehameha III. However, the *ʻili* of ʻEleʻele, which constituted an *ʻili kūpono* (an *ʻili* independent of the *ahupuaʻa* in which it is situated), was awarded to Mataio Kekūanaōʻa as Land Commission Award (LCA) 7712, *ʻāpana* (parcel) 5. Kekūanaōʻa was a high chief of Hawaiʻi Island and third husband of Kīnaʻu, a daughter of Kamehameha I by Kaheiheimālie (Hammatt 1990:7). Upon his death in 1868, ʻEleʻele passed to his son, Kamehameha V.

Between ca. 1863 and 1873, the *ʻili* of ʻEleʻele was leased by Valdemar Knudsen (Interior Department 1873; memo available on Papakilo Database). Knudsen, a Norwegian, settled at Waiawa, Kauaʻi in 1856 and became a prominent rancher and sugar plantation entrepreneur with multiple leases of land, totaling approximately 100,000 acres, across southern Kauaʻi (Greipsland 2016).

In 1884, Bernice Pauahi Bishop, heiress of the Kamehameha lands across the archipelago, sold the *ʻili* of ʻEleʻele to August Dreier and Elizabeth McBryde. Dreier, a German engineer, settled on Kauaʻi in 1866. After working at the Lihue Plantation, he transferred his knowledge to opening a sugar venture in Kōloa and eventually the establishment of the ʻEleʻele Plantation, with 50% split ownership (Young 2023). Elizabeth McBryde was the widow of Duncan McBryde, a Scotsman, who in 1874 had established a large ranch in Wahiawa Ahupuaʻa. By 1889, ʻEleʻele Plantation produced an estimated crop value of $200,000, which was comparable to the outputs of Grove Farm Plantation and Kekaha Sugar Mill, also located on the south coast of Kauaʻi (Thrum 1889:29).

In 1889, McBryde Sugar Company was formed by the merger of ʻEleʻele Plantation, the McBryde ranch, and Koloa Agricultural Company (Dorrance 2000:36; Soboleski 2023). In 1899, through a series of legal transactions, Walter Dillingham gained control of the lands stretching from ʻEleʻele to Kōloa and intensified the agricultural infrastructure for cane production (see Figure 9 and Figure 10). In 1909, the operation was acquired by Alexander and Baldwin Corporation (Sandison 1956 in Dagher and Spear 2014:16-17).

Twentieth-century sugar cane production in ʻEleʻele involved massive land clearance and the installation of a vast irrigation system, including the creation of reservoirs, water ditches, and piping, as well as a power line system originating from a hydroelectric plant constructed in 1906 in Wainiha Valley. In order to transport the cane and necessary machinery, the harbor of ʻEleʻele, known as ʻEleʻele Landing until 1950 when it was renamed Port Allen, was greatly expanded and upgraded, including the dredging of the harbor and the construction of a pier and breakwater in 1939. Rail infrastructure constructed by the Kauaʻi Railway Company connected Port Allen with various plantation locations (Stroup 1950:35; Soboleski 2023).

Twentieth-century world events brought many difficulties to the Hawaiʻi sugar industry with the outbreak of World Wars I and II and resultant labor shortages, along with other economic and political transformations. Following Hurricane Iwa in 1982, the McBryde Sugar Company began to diversify its crops, planting macadamia and coffee trees in addition to sugar cane. Hurricane Iniki in 1992 inflicted devastating losses across the island of Kauaʻi, including the sugar cane fields of the McBryde Sugar Company. In 1996, the McBryde Sugar Company closed down. Today, these plantation lands are cultivated by the Kauai Coffee Company (Kauai Coffee 2019).

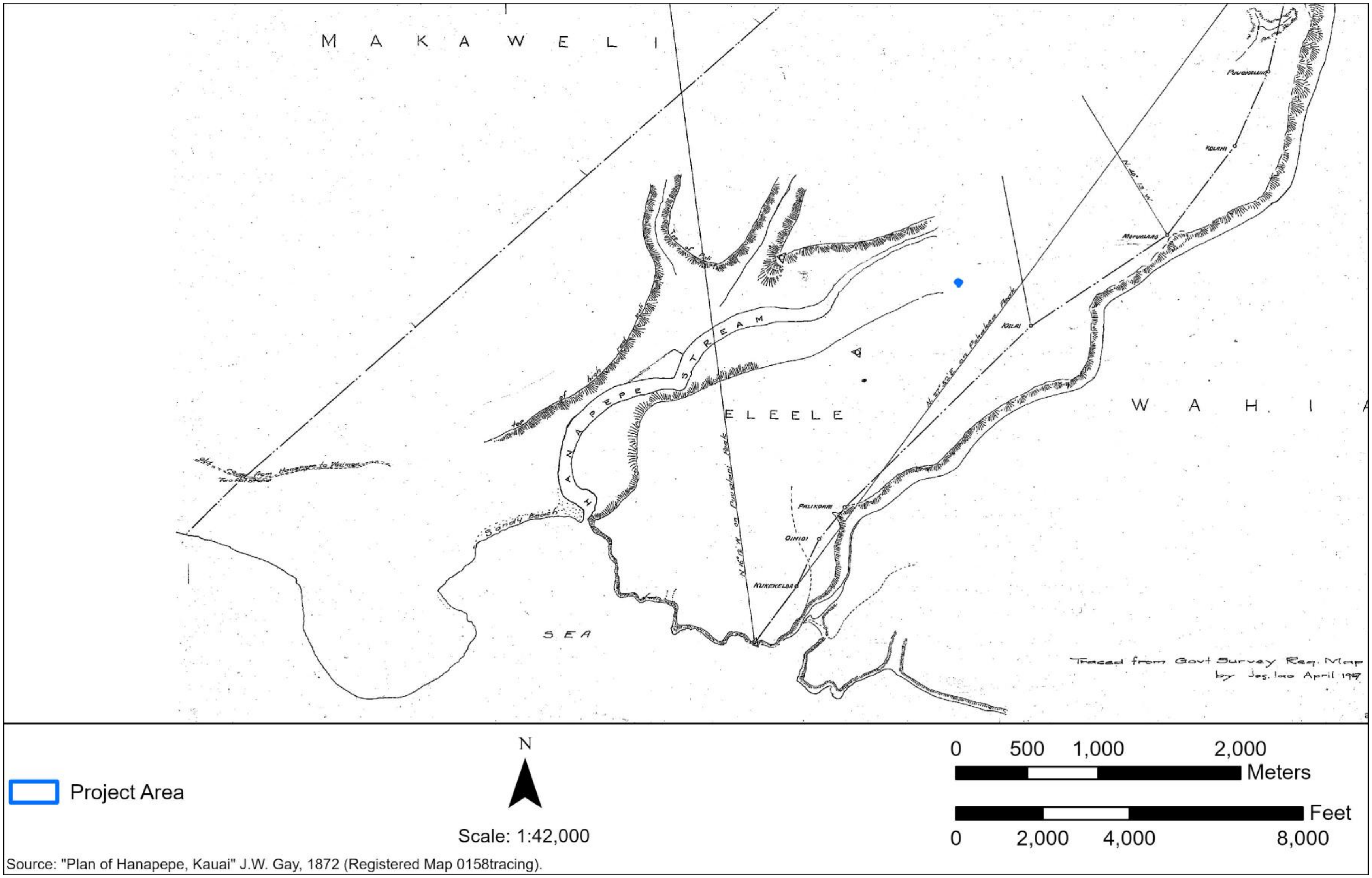

Figure 6. 1872 map of Hanapēpē Valley (portion) by J.W. Gay, showing the proposed Off-Site Water System Improvements Project Area within ʻEleʻele.

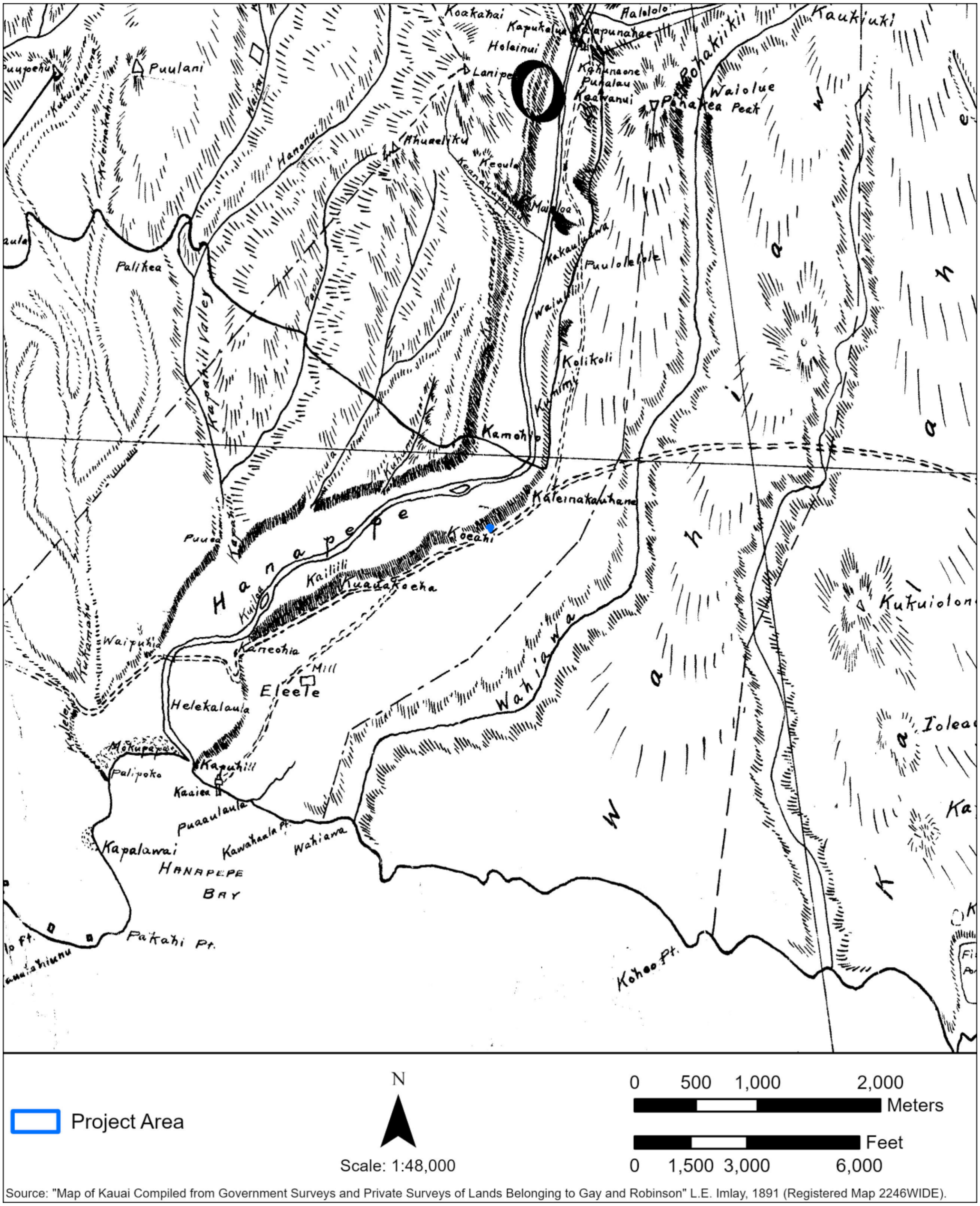

Figure 7. 1891 map of Kaua'i Island (portion) by L.E. Imlay, showing the proposed Off-Site Water System Improvements Project Area located on the plain of 'Ele'ele near the Hanapēpē Valley escarpment and *mauka* of a place named "Koeahi."

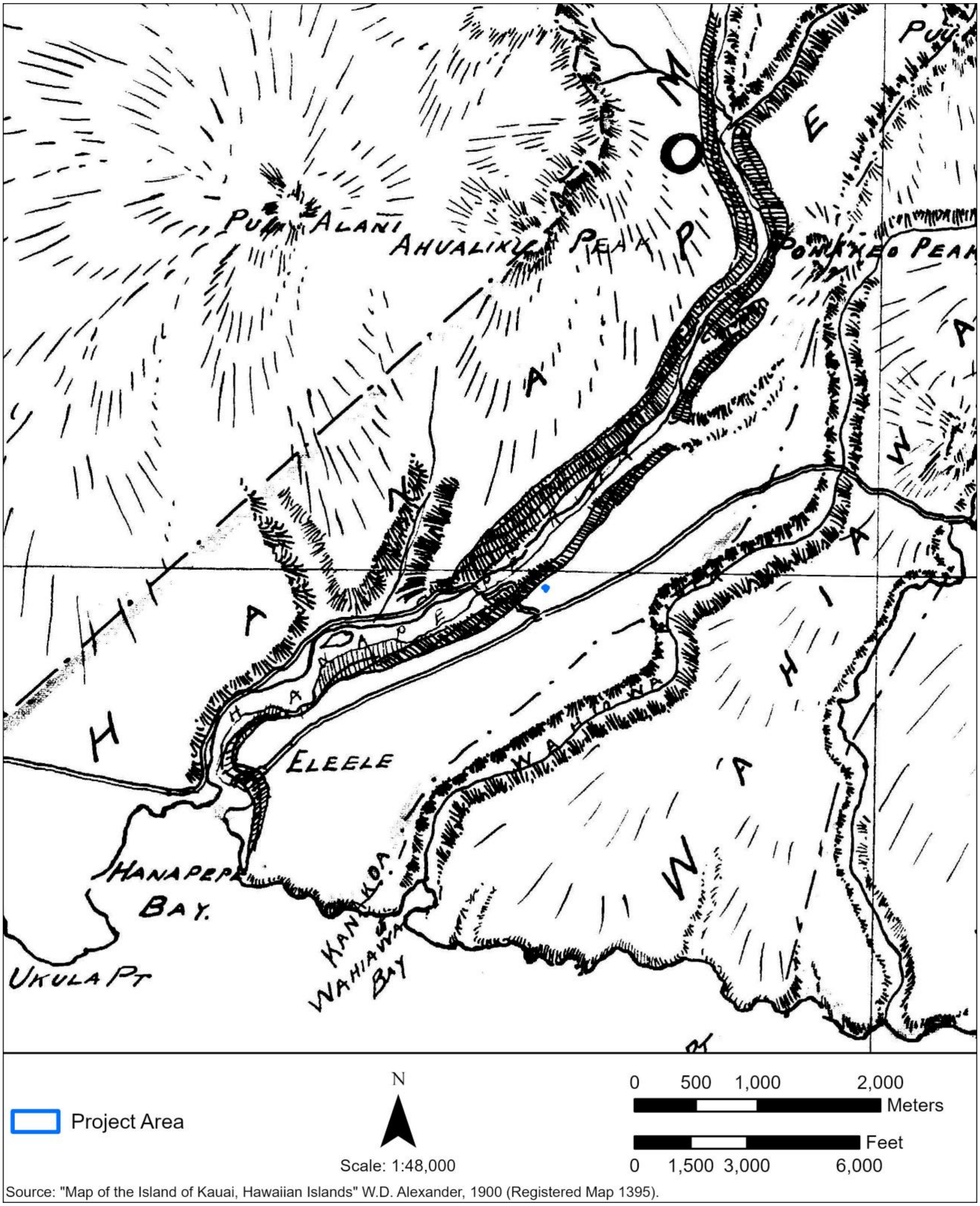

Figure 8. 1900 map of Kauaʻi Island (portion) by F.E. Harvey, showing the proposed Off-Site Water System Improvements Project Area located on the plain of ʻEleʻele near the Hanapēpē Valley escarpment.

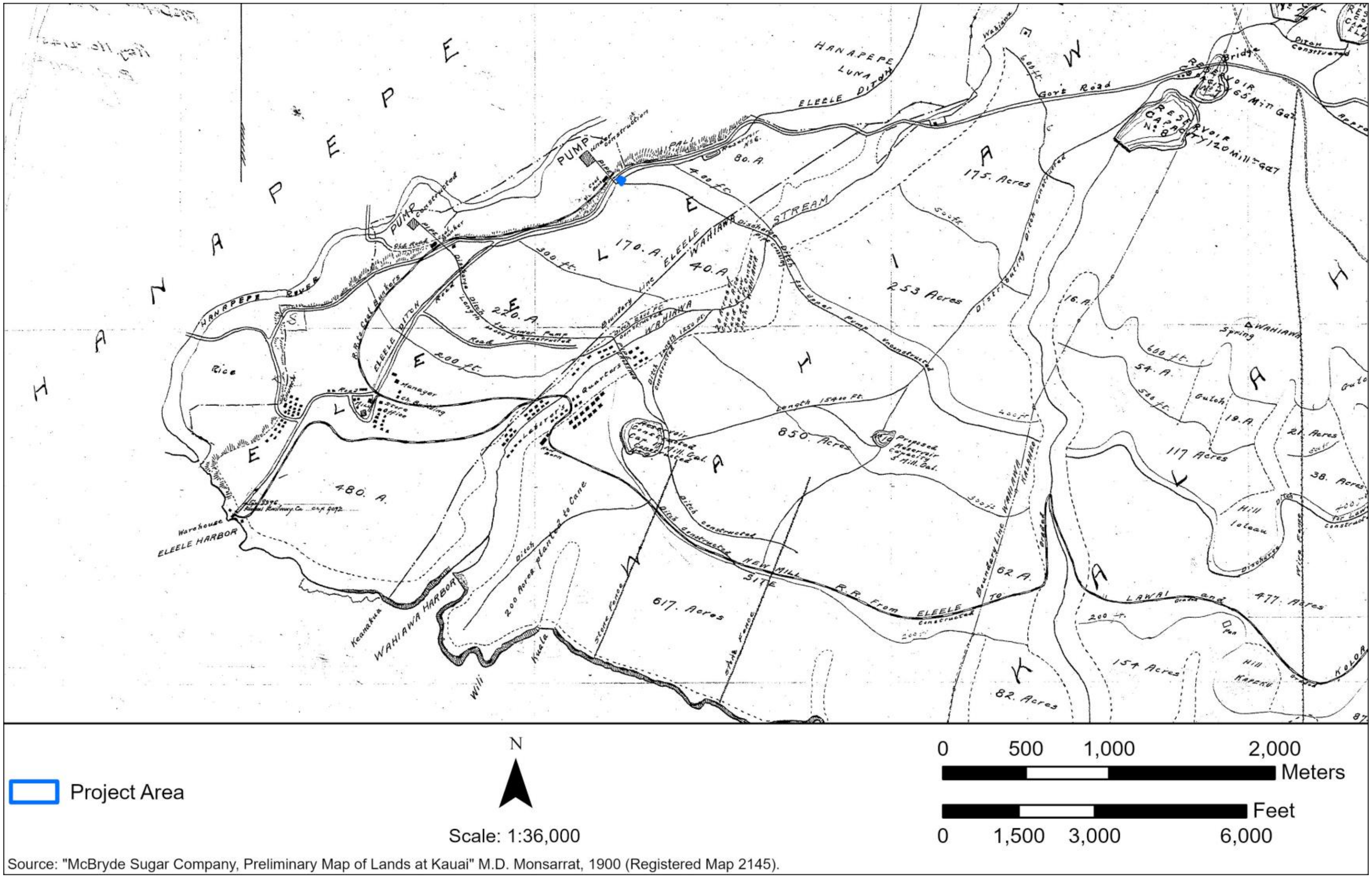

Figure 9. 1900 map of the McBryde Sugar Company land holdings (portion) by M.D. Monsarrat, showing the proposed Off-Site Water System Improvements Project Area within the plain of ʻEleʻele and a network of irrigation ditches, including the *mauka-makai* oriented ʻEleʻele Ditch.

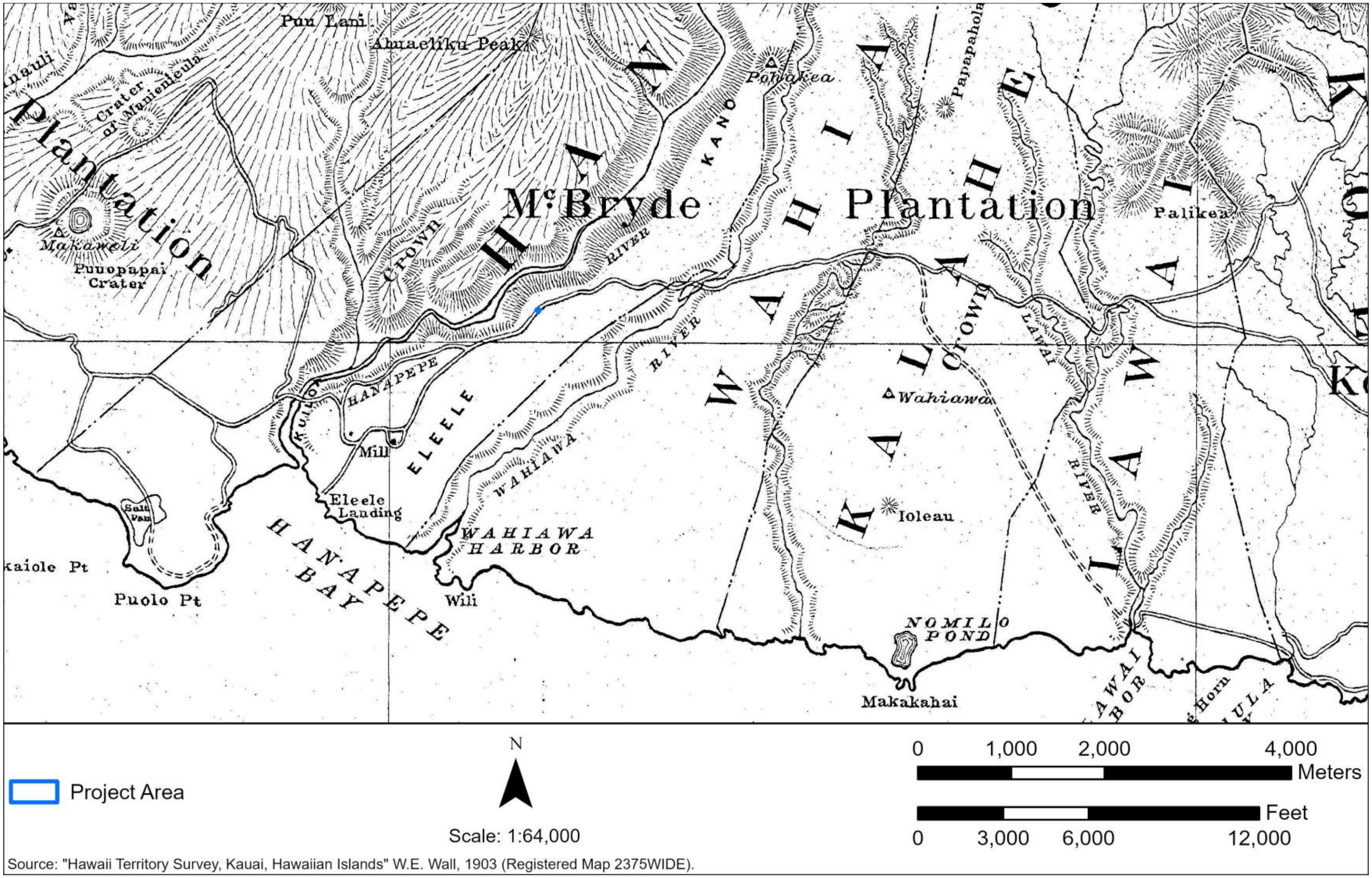

Figure 10. 1903 map of Kauaʻi Island (portion) by W.E. Wall, showing the proposed Off-Site Water System Improvements Project Area within the western portion of the McBryde Plantation and along a major roadway.

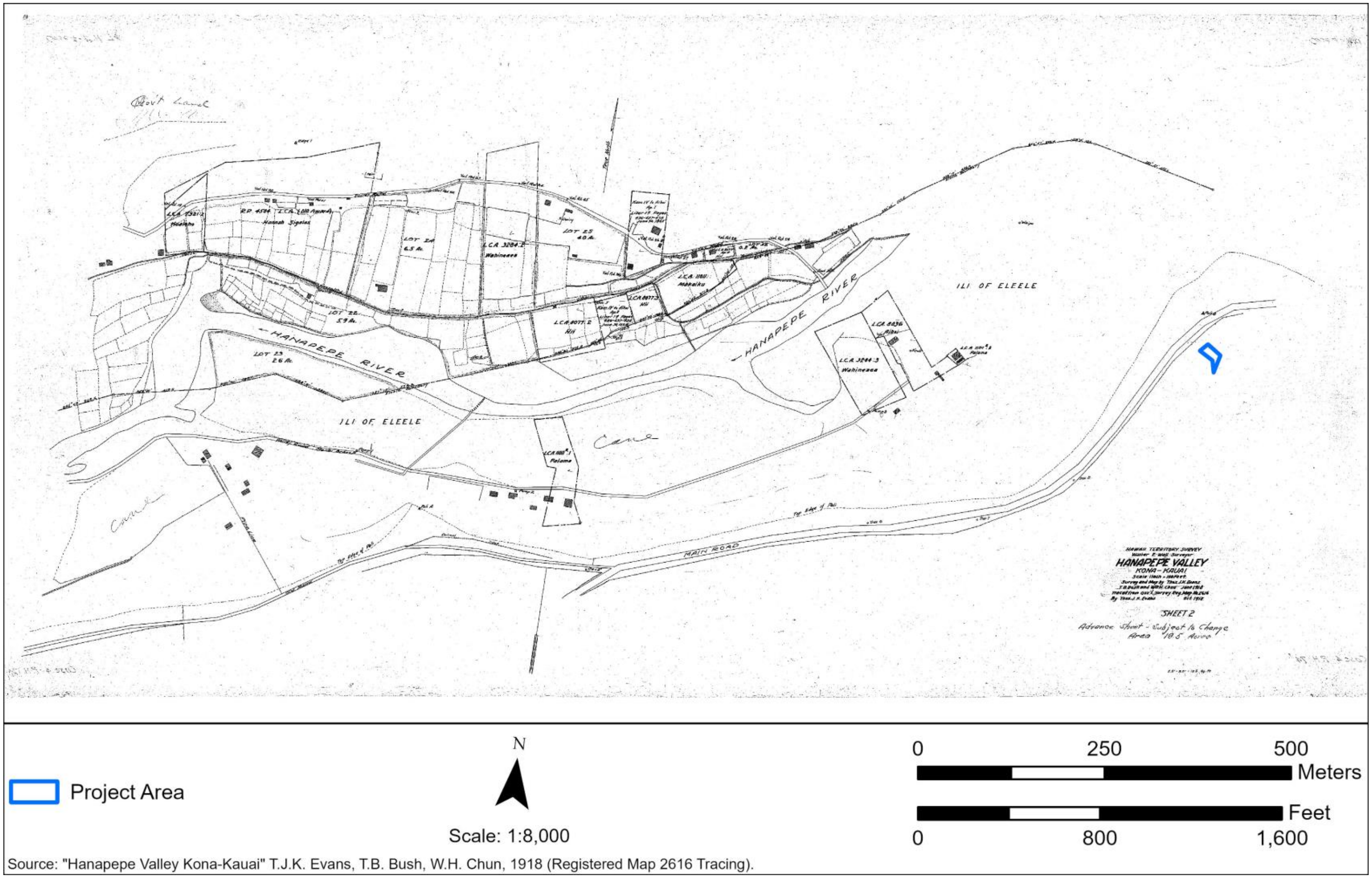

Figure 11. 1918 map of Hanapēpē Valley (portion) by T.J.K. Evans et al., showing the boundary of ‘Ele‘ele ‘Ili crossing the Hanapēpē River multiple times before turning east to ascend up the valley escarpment; the proposed Off-Site Water System Improvements Project Area is located atop the cliff on the south side of the “MAIN ROAD.”

3.0 PREVIOUS ARCHAEOLOGY

A number of previous archaeological investigations have been conducted within a 1-mile (1.6 km) radius of the proposed Off-Site Water System Improvements Project Area (Figure 12, Table 1). These studies are summarized below. The locations of documented historic properties are depicted on Figure 13 and the historic property types are presented within Table 2.

The earliest archaeological investigation of Kauaʻi Island was undertaken between 1928 and 1929 by Wendell Bennett (Bennett 1931). Bennett conducted nine months of fieldwork along with a study of Bernice Pauahi Bishop Museum resources, published literature, and various artifact collections. Of the 202 sites identified throughout Kauaʻi (Bennett 1931:98), 12 were located within Hanapēpē Ahupuaʻa. Of these, four were located within a 1-mile radius of the current proposed project area (Bennett 1931:113-115). Site 56 (SIHP 50-30-09-00056) consists of remnants of Akowai Heiau. Site 57 (SIHP 50-30-09-00057) consists of three stone-paved house sites in the area of Akowai Heiau. Site 60 (SIHP 50-30-09-00060) comprises the Hanapēpē Complex, a large area within Hanapēpē Valley containing a complex of taro terraces and house sites. Site 61 (SIHP 50-30-09-00061) is a complex of taro terraces, possible agricultural clearance walls, platform house sites, and possible burial caves and petroglyphs within Wahiawa Valley. No sites were noted within the upland plains of ʻEleʻele.

In 1960, Richard Pearson of the Bernice Pauahi Bishop Museum conducted a study of the extent of traditional Hawaiian taro agriculture in Hanapēpē Valley (Pearson 1962). The study included background research, a three-day reconnaissance survey, and four days of test excavations; the fieldwork crew included graduate students William Kikuchi and Richard Paglinawan. Excavations within terrace walls did not provide organic material for study. Based primarily on historical research, Pearson concluded that “Our material substantiated Bennett’s terse statement that every available corner of the valley was irrigated and in taro in aboriginal times” (Pearson 1962:12). The precise locations of the test excavations could not be determined from the available documentation.

In 1961, William Kikuchi and Richard Paglinawan conducted a three-week survey of the Kona coastline extending from Hanapēpē Bay through Mahaʻulepū Ahupuaʻa. This was followed by limited subsurface testing in 1963 (Kikuchi 1963). The survey identified and described a total of 108 sites, and described a small number of additional sites that they were unable to definitively locate. Within Hanapēpē Ahupuaʻa, two sites were located within a 1-mile radius of the current proposed project area (Kikuchi 1963:3). Site 1 (SIHP 50-30-09-03037) consists of burial caves with remnant wooden coffins located in the north *pali* of Hanapēpē Valley. Site 2 represents Akowai Heiau (SIHP 50-30-09-00056). Within Wahiawa Ahupuaʻa, five sites were located within a 1-mile radius of the current proposed project area (Kikuchi 1963:10-16). Site 8 (SIHP 50-30-09-03040) is a shelter cave containing midden and historic artifacts within the interior. Site 9 (SIHP 50-30-09-03041) consists of names of Hawaiian individuals pecked on the cliff walls on the exterior of Site 8. Site 10 (SIHP 50-30-09-03042) consists of petroglyph figures as well as pecked names, also located around Site 8. Site 11 (SIHP 50-30-09-03043) consists of two large boulders with petroglyph figures. Site 12 (SIHP 50-30-09-03044) is a grindstone located beside a stream bed. Site 13 (SIHP 50-30-09-03045) is a house site.

In 1990, Cultural Surveys Hawaiʻi, Inc. (CSH) conducted a one-day archaeological reconnaissance survey of 72 acres in ʻEleʻele (Hammatt 1990). The project area extended from Port Allen to 230 feet above sea level. The survey was limited to cane roads and young cane fields with good visibility. No historic properties were identified.

In 2003 and 2004, Scientific Consultant Services, Inc. (SCS) conducted archaeological monitoring for the Phase II Kauaʻi Rural Fiber Optic Duct Lines Project (Monahan and Powell 2005). The project corridor extended primarily along the Kaumualiʻi Highway right-of-way between Lihuʻe and Kekaha. They identified a total of 10 historic properties, including six historic bridges (SIHP 50-30-09-01043 through 50-30-09-01046, 50-30-09-03884, and 50-30-09-03885), two burials (SIHP 50-30-05-03880 and 50-30-05-03881), a subsurface cultural layer (SIHP 50-30-09-03882), and a subsurface road base (SIHP 50-30-11-03883). No historic properties were identified within ʻEleʻele.

In 2008, CSH carried out an archaeological inventory survey (AIS) for the 777-acre ʻEleʻele Urban Expansion Project (Tulchin and Hammatt 2008). They identified a total of 11 sites which could be affected by the proposed development, most of which related to plantation irrigation or transportation features (SIHP 50-30-09-00685 through 50-30-09-00695). Eight historic properties were documented within a 1-mile radius of the current proposed project area. The sites are associated with historic sugar plantation infrastructure and include a water reservoir (SIHP 50-30-09-00690), irrigation ditches (SIHP 50-30-09-00689, 50-30-09-00691, 50-30-09-00692, 50-30-09-00693, and 50-30-09-00694), a soil/rock mound (SIHP 50-30-09-00688), and a historic road (SIHP 50-30-09-00695). The current proposed project area is located just south of the SIHP -00693 irrigation ditch. All eight historic properties were assessed as significant under criterion d and recommended for no further work. However, a letter from SHPD dated August 19, 2008 in response to the AIS submittal indicated that the identified historic properties were also significant under criteria a and c in addition to criterion d (it is not apparent whether the AIS was revised to reflect this recommendation). SHPD recommended SIHP -00688 through -00691, -00693 and -00694 for data recovery. SIHP -00692 and -00695 were recommended for no further work.

In 2014, SCS carried out an AIS for the Lima Ola Workforce Housing Development Project (Powell and Dega 2017). The project area encompassed 78 acres of agricultural land to the south of the current proposed project area. Fieldwork included a 100% pedestrian survey and five backhoe test trenches. One historic-era irrigation ditch was recorded and designated SIHP 50-30-09-02219; this ditch corresponds with SIHP 50-30-09-00692 (Tulchin and Hammatt 2008). The ditch was constructed in 1908 as infrastructure for the McBryde Sugar Company and was known as the Pump 1 Ditch (Powell and Dega 2014:23). The excavations extended to maximum depths of 50-90 cm below surface and exposed a deposit of red silty clay to silty clay loam soil.

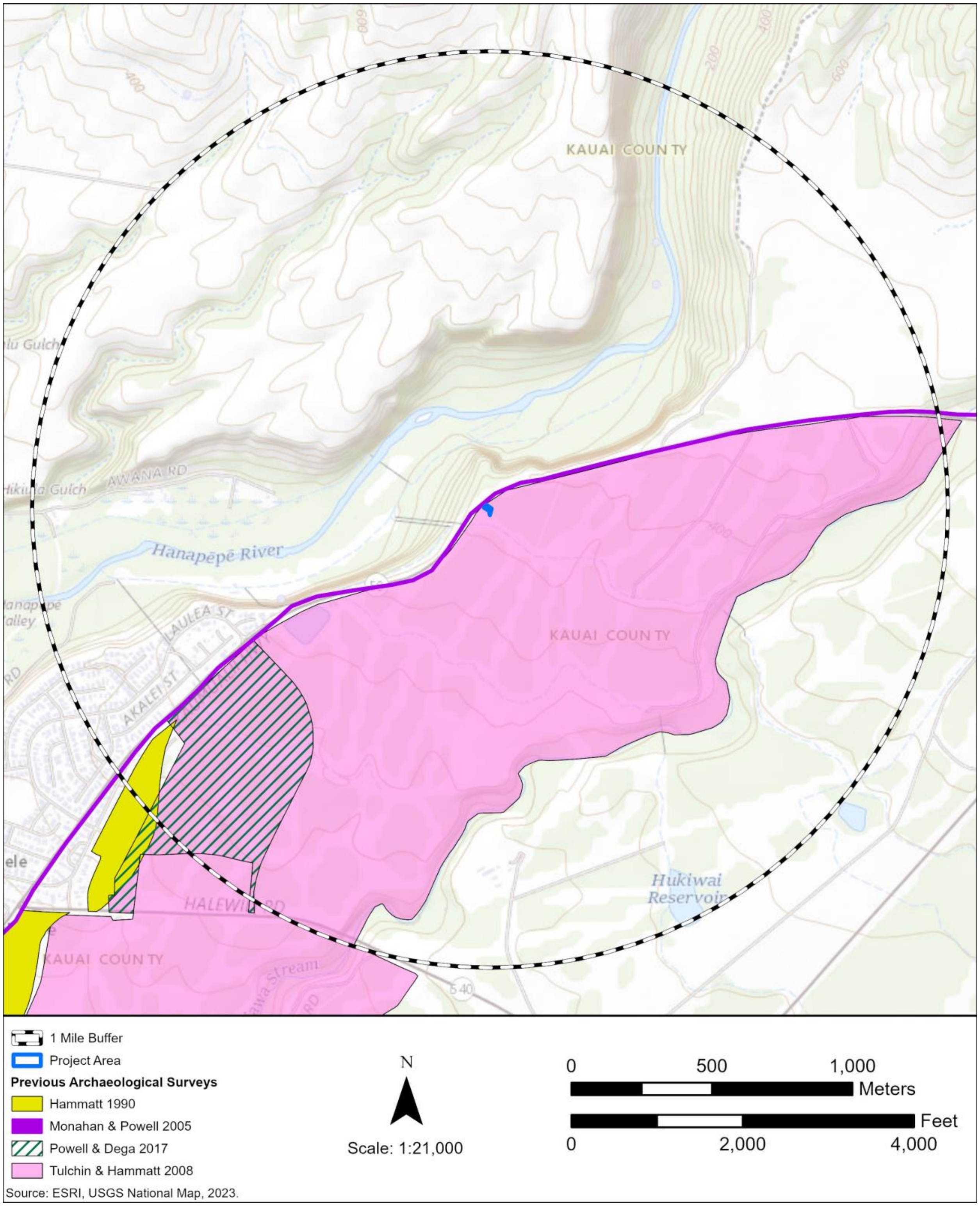

Figure 12. Previous archaeological investigations within a 1-mile radius of the proposed Off-Site Water System Improvements Project Area (base map: Esri World Imagery 2023).

Table 1. Previous Archaeological Studies within a 1-Mile Radius of the Proposed Off-Site Water System Improvements Project Area

Reference	Type of Study	Location	Findings (SIHP 50-30-09-)
Bennett 1931	Archaeological survey	Kauaʻi Island	Island-wide survey identified four historic properties within one mile of the proposed project area: Akowai Heiau (SIHP -00056); house sites at Akowai (SIHP -00057); the Hanapēpē Complex of agricultural terraces and habitation sites (SIHP -00060); and a complex of agricultural terraces, walls, and house sites in Wahiawa (SIHP -00061).
Pearson 1962	Historical research, archaeological reconnaissance survey, and limited testing	Hanapēpē Valley	Background research supported the hypothesis that all available land within Hanapēpē Valley was under cultivation during the late pre-Contact period. Excavations within terrace walls did not provide organic material for study.
Kikuchi 1963	Archaeological survey	Kona District: Hanapēpē Bay to Mahaʻulepū	District-wide survey. A total of 108 sites identified and described. Seven newly identified historic properties within one mile of the proposed project area: Site 1, burial caves (SIHP -03037); Site 8, a shelter cave (SIHP -03040); Site 9, petroglyph names (SIHP -03041); Sites 10 and 11, petroglyphs (SIHP -03042 and -03043); Site 12, a grindstone (SIHP -03044); and Site 13, a house site (SIHP -03045). The SHPD database groups Sites -03040 through -03042 into a complex (SIHP -03169). One previously documented historic property recorded: Site 2, Akowai Heiau (SIHP -00056).
Hammatt 1990	Archaeological reconnaissance survey	ʻEleʻele	Reconnaissance of 72 acres from sea level to 230 ft elevation; no historic properties identified.
Monahan & Powell 2005	Archaeological monitoring	Kaumualiʻi Hwy. rights-of-way and portions of Kuhio Hwy. and Moi Rd.	Identified 10 total historic properties. No historic properties identified within 1 mile of the proposed project area.
Tulchin & Hammatt 2008	Archaeological inventory survey	ʻEleʻele and Wahiawa	AIS of 777 acres. Identified 11 historic properties. Eight historic properties identified within one mile of the proposed project area: irrigation infrastructure (SIHP -00688 through -00694) and a historic road (SIHP -00695).

Reference	Type of Study	Location	Findings (SIHP 50-30-09-)
Powell & Dega 2017	Archaeological inventory survey	Lima Ola Housing	Survey included 5 test trenches. One historic property identified: an irrigation ditch associated with the McBryde Sugar Company (SIHP -02219; previously documented as SIHP -00692 by Tulchin & Hammatt in 2008).

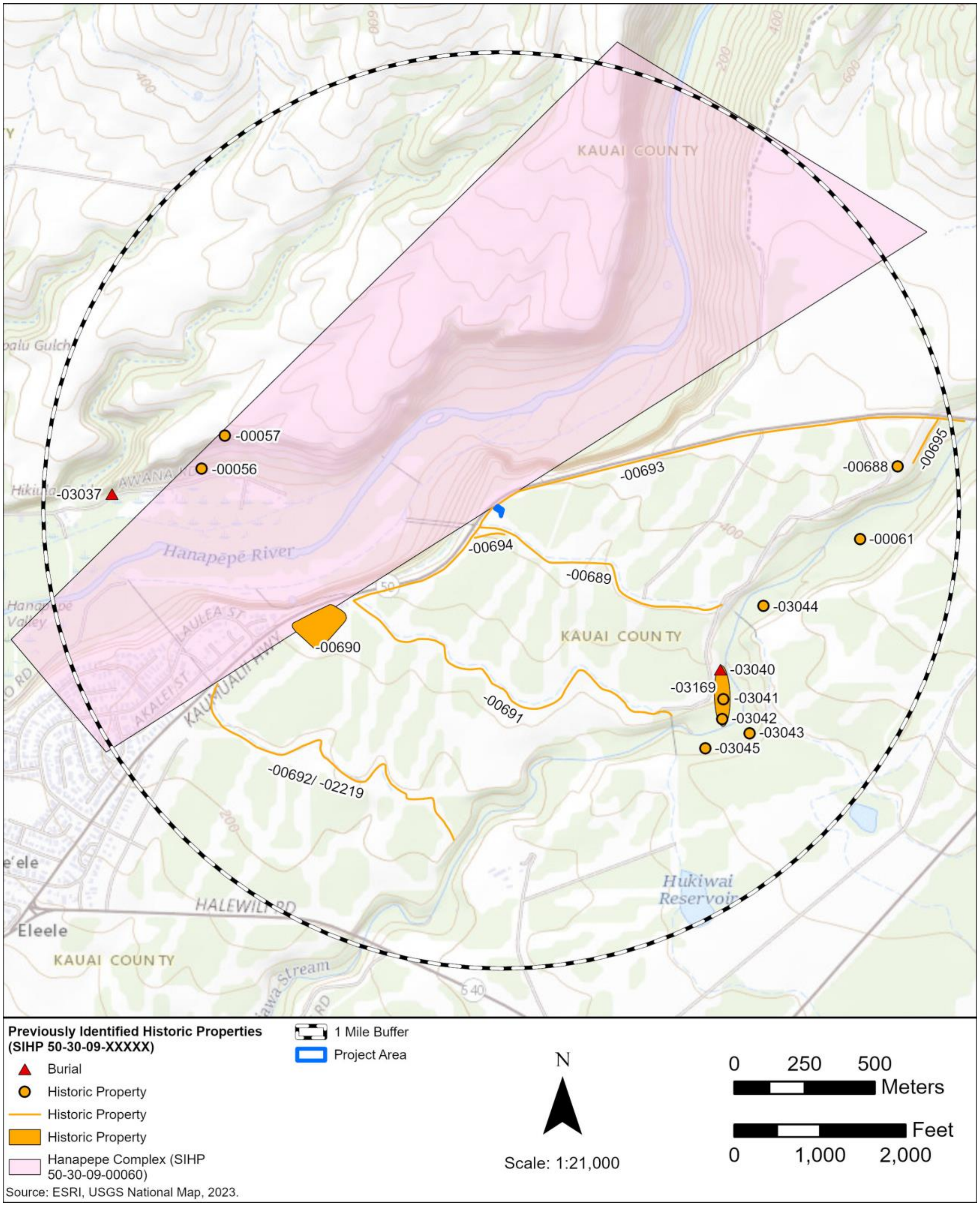

Figure 13. Previously identified historic properties within a 1-mile radius of the proposed Off-Site Water System Improvements Project Area (base map: Esri World Imagery 2023).

Table 2. Archaeological Historic Properties within a 1-Mile Radius of the proposed Off-Site Water System Improvements Project Area

SIHP Number (50-30-09)	Type	Function	Age	Significance	Mitigation Recommendation	Reference(s)
-00056	Akowai Heiau (Site 2 in Kikuchi 1963)	Ceremonial	Pre-Contact	None Provided	None Provided	Bennett 1931; Kikuchi 1963
-00057	House Sites at Akowai	Permanent Habitation	Pre-Contact	None Provided	None Provided	Bennett 1931
-00060	Hanapepe Complex	Agriculture/Habitation	Pre-Contact	None Provided	None Provided	Bennett 1931
-00061	Taro Terraces, Walls, Platforms	Agriculture/Habitation	Pre-Contact	None Provided	None Provided	Bennett 1931
-00688	Irrigation Infrastructure	Plantation Irrigation	Post-Contact	d	Data Recovery	Tulchin & Hammatt 2008
-00689	Irrigation Ditch	Plantation Irrigation	Post-Contact	d	Data Recovery	Tulchin & Hammatt 2008
-00690	Kapa Reservoir	Plantation Irrigation	Post-Contact	d	Data Recovery	Tulchin & Hammatt 2008
-00691	Irrigation Ditch	Plantation Irrigation	Post-Contact	d	Data Recovery	Tulchin & Hammatt 2008
-00692/-02219	Pump 1 Ditch	Plantation Irrigation	Post-Contact	d	No Further Work	Tulchin & Hammatt 2008; Powell & Dega 2017
-00693	Irrigation Ditch	Plantation Irrigation	Post-Contact	d	Data Recovery	Tulchin & Hammatt 2008
-00694	Irrigation Ditch	Plantation Irrigation	Post-Contact	d	Data Recovery	Tulchin & Hammatt 2008
-00695	Road	Transportation	Post-Contact	d	No Further Work	Tulchin & Hammatt 2008
-03037	Burial Caves (Site 1 in Kikuchi 1963)	Burial	Pre- to Post-Contact	None Provided	None Provided	Kikuchi 1963
-03040	Shelter Cave (Site 8 in Kikuchi 1963)	Habitation/Possible Burial	Pre- to Post-Contact	None Provided	None Provided	Kikuchi 1963
-03041	Petroglyph	Art/Symbolism	Post-Contact	None	None Provided	Kikuchi 1963

SIHP Number (50-30-09)	Type	Function	Age	Significance	Mitigation Recommendation	Reference(s)
	Names (Site 9 in Kikuchi 1963)			Provided		
-03042	Petroglyphs (Site 10 in Kikuchi 1963)	Art/Symbolism	Pre- to Post-Contact	None Provided	None Provided	Kikuchi 1963
-03043	Petroglyphs (Site 11 in Kikuchi 1963)	Art/Symbolism	Pre-Contact	None Provided	None Provided	Kikuchi 1963
-03044	Modified Stone (Site 12 in Kikuchi 1963)	Grindstone	Pre-Contact	None Provided	None Provided	Kikuchi 1963
-03045	House Site (Site 13 in Kikuchi 1963)	Habitation	Pre- to Post-Contact	None Provided	None Provided	Kikuchi 1963
-03169	Complex	Habitation/ Art/Symbolism/ Possible Burial	Pre-Contact	None Provided	None Provided	On File, SHPD

4.0 RESULTS OF FIELD INSPECTION

A field inspection of the proposed project area was conducted on February 16, 2024 by Ena Sroat, B.A., and Emmaline Irvine, M.A., under the supervision of Mara Mulrooney, Ph.D. (Principal Investigator). The field inspection consisted of a reconnaissance pedestrian survey conducted in parallel sweeps of the proposed project area. The field inspection did not identify any potential historic properties within the proposed project area. As such, field recordation entailed general photo-documentation of the proposed project area.

The pedestrian survey commenced along the southern boundary of the proposed project area within an open space on the north side of the fenced Lima Ola Subdivision water storage tank area (Figure 14, Figure 15). The survey then tracked between each of the six rows of coffee trees located within the proposed project area (Figure 16, Figure 17). The inspection identified only modern irrigation lines running along the bases or at mid-height of the coffee trees (Figure 18). No artifacts or sugar plantation infrastructure were observed within the proposed project area. An earthen ditch (SIHP 50-30-09-00693) and white PVC irrigation piping was observed outside of and to the northwest of the proposed project area, and a concrete ditch (SIHP 50-30-09-00689) was observed outside of and to the south of the proposed project area (Figure 19).

Figure 14. Photograph of the southern boundary of the proposed project area, bordering the Lima Ola Subdivision's existing water storage tank (view to southeast).

Figure 15. Photograph of the southern-most row of coffee trees within the proposed project area (view to north).

Figure 16. Photograph of cultivated rows of coffee within the central portion of the proposed project area (view to east).

Figure 17. Photograph of the northern-most row of coffee trees within the proposed project area (view to west).

Figure 18. Photograph of modern coffee plantation infrastructure consisting of black irrigation lines within the proposed project area (view to northeast).

Figure 19. Photograph of a concrete water ditch (SIHP 50-30-09-00689) located on the south side of the current water storage tank, outside of the proposed project area (view to west).

5.0 SUMMARY AND RECOMMENDATIONS

A literature review and field inspection were conducted for the proposed Off-Site Water System Improvements Project for the Lima Ola Subdivision in ʻEleʻele, Hanapēpē Ahupuaʻa, Kona Moku, Kauaʻi Island [TMK: (4) 2-1-001:027 (por.)]. The literature review consisted of a review of historical documents, historical maps and aerial photographs, and reference materials. A one-day archaeological field inspection was conducted on February 16, 2024.

This work was initiated to facilitate historic preservation review by SHPD, as mandated by HRS Chapter 6E, for a proposed 18,700-sq. ft expansion to the water tank storage area for the Lima Ola Subdivision and the installation of a new 0.3 MG 402' water storage tank.

The literature review found that the dry plateau area of ʻEleʻele, in which the proposed project area is located, lay outside of the habitation and agriculture locus of Hanapēpē, which was situated along Hanapēpē River. No cultural sites or resources were noted in this area in nineteenth-century written records or survey maps. Prior to the development of large-scale sugar plantations within ʻEleʻele in the late-nineteenth century, which continued until 1996, it was perhaps best known as the location of the last battle between the Kauaʻi *aliʻi*, in support of an independent Kauaʻi kingdom, and the Kamehameha dynasty.

The field inspection did not identify any potential historic properties within the proposed project area. Currently, the proposed project area is entirely under cultivation by the Kauai Coffee Company.

Based on the findings of the literature review and field inspection, no mitigation is recommended for the proposed project, as no subsurface historic properties or artifacts are expected to be encountered during project construction.

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APPENDIX A

1873 Survey of ‘Ele‘ele

NO. 16

CERTIFICATE OF BOUNDARIES

Land of: E L E E L E

District of: W A I M E A

Island of: K A U A I

****

Decision rendered: Nov. 25, 1873

By: Duncan McBryde
Commissioner of Boundaries
for the Island of Kauai.

****

Certificate of the Boundaries of the Land

Of Eleele District of Waimea Island of Kauai

COMMISSION OF BOUNDARIES

Fourth Judicial Circuit, Duncan McBryde, Esq., Commissioner.

In the Matter of the Boundaries of the Land of Eleele District of Waimea Island of Kauai

JUDGMENT.

An application to decide and certify the Boundaries of the Land of Eleele District of Waimea Island of Kauai having been filed with me on the 14 day of July 1873 by Jno O. Dominis Administrator of the Estate of His Late Majesty Kamehameha V in accordance with the provisions of an Act to facilitate the settlement of Boundaries, &c., approved on the 22d day of June, A. D. 1868; now, therefore, having duly received and heard all the testimony offered in reference to the said boundaries and having gone on the said land, at the request of James W. Gay and having endeavored otherwise to obtain all information possible to enable me to arrive at a just decision, which will more fully appear by reference to the records of this matter by me kept in Book No. 1, page 76, and it appearing to my satisfaction that the true, lawful and equitable boundaries, are as follows, viz: Commences at a rocky point on the sea shore at the junction of the Kuiloa Boundary and called Kupahile, and thence mauka along the Hanapepe river and Boundary of Kuiloa to a place on the river bank called Palemo, thence turning East to an old Auwai that formerly led to a fish pond Kualoau, thence through rice fields to a hole in the side of the Pali called Nihouana thence up in a straight line to top of ridge and mauka along ridge to Kanihea, thence continuing along top of ridge and pali to opposite and down to a large hole in side of cliff called Heana, Thence to an old Heiau where the Boundary again joins the Mauka or W.E. corner of Kuiloa at a place called Kalua where there is a large Pride of India tree. Thence across the Hanapepe river to Hailiili Thence up along the old bed of river to loi Puuhau, Thence to Kuhuna, Thence to ridge of stones across river called Waipa Thence to head of auwai of Elele at a place called Akeahi, Thence up face of high cliff to top of ridge and along ridge and pali to Rowells stone wall and following said stone wall to junction with the Boundary of Wahiawa Thence makai along the Wahiawa Boundary in all its windings and turnings to a rocky point on the sea shore called Kenakua and then West along sea shore to Kupouhele the place of commencement.

It is therefore adjudged and I do hereby decide and certify that the Boundaries of the said land are and hereafter shall be as hereinbefore set forth.

Dated at Wahiawa this ... day of ... A.D. 1873

Duncan McBryde
Commissioner of Boundaries
Fourth Judicial Circuit

Copy

Notes of Survey of the Land of Elecle, on the South East Corner of the Ahupuaa of Hanapepe

by

James W. Gay

The South East corner of this land commences at the S. West corner of Wahiawa at a place called Keanakua on the sea shore where the rock forms an arch through which the sea rushes. The boundary runs thence

N 27°: 48' E 2375 links to the centre of a pile of stones under which there is a kind of cave or tunnel. At 95 links on this line from the top of the cliff there is a seat and a long stone set into the ground and from whence the following places bear N 4°:43' E Ahualiku Peak △ on the Boundary of Hanapepe and Makaweli.

N 32°: 25' W on Puukapele N 16°: 12' W on Pualani Peak △

N 27°: 52' E on Pohakea Peak △ on the Boundary of Wahiawa and Hanapepe. The Boundary continued from 2375 (1567.5 ft.)

N 16°: 39' E 1847 (1219.0 ft) links to centre of large pile of stones. at 390 links on this line close to makai side of road there are three stones set into the ground thus --- on the line)

N 30°: 36' E 1410 (930.6 ft) links to place about 150 links from the top of the Pali (3) stones set into the ground thus ∴

N 36° 53' E 9035 (5963.1 ft) links to three stones set into the ground thus ∴ outside of old stone wall forming a kind of circle and in area about 1/4 acre, there is to the East a clump of Castor or Papipi bushes. thence

N 47°: 23' E 5676 (3746.2 ft) link to mauka side of Government road adjoining Mr. Rowell's land at stone fence which forms the N. East corner of this land. Thence following along stonewall see Bdy Com Bk

~~S 74°32'W 567~~ Links S 87°34'W 470 links thence 310.2

~~S 73°40'W 1232~~ " S 77°32'W 323 links thence 213.18

S 74°32'W 567 "

S 73°40'W 1232 "

N 77°32'W 1118 " to the top of pali or terrace which is the North West corner of this land and South West corner of Mr Rowell's. and from whence the following places bear

Ahuaiahu Peak △ N 26°56'W Puualani Peak △

N 52°27'W Pohakea Peak △ N 27°42'E. The Boundary runs thence

S 50°0'W 628 [414.3] links along top of terrace

S 22°37'W 368 [242.3] Links. Thence

S 37°49'W 1085 [716.1] "

S 70 33'W 1946 [1284.4] "

N 33°25'W 620 [409.2] " over on to the point & top of Keahi point.

The last five courses are along to top of the pali or terrace which is the boundary.

Returning to the place of commencement the boundary runs along the sea shore in a N.W. direction to a point on the East side of the Hanapepe Stream, at South corner of a Land called Kuiloa, the property of her Majesty Queen Kapiolani, from thence the boundary runs along the land of Kuiloa

N 65°41'W 826 links along Kuiloa. Thence

N 25°52'W 801 " " to side of Kuleana owned by Kearre and Kalea Kualaau - stone set into the ground here

N 48°21'E [190.08] 288 links along to corner of Kearre's Kuleana

N 81 20'E [1650.0] 2500 " crossing through rice plantation and up the face of pali and passing through cave called Kihouana to the top of the terrace. Thence along top of terrace

N 9°44'E [462.0] 700 Links

N 16°32'W [512.16] 776 "

W.F.E.H.

N 0° 3' W	699 [455.4] Links. At 727 [481.8] links on this line passes close
to two (2) tall stones. Thence	
N 21° 30' W	791 [515.06] links to the top of Kaneohia pali. Thence
N 82° 12' E	1115 [726.9] "
N 58° E	563 "
42° 30' E	1300 " along the top of pali. Thence
N 2° 14' W	1050 " passing down the face of pali and through
cave called Heana and across flat to the North corner of Kuiloa. Thence	
N 29° 29' W	462 [305.3] links crossing Hanapepe stream to its western
bank and mauka side of Govt. Road (there three stones thus ∴)	
N 57° E	407 [268.6] links crossing an Auwai, thence
N 70 24 E	636 [420] " " Hanapepe stream to its Eastern bank. Thence
N 60° 53' E	439 [290] "
~~S 84° 46' E~~	~~485~~ [320.3] "
N 62° 8 E	870 [574] " crossing Hanapepe stream to a point
where a small stream joins the main one. Thence	
N 61° 19' E	369 [243.9] links crossing small stream and on to bank.
N 59° 14 E	418 [276.3] " along bank and past place called Puukiawe
where a Tamarind and Mango tree are growing. Thence	
N 32° 21 E	62 [40.9] links along Kuaaina. Thence
N 51° 8 E	161 [106.7] " " "
~~N 51° 2' E~~	~~210~~ [139] " " "
S 77° 33 E	24 [15.8] " " "
N 41° 38 E	412 [272.3] " " "
N 16° 23 E	175 [115.3] " to bank of Auwai and called Kuhimu.
N 60° 37 E	538 [355.3] along " "
N 49° 25' E	447 [294.6] "
N 40° 58 E	269 [177.9] " " " " to Hanapepe stream and called Waipaa	

N 49° 10' E | 706 Links crossing Stream to its East bank
N 65° 50' E | 384 ^1436^ . along bank of Stream. Thence
N 82° 55' E | 156 ^103^ . along old bank of Stream
S 85° 12' E | 835 ^551.3^ , " " , Water course to foot of Beaka pali, and containing an area of Ten Hundred and Seventy One acres more or less.

This land is chiefly adapted for grazing purposes, it is very stony. There is in the valley a few acres here and there adapted and suitable for raising rice, but to no great extent.

There is somewhere here in this land a block owned by a native, but as the boundary has never been defined it is not possible to say to what extent.

I hereby certify that this is a correct survey of Eleele as shown by the Commissioner of Boundaries

James W. Gay
Surveyor

16 No. 8 #2.53
Eleele
Survey J. W. Gay

Notes of Survey of an Ili of Land
called Eleele situated in the Ahu-
puaa of Hanapepe District of Kona
Island of Kauai made for & an ac
of His Excellency M. Kekuanoa Governor
etc etc.

Commencing upon the sea at
the Pali called Kaioakaala at the
south westerly corner of the harbor
of Wahiawa & upon the top of said
Pali running from thence N 30
E. 167 Chains following the top
of the Pali which bounds the
valley of Wahiawa on the West to
a rock on the edge of said Pali
thence N 49 E 24 Chains along
the edge of said Pali to a rock
thence S 82 E 5. Chains passing
down the side of said Pali to a
rock which stands near the west
bank of Wahiawa River & upon the
south easterly corner of the land
held by the Am. Bd of Foreign Missions
in Hanapepe from thence N 11°
W. 3 25/100 Chains to the foot of the
Pali bounded by Kalo land held
by said Mission thence + N 27 E 2 Chains
along foot of said Pali bounded

+ N 10 E 5
chains along
foot of said
Pali bounded
by Kalo land
held by said
mission thence

by land held by said Mission thence N 51 E 8 55/100 Chain along foot of said Pali bounded by land held by said Mission thence N 61 E 10 50/100 Chain bounded by land held by said Mission to a stone wall thence N 89 W 5 Chain passing up the side of said pali bounded by a stone wall & land held by said Mission thence S 84 W 1 50/100 Chain bounded by a stone wall & land held by said Mission thence S 68 W 2 Chain bounded by a stone wall & land held by said Mission thence S 50 W 5 Chains bounded by stone wall & land held by said Mission thence S 32 W 4 50/100 Chains bounded by a stone wall & land held by said Mission thence S 73 W 15 50/100 Chain bounded by a stone wall & land held by said mission thence S 69 W 15 Chains bounded by a stone wall & land held by said mission thence N 82 W 11 50/100 Chains bounded by a stone wall & land held by said Mission to the edge of the Pali which bounds the valley of Hanapepe on the East thence S 40 W 12 Chain along the edge of said pali thence S 77 W 42 Chains along the edge of said pali to a high rocky cape in said pali thence N 77 W 20 50/100 Chains passing down the side of said pali & crossing the valley & river of Hanapepe to the foot of the pali bounding said valley on the West called Waipa thence S 35 W 21 Chains passing down the westerly side of said River to a Hau bush thence S 31' 80' W 21 50/100 Chains passing down the valley of Hanapepe to a certain rapids in the River of Hanapepe thence S 61° W 23 Chains passing down the valley of Hanapepe on the easterly side of said River to a stake thence S 70° W 9 Chains passing down the valley of Hanapepe to the foot of the pali bounding said valley on the East thence S 53° W 17 Chains along the foot of said pali thence S 84 W 13 Chains along foot of said pali & passing up to the top of the rocky point called Kane-ohia thence S 21° E 19 80/100 Chains along the edge of the pali called Kapalawai thence S 11° W 12 50/100 Chains along the edge of said pali thence S 54° W 19 Chains along the edge of said pali to the rocky point called Kupuhili upon the sea & at the easterly side of the mouth of Hanapepe River from thence following the Sea to point of commencement comprising an area of One Thousand Three Hundred & thirteen Acres Two Roads & sixteen Perches.

Kauai April 5. 52.

sig. W. H. Peake.

Copy of W. H. Pease
B'ng Survey –

Certificate of the Boundaries
of the
Land of Eleele,
District of Waimea,
Kauai.

Commission of Boundaries, Fourth Judicial Circuit, Duncan McBryde, Com'r.

Judgment.

An application to decide and certify the bouhdaries of the Land of Eleele, District of Waimea, Island of Kauai, having been filed with me on the 14th day of July, 1873, Jno. O. Dominis, Administrator of the Estate of His Late Majesty Kamekameha V in accordance with the provisions of an Act to facilitate the settlement of Boundaries &c, approved on the 22nd day of June, A. D. 1868; now, therefore, having duly received and heard all the testimony offered in reference to the said boundaries and having gone on the said land, at the request of James W. Ray, and having endeavored otherwise to obtain all information possible to enable me to arrive at a just decision, which will more fully appear by reference to the records of this matter by me kept in Book No.1, page 76, and it appearing to my satisfaction that the true, lawful and equitable boundaries, are as follows, viz: Commences at a rocky point on the sea shore at the junction of the Kuilow Boundary and called Kupuhili, and thence mauka along the Hanapoepoe river and boundary of kuiloa to a place on the river bank called Palemo. Thence turning East to an old Auwai that formerly led to a fish pond Kualaau; Thence through rice fields to a hole in the side of the Pale called Nihouana. Thence up in a straight line to top of ridge and mauka along ridge to Kaniohea. Thence continuing along top of ridge and pale to opposite and down to a large hole in side of cliff called Heana. Thence to an old Heau where the boundary again joins the mauka or N.E. corner of Kuiloa at a place called Kaluea where there is a large Pride of India tree. Thence across the Hanapoepoe river to Hailiili. Thence up along the old bed of the river to loi Puuhau. Thence to Kuhuna. Thence to ridge of stones across river called Waipa. Thence to head of auwai of Eleele at a place called Akeahi. Thence up face of high cliff to top of ridge and along ridge and pali to Rowell's dtone wall and following said stone wall to junction with the boundary of Wahiawa. Thence makai along the Wahiawa boundary in all its windings and turnings to a rocky point on the sea shore called Kenakua and then West along sea shore to Kupuhele the place of commencement.

It is therefore adjusged and I do hereby decide and certify that the boundaries of the said land are and hereafter shall be as hereinbefore set forth.

Dated at Wahiawa this 25 day of November A. D. 1873.

(Sgd.) Duncan McBryde,
Commissioner of Boundaries
Fowrth Judicial Circuit.

In this case the expenses are:

Costs	$24.75
Witnesses	2.50
	$27.25

Which were all awarded to Eleele.

I hereby certify that the above is an accurate and true copy of the certificate of the boundaries of the land of Elele, District of Waimea, Island of Kauai, issued on the 25th day of November, A. D. 1873.

(Sgd.) Duncan McBryde,
Commissioner of Boundaries
Fourth Judicial Circuit.

-2-

No 39

CERTIFICATE OF BOUNDARIES

16

Island of Kauai, District of Waimea, Land of Eleele

Decision rendered 25th Novr., 1873

By Duncan McBryde

Commissioner of Boundaries for the Island of Kauai

In this case the expences are

Costs	$ 24.75	
Witnesses	2.50	$ 27.25
		$ 27.25

Which were all awarded to Eleele

I hereby certify that the above is an accurate and true copy of the certificate of the boundaries of the land of Eleele District of Waimea Island of Kauai issued on the 25th day of November A.D. 1873

Duncan McBryde
Commissioner of Boundaries
Fourth Judicial Circuit

Appendix C: Comments on Draft Environmental Assessment and Responses

STATE OF HAWAI'I | KA MOKU'ĀINA 'O HAWAI'I
DEPARTMENT OF LAND AND NATURAL RESOURCES
KA 'OIHANA KUMUWAIWAI 'ĀINA
LAND DIVISION

P.O. BOX 621
HONOLULU, HAWAII 96809

November 8, 2024

LD 0330

Mr. Max R. Solmssen
Principal
Kaimana Environmental Solutions LLC
PO Box 11890
Honolulu, Hawaii 96828

Via email*: max@kaimanaenv.com*

SUBJECT: **Draft Environmental Assessment, Lima Ola Subdivision Off- Site Water System Improvements, Ele'ele, Island of Kaua'i, Hawai'i, Tax Map Key: (4) 2-1-001:049 and 046**

Thank you for the opportunity to review and comment on the subject project. The Land Division of the Department of Land and Natural Resources (DLNR) distributed copies of your request to DLNR's various divisions for their review and comment.

Enclosed are comments received from our Engineering and Land Division. Should you have any questions, please feel free to contact Dayna Vierra via email at *dayna.k.vierra@hawaii.gov*. Thank you.

Sincerely,

Russell Tsuji

Russell Y. Tsuji
Land Administrator

Attachments
cc: Central Files

DEPARTMENT OF LAND AND NATURAL RESOURCES
ENGINEERING DIVISION

LD/Russell Y. Tsuji
Ref: Draft Environmental Assessment, Lima Ola Subdivision Off-Site Water System Improvements
Location: Ele'ele, Island of Kaua'i, Hawai'i
TMK(s): (4) 2-1-001:049 and 046
Applicant: Kaimana Environmental Solutions, Inc.

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). 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 for researching the Flood Hazard Zone designation for the project. Flood zones subject to NFIP requirements are identified 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) (fhat.hawaii.gov) 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) 241-4849.

Signed:
CARTY S. CHANG, CHIEF ENGINEER

Date: Nov 4, 2024

KaimanaEnv.com
808.341.3546
PO Box 11890
Honolulu, HI 96828
max@kaimanaenv.com

November 20, 2024

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

Subject: Receipt of Comment Letter on Draft Environmental Assessment for the Kaua'i County Housing Agency Lima Ola Subdivision Proposed Off-Site Water System Improvements, 'Ele'ele, Kaua'i, Hawai'i

Thank you for forwarding the standard comments from the DLNR Engineering Division regarding the rules and regulations of the National Flood Insurance Program, Title 44 of the Code of Federal Regulations. The proposed project site is not located in a Special Flood Hazard Area (high-risk area). As stated in the Draft Environmental Assessment, the project site is located in FEMA Flood Zone X: area of minimal flood hazard.

Thank you for your participation in environmental review process for the proposed project.

Sincerely,

Max R. Solmssen
Environmental Planner
Kaimana Environmental Solutions LLC

Email: Max@kaimanaenv.com

Mailing Address:
Kaimana Environmental Solutions LLC
PO Box 11890
Honolulu, HI 96828

STATE OF HAWAIʻI
OFFICE OF PLANNING
& SUSTAINABLE DEVELOPMENT

235 South Beretania Street, 6th Floor, Honolulu, Hawaiʻi 96813
Mailing Address: P.O. Box 2359, Honolulu, Hawaiʻi 96804

Telephone: (808) 587-2846
Fax: (808) 587-2824
Web: https://planning.hawaii.gov/

DTS 202410101548NA
TRANSMITTED VIA EMAIL

November 6, 2024

Max Solmssen, Environmental Planner
Kaimana Environmental Solutions LLC
P.O. Box 11890
Honolulu, Hawaiʻi 96828

Dear Mr. Solmssen:

Subject: Draft Environmental Assessment (DEA) for Proposed Offsite Water System Improvements, Lima Ola Affordable Housing Subdivision, ʻEleʻele, Kauaʻi
Tax Map Key No. (4) 2-1-001: 027 (portion)

The Office of Planning and Sustainable Development (OPSD) has reviewed the Draft Environmental Assessment (DEA) for the subject project.

The County of Kauaʻi Housing Agency proposes to construct a 0.3-million-gallon water tank and associated improvements to serve the County's Lima Ola affordable housing development. OPSD supports the proposed infrastructure improvement as it will support buildout of the Lima Ola Affordable Housing Project, which is identified as a transit-oriented development (TOD) project in the *State Strategic Plan for Transit-Oriented Development* issued in 2017.

OPSD offers the following comments related to the DEA and final project design and implementation.

1. Impact on Water Source and Availability. We note that neither the body nor Appendix D, Lima Ola Water Master Plan, of the DEA discusses the impact of water development on water resources. To the extent known, this and any uncertainties associated with water resource development should be identified in Section 2.5, Water Resources. Further, the Lima Ola Water Master Plan states that water source availability and water system transmission capacity may be limited for future phases. These limitations—particularly the need for extension of the 16-inch water transmission line to the project site—should be included in the body of the DEA to make clear to the reader any constraints that may impact the timing of Lima Ola buildout.

Further, the DEA should discuss whether the proposed improvements will increase capacity for other development in the area and how much capacity in excess of Lima Ola's needs would be added. Finally, rather than referring to State Commission on Water Resources Management or County recommendations, the body of the DEA should describe mitigation measures that should or will be taken to reduce water consumption and optimize water reuse within the project.

2. <u>Section 3, Environmental Impact Significance Criteria Analysis, Paragraph (7)</u>. Without clarification of the potential excess capacity that would be created by the proposed improvements, it is unclear whether the action allows for larger actions, beyond transmission or other source improvements that are needed to serve later phases of the Lima Ola project. If the improvements as a whole could support additional growth outside of already built-up areas, then this should be acknowledged in this section.

Thank you for the opportunity to comment on the DEA. If you have any questions, please contact Ruby Edwards, ruby.m.edwards@hawaii.gov, (808) 587-2817. If you wish to respond to this comment letter, please include DTS 202410101548NA in the subject line.

Mahalo,

Mary Alice Evans

Mary Alice Evans
Director

c: Adam Roversi, Kauaʻi Housing Agency

KaimanaEnv.com
808.341.3546
PO Box 11890
Honolulu, HI 96828
max@kaimanaenv.com

December 9, 2024

To: Mary Alice Evans
Director
State of Hawaiʻi Office of Planning & Sustainable Development
235 South Beretania Street, 6th Floor
Honolulu, HI 96804

Subject: Response to Comment Letter on the Draft Environmental Assessment for the Kauaʻi County Housing Agency Lima Ola Subdivision Proposed Off-Site Water System Improvements, ʻEleʻele, Kauaʻi, Hawaiʻi

Thank you for your Draft Environmental Assessment comment letter for the subject project. Below are responses to your comments:

Comment #1: Impact on Water Source and Availability: We note that neither the body nor Appendix D, Lima Ola Water Master Plan, of the DEA discusses the impact of water development on water resources. To the extent known, this and any uncertainties associated with water resource development should be identified in Section 2.5, Water Resources. Further, the Lima Ola Water Master Plan states that water source availability and water system transmission capacity may be limited for future phases. These limitations-particularly the need for extension of the 16-inch water transmission line to the project site-should be included in the body of the DEA to make clear to the reader any constraints that may impact the timing of Lima Ola buildout. Further, the DEA should discuss whether the proposed improvements will increase capacity for other development in the area and how much capacity in excess of Lima Ola's needs would be added. Finally, rather than referring to State Commission on Water Resources Management or County recommendations, the body of the DEA should describe mitigation measures that should or will be taken to reduce water consumption and optimize water reuse within the project.

Response to Comment #1: Section 2.5 of the DEA, as well as the Lima Ola Water Master Plan discuss the impact of water development on water resources. Section 2.5 of the DEA provides the existing water system demand in the area, as well as the projected water demand for the Lima Ola Development, which shows the quantitative estimated impact of the proposed action on water resources. The limitations of water source availability for full build out of Lima Ola is disclosed and described in Section 2.5 of the DEA:

> *With the additional water storage tank and booster pumps planned as part of the proposed action, there would be adequate pumping capacity and storage through buildout of the Lima Ola Development. However, the source availability for subsequent phases after Phase 2 would need to be re-evaluated when planning for each phase is implemented (CPE, 2019). If additional source and/or capacity is needed for subsequent phases, then a well permit application would need to be submitted to the County of Kauaʻi Department of Water,*

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the State DOH, and the State DLNR Commission on Water Resource Management to assure that any new source (i.e., new water well) is allowed and compliant with county rules, as well as HAR 13-168: Water Use, Wells, and Stream Diversion Works…

The final decision document will include a discussion of the proposed 16-inch water transmission line that has been recently completed, interconnecting the Hanapēpē water system with the ʻEleʻele water system along Kaumualiʻi Highway. The final decision document will include a statement that the proposed action will not increase water capacity for the surrounding area outside Lima Ola Development. With regards to water consumption and optimizing water reuse for the proposed project, the proposed project would include potable water transmission and storage, which would not allow for reusing water.

Comment #2: Section 3, Environmental Impact Significance Criteria Analysis, Paragraph (7). Without clarification of the potential excess capacity that would be created by the proposed improvements, it is unclear whether the action allows for larger actions, beyond transmission or other source improvements that are needed to serve later phases of the Lima Ola project. If the improvements as a whole could support additional growth outside of already built-up areas, then this should be acknowledged in this section.

Response to Comment #2: The final decision document will be revised to state that the proposed action would not result in excess potable water capacity that could allow for additional development actions in the area, beyond the planned Lima Ola development.

Thank you for your participation in the environmental review process for the proposed project.

Sincerely,

Max R. Solmssen

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

November 6, 2024

IN REPLY REFER TO:
Project No: 2024PR01316
Doc No: 2411NG01
History & Culture

Max Solmssen
Kaimana Environmental Solutions LLC
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info@kaimanaenv.com

Aloha e Max,

SUBJECT: Draft Environmental Assessment for the Lima Ola Subdivision Off-Site Water System Improvements, 'Ele'ele Ahupua'a, Kona District, Island of Kaua'i, TMK: (4) 2-1-001:046 and 049.

Thank you for the opportunity to review the Draft Environmental Assessment (DEA) for the subject property located at Tax Map Key No. (4) 2-1-001:46, 49 on the island of Kaua'i. The DEA was prepared by Kaimana Environmental Solutions LLC at the request of the County of Kaua'i Housing Agency. The Hawaii State Historic Preservation Division (SHPD) has reviewed the above cited DEA and has the following comments:

- An archaeological literature review and field inspection of the project site was conducted by Pacific Legacy Historic Preservation. According to page 22 of the DEA "the field inspection did not identify any potential historic properties within, or directly surrounding the project area." SHPD **does not concur** with these findings.

- SHPD records indicate that there are several historic properties associated with former sugar plantation operations on TMK: (4) 2-1-001:027, which surrounds both TMK: (4) 2-1-001:046 and TMK: (4) 2-1-001:049. The SIHP numbers for the historic properties are as follows:
  - SIHP #50-30-09-00690 ("Kapa Reservoir")
  - SIHP #50-30-09-00691 (Irrigation Ditch)
  - SIHP #50-30-09-00693 (Irrigation Ditch)
  - SIHP #50-30-09-00694 (Irrigation Ditch)
  - SIHP #50-30-09-00689 (Irrigation Ditch)

- The project proponents have identified alternative actions of "No Action" and "Proposed Action," for the proposed project. While the historic properties cited here were not apropriately considered in the DEA, based on the information provided in the DEA, SHPD does not believe that the referenced sites are likely to be negatively impacted by the proposed project. SHPD therefore **concurs** with the "Proposed Action" option for the proposed project.

The State of Hawaii Office of Planning and Sustainable Development is the office of record for this environmental review. Please maintain a copy of this letter with your environmental review record. If you have any questions about the contents of this letter or SHPD's review, please contact please contact Noah Gomes, SHPD Ethnographer, at (808) 987-5001 or via email at noah.gomes@hawaii.gov.

Mahalo,

Jessica L. Puff
State Historic Preservation Administrator
Deputy State Historic Preservation Officer

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December 9, 2024

To: Jessica L. Puff
State Historic Preservation Administrator
Deputy State Historic Preservation Officer
State of Hawai'i Department of Land and Natural Resources
Historic Preservation Division
601 Kamokila BLVD, STE 555
Kapolei, HI 96707

Subject: Response to Comment Letter on the Draft Environmental Assessment for the Kaua'i County Housing Agency Lima Ola Subdivision Proposed Off-Site Water System Improvements, 'Ele'ele, Kaua'i, Hawai'i

Thank you for your Draft Environmental Assessment comment letter for the subject project. Below are responses to your comments:

Comment #1: *An archaeological literature review and field inspection of the project site was conducted by Pacific Legacy Historic Preservation. According to page 22 of the DEA "the field inspection did not identify any potential historic properties within, or directly surrounding the project area." SHPD does not concur with these findings.*

SHPD records indicate that there are several historic properties associated with former sugar plantation operations on TMK: (4) 2-1-001:027, which surrounds both TMK: (4) 2-1-001:046 and TMK: (4) 2-1-001:049. The SIHP numbers for the historic properties are as follows:

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- *SIHP #50-30-09-00694 (Irrigation Ditch)*
- *SIHP #50-30-09-00689 (Irrigation Ditch)*

Response to Comment #1: The final decision document will be revised to identify the above referenced documented historic properties, and will state that the proposed action would not include ground disturbance or any anticipated impacts to these off-site historic properties.

Comment 2: *The project proponents have identified alternative actions of "No Action" and "Proposed Action," for the proposed project. While the historic properties cited here were not [appropriately] considered in the DEA, based on the information provided in the DEA, SHPD does not believe that the referenced sites are likely to be negatively impacted by the proposed project. SHPD therefore concurs with the "Proposed Action" option for the proposed project.*

Response to Comment #2: The final decision document will be revised to identify and appropriately consider impacts to the above referenced off-site historic properties.

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Thank you for your participation in the environmental review process for the proposed project.

Sincerely,

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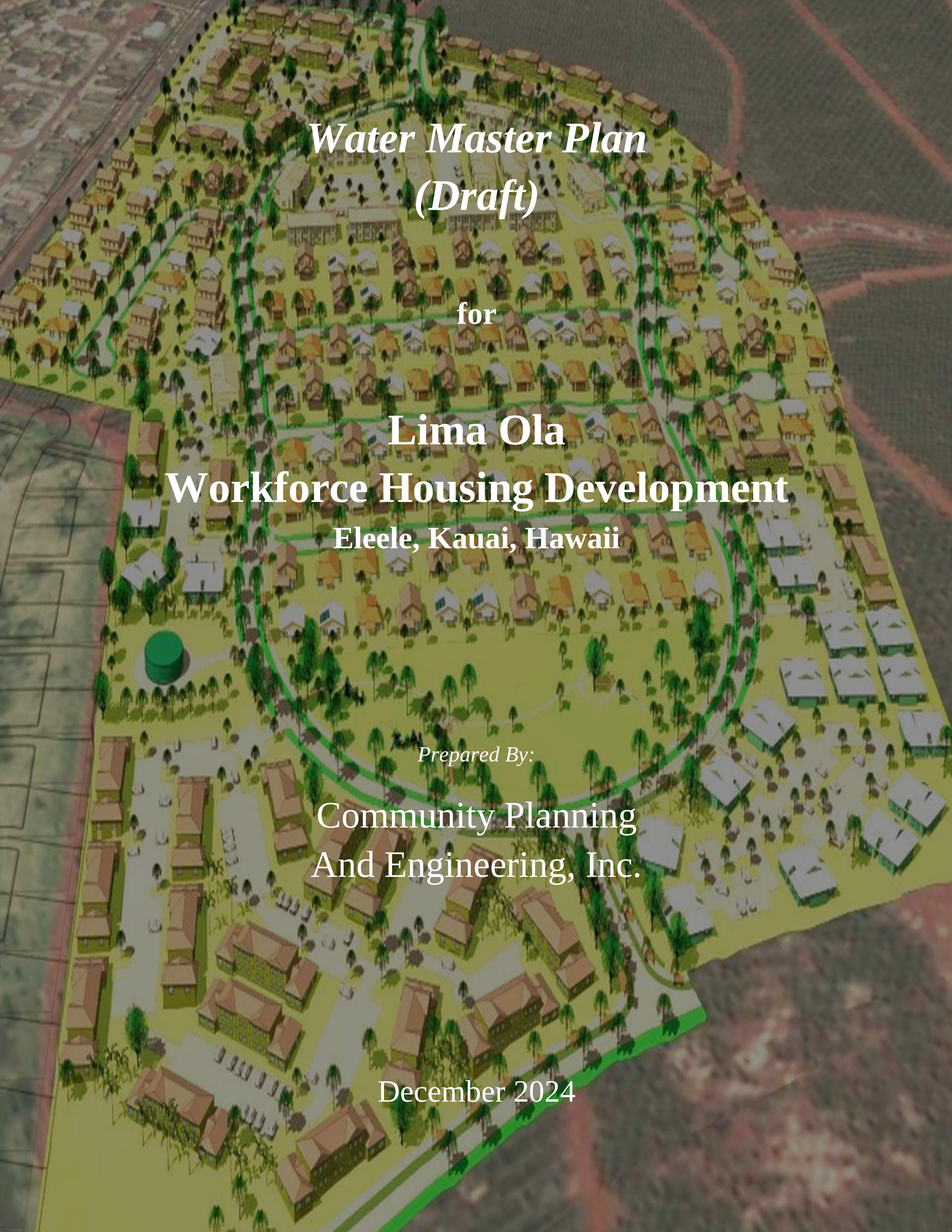
Appendix D: Lima Ola Water Master Plan



Water Master Plan (Draft)

for

Lima Ola Workforce Housing Development

Eleele, Kauai, Hawaii

Prepared By:

Community Planning
And Engineering, Inc.

December 2024

December 2024 (DRAFT)

Water Master Plan (Draft)

for

Lima Ola Workforce Housing Development

Eleele, Kauai, Hawaii

Prepared For:

Kauai County Housing Agency

KAUAI COUNTY HOUSING AGENCY

Prepared By:

cp&e Community Planning and Engineering, Inc.

ANSON M. MURAYAMA
LICENSED PROFESSIONAL ENGINEER
No. 6975-C
HAWAII, U.S.A.

THIS WORK WAS PREPARED BY
ME OR UNDER MY SUPERVISION.
CONSTRUCTION OF THIS PROJECT
WILL BE UNDER MY OBSERVATION.
LICENSE EXPIRATION DATE: 4/30/20

1286 Queen Emma Street
Honolulu, Hawaii 96813

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- Exhibit 1 – Overall System Map
- Exhibit 2 – Lima Ola Workforce Housing Proposed Development
- Exhibit 3 – 340-Foot Service Zone Pipe and Junction Map
- Exhibit 4 – 402-Foot Service Zone Pipe and Junction Map
- Exhibit 5 – Schematic Diagram

Appendix B: Existing Hanapepe-Eleele Water System

- Water Model Results for the Existing System

Appendix C: Proposed Lima Ola Development

- Water Model Results for the Lima Ola Development

Appendix D (See Correspondence):

- Lima Ola Development Water Model (Bentley WaterCAD, Version 2024)
- County of Kauai, Department of Water Approval Letter of WMP (dated October 5, 2015)
- County of Kauai, Department of Water Conditional Approval Letter (dated May 14, 2012)
- Water Meter Readings Data Provided by County of Kauai, Department of Water
- Fire Hydrant Data Provided by County of Kauai, Department of Water

Executive Summary

This project involves the development of an affordable housing community called Lima Ola in Eleele on the island of Kauai, Hawaii. The development will be constructed in four (4) distinct phases; however, with development schedules and funding for Phases 3 and 4 being unknown at this time, this water master plan is seeking at a minimum the acceptance of Phase 2 to proceed. Although the emphasis is focused toward Phase 2, Phase (1) and subsequent phases (3 and 4) will need to be taken into consideration when performing the water analysis in order to properly size improvements to the water system that may be necessary to accommodate the Lima Ola Development. Based on this a water master plan will be prepared for the Lima Ola Development.

This water master plan supersedes the previously approved “Water Master Plan for Lima Ola Workforce Housing Development,” dated May 2019. Revisions were made to the water master plan to conform with the construction plans prepared for “Lima Ola Subdivision Phase 2.” The revisions made to this water master plan does not significantly impact the results of the interconnection of the proposed Lima Ola Development water system and the existing Hanapepe-Eleele Water System.

The water master plan includes information on the existing Hanapepe-Eleele Water System consisting of existing storage tanks, groundwater wells and its associated pumps, booster pumps, and distribution piping. Existing water demands were determined using 2013 water usage data from water meters within the Hanapepe-Eleele Water System. A 15% water loss factor, with the addition of a 5% factor of safety, was added to the demand that would take into consideration potential leaks or possibility of water loss from the system. Existing water demands for the Hanapepe-Eleele Water System are 830,960 GPD (average daily); 1,246,440 GPD (maximum daily); and 2,492,878 GPD (peak hour). Distribution piping, well pumping, and booster pumping information was taken from water system maps and other data (i.e. previous water model information) and verified with available as-built drawings and/or in the field. Water system information was then used to construct a water system model for the Hanapepe-Eleele Water System. Existing water demands and other information were included in the water system model to establish a baseline of the operation of the water system. Model runs were compared to fire hydrant tests as a means of calibration.

The proposed Lima Ola Development will increase the water demand of the Hanapepe-Eleele Water System by 340,560 gallons per day (GPD) on an average day, or 510,840 GPD during maximum daily demand flows, and 1,021,680 GPD during peak hour demand flows for the overall development (Phases 1 through 4). In terms of phases, the overall proposed water demand for the development is shown in the following table.

Table ES-1: Proposed Water Demand by Development Phase

	Average Demand (GPD)	Maximum Daily Demand (GPD)	Peak Hour Demand (GPD)
Phase 1*	103,560	155,340	310,680
Phase 2	112,080	168,120	336,240
Phase 3	78,000	117,000	234,000
Phase 4	46,920	70,380	140,760
Total	340,560	510,840	1,021,680

*These phases have been constructed.

Pumping capacity analysis was performed to evaluate the pumping ability of the water system to provide the necessary water required for the Hanapepe-Eleele Water System and the overall Lima Ola Development. The pumping capacity and source availability proved to be adequate to accommodate the demand for Phase 2. As for subsequent Phases 3 and 4, the pumping capacity and source availability will be re-evaluated at the time when planning for the phase is implemented. If at the time of re-evaluation additional source is needed, then considerations will be discussed with County of Kauai, Department of Water to analyze viable options to address need.

To fulfill the water demands for the proposed Lima Ola Development, water will be drawn from water storage tanks on the Eleele-side of the water system consisting of two (2) 400,000-gallon water storage tanks at the 340-foot elevation and a 200,000-gallon water storage tank at the 402-foot elevation. The existing Phase 1 of the Lima Ola development utilizes water from the two (2) 400,000-gallon water storage tanks. Subsequent proposed phases (2, 3, and 4) will utilize water from the one (1) 200,000-gallon water storage tank. An analysis of the adequacy of the existing tanks was performed which took into consideration existing and proposed water demands of these tanks. The results indicated that two (2) 400,000-gallon tanks at the 340-foot elevation were adequate to accommodate the demands for the existing Phase 1 water demands. In comparison, the 200,000 gallon water storage tank at the 402-foot elevation showed that it was inadequate to accommodate the added proposed water demands for Phase 2; therefore, an analysis for an additional tank at the 402-foot elevation was performed and the tank will be installed during the construction of the proposed Phase 2 development.. Under the existing and current proposed development plan as shown in this Water Master Plan, the additional tank required will be 300,000 gallons. Subsequent phases (3 and 4) will also be evaluated when planning and design considerations commence.

A 16-inch water transmission line that interconnects the Hanapepe water system with the Eleele water system along Kaumualii Highway was constructed nearby.. The project was a Capital Improvement Project (CIP) part of the Hanapepe-Eleele Water System improvement program assessed in the DOW’s Water Plan 2020. This water line increases reliability of the water system by allowing water to flow from the Hanapepe 212-foot water system to the Eleele-side of the system that will support future development phases of the Lima Ola Development project and areas such as Eleele Shopping Center and Port Allen.

A proposed Department of Hawaiian Home Lands (DHHL) development that’s planned to be constructed to the left of the Hanapepe residential areas will need to be considered as it would connect to the existing Hanapepe-Eleele water system in addition to the Lima Ola development.

Upon completion of the analyses and modeling scenarios, the following improvements are required per phase:

Table ES-2: Required Improvements Per Phase

	Required Improvements
Phase 2	300,000-gallon water storage tank at 402-foot elevation; 350 GPM booster pump at the 340-foot elevation; approximately 2,689 linear feet of 8-inch water line; 8 fire hydrants; 69 water laterals; and chlorination and testing.
Phase 3*	Approximately 1,764 linear feet of 8-inch water line; 5 fire hydrants; 3 water laterals; and chlorination and testing.
Phase 4*	Approximately 924 linear feet of 8-inch water line; 4 fire hydrants; 2 water laterals; and chlorination and testing.

*Required improvements address storage and transmission facilities for Phases 3 and 4 are based on the current layout of the Lima Ola Development and its associated water demands, which are subject to change. It is noted that due to the uncertainty of the development schedule for Phases 3 and 4 of this project and other potential developments in the vicinity, Phase 3 and 4 will be re-evaluated at the appropriate time when the planning and design of the particular phase commences.

Introduction

Background

The scope of this project includes the development of an affordable housing community, Lima Ola, on the island of Kauai, Hawaii. The project site is located mauka of Halewili Road and east of Kaumualii Highway and consists of approximately 75 acres of land within Tax Map Key (TMK) (4) 2-1-001:027, owned by the County of Kauai. The parcel of land was purchased by the County of Kauai from McBryde Sugar Company with the stipulation that the parcel be developed for affordable housing. The land was previously used for sugarcane cultivation and is currently being used by Kauai Coffee Company under a licensed agreement with the County of Kauai. The agreement states that Kauai Coffee Company will vacate the land when the County of Kauai proceeds with the housing development project.

The Kauai County Housing Agency is in the process of completing the Hawaii Revised Statutes (HRS) 201H exemption process for the proposed Lima Ola subdivision. HRS Section 201H-38 was enacted into law to provide a process whereby an affordable housing project may be granted exemptions from any statutes, ordinances, charter provisions, and rules of any governmental agency relating to planning, zoning and construction standards that do not negatively affect the health and safety of the general public. As part of the 201H exemption process, the Kauai County Housing Agency is seeking an exemption from the Kauai County Code Zoning Ordinance, as well as a State Land Use District Boundary Amendment in order to allow for residential use in a district currently zoned for Agricultural use.

Community Planning and Engineering, Inc., (CPE) in association with PBR Hawaii (PBR) prepared an overall development master plan for the proposed project. Based on the overall development master plan, the Lima Ola project is planned for 550 residential units (single family, multi-family and senior resident units) designed with green sustainable energy efficiency features, a community center, drainage swales and detention basins, landscaped areas, and bike and pedestrian paths. The project will be implemented in four development phases.

Purpose of Study

The purpose of this water master plan is to analyze the adequacy of the existing Hanapepe-Eleele Water System, within Tax Map Key Zone 1 and 2 in the Fourth Tax District, and how the existing water system is affected by the proposed Lima Ola Development. Additionally, the water master plan incorporates the water demands for the proposed developments which determine pipe and tank sizes that conform to the 2002 Water System Standards for the Department of Water. Water demands for proposed developments, along with an estimated system loss value, are further analyzed into an integrated water model with connection to the existing water system. The proposed water system for Phase 2 of the Lima Ola Development is interconnected with the existing Hanapepe-Eleele Water System, drawing water from the existing source facilities: Hanapepe Well A, Hanapepe Well B, and Hanapepe Well No. 4. Source adequacy for subsequent phases 3 and 4 will be re-evaluated at the time planning is implemented.

Water System Design Criteria

The proposed water master plan utilizes the State of Hawaii, Water System Standards (2002). The criterion used in the development of this water master plan is included in this section.

Consumption Guidelines

The average daily demands were obtained from the consumption guidelines. Table 1 summarizes these guidelines for the County of Kauai.

Table 1: Kauai County Consumption Guidelines

Zoning Designation	Average Daily Demand
Single Family or Duplex	500 gallons / unit
Multi-Family Low Rise	350 gallons / unit
Commercial Only	3000 gallons / acre
Schools, Parks	4000 gallons / acre or 60 gallons / student

Demand Factors

The demand factors which calculate the maximum daily demand and peak hour demand are summarized in Table 2.

Table 2: Demand Factors

Maximum Daily Demand	Peak Hour
1.5 x Average Day	3.0 x Average Day

Fire Flow Requirements

The fire flow requirements for the Kauai County are summarized in Table 3.

Table 3: Fire Flow Requirements

Land Use	Flow Gallons per Minute (GPM)	Duration (Hours)	Fire Hydrant Spacing (Feet)
Single Family (R-10)	1,250	2	350
Community Center/Small Shopping Center	2,000	2	350

Pipeline Sizing

Pipelines need to be designed to meet the following requirements:

- Maximum daily flow plus fire flow with a residual pressure of 20 pounds per square inch (psi) at the critical fire hydrant.

- Peak hour flow with a minimum residual pressure of 40 psi.

- “C” factors as shown in Table 4.

Table 4: “C” Factors

Pipe Diameter	“C”
8”, 12”	110

- Maximum velocity in the distribution main (without fire flow) is 6 feet per second (fps).

- Maximum static or pumping pressure, whichever is greater, shall not exceed 125 psi.

Reservoir (Tank) Capacity

Reservoirs (tanks) need to be designed to meet the following requirements:

- Meet maximum day consumption. Reservoir (tank) full at the beginning of the 24-hour period with no source input to the reservoir (tank).

- Meet maximum day rate plus fire flow for duration of fire. Reservoir (tank) ¾ full at start of fire, with credit for incoming flow from pumps, one maximum size pump out of service.

- Minimum size reservoir (tank) shall be 0.1 million gallon (MG). The standard sizes for reservoirs (tanks) are 0.1 MG, 0.2 MG, 0.25 MG, 0.3 MG, 0.5 MG, 1.0 MG, and 0.5 MG increments thereafter.

Where there are two or more reservoirs (tanks) serving the same system, the design shall be made on the basis of combined protection provided by all facilities available.

Total Pump Capacity

The system is deemed to have adequate pumping capacity if it meets the maximum day demand with an operating time of 24 hours. This justification is in consideration of the storage facility with the largest pumping capacity to be out of service.

Hanapepe-Eleele Water System

Existing Water System

The Department of Water (DOW) has four (4) well sources in the Hanapepe-Eleele Water System. Two (Hanapepe A and Hanapepe B) of the four wells are situated in Hanapepe Valley. Hanapepe A was drilled in 1974 and has a pumping capacity of 500 gallons per minute (GPM). The existing ground elevation at Hanapepe A is 98 feet above mean sea level (MSL). Hanapepe B was drilled in 1980 and has a pumping capacity of 900 GPM. The existing ground elevation at Hanapepe B is 99 feet above MSL. The two other wells (Hanapepe 25-1 and Hanapepe 4) are located on the west side of Hanapepe Valley. Hanapepe 25-1 was drilled in 1966 and has a pumping capacity of 150 GPM. Hanapepe 25-1 has been abandoned in place and is no longer being used by the DOW due to a pump/motor problem. The existing ground elevation at Hanapepe 25-1 is 78 feet above MSL. Hanapepe 4 was drilled in 1993 and has a pumping capacity of 700 GPM. The existing ground elevation at Hanapepe 4 is 463 feet above MSL. The Hanapepe and Eleele water systems are interconnected, with both areas retrieving water from the three active well sources in Hanapepe. Water is drawn into Eleele through a booster pump connection in Hanapepe Valley. The four well sources for the Hanapepe-Eleele Water System are summarized in Table 5 below.

Table 5: Hanapepe-Eleele Water System Source Facilities

Well Source	Pumping Capacity (GPM)	Ground Elevation Above Mean Sea Level (ft)	Status
Hanapepe A	500	98	Active
Hanapepe B	900	99	Active
Hanapepe 25-1	150	78	Inactive
Hanapepe 4	700	463	Active

The DOW has five (5) water storage tanks within the Hanapepe-Eleele Water System. On the Eleele-side there are two (2) 0.4-million-gallon (MG) steel tanks with 340-foot spillway elevation; and one (1) 0.2-MG concrete tank with a 402-foot spillway elevation. On the Hanapepe-side there are one (1) 0.5-MG concrete tank at the 402-foot spillway elevation; and one (1) 0.5-MG concrete tank at the 212-foot spillway elevation. Delivery of water to the Eleele-side of the water system primarily comes from the Hanapepe A and B Wells and is pumped through two (2) 750 GPM Eleele booster pumps in Hanapepe Valley and a 27-inch water line up the valley wall to the Eleele steel tanks at the 340-foot elevation. Located next to the two (2) 340-foot Eleele tanks are two (2) 120 GPM Eleele Nani booster pumps, which deliver water from the 340-foot Eleele tanks to the 402-foot Upper Eleele tank. In Hanapepe, water is primarily delivered from the Hanapepe 4 Well to the 0.5-MG concrete tank with a 402-foot spillway. The 212-foot Hanapepe Heights water storage tank is primarily fed from the 402-foot water storage tank. It is noted that although each water storage tank in the Hanapepe-Eleele Water System has its associated primary water source, the three (3) active wells have the ability to deliver water to all five (5) water storage tanks. The five existing water storage tanks are summarized in Table 6.

Table 6: Existing Water Storage Tanks

Pump	Delivery Pathway	Storage Tank
Two (2) 750-GPM Eleele Booster Pumps	From well sources to 340-foot storage tanks	Two (2) 0.4-MG Steel Eleele Tanks at 340-foot elevation
Two (2) 120-GPM Eleele Nani Booster Pumps	From 340-foot storage tanks to 402-foot storage tank	0.2-MG Concrete Upper Eleele Tank at 402-foot elevation
500-GPM Pump at Hanapepe A Well and 900-GPM Pump at Hanapepe B Well	From well source and 402-foot storage tank to 212-foot storage tank	0.5-MG Concrete Hanapepe Heights Tank at 212-foot elevation
700-GPM Pump at Hanapepe 4 Well	From well source to 402-foot storage tank	0.5-MG Concrete Upper Hanapepe Heights Tank at 402-foot elevation

The existing Hanapepe-Eleele Water System is shown in Exhibit 1 - Overall System Map in Appendix A.

Lima Ola Water System

Existing Water System

Based on the topography of the project, Phase 1 of the development falls within the 340-foot water service zone and the remaining three (3) phases (Phases 2, 3 and 4) fall within the 402-foot water service zone. For Phase 1, two connection points were made, one connection made to the existing 12-inch waterline on Kaumualii Highway, which distributes water from the water storage tanks at the 340-foot elevation. This connection point is north of the Habitat for Humanity housing project and required a waterline easement from the highway to the roadway in Phase 1. The second connection was made to the existing 8-inch waterline on Mahea Road, where the Lima Ola development connects and extended the existing roadway. Refer to Exhibit 3 – 340-Foot Service Zone Pipe and Junction Map and Exhibit 4 – 402-Foot Service Zone Pipe and Junction Map in Appendix A for the existing alignment of the Phase 1 waterline for the Lima Ola development.

Table 7 shows the existing development and water demand for Phase 1 of the Lima Ola development.

Table 7: Phase 1 Development

Development Type	No. of Units	Average Daily Demand (GPD)	Maximum Daily Demand (GPD)	Peak Hour Demand (GPD)
Single Family	38	19,000	28,500	57,000
Multi-Family	138	48,300	72,450	144,900
Community Center (3,000 GPD/acre)	3	9,000	13,500	27,000
Irrigation (4,000 GPD/acre)	2.5	10,000	15,000	30,000
Total		86,300	129,450	258,900
Total (Including 20% loss)		103,560	155,340	310,680

Proposed Development

The proposed Lima Ola Development located in Eleele, Kauai is on approximately 75 acres situated north of Halewili Road and east of Kaumualii Highway and the Habitat for Humanity housing project. Total development will consist of approximately 550 residential units consisting of single family, multi-family, and senior housing units, a park, and a community center. The project will be developed into four (4) distinct phases, as shown in Exhibit 2 – Lima Ola Workforce Housing Proposed Development in Appendix A.

Phase 1 of the Lima Ola Development has been constructed and is described in the previous section above. For Phases 2, 3 and 4, there will be two connection points for the proposed waterline, both connections will be made to the existing 12-inch waterline on Kaumualii Highway, which distributes water from the water storage tank at the 402-foot elevation. Refer to Exhibit 3 – 340-Foot Service Zone Pipe and Junction Map and Exhibit 4 – 402-Foot Service Zone Pipe and Junction Map in Appendix A for the proposed alignment of the waterline for the Lima Ola development.

Water demands for each phase of the proposed development were calculated based on the State of Hawaii, Water System Standards (2002). In addition, to the demand factors from the Water System Standards, a 15% water system loss factor, with an added 5% factor of safety, was also considered for the water demands of both existing and proposed to account for possible water leakage and/or water loss through the system. The analysis to be performed will determine whether the existing pumping capacity, existing reservoir capacities and existing water distribution system is adequate to serve the proposed development.

Tables 8 through 10 show the proposed development and water demands for each phase.

Table 8: Phase 2 Development

Development Type	No. of Units	Average Daily Demand (GPD)	Maximum Daily Demand (GPD)	Peak Hour Demand (GPD)
Single Family	62	31,000	46,500	93,000
Multi-Family	140	49,000	73,500	147,000
Irrigation (4,000 GPD/acre)	3.35	13,400	20,100	40,200
Total		93,400	140,100	280,200
Total (Including 20% loss)		112,080	168,120	336,240

Table 9: Phase 3 Development*

Development Type	No. of Units	Average Daily Demand (GPD)	Maximum Daily Demand (GPD)	Peak Hour Demand (GPD)
Single Family	0	0	0	0
Multi-Family	180	63,000	94,500	189,000
Irrigation (4,000 GPD/acre)	0.5	2,000	3,000	6,000
Total		65,000	97,500	195,000
Total (Including 20% loss)		78,000	117,000	234,000

Table 10: Phase 4 Development*

Development Type	No. of Units	Average Daily Demand (GPD)	Maximum Daily Demand (GPD)	Peak Hour Demand (GPD)
Single Family	0	0	0	0
Multi-Family	106	37,100	55,650	111,300

Irrigation (4,000 GPD/acre)	0.5	2,000	3,000	6,000
Total		39,100	58,650	111,300
Total (Including 20% loss)		46,920	70,380	140,760

*Water demands shown were calculated based on the current overall Land Use Master Plan. Due to uncertainty in the development schedules for Phases 3 and 4 and the potential for changes to the development density and configuration could occur in which water demands could also change. Water demands for future phases would have to be re-evaluated upon commencement of the planning and design of those phases.

Pumping Capacity Analysis

Overall Hanapepe-Eleele System

The pumping capacity of the existing system was analyzed to determine if it is adequate to accommodate the proposed Lima Ola Development. The analysis was done with the consideration of two wells (Hanapepe A and Hanapepe 4) as water sources. In accordance with the County of Kauai’s Water System Standards, the largest pumping unit in the system is considered to be out of service (on standby). With Hanapepe B being the well with the largest pump (900 GPM) in the Hanapepe-Eleele Water System, this pump was considered out of service. With the developmental planning proceeding for Phase 2 of Lima Ola, pumping capacity will need to be re-evaluated for subsequent phases 3 and 4, at the time when phase(s) are implemented.

Total Pumping Capacity of Well ‘Hanapepe A’ = 500 GPM

Total Pumping Capacity of Well ‘Hanapepe 4’ = 700 GPM

Total Pumping Capacity of the Hanapepe-Eleele System = 1,200 GPM

= **1,728,000 Gallons per Day (GPD)**

The pumping capacity of the proposed water system was analyzed for two (2) different scenarios.

Scenario 1: The first scenario uses the maximum water demand of the Hanapepe-Eleele Water System based on water consumption data provided by the DOW for the 2013 calendar year and the projected demand for the Lima Ola Development based on the Water System Standards, 2002. Water consumption data provided by the DOW is shown in Appendix D (see attached CD).

Average Daily Demand for the Hanapepe-Eleele Water System (2013 DOW Data)

= 692,466 GPD

Maximum (Max) Factor = 1.5

Maximum Daily Demand = 1.5 x 692,466 GPD

= 1,038,700 GPD

In consideration of non-metered water use and future pending developments, a 15 percent allowance, with the addition of a 5 percent factor of safety, was included in the calculations to represent a water system loss; adding onto the existing water consumption. Non-metered water use includes pipe leakage, unaccounted water meters and hydrants, unauthorized water use, inaccurate metering and line flushing. This value is based on the projection of the water conservation programs described in the DOW's Water Plan 2020.

Allowance for Non-Metered Water Use and Future Pending Developments

= 20% (estimated system loss)

Maximum Daily Demand (including 20% loss) = 1.20 x 1,038,700 GPD

= 1,246,440 GPD

Water demands for each phase of the proposed Lima Ola Development are shown in the following Tables 11 through 14.

Table 11: Phase 1 Water Consumption

Development Type	**Water Demand Per Land Use (GPD/Unit)**	**No. of Units**	**Area (Acres)**	**Average Demand (GPD)**	**Max Daily Demand (GPD)**	**Peak Hour Demand (GPD)**
Single Family or Duplex	500	38	-	19,000	28,500	57,000
Multi Family	350	138	-	48,300	72,450	144,900
Community Center	3,000	-	3	9,000	13,500	27,000
Irrigation	4,000	-	2.5	10,000	15,000	30,000
Total				86,300	129,450	258,900

*Phase 1 is located within the 340-Foot Service Zone. Primarily serviced by two (2) 0.4 MG water storage tanks.

Calculated Maximum Daily Demand for Lima Ola (Phase 1) = 129,450 GPD

Table 12: Phase 2 Water Consumption

Development Type	**Water Demand Per Land Use (GPD/Unit)**	**No. of Units**	**Area (Acres)**	**Average Demand (GPD)**	**Max Daily Demand (GPD)**	**Peak Hour Demand (GPD)**
Single Family or Duplex	500	62	-	31,000	46,500	93,000
Multi Family	350	140	-	49,000	73,500	147,000
Irrigation	4,000	-	3.35	13,400	20,100	40,200

Total	93,400	140,100	280,200

*Phase 2 is located within the 402-Foot Service Zone. Primarily to be serviced by one (1) 0.2 MG water storage tank.

Calculated Maximum Daily Demand for Lima Ola (Phase 2) = 140,100 GPD

Table 13: Phase 3 Water Consumption

Development Type	Water Demand Per Land Use (GPD/Unit)	No. of Units	Area (Acres)	Average Demand (GPD)	Max Daily Demand (GPD)	Peak Hour Demand (GPD)
Single Family or Duplex	500	0	-	0	0	0
Multi Family	350	180	-	63,000	94,500	189,000
Irrigation	4,000	-	0.5	2,000	3,000	6,000
Total				65,000	97,500	195,000

*Phase 3 is located within the 402-Foot Service Zone. Primarily to be serviced by one (1) 0.2 MG water storage tank.

Calculated Maximum Daily Demand for Lima Ola (Phase 3) = 97,500 GPD

Table 14: Phase 4 Water Consumption

Development Type	Water Demand Per Land Use (GPD/Unit)	No. of Units	Area (Acres)	Average Demand (GPD)	Max Daily Demand (GPD)	Peak Hour Demand (GPD)
Single Family or Duplex	500	0	-	0	0	0
Multi Family	350	106	-	37,100	55,650	111,300
Irrigation	4,000	-	0.5	2,000	3,000	6,000
Total				39,100	58,650	117,300

*Phase 4 is located within the 402-Foot Service Zone. Primarily to be serviced by one (1) 0.2 MG water storage tank.

Calculated Maximum Daily Demand for Lima Ola (Phase 4) = 58,650 GPD

Total Maximum Daily Demand for Lima Ola = 425,700 GPD

Total Maximum Daily Demand for Lima Ola (including 20% loss) = 1.20 x 425,700 GPD

= 510,840 GPD

Total Demand (including Lima Ola) of the Hanapepe-Eleele Water System = **1,757,280 GPD**

Total Maximum Daily Demand is greater than Total Pumping Capacity. Therefore, pumping capacity is not adequate. (1,757,280 GPD < 1,728,000 GPD)

Scenario 2: The second scenario is based on the projected demand in the DOW's Water Plan 2020 for the Hanapepe-Eleele water system. The projected demand value is stated in Table 4.5 of the Water Plan 2020, which displays the historical and forecasted water use for the water systems in Kauai. The value stated in the Water Plan 2020 incorporates non-metered water use. Proposed water demands for Lima Ola Development also include non-metered water use.

Hanapepe-Eleele Forecasted Demand (Year 2020) = **1,361,000 GPD**

Hanapepe-Eleele Forecasted Demand (Year 2020) + Phase 1 of Lima Ola Development + Phase 2 of Lima Ola Development

1,361,000 + 155,340 + 168,120 = 1,684,460 GPD

Hanapepe-Eleele Forecasted Demand (Year 2020) + Overall Lima Ola Development

1,361,000 + 456,570 = 1,817,570 GPD

Total Maximum Daily Demand for the Hanapepe-Eleele Forecasted Demand (Year 2020) with the addition of Phase 1 and Phase 2 of Lima Ola is less than Total Pumping Capacity. Therefore, pumping capacity is adequate. (1,684,460 GPD < 1,728,000 GPD)

Eleele Water System

The pumping capacity of the existing Eleele portion of the Hanapepe-Eleele Water System was analyzed to determine if it is adequate to accommodate the proposed Lima Ola Development. In the existing Hanapepe-Eleele Water System, water is drawn into Eleele through a 750-GPM booster pump in Hanapepe Valley. Therefore, the pumping capacity analysis was based on the Eleele booster pump as the water source for Eleele.

Total Pumping Capacity of Eleele Booster Pump = 750 GPM*

= **1,080,000 Gallons per Day (GPD)**

*750 GPM is identified here, for capacity of Eleele, is not the set figure that the DOW has approved from the available total source of the Hanapepe-Eleele service zone. The exact capacity of water being delivered from Hanapepe to Eleele will be determined by the DOW.

The pumping capacity was done using the maximum daily water demand for Eleele based on the Hanapepe-Eleele water consumption data provided by the DOW for the 2013 calendar year and the proposed maximum daily demand for the Lima Ola Development was based on the Water System Standards, 2002. Water consumption data provided by the DOW is shown in Appendix D (see attached CD).

Average Daily Demand

Existing Eleele Water System (Based on 2013 DOW Data) = 252,924 GPD
Proposed Lima Ola Development = 283,800 GPD
Total = 252,924 + 283,800= 536,724 GPD

Maximum Daily Demand = 1.5 x 536,724 GPD

= 805,086 GPD

In consideration of non-metered water use and future pending developments, a 15 percent allowance, with the addition of a 5 percent factor of safety, was included in the calculations to represent a water system loss; adding onto the existing and proposed water consumption. Non-metered water use includes pipe leakage, unaccounted water meters and hydrants, unauthorized water use, inaccurate metering and line flushing. This value is based on the projection of the water conservation programs described in the DOW's Water Plan 2020.

Allowance for Non-Metered Water Use and Future Pending Developments

= 20% (estimated system loss)

Maximum Daily Demand (including 20% loss) = 1.20 x 805,086 GPD

= 966,104 GPD

Total Maximum Daily Demand (Existing Eleele and proposed Lima Ola) of the Hanapepe-Eleele Water System = **966,104 GPD**

Total Maximum Daily Demand is less than Total Pumping Capacity. Therefore, pumping capacity is adequate. (966,104 GPD < 1,080,000 GPD)

In accordance with the analysis performed, the pumping capacity and source availability is adequate for Phase 2 of the proposed Lima Ola Development. This is in accordance with consideration of the Eleele 750 GPM booster pump being the limiting source for the existing Eleele and proposed Lima Ola Development in the Hanapepe-Eleele Water System. Due to the uncertainty of Lima Ola's development schedule and the schedule of other developments, the pumping capacity and source availability for subsequent Phases 3 and 4 will be re-evaluated at the time when that phase(s) are implemented. Designation of the maximum allowable capacity for the Eleele service zone from the total source capacity of the three (3) active well sources in the Hanapepe service zone will be determined by the DOW.

Reservoir (Tank) Sizing Analysis

For the proposed development, the maximum daily demand with a 15 percent estimated water system loss, with an addition of a 5 percent factor of safety, was calculated to evaluate the required water storage capacity to support the Lima Ola development. The water demand analysis was performed for each phase of the development.

Lima Ola Development – Phase 1 (340-Foot Service Zone)

Phase 1 of the proposed Lima Ola development was analyzed for the case of using the existing water storage at the 340-foot elevation service zone.

Existing 340-Foot Service Zone with Lima Ola Development (Phase 1)

Phase 1 was evaluated along with the existing water demands for the 340-foot service zone area to determine if the two (2) existing 0.4 MG Eleele water storage tanks are adequate to service the existing water demand and proposed water demand for Phase 1. Water demands also include the 20% water loss factor.

Case 1
Criteria: Meet maximum day consumption. Tank is full at the beginning of the 24-hour period with no source input to the tank.

Average Daily Demand

Existing 340’ service zone (Based on 2013 DOW Data) = 211,104 GPD
Lima Ola, Phase 1 = 86,300 GPD
Total = 211,104 + 86,300 = 297,404 GPD

Maximum Daily Demand = 1.5 x 297,404 GPD

= 446,106 GPD

Maximum Daily Demand (including 20% loss) = 1.20 x 446,106 GPD

= 535,327 GPD

Therefore, the tank must have a 535,327-gallon capacity.

Case 2
Criteria: Meet the maximum day rate plus fire flow for duration of fire. Tank is ¾ full at the start of fire, with credit for incoming flow from pumps, one maximum size pump out of service.

Assume Inflow from Pumps (worst case scenario) = 0 GPM

$$\frac{\left[\dfrac{446{,}106\ \text{GPD}}{24\,\dfrac{\text{hr}}{\text{day}}\ \text{x}\ 60\,\dfrac{\text{min}}{\text{hr}}} + \ 2{,}000\ \text{GPM}\right] \text{x}\ 120\ \text{min}}{0.75} = 369{,}567\ \text{gallons}$$

Maximum Daily Demand (including 20% loss) = 1.20 x 369,567 GPD

= 443,481 GPD

Therefore, the tank must have a 443,481-gallon capacity.

Case 1 governs. The two (2) existing 0.4 MG water storage tanks have adequate water storage capacity to accommodate the existing water demands for the existing 340-foot elevation service zone and Phase 1 of the Lima Ola Development.

Lima Ola Development - Phase 2 (402-Foot Service Zone)

Existing 402-Foot Service Zone with Lima Ola Development (Phase 2)

Phase 2 was evaluated along with the existing water demands for the 402-foot service zone area to determine if the existing 0.2 MG Eleele water storage tank is adequate to service the existing water demand and proposed water demand for Phase 2. Water demands also include the 20% water loss factor. It is also noted that the existing 0.2 MG water storage tank is filled from the 340-foot water storage tanks through two (2) 120 GPM Eleele Nani booster pumps, where one (1) pump operates at a time with the other one serving as a back-up pump.

Case 1
Criteria: Meet maximum day consumption. Tank is full at the beginning of the 24-hour period with no source input to the tank.

Average Daily Demand
Existing 402' service zone (Based on 2013 DOW Data) = 41,820 GPD
Lima Ola, Phase 2 = 93,400 GPD
Total = 41,820 + 93,400 = 135,220 GPD

Maximum Daily Demand = 1.5 x 135,220 GPD
= 202,830 GPD

Maximum Daily Demand (including 20% loss) = 1.20 x 202,830 GPD

= 243,396 GPD

Therefore, the tank must have a 243,396-gallon capacity.

Case 2
Criteria: Meet the maximum day rate plus fire flow for duration of fire. Tank is ¾ full at the start of fire, with credit for incoming flow from pumps, one maximum size pump out of service.

Assume Inflow from Pumps (worst case scenario) = 0 GPM

$$\frac{\left[\frac{202{,}830\ \text{GPD}}{24\frac{\text{hr}}{\text{day}}\ \text{x}\ 60\frac{\text{min}}{\text{hr}}}+\ 1{,}250\ \text{GPM}\right]\text{x}\ 120\ \text{min}}{0.75}=222{,}537\text{gallons}$$

Maximum Daily Demand (including 20% loss) = 1.20 x 222,537 GPD

= 267,044 GPD

Therefore, the tank must have a 267,044-gallon capacity.

Case 2 governs. The existing 0.2 MG water storage tank is inadequate to accommodate the existing water demand for the 402-foot elevation water service zone and the proposed water demand for Phase 2 of the Lima Ola Development. Since subsequent phases of the proposed Lima Ola Development is also serviced by the existing 0.2 MG water storage tank, this analysis will continue to look at water demands for Phases 3 and 4 to determine sizing requirements for water storage.

As previously noted, the 120 GPM Eleele Nani booster pumps are used to supply water from the two (2) 0.4 MG water storage tanks at the 340-foot elevation to the 402-foot 0.2 MG water storage tank. The booster pump must meet the pumping capacity criteria at the maximum daily demand with an operating time of 24 hours.

Eleele Nani Booster Pump: 120 GPM = 172,800 GPD.

Maximum Daily Demand (Existing + Phase 2): 243,396 GPD (inclusive of 20% water loss)

Therefore, pumping ability to fill the 0.2 MG 402-foot water storage tank is inadequate to accommodate the water demands for existing and proposed Phase 2 Lima Ola. To meet the 243,396 GPD demand, a minimum sized pump required is a 160 GPM booster pump; however, since Phase 3 and 4 also needs to be pumped to the 0.2 MG 402-foot water storage tank, the analysis will continue to look at water demands for these phases and determine the minimum required pumping capacity to satisfy these phases.

Lima Ola Development - Phases 2 and 3 (402-Foot Service Zone)

Existing 402-Foot Service Zone with Lima Ola Development (Phases 2 and 3)

In the previous analysis, it was determined that the existing 0.2 MG water storage tank at the 402-foot elevation is inadequate to accommodate existing and Phase 2 Lima Ola water demands. It was also determined that the existing 120 GPM booster pump was also inadequate to meet the maximum daily demands required with an operating time of 24 hours. However, for purposes of this Water Master Plan and consistency of the calculations, the following calculations will continue to look at how the subsequent phases affect the water system.

Case 1
Criteria: Meet maximum day consumption. Tank is full at the beginning of the 24-hour period with no source input to the tank.

Average Daily Demand

Existing 402’ service zone (Based on 2013 DOW Data) = 50,184 GPD
Lima Ola, Phase 2 + 3 = 93,400 + 65,000 = 158,400 GPD
Total = 50,184 + 158,400 = 208,584 GPD

Maximum Daily Demand = 1.5 x 208,584 GPD
= 312,876 GPD

Maximum Daily Demand (including 20% loss) = 1.20 x 312,876 GPD

= 375,451 GPD

Therefore, the tank must have a 375,451-gallon capacity.

Case 2
Criteria: Meet the maximum day rate plus fire flow for duration of fire. Tank is ¾ full at the start of fire, with credit for incoming flow from pumps, one maximum size pump out of service.

Assume Inflow from Pumps (worst case scenario) = 0 GPM

$$\frac{\left[\dfrac{312{,}876}{24\,\dfrac{\text{hr}}{\text{day}}\ \text{x}\ 60\,\dfrac{\text{min}}{\text{hr}}} +\ 1{,}250\ \text{GPM}\right]\text{x}\ 120\ \text{min}}{0.75} = 234{,}764\ \text{gallons}$$

Maximum Daily Demand (including 20% loss) = 1.20 x 234,764 GPD

= 281,717 GPD

Therefore, the tank must have a 281,717-gallon capacity.

Case 1 governs. The existing 0.2 MG water storage tank is inadequate to accommodate the existing water demand for the 402-foot elevation water service zone and the proposed water demand for Phases 2 and 3 of the Lima Ola Development. In addition, it is also known that the existing 120 GPM Eleele Nani booster pumps at the 340-foot elevation water storage tank are inadequate to convey water from the 340-foot elevation water storage tank to the 402-foot elevation water storage tank.

Lima Ola Development - Phases 2, 3 and 4 (402-Foot Service Zone)

Existing 402-Foot Service Zone with Lima Ola Development (Phases 2, 3 and 4)

In the previous analysis, it was determined that the existing 0.2 MG water storage tank at the 402-foot elevation is inadequate to accommodate existing and Phases 2 and 3 Lima Ola water demands. It was also determined that the existing 120 GPM booster pump was also inadequate to meet the maximum daily demands required with an operating time of 24 hours. For purposes of this Water Master Plan and consistency of the calculations, the following calculations will continue to look at the how subsequent phases affects the water system.

Case 1
Criteria: Meet maximum day consumption. Tank is full at the beginning of the 24-hour period with no source input to the tank.

Average Daily Demand
Existing 402' service zone (Based 2013 on DOW Data) = 50,184 GPD
Lima Ola, Phase 2 + 3 + 4 = 93,400 + 65,000 + 39,100 = 197,500 GPD
Total = 50,184 + 197,500 = 247,684 GPD

Maximum Daily Demand = 1.5 x 247,684 GPD
= 371,526 GPD

Maximum Daily Demand (including 20% loss) = 1.20 x 371,526 GPD

= 445,831 GPD

Therefore, the tank must have a 445,831-gallon capacity.

Case 2
Criteria: Meet the maximum day rate plus fire flow for duration of fire. Tank is ¾ full at the start of fire, with credit for incoming flow from pumps, one maximum size pump out of service.

Assume Inflow from Pumps (worst case scenario) = 0 GPM

$$\frac{\left[\dfrac{371{,}526\text{ GPD}}{24\dfrac{\text{hr}}{\text{day}}\text{ x }60\dfrac{\text{min}}{\text{hr}}} + 1{,}250\text{ GPM}\right]\text{x }120\text{ min}}{0.75} = 241{,}281\text{ gallons}$$

Maximum Daily Demand (including 20% loss) = 1.20 x 241,281 GPD

= 289,537 GPD

Therefore, the tank must have a 289,537-gallon capacity.

Case 1 governs. The existing 0.2 MG water storage tank is inadequate to accommodate the existing water demand for the 402-foot elevation water service zone and the proposed water demand for Phases 2, 3 and 4 of the Lima Ola Development. In addition, it is also known that the existing 120 GPM Eleele Nani booster pumps at the 340-foot elevation water storage tank are inadequate to convey water from the 340-foot elevation water storage tank to the 402-foot elevation water storage tank.

In accordance with the analysis performed in this section, it is determined that the two (2) existing 0.4 MG 340-foot water storage tanks are adequate to accommodate Phase 1 of the Lima Ola Development. However, the existing 0.2 MG 402-foot water storage tank and the 120 GPM booster pumps are inadequate to accommodate the remaining phases (Phases 2 through 4) of the Lima Ola Development. Since the deficiency occurs during Phase 2, improvements to the water system should take place during construction of the Phase 2 Development, but the size of the improvements should consider the ultimate development (Phase 4). Based on this, it is recommended that an additional 0.3 MG water storage tank be constructed at the 402-foot elevation. It is also recommended that the pumping ability at the 340-foot elevation tanks be increased from 120 GPM to 350 GPM to fill the existing 0.2 MG and proposed 0.3 MG storage tanks at the 402-foot elevation in 24 hours.

Hydraulic Model Analysis

The purpose of constructing a water system model was to simulate the operation of the existing Hanapepe-Eleele Water System and evaluate the effect the Lima Ola Development has on the water system. In addition, the water model will allow the sizing of distribution mains and provide results that meet the Water System Standards (2002). This water model was developed using the Bentley WaterCAD, Version 2024. The water model was constructed as follows:

Existing Hanapepe-Eleele Water System

The existing Hanapepe-Eleele Water System model was constructed with information from as-built drawings and a previous water model that was developed for the Hanapepe-Eleele Water System. The simulation results for all pipes and nodes for the existing Hanapepe-Eleele Water System are shown in Appendix B. The water demands were based on the 2013 water consumption data provided by the DOW; see Appendix D in attached CD. The demand for each node was calculated based on the ratio between the DOW WaterGEMS model and the DOW 2013 consumption data for the Hanapepe-Eleele area. The calculated demands were then assigned to select nodes throughout the water system model. The velocities in the pipe segments of the existing water system range between 0 fps to 2.00 fps. The pressures at various nodes of the existing water system range between 31 psi to 125 psi.

Calibrating the Water Model

The model was calibrated by comparing selected fire hydrant test pressures measured during field testing against residual fire hydrant pressures obtained from the model. The deviation of error between the data from the field and the hydraulic model was ±10 psi in consideration of systematic errors, as well as measurement analysis errors. The field-testing data for the fire hydrants was provided by the DOW; for data refer to Appendix D (see attached CD). Ten (10) fire hydrants were chosen for the calibration of the model. The ten (10) fire hydrants used for calibration are shown on Exhibit 1 - Overall System Map in Appendix A. A comparison of pressures between the model and the field test pressures are shown in Table 15.

Table 15: Fire Hydrant Pressure Comparisons

Fire Hydrant ID	Data from Field Testing (psi)	Data from Model (psi)
C-105	60	53
C-120	81	87
C-1	33	27
C-16	68	61
C-55	49	48
C-34	87	89
C-83	70	61
C-149	80	81
C-131	52	55
C-126	74	79

Lima Ola Development

The Lima Ola Development was conceptually designed and integrated into the model. The water tanks to service the Lima Ola Development are located along Kaumualii Highway in two (2) separate pressure zones; 340-foot elevation and 402-foot elevation. Interconnecting the proposed Lima Ola Development and the existing Hanapepe-Eleele Water System showed no adverse effects on the existing transmission and distribution mains. In the past, the only transmission main delivering water to the Eleele service zone was the 27-inch transmission line in Hanapepe Valley. Presently, a 16-inch transmission line was put in place to interconnect the Hanapepe and Eleele water service zones along Kaumualii Highway. A copy of the Lima Ola Development water model can be accessed in Appendix D (see attached CD).

Maximum Day Demand (With Fire Flow) and Peak Hour Flow Analysis

The results in Appendix C include the simulation results for the 340-foot and 402-foot elevation service zones that will service the Lima Ola Development.

The velocities in the pipe segments for the 340-foot elevation service zone range between 0 fps to 5.78 fps. The pressures at the various nodes in this service zone for the maximum day consumption with fire flow (community center) range between 29 psi to 58 psi. Our fire flow analysis showed no adverse effects on the existing system. The pressure at the critical hydrant (FH-5a) in this service zone is 18 psi. This does not meet the required pressure of 20 psi, and so, a fire hydrant will be constructed nearby, in the 402-foot service zone, to accommodate the low pressure. The pressures at the various nodes in this 340-foot service zone for peak hour consumption range between 48 psi to 76 psi. Exhibit 3 – 340-Foot Service Zone Pipe and Junction Map in Appendix A shows the schematics and results for this service zone.

The velocities in the pipe segments for the 402-foot elevation service zone range between 0 fps to 5.57 fps. The pressures at the various nodes in this service zone for the maximum day consumption with fire flow range between 37 psi to 61 psi. The fire flow analysis showed no adverse effects on the existing system. The pressure at the critical hydrant (FH-21) in this service zone is 31 psi. The pressures at the various nodes in this service zone for peak hour consumption range between 54 psi to 75 psi. Exhibit 4 – 402-Foot Service Zone Pipe and Junction Map in Appendix A includes the schematics and results for this service zone.

Two simulation scenarios were conducted for both service zones with the proposed 0.3 MG tank set to be ¾ full at the start of fire flow. By the end of fire flow, the pressure in both critical fire hydrants (FH-5a and FH-21) was 18 psi. Due to the inadequate pressure, a new fire hydrant must be constructed in the 402-foot service zone to provide support to service the affected lots.

Extended Period Simulation Analysis

An extended period simulation (EPS) analysis was incorporated into the water model to analyze the existing water system with the proposed conditions over the course of a 24-hour period. A diurnal curve developed by AWWA, as shown in Figure 1, was used to model the variation of water demand throughout the day. The diurnal curve developed by AWWA was based on field measurements that provided a rational basis for varying the demands over a 24-hour period.

To simulate the water system over an extended time period, controls were programmed into the model to trigger the on and off sequence of the pumps based on the water level of the corresponding tank. These on and off controls of the pumps have been set to match the existing condition in the Hanapepe-Eleele Water System. For the proposed 0.3 MG water storage tank to be built at the 402-foot elevation to service the proposed phase 2 and the subsequent phases 3 and 4 of Lima Ola, the pump controls were set as the same as the existing 0.2 MG water storage tank at the 402-foot elevation. Monitoring the tank levels throughout our EPS analysis shows the existing and proposed water storage tanks emptying and filling throughout the day to maintain an adequate water level in each tank. This analysis was done to validate that there is sufficient water sources and pump capacity for maximum daily consumption over the 24-hour period. Figure 2 shows the tank levels fluctuating over the 24-hour time period.

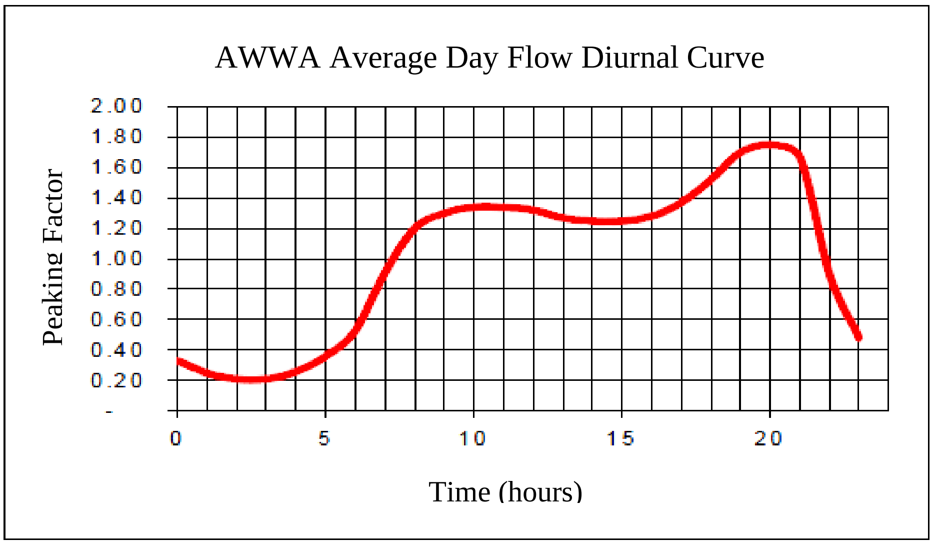

Figure 1: AWWA Average Day Flow Diurnal Curve (Source: AWWA Manual M32)

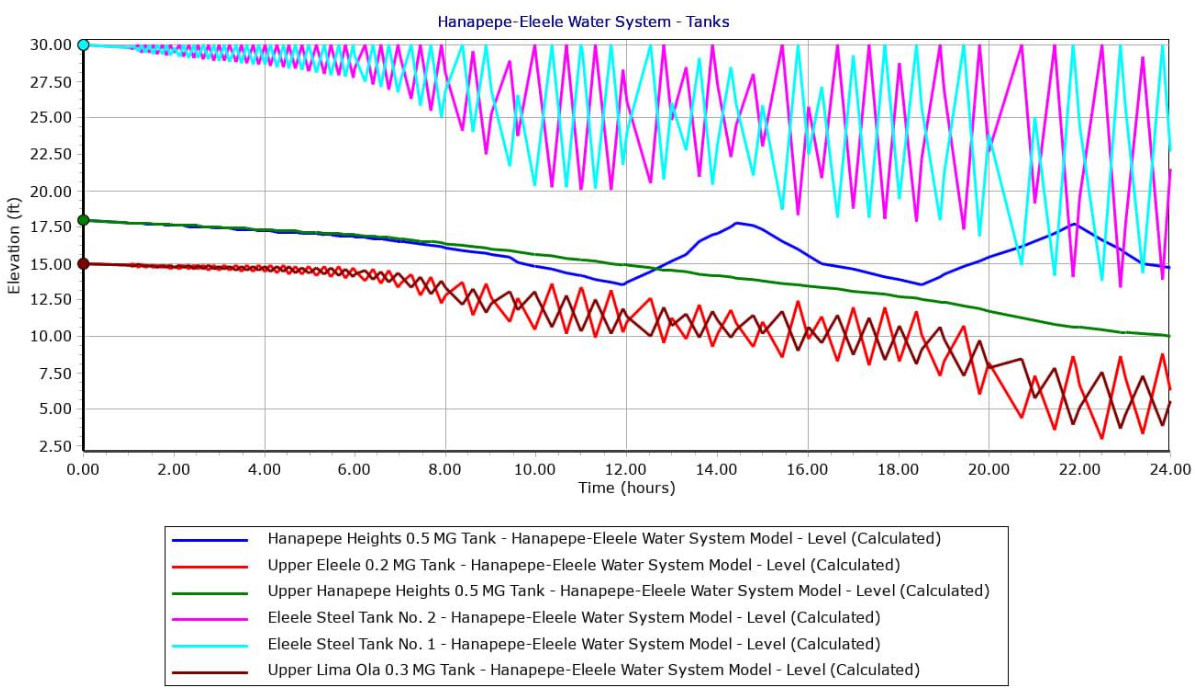

Figure 2: Hanapepe-Eleele Water System – Tanks (EPS)

As shown in Figure 2, the water level of all tanks were above zero by the end of the EPS simulation which means that the system is able to provide full service to the proposed maximum daily demands till the end of a 24-hour period.

The recently built 16-inch waterline constructed through a DOW Capital Improvement Project (CIP) has increased the reliability within the water system but is shown as not being necessary to accommodate the Lima Ola Development.

Exhibit 5 – Schematic Diagram in Appendix A includes a schematic of the overall Hanapepe-Eleele water system with the different pressure zones that constitute the water system.

Approximately 5,377 linear feet (LF) of 8-inch waterline is required for the proposed Lima Ola Development. The water model results confirm that the proposed infrastructure improvements meet the State of Hawaii, Water System Standards (2002).

Cost Analysis

Tables 16 through 18 include a cost breakdown of the water system improvements to be implemented by the Kauai County Housing Agency for each phase of the proposed Lima Ola Development.

Table 16: Cost for the Water System Design of the Lima Ola Development, Phase 2

Item	Unit Count	Unit	Unit Cost (US Dollars)	Total Cost (US Dollars)
8" Waterline (including gate valves, bends etc.)	2,689	LF	210	564,690
Fire Hydrant	8	EA	4,500	36,000
Water Lateral	69	EA	1,800	124,200
Chlorination and Testing	1	LS	50,000	50,000
Connection to Existing System	1	EA	10,000	10,000
300,000-Gallon Water Tank	1	EA	700,000	700,000
350-GPM Booster Pump	2	EA	35,000	70,000
			Total	**$ 1,554,890**

Table 17: Cost for the Water System Design of the Lima Ola Development, Phase 3

Item	Unit Count	Unit	Unit Cost (US Dollars)	Total Cost (US Dollars)
8" Waterline (including gate valves, bends etc.)	1,764	LF	210	370,440
Fire Hydrant	5	EA	4,500	22,500
Water Lateral	3	EA	1,800	5,400
Chlorination and Testing	1	LS	50,000	50,000
Connection to Existing System	1	EA	10,000	10,000
			Total	**$ 458,340**

Table 18: Cost for the Water System Design of the Lima Ola Development, Phase 4

Item	Unit Count	Unit	Unit Cost (US Dollars)	Total Cost (US Dollars)
8" Waterline (including gate valves, bends etc.)	924	LF	210	194,040
Fire Hydrant	4	EA	4,500	18,000
Water Lateral	2	EA	1,800	3,600
Chlorination and Testing	1	LS	50,000	50,000
Connection to Existing System	1	EA	10,000	10,000
			Total	**$ 275,640**

Total Cost for the Water System Design of the Lima Ola Development = $ 2,288,870

Conclusions and Recommendations

This water master plan for the Lima Ola Development shows that the Hanapepe-Eleele water system is adequate to support the proposed Lima Ola Development, Phase 2. As for phases 3 and 4, water source availability will be re-evaluated at a later time due to uncertainty in Lima Ola's development schedule.

Transmission and storage facility improvements according to each development phase for the Lima Ola Development were analyzed and summarized below.

Table 20: Summary of Required Improvements Per Phase

	Required Improvements
Phase 2	300,000-gallon water storage tank at 402-foot elevation; 350 GPM booster pump at the 340-foot elevation; approximately 2,689 linear feet of 8-inch water line; 8 fire hydrants; 69 water laterals; and chlorination and testing.
Phase 3*	Approximately 1,764 linear feet of 8-inch water line; 5 fire hydrants; 3 water laterals; and chlorination and testing.
Phase 4*	Approximately 924 linear feet of 8-inch water line; 4 fire hydrants; 2 water laterals; and chlorination and testing.

*Required improvements addresses storage and transmission facilities for Phases 3 and 4 are based on the current layout of the Lima Ola Development and its associated water demands, which are subject to change. It is noted that due to the uncertainty of the development schedule for Phases 3 and 4 of this project and other potential developments in the vicinity, Phase 3 and 4 will be re-evaluated at the appropriate time when the planning and design of the particular phase commences.

As previously stated, the Hanapepe-Eleele Water System is able to accommodate Phase 2 of the proposed Lima Ola development. Due to the uncertainty of Lima Ola's development schedule and the schedule of other developments, subsequent phases (Phase 3 and 4) will be re-evaluated at the time when that phase(s) are implemented. If at the time of re-evaluation additional source is needed, then considerations will be discussed with County of Kauai, Department of Water to analyze viable options to address need. If in the later phases of the development another point of source is developed in the Eleele service zone, then the 16-inch interconnection waterline may not be necessary and the Hanapepe and Eleele water systems will not be totally dependent on each other. Any alterations to the development that deviates from this master plan is subject to an amendment of this water master plan.

References

1. State of Hawaii, Water System Standards (2002).

2. Water Plan 2020, Department of Water, County of Kauai (March 2001).

3. Lima Ola Workforce Housing Development, Master Plan, County of Kauai, Kimura International (March 2012).

4. Lima Ola Feasibility Study, R.M. Towill Corporation (January 2013).

Appendix A

HANAPEPE-ELEELE WATER SYSTEM

SCALE: 1"=500'

Community Planning and Engineering, Inc.
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LIMA OLA WORKFORCE HOUSING DEVELOPMENT WATER MASTER PLAN

ELEELE, KAUAI, HAWAII

EXHIBIT 1
OVERALL SYSTEM MAP

LIMA OLA (PHASE 1)

RESIDENTIAL UNIT TYPE	NO. OF UNITS
SINGLE FAMILY (SF)	38
MULTI FAMILY (MF)	138

LIMA OLA (PHASE 2)

RESIDENTIAL UNIT TYPE	NO. OF UNITS
SINGLE FAMILY (SF)	62
MULTI FAMILY (MF)	87

LIMA OLA (PHASE 3)

RESIDENTIAL UNIT TYPE	NO. OF UNITS
SINGLE FAMILY (SF)	0
MULTI FAMILY (MF)	180

LIMA OLA (PHASE 4)

RESIDENTIAL UNIT TYPE	NO. OF UNITS
SINGLE FAMILY (SF)	0
MULTI FAMILY (MF)	106

TOTAL LIMA OLA DEVELOPMENT

RESIDENTIAL UNIT TYPE	NO. OF UNITS
SINGLE FAMILY (SF)	100
MULTI FAMILY (MF)	511
TOTAL	611

LIMA OLA WORKFORCE HOUSING PROPOSED DEVELOPMENT
AVERAGE MULTI FAMILY DENSITY (12 UNITS/ACRE)

SCALE: 1"=350'

350 175 0 350 700

Graphic Scale in Feet

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LIMA OLA WORKFORCE HOUSING DEVELOPMENT WATER MASTER PLAN

ELEELE, KAUAI, HAWAII

EXHIBIT 3
LIMA OLA WORKFORCE HOUSING PROPOSED DEVELOPMENT

REVISED AUGUST 9, 2024

MAX DAY: PIPE AND JUNCTION TABLE WITH FIRE FLOW AT HYDRANT FH-5a

Label	Diameter (in)	Start Node	Stop Node	Length (User Defined) (ft)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
1	8	EL-J-821	FH-1	50	Ductile Iron	110	468.29	2.99
1a	8	FH-1a	FH-1	340	Ductile Iron	110	-468.29	2.99
2	8	FH-2	FH-1a	310	Ductile Iron	110	-468.29	2.99
2a	8	FH-2	FH-2a	324	Ductile Iron	110	468.29	2.99
3	8	1	FH-2a	124	Ductile Iron	110	-468.29	2.99
3a	8	FH-3	1	86	Ductile Iron	110	443.73	2.83
4	8	2	FH-3	135	Ductile Iron	110	443.73	2.83
4a	8	3	2	25	Ductile Iron	110	466.92	2.98
5	8	4	3	125	Ductile Iron	110	486.62	3.11
5a	8	FH-3a	4	50	Ductile Iron	110	497.87	3.18
6	8	FH-3a	5	285	Ductile Iron	110	-497.87	3.18
6a	12	EL-J-36	5	1,015	Ductile Iron	110	1,639.60	4.65
7	8	5	FH-4	28	Ductile Iron	110	1,111.73	7.1
7a	8	FH-4	FH-4a	232	Ductile Iron	110	1,111.73	7.1
8	8	FH-4a	FH-5	242	Ductile Iron	110	1,111.73	7.1
8a	8	FH-5	FH-5a	203	Ductile Iron	110	1,111.73	7.1
9	8	FH-5a	FH-6	237	Ductile Iron	110	-888.27	5.67
9a	8	6	FH-6	252	Ductile Iron	110	888.27	5.67
10	8	FH-7	6	92	Ductile Iron	110	905.77	5.78
10a	8	1	FH-7	250	Ductile Iron	110	905.77	5.78
10b	8	2	2a	33	Ductile Iron	110	23.19	0.15
10c	8	3	3a	33	Ductile Iron	110	19.69	0.13
10d	8	4	4a	27	Ductile Iron	110	11.25	0.07
10e	8	6	6a	33	Ductile Iron	110	17.5	0.11

Label	Elevation (ft)	Demand (gpm)	Pressure (psi)	Hydraulic Grade (ft)
1	202.9	6.26	36	286.39
2	209.52	0	34	287.62
2a	209.52	23.19	34	287.61
3	209.78	0	34	287.77
3a	209.78	19.69	34	287.77
4	210.31	0	34	288.59
4a	210.31	11.25	34	288.59
5	213	30	34	290.88
6	212.09	0	29	279.31
6a	212.09	17.5	29	279.31
EL-J-36	223.7	0	33	299.64
EL-J-821	160	0	58	293.4
FH-1	172.79	0	52	293.1
FH-1a	179.74	0	48	291.02
FH-2	189.09	0	43	289.13
FH-2a	201.39	0	37	287.15
FH-3	205.79	0	35	286.87
FH-3a	211.15	0	34	288.93
FH-4	220.8	0	30	290.04
FH-4a	224.21	0	25	283.01
FH-5	226.62	0	21	275.68
FH-5a	227.81	2,000	18	269.53
FH-6	224.15	0	22	274.27
FH-7	210.11	0	31	281.21

PEAK HOUR: PIPE AND JUNCTION TABLE

Label	Diameter (in)	Start Node	Stop Node	Length (User Defined) (ft)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
1	8	EL-J-821	FH-1	50	Ductile Iron	110	-18.48	0.12
1a	8	FH-1a	FH-1	340	Ductile Iron	110	18.48	0.12
2	8	FH-2	FH-1a	310	Ductile Iron	110	18.48	0.12
2a	8	FH-2	FH-2a	324	Ductile Iron	110	-18.48	0.12
3	8	1	FH-2a	124	Ductile Iron	110	18.48	0.12
3a	8	FH-3	1	86	Ductile Iron	110	3.92	0.02
4	8	2	FH-3	135	Ductile Iron	110	3.92	0.02
4a	8	3	2	25	Ductile Iron	110	50.3	0.32
5	8	4	3	125	Ductile Iron	110	89.69	0.57
5a	8	FH-3a	4	50	Ductile Iron	110	112.19	0.72
6	8	FH-3a	5	285	Ductile Iron	110	-112.2	0.72
6a	12	EL-J-36	5	1,015	Ductile Iron	110	234.27	0.66
7	8	5	FH-4	28	Ductile Iron	110	62.09	0.4
7a	8	FH-4	FH-4a	232	Ductile Iron	110	62.09	0.4
8	8	FH-4a	FH-5	242	Ductile Iron	110	62.09	0.4
8a	8	FH-5	FH-5a	203	Ductile Iron	110	62.09	0.4
9	8	FH-5a	FH-6	237	Ductile Iron	110	62.09	0.4
9a	8	6	FH-6	252	Ductile Iron	110	-62.09	0.4
10	8	FH-7	6	92	Ductile Iron	110	-27.08	0.17
10a	8	1	FH-7	250	Ductile Iron	110	-27.08	0.17
10b	8	2	2a	33	Ductile Iron	110	46.38	0.3
10c	8	3	3a	33	Ductile Iron	110	39.39	0.25
10d	8	4	4a	27	Ductile Iron	110	22.5	0.14
10e	8	6	6a	33	Ductile Iron	110	35.01	0.22

Label	Elevation (ft)	Demand (gpm)	Pressure (psi)	Hydraulic Grade (ft)
1	202.9	12.51	57	334.82
2	209.52	0	54	334.82
2a	209.52	46.38	54	334.81
3	209.78	0	54	334.82
3a	209.78	39.39	54	334.82
4	210.31	0	54	334.85
4a	210.31	22.5	54	334.85
5	213	60	53	335
6	212.09	0	53	334.83
6a	212.09	35.01	53	334.82
EL-J-36	223.7	0	48	335.24
EL-J-821	160	0	76	334.8
FH-1	172.79	0	70	334.8
FH-1a	179.74	0	67	334.8
FH-2	189.09	0	63	334.81
FH-2a	201.39	0	58	334.81
FH-3	205.79	0	56	334.82
FH-3a	211.15	0	54	334.88
FH-4	220.8	0	50	334.99
FH-4a	224.21	0	48	334.96
FH-5	226.62	0	47	334.93
FH-5a	227.81	0	46	334.9
FH-6	224.15	0	48	334.86
FH-7	210.11	0	54	334.82

340' SERVICE ZONE

SCALE: 1"=100'

LEGEND

- PROPOSED 340' SERVICE ZONE WATERLINE
- EXISTING 340' SERVICE ZONE WATERLINE
- PROPOSED 402' SERVICE ZONE WATERLINE
- EXISTING 402' SERVICE ZONE WATERLINE
- EXISTING WATERLINE
- JUNCTION
- FIRE HYDRANT
- JUNCTION NUMBER
- PIPE NUMBER

100 50 0 100 200
Graphic Scale in Feet

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LIMA OLA WORKFORCE HOUSING DEVELOPMENT WATER MASTER PLAN

ELEELE, KAUAI, HAWAII

EXHIBIT 3
340-FOOT SERVICE ZONE PIPE AND JUNCTION MAP

402' SERVICE ZONE - 1

SCALE: 1"=100'

MAX DAY: PIPE AND NODE TABLE WITH FIRE FLOW AT HYDRANT FH-21

Pipe No.	Diameter (in)	Start Node	Stop Node	Length (User Defined) (ft)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
11	8	7	8	14	Ductile Iron	110	160.91	1.03
11a	8	7	7a	30	Ductile Iron	110	16.62	0.11
12	8	8	FH-9	124	Ductile Iron	110	146.42	0.93
13	8	FH-9	FH-9a	183	Ductile Iron	110	146.42	0.93
14	8	FH-9a	FH-10	212	Ductile Iron	110	146.42	0.93
15	8	FH-10	9	218	Ductile Iron	110	146.42	0.93
15a	8	9	FH-11	116	Ductile Iron	110	11.37	0.07
15b	8	FH-11	10	28	Ductile Iron	110	11.37	0.07
15c	8	10	10a	30	Ductile Iron	110	11.37	0.07
16	8	9	11	37	Ductile Iron	110	120.56	0.77
16a	8	11	11a	30	Ductile Iron	110	10.07	0.06
17	8	11	FH-12	22	Ductile Iron	110	110.49	0.71
18	8	FH-12	13	188	Ductile Iron	110	110.49	0.71
19	8	FH-13	13	156	Ductile Iron	110	139.17	0.89
20	8	FH-13a	FH-13	290	Ductile Iron	110	139.17	0.89
21	8	FH-14	FH-13a	245	Ductile Iron	110	139.17	0.89
22	8	12	FH-14	98	Ductile Iron	110	139.17	0.89
23	8	13	14	77	Ductile Iron	110	241.35	1.54
23a	8	14	14a	30	Ductile Iron	110	15.75	0.1
24	8	14	FH-15a	65	Ductile Iron	110	225.6	1.44
25	8	FH-15a	15	176	Ductile Iron	110	225.6	1.44
25a	8	15	15a	30	Ductile Iron	110	15.75	0.1
26	8	15	FH-16	59	Ductile Iron	110	209.85	1.34
27	8	FH-16	16	91	Ductile Iron	110	209.85	1.34
27a	8	16	16a	30	Ductile Iron	110	14.88	0.09
28	8	16	FH-18	159	Ductile Iron	110	194.97	1.24
29	8	FH-18	FH-20	200	Ductile Iron	110	194.97	1.24
30	8	FH-20	17	97	Ductile Iron	110	194.97	1.24
31	8	17	FH-19	153	Ductile Iron	110	-188.1	1.2
32	8	FH-19	18	253	Ductile Iron	110	-188.1	1.2
32a	8	18	18a	30	Ductile Iron	110	33.26	0.21
33	8	18	FH-17	84	Ductile Iron	110	-265.9	1.7
34	8	FH-17	19	84	Ductile Iron	110	-265.9	1.7
34a	8	19	19a	30	Ductile Iron	110	29.75	0.19
34b	8	19	19b	30	Ductile Iron	110	15.75	0.1
35	8	19	FH-15	215	Ductile Iron	110	-311.4	1.99
36	8	FH-15	12	123	Ductile Iron	110	-311.4	1.99
37	8	12	J-90	53	Ductile Iron	110	-458.9	2.93
38	8	J-90	FH-8	151	Ductile Iron	110	177.53	1.13
39	8	FH-8	7	26	Ductile Iron	110	177.53	1.13
40	8	FH-21	17	168	Ductile Iron	110	-378	2.41
41	8	FH-22	FH-21	384	Ductile Iron	110	871.97	5.57
42	8	EL-J-3	FH-22	300	Ductile Iron	110	871.97	5.57
43	8	J-90	J-91	122	Ductile Iron	110	-636.4	4.06
44	8	J-91	J-92	172	Ductile Iron	110	-636.4	4.06
45	8	J-92	J-93	31	Ductile Iron	110	-636.4	4.06
45a	8	J-93	J-94	433	Ductile Iron	110	-636.4	4.06

Junction No.	Elevation (ft)	Demand (gpm)	Pressure (psi)	Hydraulic Grade (ft)
7	222.54	0	57	354.86
7a	222.54	16.62	57	354.86
8	222.54	14.49	57	354.85
9	225.9	14.49	56	354.33
10	223.6	0	57	354.33
10a	223.3	11.37	57	354.33
11	226.34	0	55	354.31
11a	226.34	10.07	55	354.31
12	227.67	8.31	55	354.73
13	230.67	8.31	54	354.22
14	233.14	0	52	354.08
14a	233.14	15.75	52	354.08
15	242.99	0	48	353.7
15a	242.99	15.75	48	353.7
16	250.85	0	44	353.5
16a	250.85	14.88	44	353.5
17	268.22	4.99	37	352.95
18	252.77	44.62	44	353.4
18a	252.77	33.26	44	353.4
19	243.85	0	48	353.76
19a	243.85	29.75	48	353.76
19b	243.85	15.75	48	353.76
J-90	226.73	0	56	355.04
J-91	246	0	48	356.36
J-92	240	0	51	358.21
J-93	240	0	51	358.54
J-94	221.44	0	61	363.21
FH-8	229.92	0	54	354.89
FH-9	229.94	0	54	354.76
FH-9a	231.38	0	53	354.63
FH-10	233.05	0	53	354.48
FH-11	230.14	0	54	354.33
FH-12	233.67	0	52	354.3
FH-13	238.35	0	50	354.32
FH-13a	237.05	0	51	354.51
FH-14	235.12	0	52	354.67
FH-15	239.41	0	50	354.38
FH-15a	242.71	0	48	353.98
FH-16	252.12	0	44	353.62
FH-17	255.09	0	43	353.58
FH-18	266.49	0	38	353.3
FH-19	271.6	0	35	353.12
FH-20	274.36	0	34	353.06
FH-21	281.35	1,250.00	31	352.26
FH-22	280.93	0	34	359.67

PEAK HOUR PIPE AND NODE TABLE

Pipe No.	Diameter (in)	Start Node	Stop Node	Length (User Defined) (ft)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
11	8	7	8	14	Ductile Iron	110	65.59	0.42
11a	8	7	7a	30	Ductile Iron	110	33.24	0.21
12	8	8	FH-9	124	Ductile Iron	110	36.61	0.23
13	8	FH-9	FH-9a	183	Ductile Iron	110	36.61	0.23
14	8	FH-9a	FH-10	212	Ductile Iron	110	36.61	0.23
15	8	FH-10	9	218	Ductile Iron	110	36.61	0.23
15a	8	9	FH-11	116	Ductile Iron	110	22.74	0.15
15b	8	FH-11	10	28	Ductile Iron	110	22.74	0.15
15c	8	10	10a	30	Ductile Iron	110	22.74	0.15
16	8	9	11	37	Ductile Iron	110	-15.11	0.1
16a	8	11	11a	30	Ductile Iron	110	20.13	0.13
17	8	11	FH-12	22	Ductile Iron	110	-35.24	0.22
18	8	FH-12	13	188	Ductile Iron	110	-35.24	0.22
19	8	FH-13	13	156	Ductile Iron	110	39.76	0.25
20	8	FH-13a	FH-13	290	Ductile Iron	110	39.76	0.25
21	8	FH-14	FH-13a	245	Ductile Iron	110	39.76	0.25
22	8	12	FH-14	98	Ductile Iron	110	39.76	0.25
23	8	13	14	77	Ductile Iron	110	-12.1	0.08
23a	8	14	14a	30	Ductile Iron	110	31.5	0.2
24	8	14	FH-15a	65	Ductile Iron	110	-43.6	0.28
25	8	FH-15a	15	176	Ductile Iron	110	-43.6	0.28
25a	8	15	15a	30	Ductile Iron	110	31.5	0.2
26	8	15	FH-16	59	Ductile Iron	110	-75.1	0.48
27	8	FH-16	16	91	Ductile Iron	110	-75.1	0.48
27a	8	16	16a	30	Ductile Iron	110	29.76	0.19
28	8	16	FH-18	159	Ductile Iron	110	-104.86	0.67
29	8	FH-18	FH-20	200	Ductile Iron	110	-104.86	0.67
30	8	FH-20	17	97	Ductile Iron	110	-104.86	0.67
31	8	17	FH-19	153	Ductile Iron	110	147.44	0.94
32	8	FH-19	18	253	Ductile Iron	110	147.44	0.94
32a	8	18	18a	30	Ductile Iron	110	66.51	0.42
33	8	18	FH-17	84	Ductile Iron	110	-8.31	0.05
34	8	FH-17	19	84	Ductile Iron	110	-8.31	0.05
34a	8	19	19a	30	Ductile Iron	110	59.49	0.38
34b	8	19	19b	30	Ductile Iron	110	31.5	0.2
35	8	19	FH-15	215	Ductile Iron	110	-99.3	0.63
36	8	FH-15	12	123	Ductile Iron	110	-99.3	0.63
37	8	12	J-90	53	Ductile Iron	110	-155.68	0.99
38	8	J-90	FH-8	151	Ductile Iron	110	98.83	0.63
39	8	FH-8	7	26	Ductile Iron	110	98.83	0.63
40	8	FH-21	17	168	Ductile Iron	110	262.29	1.67
41	8	FH-22	FH-21	384	Ductile Iron	110	262.29	1.67
42	8	EL-J-3	FH-22	300	Ductile Iron	110	262.29	1.67
43	8	J-90	J-91	122	Ductile Iron	110	-254.51	1.62
44	8	J-91	J-92	172	Ductile Iron	110	-254.51	1.62
45	8	J-92	J-93	31	Ductile Iron	110	-254.51	1.62
45a	8	J-93	J-94	433	Ductile Iron	110	-254.51	1.62

Junction No.	Elevation (ft)	Demand (gpm)	Pressure (psi)	Hydraulic Grade (ft)
7	222.54	0	74	393.48
7a	222.54	33.24	74	393.48
8	222.54	28.98	74	393.48
9	225.9	28.98	73	393.44
10	223.3	0	74	393.44
10a	223.3	22.74	74	393.44
11	226.34	0	72	393.44
11a	226.34	20.13	72	393.44
12	227.67	16.62	72	393.5
13	230.67	16.62	71	393.45
14	233.14	0	69	393.45
14a	233.14	31.5	69	393.45
15	242.99	0	65	393.47
15a	242.99	31.5	65	393.47
16	250.85	0	62	393.5
16a	250.85	29.76	62	393.5
17	268.22	9.99	54	393.68
18	252.77	89.24	61	393.39
18a	252.77	66.51	61	393.38
19	243.85	0	65	393.39
19a	243.85	59.49	65	393.38
19b	243.85	31.5	65	393.39
J-90	226.73	0	72	393.55
J-91	246	0	64	393.79
J-92	240	0	67	394.13
J-93	240	0	67	394.19
J-94	221.44	0	75	395.04
FH-8	229.92	0	71	393.49
FH-9	229.94	0	71	393.48
FH-9a	231.38	0	70	393.47
FH-10	233.05	0	70	393.45
FH-11	230.14	0	71	393.44
FH-12	233.67	0	69	393.44
FH-13	238.35	0	67	393.46
FH-13a	237.05	0	68	393.48
FH-14	235.12	0	69	393.5
FH-15	239.41	0	67	393.46
FH-15a	242.71	0	65	393.46
FH-16	252.12	0	61	393.48
FH-17	255.09	0	60	393.39
FH-18	266.49	0	55	393.56
FH-19	271.6	0	53	393.57
FH-20	274.36	0	52	393.64
FH-21	281.35	0	49	394.03
FH-22	280.93	0	49	394.83

TRUE NORTH
Scale: 1 in. = 100 ft.

100 50 0 100 200
Graphic Scale in Feet

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1286 Queen Emma St. Honolulu, Hawaii

LIMA OLA WORKFORCE HOUSING DEVELOPMENT WATER MASTER PLAN

ELEELE, KAUAI, HAWAII

EXHIBIT 4
402-FOOT SERVICE ZONE PIPE AND JUNCTION MAP

LEGEND

	PROPOSED 340' SERVICE ZONE WATERLINE
	EXISTING 340' SERVICE ZONE WATERLINE
	PROPOSED 402' SERVICE ZONE WATERLINE
	EXISTING 402' SERVICE ZONE WATERLINE
	EXISTING WATERLINE
	JUNCTION
	FIRE HYDRANT
16	JUNCTION NUMBER
24	PIPE NUMBER

402' SERVICE ZONE - 2

SCALE: 1"=100'

100 50 0 100 200

Graphic Scale in Feet

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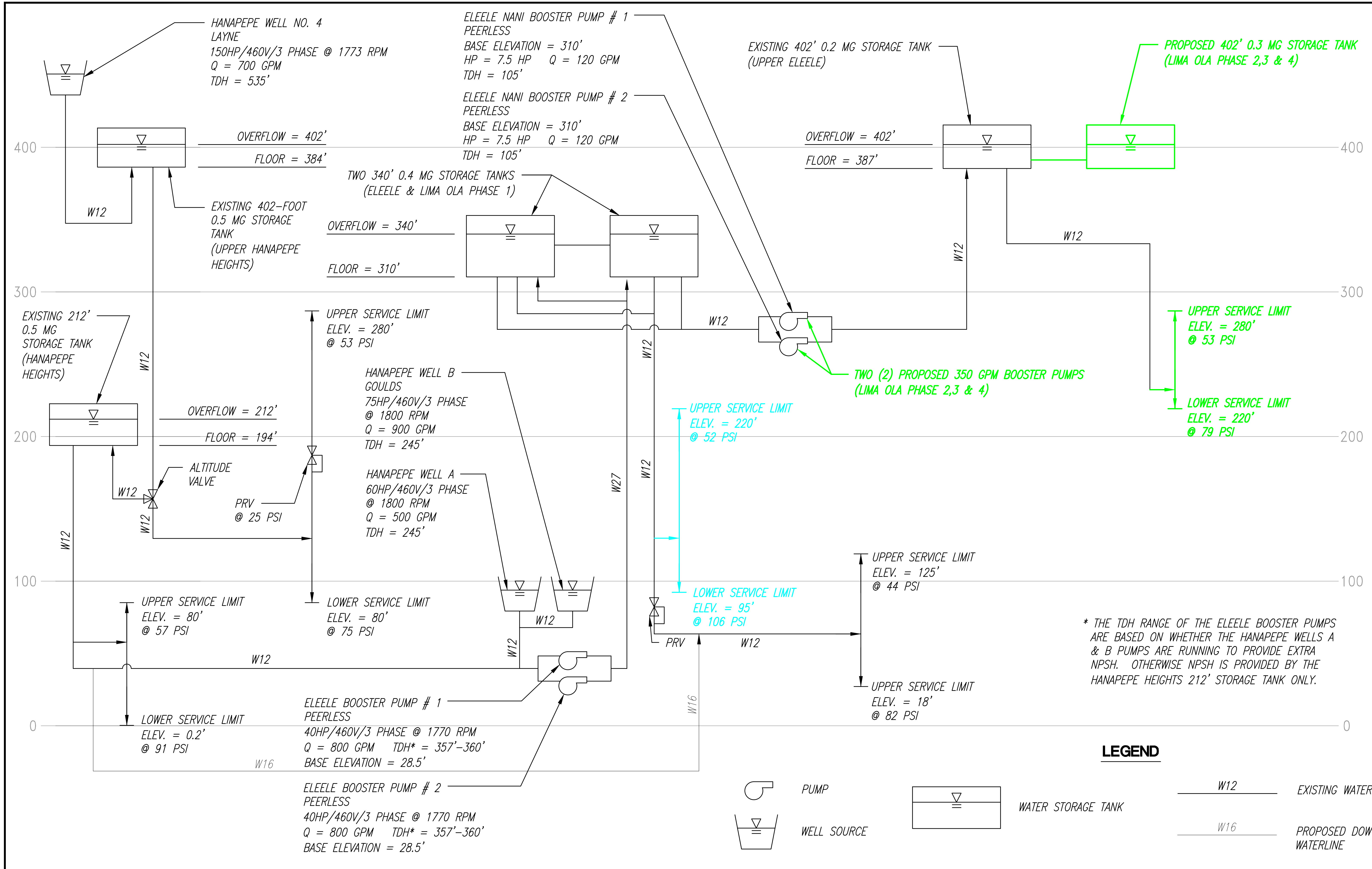
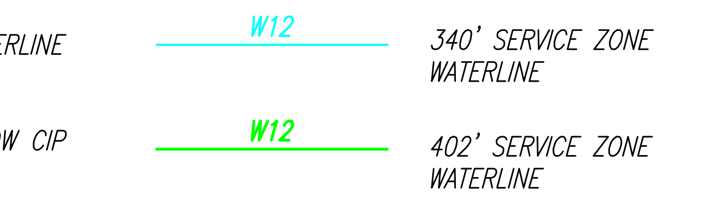
LIMA OLA WORKFORCE HOUSING DEVELOPMENT WATER MASTER PLAN

ELEELE, KAUAI, HAWAII

EXHIBIT 5
402-FOOT SERVICE ZONE PIPE AND JUNCTION MAP



LEGEND



LIMA OLA (PHASE 1)

LAND USE	WATER DEMAND PER LAND USE	NO. OF UNITS	AREA (ACRES)	AVERAGE DEMAND	MAX DAILY	PEAK HOUR
SINGLE FAMILY OR DUPLEX	500	38	–	19,000	28,500	57,000
MULTI FAMILY	350	138	–	48,300	72,450	144,900
COMMUNITY CENTER	3,000	–	3	9,000	13,500	27,000
IRRIGATION	4,000	–	2.5	10,000	15,000	30,000
TOTAL	–	–	–	86,300	129,450	310,680

LIMA OLA (PHASE 2)

LAND USE	WATER DEMAND PER LAND USE	NO. OF UNITS	AREA (ACRES)	AVERAGE DEMAND	MAX DAILY	PEAK HOUR
SINGLE FAMILY OR DUPLEX	500	62	–	31,000	46,500	93,000
MULTI FAMILY	350	140	–	49,000	73,500	147,000
IRRIGATION	4,000	–	3.35	13,400	20,100	40,200
TOTAL	–	–	–	93,400	140,100	280,200

LIMA OLA (PHASE 3)

LAND USE	WATER DEMAND PER LAND USE	NO. OF UNITS	AREA (ACRES)	AVERAGE DEMAND	MAX DAILY	PEAK HOUR
SINGLE FAMILY OR DUPLEX	500	0	–	0	0	0
MULTI FAMILY	350	180	–	63,000	94,500	189,000
IRRIGATION	4,000	–	0.5	2,000	3,000	6,000
TOTAL	–	–	–	65,000	97,500	195,000

LIMA OLA (PHASE 4)

LAND USE	WATER DEMAND PER LAND USE	NO. OF UNITS	AREA (ACRES)	AVERAGE DEMAND	MAX DAILY	PEAK HOUR
SINGLE FAMILY OR DUPLEX	500	0	–	0	0	0
MULTI FAMILY	350	106	–	37,100	55,650	111,300
IRRIGATION	4,000	–	0.5	2,000	3,000	6,000
TOTAL	–	–	–	39,100	58,650	117,300

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LIMA OLA WORKFORCE HOUSING DEVELOPMENT WATER MASTER PLAN

ELEELE, KAUAI, HAWAII

EXHIBIT 6
SCHEMATIC DIAGRAM

Appendix B

Water Model Results for

Hanapepe-Eleele Water System (Existing)

Pipe Table

FlexTable: Pipe Table

Hanapepe-Eleele Water System

Current Time: 0.000 hours

Pipe No.	Diameter (in)	Start Node	Stop Node	Length (Scaled) (ft)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
HH-P-1	12.0	HH-J-1	Upper Hanapepe Heights 0.5MG Tank	4,549	Ductile Iron	100.0	-125.18	0.36
HH-P-2	12.0	HH-J-2	HH-J-1	231	Ductile Iron	100.0	-125.18	0.36
HH-P-3	6.0	HH-J-2	C-105	55	Ductile Iron	100.0	17.99	0.20
HH-P-4	6.0	C-105	HH-J-3	150	Ductile Iron	100.0	17.41	0.20
HH-P-5	6.0	HH-J-3	C-106	114	Ductile Iron	100.0	0.18	0.00
HH-P-7	6.0	HH-J-3	C-107	290	Ductile Iron	100.0	17.23	0.20
HH-P-8	6.0	C-107	HH-J-4	199	Ductile Iron	100.0	15.39	0.17
HH-P-9	6.0	HH-J-4	HH-J-5	208	Ductile Iron	100.0	-15.66	0.18
HH-P-10	12.0	HH-J-5	HH-J-2	486	Ductile Iron	100.0	-107.19	0.30
HH-P-11	6.0	C-108	HH-J-4	244	Ductile Iron	100.0	-30.63	0.35
HH-P-12	6.0	HH-J-6	C-108	48	Ductile Iron	100.0	-29.38	0.33
HH-P-13	2.5	HH-J-6	HH-J-7	149	PVC	150.0	0.79	0.05
HH-P-14	6.0	HH-J-8	HH-J-6	281	Ductile Iron	100.0	-27.84	0.32
HH-P-15	6.0	HH-J-9	HH-J-8	203	Ductile Iron	100.0	-11.88	0.13
HH-P-16	12.0	C-104	HH-J-9	511	Ductile Iron	100.0	89.03	0.25
HH-P-17	6.0	HH-J-5	C-104	66	Ductile Iron	100.0	90.51	1.03
HH-P-18	6.0	C-109	HH-J-8	223	Ductile Iron	100.0	-14.31	0.16
HH-P-19	6.0	HH-J-10	C-109	36	Ductile Iron	100.0	-13.65	0.15
HH-P-20	2.5	HH-J-10	HH-J-11	141	PVC	150.0	0.42	0.03
HH-P-21	6.0	C-110	HH-J-10	298	Ductile Iron	100.0	-11.91	0.14
HH-P-22	6.0	HH-J-12	C-110	142	Ductile Iron	100.0	-10.60	0.12
HH-P-23	2.5	HH-J-12	HH-J-13	129	PVC	150.0	0.00	0.00
HH-P-24	6.0	HH-J-14	HH-J-12	180	Ductile Iron	100.0	-10.11	0.11
HH-P-25	6.0	C-125	HH-J-14	468	Ductile Iron	100.0	4.73	0.05
HH-P-26	6.0	HH-J-15	C-125	436	Ductile Iron	100.0	8.04	0.09
HH-P-27	12.0	C-103	HH-J-15	169	Ductile Iron	100.0	99.53	0.28
HH-P-28	12.0	HH-J-9	C-103	64	Ductile Iron	100.0	100.48	0.29

FlexTable: Pipe Table
Hanapepe-Eleele Water System

Current Time: 0.000 hours

Pipe No.	Diameter (in)	Start Node	Stop Node	Length (Scaled) (ft)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
HH-P-29	6.0	C-111	HH-J-14	32	Ductile Iron	100.0	-14.19	0.16
HH-P-30	6.0	HH-J-16	C-111	190	Ductile Iron	100.0	-12.98	0.15
HH-P-31	6.0	C-124	HH-J-16	296	Ductile Iron	100.0	2.39	0.03
HH-P-32	6.0	HH-J-17	C-124	600	Ductile Iron	100.0	7.25	0.08
HH-P-33	12.0	C-102	HH-J-17	61	Ductile Iron	100.0	87.96	0.25
HH-P-34	12.0	HH-J-15	C-102	156	Ductile Iron	100.0	89.20	0.25
HH-P-35	6.0	C-112	HH-J-16	156	Ductile Iron	100.0	-13.66	0.15
HH-P-36	6.0	HH-J-18	C-112	48	Ductile Iron	100.0	-11.95	0.14
HH-P-37	6.0	C-123	HH-J-18	458	Ductile Iron	100.0	4.85	0.06
HH-P-38	6.0	HH-J-19	C-123	435	Ductile Iron	100.0	7.58	0.09
HH-P-39	12.0	HH-J-17	HH-J-19	197	Ductile Iron	100.0	79.73	0.23
HH-P-40	6.0	C-113	HH-J-18	188	Ductile Iron	100.0	-8.59	0.10
HH-P-41	6.0	HH-J-20	C-113	57	Ductile Iron	130.0	-8.39	0.10
HH-P-42	6.0	C-122	HH-J-20	548	Ductile Iron	100.0	3.32	0.04
HH-P-43	6.0	HH-J-21	C-122	341	Ductile Iron	100.0	6.83	0.08
HH-P-44	12.0	C-101	HH-J-21	170	Ductile Iron	100.0	69.35	0.20
HH-P-45	12.0	HH-J-19	C-101	76	Ductile Iron	100.0	70.83	0.20
HH-P-46	6.0	C-114	HH-J-20	191	Ductile Iron	100.0	-10.76	0.12
HH-P-47	6.0	HH-J-22	C-114	53	Ductile Iron	100.0	-9.58	0.11
HH-P-48	6.0	HH-J-23	HH-J-22	445	Ductile Iron	100.0	-2.32	0.03
HH-P-49	6.0	HH-J-24	HH-J-23	445	Ductile Iron	100.0	7.98	0.09
HH-P-50	12.0	C-100	HH-J-24	63	Ductile Iron	100.0	60.71	0.17
HH-P-51	12.0	HH-J-21	C-100	187	Ductile Iron	100.0	61.36	0.17
HH-P-52	6.0	HH-J-25	HH-J-22	250	Ductile Iron	100.0	-5.68	0.06
HH-P-53	6.0	HH-J-26	HH-J-25	217	Ductile Iron	100.0	-3.89	0.04
HH-P-54	2.5	HH-J-26	HH-J-27	128	PVC	150.0	1.41	0.09
HH-P-55	6.0	HH-J-28	HH-J-26	229	Ductile Iron	100.0	0.31	0.00
HH-P-56	2.5	HH-J-28	HH-J-29	124	PVC	150.0	1.24	0.08
HH-P-57	6.0	C-121	HH-J-28	203	Ductile Iron	100.0	5.99	0.07

FlexTable: Pipe Table
Hanapepe-Eleele Water System

Current Time: 0.000 hours

Pipe No.	Diameter (in)	Start Node	Stop Node	Length (Scaled) (ft)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
HH-P-58	6.0	HH-J-23	C-121	51	Ductile Iron	130.0	7.14	0.08
HH-P-59	6.0	C-118	HH-J-18	416	Ductile Iron	100.0	-7.32	0.08
HH-P-60	6.0	C-117	C-118	433	Ductile Iron	100.0	-7.32	0.08
HH-P-61	6.0	HH-J-30	C-117	61	Ductile Iron	100.0	-6.17	0.07
HH-P-62	6.0	C-119	HH-J-30	419	Ductile Iron	100.0	-1.78	0.02
HH-P-67	6.0	C-116	HH-J-34	211	Ductile Iron	130.0	(N/A)	(N/A)
HH-P-68	6.0	C-115	C-116	298	Ductile Iron	100.0	2.12	0.02
HH-P-69	6.0	HH-J-25	C-115	66	Ductile Iron	100.0	3.55	0.04
HH-P-74	6.0	C-9	HH-J-37	66	Ductile Iron	130.0	(N/A)	(N/A)
HH-P-75	6.0	C-120	C-9	463	Ductile Iron	100.0	2.09	0.02
HH-P-76	6.0	HH-J-28	C-120	51	Ductile Iron	100.0	3.78	0.04
HH-P-79	6.0	HH-J-41	HH-J-38	414	Ductile Iron	80.0	24.60	0.28
HH-P-81	12.0	HH-J-43	HH-J-42	494	Asbestos Cement	140.0	164.59	0.47
HH-P-82	12.0	HH-J-47	HH-J-43	87	Asbestos Cement	140.0	164.59	0.47
HH-P-83	12.0	HH-J-24	HH-J-44	213	Ductile Iron	100.0	52.05	0.15
HH-P-85	6.0	Hanapepe Heights Booster Pump #1	HH-J-45	41	Ductile Iron	130.0	0.00	0.00
HH-P-86	6.0	HH-J-45	Hanapepe Heights 0.5 MG Tank	51	Ductile Iron	80.0	-165.77	1.88
HH-P-87	6.0	HH-J-45	HH-J-46	41	Ductile Iron	80.0	165.77	1.88
HH-P-88	6.0	HH-J-47	HH-J-46	101	Ductile Iron	80.0	-164.59	1.87
HH-P-89	6.0	HH-J-48	HH-J-46	39	Ductile Iron	80.0	0.00	0.00
HH-P-91	6.0	HH-J-49	C-1	91	Ductile Iron	80.0	52.05	0.59
HH-P-92	6.0	C-1	HH-J-41	420	Ductile Iron	80.0	50.46	0.57
HH-P-93	6.0	HH-J-34	C-10	43	Ductile Iron	130.0	10.04	0.11
HH-P-94	6.0	C-10	HH-J-53	24	Ductile Iron	80.0	10.04	0.11

FlexTable: Pipe Table
Hanapepe-Eleele Water System
Current Time: 0.000 hours

Pipe No.	Diameter (in)	Start Node	Stop Node	Length (Scaled) (ft)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
HH-P-97	1.5	HH-J-56	HH-J-55	405	Ductile Iron	80.0	0.25	0.05
HH-P-100	6.0	C-8	HH-J-50	66	Cast iron	80.0	5.33	0.06
HH-P-101	6.0	C-3	HH-J-50	374	Asbestos Cement	140.0	5.64	0.06
HH-P-102	6.0	C-3	HH-J-51	47	Ductile Iron	80.0	-7.27	0.08
HH-P-103	6.0	C-2	HH-J-51	575	Ductile Iron	80.0	21.82	0.25
HH-P-104	6.0	HH-J-41	C-2	42	Ductile Iron	80.0	24.10	0.27
HH-P-105	6.0	HH-J-55	HH-J-57	27	Ductile Iron	80.0	2.64	0.03
HH-P-106	1.5	HH-J-57	HH-J-58	406	Ductile Iron	80.0	-0.25	0.05
HH-P-107	6.0	HH-J-58	HH-J-56	26	Ductile Iron	80.0	-1.39	0.02
HH-P-108	6.0	HH-J-50	HH-J-59	26	Cast iron	80.0	10.97	0.12
HH-P-109	1.5	HH-J-60	HH-J-59	421	Ductile Iron	80.0	0.09	0.02
HH-P-110	6.0	HH-J-51	HH-J-60	27	Ductile Iron	80.0	12.88	0.15
HH-P-115	1.0	HH-J-65	HH-J-64	333	Ductile Iron	80.0	-0.57	0.23
HH-P-116	2.0	HH-J-67	HH-J-66	106	Ductile Iron	80.0	0.11	0.01
HH-P-117	2.0	HH-J-58	HH-J-67	395	Ductile Iron	80.0	0.67	0.07
HH-P-118	6.0	HH-J-68	HH-J-67	25	Ductile Iron	80.0	-0.51	0.01
HH-P-119	6.0	HH-J-68	HH-J-69	201	Cast iron	80.0	9.35	0.11
HH-P-120	6.0	HH-J-69	HH-J-70	21	Ductile Iron	80.0	-1.60	0.02
HH-P-121	6.0	HH-J-70	C-4	333	Asbestos Cement	140.0	-1.60	0.02
HH-P-124	6.0	HH-J-59	C-7	301	Cast iron	80.0	10.56	0.12
HH-P-125	6.0	C-7	HH-J-68	95	Cast iron	80.0	9.39	0.11
HH-P-126	4.0	HH-J-86	HH-J-87	410	Ductile Iron	80.0	1.17	0.03
HH-P-128	1.0	HH-J-78a	HH-J-81	507	Cast iron	80.0	0.08	0.03
HH-P-129	6.0	HH-J-81	HH-J-82	43	Cast iron	80.0	-0.53	0.01
HH-P-130	4.0	HH-J-82	HH-J-83	60	Ductile Iron	80.0	-0.53	0.01
HH-P-131	4.0	HH-J-83	C-5	62	Ductile Iron	80.0	-0.53	0.01
HH-P-132	6.0	C-5	HH-J-84	30	Ductile Iron	80.0	-0.53	0.01
HH-P-133	2.0	HH-J-84	HH-J-86	436	Ductile Iron	80.0	-0.61	0.06

FlexTable: Pipe Table

Hanapepe-Eleele Water System

Current Time: 0.000 hours

Pipe No.	Diameter (in)	Start Node	Stop Node	Length (Scaled) (ft)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
HH-P-135	6.0	HH-J-80	HH-J-88	162	Cast iron	80.0	7.50	0.09
HH-P-136	2.0	HH-J-88	HH-J-89	30	Ductile Iron	80.0	0.20	0.02
HH-P-137	2.0	HH-J-89	HH-J-90	553	Ductile Iron	80.0	0.20	0.02
HH-P-138	2.0	HH-J-90	HH-J-91	81	Ductile Iron	80.0	0.20	0.02
HH-P-139	2.0	HH-J-91	HH-J-92	99	Ductile Iron	80.0	0.20	0.02
HH-P-140	2.0	HH-J-92	HH-J-93	62	Ductile Iron	80.0	0.20	0.02
HH-P-141	2.0	HH-J-93	HH-J-94	126	Ductile Iron	80.0	-0.23	0.02
HH-P-142	2.0	HH-J-94	HH-J-95	36	Ductile Iron	80.0	-0.23	0.02
HH-P-143	2.0	HH-J-95	HH-J-96	148	Ductile Iron	80.0	-0.23	0.02
HH-P-144	2.0	HH-J-96	HH-J-97	54	Ductile Iron	80.0	-0.23	0.02
HH-P-145	2.0	HH-J-97	C-6	305	Ductile Iron	80.0	-0.23	0.02
HH-P-146	2.0	C-6	HH-J-98	130	Ductile Iron	80.0	-0.23	0.02
HH-P-147	2.0	HH-J-98	HH-J-99	86	Ductile Iron	80.0	-0.23	0.02
HH-P-148	2.0	HH-J-99	HH-J-100	222	Ductile Iron	80.0	-0.23	0.02
HH-P-151	6.0	C-11	HH-J-74	149	Ductile Iron	80.0	1.51	0.02
HH-P-152	2.0	HH-J-74	HH-J-75	94	Ductile Iron	80.0	1.51	0.15
HH-P-153	6.0	HH-J-75	HH-J-76	68	Ductile Iron	80.0	1.51	0.02
HH-P-154	6.0	HH-J-76	HH-J-77	47	Ductile Iron	80.0	1.51	0.02
HH-P-155	6.0	HH-J-77	C-12	58	Ductile Iron	80.0	-0.06	0.00
HH-P-156	4.0	C-12	C-13	470	Cast iron	80.0	-0.89	0.02
HH-P-157	6.0	C-13	HH-J-78	115	Cast iron	80.0	-1.33	0.02
HH-P-158	6.0	HH-J-78	HH-J-79	272	Cast iron	80.0	8.84	0.10
HH-P-159	6.0	HH-J-79	C-14	74	Cast iron	80.0	8.84	0.10
HH-P-160	6.0	C-14	HH-J-80	55	Cast iron	80.0	8.09	0.09
HH-P-167	6.0	HH-J-105	HH-J-106	52	Cast iron	80.0	(N/A)	(N/A)
HH-P-168	12.0	HH-J-107	HH-J-106	315	Asbestos Cement	140.0	131.80	0.37
HH-P-169	12.0	C-55	HH-J-107	225	Asbestos Cement	140.0	131.80	0.37

FlexTable: Pipe Table
Hanapepe-Eleele Water System

Current Time: 0.000 hours

Pipe No.	Diameter (in)	Start Node	Stop Node	Length (Scaled) (ft)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
HH-P-170	12.0	HH-J-85	C-55	530	Asbestos Cement	140.0	134.74	0.38
HH-P-171	12.0	HH-J-85	HH-J-42	1,743	Asbestos Cement	140.0	-134.74	0.38
HH-P-172	12.0	HH-J-106	HH-J-108	634	Asbestos Cement	140.0	131.80	0.37
HH-P-173	12.0	HH-J-108	HH-J-109	185	Asbestos Cement	140.0	131.80	0.37
HH-P-174	12.0	HH-J-109	HH-J-110	347	Asbestos Cement	140.0	131.80	0.37
HH-P-175	12.0	HH-J-110	J-56	92	Asbestos Cement	140.0	131.80	0.37
HH-P-1420	6.0	C-15	HH-J-88	268	Ductile Iron	80.0	-5.03	0.06
HH-P-1421	6.0	C-16	C-15	496	Ductile Iron	80.0	-2.80	0.03
HH-P-1422	6.0	HH-J-105	HH-J-103a	280	Ductile Iron	80.0	-1.42	0.02
HH-P-1423	6.0	J-848	HH-J-53	281	Ductile Iron	80.0	-4.17	0.05
P-1	6.0	HH-J-42	J-73	1,334	Ductile Iron	80.0	28.54	0.32
P-2	6.0	J-73	J-548	329	Ductile Iron	80.0	28.54	0.32
P-3	6.0	J-549	J-551	701	Ductile Iron	80.0	11.15	0.13
P-4	6.0	C-60	J-155	198	Ductile Iron	85.0	-4.36	0.05
P-5	6.0	J-149	C-59	321	Ductile Iron	85.0	0.32	0.00
P-6	6.0	J-712	J-713	491	Ductile Iron	85.0	41.18	0.47
P-38	6.0	HH-J-25	HH-J-30	253	Ductile Iron	100.0	-2.59	0.03
P-76	6.0	HH-J-38	HH-J-34	468	Ductile Iron	80.0	12.17	0.14
P-157	6.0	J-131	J-132	54	Cast iron	80.0	19.31	0.22
P-158	6.0	J-132	J-133	31	Cast iron	80.0	18.00	0.20
P-159	6.0	J-133	J-134	120	Cast iron	80.0	18.00	0.20
P-160	6.0	J-134	C-18	164	Ductile Iron	80.0	18.00	0.20
P-161	6.0	C-18	J-136	194	Ductile Iron	80.0	17.64	0.20
P-162	6.0	J-136	J-137	76	Ductile Iron	80.0	17.64	0.20

FlexTable: Pipe Table
Hanapepe-Eleele Water System

Current Time: 0.000 hours

Pipe No.	Diameter (in)	Start Node	Stop Node	Length (Scaled) (ft)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
P-163	6.0	J-137	J-138	42	Ductile Iron	130.0	24.89	0.28
P-164	2.0	J-138	J-139	226	PVC	150.0	0.90	0.09
P-165	2.0	J-132	J-140	34	PVC	150.0	0.25	0.03
P-166	2.0	J-140	J-141	173	PVC	150.0	0.25	0.03
P-167	6.0	J-138	J-142	53	Cast iron	80.0	23.76	0.27
P-168	6.0	J-142	J-143	67	Ductile Iron	85.0	5.37	0.06
P-169	8.0	J-143	C-19	498	Asbestos Cement	140.0	5.37	0.03
P-170	8.0	C-19	J-145	109	Asbestos Cement	140.0	2.02	0.01
P-174	8.0	C-20	J-149	230	Asbestos Cement	140.0	0.32	0.00
P-177	8.0	C-59	J-152	157	Asbestos Cement	140.0	-1.00	0.01
P-178	8.0	J-152	J-153	263	Asbestos Cement	140.0	-1.00	0.01
P-179	8.0	J-153	J-154	198	Asbestos Cement	140.0	-3.47	0.02
P-184	6.0	J-158	J-159	624	Ductile Iron	80.0	9.64	0.11
P-185	2.5	J-159	J-160	111	PVC	150.0	1.05	0.07
P-186	2.5	J-160	J-161	83	PVC	150.0	1.05	0.07
P-187	2.5	J-161	J-162	89	PVC	150.0	1.05	0.07
P-188	2.5	J-162	J-163	125	PVC	150.0	1.05	0.07
P-189	2.5	J-163	J-164	401	PVC	150.0	1.05	0.07
P-190	2.5	J-164	C-22	141	PVC	150.0	1.05	0.07
P-191	2.5	C-22	J-166	240	PVC	150.0	0.45	0.03
P-192	2.5	J-166	J-167	101	PVC	150.0	0.45	0.03
P-195	12.0	J-169	J-170	64	Asbestos Cement	140.0	97.30	0.28

FlexTable: Pipe Table

Hanapepe-Eleele Water System

Current Time: 0.000 hours

Pipe No.	Diameter (in)	Start Node	Stop Node	Length (Scaled) (ft)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
P-196	12.0	J-170	C-65	276	Asbestos Cement	140.0	25.38	0.07
P-198	8.0	J-172	J-173	179	Asbestos Cement	140.0	10.02	0.06
P-199	8.0	J-173	C-69	104	Ductile Iron	85.0	16.11	0.10
P-200	8.0	C-69	J-175	58	Ductile Iron	85.0	16.11	0.10
P-201	6.0	J-175	J-176	511	Ductile Iron	90.0	0.00	0.00
P-202	6.0	J-168	J-173	44	Cast iron	80.0	6.10	0.07
P-203	6.0	J-172	J-177	355	Asbestos Cement	140.0	12.85	0.15
P-204	6.0	J-177	C-63	89	Asbestos Cement	140.0	12.85	0.15
P-205	4.0	C-63	J-179	134	PVC	150.0	12.85	0.33
P-206	4.0	J-179	J-180	66	PVC	150.0	12.85	0.33
P-207	12.0	J-170	J-181	474	Asbestos Cement	140.0	71.44	0.20
P-210	12.0	J-183	J-184	310	Ductile Iron	85.0	18.63	0.05
P-213	1.5	J-186	J-187	468	PVC	150.0	1.23	0.22
P-214	2.0	J-188	J-187	148	PVC	150.0	4.18	0.43
P-216	6.0	J-189	J-190	614	Asbestos Cement	140.0	-4.48	0.05
P-218	12.0	J-191	J-186	73	Ductile Iron	80.0	-13.48	0.04
P-219	6.0	J-188	J-192	67	Ductile Iron	80.0	-4.18	0.05
P-221	2.5	J-191	J-192	611	PVC	150.0	1.88	0.12
P-222	2.0	J-192	J-193	195	PVC	150.0	0.82	0.08
P-223	2.0	J-193	J-194	129	PVC	150.0	0.82	0.08
P-224	8.0	J-189	J-195	134	Asbestos Cement	140.0	-3.00	0.02
P-225	8.0	J-195	C-62	271	Asbestos Cement	140.0	-3.81	0.02

FlexTable: Pipe Table
Hanapepe-Eleele Water System

Current Time: 0.000 hours

Pipe No.	Diameter (in)	Start Node	Stop Node	Length (Scaled) (ft)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
P-226	8.0	C-62	J-197	28	Ductile Iron	80.0	-3.81	0.02
P-233	4.0	J-201	J-203	193	Cast iron	80.0	-1.43	0.04
P-234	4.0	J-203	J-204	183	Cast iron	80.0	-1.43	0.04
P-235	4.0	J-204	J-205	198	Cast iron	80.0	-1.43	0.04
P-236	4.0	J-205	J-206	61	Cast iron	80.0	-2.17	0.06
P-237	6.0	J-198	J-207	48	Ductile Iron	80.0	0.50	0.01
P-239	6.0	J-201	J-209	37	Ductile Iron	80.0	-1.34	0.02
P-240	6.0	J-209	J-210	209	Cast iron	80.0	-3.77	0.04
P-242	6.0	J-211	J-206	219	Cast iron	80.0	-5.05	0.06
P-244	6.0	J-212	J-213	26	Ductile Iron	80.0	10.16	0.12
P-246	6.0	J-213	J-215	41	Cast iron	80.0	10.16	0.12
P-247	4.0	J-215	J-216	236	Cast iron	80.0	2.13	0.05
P-248	6.0	J-215	C-31	65	Ductile Iron	80.0	8.03	0.09
P-249	6.0	C-31	J-183	278	Asbestos Cement	140.0	5.37	0.06
P-250	8.0	J-175	J-218	82	Ductile Iron	85.0	16.11	0.10
P-251	8.0	J-218	J-219	234	Asbestos Cement	140.0	16.11	0.10
P-254	8.0	C-58	J-222	337	Ductile Iron	85.0	14.16	0.09
P-257	3.0	J-224	C-67	387	PVC	150.0	6.86	0.31
P-258	3.0	C-67	J-226	593	PVC	150.0	0.00	0.00
P-259	3.0	J-226	J-227	581	PVC	150.0	0.00	0.00
P-260	3.0	J-227	J-228	479	PVC	150.0	0.00	0.00
P-261	3.0	J-228	J-229	113	PVC	150.0	0.00	0.00
P-262	3.0	J-229	C-68	380	PVC	150.0	0.00	0.00
P-263	3.0	C-68	J-231	74	PVC	150.0	0.00	0.00
P-264	3.0	J-231	J-232	39	PVC	150.0	0.00	0.00
P-265	3.0	J-232	J-233	76	PVC	150.0	0.00	0.00
P-267	8.0	J-151	J-235	92	Ductile Iron	85.0	7.45	0.05
P-268	3.0	J-235	J-224	727	PVC	150.0	6.86	0.31

FlexTable: Pipe Table

Hanapepe-Eleele Water System

Current Time: 0.000 hours

Pipe No.	Diameter (in)	Start Node	Stop Node	Length (Scaled) (ft)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
P-269	2.0	J-235	J-236	52	Ductile Iron	85.0	0.00	0.00
P-270	2.0	J-236	J-237	306	Ductile Iron	85.0	0.00	0.00
P-271	2.0	J-237	J-238	331	Ductile Iron	85.0	0.00	0.00
P-272	2.0	J-238	J-239	345	Ductile Iron	85.0	0.00	0.00
P-273	2.0	J-239	J-240	391	Ductile Iron	85.0	0.00	0.00
P-274	2.0	J-240	J-241	180	Ductile Iron	85.0	0.00	0.00
P-275	2.0	J-241	J-242	79	Ductile Iron	85.0	0.00	0.00
P-276	2.0	J-242	J-243	156	Ductile Iron	85.0	0.00	0.00
P-277	8.0	J-181	C-66	57	Asbestos Cement	140.0	13.99	0.09
P-280	8.0	C-25	J-247	178	Asbestos Cement	140.0	3.76	0.02
P-281	4.0	J-247	C-24	145	Cast iron	85.0	2.79	0.07
P-282	8.0	C-66	C-26	404	Asbestos Cement	140.0	11.33	0.07
P-283	8.0	C-26	C-25	516	Asbestos Cement	140.0	9.82	0.06
P-284	4.0	C-24	J-249	232	Cast iron	85.0	1.57	0.04
P-285	1.5	J-249	J-250	49	PVC	150.0	1.06	0.19
P-286	1.5	J-250	J-251	408	PVC	150.0	0.00	0.00
P-287	1.5	J-251	J-252	39	PVC	150.0	0.00	0.00
P-288	1.5	J-252	J-253	295	PVC	150.0	0.00	0.00
P-289	1.5	J-250	J-254	95	PVC	150.0	0.86	0.16
P-290	1.5	J-254	J-255	133	PVC	150.0	0.86	0.16
P-291	6.0	J-183	C-30	72	Asbestos Cement	140.0	26.10	0.30
P-292	6.0	C-30	J-257	330	Asbestos Cement	140.0	25.30	0.29
P-293	6.0	J-257	C-29	122	Asbestos Cement	140.0	25.30	0.29

FlexTable: Pipe Table

Hanapepe-Eleele Water System

Current Time: 0.000 hours

Pipe No.	Diameter (in)	Start Node	Stop Node	Length (Scaled) (ft)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
P-295	6.0	C-29	J-260	39	Asbestos Cement	140.0	23.78	0.27
P-297	2.5	J-260	J-261	25	PVC	150.0	1.42	0.09
P-298	2.5	J-261	J-262	359	PVC	150.0	1.42	0.09
P-300	2.0	J-263	J-264	97	PVC	150.0	1.76	0.18
P-302	2.0	C-56	J-263	119	PVC	150.0	1.76	0.18
P-303	2.0	J-855	J-266	245	PVC	150.0	6.74	0.69
P-304	2.0	J-184	J-267	196	PVC	150.0	1.05	0.11
P-313	6.0	EL-J-84	EL-J-85	43	Cast iron	80.0	-2.95	0.03
P-315	6.0	EL-J-87	EL-J-88	133	Cast iron	80.0	-7.78	0.09
P-316	6.0	EL-J-88	EL-J-89	46	Cast iron	80.0	-7.78	0.09
P-317	8.0	EL-J-89	EL-J-81	199	Cast iron	80.0	6.92	0.04
P-318	8.0	EL-J-81	EL-J-80	213	Cast iron	80.0	4.19	0.03
P-319	6.0	EL-J-80	C-45	85	Cast iron	80.0	6.54	0.07
P-320	6.0	C-45	EL-J-90	83	Cast iron	80.0	6.18	0.07
P-322	4.0	EL-J-93	EL-J-94	297	Cast iron	80.0	2.31	0.06
P-323	4.0	EL-J-94	C-40	384	Cast iron	80.0	2.31	0.06
P-325	6.0	EL-J-95	EL-J-96	123	Cast iron	80.0	-1.11	0.01
P-326	6.0	EL-J-96	C-41	51	Cast iron	80.0	-1.11	0.01
P-328	6.0	EL-J-83	EL-J-84	67	Cast iron	80.0	-2.61	0.03
P-329	6.0	C-41	EL-J-82	47	Cast iron	80.0	-2.09	0.02
P-330	6.0	EL-J-82	EL-J-83	340	Cast iron	80.0	-2.61	0.03
P-331	2.0	EL-J-82	EL-J-81	520	PVC	150.0	-0.97	0.10
P-332	2.0	EL-J-90	EL-J-91	194	PVC	150.0	1.50	0.15
P-333	6.0	EL-J-93	EL-J-108	320	Ductile Iron	80.0	-8.39	0.10
P-334	6.0	EL-J-108	EL-J-107	115	Ductile Iron	80.0	-8.39	0.10
P-335	6.0	EL-J-90	EL-J-92	188	Cast iron	80.0	4.25	0.05
P-338	1.0	EL-J-100	EL-J-101	86	PVC	150.0	0.44	0.18
P-339	1.0	EL-J-101	EL-J-102	61	PVC	150.0	0.44	0.18
P-340	2.0	EL-J-100	EL-J-99	40	PVC	150.0	-2.02	0.21

FlexTable: Pipe Table

Hanapepe-Eleele Water System

Current Time: 0.000 hours

Pipe No.	Diameter (in)	Start Node	Stop Node	Length (Scaled) (ft)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
P-341	2.0	EL-J-99	EL-J-98	288	PVC	150.0	-2.02	0.21
P-343	6.0	EL-J-79	EL-J-78	79	Cast iron	80.0	-5.80	0.07
P-344	16.0	EL-J-78	EL-J-97	18	Ductile Iron	80.0	69.67	0.11
P-346	16.0	EL-J-98	C-139	162	Ductile Iron	80.0	66.03	0.11
P-347	16.0	C-139	EL-J-103	121	Ductile Iron	80.0	66.03	0.11
P-348	16.0	EL-J-103	EL-J-104	188	Ductile Iron	80.0	66.03	0.11
P-349	16.0	EL-J-104	C-140	176	Ductile Iron	80.0	66.03	0.11
P-350	16.0	C-140	EL-J-105	165	Ductile Iron	80.0	64.03	0.10
P-351	16.0	EL-J-105	EL-J-106	175	Ductile Iron	80.0	64.03	0.10
P-356	12.0	C-142	C-143	277	Ductile Iron	80.0	45.61	0.13
P-358	12.0	C-143	C-144	381	Ductile Iron	80.0	22.88	0.06
P-359	12.0	C-144	C-145	369	Ductile Iron	80.0	16.10	0.05
P-363	12.0	J-318	J-320	80	Ductile Iron	130.0	15.39	0.04
P-364	12.0	J-320	J-321	73	Ductile Iron	130.0	15.39	0.04
P-365	12.0	J-321	C-147	83	Ductile Iron	130.0	15.39	0.04
P-366	12.0	C-147	J-323	97	Ductile Iron	130.0	14.23	0.04
P-367	12.0	J-323	J-324	108	Ductile Iron	130.0	14.23	0.04
P-368	12.0	J-324	C-148	121	Ductile Iron	130.0	14.23	0.04
P-370	12.0	C-149	J-327	49	Ductile Iron	130.0	12.30	0.03
P-371	6.0	J-320	J-328	137	Ductile Iron	130.0	0.00	0.00
P-376	12.0	EL-J-70	EL-J-55	605	Asbestos Cement	140.0	-101.91	0.29
P-378	12.0	EL-J-69	EL-J-68	12	Asbestos Cement	140.0	0.00	0.00
P-379	12.0	EL-J-68	EL-J-70	6	Asbestos Cement	140.0	-78.95	0.22
P-380	16.0	EL-J-68	EL-J-67	6	Ductile Iron	80.0	78.61	0.13
P-383	16.0	EL-J-67	EL-J-66	272	Ductile Iron	80.0	78.61	0.13
P-384	16.0	EL-J-66	EL-J-78	34	Ductile Iron	80.0	75.47	0.12

FlexTable: Pipe Table
Hanapepe-Eleele Water System

Current Time: 0.000 hours

Pipe No.	Diameter (in)	Start Node	Stop Node	Length (Scaled) (ft)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
P-385	6.0	EL-J-66	EL-J-65	40	Asbestos Cement	140.0	2.93	0.03
P-388	6.0	EL-J-63	EL-J-60	62	Asbestos Cement	140.0	-17.47	0.20
P-389	3.0	EL-J-62	EL-J-61	67	PVC	150.0	0.00	0.00
P-390	3.0	EL-J-61	EL-J-60	107	PVC	150.0	0.00	0.00
P-391	6.0	EL-J-60	EL-J-59	123	Asbestos Cement	140.0	-17.97	0.20
P-393	8.0	EL-J-58	J-774	186	Ductile Iron	130.0	7.77	0.05
P-397	12.0	J-347	J-348	1,730	Asbestos Cement	140.0	-179.19	0.51
P-398	12.0	J-348	J-349	543	Asbestos Cement	140.0	-179.19	0.51
P-401	8.0	EL-J-55	EL-J-54	486	Asbestos Cement	140.0	58.73	0.37
P-403	8.0	EL-J-77	EL-J-74	86	Asbestos Cement	140.0	5.03	0.03
P-405	3.0	EL-J-76	EL-J-75	125	PVC	150.0	-1.22	0.06
P-408	3.0	EL-J-72	EL-J-73	184	PVC	150.0	1.22	0.06
P-411	8.0	EL-J-72	EL-J-71	242	Asbestos Cement	140.0	-1.76	0.01
P-412	8.0	EL-J-54	C-73	54	Asbestos Cement	140.0	8.24	0.05
P-413	8.0	C-73	EL-J-77	266	Asbestos Cement	140.0	5.03	0.03
P-414	8.0	EL-J-54	EL-J-53	208	Asbestos Cement	140.0	49.70	0.32
P-415	8.0	EL-J-53	EL-J-52	119	Asbestos Cement	140.0	49.70	0.32
P-416	8.0	EL-J-52	C-74	131	Asbestos Cement	140.0	49.70	0.32

FlexTable: Pipe Table
Hanapepe-Eleele Water System

Current Time: 0.000 hours

Pipe No.	Diameter (in)	Start Node	Stop Node	Length (Scaled) (ft)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
P-417	8.0	C-74	EL-J-35	42	Asbestos Cement	140.0	49.05	0.31
P-418	8.0	EL-J-35	EL-J-36	258	Ductile Iron	90.0	20.63	0.13
P-419	6.0	EL-J-36	C-79	157	Ductile Iron	90.0	4.90	0.06
P-420	3.0	C-79	EL-J-37	82	PVC	150.0	2.47	0.11
P-422	8.0	EL-J-35	EL-J-34	186	Asbestos Cement	140.0	27.35	0.17
P-423	8.0	EL-J-34	C-75	171	Asbestos Cement	140.0	27.35	0.17
P-424	8.0	C-75	EL-J-33	163	Asbestos Cement	140.0	24.30	0.16
P-425	8.0	EL-J-33	EL-J-26	171	Asbestos Cement	140.0	24.30	0.16
P-426	8.0	EL-J-26	EL-J-48	259	Asbestos Cement	140.0	16.37	0.10
P-428	8.0	EL-J-47	EL-J-45	137	Asbestos Cement	140.0	7.58	0.05
P-429	6.0	EL-J-48	EL-J-49	121	Asbestos Cement	140.0	4.38	0.05
P-430	6.0	EL-J-49	EL-J-50	107	Asbestos Cement	140.0	4.38	0.05
P-431	6.0	EL-J-50	C-87	96	Asbestos Cement	140.0	4.38	0.05
P-432	3.0	C-87	EL-J-51	305	PVC	150.0	2.03	0.09
P-433	8.0	EL-J-36	EL-J-38	209	Asbestos Cement	140.0	14.49	0.09
P-435	8.0	EL-J-39	EL-J-40	179	Asbestos Cement	140.0	11.74	0.07
P-436	8.0	EL-J-40	C-81	196	Asbestos Cement	140.0	11.74	0.07

FlexTable: Pipe Table

Hanapepe-Eleele Water System

Current Time: 0.000 hours

Pipe No.	Diameter (in)	Start Node	Stop Node	Length (Scaled) (ft)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
P-437	8.0	C-81	EL-J-28	266	Asbestos Cement	140.0	11.74	0.07
P-438	8.0	EL-J-28	EL-J-27	245	Ductile Iron	90.0	4.30	0.03
P-439	8.0	EL-J-27	EL-J-26	120	Ductile Iron	90.0	4.30	0.03
P-441	8.0	EL-J-28	C-82	91	Asbestos Cement	140.0	7.44	0.05
P-442	8.0	C-82	EL-J-29	200	Asbestos Cement	140.0	7.44	0.05
P-443	8.0	EL-J-29	EL-J-31	85	Asbestos Cement	140.0	4.07	0.03
P-445	8.0	EL-J-32	C-84	103	Asbestos Cement	140.0	4.07	0.03
P-448	6.0	EL-J-29	EL-J-30	185	Asbestos Cement	140.0	3.37	0.04
P-449	6.0	EL-J-30	C-85	145	Asbestos Cement	140.0	3.37	0.04
P-452	8.0	EL-J-20	EL-J-21	253	Ductile Iron	90.0	-3.39	0.02
P-455	6.0	EL-J-45	EL-J-42	317	Asbestos Cement	140.0	3.01	0.03
P-456	6.0	EL-J-42	C-90	108	Asbestos Cement	140.0	-2.14	0.02
P-457	6.0	C-90	EL-J-41	92	Asbestos Cement	140.0	-3.12	0.04
P-458	6.0	EL-J-41	EL-J-19	143	Asbestos Cement	140.0	-3.12	0.04
P-459	6.0	EL-J-19	C-77	202	Asbestos Cement	140.0	-7.70	0.09
P-460	6.0	C-77	EL-J-20	55	Asbestos Cement	140.0	-9.08	0.10
P-461	6.0	EL-J-42	EL-J-43	110	Asbestos Cement	140.0	3.52	0.04

FlexTable: Pipe Table
Hanapepe-Eleele Water System

Current Time: 0.000 hours

Pipe No.	Diameter (in)	Start Node	Stop Node	Length (Scaled) (ft)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
P-462	6.0	EL-J-43	C-88	77	Asbestos Cement	140.0	3.52	0.04
P-463	3.0	C-88	EL-J-44	201	PVC	150.0	2.05	0.09
P-464	6.0	EL-J-19	C-89	277	Asbestos Cement	140.0	2.59	0.03
P-467	8.0	EL-J-17	C-133	457	Ductile Iron	100.0	-3.27	0.02
P-468	8.0	C-133	EL-J-9	74	Ductile Iron	100.0	-4.88	0.03
P-469	8.0	EL-J-9	EL-J-8	247	Ductile Iron	100.0	-10.89	0.07
P-471	8.0	EL-J-7	EL-J-6	67	Ductile Iron	100.0	-15.68	0.10
P-472	8.0	EL-J-7	C-135	57	Ductile Iron	100.0	1.50	0.01
P-474	8.0	EL-J-8	C-136	92	Ductile Iron	100.0	2.06	0.01
P-479	8.0	C-137	EL-J-10	118	Ductile Iron	100.0	1.39	0.01
P-480	4.0	EL-J-24	C-127	99	PVC	150.0	-1.25	0.03
P-481	8.0	C-127	EL-J-23	280	Ductile Iron	100.0	-2.86	0.02
P-482	6.0	EL-J-23	C-126	50	Asbestos Cement	140.0	-2.86	0.03
P-483	6.0	C-126	EL-J-22	246	Asbestos Cement	140.0	-5.00	0.06
P-486	8.0	EL-J-25	C-128	103	Ductile Iron	100.0	-8.33	0.05
P-487	8.0	C-128	EL-J-10	195	Ductile Iron	100.0	-10.80	0.07
P-488	8.0	EL-J-10	EL-J-11	113	Ductile Iron	100.0	-9.41	0.06
P-489	8.0	EL-J-11	C-129	150	Ductile Iron	100.0	-9.41	0.06
P-490	8.0	C-129	EL-J-12	252	Ductile Iron	100.0	-10.77	0.07
P-491	8.0	EL-J-12	EL-J-13	139	Ductile Iron	100.0	-10.77	0.07
P-493	8.0	EL-J-14	EL-J-15	163	Ductile Iron	100.0	-10.77	0.07
P-495	12.0	EL-J-3	EL-J-4	1,296	Ductile Iron	100.0	0.22	0.00
P-496	8.0	EL-J-15	EL-J-16	118	Ductile Iron	100.0	1.20	0.01
P-497	8.0	EL-J-16	C-131	145	Ductile Iron	100.0	1.20	0.01
P-499	12.0	EL-J-3	EL-J-2	293	Ductile Iron	100.0	-29.04	0.08
P-500	12.0	EL-J-2	EL-J-1	507	Ductile Iron	100.0	-29.04	0.08

FlexTable: Pipe Table
Hanapepe-Eleele Water System

Current Time: 0.000 hours

Pipe No.	Diameter (in)	Start Node	Stop Node	Length (Scaled) (ft)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
P-503	12.0	J-448	J-197	33	Asbestos Cement	140.0	1.15	0.00
P-507	12.0	J-451	J-452	650	Asbestos Cement	140.0	-1.77	0.01
P-508	12.0	J-452	J-453	408	Asbestos Cement	140.0	-1.77	0.01
P-511	12.0	J-455	J-456	239	Asbestos Cement	140.0	-1.77	0.01
P-512	12.0	J-456	J-457	334	Asbestos Cement	140.0	-1.77	0.01
P-513	12.0	J-457	J-458	37	Asbestos Cement	140.0	-1.77	0.01
P-514	12.0	J-458	J-459	462	Asbestos Cement	140.0	-1.77	0.01
P-515	12.0	J-459	J-460	316	Asbestos Cement	140.0	-1.77	0.01
P-516	12.0	J-460	J-461	137	Asbestos Cement	140.0	-1.77	0.01
P-517	12.0	J-461	J-462	133	Asbestos Cement	140.0	-1.77	0.01
P-518	12.0	J-462	J-463	371	Asbestos Cement	140.0	-1.77	0.01
P-519	12.0	J-463	J-464	301	Asbestos Cement	140.0	-1.77	0.01
P-522	6.0	J-207	J-467	192	Ductile Iron	80.0	0.50	0.01
P-523	4.0	J-467	J-208	230	Ductile Iron	80.0	-0.06	0.00
P-524	4.0	J-467	J-468	34	Ductile Iron	80.0	0.56	0.01
P-525	4.0	J-468	J-469	251	Ductile Iron	80.0	-0.19	0.00
P-526	4.0	J-469	J-470	38	Ductile Iron	80.0	-0.19	0.00
P-527	4.0	J-470	J-208	26	Ductile Iron	80.0	0.06	0.00
P-535	6.0	J-470	J-476	80	Ductile Iron	80.0	-0.25	0.00

FlexTable: Pipe Table
Hanapepe-Eleele Water System
Current Time: 0.000 hours

Pipe No.	Diameter (in)	Start Node	Stop Node	Length (Scaled) (ft)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
P-536	1.0	J-476	J-477	177	Ductile Iron	80.0	1.17	0.48
P-537	8.0	J-476	J-478	174	Ductile Iron	80.0	-1.76	0.01
P-539	3.0	J-153	J-480	276	Ductile Iron	85.0	1.83	0.08
P-540	3.0	J-480	J-481	627	Ductile Iron	85.0	1.83	0.08
P-541	3.0	J-481	J-482	47	Ductile Iron	85.0	1.83	0.08
P-542	8.0	J-482	J-483	565	Cast iron	80.0	-6.26	0.04
P-543	8.0	J-483	J-484	241	Ductile Iron	80.0	-6.26	0.04
P-544	8.0	J-484	C-97	130	Ductile Iron	80.0	-6.26	0.04
P-545	8.0	C-97	J-486	280	Ductile Iron	80.0	-6.26	0.04
P-546	8.0	J-486	J-487	53	Ductile Iron	80.0	-6.26	0.04
P-547	8.0	J-487	J-488	78	Ductile Iron	80.0	-6.26	0.04
P-548	8.0	J-488	J-489	79	Ductile Iron	80.0	-6.26	0.04
P-549	8.0	J-489	J-490	230	Ductile Iron	80.0	-6.26	0.04
P-550	8.0	J-490	J-491	263	Ductile Iron	80.0	-6.26	0.04
P-551	8.0	J-491	J-492	84	Cast iron	80.0	1.97	0.01
P-552	8.0	J-492	J-167	803	Cast iron	80.0	1.97	0.01
P-553	8.0	J-167	J-493	34	Ductile Iron	80.0	2.42	0.02
P-554	8.0	J-493	J-494	155	Cast iron	80.0	4.05	0.03
P-555	8.0	J-494	J-495	376	Cast iron	80.0	4.05	0.03
P-556	8.0	J-495	J-496	293	Cast iron	80.0	4.05	0.03
P-557	8.0	J-496	J-497	666	Cast iron	80.0	4.05	0.03
P-558	8.0	J-497	J-498	424	Cast iron	80.0	4.05	0.03
P-559	8.0	J-498	J-499	692	Cast iron	80.0	4.05	0.03
P-560	8.0	J-499	J-500	415	Cast iron	80.0	4.05	0.03
P-561	8.0	J-500	J-501	248	Cast iron	80.0	4.05	0.03
P-565	8.0	J-504	J-505	764	Cast iron	85.0	1.77	0.01
P-568	8.0	J-507	J-508	688	Cast iron	85.0	1.77	0.01
P-575	8.0	J-514	J-515	369	Cast iron	85.0	1.77	0.01
P-576	8.0	J-515	J-516	434	Cast iron	85.0	1.77	0.01

FlexTable: Pipe Table
Hanapepe-Eleele Water System

Current Time: 0.000 hours

Pipe No.	Diameter (in)	Start Node	Stop Node	Length (Scaled) (ft)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
P-578	12.0	J-519	J-520	207	Asbestos Cement	140.0	0.00	0.00
P-579	12.0	J-520	J-521	267	Asbestos Cement	140.0	0.00	0.00
P-580	12.0	J-521	J-522	244	Asbestos Cement	140.0	0.00	0.00
P-582	8.0	J-524	J-516	117	Asbestos Cement	140.0	0.00	0.00
P-583	12.0	J-516	J-525	199	Asbestos Cement	140.0	1.77	0.01
P-584	12.0	J-525	J-522	133	Asbestos Cement	140.0	1.77	0.01
P-585	12.0	J-522	J-526	224	Asbestos Cement	140.0	1.77	0.01
P-586	12.0	J-526	J-527	104	Asbestos Cement	140.0	1.77	0.01
P-587	12.0	J-527	J-528	122	Asbestos Cement	140.0	1.77	0.01
P-588	12.0	J-528	J-529	439	Asbestos Cement	140.0	1.77	0.01
P-589	12.0	J-529	J-530	81	Asbestos Cement	140.0	1.77	0.01
P-590	12.0	J-530	J-531	138	Asbestos Cement	140.0	1.77	0.01
P-591	12.0	J-531	J-532	332	Asbestos Cement	140.0	1.77	0.01
P-592	12.0	J-532	J-533	522	Asbestos Cement	140.0	1.77	0.01
P-593	12.0	J-533	J-534	601	Asbestos Cement	140.0	1.77	0.01

FlexTable: Pipe Table

Hanapepe-Eleele Water System

Current Time: 0.000 hours

Pipe No.	Diameter (in)	Start Node	Stop Node	Length (Scaled) (ft)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
P-594	12.0	J-534	J-535	579	Asbestos Cement	140.0	1.77	0.01
P-599	12.0	J-539	J-540	94	Asbestos Cement	140.0	1.77	0.01
P-600	12.0	J-540	J-541	187	Asbestos Cement	140.0	1.77	0.01
P-601	12.0	J-541	J-542	105	Asbestos Cement	140.0	1.77	0.01
P-606	12.0	J-546	J-466	255	Asbestos Cement	140.0	1.77	0.01
P-609	8.0	J-548	J-549	60	Asbestos Cement	140.0	11.15	0.07
P-612	8.0	J-551	J-552	77	Asbestos Cement	140.0	11.15	0.07
P-614	8.0	J-552	J-553	92	Asbestos Cement	140.0	11.15	0.07
P-615	8.0	J-553	J-554	109	Asbestos Cement	140.0	11.15	0.07
P-616	8.0	J-554	J-555	409	Asbestos Cement	140.0	11.15	0.07
P-617	8.0	J-555	J-556	121	Asbestos Cement	140.0	11.15	0.07
P-619	8.0	J-556	J-557	111	Asbestos Cement	140.0	11.15	0.07
P-620	8.0	J-557	C-47	50	Asbestos Cement	140.0	6.78	0.04
P-622	8.0	J-559	J-560	178	Asbestos Cement	140.0	6.35	0.04
P-625	8.0	C-48	C-49	591	Asbestos Cement	140.0	6.35	0.04

FlexTable: Pipe Table
Hanapepe-Eleele Water System

Current Time: 0.000 hours

Pipe No.	Diameter (in)	Start Node	Stop Node	Length (Scaled) (ft)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
P-630	8.0	J-567	C-51	256	Asbestos Cement	140.0	-0.63	0.00
P-631	8.0	C-51	J-569	109	Asbestos Cement	140.0	-2.24	0.01
P-633	8.0	J-569	J-571	158	Asbestos Cement	140.0	-2.24	0.01
P-634	8.0	J-571	J-572	149	Asbestos Cement	140.0	-2.24	0.01
P-635	8.0	J-572	J-573	123	Asbestos Cement	140.0	0.00	0.00
P-636	8.0	J-573	J-574	130	Asbestos Cement	140.0	0.00	0.00
P-639	8.0	J-576	J-501	64	Cast iron	80.0	-2.24	0.01
P-640	6.0	J-159	J-491	484	Cast iron	80.0	8.23	0.09
P-641	1.5	J-156	J-577	174	Ductile Iron	85.0	2.42	0.44
P-643	4.0	J-578	J-579	242	Ductile Iron	85.0	-8.16	0.21
P-644	4.0	J-579	C-27	205	Ductile Iron	85.0	-8.16	0.21
P-645	4.0	C-27	J-581	71	Ductile Iron	85.0	-8.84	0.23
P-646	4.0	J-581	J-582	34	Ductile Iron	85.0	-8.84	0.23
P-647	2.0	J-582	J-583	82	PVC	150.0	5.52	0.56
P-656	4.0	J-585	J-582	71	Cast iron	85.0	14.88	0.38
P-657	6.0	J-56	C-52	311	Cast iron	80.0	7.37	0.08
P-658	6.0	C-52	J-168	425	Cast iron	80.0	6.10	0.07
P-659	12.0	C-65	C-64	286	Asbestos Cement	140.0	25.38	0.07
P-660	12.0	C-64	J-172	88	Asbestos Cement	140.0	22.87	0.06
P-661	6.0	EL-J-85	EL-J-86	232	Asbestos Cement	140.0	3.48	0.04
P-682	8.0	J-222	C-23	85	Ductile Iron	85.0	7.45	0.05
P-684	8.0	C-23	C-151	232	Ductile Iron	85.0	7.45	0.05

FlexTable: Pipe Table

Hanapepe-Eleele Water System

Current Time: 0.000 hours

Pipe No.	Diameter (in)	Start Node	Stop Node	Length (Scaled) (ft)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
P-685	8.0	C-151	J-151	47	Ductile Iron	85.0	7.45	0.05
P-687	12.0	J-349	J-606	549	Asbestos Cement	140.0	-179.19	0.51
P-695	27.0	J-613	J-613-A	30	CMP	100.0	0.00	0.00
P-696	27.0	J-613-A	J-614	57	CMP	100.0	0.00	0.00
P-697	27.0	J-614	J-615	761	Concrete (steel forms)	140.0	0.00	0.00
P-704	12.0	EL-J-1	J-618	412	Ductile Iron	100.0	-29.04	0.08
P-707	12.0	J-618	J-619	50	Ductile Iron	100.0	-29.04	0.08
P-708	12.0	J-619	J-620	892	Ductile Iron	100.0	-29.04	0.08
P-709	12.0	J-620	J-621	311	Ductile Iron	100.0	-29.04	0.08
P-710	12.0	J-621	J-622	315	Ductile Iron	100.0	-29.04	0.08
P-711	12.0	J-622	J-623	499	Ductile Iron	100.0	-29.04	0.08
P-712	12.0	J-623	J-624	93	Ductile Iron	100.0	-29.04	0.08
P-817	6.0	HH-J-64	HH-J-77	23	Ductile Iron	80.0	-0.45	0.01
P-821	8.0	J-154	C-60	45	Asbestos Cement	140.0	-3.47	0.02
P-835	6.0	HH-J-85	HH-J-84	52	Ductile Iron	80.0	(N/A)	(N/A)
P-852	4.0	J-137	C-28	118	Ductile Iron	85.0	-7.25	0.19
P-853	4.0	C-28	J-578	196	Ductile Iron	85.0	-8.16	0.21
P-856	6.0	J-56	C-17	580	Cast iron	80.0	22.73	0.26
P-857	6.0	C-17	J-131	227	Cast iron	80.0	19.31	0.22
P-860	12.0	J-56	C-53	64	Asbestos Cement	140.0	99.68	0.28
P-863	12.0	C-53	C-54	197	Asbestos Cement	140.0	97.82	0.28
P-864	12.0	C-54	J-169	43	Asbestos Cement	140.0	97.82	0.28
P-874	8.0	J-222	C-150	135	Ductile Iron	100.0	0.00	0.00
P-875	2.5	C-150	J-234	145	Ductile Iron	100.0	0.00	0.00

FlexTable: Pipe Table
Hanapepe-Eleele Water System
Current Time: 0.000 hours

Pipe No.	Diameter (in)	Start Node	Stop Node	Length (Scaled) (ft)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
P-891	12.0	J-184	AV-10	309	Asbestos Cement	140.0	17.45	0.05
P-892	12.0	AV-10	J-186	60	Ductile Iron	85.0	17.45	0.05
P-893	4.0	J-192	C-39	28	Cast iron	80.0	-3.39	0.09
P-896	12.0	J-190	C-38	300	Asbestos Cement	140.0	-10.86	0.03
P-897	12.0	C-38	J-191	39	Asbestos Cement	140.0	-11.60	0.03
P-900	12.0	C-37	J-190	45	Ductile Iron	80.0	-4.32	0.01
P-902	4.0	C-39	C-36	273	Cast iron	80.0	-4.20	0.11
P-903	4.0	C-36	J-189	50	Cast iron	80.0	-6.00	0.15
P-906	12.0	J-197	C-35	272	Ductile Iron	80.0	-2.81	0.01
P-907	12.0	C-35	J-198	66	Ductile Iron	80.0	-3.82	0.01
P-909	12.0	J-200	AV-11	116	Ductile Iron	80.0	5.01	0.01
P-910	12.0	AV-11	J-198	62	Ductile Iron	80.0	5.01	0.01
P-914	6.0	J-210	C-33	86	Cast iron	80.0	-3.77	0.04
P-915	6.0	C-33	J-211	98	Cast iron	80.0	-5.05	0.06
P-917	6.0	J-206	C-32	24	Cast iron	80.0	-8.04	0.09
P-918	6.0	C-32	J-212	121	Ductile Iron	80.0	-8.05	0.09
P-920	12.0	J-448	C-70	55	Asbestos Cement	140.0	-1.15	0.00
P-921	12.0	C-70	J-449	129	Ductile Iron	85.0	-1.77	0.01
P-923	12.0	J-449	AV-13	81	Asbestos Cement	140.0	-1.77	0.01
P-924	12.0	AV-13	J-451	88	Asbestos Cement	140.0	-1.77	0.01
P-926	6.0	EL-J-85	C-42	125	Cast iron	80.0	-6.67	0.08
P-927	6.0	C-42	EL-J-87	423	Cast iron	80.0	-7.78	0.09
P-931	6.0	EL-J-92	C-43	194	Cast iron	80.0	-0.65	0.01
P-932	6.0	C-43	EL-J-93	202	Cast iron	80.0	-1.78	0.02

FlexTable: Pipe Table

Hanapepe-Eleele Water System

Current Time: 0.000 hours

Pipe No.	Diameter (in)	Start Node	Stop Node	Length (Scaled) (ft)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
P-934	4.0	EL-J-92	C-44	367	Cast iron	80.0	3.33	0.09
P-935	2.0	C-44	EL-J-100	101	PVC	150.0	1.11	0.11
P-938	16.0	AV-14	EL-J-106	145	Ductile Iron	80.0	-64.03	0.10
P-939	16.0	EL-J-107	C-141	47	Ductile Iron	80.0	-63.83	0.10
P-940	16.0	C-141	AV-14	66	Ductile Iron	80.0	-64.03	0.10
P-944	4.0	EL-J-80	C-46	573	Cast iron	80.0	-3.16	0.08
P-945	4.0	C-46	EL-J-79	52	Cast iron	80.0	-5.80	0.15
P-949	16.0	EL-J-97	C-138	52	Ductile Iron	80.0	69.67	0.11
P-950	16.0	C-138	EL-J-98	274	Ductile Iron	80.0	68.65	0.11
P-954	6.0	C-93	EL-J-65	36	Asbestos Cement	140.0	-2.58	0.03
P-955	6.0	C-93	EL-J-64	149	Asbestos Cement	140.0	2.53	0.03
P-957	6.0	EL-J-64	C-94	62	Asbestos Cement	140.0	2.53	0.03
P-958	6.0	C-94	EL-J-63	71	Asbestos Cement	140.0	-17.47	0.20
P-960	6.0	EL-J-59	C-95	73	Asbestos Cement	140.0	-17.97	0.20
P-963	8.0	C-95	AV-15	83	Ductile Iron	80.0	-18.55	0.12
P-964	8.0	AV-15	EL-J-58	402	Ductile Iron	80.0	-18.55	0.12
P-965	8.0	EL-J-71	C-99	365	Cast iron	80.0	-20.32	0.13
P-966	8.0	C-99	EL-J-70	240	Cast iron	80.0	-22.44	0.14
P-969	8.0	EL-J-89	C-98	42	Cast iron	80.0	-15.81	0.10
P-970	8.0	C-98	EL-J-71	178	Cast iron	80.0	-16.94	0.11
P-972	8.0	EL-J-74	C-71	93	Asbestos Cement	140.0	1.19	0.01
P-973	8.0	C-71	EL-J-72	118	Asbestos Cement	140.0	-0.32	0.00
P-975	3.0	EL-J-75	C-72	23	PVC	150.0	-1.22	0.06

FlexTable: Pipe Table

Hanapepe-Eleele Water System

Current Time: 0.000 hours

Pipe No.	Diameter (in)	Start Node	Stop Node	Length (Scaled) (ft)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
P-976	8.0	C-72	EL-J-74	171	Asbestos Cement	140.0	-2.95	0.02
P-982	8.0	EL-J-38	C-80	133	Asbestos Cement	140.0	14.49	0.09
P-983	8.0	C-80	EL-J-39	46	Asbestos Cement	140.0	13.04	0.08
P-986	12.0	J-453	AV-18	321	Asbestos Cement	140.0	-1.77	0.01
P-987	12.0	AV-18	J-455	256	Asbestos Cement	140.0	-1.77	0.01
P-992	8.0	EL-J-26	C-76	96	Asbestos Cement	140.0	10.58	0.07
P-993	8.0	C-76	EL-J-20	422	Asbestos Cement	140.0	7.84	0.05
P-999	3.0	EL-J-46	C-91	274	PVC	150.0	-1.43	0.06
P-1000	6.0	C-91	EL-J-45	24	Asbestos Cement	140.0	-2.42	0.03
P-1006	8.0	EL-J-21	C-78	210	Ductile Iron	90.0	-3.39	0.02
P-1009	6.0	C-78	AV-21	28	Ductile Iron	90.0	-4.07	0.05
P-1010	8.0	AV-21	C-84	423	Asbestos Cement	140.0	-4.07	0.03
P-1013	8.0	EL-J-31	C-83	61	Asbestos Cement	140.0	4.07	0.03
P-1014	8.0	C-83	EL-J-32	338	Asbestos Cement	140.0	4.07	0.03
P-1021	8.0	EL-J-9	AV-23	165	Ductile Iron	100.0	2.82	0.02
P-1022	8.0	AV-23	C-137	63	Ductile Iron	100.0	2.82	0.02
P-1024	8.0	EL-J-18	C-132	246	Ductile Iron	100.0	-1.45	0.01
P-1025	8.0	C-132	EL-J-17	34	Ductile Iron	130.0	-3.27	0.02
P-1030	8.0	EL-J-8	C-134	138	Ductile Iron	100.0	-13.54	0.09
P-1031	8.0	C-134	EL-J-7	135	Ductile Iron	100.0	-13.98	0.09

FlexTable: Pipe Table
Hanapepe-Eleele Water System
Current Time: 0.000 hours

Pipe No.	Diameter (in)	Start Node	Stop Node	Length (Scaled) (ft)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
P-1034	8.0	EL-J-13	C-130	87	Ductile Iron	100.0	-10.77	0.07
P-1035	8.0	C-130	EL-J-14	56	Ductile Iron	100.0	-10.77	0.07
P-1040	12.0	J-464	AV-27	563	Asbestos Cement	140.0	-1.77	0.01
P-1041	12.0	AV-27	J-466	525	Asbestos Cement	140.0	-1.77	0.01
P-1042	12.0	J-546	AV-28	319	Asbestos Cement	140.0	-1.77	0.01
P-1043	12.0	AV-28	J-544	605	Asbestos Cement	140.0	-1.77	0.01
P-1044	12.0	J-544	AV-29	501	Asbestos Cement	140.0	-1.77	0.01
P-1045	12.0	AV-29	J-542	218	Asbestos Cement	140.0	-1.77	0.01
P-1046	12.0	J-539	AV-30	425	Asbestos Cement	140.0	-1.77	0.01
P-1047	12.0	AV-30	J-537	224	Asbestos Cement	140.0	-1.77	0.01
P-1048	12.0	J-537	AV-31	200	Asbestos Cement	140.0	-1.77	0.01
P-1049	12.0	AV-31	J-535	110	Asbestos Cement	140.0	-1.77	0.01
P-1050	8.0	J-572	AV-32	102	Cast iron	80.0	-2.24	0.01
P-1051	8.0	AV-32	J-576	66	Cast iron	80.0	-2.24	0.01
P-1053	8.0	C-50	AV-33	236	Asbestos Cement	140.0	-0.63	0.00
P-1054	8.0	AV-33	J-567	292	Asbestos Cement	140.0	-0.63	0.00
P-1056	8.0	C-49	AV-34	191	Asbestos Cement	140.0	-0.63	0.00

FlexTable: Pipe Table
Hanapepe-Eleele Water System

Current Time: 0.000 hours

Pipe No.	Diameter (in)	Start Node	Stop Node	Length (Scaled) (ft)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
P-1057	8.0	AV-34	C-50	250	Asbestos Cement	140.0	-0.63	0.00
P-1060	8.0	C-48	AV-35	210	Asbestos Cement	140.0	-6.35	0.04
P-1061	8.0	AV-35	J-560	259	Asbestos Cement	140.0	-6.35	0.04
P-1070	6.0	J-156	AV-38	33	Ductile Iron	85.0	-7.14	0.08
P-1071	8.0	AV-38	J-548	445	Asbestos Cement	140.0	-7.14	0.05
P-1072	8.0	J-155	C-61	292	Asbestos Cement	140.0	-4.36	0.03
P-1073	8.0	C-61	J-156	99	Asbestos Cement	140.0	-4.36	0.03
P-1075	6.0	C-21	J-482	46	Cast iron	85.0	-1.03	0.01
P-1078	12.0	C-148	AV-32	185	Ductile Iron	130.0	12.57	0.04
P-1079	12.0	AV-32	C-149	160	Ductile Iron	130.0	12.57	0.04
P-1083	12.0	J-318	AV-40	93	Ductile Iron	80.0	-15.87	0.05
P-1084	12.0	AV-40	C-145	35	Ductile Iron	80.0	-15.87	0.05
P-1090	8.0	EL-J-58	C-152	33	Ductile Iron	130.0	-26.32	0.17
P-1095	12.0	C-92	EL-J-56	587	Asbestos Cement	140.0	-152.87	0.43
P-1097	8.0	C-152	C-153	431	Ductile Iron	80.0	-26.32	0.17
P-1098	8.0	C-153	EL-J-57	285	Ductile Iron	80.0	-26.32	0.17
P-1100	8.0	AV-41	EL-J-57	67	Ductile Iron	80.0	0.00	0.00
P-1101	12.0	EL-J-56	AV-42	154	Asbestos Cement	140.0	-179.19	0.51
P-1102	12.0	AV-42	J-347	186	Asbestos Cement	140.0	-179.19	0.51
P-1118	12.0	J-585	AV-45	37	Asbestos Cement	140.0	-57.45	0.16

FlexTable: Pipe Table
Hanapepe-Eleele Water System

Current Time: 0.000 hours

Pipe No.	Diameter (in)	Start Node	Stop Node	Length (Scaled) (ft)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
P-1119	12.0	AV-45	J-181	34	Asbestos Cement	140.0	-57.45	0.16
P-1120	12.0	J-585	J-712	210	Asbestos Cement	140.0	41.57	0.12
P-1123	12.0	J-713	J-183	158	Ductile Iron	85.0	39.36	0.11
P-1124	12.0	J-200	C-34	105	Ductile Iron	80.0	-5.01	0.01
P-1125	12.0	C-34	J-201	28	Ductile Iron	80.0	-5.80	0.02
P-1128	8.0	J-145	AV-46	232	Asbestos Cement	140.0	2.02	0.01
P-1129	8.0	AV-46	C-20	238	Asbestos Cement	140.0	2.02	0.01
P-1130	2.5	HH-J-31	HH-J-34	267	PVC	150.0	-1.32	0.09
P-1133	12.0	J-606	J-609	21	Asbestos Cement	140.0	-179.19	0.51
P-1134	12.0	J-609	Eleele Steel Tank No. 1	53	Ductile Iron	130.0	-142.29	0.40
P-1137	12.0	Upper Eleele 0.2MG Tank	J-624	69	Ductile Iron	100.0	29.04	0.08
P-1141	8.0	EL-J-15	EL-J-5	38	Ductile Iron	100.0	-12.33	0.08
P-1142	12.0	EL-J-5	EL-J-3	190	Ductile Iron	100.0	-28.41	0.08
P-1143	8.0	EL-J-6	EL-J-5	56	Ductile Iron	100.0	-15.68	0.10
P-1144	8.0	J-512	J-508	907	Cast iron	85.0	-1.77	0.01
P-1145	8.0	J-512	J-514	629	Cast iron	85.0	1.77	0.01
P-1146	8.0	J-507	J-505	520	Cast iron	85.0	-1.77	0.01
P-1149	8.0	J-504	J-501	464	Cast iron	85.0	-1.77	0.01
P-1151	8.0	J-722	J-493	100	Asbestos Cement	140.0	4.15	0.03
P-1154	6.0	J-142	J-212	289	Cast iron	80.0	18.21	0.21
P-1165	12.0	Eleele Steel Tank No. 2	J-740	34	Ductile Iron	130.0	0.00	0.00
P-1169	6.0	J-742	J-619	25	Ductile Iron	130.0	0.00	0.00

FlexTable: Pipe Table
Hanapepe-Eleele Water System
Current Time: 0.000 hours

Pipe No.	Diameter (in)	Start Node	Stop Node	Length (Scaled) (ft)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
P-1172	12.0	Eleele Steel Tank No. 2	J-743	54	Ductile Iron	130.0	36.90	0.10
P-1199	6.0	J-548	J-158	34	Ductile Iron	80.0	10.07	0.11
P-1220	12.0	Upper Hanapepe Heights 0.5MG Tank	Hanapepe No. 4 Pump	3,632	Ductile Iron	100.0	0.00	0.00
P-1221	12.0	Hanapepe No. 4	Hanapepe No. 4 Pump	10	Ductile Iron	100.0	0.00	0.00
P-1222	12.0	Hanapepe Well B Pump	Hanapepe Well B	2	Ductile Iron	85.0	0.00	0.00
P-1223	12.0	Hanapepe Well B Pump	J-519	186	Asbestos Cement	140.0	0.00	0.00
P-1227	6.0	J-524	Hanapepe Well A Pump	72	Ductile Iron	85.0	0.00	0.00
P-1228	6.0	Hanapepe Well A Pump	Hanapepe Well A	12	Ductile Iron	85.0	0.00	0.00
P-1237	12.0	EL-J-55	J-774	21	Asbestos Cement	140.0	-160.64	0.46
P-1238	12.0	J-774	C-92	176	Asbestos Cement	140.0	-152.87	0.43
P-1239	6.0	EL-J-56	EL-J-57	59	Ductile Iron	80.0	26.32	0.30
P-1242	12.0	J-744	J-609	26	Ductile Iron	130.0	36.91	0.10
P-1244	6.0	J-613	J-740	48	Ductile Iron	130.0	0.00	0.00
P-1245	6.0	J-744	J-743	19	Ductile Iron	130.0	-36.90	0.42
P-1290	8.0	J-815	J-819	203	Ductile Iron	100.0	0.00	0.00
P-1292	8.0	EL-J-58	J-813	292	Ductile Iron	100.0	0.00	0.00
P-1295	8.0	J-819	H-303	150	Ductile Iron	100.0	0.00	0.00
P-1296	8.0	H-303	J-820	15	Ductile Iron	100.0	0.00	0.00
P-1297	6.0	J-815	H-304	56	Ductile Iron	100.0	0.00	0.00
P-1298	6.0	H-304	J-813	319	Ductile Iron	100.0	0.00	0.00

FlexTable: Pipe Table
Hanapepe-Eleele Water System

Current Time: 0.000 hours

Pipe No.	Diameter (in)	Start Node	Stop Node	Length (Scaled) (ft)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
P-1299	8.0	J-812	H-305	285	Ductile Iron	100.0	0.00	0.00
P-1300	8.0	H-305	J-813	804	Ductile Iron	100.0	0.00	0.00
P-1301	6.0	J-811	H-306	98	Ductile Iron	100.0	0.00	0.00
P-1302	6.0	H-306	J-812	88	Ductile Iron	100.0	0.00	0.00
P-1303	6.0	HH-J-105	HH-J-105a	63	Ductile Iron	80.0	0.73	0.01
P-1304	4.0	HH-J-81	HH-J-100	29	Ductile Iron	80.0	0.29	0.01
P-1305	4.0	HH-J-100	HH-J-80	94	Ductile Iron	80.0	-0.21	0.01
P-1306	6.0	C-16	HH-J-103a	66	Cast iron	80.0	1.35	0.02
P-1308	6.0	HH-J-93	HH-J-103a	23	Ductile Iron	80.0	0.19	0.00
P-1309	6.0	HH-J-60	HH-J-73	616	Ductile Iron	80.0	10.18	0.12
P-1310	6.0	HH-J-73	HH-J-86	26	Ductile Iron	80.0	3.53	0.04
P-1311	6.0	C-4	HH-J-73	61	Ductile Iron	80.0	-4.30	0.05
P-1312	6.0	HH-J-69	HH-J-87	38	Cast iron	80.0	10.45	0.12
P-1313	6.0	HH-J-87	HH-J-78a	64	Cast iron	80.0	11.62	0.13
P-1314	6.0	HH-J-78a	HH-J-78	63	Ductile Iron	80.0	11.08	0.13
P-1316	6.0	J-828	Hanapepe Heights Booster Pump #1	44	Ductile Iron	130.0	0.00	0.00
P-1318	6.0	HH-J-45	Hanapepe Heights Booster Pump #2	42	Ductile Iron	130.0	0.00	0.00
P-1319	6.0	Hanapepe Heights Booster Pump #2	J-828	45	Ductile Iron	130.0	0.00	0.00
P-1320	6.0	HH-J-46	J-829	55	Ductile Iron	80.0	0.00	0.00
P-1322	6.0	J-831	HH-J-44	43	Ductile Iron	130.0	-52.05	0.59
P-1323	6.0	J-828	J-831	12	Ductile Iron	130.0	0.00	0.00
P-1325	6.0	J-830	J-832	51	Ductile Iron	80.0	-52.05	0.59
P-1326	6.0	J-832	J-831	98	Ductile Iron	80.0	-52.05	0.59
P-1327	12.0	J-832	R-5	15	Ductile Iron	80.0	0.00	0.00

FlexTable: Pipe Table
Hanapepe-Eleele Water System

Current Time: 0.000 hours

Pipe No.	Diameter (in)	Start Node	Stop Node	Length (Scaled) (ft)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
P-1328	6.0	HH-J-49	J-833	21	Ductile Iron	80.0	-52.05	0.59
P-1331	6.0	J-834	J-830	14	Ductile Iron	80.0	-52.05	0.59
P-1333	6.0	J-833	PRV2-5	13	Ductile Iron	80.0	-52.05	0.59
P-1334	6.0	PRV2-5	J-834	12	Ductile Iron	80.0	-52.05	0.59
P-1335	6.0	J-833	PRV2-4	28	Ductile Iron	80.0	0.00	0.00
P-1336	6.0	PRV2-4	J-834	28	Ductile Iron	80.0	0.00	0.00
P-1339	6.0	J-466	Eleele Booster Pump #1	87	Ductile Iron	130.0	0.00	0.00
P-1340	27.0	Eleele Booster Pump #1	J-615	93	Concrete (steel forms)	140.0	0.00	0.00
P-1341	6.0	J-615	Eleele Booster Pump #2	91	Ductile Iron	130.0	0.00	0.00
P-1342	6.0	Eleele Booster Pump #2	J-466	83	Ductile Iron	130.0	0.00	0.00
P-1343	6.0	J-744	J-747	159	Ductile Iron	130.0	0.00	0.00
P-1344	6.0	J-747	Eleele Nani Booster Pump #2	43	Ductile Iron	130.0	0.00	0.00
P-1345	6.0	Eleele Nani Booster Pump #2	J-742	43	Ductile Iron	130.0	0.00	0.00
P-1346	6.0	J-742	Eleele Nani Booster Pump #1	42	Ductile Iron	130.0	0.00	0.00
P-1347	6.0	Eleele Nani Booster Pump #1	J-747	42	Ductile Iron	130.0	0.00	0.00
P-1348	6.0	C-47	J-559	263	Ductile Iron	80.0	6.35	0.07
P-1349	8.0	J-557	J-835	35	Asbestos Cement	140.0	4.15	0.03

FlexTable: Pipe Table
Hanapepe-Eleele Water System
Current Time: 0.000 hours

Pipe No.	Diameter (in)	Start Node	Stop Node	Length (Scaled) (ft)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
P-1352	8.0	J-835	J-837	26	Asbestos Cement	140.0	4.15	0.03
P-1353	8.0	J-837	J-722	134	Asbestos Cement	140.0	4.15	0.03
P-1355	6.0	J-835	Awaawa Road 6" PRV	26	Ductile Iron	80.0	(N/A)	(N/A)
P-1356	6.0	Awaawa Road 6" PRV	J-837	27	Ductile Iron	80.0	(N/A)	(N/A)
P-1362	6.0	PRV2-3	J-842	171	Ductile Iron	80.0	0.00	0.00
P-1363	6.0	J-842	C-142	72	Ductile Iron	80.0	45.61	0.52
P-1364	6.0	J-842	J-843	5	Ductile Iron	80.0	-45.61	0.52
P-1365	6.0	J-843	PRV2-6	171	Ductile Iron	80.0	-45.61	0.52
P-1366	6.0	PRV2-6	J-844	114	Ductile Iron	80.0	-45.61	0.52
P-1367	6.0	EL-J-107	J-845	46	Ductile Iron	80.0	45.61	0.52
P-1368	6.0	J-845	PRV2-3	114	Ductile Iron	80.0	0.00	0.00
P-1369	6.0	J-844	J-845	5	Ductile Iron	80.0	-45.61	0.52
P-1370	6.0	J-478	J-482	255	Ductile Iron	80.0	-1.76	0.02
P-1371	6.0	HH-J-38	J-846	309	Cast iron	80.0	11.58	0.13
P-1372	6.0	J-846	C-8	249	Cast iron	80.0	6.46	0.07
P-1373	6.0	HH-J-37	J-847	309	Ductile Iron	80.0	-0.80	0.01
P-1374	6.0	J-847	HH-J-56	317	Ductile Iron	80.0	2.21	0.03
P-1375	6.0	J-846	J-847	29	Ductile Iron	80.0	3.99	0.05
P-1377	6.0	J-848	HH-J-55	310	Ductile Iron	80.0	2.86	0.03
P-1378	6.0	HH-J-53	J-849	254	Ductile Iron	80.0	4.40	0.05
P-1379	6.0	J-849	C-11	249	Ductile Iron	80.0	3.07	0.03
P-1380	6.0	J-848	J-849	29	Ductile Iron	80.0	-0.40	0.00
P-1381	6.0	HH-J-31	HH-J-31a	41	Ductile Iron	80.0	0.62	0.01
P-1383	6.0	J-260	J-852	358	Asbestos Cement	140.0	13.45	0.15

FlexTable: Pipe Table

Hanapepe-Eleele Water System

Current Time: 0.000 hours

Pipe No.	Diameter (in)	Start Node	Stop Node	Length (Scaled) (ft)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
P-1384	6.0	J-852	J-259	165	Asbestos Cement	140.0	5.26	0.06
P-1385	6.0	J-262	J-852	21	Ductile Iron	100.0	-8.19	0.09
P-1386	6.0	J-205	J-853	33	Ductile Iron	80.0	0.38	0.00
P-1389	6.0	J-262	J-855	115	Asbestos Cement	140.0	9.61	0.11
P-1390	6.0	J-855	C-56	25	Asbestos Cement	140.0	2.03	0.02
P-1391	6.0	C-40	J-856	286	Cast iron	80.0	2.31	0.03
P-1392	6.0	J-856	EL-J-95	92	Cast iron	80.0	-1.11	0.01
P-1393	6.0	EL-J-91	J-856	175	Ductile Iron	80.0	-1.37	0.02
P-1394	6.0	EL-J-76	EL-J-76a	150	Ductile Iron	90.0	1.22	0.01
P-1396	6.0	EL-J-37	EL-J-37a	124	Ductile Iron	90.0	2.47	0.03
P-1397	6.0	C-89	EL-J-19a	143	Ductile Iron	90.0	0.60	0.01
P-1398	6.0	C-85	EL-J-30a	219	Ductile Iron	90.0	1.43	0.02
P-1399	6.0	EL-J-22	EL-J-22a	142	Ductile Iron	100.0	1.35	0.02
P-1400	6.0	C-131	EL-J-16a	64	Ductile Iron	100.0	0.73	0.01
P-1401	6.0	C-135	EL-J-7a	95	Ductile Iron	100.0	1.16	0.01
P-1402	6.0	C-136	EL-J-8a	94	Ductile Iron	100.0	1.36	0.02
P-1403	6.0	J-201	J-865	61	Ductile Iron	80.0	-3.03	0.03
P-1404	6.0	J-865	C-37	197	Ductile Iron	80.0	-3.71	0.04
P-1405	6.0	EL-J-86	J-866	119	Asbestos Cement	140.0	3.48	0.04
P-1406	6.0	J-866	C-96	15	Asbestos Cement	140.0	1.38	0.02
P-1407	6.0	C-119	J-868	19	Ductile Iron	130.0	0.46	0.01
P-1408	6.0	J-868	HH-J-31	137	Ductile Iron	130.0	(N/A)	(N/A)
P-1409	6.0	C-106	J-869	69	Ductile Iron	100.0	0.00	0.00
P-1410	8.0	EL-J-48	C-86	140	Asbestos Cement	140.0	11.01	0.07

FlexTable: Pipe Table

Hanapepe-Eleele Water System

Current Time: 0.000 hours

Pipe No.	Diameter (in)	Start Node	Stop Node	Length (Scaled) (ft)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
P-1411	8.0	C-86	EL-J-47	278	Asbestos Cement	140.0	7.58	0.05
P-1412	8.0	EL-J-22	J-870	67	Ductile Iron	100.0	-6.60	0.04
P-1413	8.0	J-870	EL-J-25	271	Ductile Iron	100.0	-8.33	0.05
P-1414	6.0	EL-J-39	EL-J-871	265	Ductile Iron	90.0	0.00	0.00
P-1415	6.0	C-57	J-219	726	Ductile Iron	85.0	-16.11	0.18
P-1416	8.0	C-57	J-872	26	Ductile Iron	85.0	16.11	0.10
P-1417	8.0	J-872	C-58	227	Ductile Iron	85.0	16.11	0.10
P-1418	12.0	J-318	C-146	212	Ductile Iron	80.0	0.00	0.00
P-1419	12.0	C-146	J-319	20	Ductile Iron	80.0	0.00	0.00
P-1424	2.0	HH-J-64	HH-J-57	255	Steel	100.0	-1.10	0.11

Water Model Results for

Hanapepe-Eleele Water System (Existing)

Junction Table

FlexTable: Junction Table

Hanapepe-Eleele Water System

Current Time: 0.000 hours

Junction No.	Elevation (ft)	Demand (gpm)	Pressure (psi)	Hydraulic Grade (ft)
EL-J-1	288.00	0.00	49	401.98
EL-J-2	278.00	0.00	54	401.98
EL-J-3	280.00	0.41	53	401.98
EL-J-4	220.00	0.22	79	401.98
EL-J-5	280.00	0.40	53	401.98
EL-J-6	261.00	0.00	61	401.98
EL-J-7	270.00	0.20	57	401.98
EL-J-7a	270.00	1.16	57	401.98
EL-J-8	240.00	0.59	70	401.97
EL-J-8a	240.00	1.36	70	401.97
EL-J-9	240.00	3.19	70	401.97
EL-J-10	240.00	0.00	70	401.97
EL-J-11	246.00	0.00	68	401.97
EL-J-12	248.00	0.00	67	401.98
EL-J-13	249.00	0.00	66	401.98
EL-J-14	270.00	0.00	57	401.98
EL-J-15	270.00	0.36	57	401.98
EL-J-16	261.00	0.00	61	401.98
EL-J-16a	280.00	0.73	53	401.98
EL-J-17	233.00	0.00	73	401.97
EL-J-18	220.00	1.45	79	401.97
EL-J-19	205.00	1.99	58	339.56
EL-J-19a	220.00	0.60	52	339.56
EL-J-20	200.00	2.15	61	339.57
EL-J-21	210.00	0.00	56	339.57
EL-J-22	210.00	0.25	83	401.97
EL-J-22a	205.00	1.35	85	401.97
EL-J-23	197.00	0.00	89	401.97
EL-J-24	200.00	1.25	88	401.97

FlexTable: Junction Table

Hanapepe-Eleele Water System

Current Time: 0.000 hours

Junction No.	Elevation (ft)	Demand (gpm)	Pressure (psi)	Hydraulic Grade (ft)
EL-J-25	234.00	0.00	73	401.97
EL-J-26	180.00	1.65	69	339.57
EL-J-27	180.00	0.00	69	339.57
EL-J-28	180.00	0.00	69	339.57
EL-J-29	190.00	0.00	65	339.57
EL-J-30	183.00	0.00	68	339.57
EL-J-30a	195.00	1.43	63	339.57
EL-J-31	177.00	0.00	70	339.57
EL-J-32	198.00	0.00	61	339.57
EL-J-33	173.00	0.00	72	339.57
EL-J-34	169.00	0.00	74	339.58
EL-J-35	165.00	1.07	76	339.58
EL-J-36	165.00	1.24	76	339.57
EL-J-37	157.00	0.00	79	339.57
EL-J-37a	160.00	2.47	78	339.57
EL-J-38	164.00	0.00	76	339.57
EL-J-39	165.00	1.30	76	339.57
EL-J-40	165.00	0.00	76	339.57
EL-J-41	203.00	0.00	59	339.56
EL-J-42	205.00	1.63	58	339.56
EL-J-43	197.00	0.00	62	339.56
EL-J-44	195.00	2.05	63	339.56
EL-J-45	190.00	2.15	65	339.56
EL-J-46	175.00	1.43	71	339.56
EL-J-47	185.00	0.00	67	339.56
EL-J-48	180.00	0.98	69	339.57
EL-J-49	178.00	0.00	70	339.57
EL-J-50	175.00	0.00	71	339.56
EL-J-51	170.00	2.03	74	339.56

FlexTable: Junction Table
Hanapepe-Eleele Water System

Current Time: 0.000 hours

Junction No.	Elevation (ft)	Demand (gpm)	Pressure (psi)	Hydraulic Grade (ft)
EL-J-52	158.00	0.00	79	339.59
EL-J-53	159.00	0.00	78	339.60
EL-J-54	160.00	0.79	78	339.61
EL-J-55	170.00	0.00	74	339.65
EL-J-56	193.00	0.00	64	339.71
EL-J-57	200.00	0.00	61	339.69
EL-J-58	160.00	0.00	78	339.65
EL-J-59	144.00	0.00	85	339.64
EL-J-60	140.00	0.50	87	339.63
EL-J-61	130.00	0.00	91	339.63
EL-J-62	130.00	0.00	91	339.63
EL-J-63	139.00	0.00	87	339.63
EL-J-64	135.00	0.00	89	339.63
EL-J-65	135.00	0.35	89	339.63
EL-J-66	135.00	0.21	89	339.63
EL-J-67	150.00	0.00	82	339.63
EL-J-68	150.00	0.34	82	339.63
EL-J-69	150.00	0.00	82	339.63
EL-J-70	150.00	0.52	82	339.63
EL-J-71	130.00	1.62	91	339.61
EL-J-72	140.00	0.22	87	339.61
EL-J-73	140.00	1.22	87	339.61
EL-J-74	145.00	0.89	84	339.61
EL-J-75	153.00	0.00	81	339.61
EL-J-76	156.00	0.00	80	339.61
EL-J-76a	165.00	1.22	76	339.61
EL-J-77	150.00	0.00	82	339.61
EL-J-78	130.00	0.00	91	339.63
EL-J-79	124.00	0.00	93	339.63

FlexTable: Junction Table
Hanapepe-Eleele Water System

Current Time: 0.000 hours

Junction No.	Elevation (ft)	Demand (gpm)	Pressure (psi)	Hydraulic Grade (ft)
EL-J-80	115.00	0.81	97	339.60
EL-J-81	125.00	1.77	93	339.60
EL-J-82	120.00	1.48	95	339.59
EL-J-83	124.00	0.00	93	339.59
EL-J-84	130.00	0.34	91	339.59
EL-J-85	130.00	0.24	91	339.59
EL-J-86	131.00	0.00	90	339.59
EL-J-87	132.00	0.00	90	339.60
EL-J-88	129.00	0.00	91	339.60
EL-J-89	130.00	1.11	91	339.61
EL-J-90	100.00	0.43	104	339.60
EL-J-91	100.00	2.87	104	339.59
EL-J-92	85.00	1.57	110	339.60
EL-J-93	80.00	4.30	113	339.60
EL-J-94	85.00	0.00	110	339.60
EL-J-95	105.00	0.00	102	339.59
EL-J-96	111.00	0.00	99	339.59
EL-J-97	124.00	0.00	93	339.63
EL-J-98	125.00	0.60	93	339.62
EL-J-99	98.00	0.00	105	339.59
EL-J-100	100.00	2.69	104	339.58
EL-J-101	93.00	0.00	107	339.57
EL-J-102	110.00	0.44	100	339.55
EL-J-103	120.00	0.00	95	339.62
EL-J-104	85.00	0.00	110	339.62
EL-J-105	74.00	0.00	115	339.62
EL-J-106	70.00	0.00	117	339.61
EL-J-107	68.00	9.83	118	339.61
EL-J-108	75.00	0.00	115	339.61

FlexTable: Junction Table

Hanapepe-Eleele Water System

Current Time: 0.000 hours

Junction No.	Elevation (ft)	Demand (gpm)	Pressure (psi)	Hydraulic Grade (ft)
EL-J-871	160.00	0.00	78	339.57
HH-J-1	280.00	0.00	53	401.60
HH-J-2	280.00	0.00	53	401.58
HH-J-3	280.00	0.00	53	401.57
HH-J-4	270.00	0.42	57	401.54
HH-J-5	270.00	1.02	57	401.55
HH-J-6	236.00	0.75	72	401.48
HH-J-7	236.00	0.79	72	401.48
HH-J-8	230.00	1.66	74	401.44
HH-J-9	255.00	0.43	63	401.43
HH-J-10	225.00	1.32	76	401.43
HH-J-11	225.00	0.42	76	401.43
HH-J-12	225.00	0.49	76	401.41
HH-J-13	225.00	0.00	76	401.41
HH-J-14	250.00	0.64	66	401.41
HH-J-15	250.00	2.29	66	401.42
HH-J-16	245.00	1.72	68	401.40
HH-J-17	245.00	0.98	68	401.41
HH-J-18	240.00	0.89	70	401.39
HH-J-19	240.00	1.31	70	401.40
HH-J-20	220.00	0.95	79	401.39
HH-J-21	220.00	1.16	79	401.39
HH-J-22	210.00	1.58	83	401.38
HH-J-23	210.00	3.15	83	401.38
HH-J-24	180.00	0.68	96	401.39
HH-J-25	200.00	0.84	87	401.38
HH-J-26	200.00	2.79	87	401.38
HH-J-27	200.00	1.41	87	401.37
HH-J-28	200.00	0.66	87	401.38

FlexTable: Junction Table

Hanapepe-Eleele Water System

Current Time: 0.000 hours

Junction No.	Elevation (ft)	Demand (gpm)	Pressure (psi)	Hydraulic Grade (ft)
HH-J-29	200.00	1.24	87	401.38
HH-J-30	200.00	1.80	87	401.38
HH-J-31	170.00	0.70	81	356.02
HH-J-31a	170.00	0.62	81	356.02
HH-J-34	180.00	0.81	76	356.03
HH-J-37	180.00	0.80	76	356.03
HH-J-38	180.00	0.85	76	356.05
HH-J-41	180.00	1.76	76	356.13
HH-J-42	180.00	1.31	13	210.70
HH-J-43	194.00	0.00	7	210.74
HH-J-44	195.00	0.00	89	401.38
HH-J-45	195.00	0.00	7	211.67
HH-J-46	195.00	1.18	7	211.40
HH-J-47	194.00	0.00	7	210.75
HH-J-48	195.00	0.00	7	211.40
HH-J-49	194.00	0.00	70	356.50
HH-J-50	165.00	0.00	83	356.03
HH-J-51	160.00	1.68	85	356.03
HH-J-53	180.00	1.47	76	356.02
HH-J-55	170.00	0.47	81	356.02
HH-J-56	165.00	0.57	83	356.03
HH-J-57	170.00	1.78	81	356.02
HH-J-58	165.00	0.47	83	356.03
HH-J-59	165.00	0.50	83	356.03
HH-J-60	160.00	2.61	85	356.03
HH-J-64	165.00	0.98	83	356.00
HH-J-65	150.00	0.57	89	355.63
HH-J-66	160.00	0.11	85	356.01
HH-J-67	155.00	0.05	87	356.01

FlexTable: Junction Table
Hanapepe-Eleele Water System

Current Time: 0.000 hours

Junction No.	Elevation (ft)	Demand (gpm)	Pressure (psi)	Hydraulic Grade (ft)
HH-J-68	155.00	0.55	87	356.01
HH-J-69	150.00	0.49	89	356.01
HH-J-70	136.00	0.00	95	356.01
HH-J-73	130.00	2.35	98	356.01
HH-J-74	172.00	0.00	80	356.02
HH-J-75	169.00	0.00	81	356.00
HH-J-76	167.00	0.00	82	356.00
HH-J-77	165.00	1.13	83	356.00
HH-J-78	150.00	0.91	89	356.00
HH-J-78a	150.00	0.46	89	356.00
HH-J-79	135.00	0.00	96	355.99
HH-J-80	120.00	0.38	102	355.99
HH-J-81	120.00	0.32	102	355.99
HH-J-82	113.00	0.00	105	355.99
HH-J-83	112.00	0.00	106	355.99
HH-J-84	110.00	0.08	107	355.99
HH-J-85	110.00	0.00	44	210.61
HH-J-86	130.00	1.75	98	356.01
HH-J-87	150.00	0.00	89	356.01
HH-J-88	120.00	2.27	102	355.99
HH-J-89	119.00	0.00	103	355.99
HH-J-90	94.00	0.00	114	355.98
HH-J-91	93.00	0.00	114	355.98
HH-J-92	89.00	0.00	116	355.98
HH-J-93	90.00	0.24	115	355.98
HH-J-94	82.00	0.00	119	355.98
HH-J-95	80.00	0.00	120	355.98
HH-J-96	85.00	0.00	117	355.98
HH-J-97	88.00	0.00	116	355.98

FlexTable: Junction Table

Hanapepe-Eleele Water System

Current Time: 0.000 hours

Junction No.	Elevation (ft)	Demand (gpm)	Pressure (psi)	Hydraulic Grade (ft)
HH-J-98	110.00	0.00	107	355.99
HH-J-99	113.00	0.00	105	355.99
HH-J-100	120.00	0.27	102	355.99
HH-J-103a	90.00	0.12	115	355.98
HH-J-105	80.00	0.69	120	355.98
HH-J-105a	80.00	0.73	120	355.98
HH-J-106	80.00	0.00	57	210.55
HH-J-107	90.00	0.00	52	210.57
HH-J-108	38.00	0.00	75	210.52
HH-J-109	37.00	0.00	75	210.51
HH-J-110	34.00	0.00	77	210.49
J-56	35.00	2.02	76	210.49
J-73	161.00	0.00	21	210.37
J-131	32.00	0.00	77	210.37
J-132	30.00	1.06	78	210.36
J-133	30.00	0.00	78	210.36
J-134	30.00	0.00	78	210.34
J-136	28.00	0.00	79	210.31
J-137	20.00	0.00	82	210.30
J-138	20.00	0.23	82	210.29
J-139	30.00	0.90	78	210.29
J-140	30.00	0.00	78	210.36
J-141	30.00	0.25	78	210.36
J-142	20.00	0.18	82	210.28
J-143	18.00	0.00	83	210.28
J-145	38.00	0.00	75	210.28
J-149	36.00	0.00	76	210.28
J-151	19.00	0.00	83	210.40
J-152	35.00	0.00	76	210.28

FlexTable: Junction Table

Hanapepe-Eleele Water System

Current Time: 0.000 hours

Junction No.	Elevation (ft)	Demand (gpm)	Pressure (psi)	Hydraulic Grade (ft)
J-153	40.00	0.64	74	210.28
J-154	34.00	0.00	76	210.28
J-155	37.00	0.00	75	210.28
J-156	35.00	0.36	76	210.29
J-158	35.00	0.43	76	210.29
J-159	30.00	0.36	78	210.26
J-160	30.00	0.00	78	210.26
J-161	31.00	0.00	78	210.26
J-162	33.00	0.00	77	210.26
J-163	34.00	0.00	76	210.26
J-164	37.00	0.00	75	210.25
J-166	21.00	0.00	82	210.25
J-167	15.00	0.00	85	210.25
J-168	30.00	0.00	78	210.48
J-169	30.00	0.52	78	210.48
J-170	30.00	0.48	78	210.48
J-172	30.00	0.00	78	210.48
J-173	30.00	0.01	78	210.48
J-175	40.00	0.00	74	210.47
J-176	20.00	0.00	83	210.47
J-177	20.00	0.00	83	210.47
J-179	17.00	0.00	84	210.45
J-180	17.00	12.85	84	210.44
J-181	10.00	0.00	87	210.47
J-183	10.00	0.00	87	210.25
J-184	10.00	0.13	87	210.25
J-186	10.00	2.74	87	210.25
J-187	20.00	5.41	82	210.15
J-188	20.00	0.00	82	210.22

FlexTable: Junction Table

Hanapepe-Eleele Water System

Current Time: 0.000 hours

Junction No.	Elevation (ft)	Demand (gpm)	Pressure (psi)	Hydraulic Grade (ft)
J-189	20.00	1.48	82	210.24
J-190	10.00	2.06	87	210.25
J-191	10.00	0.00	87	210.25
J-192	20.00	0.27	82	210.22
J-193	25.00	0.00	80	210.22
J-194	30.00	0.82	78	210.22
J-195	10.00	0.81	87	210.24
J-197	20.00	0.15	82	210.24
J-198	10.00	0.69	87	210.24
J-200	21.00	0.00	82	210.24
J-201	5.00	0.00	89	210.24
J-203	6.00	0.00	89	210.25
J-204	8.00	0.00	88	210.25
J-205	10.00	0.36	87	210.25
J-206	10.00	0.82	87	210.25
J-207	10.00	0.00	87	210.24
J-208	18.00	0.00	83	210.24
J-209	6.00	2.43	89	210.24
J-210	10.00	0.00	87	210.25
J-211	10.00	0.00	87	210.25
J-212	10.00	0.00	87	210.25
J-213	10.00	0.00	87	210.25
J-215	10.00	0.00	87	210.25
J-216	10.00	2.13	87	210.25
J-218	32.00	0.00	77	210.47
J-219	20.00	0.00	83	210.47
J-222	30.00	6.71	78	210.40
J-224	15.00	0.00	85	210.28
J-226	15.00	0.00	85	210.22

FlexTable: Junction Table

Hanapepe-Eleele Water System

Current Time: 0.000 hours

Junction No.	Elevation (ft)	Demand (gpm)	Pressure (psi)	Hydraulic Grade (ft)
J-227	15.00	0.00	85	210.22
J-228	15.00	0.00	85	210.22
J-229	15.00	0.00	85	210.22
J-231	15.00	0.00	85	210.22
J-232	15.00	0.00	85	210.22
J-233	10.00	0.00	87	210.22
J-234	20.00	0.00	83	210.40
J-235	20.00	0.59	83	210.40
J-236	18.00	0.00	83	210.40
J-237	18.00	0.00	83	210.40
J-238	15.00	0.00	85	210.40
J-239	16.00	0.00	84	210.40
J-240	15.00	0.00	85	210.40
J-241	16.00	0.00	84	210.40
J-242	16.00	0.00	84	210.40
J-243	20.00	0.00	83	210.40
J-247	5.00	0.97	89	210.47
J-249	10.00	0.51	87	210.46
J-250	10.00	0.20	87	210.45
J-251	10.00	0.00	87	210.45
J-252	10.00	0.00	87	210.45
J-253	10.00	0.00	87	210.45
J-254	10.00	0.00	87	210.44
J-255	10.00	0.86	87	210.43
J-257	10.00	0.00	87	210.22
J-259	10.00	5.26	87	210.20
J-260	10.00	8.91	87	210.21
J-261	10.00	0.00	87	210.21
J-262	10.00	0.00	87	210.20

FlexTable: Junction Table
Hanapepe-Eleele Water System

Current Time: 0.000 hours

Junction No.	Elevation (ft)	Demand (gpm)	Pressure (psi)	Hydraulic Grade (ft)
J-263	6.00	0.00	89	210.19
J-264	10.00	1.76	87	210.18
J-266	10.00	6.74	87	209.92
J-267	10.00	1.05	87	210.24
J-318	25.00	0.48	56	154.30
J-319	18.00	0.00	59	154.30
J-320	26.00	0.00	56	154.30
J-321	28.00	0.00	55	154.30
J-323	34.00	0.00	52	154.30
J-324	38.00	0.00	50	154.30
J-327	37.00	12.30	51	154.29
J-328	28.00	0.00	55	154.30
J-347	205.00	0.00	58	339.74
J-348	276.00	0.00	28	339.89
J-349	288.00	0.00	23	339.94
J-448	20.00	0.00	82	210.24
J-449	16.00	0.00	84	210.24
J-451	11.00	0.00	86	210.24
J-452	70.00	0.00	61	210.24
J-453	112.00	0.00	43	210.24
J-455	112.00	0.00	43	210.24
J-456	130.00	0.00	35	210.24
J-457	144.00	0.00	29	210.24
J-458	140.00	0.00	30	210.24
J-459	30.00	0.00	78	210.24
J-460	20.00	0.00	82	210.24
J-461	17.00	0.00	84	210.24
J-462	17.00	0.00	84	210.24
J-463	15.00	0.00	85	210.24

FlexTable: Junction Table
Hanapepe-Eleele Water System

Current Time: 0.000 hours

Junction No.	Elevation (ft)	Demand (gpm)	Pressure (psi)	Hydraulic Grade (ft)
J-464	16.00	0.00	84	210.24
J-466	40.00	0.00	74	210.24
J-467	10.00	0.00	87	210.24
J-468	10.00	0.75	87	210.24
J-469	20.00	0.00	82	210.24
J-470	10.00	0.00	87	210.24
J-476	10.00	0.34	87	210.24
J-477	10.00	1.17	86	209.51
J-478	18.00	0.00	83	210.24
J-480	28.00	0.00	79	210.27
J-481	20.00	0.00	82	210.25
J-482	20.00	5.30	82	210.24
J-483	16.00	0.00	84	210.25
J-484	15.00	0.00	85	210.25
J-486	16.00	0.00	84	210.25
J-487	16.00	0.00	84	210.25
J-488	16.00	0.00	84	210.25
J-489	16.00	0.00	84	210.25
J-490	19.00	0.00	83	210.25
J-491	20.00	0.00	82	210.25
J-492	19.00	0.00	83	210.25
J-493	15.00	2.52	85	210.25
J-494	19.00	0.00	83	210.25
J-495	15.00	0.00	85	210.25
J-496	14.00	0.00	85	210.25
J-497	10.00	0.00	87	210.25
J-498	8.00	0.00	88	210.25
J-499	8.00	0.00	88	210.25
J-500	13.00	0.00	86	210.25

FlexTable: Junction Table

Hanapepe-Eleele Water System

Current Time: 0.000 hours

Junction No.	Elevation (ft)	Demand (gpm)	Pressure (psi)	Hydraulic Grade (ft)
J-501	30.00	0.03	78	210.25
J-504	30.00	0.00	78	210.25
J-505	21.00	0.00	82	210.25
J-507	26.00	0.00	80	210.25
J-508	25.00	0.00	80	210.25
J-512	28.00	0.00	79	210.25
J-514	31.00	0.00	78	210.24
J-515	35.00	0.00	76	210.24
J-516	80.00	0.00	56	210.24
J-519	52.00	0.00	69	210.24
J-520	34.00	0.00	76	210.24
J-521	32.00	0.00	77	210.24
J-522	60.00	0.00	65	210.24
J-524	76.00	0.00	58	210.24
J-525	34.00	0.00	76	210.24
J-526	22.00	0.00	82	210.24
J-527	22.00	0.00	82	210.24
J-528	29.00	0.00	79	210.24
J-529	35.00	0.00	76	210.24
J-530	34.00	0.00	76	210.24
J-531	33.00	0.00	77	210.24
J-532	29.00	0.00	79	210.24
J-533	27.00	0.00	79	210.24
J-534	40.00	0.00	74	210.24
J-535	16.00	0.00	84	210.24
J-537	40.00	0.00	74	210.24
J-539	34.00	0.00	76	210.24
J-540	38.00	0.00	75	210.24
J-541	35.00	0.00	76	210.24

FlexTable: Junction Table

Hanapepe-Eleele Water System

Current Time: 0.000 hours

Junction No.	Elevation (ft)	Demand (gpm)	Pressure (psi)	Hydraulic Grade (ft)
J-542	32.00	0.00	77	210.24
J-544	25.00	0.00	80	210.24
J-546	18.00	0.00	83	210.24
J-548	35.00	0.18	76	210.29
J-549	32.00	0.00	77	210.29
J-551	30.00	0.00	78	210.26
J-552	31.00	0.00	78	210.26
J-553	34.00	0.00	76	210.25
J-554	34.00	0.00	76	210.25
J-555	37.00	0.00	75	210.25
J-556	30.00	0.00	78	210.25
J-557	16.00	0.23	84	210.25
J-559	17.00	0.00	84	210.25
J-560	16.00	0.00	84	210.25
J-567	29.00	0.00	79	210.25
J-569	18.00	0.00	83	210.25
J-571	20.00	0.00	82	210.25
J-572	30.00	0.00	78	210.25
J-573	29.00	0.00	79	210.25
J-574	27.00	0.00	79	210.25
J-576	15.00	0.00	85	210.25
J-577	30.00	2.42	78	209.94
J-578	17.00	0.00	84	210.34
J-579	14.00	0.00	85	210.38
J-581	10.00	0.00	87	210.43
J-582	10.00	0.52	87	210.43
J-583	10.00	5.52	87	210.37
J-585	10.00	1.00	87	210.47
J-606	310.00	0.00	13	339.99

FlexTable: Junction Table
Hanapepe-Eleele Water System

Current Time: 0.000 hours

Junction No.	Elevation (ft)	Demand (gpm)	Pressure (psi)	Hydraulic Grade (ft)
J-609	310.00	0.00	13	340.00
J-613	310.00	0.00	13	340.00
J-613-A	310.00	0.00	13	340.00
J-614	290.00	0.00	22	340.00
J-615	55.00	0.00	124	340.00
J-618	294.00	0.00	47	401.99
J-619	310.00	0.00	40	401.99
J-620	326.00	0.00	33	401.99
J-621	330.00	0.00	31	401.99
J-622	358.00	0.00	19	402.00
J-623	365.00	0.00	16	402.00
J-624	365.00	0.00	16	402.00
J-712	10.00	0.39	87	210.47
J-713	10.00	1.82	87	210.25
J-722	21.00	0.00	82	210.25
J-740	310.00	0.00	13	340.00
J-742	310.00	0.00	40	401.99
J-743	310.00	0.00	13	340.00
J-744	310.00	0.00	13	340.00
J-747	310.00	0.00	13	340.00
J-774	168.76	0.00	74	339.65
J-811	190.00	0.00	65	339.65
J-812	205.00	0.00	58	339.65
J-813	160.00	0.00	78	339.65
J-815	165.00	0.00	76	339.65
J-819	144.00	0.00	85	339.65
J-820	130.00	0.00	91	339.65
J-828	195.00	0.00	89	401.37
J-829	195.00	0.00	7	211.40

FlexTable: Junction Table
Hanapepe-Eleele Water System

Current Time: 0.000 hours

Junction No.	Elevation (ft)	Demand (gpm)	Pressure (psi)	Hydraulic Grade (ft)
J-830	195.00	0.00	89	401.26
J-831	195.00	0.00	89	401.37
J-832	194.00	0.00	90	401.29
J-833	195.00	0.00	70	356.52
J-834	195.00	0.00	89	401.24
J-835	16.00	0.00	84	210.25
J-837	16.00	0.00	84	210.25
J-842	55.07	0.00	43	154.35
J-843	62.00	0.00	40	154.35
J-844	62.00	0.00	120	339.58
J-845	62.00	0.00	120	339.58
J-846	170.00	1.13	81	356.04
J-847	170.00	0.98	81	356.04
J-848	170.00	1.71	81	356.02
J-849	170.00	0.93	81	356.02
J-852	10.00	0.00	87	210.20
J-853	10.00	0.38	87	210.25
J-855	10.00	0.84	87	210.20
J-856	95.00	2.05	106	339.59
J-865	10.00	0.68	87	210.24
J-866	140.00	2.10	87	339.59
J-868	190.00	0.46	92	401.38
J-869	280.00	0.00	53	401.57
J-870	210.00	1.73	83	401.97
J-872	20.00	0.00	83	210.41

Appendix C

Water Model Results for

Hanapepe-Eleele Water System
With Lima Ola Development
(Existing)

340' Service Zone

340' Service Zone

Max Daily Demand with Fire Flow at Hydrant FH-5a

Pipe Table - Time: 2.00 hours

Pipe No.	Diameter (in)	Start Node	Stop Node	Length (ft)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
1	8.0	EL-J-821	FH-1	50	Ductile Iron	110.0	468.29	2.99
1a	8.0	FH-1a	FH-1	340	Ductile Iron	110.0	-468.29	2.99
2	8.0	FH-2	FH-1a	310	Ductile Iron	110.0	-468.29	2.99
2a	8.0	FH-2	FH-2a	324	Ductile Iron	110.0	468.29	2.99
3	8.0	1	FH-2a	124	Ductile Iron	110.0	-468.29	2.99
3a	8.0	FH-3	1	86	Ductile Iron	110.0	443.73	2.83
4	8.0	2	FH-3	135	Ductile Iron	110.0	443.73	2.83
4a	8.0	3	2	25	Ductile Iron	110.0	466.92	2.98
5	8.0	4	3	125	Ductile Iron	110.0	486.62	3.11
5a	8.0	FH-3a	4	50	Ductile Iron	110.0	497.87	3.18
6	8.0	FH-3a	5	285	Ductile Iron	110.0	-497.87	3.18
6a	12.0	EL-J-36	5	1,015	Ductile Iron	110.0	1,639.60	4.65
7	8.0	5	FH-4	28	Ductile Iron	110.0	1,111.73	7.10
7a	8.0	FH-4	FH-4a	232	Ductile Iron	110.0	1,111.73	7.10
8	8.0	FH-4a	FH-5	242	Ductile Iron	110.0	1,111.73	7.10
8a	8.0	FH-5	FH-5a	203	Ductile Iron	110.0	1,111.73	7.10
9	8.0	FH-5a	FH-6	237	Ductile Iron	110.0	-888.27	5.67
9a	8.0	6	FH-6	252	Ductile Iron	110.0	888.27	5.67
10	8.0	FH-7	6	92	Ductile Iron	110.0	905.77	5.78
10a	8.0	1	FH-7	250	Ductile Iron	110.0	905.77	5.78
10b	8.0	2	2a	33	Ductile Iron	110.0	23.19	0.15
10c	8.0	3	3a	33	Ductile Iron	110.0	19.69	0.13
10d	8.0	4	4a	27	Ductile Iron	110.0	11.25	0.07
10e	8.0	6	6a	33	Ductile Iron	110.0	17.50	0.11

340' Service Zone

Max Daily Demand with Fire Flow at Hydrant FH-5a

Junction Table - Time: 2.00 hours

Junction No.	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
1	202.90	6.26	286.39	36
2	209.52	0.00	287.62	34
2a	209.52	23.19	287.61	34
3	209.78	0.00	287.77	34
3a	209.78	19.69	287.77	34
4	210.31	0.00	288.59	34
4a	210.31	11.25	288.59	34
5	213.00	30.00	290.88	34
6	212.09	0.00	279.31	29
6a	212.09	17.50	279.31	29
EL-J-36	223.70	0.00	299.64	33
EL-J-821	160.00	0.00	293.40	58

340' Service Zone

Max Daily Demand with Fire Flow at Hydrant FH-5a

Hydrant Table - Time: 2.00 hours

Hydrant No.	Hydrant Status	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
FH-1	Closed	172.79	0.00	293.10	52
FH-1a	Closed	179.74	0.00	291.02	48
FH-2	Closed	189.09	0.00	289.13	43
FH-2a	Closed	201.39	0.00	287.15	37
FH-3	Closed	205.79	0.00	286.87	35
FH-3a	Closed	211.15	0.00	288.93	34
FH-4	Closed	220.80	0.00	290.04	30
FH-4a	Closed	224.21	0.00	283.01	25
FH-5	Closed	226.62	0.00	275.68	21
FH-5a	Open	227.81	2,000.00	269.53	18
FH-6	Closed	224.15	0.00	274.27	22
FH-7	Closed	210.11	0.00	281.21	31

340' Service Zone

Max Daily Demand with Fire Flow at Hydrant FH-21

Tank 3/4 Full at Fire Flow Start

Pipe Table - Time: 2.00 hours

Pipe No.	Diameter (in)	Start Node	Stop Node	Length (ft)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
1	8.0	EL-J-821	FH-1	50	Ductile Iron	110.0	468.29	2.99
1a	8.0	FH-1a	FH-1	340	Ductile Iron	110.0	-468.29	2.99
2	8.0	FH-2	FH-1a	310	Ductile Iron	110.0	-468.29	2.99
2a	8.0	FH-2	FH-2a	324	Ductile Iron	110.0	468.29	2.99
3	8.0	1	FH-2a	124	Ductile Iron	110.0	-468.29	2.99
3a	8.0	FH-3	1	86	Ductile Iron	110.0	443.73	2.83
4	8.0	2	FH-3	135	Ductile Iron	110.0	443.73	2.83
4a	8.0	3	2	25	Ductile Iron	110.0	466.92	2.98
5	8.0	4	3	125	Ductile Iron	110.0	486.62	3.11
5a	8.0	FH-3a	4	50	Ductile Iron	110.0	497.87	3.18
6	8.0	FH-3a	5	285	Ductile Iron	110.0	-497.87	3.18
6a	12.0	EL-J-36	5	1,015	Ductile Iron	110.0	1,639.60	4.65
7	8.0	5	FH-4	28	Ductile Iron	110.0	1,111.73	7.10
7a	8.0	FH-4	FH-4a	232	Ductile Iron	110.0	1,111.73	7.10
8	8.0	FH-4a	FH-5	242	Ductile Iron	110.0	1,111.73	7.10
8a	8.0	FH-5	FH-5a	203	Ductile Iron	110.0	1,111.73	7.10
9	8.0	FH-5a	FH-6	237	Ductile Iron	110.0	-888.27	5.67
9a	8.0	6	FH-6	252	Ductile Iron	110.0	888.27	5.67
10	8.0	FH-7	6	92	Ductile Iron	110.0	905.77	5.78
10a	8.0	1	FH-7	250	Ductile Iron	110.0	905.77	5.78
10b	8.0	2	2a	33	Ductile Iron	110.0	23.19	0.15
10c	8.0	3	3a	33	Ductile Iron	110.0	19.69	0.13
10d	8.0	4	4a	27	Ductile Iron	110.0	11.25	0.07
10e	8.0	6	6a	33	Ductile Iron	110.0	17.50	0.11

340' Service Zone

Max Daily Demand with Fire Flow at Hydrant FH-21

Tank 3/4 Full at Fire Flow Start

Junction Table - Time: 2.00 hours

Junction No.	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
1	202.90	6.26	286.86	36
2	209.52	0.00	288.08	34
2a	209.52	23.19	288.08	34
3	209.78	0.00	288.23	34
3a	209.78	19.69	288.23	34
4	210.31	0.00	289.05	34
4a	210.31	11.25	289.05	34
5	213.00	30.00	291.34	34
6	212.09	0.00	279.77	29
6a	212.09	17.50	279.77	29
EL-J-36	223.70	0.00	300.10	33
EL-J-821	160.00	0.00	293.87	58

340' Service Zone

Max Daily Demand with Fire Flow at Hydrant FH-21

Tank 3/4 Full at Fire Flow Start

Hydrant Table - Time: 2.00 hours

Hydrant No.	Hydrant Status	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
FH-1	Closed	172.79	0.00	293.56	52
FH-1a	Closed	179.74	0.00	291.48	48
FH-2	Closed	189.09	0.00	289.59	44
FH-2a	Closed	201.39	0.00	287.61	37
FH-3	Closed	205.79	0.00	287.33	35
FH-3a	Closed	211.15	0.00	289.39	34
FH-4	Closed	220.80	0.00	290.50	30
FH-4a	Closed	224.21	0.00	283.47	26
FH-5	Closed	226.62	0.00	276.14	21
FH-5a	Open	227.81	2,000.00	270.00	18
FH-6	Closed	224.15	0.00	274.73	22
FH-7	Closed	210.11	0.00	281.67	31

340' Service Zone

Peak Hour Flow

Pipe Table - Time: 0.00 hours

Pipe No.	Diameter (in)	Start Node	Stop Node	Length (ft)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
1	8.0	EL-J-821	FH-1	50	Ductile Iron	110.0	-18.48	0.12
1a	8.0	FH-1a	FH-1	340	Ductile Iron	110.0	18.48	0.12
2	8.0	FH-2	FH-1a	310	Ductile Iron	110.0	18.48	0.12
2a	8.0	FH-2	FH-2a	324	Ductile Iron	110.0	-18.48	0.12
3	8.0	1	FH-2a	124	Ductile Iron	110.0	18.48	0.12
3a	8.0	FH-3	1	86	Ductile Iron	110.0	3.92	0.02
4	8.0	2	FH-3	135	Ductile Iron	110.0	3.92	0.02
4a	8.0	3	2	25	Ductile Iron	110.0	50.30	0.32
5	8.0	4	3	125	Ductile Iron	110.0	89.69	0.57
5a	8.0	FH-3a	4	50	Ductile Iron	110.0	112.19	0.72
6	8.0	FH-3a	5	285	Ductile Iron	110.0	-112.19	0.72
6a	12.0	EL-J-36	5	1,015	Ductile Iron	110.0	234.27	0.66
7	8.0	5	FH-4	28	Ductile Iron	110.0	62.09	0.40
7a	8.0	FH-4	FH-4a	232	Ductile Iron	110.0	62.09	0.40
8	8.0	FH-4a	FH-5	242	Ductile Iron	110.0	62.09	0.40
8a	8.0	FH-5	FH-5a	203	Ductile Iron	110.0	62.09	0.40
9	8.0	FH-5a	FH-6	237	Ductile Iron	110.0	62.09	0.40
9a	8.0	6	FH-6	252	Ductile Iron	110.0	-62.09	0.40
10	8.0	FH-7	6	92	Ductile Iron	110.0	-27.08	0.17
10a	8.0	1	FH-7	250	Ductile Iron	110.0	-27.08	0.17
10b	8.0	2	2a	33	Ductile Iron	110.0	46.38	0.30
10c	8.0	3	3a	33	Ductile Iron	110.0	39.39	0.25
10d	8.0	4	4a	27	Ductile Iron	110.0	22.50	0.14
10e	8.0	6	6a	33	Ductile Iron	110.0	35.01	0.22

340' Service Zone
Peak Hour Flow

Junction Table - Time: 0.00 hours

Junction No.	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
1	202.90	12.51	337.62	58
2	209.52	0.00	337.62	56
2a	209.52	46.38	337.61	56
3	209.78	0.00	337.62	55
3a	209.78	39.39	337.62	55
4	210.31	0.00	337.66	55
4a	210.31	22.50	337.65	55
5	213.00	60.00	337.80	54
6	212.09	0.00	337.63	54
6a	212.09	35.01	337.63	54
EL-J-36	223.70	0.00	338.04	50
EL-J-821	160.00	0.00	337.60	77

340' Service Zone

Peak Hour Flow

Hydrant Table - Time: 0.00 hours

Hydrant No.	Hydrant Status	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
FH-1	Closed	172.79	0.00	337.60	71
FH-1a	Closed	179.74	0.00	337.61	68
FH-2	Closed	189.09	0.00	337.61	64
FH-2a	Closed	201.39	0.00	337.62	59
FH-3	Closed	205.79	0.00	337.62	57
FH-3a	Closed	211.15	0.00	337.68	55
FH-4	Closed	220.80	0.00	337.80	51
FH-4a	Closed	224.21	0.00	337.76	49
FH-5	Closed	226.62	0.00	337.73	48
FH-5a	Closed	227.81	0.00	337.70	48
FH-6	Closed	224.15	0.00	337.66	49
FH-7	Closed	210.11	0.00	337.62	55

Water Model Results for

Hanapepe-Eleele Water System With Lima Ola Development (Proposed)

402’ Service Zone

402' Service Zone

Max Daily Demand with Fire Flow at Hydrant FH-21

Pipe Table - Time: 2.00 hours

Pipe No.	Diameter (in)	Start Node	Stop Node	Length (ft)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
11	8.0	7	8	14	Ductile Iron	110.0	160.91	1.03
11a	8.0	7	7a	30	Ductile Iron	110.0	16.62	0.11
12	8.0	8	FH-9	124	Ductile Iron	110.0	146.42	0.93
13	8.0	FH-9	FH-9a	183	Ductile Iron	110.0	146.42	0.93
14	8.0	FH-9a	FH-10	212	Ductile Iron	110.0	146.42	0.93
15	8.0	FH-10	9	218	Ductile Iron	110.0	146.42	0.93
15a	8.0	9	FH-11	116	Ductile Iron	110.0	11.37	0.07
15b	8.0	FH-11	10	28	Ductile Iron	110.0	11.37	0.07
15c	8.0	10	10a	30	Ductile Iron	110.0	11.37	0.07
16	8.0	9	11	37	Ductile Iron	110.0	120.56	0.77
16a	8.0	11	11a	30	Ductile Iron	110.0	10.07	0.06
17	8.0	11	FH-12	22	Ductile Iron	110.0	110.49	0.71
18	8.0	FH-12	13	188	Ductile Iron	110.0	110.49	0.71
19	8.0	FH-13	13	156	Ductile Iron	110.0	139.17	0.89
20	8.0	FH-13a	FH-13	290	Ductile Iron	110.0	139.17	0.89
21	8.0	FH-14	FH-13a	245	Ductile Iron	110.0	139.17	0.89
22	8.0	12	FH-14	98	Ductile Iron	110.0	139.17	0.89
23	8.0	13	14	77	Ductile Iron	110.0	241.35	1.54
23a	8.0	14	14a	30	Ductile Iron	110.0	15.75	0.10
24	8.0	14	FH-15a	65	Ductile Iron	110.0	225.60	1.44
25	8.0	FH-15a	15	176	Ductile Iron	110.0	225.60	1.44
25a	8.0	15	15a	30	Ductile Iron	110.0	15.75	0.10
26	8.0	15	FH-16	59	Ductile Iron	110.0	209.85	1.34
27	8.0	FH-16	16	91	Ductile Iron	110.0	209.85	1.34
27a	8.0	16	16a	30	Ductile Iron	110.0	14.88	0.09
28	8.0	16	FH-18	159	Ductile Iron	110.0	194.97	1.24
29	8.0	FH-18	FH-20	200	Ductile Iron	110.0	194.97	1.24
30	8.0	FH-20	17	97	Ductile Iron	110.0	194.97	1.24
31	8.0	17	FH-19	153	Ductile Iron	110.0	-188.06	1.20
32	8.0	FH-19	18	253	Ductile Iron	110.0	-188.06	1.20

402' Service Zone

Max Daily Demand with Fire Flow at Hydrant FH-21

Pipe Table - Time: 2.00 hours

Pipe No.	Diameter (in)	Start Node	Stop Node	Length (ft)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
32a	8.0	18	18a	30	Ductile Iron	110.0	33.26	0.21
33	8.0	18	FH-17	84	Ductile Iron	110.0	-265.93	1.70
34	8.0	FH-17	19	84	Ductile Iron	110.0	-265.93	1.70
34a	8.0	19	19a	30	Ductile Iron	110.0	29.75	0.19
34b	8.0	19	19b	30	Ductile Iron	110.0	15.75	0.10
35	8.0	19	FH-15	215	Ductile Iron	110.0	-311.43	1.99
36	8.0	FH-15	12	123	Ductile Iron	110.0	-311.43	1.99
37	8.0	12	J-90	53	Ductile Iron	110.0	-458.91	2.93
38	8.0	J-90	FH-8	151	Ductile Iron	110.0	177.53	1.13
39	8.0	FH-8	7	26	Ductile Iron	110.0	177.53	1.13
40	8.0	FH-21	17	168	Ductile Iron	110.0	-378.03	2.41
41	8.0	FH-22	FH-21	384	Ductile Iron	110.0	871.97	5.57
42	8.0	EL-J-3	FH-22	300	Ductile Iron	110.0	871.97	5.57
43	8.0	J-90	J-91	122	Ductile Iron	110.0	-636.43	4.06
44	8.0	J-91	J-92	172	Ductile Iron	110.0	-636.43	4.06
45	8.0	J-92	J-93	31	Ductile Iron	110.0	-636.43	4.06
45a	8.0	J-93	J-94	433	Ductile Iron	110.0	-636.43	4.06

402' Service Zone

Max Daily Demand with Fire Flow at Hydrant FH-21

Junction Table - Time: 2.00 hours

Junction No.	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
7	222.54	0.00	354.86	57
7a	222.54	16.62	354.86	57
8	222.54	14.49	354.85	57
9	225.90	14.49	354.33	56
10	223.30	0.00	354.33	57
10a	223.30	11.37	354.33	57
11	226.34	0.00	354.31	55
11a	226.34	10.07	354.31	55
12	227.67	8.31	354.73	55
13	230.67	8.31	354.22	54
14	233.14	0.00	354.08	52
14a	233.14	15.75	354.08	52
15	242.99	0.00	353.70	48
15a	242.99	15.75	353.70	48
16	250.85	0.00	353.50	44
16a	250.85	14.88	353.50	44
17	268.22	4.99	352.95	37
18	252.77	44.62	353.40	44
18a	252.77	33.26	353.40	44
19	243.85	0.00	353.76	48
19a	243.85	29.75	353.76	48
19b	243.85	15.75	353.76	48
J-90	226.73	0.00	355.04	56
J-91	246.00	0.00	356.36	48
J-92	240.00	0.00	358.21	51
J-93	240.00	0.00	358.54	51
J-94	221.44	0.00	363.21	61

402' Service Zone

Max Daily Demand with Fire Flow at Hydrant FH-21

Hydrant Table - Time: 2.00 hours

Hydrant No.	Hydrant Status	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
FH-8	Closed	229.92	0.00	354.89	54
FH-9	Closed	229.94	0.00	354.76	54
FH-9a	Closed	231.38	0.00	354.63	53
FH-10	Closed	233.05	0.00	354.48	53
FH-11	Closed	230.14	0.00	354.33	54
FH-12	Closed	233.67	0.00	354.30	52
FH-13	Closed	238.35	0.00	354.32	50
FH-13a	Closed	237.05	0.00	354.51	51
FH-14	Closed	235.12	0.00	354.67	52
FH-15	Closed	239.41	0.00	354.38	50
FH-15a	Closed	242.71	0.00	353.98	48
FH-16	Closed	252.12	0.00	353.62	44
FH-17	Closed	255.09	0.00	353.58	43
FH-18	Closed	266.49	0.00	353.30	38
FH-19	Closed	271.60	0.00	353.12	35
FH-20	Closed	274.36	0.00	353.06	34
FH-21	Open	281.35	1,250.00	352.26	31
FH-22	Closed	280.93	0.00	359.67	34

402' Service Zone

Max Daily Demand with Fire Flow at Hydrant FH-21

Tank 3/4 Full at Fire Flow Start

Pipe Table - Time: 2.00 hours

Pipe No.	Diameter (in)	Start Node	Stop Node	Length (ft)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
11	8.0	7	8	14	Ductile Iron	110.0	160.91	1.03
11a	8.0	7	7a	30	Ductile Iron	110.0	16.62	0.11
12	8.0	8	FH-9	124	Ductile Iron	110.0	146.42	0.93
13	8.0	FH-9	FH-9a	183	Ductile Iron	110.0	146.42	0.93
14	8.0	FH-9a	FH-10	212	Ductile Iron	110.0	146.42	0.93
15	8.0	FH-10	9	218	Ductile Iron	110.0	146.42	0.93
15a	8.0	9	FH-11	116	Ductile Iron	110.0	11.37	0.07
15b	8.0	FH-11	10	28	Ductile Iron	110.0	11.37	0.07
15c	8.0	10	10a	30	Ductile Iron	110.0	11.37	0.07
16	8.0	9	11	37	Ductile Iron	110.0	120.56	0.77
16a	8.0	11	11a	30	Ductile Iron	110.0	10.07	0.06
17	8.0	11	FH-12	22	Ductile Iron	110.0	110.49	0.71
18	8.0	FH-12	13	188	Ductile Iron	110.0	110.49	0.71
19	8.0	FH-13	13	156	Ductile Iron	110.0	139.17	0.89
20	8.0	FH-13a	FH-13	290	Ductile Iron	110.0	139.17	0.89
21	8.0	FH-14	FH-13a	245	Ductile Iron	110.0	139.17	0.89
22	8.0	12	FH-14	98	Ductile Iron	110.0	139.17	0.89
23	8.0	13	14	77	Ductile Iron	110.0	241.35	1.54
23a	8.0	14	14a	30	Ductile Iron	110.0	15.75	0.10
24	8.0	14	FH-15a	65	Ductile Iron	110.0	225.60	1.44
25	8.0	FH-15a	15	176	Ductile Iron	110.0	225.60	1.44
25a	8.0	15	15a	30	Ductile Iron	110.0	15.75	0.10
26	8.0	15	FH-16	59	Ductile Iron	110.0	209.85	1.34
27	8.0	FH-16	16	91	Ductile Iron	110.0	209.85	1.34
27a	8.0	16	16a	30	Ductile Iron	110.0	14.88	0.09
28	8.0	16	FH-18	159	Ductile Iron	110.0	194.97	1.24
29	8.0	FH-18	FH-20	200	Ductile Iron	110.0	194.97	1.24
30	8.0	FH-20	17	97	Ductile Iron	110.0	194.97	1.24
31	8.0	17	FH-19	153	Ductile Iron	110.0	-188.06	1.20

402' Service Zone

Max Daily Demand with Fire Flow at Hydrant FH-21

Tank 3/4 Full at Fire Flow Start

Pipe Table - Time: 2.00 hours

Pipe No.	Diameter (in)	Start Node	Stop Node	Length (ft)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
32	8.0	FH-19	18	253	Ductile Iron	110.0	-188.06	1.20
32a	8.0	18	18a	30	Ductile Iron	110.0	33.26	0.21
33	8.0	18	FH-17	84	Ductile Iron	110.0	-265.93	1.70
34	8.0	FH-17	19	84	Ductile Iron	110.0	-265.93	1.70
34a	8.0	19	19a	30	Ductile Iron	110.0	29.75	0.19
34b	8.0	19	19b	30	Ductile Iron	110.0	15.75	0.10
35	8.0	19	FH-15	215	Ductile Iron	110.0	-311.43	1.99
36	8.0	FH-15	12	123	Ductile Iron	110.0	-311.43	1.99
37	8.0	12	J-90	53	Ductile Iron	110.0	-458.91	2.93
38	8.0	J-90	FH-8	151	Ductile Iron	110.0	177.53	1.13
39	8.0	FH-8	7	26	Ductile Iron	110.0	177.53	1.13
40	8.0	FH-21	17	168	Ductile Iron	110.0	-378.03	2.41
41	8.0	FH-22	FH-21	384	Ductile Iron	110.0	871.97	5.57
42	8.0	EL-J-3	FH-22	300	Ductile Iron	110.0	871.97	5.57
43	8.0	J-90	J-91	122	Ductile Iron	110.0	-636.43	4.06
44	8.0	J-91	J-92	172	Ductile Iron	110.0	-636.43	4.06
45	8.0	J-92	J-93	31	Ductile Iron	110.0	-636.43	4.06
45a	8.0	J-93	J-94	433	Ductile Iron	110.0	-636.43	4.06

402' Service Zone

Max Daily Demand with Fire Flow at Hydrant FH-21

Tank 3/4 Full at Fire Flow Start

Junction Table - Time: 2.00 hours

Junction No.	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
7	222.54	0.00	352.72	56
7a	222.54	16.62	352.72	56
8	222.54	14.49	352.71	56
9	225.90	14.49	352.19	55
10	223.30	0.00	352.19	56
10a	223.30	11.37	352.19	56
11	226.34	0.00	352.17	55
11a	226.34	10.07	352.17	55
12	227.67	8.31	352.59	54
13	230.67	8.31	352.08	53
14	233.14	0.00	351.94	52
14a	233.14	15.75	351.94	52
15	242.99	0.00	351.56	47
15a	242.99	15.75	351.56	47
16	250.85	0.00	351.36	44
16a	250.85	14.88	351.36	44
17	268.22	4.99	350.81	36
18	252.77	44.62	351.26	43
18a	252.77	33.26	351.26	43
19	243.85	0.00	351.62	47
19a	243.85	29.75	351.62	47
19b	243.85	15.75	351.62	47
J-90	226.73	0.00	352.90	55
J-91	246.00	0.00	354.22	47
J-92	240.00	0.00	356.07	50
J-93	240.00	0.00	356.40	50
J-94	221.44	0.00	361.07	61

402' Service Zone

Max Daily Demand with Fire Flow at Hydrant FH-21

Tank 3/4 Full at Fire Flow Start

Hydrant Table - Time: 2.00 hours

Hydrant No.	Hydrant Status	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
FH-8	Closed	229.92	0.00	352.75	53
FH-9	Closed	229.94	0.00	352.62	53
FH-9a	Closed	231.38	0.00	352.49	53
FH-10	Closed	233.05	0.00	352.34	52
FH-11	Closed	230.14	0.00	352.19	53
FH-12	Closed	233.67	0.00	352.16	51
FH-13	Closed	238.35	0.00	352.18	49
FH-13a	Closed	237.05	0.00	352.37	50
FH-14	Closed	235.12	0.00	352.53	51
FH-15	Closed	239.41	0.00	352.24	49
FH-15a	Closed	242.71	0.00	351.84	47
FH-16	Closed	252.12	0.00	351.48	43
FH-17	Closed	255.09	0.00	351.44	42
FH-18	Closed	266.49	0.00	351.16	37
FH-19	Closed	271.60	0.00	350.98	34
FH-20	Closed	274.36	0.00	350.92	33
FH-21	Open	281.35	1,250.00	350.12	30
FH-22	Closed	280.93	0.00	357.53	33

402' Service Zone

Peak Hour Flow

Pipe Table - Time: 0.00 hours

Pipe No.	Diameter (in)	Start Node	Stop Node	Length (ft)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
11	8.0	7	8	14	Ductile Iron	110.0	65.59	0.42
11a	8.0	7	7a	30	Ductile Iron	110.0	33.24	0.21
12	8.0	8	FH-9	124	Ductile Iron	110.0	36.61	0.23
13	8.0	FH-9	FH-9a	183	Ductile Iron	110.0	36.61	0.23
14	8.0	FH-9a	FH-10	212	Ductile Iron	110.0	36.61	0.23
15	8.0	FH-10	9	218	Ductile Iron	110.0	36.61	0.23
15a	8.0	9	FH-11	116	Ductile Iron	110.0	22.74	0.15
15b	8.0	FH-11	10	28	Ductile Iron	110.0	22.74	0.15
15c	8.0	10	10a	30	Ductile Iron	110.0	22.74	0.15
16	8.0	9	11	37	Ductile Iron	110.0	-15.11	0.10
16a	8.0	11	11a	30	Ductile Iron	110.0	20.13	0.13
17	8.0	11	FH-12	22	Ductile Iron	110.0	-35.24	0.22
18	8.0	FH-12	13	188	Ductile Iron	110.0	-35.24	0.22
19	8.0	FH-13	13	156	Ductile Iron	110.0	39.76	0.25
20	8.0	FH-13a	FH-13	290	Ductile Iron	110.0	39.76	0.25
21	8.0	FH-14	FH-13a	245	Ductile Iron	110.0	39.76	0.25
22	8.0	12	FH-14	98	Ductile Iron	110.0	39.76	0.25
23	8.0	13	14	77	Ductile Iron	110.0	-12.10	0.08
23a	8.0	14	14a	30	Ductile Iron	110.0	31.50	0.20
24	8.0	14	FH-15a	65	Ductile Iron	110.0	-43.60	0.28
25	8.0	FH-15a	15	176	Ductile Iron	110.0	-43.60	0.28
25a	8.0	15	15a	30	Ductile Iron	110.0	31.50	0.20
26	8.0	15	FH-16	59	Ductile Iron	110.0	-75.10	0.48
27	8.0	FH-16	16	91	Ductile Iron	110.0	-75.10	0.48
27a	8.0	16	16a	30	Ductile Iron	110.0	29.76	0.19
28	8.0	16	FH-18	159	Ductile Iron	110.0	-104.86	0.67
29	8.0	FH-18	FH-20	200	Ductile Iron	110.0	-104.86	0.67
30	8.0	FH-20	17	97	Ductile Iron	110.0	-104.86	0.67
31	8.0	17	FH-19	153	Ductile Iron	110.0	147.44	0.94
32	8.0	FH-19	18	253	Ductile Iron	110.0	147.44	0.94

402' Service Zone

Peak Hour Flow

Pipe Table - Time: 0.00 hours

Pipe No.	Diameter (in)	Start Node	Stop Node	Length (ft)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
32a	8.0	18	18a	30	Ductile Iron	110.0	66.51	0.42
33	8.0	18	FH-17	84	Ductile Iron	110.0	-8.31	0.05
34	8.0	FH-17	19	84	Ductile Iron	110.0	-8.31	0.05
34a	8.0	19	19a	30	Ductile Iron	110.0	59.49	0.38
34b	8.0	19	19b	30	Ductile Iron	110.0	31.50	0.20
35	8.0	19	FH-15	215	Ductile Iron	110.0	-99.30	0.63
36	8.0	FH-15	12	123	Ductile Iron	110.0	-99.30	0.63
37	8.0	12	J-90	53	Ductile Iron	110.0	-155.68	0.99
38	8.0	J-90	FH-8	151	Ductile Iron	110.0	98.83	0.63
39	8.0	FH-8	7	26	Ductile Iron	110.0	98.83	0.63
40	8.0	FH-21	17	168	Ductile Iron	110.0	262.29	1.67
41	8.0	FH-22	FH-21	384	Ductile Iron	110.0	262.29	1.67
42	8.0	EL-J-3	FH-22	300	Ductile Iron	110.0	262.29	1.67
43	8.0	J-90	J-91	122	Ductile Iron	110.0	-254.51	1.62
44	8.0	J-91	J-92	172	Ductile Iron	110.0	-254.51	1.62
45	8.0	J-92	J-93	31	Ductile Iron	110.0	-254.51	1.62
45a	8.0	J-93	J-94	433	Ductile Iron	110.0	-254.51	1.62

402' Service Zone

Peak Hour Flow

Junction Table - Time: 0.00 hours

Junction No.	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
7	222.54	0.00	395.45	75
7a	222.54	33.24	395.45	75
8	222.54	28.98	395.45	75
9	225.90	28.98	395.41	73
10	223.30	0.00	395.40	75
10a	223.30	22.74	395.40	75
11	226.34	0.00	395.41	73
11a	226.34	20.13	395.41	73
12	227.67	16.62	395.47	73
13	230.67	16.62	395.42	71
14	233.14	0.00	395.42	70
14a	233.14	31.50	395.42	70
15	242.99	0.00	395.44	66
15a	242.99	31.50	395.43	66
16	250.85	0.00	395.47	63
16a	250.85	29.76	395.47	63
17	268.22	9.99	395.64	55
18	252.77	89.24	395.35	62
18a	252.77	66.51	395.34	62
19	243.85	0.00	395.35	66
19a	243.85	59.49	395.35	66
19b	243.85	31.50	395.35	66
J-90	226.73	0.00	395.51	73
J-91	246.00	0.00	395.75	65
J-92	240.00	0.00	396.09	68
J-93	240.00	0.00	396.15	68
J-94	221.44	0.00	397.00	76

402' Service Zone

Peak Hour Flow

Hydrant Table - Time: 0.00 hours

Hydrant No.	Hydrant Status	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
FH-8	Closed	229.92	0.00	395.46	72
FH-9	Closed	229.94	0.00	395.44	72
FH-9a	Closed	231.38	0.00	395.43	71
FH-10	Closed	233.05	0.00	395.42	70
FH-11	Closed	230.14	0.00	395.40	72
FH-12	Closed	233.67	0.00	395.41	70
FH-13	Closed	238.35	0.00	395.43	68
FH-13a	Closed	237.05	0.00	395.45	69
FH-14	Closed	235.12	0.00	395.46	70
FH-15	Closed	239.41	0.00	395.42	68
FH-15a	Closed	242.71	0.00	395.42	66
FH-16	Closed	252.12	0.00	395.45	62
FH-17	Closed	255.09	0.00	395.35	61
FH-18	Closed	266.49	0.00	395.53	56
FH-19	Closed	271.60	0.00	395.53	54
FH-20	Closed	274.36	0.00	395.60	53
FH-21	Closed	281.35	0.00	395.99	50
FH-22	Closed	280.93	0.00	396.79	50

Appendix D

Department of Water
County of Kaua'i

Water has no substitute.......Conserve it

October 5, 2015

Anson Murayama
Community Planning and Engineering, Inc.
1286 Queen Emma Street
Honolulu, HI 96813

Dear Anson Murayama:

Subject: Water Master Plan for Lima Ola Workforce Housing Development dated September 2015, Eleele, Kauai

This is in regard to your resubmittal of the Water Master Plan for Lima Ola Workforce Housing Development received by the Department of Water (DOW) on September 9, 2015.

The "Water Master Plan for Lima Ola Workforce Housing Development" dated September 2015 and prepared by Community Planning and Engineering is approved by the DOW.

Please submit six copies of the approved master plan with the hydraulic model.

If you have any questions, please contact Mr. Edward Doi at (808) 245-5417.

Sincerely,

Kirk Saiki
Manager & Chief Engineer

RF:mll
WMP-Lima Ola Sept 2015, Murayama

RECEIVED
OCT - 7 2015
COMMUNITY PLANNING AND ENGINEERING INC.

4398 Pua Loke St., P.O. Box 1706, Lihue, HI 96766 Phone; 808-245-5400
Engineering and Fiscal Fax: 808-245-5813, Operations Fax: 808-245-5402, Administration Fax: 808-246-8628

Department of Water
County of Kaua'i

Water has no substitute.......Conserve it

COUNTY OF KAUAI
HOUSING AGENCY

12 MAY 17 P1:21

May 14, 2012

Mr. Eugene Jimenez, Housing Director
Kauai County Housing Agency
4444 Rice Street, Suite 330
Lihue, HI 96766

Dear Mr. Jimenez:

Subject: LIMA OLA WORKFORCE HOUSING DEVELOPMENT MASTER PLAN, Dated March 2012, TMK: 2-1-01:054, Eleele, Kauai

This is in regard to your letter dated April 9, 2012 transmitting the final report for the Lima Ola Workforce Housing Development Master Plan, dated March 2012. As identified, the proposed land use includes six categories of residential lots with a total count of 400 units on 43.1 acres plus green space and roadways on 31.9 acres which totals 75 acres.

Please be made aware that any actual subdivision or development of this area will be dependent on the adequacy of the source, storage, and transmission facilities existing at that time. At the present time, the major portions of the proposed development are outside the service area for which the Department's Water Plan 2020 was prepared. If this area is to be fully developed, new source, storage, and transmission water system facilities will be required to be developed to serve the additional water demands of the area. Presently, the Department's Water Plan 2020 does not include water facility improvements for the proposed area or development.

Prior to the Department of Water (DOW) recommending final subdivision, water meter service, or building permit approval, the applicant may be required to:

1. Prepare and receive DOW's approval of a water master plan for the full development of this area. The plan shall include necessary water system facilities required for the proposed project and project's phasing, as applicable.
2. Prepare and receive DOW's approval of construction drawings for the necessary water system facilities and construct said facilities. These facilities shall include but not be limited to:
   a) All water facilities required in the approved Water Master Plan.
   b) The domestic service connections.
   c) The fire service connections, as applicable.
   d) The interior plumbing plans with the appropriate backflow prevention device(s), as necessary.

3. Pay the applicable charges in effect at the time of payment to the Department. At the present time, these charges shall include but not be limited to:
   a) The Facilities Reserve Charge (FRC) of $4,600 per 5/8-inch water meter/dwelling unit.
   b) For Multi-family dwellings, the FRC shall be based on $4,600 per unit or the FRC based on the approved water meter size; whichever amount is greater.

   FRC offsets may apply in accordance with the DOW Rules and Regulations. The applicant is made aware that applicable FRC liability shall be offset by up to 33% each where water source or water storage improvements are constructed and up to 50% where transmission mains are constructed; provided that the total amount of all offsets shall not exceed 100% of the applicant's FRC liability, and provided further that the offset for any source or storage improvements or transmission main shall not exceed the actual cost of the source or storage improvement or transmission main.

4. Receive a "Certification of Completion" for the construction of the necessary water system facilities from the DOW.

If you have any questions concerning the construction drawings or Certification of Completion, please contact Mr. Keith Aoki at (808) 245-5411. For other questions, please contact Mr. Edward Doi at (808) 245-5417.

Sincerely,

Gregg Fujikawa
Chief of Water Resources and Planning Division

ED:loo
T-13909 Eleele, Jimenez–Workforce Housing Master Plan-March 2012

Fire Hydrant Data_DOW

HYDRANT NUMBER	DATE	STATIC	RESIDUAL	PITOT	Q-GPM	Q-20GPM
C-001	8/30/1979	33	26	10	589	823
C-002	8/30/1979	36	25	10	493	604
C-002	7/10/1996	40	32	13	672	1101
C-003	8/30/1979	44	25	10	589	668
C-004	8/30/1979	55	29	11	618	726
C-004	7/12/1996	56	18	8	527	512
C-005	8/30/1979	62	48	17	757	1370
C-005	7/12/1996	62	30	20	833	965
C-006	8/30/1979	67	11	5	395	359
C-007	8/30/1979	44	26	9	543	634
C-007	7/12/1996	60	32	9	559	677
C-008	8/30/1979	41	28	9	543	704
C-008	7/12/1996	57	26	7	493	542
C-009	8/30/1979	31	26	9	543	831
C-010	8/30/1979	32	16	4	372	318
C-010	7/11/1996	50	25	6	456	503
C-011	8/30/1979	31	14	5	395	312
C-011	7/12/1996	50	30	3	323	402
C-012	8/30/1979	42	20	5	416	416
C-013	8/30/1979	48	26	8	510	647
C-013	7/12/1996	50	5	5	416	335
C-014	8/30/1979	56	38	10	574	835
C-014	7/12/1996	70	22	6	456	466
C-015	8/30/1979	64	31	9	543	635
C-016	8/30/1979	68	34	8	510	614
C-016	7/12/1996	70	55	8	527	1009
C-017	8/28/1979	86	60	19	812	1343
C-017	7/15/1996	86	75	30	1020	2684
C-018	8/28/1979	84	55	16	745	1142
C-019	8/28/1979	107	83	27	968	1940
C-020	8/28/1979	110	85	26	950	1897
C-021	8/28/1979	95	63	14	697	1104
C-022						
C-023	8/1/1977	70	27		158	171
C-023	8/27/1979	71	11	2	263	241
C-023	7/15/1996	76	52		293	463
C-024	8/27/1979	87	20	6	456	456
C-025	8/27/1979	87	71	27	968	2012
C-025	7/15/1996	88	75	46	1263	3007
C-026	8/27/1979	87	73	25	931	2168
C-026	1/12/1996	85	80	58	1149	4600
C-026	7/15/1996	86	73	51	1330	3198
C-027	8/28/1979	86	25	5	416	434
C-027						
C-028	8/28/1978	86	21	5	416	419

C-029	8/27/1979	89	37	16	745	868
C-029	7/15/1996	91	66	45	1249	2195
C-030	7/27/1979	89	41	18	790	961
C-031	8/28/1979	79	38	17	757	927
C-032	8/28/1979	87	40	17	757	917
C-033	8/28/1979	89	37	14	684	797
C-033	7/15/1996	83	66	35	1102	2235
C-034	8/28/1979	88	40	13	658	794
C-034	1/12/1996	87	85	30	205	1400
C-035	8/28/1979	87	35	12	645	740
C-036	8/28/1979	83	21	9	543	548
C-037	8/28/1979	90	24	8	527	544
C-038	8/28/1979	86	25	3	323	337
C-038	9/29/1995	86	76	47	1277	3537
C-039	8/28/1979	85	28	3	325	347
C-040	7/18/1996	103	10	8	527	495
C-041	6/4/1993	105	25	5	416	430
C-041	7/18/1996	92	13	3	323	307
C-042	6/4/1993	90	10	5	416	387
C-042	7/18/1996	84	8	2	263	240
C-043	6/4/1993	100	55		266	363
C-043	7/18/1996	100	25	18	790	810
C-044	7/18/1996	95	5		71	64
C-045	6/4/1993	105	25	4	373	385
C-045	7/18/1996	100	34	6	456	506
C-046						
C-047	8/28/1979	90	72	28	986	2053
C-047	7/12/1996	73	52	30	1020	1682
C-048	8/28/1979	90	71	28	986	1994
C-048	7/12/1996	78	57	28	986	1706
C-049	8/28/1979	90	70	26	950	1869
C-050	8/28/1979	88	65	27	968	1738
C-050	7/12/1996	72	42	25	931	1253
C-051	8/28/1979	89	65	28	977	1809
C-051	7/12/1996	72	44	25	931	1301
C-052	8/28/1979	86	68	25	931	1878
C-053	8/28/1979	85	74	34	1086	2834
C-054	8/28/1979	83	77	35	1102	3923
C-055	8/20/1979	49	45	11	618	1801
C-056	8/27/1979	89	31	13	672	738
C-056	7/15/1996	90	54	30	1020	1461
C-057	8/27/1979	73	11	2	263	242
C-057	7/3/1993	85	70	45	1249	2757
C-057	7/12/1996	73	30	26	950	1063
C-058	8/1/1977	72	43		151	207
C-058	8/27/1979	71	38	2	263	550
C-058	6/3/1993	85	50	4	373	521

C-058	7/15/1996	73	34		380	448
C-059	8/28/1979	110	85	30	1012	2021
C-060	8/28/1979	90	78	28	986	2555
C-060	7/12/1996	80	60	35	1102	1994
C-061	8/28/1979	90	79	29	994	2700
C-062	8/28/1979	84	40	9	559	684
C-062	9/29/1995	78	68	43	1221	3155
C-063	8/28/1979	85	60	24	912	1528
C-064	8/28/1979	83	77	34	1086	3866
C-064	7/15/1996	82	78	48	1290	5669
C-065	8/28/1979	85	75	35	1102	3028
C-065	7/15/1996	82	77	47	1277	4973
C-066	8/27/1979	87	77	30	1020	2849
C-066	7/15/1996	89	86	46	1263	6868
C-067	7/12/1996	70	27		187	203
C-068	7/12/1996	72	30		200	224
C-069	6/4/1993	85	80	49	1304	5210
C-070						
C-071						
C-072	7/18/1996	78	64	34	1086	2340
C-073						
C-074	7/18/1996	75	63	37	1133	2578
C-075	7/18/1996	70	58	27	968	2092
C-076						
C-077	7/17/1996	58	37	16	745	1026
C-078						
C-079	7/18/1996	70	63	31	1037	2998
C-080	1/2/1996	65	50	42	978	1800
C-080	7/18/1996	70	51	26	950	1601
C-081	6/4/1993	75	47	25	931	1341
C-082	6/4/1993	72	46	24	912	1326
C-082	7/17/1996	62	45	25	931	1518
C-083	6/4/1993	70	44	22	874	1244
C-084						
C-085	7/17/1996	60	38	20	833	1150
C-086	7/17/1996	68	47	20	833	1302
C-087	7/17/1996	69	46	24	912	1373
C-088						
C-089						
C-090	7/17/1996	55	40	18	790	1249
C-091	7/17/1996	64	39	24	912	1238
C-092						
C-093	6/4/1993	85	75	41	1193	3278
C-094	6/4/1993	90	85	36	1118	4649
C-094	1/2/1996	85	70	50	1065	2300
C-094	7/18/1996	80	62	30	1020	1954
C-095	7/18/1996	75	48	25	931	1367

C-096						
C-097						
C-098	6/4/1993	100	90	49	1304	4008
C-098	7/18/1996	75	65	50	1317	3307
C-099	7/18/1996	83	77	35	1102	3923
C-100	6/4/1993	90	80	42	1207	3452
C-100	7/10/1996	79	70	47	1277	3525
C-101	7/10/1996	80	73	40	1178	3758
C-102	6/4/1993	80	70	48	1290	3395
C-102	7/10/1996	72	66	43	1221	3920
C-103	6/4/1993	80	75	45	1249	4779
C-104	6/4/1993	80	75	41	1193	4565
C-105	6/4/1993	70	65	38	1140	3981
C-105	7/10/1996	60	55	31	1037	3187
C-106	7/10/1996	60	55	29	1003	3083
C-107	6/4/1993	70	65	37	1133	3929
C-107	7/10/1996	64	55	32	1054	2482
C-108	6/4/1993	70	65	42	1207	4185
C-108	7/10/1996	64	56	32	1054	2645
C-109	7/10/1996	70	54	37	1133	2096
C-110	7/10/1996	70	60	36	1118	2665
C-111	6/4/1993	85	80	41	1193	4766
C-111	7/10/1996	76	62	33	1070	2262
C-112	6/4/1993	85	80	49	1304	5210
C-112	1/12/1996	82	68	58	1149	2600
C-112	7/10/1996	79	70	42	1207	3332
C-113						
C-114						
C-115						
C-116						
C-117						
C-118	6/4/1993	90	80	46	1263	3612
C-118	7/10/1996	75	50	43	1221	1870
C-119	7/10/1996	88	83	5	416	1705
C-120	7/10/1996	81	80	9	559	5144
C-121						
C-122						
C-123						
C-124						
C-125						
C-126	7/17/1996	74	38	11	618	769
C-127	7/17/1996	70	28	13	672	738
C-128	7/17/1996	65	28	13	672	746
C-129	6/4/1993	72	65	33	1070	3160
C-129	7/17/1996	60	55	26	950	2919
C-130	6/4/1993	67	60	31	1037	2900
C-131	7/17/1996	52	48	24	912	2805

Fire Hydrant Data_DOW

C-132	6/4/1993	70	32	21	854	990
C-132	7/17/1996	60	25	12	645	693
C-133						
C-134	7/17/1996	60	26	11	618	674
C-135	7/17/1996	53	23	11	618	650
C-136	7/17/1996	58	25	12	645	696
C-137	7/17/1996	65	30	13	672	769
C-138						
C-139						
C-140	9/6/1995	124	110	56	1394	4116
C-140	7/18/1996	98	88	60	1443	4374
C-141	9/6/1995	121	105	58	1418	3836
C-142	7/18/1996	20	66	35	1102	4310
C-142	12/2/2011	70	26	12	645	691
C-142						
C-143						
C-144	7/18/1996	70	66	43	1221	4777
C-145	7/18/1996	74	70	45	1249	5094
C-146	7/19/1996	78	74	54	1369	5800
C-147						
C-148	9/6/1995	85	76	35	1102	3205
C-149	9/6/1995	84	75	37	1133	3268
C-149	12/6/2011	80	50	38	1148	1669

Appendix E: HUD Environmental Assessment

U.S. Department of Housing and Urban Development
451 Seventh Street, SW
Washington, DC 20410
www.hud.gov

espanol.hud.gov

Environmental Assessment
Determinations and Compliance Findings for HUD-assisted Projects
24 CFR Part 58

Project Information

Project Name: Lima Ola Subdivision Off-Site Water System Improvements

Responsible Entity: Kauaʻi County Housing Agency

Grant Recipient (if different than Responsible Entity): Same

State/Local Identifier: State of Hawaiʻi / ʻEleʻele, County of Kauaʻi

Preparer: Kaimana Environmental Solutions LLC

Certifying Officer Name and Title: Derek S.K. Kawakami - Kauaʻi County Mayor

Grant Recipient (if different than Responsible Entity): Same

Consultant (if applicable): Kaimana Environmental Solutions LLC
PO Box 11890
Honolulu, HI 96828

Direct Comments to: Max Solmssen, Environmental Planner – Kaimana Environmental Solutions LLC / Email: max@kaimanaenv.com

Project Location:

The project site is located on the southwest side of the Island of Kauaʻi, northeast of the town of ʻEleʻele, and includes two Kauaʻi County-owned parcels of land currently developed for municipal water tank pumping and storage. One (1) existing 0.2 million gallon municipal water storage tank is located within Tax Map Key (TMK) parcel (4) 2-1-001: 049, and two (2) 0.4 million gallon county municipal water storage tanks are located at TMK parcel (4) 2-1-001: 046 (project site).

Description of the Proposed Project [24 CFR 50.12 & 58.32; 40 CFR 1508.25]**:**

The proposed project includes the design and construction of one (1) 0.3 million gallon County municipal water storage tank that would be located adjacent to the existing 0.2 million gallon County municipal water storage tank within TMK parcel (4) 2-1-001: 049. The proposed project also includes the upsizing of two existing booster pumps that serve the two existing 0.4 million gallon water storage tanks, which are located approximately 2,200 feet southwest of the existing 0.2 million gallon water tank, along Kaumualiʻi Highway, within TMK parcel (4) 2-1-001: 046. The booster pumps are planned to be upsized from 120 gallons per minute to 350 gallons per minute. The planned project includes required potable water service upgrades, as part of the County of Kauaʻi Lima Ola affordable housing subdivision, which is located southwest of the project site.

Statement of Purpose and Need for the Proposal [40 CFR 1508.9(b)]:

The purpose of the proposed project is to provide additional water storage capacity to support the need generated by the County of Kauaʻi Lima Ola affordable housing subdivision.

Existing Conditions and Trends [24 CFR 58.40(a)]:

The project site is located along Kaumualiʻi Highway adjacent to a residential area and to commercial coffee crop fields (Lima Ola Work Force Development, ʻEleʻele Heights subdivision and Kauaʻi Coffee Company croplands). The Port Allen mixed use commercial/industrual area is located to the southwest/downgradient of the Lima Ola Work Force Development and ʻEleʻele Heights subdivision. The project site is located in close proximity to transportation cooridors, jobs, shopping and other vital community services. The trend in the area includes infill density development aound the urban core of ʻEleʻele.

Funding Information

Grant Number	HUD Program	Funding Amount
B-23-CP-HI-0482	Community Project Funding Grant	$5,000,000.00

Estimated Total HUD Funded Amount: $5,000,000.00

Estimated Total Project Cost (HUD and non-HUD funds) [24 CFR 58.32(d)]**:**

$5,000,000.00

Compliance with 24 CFR 50.4, 58.5, and 58.6 Laws and Authorities

Record below the compliance or conformance determinations for each statute, executive order, or regulation. Provide credible, traceable, and supportive source documentation for each authority. Where applicable, complete the necessary reviews or consultations and obtain or note applicable permits of approvals. Clearly note citations, dates/names/titles of contacts, and page references. Attach additional documentation as appropriate.

Compliance Factors: Statutes, Executive Orders, and Regulations listed at 24 CFR §58.5 and §58.6	Are formal compliance steps or mitigation required?	Compliance determinations
STATUTES, EXECUTIVE ORDERS, AND REGULATIONS LISTED AT 24 CFR 50.4 and 58.6		
Airport Hazards 24 CFR Part 51 Subpart D	Yes ☐ No ☒	The project site is located approximately 3 miles from the nearest aiport (Port Allen Airport), and no military aiports are located within the vicinity of the project site.
Coastal Barrier Resources Coastal Barrier Resources Act, as amended by the Coastal Barrier Improvement Act of 1990 [16 USC 3501]	Yes ☐ No ☒	The project site is located approximately 1.5 miles from the nearest shoreline, and is outside the Tsunami Evacuation Area. No coastal resources are anticipated to be impacted by the proposed project.
Flood Insurance Flood Disaster Protection Act of 1973 and National Flood Insurance Reform Act of 1994 [42 USC 4001-4128 and 42 USC 5154a]	Yes ☐ No ☒	The project site is located in Federal Emergency Management Agency (FEMA) Flood Zone X: area of minimal flood hazard, and is therefore not anticipated to be impacted by flooding.
STATUTES, EXECUTIVE ORDERS, AND REGULATIONS LISTED AT 24 CFR 50.4 & 58.5		
Clean Air Clean Air Act, as amended, particularly section 176(c) & (d); 40 CFR Parts 6, 51, 93	Yes ☒ No ☐	Based on data gathered by the State of Hawaiʻi DOH Clean Air Branch, the entire State of Hawaiʻi is in compliance (attainment) for all the above criteria

		pollutants, except on the Big Island during times of naturally occurring impacts from volcanic activity. There is a DOH air quality measurement station in Niumalu, within the vicinity of the project area near Nawiliwili Harbor. Dust would be generated on a short-term basis during construction site work. In order to mitigate airborne dust (particulate matter) impacts to the surrounding environment, all construction activities would need to adhere to County of Kauaʻi DPW Interim Construction Best Management Practices (BMPs) for Sediment and Erosion Control. BMPs include watering active work areas and unpaved work roads; use of dust fences; establishment of a routine road cleaning and tire washing program; establishment of landscaping or hardened surface early in the construction schedule; and monitoring dust at the project boundary during construction (COK, 2004). With these mitigation measures in place there would be no significant impact to air quality from the proposed action during construction. Once completed, it is not anticipated that there would be any significant long-term air quality impacts from the operation of the proposed development since the water system operations would not include any significant source of dust or other air emissions.
Coastal Zone Management Coastal Zone Management Act, sections 307(c) & (d)	Yes ☐ No ☒	While the entire State of Hawaiʻi is located within the designated coastal zone, the project site is not located in the coastal area/Special Management Area (SMA), and is well outside the Tsunami Evacuation Zone.
Contamination and Toxic Substances 24 CFR Part 50.3(i) & 58.5(i)(2)	Yes ☐ No ☒	During construction of the proposed water system improvements, non-hazardous green waste and native soil will be disturbed from grading activities.

		Construction materials, such as concrete, pumps, and prefabricated metal. Construction vehicles and earth moving equipment fueled by petroleum products will be used onsite. The contractor would need to conduct regular inspections and maintenance of vehicles and equipment to assure that no petroleum spills or leaks occur. Any excess green waste, soil and construction materials generated onsite will be recycled or properly disposed at the Kekaha Landfill or another approved facility in accordance with County rules. Since the project site has been used for commercial agricultural fields, it is possible that soils onsite may contain elevated levels of pesticides and/or arsenic. It is recommended that site soils be tested for arsenic and pesticides prior to land disturbance, if not completed previously, in order to determine if any residual chemical contamination is present in soil. If soil is shown to contain elevated levels of these target chemicals, worker and environmental protection measures must be implemente in accordance with DOH and OSHA rules. Once in operation, the water tank and booster pumps would not generate or store any significant quantities of hazardous materials. Small quantities of petroleum, paints and coatings may be utilized by County maintenance staff. All potentially hazardous materials would need to be properly stored out of the sun/elements in flammable lockers within secure designated areas. The facility would not generate any significant quantity of solid waste. There would be no significant short-term or long-term impacts to the affected

		environment from solid or hazardous waste.
Endangered Species Endangered Species Act of 1973, particularly section 7; 50 CFR Part 402	Yes ☐ No ☒	A field survey of the project area was conducted by a trained biologist. The field survey methodology included inspection of the project site and recordation of the existing plant and animal species and/or species habitats observed. The survey found that vegetation at the project area is dominated by introduced (non-native) plant species. Coffee plantation and weedy scrub species dominate the site. Two native plant species were documented at the project site, both questionably indigenous; pōpolo and ʻuhaloa. Both of these species are considered widespread throughout the Hawaiian Islands. A total of 12 bird species, representing 8 separate families, were recorded during the station count. Avian diversity and densities were in keeping with the location and vegetation present within the study site. Three species—Scaly-breasted munia (*Lonchura punctulata*), Zebra Dove (*Geopelia striata*), and Cattle Egret (*Bulbucus ibis*) were the most abundant species observed. No terrestrial mammalian species were detected during this survey. It is most likely that non-native animals such as dogs (*Canis lupus familiaris*), cats (*Felis catus*), and pigs (*Sus scrofa*) transit the general area from time to time. No federally or state protected species were observed in the project area during the biological survey. Although not observed in the project area during the survey, several federally or state listed animal species may occasionally occur in or traverse the project area. No designated critical habitat occurs in the project area

		Mitigation measures to avoid impacts to protected species that may traverse the project site are included in section 2.4 of the EA.
Explosive and Flammable Hazards 24 CFR Part 51 Subpart C	Yes ☐ No ☒	Construction vehicles and equipment would utilize machinery fueled by flammable fuel (i.e., gasoline). Off-site fueling and safe fueling practices would mitigate any hazards from these flammable materials. Once in operation the main source of flammable materials would be county vehicles visiting the site for maintenance/operation of the water system, which does not represent a significant source of explosive or flammable hazards since vehicles would be fueled off-site.
Farmlands Protection Farmland Protection Policy Act of 1981, particularly sections 1504(b) and 1541; 7 CFR Part 658	Yes ☐ No ☒	Kauaʻi Coffee Company coffee fields surround the proposed water tank area, and a small portion of the coffee fields would be taken for expansion of the project area parcel. However, this would not represent a significant impact to Kauaʻi Coffee since the amount of land that would be taken out of use for the proposed project would be minimal. Therefore, the proposed development would not result in any impact to famlands.
Floodplain Management Executive Order 11988, particularly section 2(a); 24 CFR Part 55	Yes ☐ No ☒	The project site is not located within a floodplain. Several human-made irrigation ditches and the Kapa Reservoir are located in close proximity to the project site. These water resources would not be impacted by the proposed project since construction BMPs in compliance with Kauaʻi County Building Code would be instituted during construction. Therefore, there would be no impact to floodplains, and the proposed development would have little to no risk of inundation. Further, the

		proposed water tank would be designed in accordance with County code to include any required drainage features such as drywells and stormwater swales/retention area.
Historic Preservation National Historic Preservation Act of 1966, particularly sections 106 and 110; 36 CFR Part 800	Yes ☐ No ☒	An archaeolgical survey was completed for the project site. No significant historical or cultural resources were found to be associated with the project site. Therefore, no archaeolgical monitoring, or other mitigation measures are recommended during construction of the proposed water tank, where ground disturbance is planned.
Noise Abatement and Control Noise Control Act of 1972, as amended by the Quiet Communities Act of 1978; 24 CFR Part 51 Subpart B	Yes ☐ No ☒	Based on the maximum generalized outdoor noise levels at the nearest residences to the project site (‘Ele‘ele Heights), the HDOH Community Noise Rule criteria is not anticipated to be exceeded during construction. The contractor should use reasonable and standard practices to mitigate noise, such as using mufflers on diesel and gasoline engines, using properly tuned and balanced machines, and working during daylight hours.
Sole Source Aquifers Safe Drinking Water Act of 1974, as amended, particularly section 1424(e); 40 CFR Part 149	Yes ☐ No ☒	There are no designated waterways protected under the Wild and Scenic Rivers Act in the State of Hawai´i. And there are no streams that run through the project site.
Wetlands Protection Executive Order 11990, particularly sections 2 and 5	Yes ☐ No ☒	There are no designated wetlands located at the project site.
Wild and Scenic Rivers Wild and Scenic Rivers Act of 1968, particularly section 7(b) and (c)	Yes ☐ No ☒	There are no designated waterways protected under the Wild and Scenic Rivers Act in the State of Hawai´i. And there are no streams that run through the project site.

ENVIRONMENTAL JUSTICE		
Environmental Justice Executive Order 12898	Yes ☐ No ☒	The proposed project would result in the creation of short and long-term jobs for the local community. Construction jobs would be created during the construction of the proposed water tank and system upgrades. Once in operation, the facility may result in additional county jobs to manage the water system. The proposed project is not anticipated to result in any short or long-term adverse impacts to socioeconomic conditions since it would not cause loss of any jobs or housing, and would not result in tax revenue loss. The project would have beneficial economic and social impacts since it would result in job creation and potable water system improvements, resulting in more community resiliency.

Environmental Assessment Factors [24 CFR 58.40; Ref. 40 CFR 1508.8 &1508.27] Recorded below is the qualitative and quantitative significance of the effects of the proposal on the character, features and resources of the project area. Each factor has been evaluated and documented, as appropriate and in proportion to its relevance to the proposed action. Verifiable source documentation has been provided and described in support of each determination, as appropriate. Credible, traceable and supportive source documentation for each authority has been provided. Where applicable, the necessary reviews or consultations have been completed and applicable permits of approvals have been obtained or noted. Citations, dates/names/titles of contacts, and page references are clear. Additional documentation is attached, as appropriate. **All conditions, attenuation or mitigation measures have been clearly identified.**

Impact Codes: Use an impact code from the following list to make the determination of impact for each factor.
(1) Minor beneficial impact
(2) No impact anticipated
(3) Minor Adverse Impact – May require mitigation
(4) Significant or potentially significant impact requiring avoidance or modification which may require an Environmental Impact Statement

Environmental Assessment Factor	Impact Code	Impact Evaluation
LAND DEVELOPMENT		
Conformance with Plans / Compatible Land Use and Zoning / Scale and Urban Design	2	The project site is located within the State Agricultural land use district, and within the County Agricultural Zoning District. The project would be compatible with its State and County zoning designations since it represents vital infrastructure development that is allowed in both the State and County Agricultural districts.
Soil Suitability/ Slope/ Erosion/ Drainage/ Storm Water Runoff	2	The project site is located in a flat buildable area. The proposed action would result in short-term less than significant impacts to soils during construction from grading and construction of the water tank. Soils would be temporarily excavated and stockpiled onsite during the construction period. Exposed soils are susceptible to erosion, especially if it rains heavily during site work periods. Adverse impacts from soil erosion and runoff would be minimized as a result of erosion and sedimentation control measures that would be implemented during construction. Proposed construction would need to comply with Kaua'i County BMP standards addressing soil and erosion control (e.g., silt fencing, covering and protecting soil stockpiles with tarps and filter socks, surface revegetation as soon as possible). These mitigation measures would minimize soil migration from the proposed construction area. The topography of the project site would remain similar to existing conditions following construction. Once completed, the proposed development would include a small amount of hardened surfaces for the building slab under the water tank, driveway and parking area. All hardened surfaces would need appropriate drainage features in compliance with County code (i.e., drywells, swales and drainage culverts). As a result, soil and topography impacts are anticipated to be short-term and insignificant.
Hazards and Nuisances including Site Safety and Noise	2	During construction of the proposed development, non-hazardous green waste and native soil will be generated from grading activities. Construction materials, such as concrete, paints and coatings will also be used onsite during construction. Construction vehicles and earth

		moving equipment fueled by petroleum products will be used onsite. The contractor would need to conduct regular inspections and maintenance of vehicles and equipment to assure that no petroleum spills or leaks occur. Any excess green waste, soil and construction materials generated onsite will be recycled or properly disposed at the Kekaha Landfill or another approved facility in accordance with County rules. Once in operation the main source of flammable materials would be county vehicles visiting the site for maintenance/operation of the water system, which does not represent a significant source of explosive or flammable hazards since vehicles would be fueled off-site. The site has been used for commercial croplands. Former commercial croplands in Hawaii have been known to contain elevated levels of lead, arsenic and organochlorine pesticides. It is recommended that site soils be tested for these target constituents prior to land disturbance, if not completed previously, in order to determine if any residual chemical contamination is present in soil. If soil is shown to contain elevated levels of these target chemicals, worker and environmental protection measures must be implemente in accordance with DOH and OSHA rules. Under the proposed action, short-term noise impacts from construction activities would occur. Development of the project site would involve excavation, grading, and use of other typical mechanized construction equipment/tools. Based on the maximum generalized outdoor noise levels at the nearest residences across the street from the project site, HDOH Community Noise Rule criteria will not likely be exceeded during construction of the project. The contractor should use reasonable and standard practices to mitigate noise, such as using mufflers on diesel and gasoline engines, using properly tuned and balanced machines, etc.

Environmental Assessment Factor	Impact Code	Impact Evaluation
SOCIOECONOMIC		
Employment and Income Patterns	1	The proposed project would result in the creation of short-term jobs for the local community. Construction jobs would be created during the construction of the proposed development. The proposed project is not anticipated to result in any short or long-term adverse impacts to socioeconomic conditions since it would not cause loss of any jobs or housing, and would not result in tax revenue loss. The project would have

		beneficial economic and social impacts since it would result in increased potable water supply storage for the affected community.
Demographic Character Changes, Displacement	2	The proposed project would not result in direct significant demographic character changes or displacement.
Environmental Justice	1	The proposed project would result in the creation of short and long-term jobs for the local community. The proposed project is not anticipated to result in any short or long-term adverse impacts to socioeconomic conditions since it would not cause loss of any jobs or housing, and would not result in tax revenue loss. The project would have beneficial social impacts since it would result in increased resiliency for the local community.

Environmental Assessment Factor	Impact Code	Impact Evaluation
COMMUNITY FACILITIES AND SERVICES		
Educational and Cultural Facilities	2	The proposed project is not anticipated to adversely impact any existing educational or cultural facilities.
Commercial Facilities	2	The proposed project is not anticipated to adversely impact any existing commercial facilities.
Health Care and Social Services	2	The project would not impact any health care or social services.
Solid Waste Disposal / Recycling	2	During construction of the proposed development, non-hazardous green waste and native soil will be generated from grading activities. Construction materials will also be used onsite during construction. Construction vehicles and earth moving equipment fueled by petroleum products will be used onsite. The contractor would need to conduct regular inspections and maintenance of vehicles and equipment to assure that no petroleum spills or leaks occur. Any excess green waste, soil and construction materials generated onsite will be recycled or properly disposed at the Kekaha Landfill or another approved facility in accordance with County rules.

		Once in operation, the proposed water system facility would not generate any solid or potentially hazardous waste. All solid waste would be properly collected by municipal solid waste service and disposed at the Kekaha Landfill. There would be no significant short-term or long-term impacts to the affected environment from solid waste.
Waste Water / Sanitary Sewers	2	A private wastewater septic tank is present at the project site, within the pump house that services one bathroom used by County Department of Water maintenence workers onsite. There are no additional planned wastewater utility upgrades as part of the proposed action
Water Supply	2	The project site includes a municipal potable water system. There is one potable water supply line present at the project site that services the bathroom at the pump house.
Public Safety - Police, Fire and Emergency Medical	2	The nearest police station to the project site is located approximately 8.2 miles to the west at: 3990 Kaʻana Street Līhuʻe, HI 96766. The nearest fire station is located approximately 3.3 miles to the east at: 2 Kaumualii Hwy, Kalaheo, HI 96741. The nearest emergency medical facility is located approximately 8.5 miles to the west at: 4643 Waimea Canyon Dr, Waimea, HI 96796. The proposed water system upgrades would not have a any impact on police, fire or emergency medical services in the area.
Parks, Open Space and Recreation	2	The proposed action is not proposed in an area that includes any open space or recreational areas, such as parks or playgrounds. Therefore, there would be no impact to open space or recreational resources.
Transportation and Accessibility	2	The proposed project would not displace or affect any existing transportation corridors or access to any bus stops, roads or pedestrian pathways.

Environmental Assessment Factor	Impact Code	Impact Evaluation
NATURAL FEATURES		
Unique Natural Features, Water Resources	2	The project site does not include any unique natural features, such as streams, springs, or hills.
Vegetation, Wildlife	2	Vegetation at the project area is dominated by introduced (non-native) plant species. Coffee plantation and weedy scrub species dominate the site. Two native plant species were documented at the project site, both questionably indigenous; pōpolo and ‘uhaloa. Both of these species are considered widespread throughout the Hawaiian Islands. No federally or state listed species were observed in the project area during the survey. Although not observed in the project area during the survey, several federally or state listed animal species may occasionally occur in or traverse the project area. Mitigation measures to protect these biologcial resources are included in Section 2.4 of the EA, and later in this HUD ER.
Other Factors	2	Not applicable.

Environmental Assessment Factor	Impact Code	Impact Evaluation
CLIMATE AND ENERGY		
Climate Change Impacts	2	There are no anticipated significant impacts to climate change from the proposed project, since the construction period would be temporary and there are no significant emissions from the operation of the proposed water system facility.
Energy Efficiency	2	The proposed facility would be built using modern practicies and materials in accordance with County building code.

Additional Studies Performed:
Biological Resources Survey
Archaeological Survey
Lima Ola Water Master Plan

Field Inspection (Date and completed by)**:**

February 27, 2024. Completed by Max Solmssen – Kaimana Environmental Solutions LLC

List of Sources, Agencies and Persons Consulted [40 CFR 1508.9(b)]**:**

See Table 1, and Appendix E of the EA for Agencies and Persons Consulted

Sources:

CPE, 2016. Lima Ola Work Force Housing Development Final Environmental Assessment-Finding of No Significant Impact. June 2016. Prepared by Community Planning and Engineering, Inc.

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COK, 2004. Interim Construction Best Management Practices (BMP'S) for Sediment and Erosion Control for the County of Kauaʻi. April 2, 2004.

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IPCC, 2022. AR6 Synthesis Report: Climate Change 2022. Accessed at: www.ipcc.ch/report/sixth-assessment-report-cycle/

LeGrande, 2024. A Natural Resources Assessment of the Proposed Lima Ola Subdivision Off-Site Water System Improvements, ʻEleʻele Island of Kauaʻi. June 20, 2024. Prepared by LeGrande Biological Surveys Inc.

Macdonald et al., 1960. Geology and Groundwater Resources of the Island Of Kauai, Hawaii

Mink and Lau, 1990. John. F. Mink and L. Stephen Lau, Aquifer Identification and Classification for Maui: Groundwater Protection Strategy for Hawaiʻi, Technical Report No. 185. February, 1990.

NOAA, 2023. National Oceanic and Atmospheric Administration Tsunami Evacuation Map. Accessed at: tsunami.coast.noaa.gov.

USDA, 2024. United States Department of Agriculture, National Resources Conservation Service Web Soil Survey.

PacIOOS, 2023. Pacific Islands Ocean Observing System. Accessed at: www.pacioos.Hawaiʻi.edu/shoreline/slr-Hawaiʻi/

Pacific Legacy, 2024. Literature Review and Field Inspection for the Proposed Off-Site Water System Improvements Project for the Lima Ola Subdivision, ʻEleʻele, Hanapēpē Ahupuaʻa, Kona Moku, Kauaʻi Island. March 2024.

SOEST, 2023. University of Hawaiʻi School of Ocean and Earth Science and Technology, Coastal Geology Group. http://www.soest.Hawaiʻi.edu.

US Census Bureau, 2023. US Census Bureau Data. Accessed at: census.gov.

USFWS, 2024. United States Fish and Wildlife Service National Wetlands Inventory Mapper

List of Permits to be Obtained:

HRS 343 Compliance
HRS 6E Compliance
County Grubbing and Grading Permit
County Building Permit
NEPA Compliance

Public Outreach [24 CFR 50.23 & 58.43]**:**

A 30-day public comment period will commence upon publication of the draft EA in the State Environmental Notice. A public meeting to discuss the project may be held during the 30-day public comment period, if deemed necessary by the County. Comments and input gathered during the 30-day public comment period will be presented and addressed in the final environmental decision document.

Cumulative Impact Analysis [24 CFR 58.32]**:**

The proposed water service infrastructure upgrades are planned as part of the Kaua'i County Housing Agency Lima Ola Affordable Housing Development, which is a stand alone project being initiated based on the needs of the community. The proposed action would represent an incremental increase in long-term resource use. However, the proposed action would not represent a significant source of greenhouse gas emissions. There are no significant adverse cumulative impacts anticipated from the proposed action.

Alternatives [24 CFR 58.40(e); 40 CFR 1508.9]

Alternative 2: Reduced System Upgrades – Under Alternative 2, the proposed water system upgrades would include an increase in booster pumping capacity of the existing system, but no development of a new water storage tank. This alternative was eliminated from further consideration since it would not fulfill the project purpose and need to deliver adequate potable water supply storage to the affected community.

Alternative 3 (Proposed Action) –The proposed water system upgrades would be implemented as planned; which would include a new water storage tank and and upsizing of two existing booster pumps. Alternative 3 was carried forward for analysis in this EA since it best fulfills the project purpose and need to provide the required water supply to the affected community.

No Action Alternative [24 CFR 58.40(e)]:

Alternative 1: No Action – Under Alternative 1, the proposed water system upgrades would not be implemented. Although the no action alternative does not address the project purpose and need, it was carried forward for analysis in the EA in compliance with the provisions of NEPA.

Summary of Findings and Conclusions:

Based on the research, studies and outreach conducted as part of this Environmental Assessment, it is determined that the proposed project would not result in a significant environmental impact. Therefore, a finding of no significant impact (FONSI) is anticipated for this project.

Mitigation Measures and Conditions [40 CFR 1505.2(c)]

Summarize below all mitigation measures adopted by the Responsible Entity to reduce, avoid, or eliminate adverse environmental impacts and to avoid non-compliance or non-conformance with the above-listed authorities and factors. These measures/conditions must be incorporated into project contracts, development agreements, and other relevant documents. The staff responsible for implementing and monitoring mitigation measures should be clearly identified in the mitigation plan.

Law, Authority, or Factor	Mitigation Measure
Air Quality	In order to mitigate airborne dust (particulate matter) impacts to the surrounding environment, all construction activities would need to adhere to County of Kaua‘i DPW Interim Construction Best Management Practices (BMPs) for Sediment and Erosion Control.
Soils and Erosion	Adverse impacts from soil erosion and runoff would be minimized as a result of erosion and sedimentation control measures that would be implemented during construction. Proposed construction would need to comply with Kaua‘i County BMP standards addressing soil and erosion control (e.g., silt fencing, covering and protecting soil stockpiles with tarps and filter socks, surface revegetation as soon as possible) (COK, 2004).
Noise	The contractor should use reasonable and standard practices to mitigate noise, such as using mufflers on diesel and gasoline engines, using properly tuned and balanced machines, etc. Work hours should be kept to daylight hours only.
Biological Resources	Establish a wildlife education and observation program for all construction and operational

	personnel. Staff should be trained to identify listed wildlife that may be found on-site (including listed waterbirds and seabirds, and the Hawaiian goose) and to take appropriate steps if listed wildlife species are found. If downed listed species are observed at the project area, notify USFWS and DOFAW. Implement speed limits on site to reduce the risk of collision to listed wildlife. ***Nēnē*** Nēnē geese were not observed within the project area or in the general surrounding areas. The habitat is not conducive for foraging and/or loafing. Generally human impacts to this species revolve around vehicular interactions, human feeding, and disturbance to nesting birds, eggs, chicks, and goslings. These potential threats can be minimized to the maximum extent practicable by implementing the following minimization measures: • Don't feed birds especially if they approach for handouts. • Secure all food rubbish in close trash receptacles. • Establish a 15 mile an hour speed limit within the site. ***Listed Water Birds*** None of the four extant endemic endangered waterbird species or subspecies were observed at the project site. They are Hawaiian Duck, Hawaiian Coot (*Fulica alai*), the Hawaiian endemic sub-species of both the Common Gallinule, and the Black-necked Stilt. The drainage canal to the southwest of the project site was surveyed for any signs of these species as irrigation canals are often used for foraging, loafing and possibly nesting by these species. No waterbirds were observed within or near the project area during the survey. Potential human impacts to these four species during clearing and grubbing are the same as those posed by these activities to Nēnē. ***Listed Seabirds***

	It is likely that the endangered Hawaiian Petrel, Band-rumped Storm-Petrel (*Hydrobates castro*), and the threatened Newell's Shearwater (*Puffinus newelli*) over-fly the project area 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 Hawai'i is thought to be predation by alien mammalian species at the nesting colonies. Collision with manmade structures is considered the second most significant cause of mortality of these seabird species in Hawai'i. 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. These species have been recovered along roadways and in facilities adjacent to the project area. No suitable nesting habitat exists within or close to the project area for any of these three seabird species. The principal potential impact that current habitat modifications or changes pose 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 nighttime construction activities; or, 2) following build-out, security lighting is operated during the seabird nesting season. If night-time construction activity or equipment maintenance is proposed during any construction phases of the project, 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. Deleterious impacts to transiting seabirds can be avoided if construction occurs during daylight hours and all outdoor lighting installed is fully "dark sky compliant" in accordance with State DLNR definitions. DLNR recommends

	avoiding construction-related nighttime lighting between September 15 and December 15. ***Hawaiian Hoary Bat*** It is probable that the ‘ōpe‘ape‘a – the endemic Hawaiian hoary bat (*Lasiurus cinereus semotus*) overfly the project area on a seasonal basis as they are regularly recorded in the lowland areas on Kaua‘i that still contain trees. The removal of coffee trees within the project area should not have adverse affects on bats as they are all smaller in stature than the typical tree size that bats utilize 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. Do not use barbed wire fencing. ***Coconut rhinoceros beetle*** The Coconut rhinoceros beetle (*Oryctes rhinoceros*) is an invasive beetle species from South East Asia that has become established on O‘ahu and is now spreading to other Islands in Hawai‘i. The beetles feed on palm species and are a threat to our coconut trees as well as native Pritchardia species and other ornamental palms. The Coconut Rhinoceros Beetle Response (crbhawaii.org) recommends best management practices including limiting mulch, compost, and decaying plant material build up in thick piles or layers as it creates breeding material for the beetle larvae. Spreading mulch 2 inches in depth or less helps to keep the material dry which is not favorable for the beetle larvae.

Water Quality	In order to mitigate sediment and other pollutant runoff from construction activities, the contractor will be required to install and maintain construction BMPs in compliance with Kauaʻi County BMP standards. Stormwater BMPs include, but are not limited to; sediment basins/ traps; filter fabric silt fences; straw bale, sandbag, or gravel bag barriers; stormwater drain inlet protection, and stabilized construction entrances (COK, 2004). The project will also comply with State water quality regulations HAR Chapters 11-54 and 11-55.

Determination:

☒ **Finding of No Significant Impact** [24 CFR 58.40(g)(1); 40 CFR 1508.27]
The project will not result in a significant impact on the quality of the human environment.

☐ **Finding of Significant Impact** [24 CFR 58.40(g)(2); 40 CFR 1508.27]
The project may significantly affect the quality of the human environment.

Preparer Signature: Max R. Solmssen Date: 9/23/2024

Name/Title/Organization: Max Solmssen/Environmental Planner/
Kaimana Environmental Solutions LLC

Certifying Officer Signature: ______________________ Date: 9/25/24

Name/Title: Derek Kawakami / Kauaʻi County Mayor

This original, signed document and related supporting material must be retained on file by the Responsible Entity in an Environmental Review Record (ERR) for the activity/project (ref: 24 CFR Part 58.38) and in accordance with recordkeeping requirements for the HUD program(s).

Partner Worksheets

U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
WASHINGTON, DC 20410-1000

This Worksheet was designed to be used by those "Partners" (including Public Housing Authorities, consultants, contractors, and nonprofits) who assist Responsible Entities and HUD in preparing environmental reviews, but legally cannot take full responsibilities for these reviews themselves. Responsible Entities and HUD should use the RE/HUD version of the Worksheet.

Air Quality (CEST and EA) – PARTNER

https://www.hudexchange.info/environmental-review/air-quality

1. **Does your project include new construction or conversion of land use facilitating the development of public, commercial, or industrial facilities OR five or more dwelling units?**

   ☒ Yes → *Continue to Question 2.*

   ☐ No → *If the RE/HUD agrees with this recommendation, the review is in compliance with this section. Provide any documents used to make your determination.*

2. **Is your project's air quality management district or county in non-attainment or maintenance status for any criteria pollutants?**
   Follow the link below to determine compliance status of project county or air quality management district:
   http://www.epa.gov/oaqps001/greenbk/

   ☒ No, project's county or air quality management district is in attainment status for all criteria pollutants
   → *If the RE/HUD agrees with this recommendation, the review is in compliance with this section. Continue to the Worksheet Summary below. Provide any documents used to make your determination.*

   ☐ Yes, project's management district or county is in non-attainment or maintenance status for one or more criteria pollutants. → *Continue to Question 3.*

3. **Determine the estimated emissions levels of your project for each of those criteria pollutants that are in non-attainment or maintenance status on your project area. Will your project exceed any of the *de minimis or threshold* emissions levels of non-attainment and maintenance level pollutants or exceed the screening levels established by the state or air quality management district?**

   ☒ No, the project will not exceed *de minimis* or threshold emissions levels or screening levels
   → *If the RE/HUD agrees with this recommendation, the review is in compliance with this section. Explain how you determined that the project would not exceed de minimis or threshold emissions.*

☐ Yes, the project exceeds *de minimis* emissions levels or screening levels.

→ *Continue to Question 4. Explain how you determined that the project would not exceed de minimis or threshold emissions in the Worksheet Summary.*

4. **For the project to be brought into compliance with this section, all adverse impacts must be mitigated. Explain in detail the exact measures that must be implemented to mitigate for the impact or effect, including the timeline for implementation.**
   Click here to enter text.

Worksheet Summary

Dust would be generated on a short-term basis during construction site work. In order to mitigate airborne dust (particulate matter) impacts to the surrounding environment, all construction activities would need to adhere to County of Kauaʻi DPW Interim Construction Best Management Practices (BMPs) for Sediment and Erosion Control. BMPs include watering active work areas and unpaved work roads; use of dust fences; establishment of a routine road cleaning and tire washing program; establishment of landscaping or hardened surface early in the construction schedule; and monitoring dust at the project boundary during construction. With these mitigation measures in place there would be no significant impact to air quality from the proposed action during construction. Once completed, it is not anticipated that there would be any significant long-term air quality impacts from the operation of the proposed development since there would be no significant source of dust or other air emissions during operation of the development.

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Airport Hazards (CEST and EA) – PARTNER

https://www.hudexchange.info/environmental-review/airport-hazards

1. **To ensure compatible land use development, you must determine your site's proximity to civil and military airports. Is your project within 15,000 feet of a military airport or 2,500 feet of a civilian airport?**

   ☒No → *If the RE/HUD agrees with this recommendation, the review is in compliance with this section. Continue to the Worksheet Summary below. Provide a map showing that the site is not within the applicable distances to a military or civilian airport.*

   ☐Yes → *Continue to Question 2.*

2. **Is your project located within a Runway Potential Zone/Clear Zone (RPZ/CZ) or Accident Potential Zone (APZ)?**

   ☐Yes, project is in an APZ → *Continue to Question 3.*

   ☐Yes, project is an RPZ/CZ → *Project cannot proceed at this location.*

   ☐No, project is not within an APZ or RPZ/CZ
   → *If the RE/HUD agrees with this recommendation, the review is in compliance with this section. Continue to the Worksheet Summary below. Continue to the Worksheet Summary below. Provide a map showing that the site is not within either zone.*

3. **Is the project in conformance with DOD guidelines for APZ?**

   ☐Yes, project is consistent with DOD guidelines without further action.
   → *If the RE/HUD agrees with this recommendation, the review is in compliance with this section. Continue to the Worksheet Summary below. Provide any documentation supporting this determination.*

   ☐No, the project cannot be brought into conformance with DOD guidelines and has not been approved. → *Project cannot proceed at this location.*

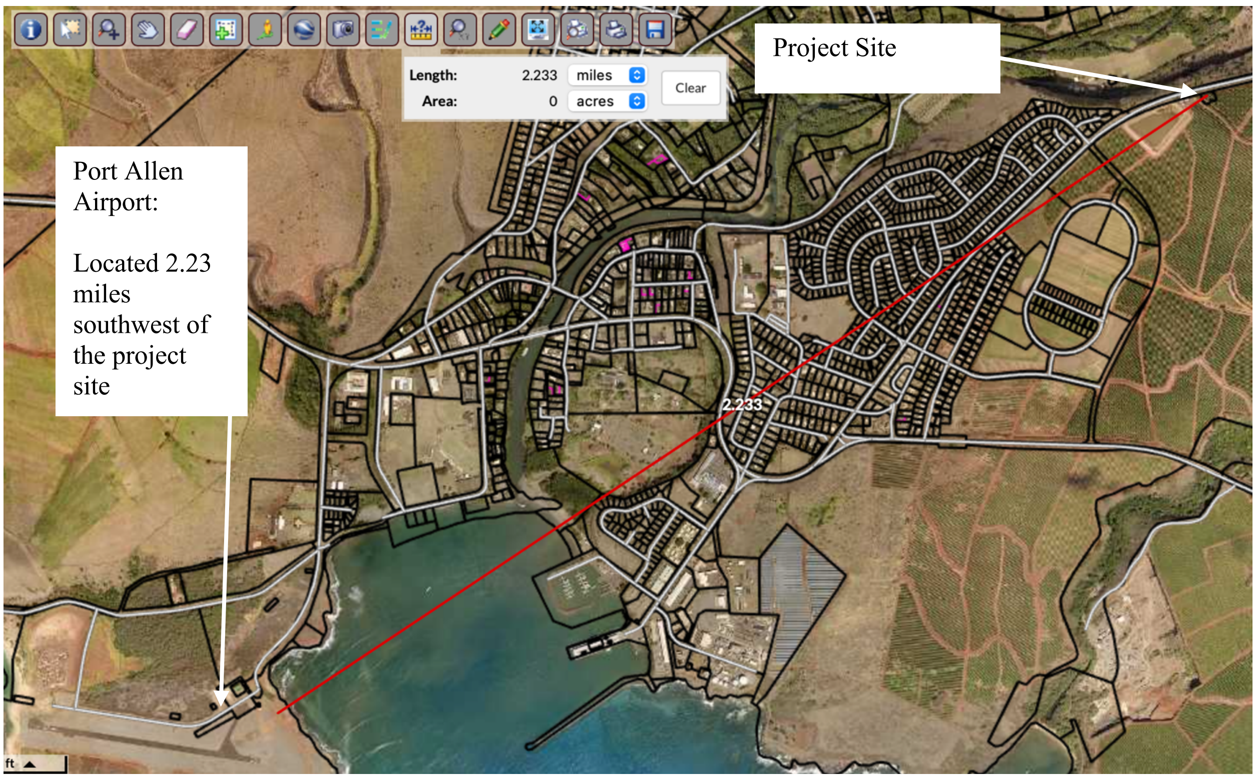
If mitigation measures have been or will be taken, explain in detail the proposed measures that must be implemented to mitigate for the impact or effect, including the timeline for implementation.

Click here to enter text.

→ *Work with the RE/HUD to develop mitigation measures. Continue to the Worksheet Summary below. Provide any documentation supporting this determination.*

Worksheet Summary

Below is a map showing the proximity to the nearest airport; Līhuʻe Airport, which is located approximately 2.23 miles southwest of the project site. There are no Military or other airports within the vicinity of the project site.



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Coastal Barrier Resources (CEST and EA) – PARTNER

https://www.hudexchange.info/environmental-review/coastal-barrier-resources

Projects located in the following states must complete this form.

Alabama	Georgia	Massachusetts	New Jersey	Puerto Rico	Virgin Islands
Connecticut	Louisiana	Michigan	New York	Rhode Island	Virginia
Delaware	Maine	Minnesota	North Carolina	South Carolina	Wisconsin
Florida	Maryland	Mississippi	Ohio	Texas	

1. **Is the project located in a CBRS Unit?**

   ☒No → *If the RE/HUD agrees with this recommendation, the review is in compliance with this section. Continue to the Worksheet Summary below. Provide a map showing that the site is not within a CBRS Unit.*

   ☐Yes → *Continue to 2.*

   Federal assistance for most activities may not be used at this location. You must either choose an alternate site or cancel the project. In very rare cases, federal monies can be spent within CBRS units for certain exempted activities (e.g., a nature trail), after consultation with the Fish and Wildlife Service (FWS) (see 16 USC 3505 for exceptions to limitations on expenditures).

2. **Indicate your recommended course of action for the RE/HUD**

   ☐ Consultation with the FWS

   ☐ Cancel the project

Worksheet Summary

Include all documentation supporting your findings in your submission to HUD.

The project site is located on the Island of Kauaʻi, within the State of Hawaiʻi, which is not included in the above table. See location map on the following page.

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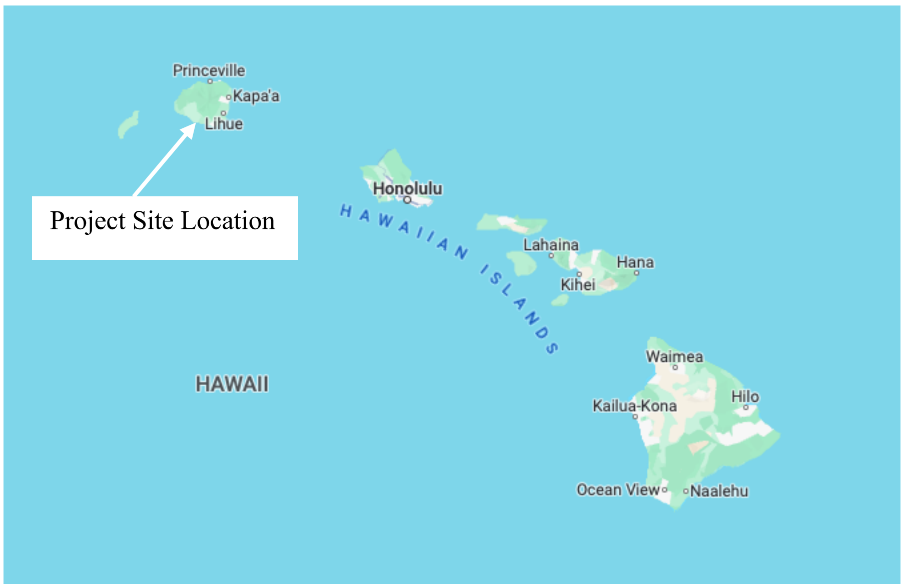

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Coastal Zone Management Act (CEST and EA) – PARTNER

https://www.onecpd.info/environmental-review/coastal-zone-management

Projects located in the following states must complete this form.

Alabama	Florida	Louisiana	Mississippi	Ohio	Texas
Alaska	Georgia	Maine	New Hampshire	Oregon	Virgin Islands
American Samona	Guam	Maryland	New Jersey	Pennsylvania	Virginia
California	Hawaii	Massachusetts	New York	Puerto Rico	Washington
Connecticut	Illinois	Michigan	North Carolina	Rhode Island	Wisconsin
Delaware	Indiana	Minnesota	Northern Mariana Islands	South Carolina	

1. **Is the project located in, or does it affect, a Coastal Zone as defined in your state Coastal Management Plan?**

   ☒Yes → *Continue to Question 2.*
   ☐No → *If the RE/HUD agrees with this recommendation, the review is in compliance with this section. Continue to the Worksheet Summary below. Provide a map showing that the site is not within a Coastal Zone.*

2. **Does this project include activities that are subject to state review**?

   ☒Yes → *Continue to Question 3.*
   ☐No → *If the RE/HUD agrees with this recommendation, the review is in compliance with this section. Continue to the Worksheet Summary below. Provide documentation used to make your determination.*

3. **Has this project been determined to be consistent with the State Coastal Management Program**?
   ☐Yes, with mitigation. → *The RE/HUD must work with the State Coastal Management Program to develop mitigation measures to mitigate the impact or effect of the project.*

   ☒Yes, without mitigation. → *If the RE/HUD agrees with this recommendation, the review is in compliance with this section. Continue to the Worksheet Summary below. Provide documentation used to make your determination.*

   ☐No → <u>Project cannot proceed at this location.</u>

Worksheet Summary

Include all documentation supporting your findings in your submission to HUD.
All of the islands of Hawaiʻi are located within the Coastal Zone, as defined in the CZM Act of 1972 and HRS Chapter 205A. However, the project site is not located within the Special Management (SMA) / shoreline area. Therefore, there are no anticipated impacts to coastal resources from the proposed project.

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Contamination and Toxic Substances (Multifamily and Non-Residential Properties) – PARTNER

https://www.hudexchange.info/programs/environmental-review/site-contamination

1. **How was site contamination evaluated?** [1] **Select all that apply.**
   - ☐ ASTM Phase I ESA
   - ☐ ASTM Phase II ESA
   - ☐ Remediation or clean-up plan
   - ☐ ASTM Vapor Encroachment Screening
   - ☒ None of the above

   → *Provide documentation and reports and include an explanation of how site contamination was evaluated in the Worksheet Summary.*
   Continue to Question 2.

2. **Were any on-site or nearby toxic, hazardous, or radioactive substances found that could affect the health and safety of project occupants or conflict with the intended use of the property? (Were any recognized environmental conditions or RECs identified in a Phase I ESA and confirmed in a Phase II ESA?)**

   ☒ No → **Explain below.**

   The project site is undveloped. The project site has been used in the long-term for commercial croplands. Testing of soil prior to disturbance for worker safety is reccommended.

   → *If the RE/HUD agrees with this recommendation, the review is in compliance with this section. Continue to the Worksheet Summary below.*

   ☐ Yes → *Describe the findings, including any recognized environmental conditions (RECs), in Worksheet Summary below. Continue to Question 3.*

3. **Can adverse environmental impacts be mitigated?**

[1] HUD regulations at 24 CFR § 58.5(i)(2)(ii) require that the environmental review for multifamily housing with five or more dwelling units or non-residential property include the evaluation of previous uses of the site or other evidence of contamination on or near the site. For acquisition and new construction of multifamily and nonresidential properties HUD strongly advises the review include an ASTM Phase I Environmental Site Assessment (ESA) to meet real estate transaction standards of due diligence and to help ensure compliance with HUD's toxic policy at 24 CFR §58.5(i) and 24 CFR §50.3(i). Also note that some HUD programs require an ASTM Phase I ESA.

☐ Adverse environmental impacts cannot feasibly be mitigated → <u>HUD assistance may not be used for the project at this site. Project cannot proceed at this location.</u>

☒ Yes, adverse environmental impacts can be eliminated through mitigation.
→ *Provide all mitigation requirements*[2] *and documents. Continue to Question 4.*

4. **Describe how compliance was achieved. Include any of the following that apply: State Voluntary Clean-up Program, a No Further Action letter, use of engineering controls[3], or use of institutional controls[4].**
   No known contamination exists at the project site. Soil testing prior to disturbance is reccommended based on current and historical land use for commercial agricultural croplands. If soil is determined to contain contaminants at significant concentrations, appropriate controls in accordance with DOH rules will need to be implemented (i.e., Environmental Hazard Management Plans for construction and long-term use, engineering/institutional controls).

   If a remediation plan or clean-up program was necessary, which standard does it follow?
   ☐ Complete removal
   ☐ Risk-based corrective action (RBCA)
   → *Continue to the Worksheet Summary.*

<u>**Worksheet Summary**</u>

Include all documentation supporting your findings in your submission to HUD.
The project site is located in and adjenct to agricultural fields. Besides potential pesticides and metals from potential past soil treatment, there is no evidence of toxic substances present at the project site.

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[2] Mitigation requirements include all clean-up actions required by applicable federal, state, tribal, or local law. Additionally, provide, as applicable, the long-term operations and maintenance plan, Remedial Action Work Plan, and other equivalent documents.
[3] Engineering controls are any physical mechanism used to contain or stabilize contamination or ensure the effectiveness of a remedial action. Engineering controls may include, without limitation, caps, covers, dikes, trenches, leachate collection systems, signs, fences, physical access controls, ground water monitoring systems and ground water containment systems including, without limitation, slurry walls and ground water pumping systems.
[4] Institutional controls are mechanisms used to limit human activities at or near a contaminated site, or to ensure the effectiveness of the remedial action over time, when contaminants remain at a site at levels above the applicable remediation standard which would allow for unrestricted use of the property. Institutional controls may include structure, land, and natural resource use restrictions, well restriction areas, classification exception areas, deed notices, and declarations of environmental restrictions.

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Endangered Species Act (CEST and EA) – PARTNER

https://www.hudexchange.info/environmental-review/endangered-species

1. **Does the project involve any activities that have the potential to affect species or habitats?**

☒No, the project will have No Effect due to the nature of the activities involved in the project.

→ *If the RE/HUD agrees with this recommendation, the review is in compliance with this section. Continue to the Worksheet Summary below. Provide any documents used to make your determination.*

☐No, the project will have No Effect based on a letter of understanding, memorandum of agreement, programmatic agreement, or checklist provided by local HUD office.

Explain your determination:

Click here to enter text.

→ *If the RE/HUD agrees with this recommendation, the review is in compliance with this section. Continue to the Worksheet Summary below. Provide any documents used to make your determination.*

☐Yes, the activities involved in the project have the potential to affect species and/or habitats. → *Continue to Question 2.*

2. **Are federally listed species or designated critical habitats present in the action area?**

Obtain a list of protected species from the Services. This information is available on the FWS Website.

☐No, the project will have No Effect due to the absence of federally listed species and designated critical habitat.

→ *If the RE/HUD agrees with this recommendation, the review is in compliance with this section. Continue to the Worksheet Summary below. Provide any documents used to make your determination. Documentation may include letters from the Services, species lists from the Services' websites, surveys or other documents and analysis showing that there are no species in the action area.*

☐Yes, there are federally listed species or designated critical habitats present in the action area. → *Continue to Question 3.*

3. **Recommend one of the following effects that the project will have on federally listed species or designated critical habitat:**

☐No Effect: Based on the specifics of both the project and any federally listed species in the action area, you have determined that the project will have absolutely no effect on listed species or critical habitat.

→ *If the RE/HUD agrees with this recommendation, the review is in compliance with this section. Continue to the Worksheet Summary below. Provide any documents used to make your determination. Documentation should include a species list and explanation of your conclusion, and may require maps, photographs, and surveys as appropriate.*

☐May Affect, Not Likely to Adversely Affect: Any effects that the project may have on federally listed species or critical habitats would be beneficial, discountable, or insignificant.

→ Partner entities should not contact the Services directly. *If the RE/HUD agrees with this recommendation, they will have to complete Informal Consultation. Provide the RE/HUD with a biological evaluation or equivalent document. They may request additional information, including surveys and professional analysis, to complete their consultation.*

☐Likely to Adversely Affect: The project may have negative effects on one or more listed species or critical habitat.

→ Partner entities should not contact the Services directly. *If the RE/HUD agrees with this recommendation, they will have to complete Formal Consultation. Provide the RE/HUD with a biological evaluation or equivalent document. They may request additional information, including surveys and professional analysis, to complete their consultation.*

Worksheet Summary

Include all documentation supporting your findings in your submission to HUD.

A biological survey was completed for the project site. There study concluded that the project site does not include any endangered or protected species habitat. Protected avian species may traverse the proejct site. Mitigation measures to avoid impacts to these species are presented in the HUD ER report.

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Environmental Justice (CEST and EA) – PARTNER

https://www.hudexchange.info/environmental-review/environmental-justice

HUD strongly encourages starting the Environmental Justice analysis only after all other laws and authorities, including Environmental Assessment factors if necessary, have been completed.

1. **Were any adverse environmental impacts identified in any other compliance review portion of this project's total environmental review?**

   ☐Yes → *Continue to Question 2.*

   ☒No → *If the RE/HUD agrees with this recommendation, the review is in compliance with this section. Continue to the Worksheet Summary below.*

2. **Were these adverse environmental impacts disproportionately high for low-income and/or minority communities?**

   ☐Yes

   Explain:

   Click here to enter text.

   → *The RE/HUD must work with the affected low-income or minority community to decide what mitigation actions, if any, will be taken. Provide any supporting documentation.*

   ☐No

   Explain:

   Click here to enter text.

   → *If the RE/HUD agrees with this recommendation, the review is in compliance with this section. Continue to the Worksheet Summary below.*

Worksheet Summary

The proposed action includes upgrads of an existing public County municipal water system. No adverse impacts to low income or minority populations are anticipated as a result of the proposed action.

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Explosive and Flammable Hazards (CEST and EA) – PARTNER
https://www.hudexchange.info/environmental-review/explosive-and-flammable-facilities

1. **Does the proposed HUD-assisted project include a hazardous facility (a facility that mainly stores, handles or processes flammable or combustible chemicals such as bulk fuel storage facilities and refineries)?**
   ☒ No
   → *Continue to Question 2.*

   ☐ Yes
   Explain:
   Click here to enter text.
   → *Continue to Question 5.*

2. **Does this project include any of the following activities: development, construction, rehabilitation that will increase residential densities, or conversion?**
   ☒ No → *If the RE/HUD agrees with this recommendation, the review is in compliance with this section. Continue to the Worksheet Summary below.*

   ☐ Yes → *Continue to Question 3.*

3. **Within 1 mile of the project site, are there any current *or planned* stationary aboveground storage containers:**
   - Of more than 100-gallon capacity, containing common liquid industrial fuels OR
   - Of any capacity, containing hazardous liquids or gases that are not common liquid industrial fuels?

   ☒ No → *If the RE/HUD agrees with this recommendation, the review is in compliance with this section. Continue to the Worksheet Summary below. Provide all documents used to make your determination.*

   ☐ Yes → *Continue to Question 4.*

4. **Is the Separation Distance from the project acceptable based on standards in the Regulation?**
   Please visit HUD’s website for information on calculating Acceptable Separation Distance.
   ☐ Yes
   → *If the RE/HUD agrees with this recommendation, the review is in compliance with this section. Continue to the Worksheet Summary below.*

Provide map(s) showing the location of the project site relative to any tanks and your separation distance calculations. If the map identifies more than one tank, please identify the tank you have chosen as the "assessed tank."

☐ No

→ *Continue to Question 6.*

Provide map(s) showing the location of the project site relative to any tanks and your separation distance calculations. If the map identifies more than one tank, please identify the tank you have chosen as the "assessed tank."

5. **Is the hazardous facility located at an acceptable separation distance from residences and any other facility or area where people may congregate or be present?**
   Please visit HUD's website for information on calculating Acceptable Separation Distance.

   ☐ Yes

   → *If the RE/HUD agrees with this recommendation, the review is in compliance with this section. Continue to the Worksheet Summary below.*

   Provide map(s) showing the location of the project site relative to residences and any other facility or area where people congregate or are present and your separation distance calculations.

   ☐ No

   → *Continue to Question 6.*

   Provide map(s) showing the location of the project site relative to residences and any other facility or area where people congregate or are present and your separation distance calculations.

6. **For the project to be brought into compliance with this section, all adverse impacts must be mitigated. Explain in detail the exact measures that must be implemented to make the Separation Distance acceptable, including the timeline for implementation. If negative effects cannot be mitigated, cancel the project at this location.**
   Note that only licensed professional engineers should design and implement blast barriers. If a barrier will be used or the project will be modified to compensate for an unacceptable separation distance, provide approval from a licensed professional engineer.
   Click here to enter text.

<u>Worksheet Summary</u>

There are no above-ground explosive tanks/containers within the vicnity of the project site.

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Farmlands Protection (CEST and EA) - PARTNER

https://www.hudexchange.info/environmental-review/farmlands-protection

1. **Does your project include any activities, including new construction, acquisition of undeveloped land or conversion, that could convert agricultural land to a non-agricultural use?**

   ☒ Yes → *Continue to Question 2.*
   ☐ No
   → *If the RE/HUD agrees with this recommendation, the review is in compliance with this section. Continue to the Worksheet Summary below.*

2. **Does "important farmland," including prime farmland, unique farmland, or farmland of statewide or local importance regulated under the Farmland Protection Policy Act, occur on the project site?**
   You may use the links below to determine important farmland occurs on the project site:
   - Utilize USDA Natural Resources Conservation Service's (NRCS) Web Soil Survey http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm
   - Check with your city or county's planning department and ask them to document if the project is on land regulated by the FPPA (zoning important farmland as non-agricultural does not exempt it from FPPA requirements)
   - Contact NRCS at the local USDA service center http://offices.sc.egov.usda.gov/locator/app?agency=nrcs or your NRCS state soil scientist http://soils.usda.gov/contact/state_offices/ for assistance

   ☐ No → *If the RE/HUD agrees with this recommendation, the review is in compliance with this section. Continue to the Worksheet Summary below. Provide any documents used to make your determination.*

   ☒ Yes → *Continue to Question 3.*

3. **Consider alternatives to completing the project on important farmland and means of avoiding impacts to important farmland.**
   - Complete form **AD-1006**, "Farmland Conversion Impact Rating" and contact the state soil scientist before sending it to the local NRCS District Conservationist.
   - Work with NRCS to minimize the impact of the project on the protected farmland. When you have finished with your analysis, return a copy of form AD-1006 to the USDA-NRCS State Soil Scientist or his/her designee informing them of your determination.

Work with the RE/HUD to determine how the project will proceed. Document the conclusion:

☐Project will proceed with mitigation.

Explain in detail the proposed measures that must be implemented to mitigate for the impact or effect, including the timeline for implementation.

Click here to enter text.

→ *If the RE/HUD agrees with this recommendation, the review is in compliance with this section. Continue to the Worksheet Summary below. Provide form AD-1006 and all other documents used to make your determination.*

☒Project will proceed without mitigation.

Explain why mitigation will not be made here:

No mitigation is reqiured since the project site includes a public municipal water project that would occupy a minimal footprint, that would not impact the adjacent commercial agricultural operation (Kaua'i Coffee Company).

→ *If the RE/HUD agrees with this recommendation, the review is in compliance with this section. Continue to the Worksheet Summary below. Provide form AD-1006 and all other documents used to make your determination.*

Worksheet Summary

The project site is designated as prime farmlands by the USDA. However, the project site includes a public municipal water project that would occupy a minimal footprint, that would not impact the adjacent commercial agricultural operation (Kaua'i Coffee Company).

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Flood Insurance (CEST and EA) – PARTNER

https://www.hudexchange.info/environmental-review/flood-insurance

1. **Does this project involve mortgage insurance, refinance, acquisition, repairs, rehabilitation, or construction of a structure, mobile home, or insurable personal property**?

   ☐No. This project does not require flood insurance or is excepted from flood insurance.
   → *Continue to the Worksheet Summary.*

   ☒Yes → *Continue to Question 2.*

2. **Provide a FEMA/FIRM map showing the site.**
   The Federal Emergency Management Agency (FEMA) designates floodplains. The FEMA Map Service Center provides this information in the form of FEMA Flood Insurance Rate Maps (FIRMs).

   Is the structure, part of the structure, or insurable property located in a FEMA-designated Special Flood Hazard Area?

   ☒ No → *Continue to the Worksheet Summary.*

   ☐ Yes → *Continue to Question 3.*

3. **Is the community participating in the National Flood Insurance Program *or* has less than one year passed since FEMA notification of Special Flood Hazards?**

   ☐ Yes, the community is participating in the National Flood Insurance Program.
   Flood insurance is required. Provide a copy of the flood insurance policy declaration or a paid receipt for the current annual flood insurance premium and a copy of the application for flood insurance.
   → *Continue to the Worksheet Summary.*

   ☐ Yes, less than one year has passed since FEMA notification of Special Flood Hazards.
   If less than one year has passed since notification of Special Flood Hazards, no flood Insurance is required.
   → *Continue to the Worksheet Summary.*

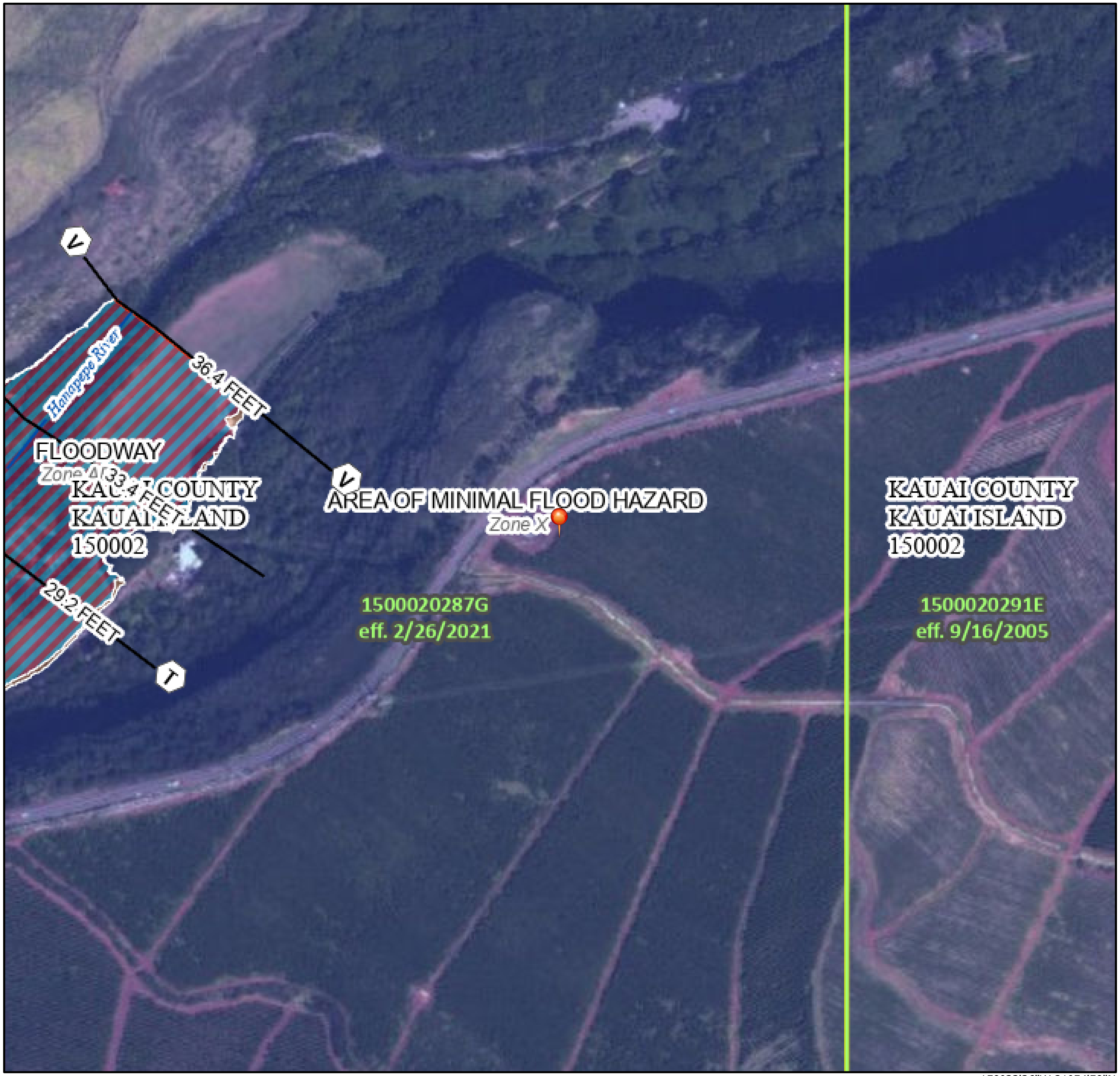
   ☐ No. The community is not participating, or its participation has been suspended.
   Federal assistance may not be used at this location. Cancel the project at this location.

Worksheet Summary
The project site is located in an area of minimal flood hazard (FEMA Zone X). See FEMA FIRMette map attached.

National Flood Hazard Layer FIRMette

FEMA

159°34'13"W 21°55'23"N



159°33'36"W 21°54'50"N

Feet

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

1:6,000

Basemap Imagery Source: USGS National Map 2023

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- B 20.2 17.5 Cross Sections with 1% Annual Chance Water Surface Elevation
- 8 Coastal Transect
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 9/9/2024 at 6:09 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

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WASHINGTON, DC 20410-1000

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Floodplain Management (CEST and EA) – PARTNER

https://www.hudexchange.info/environmental-review/floodplain-management

1. **Does 24 CFR 55.12(c) exempt this project from compliance with HUD's floodplain management regulations in Part 55?**

   ☐ Yes

   Provide the applicable citation at 24 CFR 55.12(c) here. If project is exempt under 55.12(c)(6) or (8), provide supporting documentation.

   Click here to enter text.

   → *If the RE/HUD agrees with this recommendation, the review is in compliance with this section. Continue to the Worksheet Summary below. Continue to the Worksheet Summary.*

   ☒ No → *Continue to Question 2.*

2. **Provide a FEMA/FIRM map showing the site.**

   The Federal Emergency Management Agency (FEMA) designates floodplains. The FEMA Map Service Center provides this information in the form of FEMA Flood Insurance Rate Maps (FIRMs).

   Does your project occur in a floodplain?

   ☒ No → *Continue to the Worksheet Summary below.*

   ☐ Yes

   Select the applicable floodplain using the FEMA map or the best available information:

   ☐ Floodway → *Continue to Question 3, Floodways*

   ☐ Coastal High Hazard Area (V Zone) → *Continue to Question 4, Coastal High Hazard Areas*

   ☐ 500-year floodplain (B Zone or shaded X Zone) → *Continue to Question 5, 500-year Floodplains*

   ☐ 100-year floodplain (A Zone) → *The 8-Step Process is required. Continue to Question 6, 8-Step Process*

3. Floodways

   Is this a functionally dependent use?

   ☐ Yes

The 8-Step Process is required. Work with HUD or the RE to assist with the 8-Step Process.
→ *Continue to Worksheet Summary.*

☐ No → *Federal assistance may not be used at this location unless an exception in 55.12(c) applies. You must either choose an alternate site or cancel the project.*

4. **Coastal High Hazard Area**

Is this a critical action such as a hospital, nursing home, fire station, or police station?

☐ Yes → *Critical actions are prohibited in coastal high hazard areas unless an exception in 55.12(c) applies. You must either choose an alternate site or cancel the project.*

☐ No

Does this action include new construction that is not a functionally dependent use, existing construction (including improvements), or reconstruction following destruction caused by a disaster?

☐ Yes, there is new construction of something that is not a functionally dependent use. New construction must be designed to FEMA standards for V Zones at 44 CFR 60.3(e) (24 CFR 55.1(c)(3)(i)).
→ *Continue to Question 6, 8-Step Process*

☐ No, this action concerns only existing construction.
Existing construction must have met FEMA elevation and construction standards for a coastal high hazard area or other standards applicable at the time of construction.
→ *Continue to Question 6, 8-Step Process*

5. **500-year Floodplain**

Is this a critical action?

☐ No → *If the RE/HUD agrees with this recommendation, the review is in compliance with this section. Continue to the Worksheet Summary below. Continue to the Worksheet Summary below.*

☐Yes → *Continue to Question 6, 8-Step Process*

6. **8-Step Process**.

Is this 8-Step Process required? Select one of the following options:

☐ 8-Step Process applies.
This project will require mitigation and may require elevating structure or structures. See the link to the HUD Exchange above for information on HUD's elevation requirements.
→ *Work with the RE/HUD to assist with the 8-Step Process. Continue to Worksheet Summary.*

☐ 5-Step Process is applicable per 55.12(a)(1-4).
Provide the applicable citation at 24 CFR 55.12(a) here.
Click here to enter text.
→ *Work with the RE/HUD to assist with the 5-Step Process. Continue to Worksheet Summary.*

☐ 8-Step Process is inapplicable per 55.12(b)(1-5).
Provide the applicable citation at 24 CFR 55.12(b) here.

Click here to enter text.

→ *If the RE/HUD agrees with this recommendation, the review is in compliance with this section. Continue to the Worksheet Summary below.*

Worksheet Summary

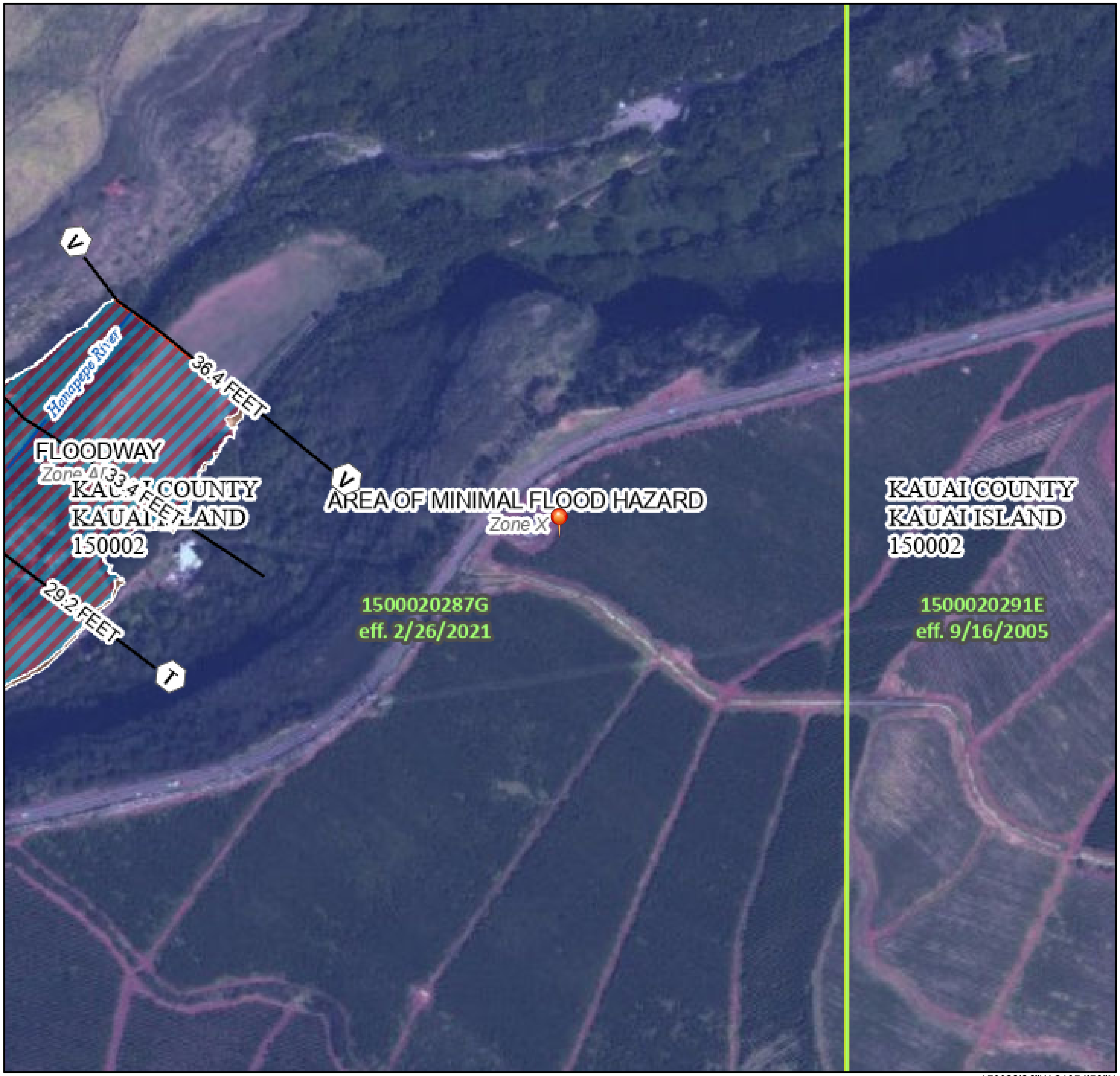
Provide a full description of your determination and a synopsis of the information that it was based on.

See attached FEMA FIRMette

National Flood Hazard Layer FIRMette

FEMA

159°34'13"W 21°55'23"N



159°33'36"W 21°54'50"N

Feet

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

1:6,000

Basemap Imagery Source: USGS National Map 2023

Legend

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Historic Preservation (CEST and EA) – PARTNER

https://www.hudexchange.info/environmental-review/historic-preservation

Threshold

Is Section 106 review required for your project?

☐ No, because a Programmatic Agreement states that all activities included in this project are exempt. (See the PA Database to find applicable PAs.)
Either provide the PA itself or a link to it here. Mark the applicable exemptions or include the text here:
Click here to enter text.
→ *Continue to the Worksheet Summary.*

☒ No, because the project consists solely of activities included in a No Potential to Cause Effects memo or other determination [36 CFR 800.3(a)(1)].
Either provide the memo itself or a link to it here. Explain and justify the other determination here:
No significant historical or cultural resources were found at the project site during the archaeolgical survey.
→ *Continue to the Worksheet Summary.*

☐Yes, because the project includes activities with potential to cause effects (direct or indirect). → *Continue to Step 1.*

The Section 106 Process
After determining the need to do a Section 106 review, HUD or the RE will initiate consultation with regulatory and other interested parties, identify and evaluate historic properties, assess effects of the project on properties listed on or eligible for the National Register of Historic Places, and resolve any adverse effects through project design modifications or mitigation.
Step 1: Initiate consultation
Step 2: Identify and evaluate historic properties
Step 3: Assess effects of the project on historic properties
Step 4: Resolve any adverse effects

Only RE or HUD staff may initiate the Section 106 consultation process. Partner entities may gather information, including from SHPO records, identify and evaluate historic properties, and make initial assessments of effects of the project on properties listed in or eligible for the National Register of Historic

Place. Partners should then provide their RE or HUD with all of their analysis and documentation so that they may initiate consultation.

Step 1 - Initiate Consultation

The following parties are entitled to participate in Section 106 reviews: Advisory Council on Historic Preservation; State Historic Preservation Officers (SHPOs); federally recognized Indian tribes/Tribal Historic Preservation Officers (THPOs); Native Hawaiian Organizations (NHOs); local governments; and project grantees. The general public and individuals and organizations with a demonstrated interest in a project may participate as consulting parties at the discretion of the RE or HUD official.   Participation varies with the nature and scope of a project.   Refer to HUD's website for guidance on consultation, including the required timeframes for response. Consultation should begin early to enable full consideration of preservation options.

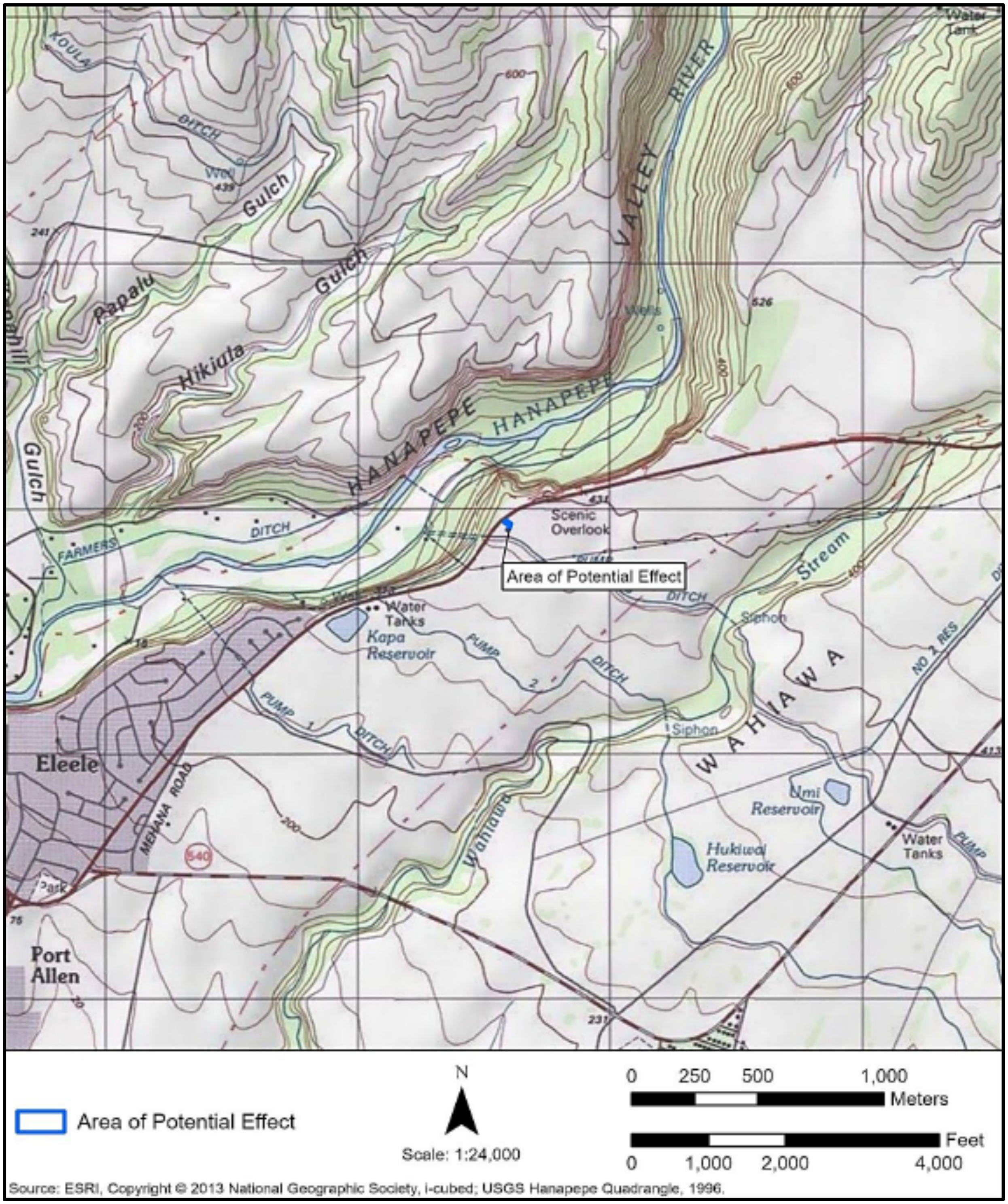
Use the When To Consult With Tribes checklist within Notice CPD-12-006: Process for Tribal Consultation to determine if the RE or HUD should invite tribes to consult on a particular project. Use the Tribal Directory Assessment Tool (TDAT) to identify tribes that may have an interest in the area where the project is located. Note that only HUD or the RE may initiate consultation with Tribes. Partner entities may prepare a draft letter for the RE or HUD to use to initiate consultation with tribes, but may not send the letter themselves.

List all organizations and individuals that you believe may have an interest in the project here:
Section 106 Consultation has been initiated by the County and will be finalized at a later date.

→ *Continue to Step 2.*

Step 2 - Identify and Evaluate Historic Properties

Provide a preliminary definition of the Area of Potential Effect (APE), either by entering the address(es) or providing a map depicting the APE. Attach an additional page if necessary.



Gather information about known historic properties in the APE. Historic buildings, districts and archeological sites may have been identified in local, state, and national surveys and registers, local historic districts, municipal plans, town and county histories, and local history websites. If not already listed on the National Register of Historic Places, identified properties are then evaluated to see if they are eligible for the National Register. Refer to HUD's website for guidance on identifying and evaluating historic properties.

In the space below, list historic properties identified and evaluated in the APE.
Every historic property that may be affected by the project should be listed. For each historic property or district, include the National Register status, whether the SHPO has concurred with the finding, and whether information on the site is sensitive. Attach an additional page if necessary.
No historic properties were identified within or directly surrounding the APE.

Provide the documentation (survey forms, Register nominations, concurrence(s) and/or objection(s), notes, and photos) that justify your National Register Status determination.

Was a survey of historic buildings and/or archeological sites done as part of the project?
If the APE contains previously unsurveyed buildings or structures over 50 years old, or there is a likely presence of previously unsurveyed archeological sites, a survey may be necessary. For Archeological surveys, refer to HP Fact Sheet #6, Guidance on Archeological Investigations in HUD Projects.

☐ Yes → *Provide survey(s) and report(s) and continue to Step 3.*
Additional notes:
Click here to enter text.

☒ No → *Continue to Step 3.*

Step 3 - Assess Effects of the Project on Historic Properties

Only properties that are listed on or eligible for the National Register of Historic Places receive further consideration under Section 106. Assess the effect(s) of the project by applying the Criteria of Adverse Effect. (36 CFR 800.5) Consider direct and indirect effects as applicable as per HUD guidance.

Choose one of the findings below to recommend to the RE or HUD.
Please note: this is a recommendation only. It is **not** the official finding, which will be made by the RE or HUD, but only your suggestion as a Partner entity.

☒ No Historic Properties Affected
Document reason for finding:
☒ No historic properties present.
☐ Historic properties present, but project will have no effect upon them.

☐ No Adverse Effect
Document reason for finding and provide any comments below.
Comments may include recommendations for mitigation, monitoring, a plan for unanticipated discoveries, etc.
Click here to enter text.

☐ Adverse Effect
Document reason for finding:
Copy and paste applicable Criteria into text box with summary and justification.
Criteria of Adverse Effect: 36 CFR 800.5]

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Noise (CEST Level Reviews) – PARTNER

https://www.hudexchange.info/programs/environmental-review/noise-abatement-and-control

1. **What activities does your project involve? Check all that apply:**

   ☐ New construction for residential use

   NOTE: HUD assistance to new construction projects is generally prohibited if they are located in an Unacceptable zone, and HUD discourages assistance for new construction projects in Normally Unacceptable zones. See 24 CFR 51.101(a)(3) for further details.
   → *Continue to Question 4.*

   ☐ Rehabilitation of an existing residential property

   NOTE: For modernization projects in all noise zones, HUD encourages mitigation to reduce levels to acceptable compliance standards. See 24 CFR 51 Subpart B for further details.
   → *Continue to Question 2.*

   ☒ None of the above

   → *If the RE/HUD agrees with this recommendation, the review is in compliance with this section. Continue to the Worksheet Summary below.*

2. **Do you have standardized noise attenuation measures that apply to all modernization and/or minor rehabilitation projects, such as the use of double glazed windows or extra insulation?**

   ☐ Yes

   Indicate the type of measures that will apply (check all that apply):

   ☐ Improved building envelope components (better windows and doors, strengthened sheathing, insulation, sealed gaps, etc.)

   ☐ Redesigned building envelope (more durable or substantial materials, increased air gap, resilient channels, staggered wall studs, etc.)

   ☐ Other (explain below)

   Click here to enter text.

   → *If the RE/HUD agrees with this recommendation, the review is in compliance with this section. Continue to the Worksheet Summary below and provide any documentation.*

   ☐ No

   → *Continue to Question 3.*

3. **Complete the Preliminary Screening to identify potential noise generators in the vicinity (1000' from a major road, 3000' from a railroad, or 15 miles from an airport).**
   Describe findings of the Preliminary Screening:
   Click here to enter text.
   → *Continue to Question 6.*

4. **Complete the Preliminary Screening to identify potential noise generators in the vicinity (1000' from a major road, 3000' from a railroad, or 15 miles from an airport).**
   Indicate the findings of the Preliminary Screening below:
   ☐ There are no noise generators found within the threshold distances above.
   → *If the RE/HUD agrees with this recommendation, the review is in compliance with this section. Continue to the Worksheet Summary below. Provide a map showing the location of the project relative to any noise generators.*

   ☒ Noise generators were found within the threshold distances.
   → *Continue to Question 5.*

5. **Complete the Noise Assessment Guidelines to quantify the noise exposure. Indicate the findings of the Noise Assessment below:**
   ☒ Acceptable: (65 decibels or less; the ceiling may be shifted to 70 decibels in circumstances described in §24 CFR 51.105(a))
   Indicate noise level here: 45 dBA
   → *If the RE/HUD agrees with this recommendation, the review is in compliance with this section. Continue to the Worksheet Summary below. Provide noise analysis, including noise level and data used to complete the analysis.*

   ☐ Normally Unacceptable: (Above 65 decibels but not exceeding 75 decibels; the floor may be shifted to 70 decibels in circumstances described in 24 CFR 51.105(a))
   Indicate noise level here: Click here to enter text.

   Is the project in a largely undeveloped area[1]?
   ☐ No → ***The project requires completion of an Environmental Assessment (EA) pursuant to 51.104(b)(1)(i).***
   ☐ Yes → ***The project requires completion of an Environmental Impact Statement (EIS) pursuant to 51.104(b)(1)(i).***

   → *Work with the RE/HUD to elevate the level of review. Provide noise analysis, including noise level and data used to complete the analysis.*
   Continue to Question 6.

   ☐ Unacceptable: (Above 75 decibels)

---

[1] A largely undeveloped area means the area within 2 miles of the project site is less than 50 percent developed with urban uses and does not have water and sewer capacity to serve the project.

Indicate noise level here: Click here to enter text.

The project requires completion of an Environmental Impact Statement (EIS) pursuant to 51.104(b)(1)(i). *Work with HUD or the RE to either complete an EIS or obtain a waiver signed by the appropriate authority.*

→ *Continue to Question 6.*

6. **HUD strongly encourages mitigation be used to eliminate adverse noise impacts. Work with the RE/HUD on the development of the mitigation measures that must be implemented to mitigate for the impact or effect, including the timeline for implementation.**

☐ Mitigation as follows will be implemented:

Click here to enter text.

→ *Provide drawings, specifications, and other materials as needed to describe the project's noise mitigation measures.*

Continue to the Worksheet Summary.

☒ No mitigation is necessary.

Explain why mitigation will not be made here:

Click here to enter text.

→ *Continue to the Worksheet Summary.*

Worksheet Summary

The proposed project does not include a residential development that will be occupied by anyone. There would be short-term noise impacts during construction, but there would be no long-term noise impacts from the new water tank and booster pumps, compared to existing conditions.

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Sole Source Aquifers (CEST and EA) - PARTNER

https://www.hudexchange.info/environmental-review/sole-source-aquifers

1. **Is the project located on a sole source aquifer (SSA)[1]?**

   ☒No → *If the RE/HUD agrees with this recommendation, the review is in compliance with this section. Continue to the Worksheet Summary below. Provide documentation used to make your determination, such as a map of your project or jurisdiction in relation to the nearest SSA.*

   ☐Yes → *Continue to Question 2.*

2. **Does the project consist solely of acquisition, leasing, or rehabilitation of an existing building(s)?**

   ☐Yes → *The review is in compliance with this section. Continue to the Worksheet Summary below.*

   ☐No → *Continue to Question 3.*

3. **Does your region have a memorandum of understanding (MOU) or other working agreement with EPA for HUD projects impacting a sole source aquifer?**

   Contact your Field or Regional Environmental Officer or visit the HUD webpage at the link above to determine if an MOU or agreement exists in your area.

   ☐Yes → *Continue to Question 4.*

   ☐No → *Continue to Question 5.*

4. **Does your MOU or working agreement exclude your project from further review?**

   ☐Yes → *If the RE/HUD agrees with this recommendation, the review is in compliance with this section. Continue to the Worksheet Summary below. Provide documentation used to make your determination and document where your project fits within the MOU or agreement.*

   ☐No → *Continue to Question 5.*

5. **Will the proposed project contaminate the aquifer and create a significant hazard to public health?**

   Consult with your Regional EPA Office. Your consultation request should include detailed information about your proposed project and its relationship to the aquifer and associated streamflow source area.

---

[1] A sole source aquifer is defined as an aquifer that supplies at least 50 percent of the drinking water consumed in the area overlying the aquifer. This includes streamflow source areas, which are upstream areas of losing streams that flow into the recharge area.

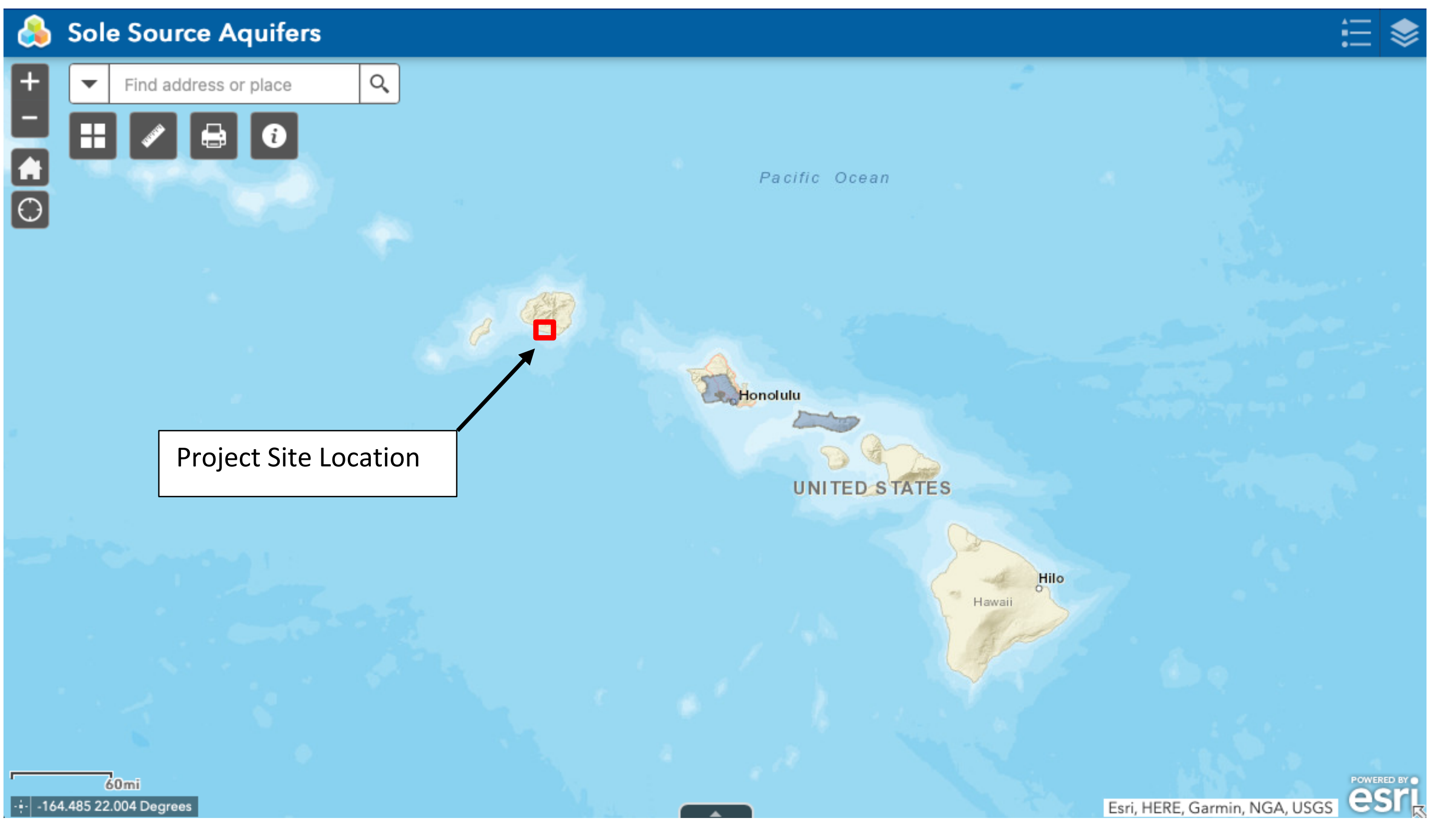
EPA will also want to know about water, storm water and waste water at the proposed project. Follow your MOU or working agreement or contact your Regional EPA office for specific information you may need to provide. EPA may request additional information if impacts to the aquifer are questionable after this information is submitted for review.

☐No → *If the RE/HUD agrees with this recommendation, the review is in compliance with this section. Continue to the Worksheet Summary below. Provide your correspondence with the EPA and all documents used to make your determination.*

☐Yes → *The RE/HUD will work with EPA to develop mitigation measures. If mitigation measures are approved, attach correspondence with EPA and include the mitigation measures in your environmental review documents and project contracts. <u>If EPA determines that the project continues to pose a significant risk to the aquifer, federal financial assistance must be denied.</u> Continue to Question 6.*

<u>Worksheet Summary</u>

Provide a full description of your determination and a synopsis of the information that it was based on, Kaua'i County does not include an sole source aquifers (See map below).



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Wetlands (CEST and EA) – Partner

https://www.hudexchange.info/environmental-review/wetlands-protection

1. **Does this project involve new construction as defined in Executive Order 11990, expansion of a building's footprint, or ground disturbance?**
   The term "new construction" includes draining, dredging, channelizing, filling, diking, impounding, and related activities and construction of any any structures or facilities.
   ☐ No → *If the RE/HUD agrees with this recommendation, the review is in compliance with this section. Continue to the Worksheet Summary below.*

   ☒ Yes → *Continue to Question 2.*

2. **Will the new construction or other ground disturbance impact a wetland as defined in E.O. 11990?**
   ☒ No → *If the RE/HUD agrees with this recommendation, the review is in compliance with this section. Continue to the Worksheet Summary below. Provide a map or any other relevant documentation to explain your determination.*

   ☐ Yes → *Work with HUD or the RE to assist with the 8-Step Process.* *Continue to Question 3.*

3. **Does Section 55.12 state that the 8-Step Process is not required?**

   ☐ No, the 8-Step Process applies.
   This project will require mitigation and may require elevating structure or structures. See the link to the HUD Exchange above for information on HUD's elevation requirements.
   → *Work with the RE/HUD to assist with the 8-Step Process. Continue to Worksheet Summary.*

   ☐ 5-Step Process is applicable per 55.12(a).
   Provide the applicable citation at 24 CFR 55.12(a) here.
   Click here to enter text.
   → *Work with the RE/HUD to assist with the 5-Step Process. This project may require mitigation or alternations. Continue to Worksheet Summary.*

   ☐ 8-Step Process is inapplicable per 55.12(b).
   Provide the applicable citation at 24 CFR 55.12(b) here.
   Click here to enter text.

→ *If the RE/HUD agrees with this recommendation, the review is in compliance with this section. Continue to Worksheet Summary.*

☐ 8-Step Process is inapplicable per 55.12(c).

Provide the applicable citation at 24 CFR 55.12(c) here.

Click here to enter text.

→ *If the RE/HUD agrees with this recommendation, the review is in compliance with this section. Continue to Worksheet Summary.*

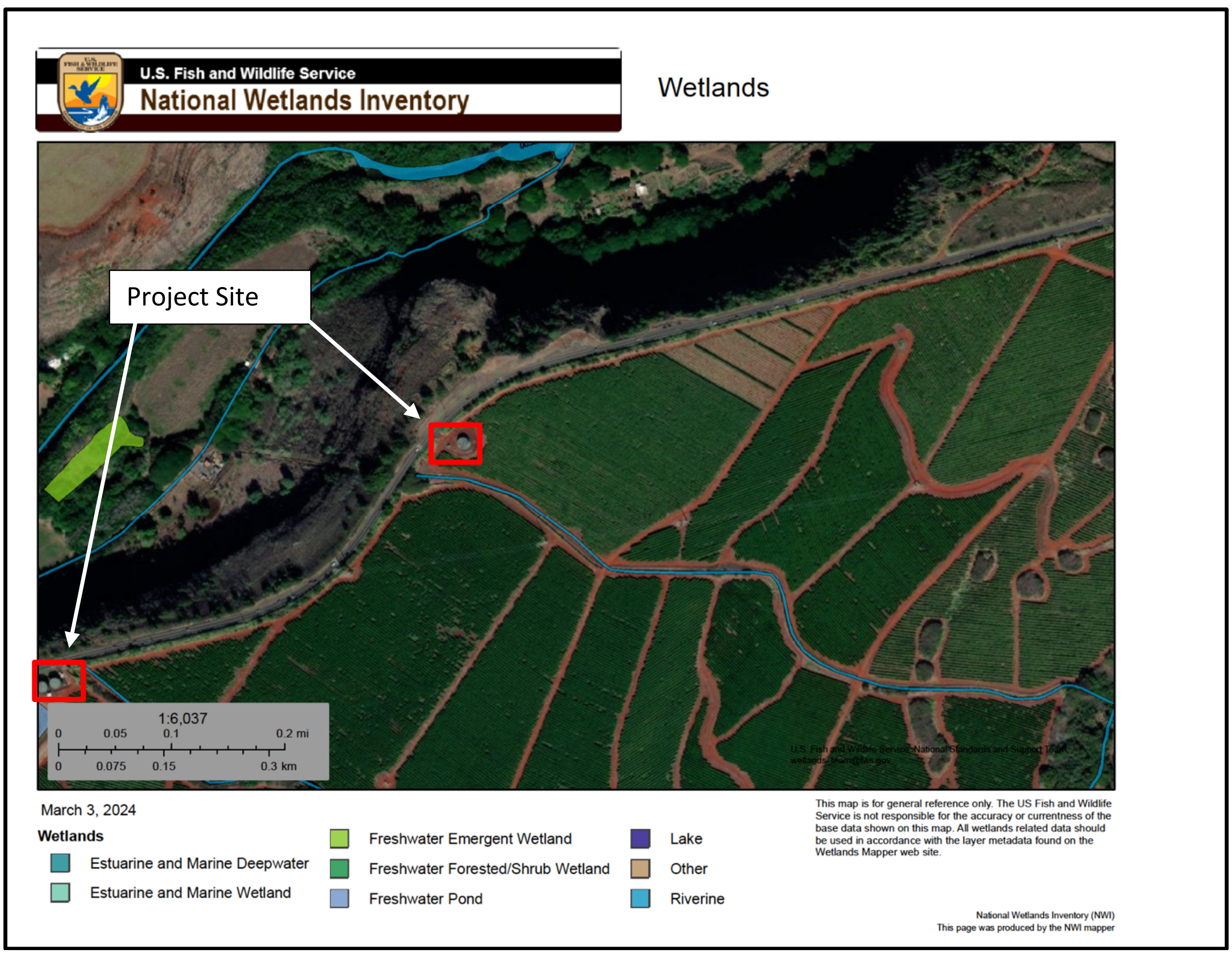
Worksheet Summary

Provide a full description of your determination and a synopsis of the information that it was based on, such as:

- Map panel numbers and dates
- Names of all consulted parties and relevant consultation dates
- Names of plans or reports and relevant page numbers
- Any additional requirements specific to your program or region

Include all documentation supporting your findings in your submission to HUD.

See wetland map below-no wetlands are mapped at the project site



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Wild and Scenic Rivers (CEST and EA) – PARTNER

https://www.hudexchange.info/environmental-review/wild-and-scenic-rivers

1. **Is your project within proximity of a Wild and Scenic River, Study River, or Nationwide Rivers Inventory River?**

   ☒ No → *If the RE/HUD agrees with this recommendation, the review is in compliance with this section. Provide documentation used to make your determination.*

   ☐ Yes → *Continue to Question 2.*

2. **Could the project do *any* of the following?**
   - Have a direct and adverse effect within Wild and Scenic River Boundaries,
   - Invade the area or unreasonably diminish the river outside Wild and Scenic River Boundaries, or
   - Have an adverse effect on the natural, cultural, and/or recreational values of a NRI segment.

   Consult with the appropriate federal/state/local/tribal Managing Agency(s), pursuant to Section 7 of the Act, to determine if the proposed project may have an adverse effect on a Wild & Scenic River or a Study River and, if so, to determine the appropriate avoidance or mitigation measures.

   Select one:

   ☐ The Managing Agency has concurred that the proposed project will not alter, directly, or indirectly, any of the characteristics that qualifies or potentially qualifies the river for inclusion in the NWSRS.

   → *If the RE/HUD agrees with this recommendation, the review is in compliance with this section. Provide documentation of the consultation (including the Managing Agency's concurrence) and any other documentation used to make your determination.*

   ☐ The Managing Agency was consulted and the proposed project may alter, directly, or indirectly, any of the characteristics that qualifies or potentially qualifies the river for inclusion in the NWSRS.

   → *The RE/HUD must work with the Managing Agency to identify mitigation measures to mitigate the impact or effect of the project on the river.*

Worksheet Summary

The State of Hawaii has approximately 3,905 miles of river, but no designated wild and scenic rivers (National Wild and Scenic Rivers System. Accessed at: https://www.rivers.gov/rivers/hawaii)