



FEASIBILITY STUDY FOR EAST MAUI WATER SOURCE DEVELOPMENT

PHASE 3 KA PA‘AKAI ANALYSIS

JULY 2024

FRAMEWORK

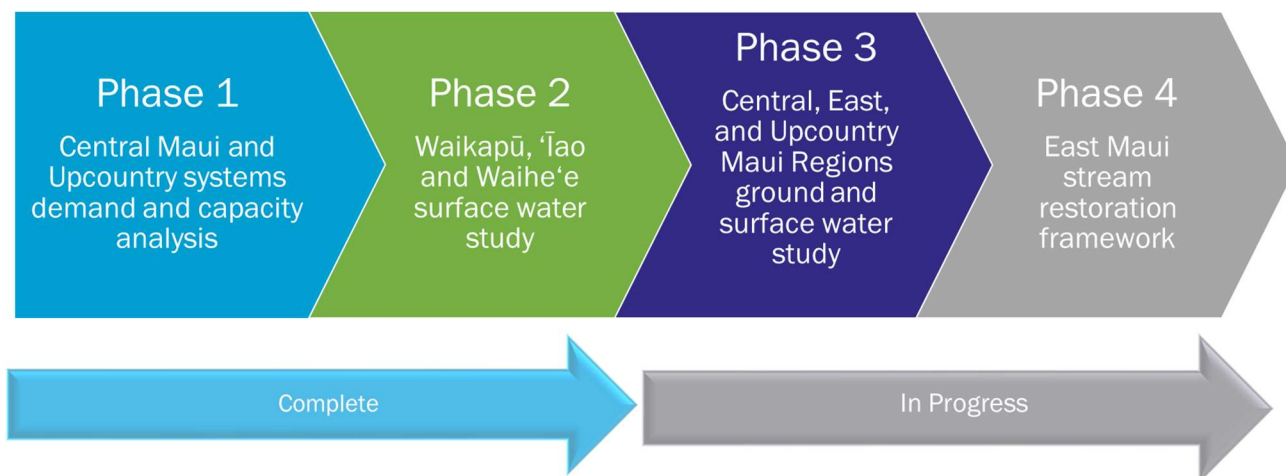
The Hawai‘i Constitution requires the State to protect all rights customarily and traditionally exercised for subsistence, cultural and religious purposes and possessed by ahupua‘a tenants who are descendants of Native Hawaiians who inhabited the Hawaiian Islands prior to 1778. The Hawai‘i Supreme Court case *Ka Pa‘akai O Ka ‘Aina v Land Use Commission* (2002) established an analytical framework for addressing the preservation and protection of customary and traditional native practices specific to Hawaiian communities. This framework has three parts.

1. Identify whether any valued cultural, historical, or natural resources are present; and identify the extent to which any traditional and customary native Hawaiian rights are exercised;
 2. Identify the extent to which those resources and rights will be affected or impaired by the actions under consideration; and
 3. Specify the feasible action, if any, to be taken by the regulatory body to reasonably protect native Hawaiian rights if they are found to exist.
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THE 4-PHASE FEASIBILITY STUDY FOR EAST MAUI WATER SOURCES

The Maui County Department of Water Supply (DWS) is conducting a Feasibility Study to explore new water sources and related water infrastructure to meet drinking water needs identified in the Water Use and Development Plan. Studies are being conducted in four phases as shown in Figure 1.

Figure 1: Feasibility Study for East Maui Water Sources



Phase 1 was an analysis of water systems demand and capacity in the Central Maui and Upcountry system. This phase has been completed.

Phase 2 was a study of the availability of surface water and a cost/benefit study for possible surface water sources from Waikapū Stream, Wailuku River and Waihe'e River. The amount available to divert from a stream is legally limited by established Interim Instream Flow Standards (IIFS): “a quantity or flow of water or depth of water which is required to be present at a specific location in a stream system at certain specified times of the year to protect fishery, wildlife, recreational, aesthetic, scenic, and other beneficial instream uses.” A Ka Pa’akai Analysis was completed for Phase 2.

Phase 3 is the current phase and involves a rigorous cost / benefit study of surface and groundwater resources available in the Central Maui region, the Upcountry region and the East Maui region. This study includes an evaluation of economic and environmental factors that would help understanding if these water sources would be feasible and how the water would be transmitted to meet potable water needs.

Phase 4 is a Stream Restoration Framework that will identify steps, timeline and potential implementing partners to restore flow to streams in the Ha’ikū area.

The Phase 3 area being studied extends from Kahakuloa to Ke’anae, and encompasses the moku of Hāmākualoa, Hāmākuapoko, Ko’olau, Kula, Ka’anapali, Lāhaina and Pū’ali Komohana. Figure 2 shows the overall study area with groundwater aquifers and moku. Figure 3 shows the study area with surface water streams, ditches and moku. Figures 4 through 6 depict the moku and potential water source options within the moku.

The following table identifies 21 options that are being further studied, the possible actions that are being considered, their respective moku, comments and their locations in Figures 4 through 6.

We stress that no actions are being taken at this time. These options are for the evaluation of the Phase 3 cost /benefit study only.

EAST MAUI FEASIBILITY STUDY

PHASE 3 ALTERNATIVES FOR BENEFIT COST ANALYSIS

ID	Figure	Groundwater Elevation Range	Moku	Comments
		Stream Locations		
Ha'ikū aquifer				
A1	4	Groundwater in Ha'ikū aquifer at elevation <500 feet	Hāmākualoa	<ul style="list-style-type: none"> Relatively large amount of groundwater potentially available in the aquifer. Potential contamination sources (historic pineapple cultivation, onsite sewage disposal systems) in some areas. Potential to impact groundwater dependent ecosystems (coastal wetlands and estuaries). Area may have slightly less groundwater recharge in a future climate scenario. Infrastructure requirements may include construction of an access road from the nearest public road to the well site, well drilling, storage tank, transmission infrastructure, and treatment as required.
A2	4	Groundwater in Ha'ikū aquifer at elevation 500-1500 feet		
A3	4	Groundwater in Ha'ikū aquifer at elevation 1500-4000 feet		
Makawao aquifer				
B1	5	Groundwater in Makawao aquifer at elevation 500-1500 feet	Hāmākuapoko Kula	<ul style="list-style-type: none"> Medium amount of groundwater potentially available in the aquifer. Few potential contamination sources (historic pineapple cultivation, onsite sewage disposal systems). Minimal impact to groundwater dependent ecosystems. Area may have less groundwater recharge in a future climate scenario. Infrastructure requirements may include construction of an access road from the nearest public road to the well site, well drilling, storage tank, transmission infrastructure, and treatment as required.
B2	5	Groundwater in Makawao aquifer at elevation 1500-4000 feet		

Kama'ole aquifer				
C1	5	Groundwater in Kama'ole aquifer at elevation <500 feet	Kula Honua'ula	<ul style="list-style-type: none"> • Medium amount of groundwater potentially available in the aquifer. • Potential contamination sources in some areas (historic pineapple cultivation, onsite sewage disposal systems) and risk of saltwater intrusion at low elevations. • Potential impacts to groundwater dependent ecosystems. • Area may have less groundwater recharge in a future climate scenario. • Infrastructure requirements may include construction of an access road from the nearest public road to the well site, well drilling, storage tank, transmission infrastructure, and treatment as required.
C2	5	Groundwater in Kama'ole aquifer at elevation 1500-4000 feet		
Waikamoi aquifer				
D1	4	Groundwater in Waikamoi aquifer at elevation <500 feet	Hāmākualoa Ko'olau	<ul style="list-style-type: none"> • Relatively high amount of groundwater potentially available in the aquifer. • Few potential contamination sources. • Potential impacts to groundwater dependent ecosystems. • Area may have more groundwater recharge in a future climate scenario. • Infrastructure requirements may include construction of an access road from the nearest public road to the well site, well drilling, storage tank, transmission infrastructure, and treatment as required
D2	4	Groundwater in Waikamoi aquifer at elevation 500-1500 feet	Hāmākualoa Ko'olau	
Pā'ia aquifer				
E	5	Groundwater in Pā'ia aquifer at elevation <500 feet	Kula Hāmākuapoko	<ul style="list-style-type: none"> • Medium amount of groundwater potentially available in the aquifer. • Multiple potential contamination sources (historic pineapple cultivation, onsite sewage disposal systems). • Potential impacts to groundwater dependent ecosystems. • Area may have less groundwater recharge in a future climate scenario. • Infrastructure requirements may include construction of an access road from the nearest public road to the well site, well drilling, storage tank, transmission infrastructure, and treatment as required.

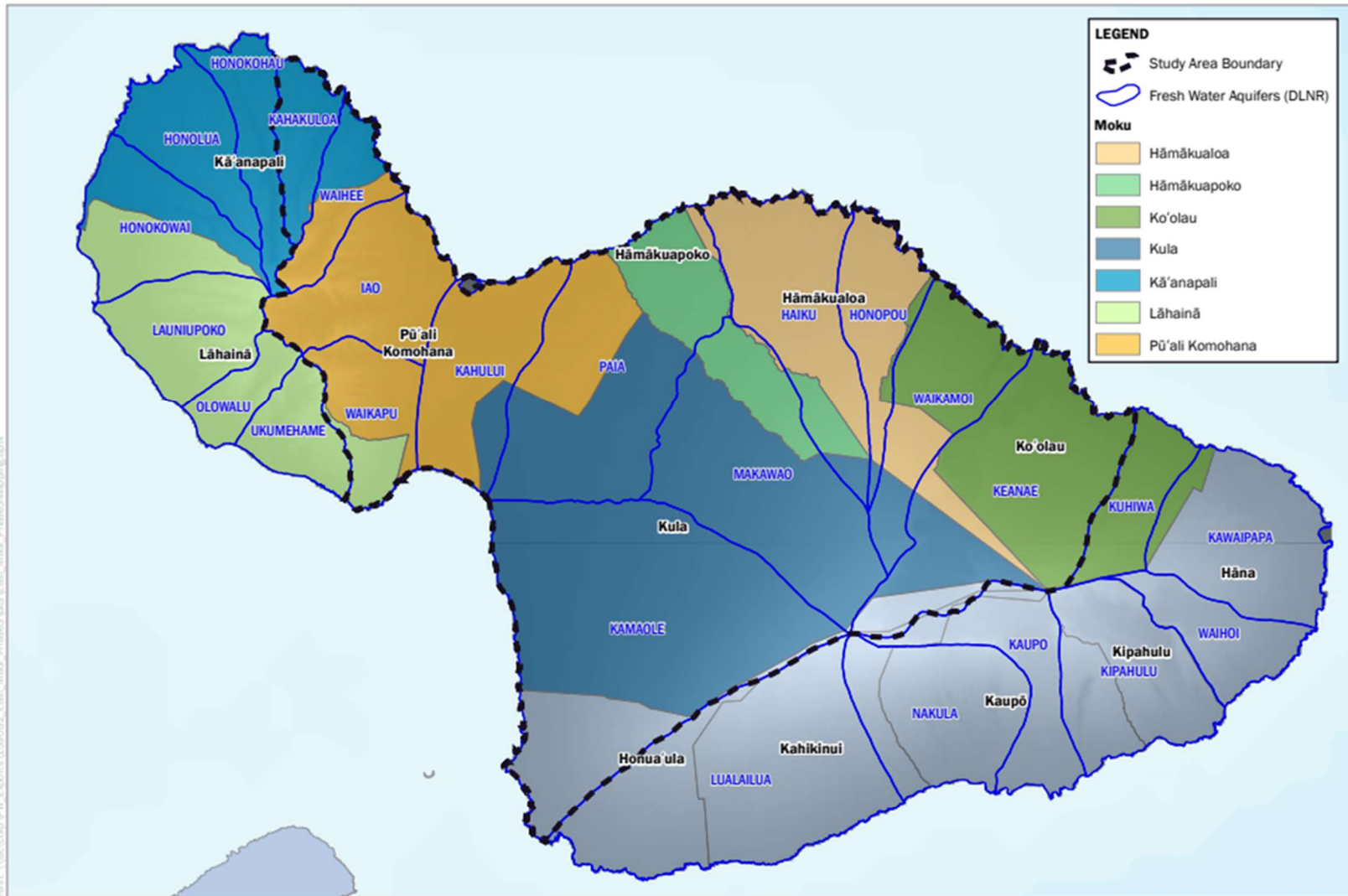
Waikapū aquifer				
F	6	Groundwater in Waikapū aquifer at elevation <500 feet	Pū'ali Komohana Lāhainā	<ul style="list-style-type: none"> • Relatively small amount of groundwater potentially available in the aquifer. • Potential contamination sources in some areas (historic pineapple cultivation, onsite sewage disposal systems) and risk of saltwater intrusion. • Minimal impact to groundwater dependent ecosystems. • Area may have less groundwater recharge in a future climate scenario. • Infrastructure requirements may include construction of an access road from the nearest public road to the well site, well drilling, storage tank, transmission infrastructure, and treatment as required.
Ke'anae aquifer				
G	4	Groundwater in the Ke'anae aquifer at elevation <500 feet	Ko'olau	<ul style="list-style-type: none"> • Relatively large amount of groundwater potentially available in the aquifer. • Few potential contamination sources. • Potential impacts to groundwater dependent ecosystems. • Area may have more groundwater recharge in a future climate scenario. • Infrastructure requirements may include construction of an access road from the nearest public road to the well site, well drilling, storage tank, transmission infrastructure, and treatment as required.
Honopou aquifer				
H	4	Groundwater in the Honopou aquifer at elevation 500-1500 feet	Hāmākualoa	<ul style="list-style-type: none"> • Medium amount of groundwater potentially available in the aquifer. • Few potential contamination sources. • Potential impacts to groundwater dependent ecosystems. • Area may have more groundwater recharge in a future climate scenario. • Infrastructure requirements may include construction of an access road from the nearest public road to the well site, well drilling, storage tank, transmission infrastructure, and treatment as required.

Waihe'e aquifer				
I	6	Groundwater in the Waihe'e aquifer at elevation 500-1500 feet	Pū'ali Komohana Kā'anapali	<ul style="list-style-type: none"> • Relatively low amount of groundwater potentially available in the aquifer. • Few potential contamination sources. • Potential impacts to groundwater dependent ecosystems. • Area may have less groundwater recharge from rain in the future. • Close to roads and existing water system. • Infrastructure requirements may include construction of an access road from the nearest public road to the well site, well drilling, storage tank, transmission infrastructure, and treatment as required.
East Maui Reallocate Stream Water from Wailoa Ditch				
J	4	Reallocate permitted uses of Wailoa Ditch water to Maui County through BLNR license and/or agreement between EMI and Maui County	Ko'olau Hāmākualoa	<ul style="list-style-type: none"> • Relatively large amount of surface water potentially available. • Moderate reliability of surface water throughout the year. • Infrastructure requirements may include: <ul style="list-style-type: none"> ○ No new stream diversions. Utilize existing stream diversions and ditch to convey raw water. ○ Construct new reservoirs near Kamole Water Treatment Facility. ○ Construct a new water treatment facility or expand Kamole Water Treatment Facility.
Waihe'e River Reallocate Agricultural Water				
K	6	Reallocate permitted "off-stream reasonable and beneficial uses" of Waihe'e River to Maui County	Hāmākuapoko Kula	<ul style="list-style-type: none"> • Medium amount of surface water potentially available. • Moderate reliability of surface water throughout the year. • Infrastructure requirements may include: <ul style="list-style-type: none"> ○ Utilize existing reservoirs and raw water transmission systems. ○ Construct a new water treatment facility.

Lower Kula Stream Water System Expansion				
L	5	Increase the capacity of Lower Kula System raw water transmission infrastructure between existing stream diversions and Pi'iholo Reservoir	Hāmākuapoko Kula	<ul style="list-style-type: none"> • Medium amount of surface water potentially available. • Moderate availability of surface water throughout the year. • Infrastructure requirements may include: <ul style="list-style-type: none"> ○ No new stream diversions. Replace existing pipes with larger ones. ○ Construct an additional reservoir with raw water transmission pipes and connection to the Pi'iholo Water Treatment Facility.
Upper Kula Stream Water System Expansion				
M	5	Increase the capacity of Upper Kula System raw water transmission infrastructure between the stream diversions and Olinda Reservoirs (Waikamoi or Kahakapao)	Hāmākuapoko Kula	<ul style="list-style-type: none"> • Relatively small amount of surface water available. • Moderate availability of surface water throughout the year. • Infrastructure requirements may include: <ul style="list-style-type: none"> ○ No new stream diversions. Replace existing raw water transmission pipes with larger ones to capture available raw water. ○ No new reservoirs anticipated for this strategy.
East Maui High Flows from Wailoa Ditch				
N	4	Capture high flows from Wailoa Ditch during high flows Q ₅₀ and above	Ko'olau Hāmākualoa	<ul style="list-style-type: none"> • Relatively large amount of surface water available. • Limited availability of high flows throughout the year. • Infrastructure requirements may include: <ul style="list-style-type: none"> ○ No new stream diversions. Utilize existing stream diversions and ditch to convey raw water. ○ Construct new reservoirs near Kamole Water Treatment Facility. ○ Construct a new water treatment facility or expand Kamole Water Treatment Facility.

Waihe'e River High Flows				
O	6	Capture high flows from Waihe'e River during high flows Q_{50} and above	Pū'ali Komohana	<ul style="list-style-type: none"> • Medium amount of surface water available. • Limited availability of high flows throughout the year. • Infrastructure requirements may include: <ul style="list-style-type: none"> ○ Construct a new diversion to capture high flows only on Waihe'e River near the Spreckels Ditch diversion. ○ Construct a new reservoir and a new water treatment facility
Wailuku River High Flows				
P	6	Capture high flows from Wailuku River during high flows Q_{50} and above	Pū'ali Komohana	<ul style="list-style-type: none"> • Medium amount of surface water available. • Limited availability of high flows throughout the year. • Infrastructure requirements may include: <ul style="list-style-type: none"> ○ Construct a new diversion to capture high flows only on Wailuku River near the Spreckels Ditch diversion. ○ Improve existing Wai'ale Reservoir, construct a new reservoir, and construct a new water treatment facility.

Figure 2: Study Area with Groundwater Aquifers



COUNTY OF MAUI
EAST MAUI SOURCE FEASIBILITY STUDY

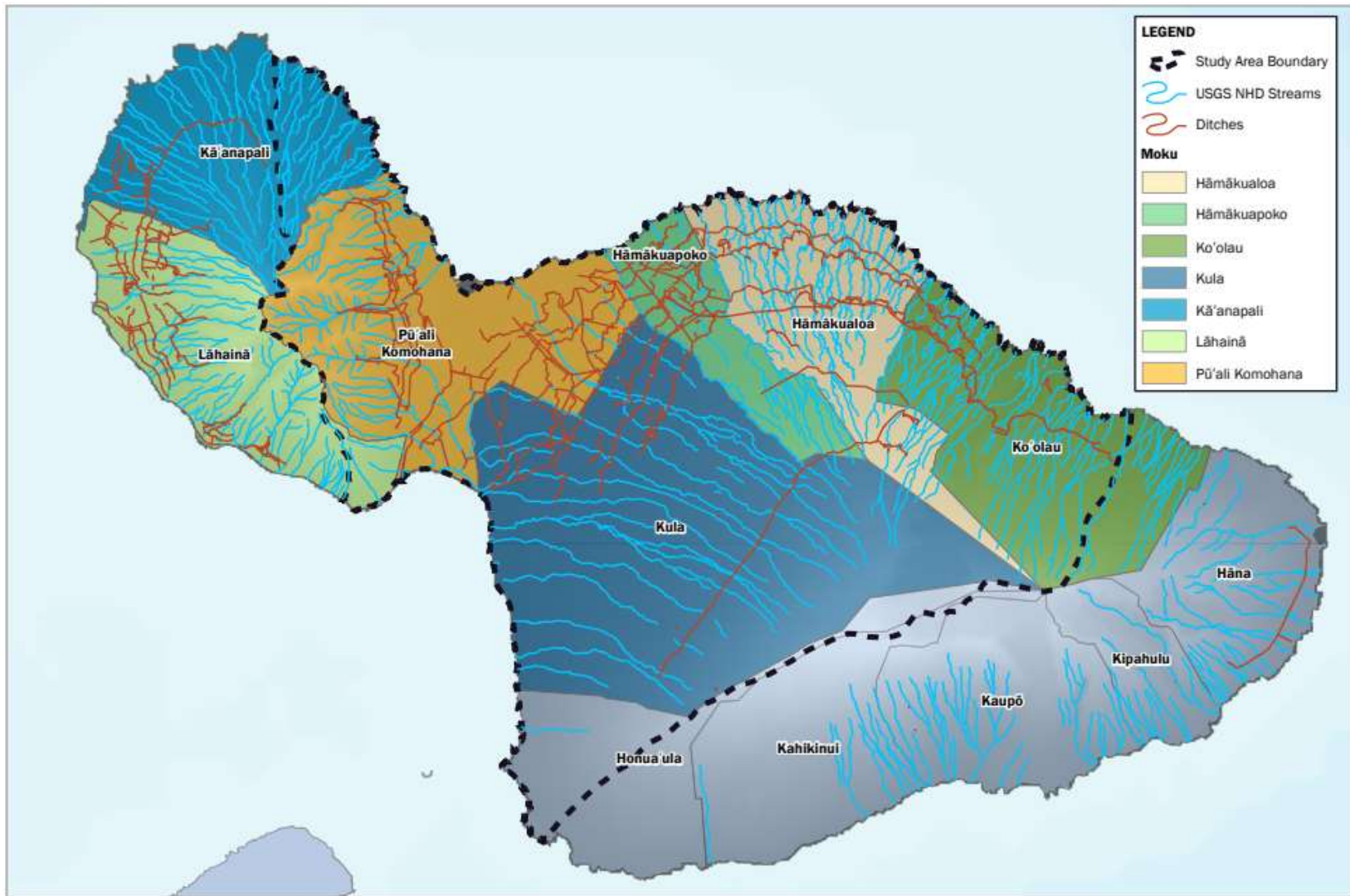
DATE: MAY 2024
PROJECT: 159082

Source:
Basemap, ESRI & Affiliates



WATER SOURCE ALTERNATIVES
BY MOKU

Figure 3: Study Area with Streams and Ditches



COUNTY OF MAUI
EAST MAUI SOURCE FEASIBILITY STUDY

DATE: JUNE 2024
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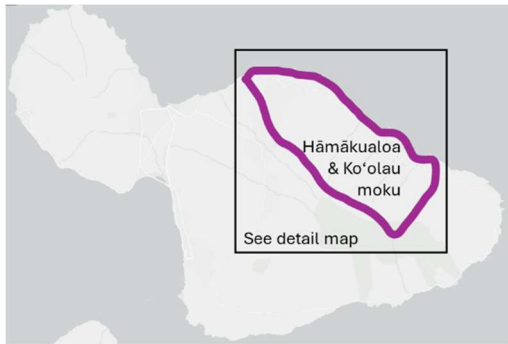
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POSSIBLE SURFACE WATER SOURCES

Figure 4: Hāmākualoa & Koʻolau moku

Haʻikū, Honopou,
Waikamoi & Keʻanae
aquifers



NOTE: This map represents a conceptual planning study for the County of Maui. No projects are proposed at this time.

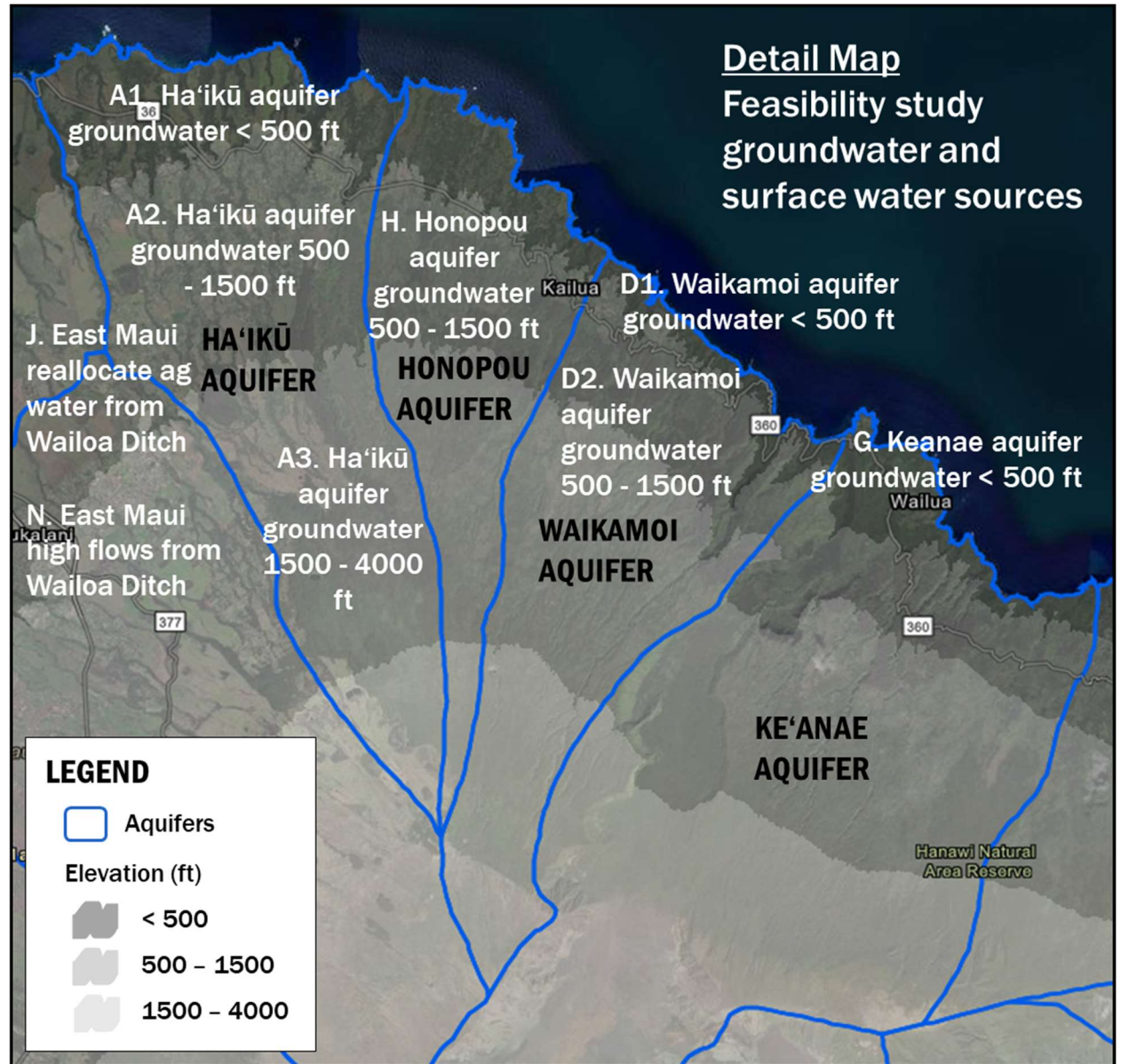
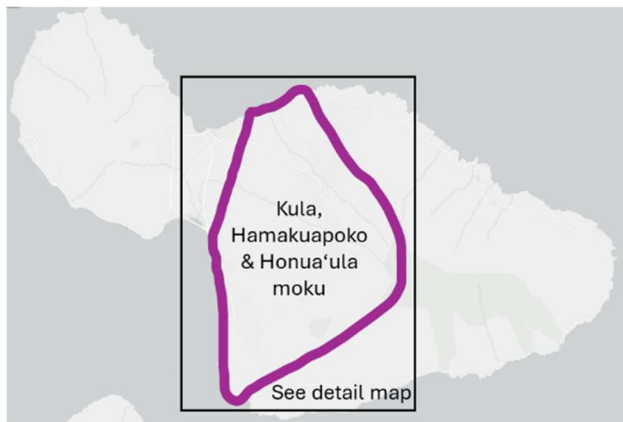


Figure 5: Kula, Hāmākuapoko & Honua‘ula moku

Makawao, Pā‘ia & Kamaole aquifers



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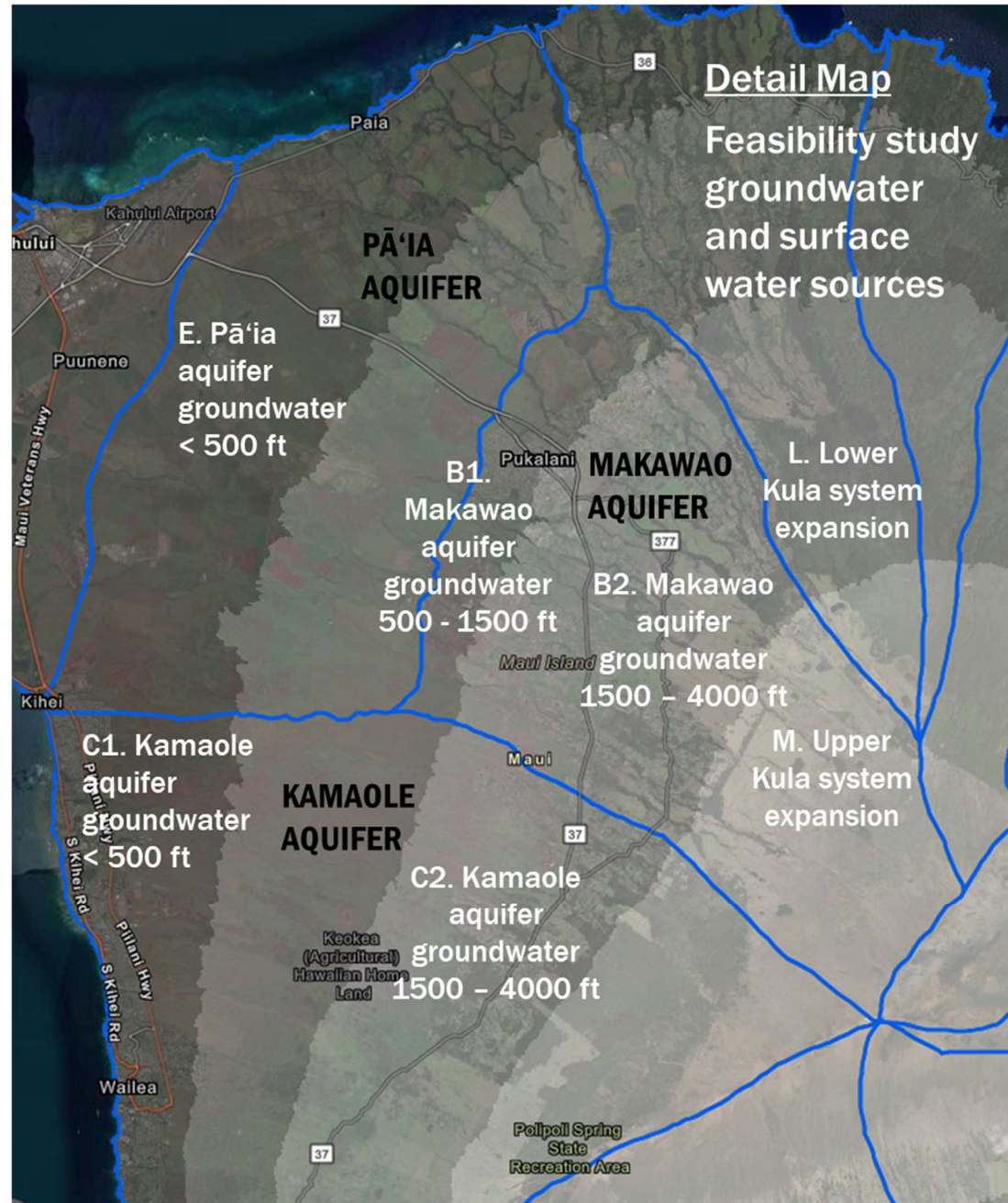
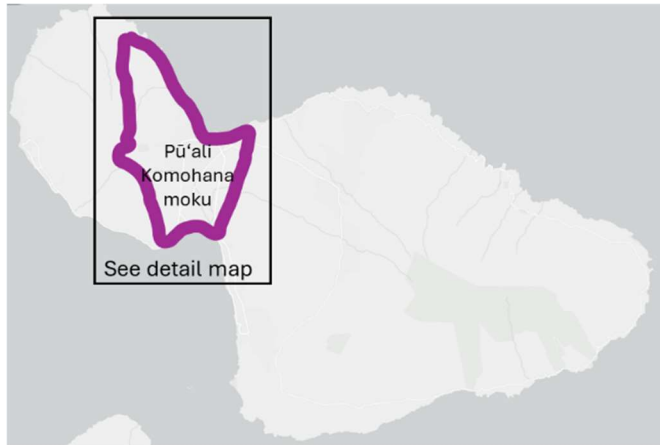
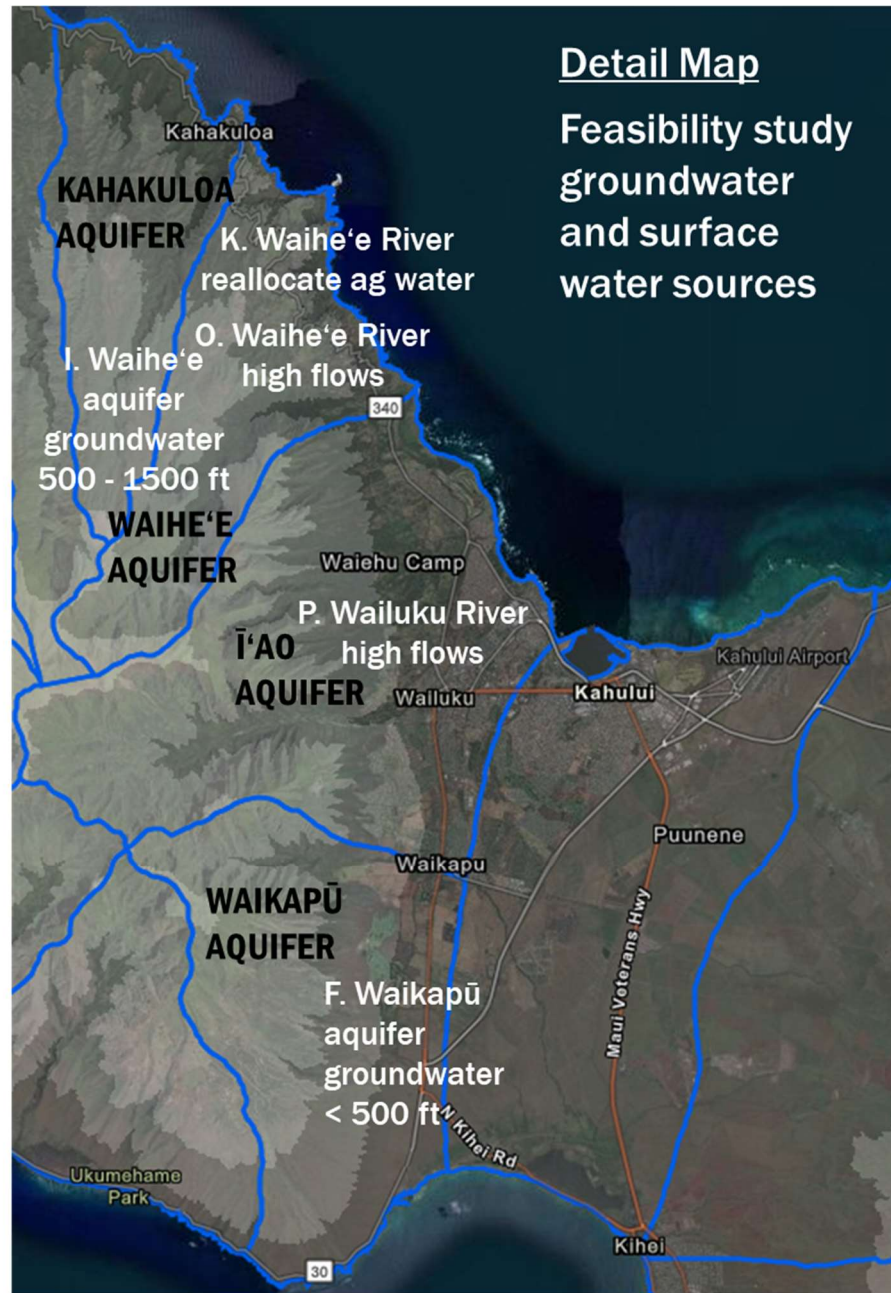


Figure 6: Pū'ali Komohana moku

Kahului, Waikapū, Ī'ao &
Waihe'e aquifers



NOTE: This map represents a conceptual planning study for the County of Maui. No projects are proposed at this time.



KA PA‘AKAI FOR THIS STUDY

This Feasibility Study for East Maui Source Development is undertaken to comply with the Consent Decree in *The Coalition to Protect East Maui Water Resources, et al. v. The Board of Water Supply, et al* (2003). Terms and Conditions 4.2 states that “Before any new project is planned by the County of Maui to develop groundwater in the agreed-upon portion of the East Maui Region, the County will undertake a Cost/Benefit Study of the surface and groundwater resources available in the Central Maui region, Upcountry Region and East Maui Region.”

We are seeking your mana‘o on the three-part framework regarding Phase 3: Cost/Benefit study of surface and groundwater resources available in the Central Maui Region, the Upcountry region and the East Maui region, of East Maui Water Source Feasibility Study.

Specifically, your input regarding the following would be greatly appreciated.

1. Identify whether any valued cultural, historical, or natural resources are present; and identify the extent to which any traditional and customary native Hawaiian rights are exercised;
2. Identify the extent to which those resources and rights will be affected or impaired by the actions under consideration, and
3. Specify options for feasible actions, if any, that could be taken by the regulatory body to reasonably protect native Hawaiian rights if they are found to exist.

If you have questions, please email Berna Senelly at Oceanit at mauiwaterstudy@oceanit.com. She may also be reached by phone at 808.954.4221.

Mahalo for your attention and input!

Acronyms and Abbreviations

<	Less than
Ag	agricultural or agriculture
et. al.	and others
IIFS	Interim Instream Flow Standards
Q ₅₀	amount of water flowing in a stream 50 percent of the time
v.	versus