

---

# **APPENDIX H:**

## Economic and Fiscal Impact Study

Munekiyo Hiraga





# **Economic and Fiscal Impact Study**

## **PROPOSED WATER LEASE FOR THE NĀHIKU, KE‘ANAE, HONOMANŪ, AND HUELO LICENSE AREA**

**Prepared for:  
WILSON OKAMOTO CORPORATION**

**June 2019**

Copyright © 2019 by  
Munekiyo Hiraga



**MUNEKIYO HIRAGA**

Planning. Project Management. Sustainable Solutions.



# **Economic and Fiscal Impact Study**

## **PROPOSED WATER LEASE FOR THE NĀHIKU, KE‘ANAE, HONOMANŪ, AND HUELO LICENSE AREA**

Prepared for:

**WILSON OKAMOTO CORPORATION**

August 2019

Copyright © 2019  
by Munekiyo Hiraga



# CONTENTS

	<u>Page</u>
I. INTRODUCTION.....	1
A. PROJECT OVERVIEW.....	1
1. Background.....	1
2. History of Water Leases.....	1
3. Purpose and Needs of Water Lease.....	2
4. Overview of License Area.....	3
B. IMPACT ANALYSIS – BASELINE AND FUTURE CONDITIONS.....	8
1. Baseline Conditions.....	8
2. Future Conditions.....	9
C. AREAS OF POTENTIAL EFFECT.....	10
1. East Maui.....	11
2. MDWS Upcountry Water System Service Areas.....	11
3. Nāhiku Community.....	11
4. Central Maui.....	13
D. METHODOLOGY.....	13
1. Economic Impact Assessment.....	13
2. Fiscal Impact Assessment.....	14
E. REPORT ORGANIZATION.....	14
II. EAST MAUI IRRIGATION COMPANY WATER USE AND OPERATIONS.....	16
A. BASELINE CONDITIONS.....	16
1. Typical Sugar Cane Operations (2006).....	16
2. Recent Sugar Cane Operations (2008-2013).....	17
3. Interim Diversified Agriculture Operations (2017).....	20
B. FUTURE CONDITIONS.....	21
1. Proposed Action.....	21
2. No Action Alternative.....	23
3. Reduced Water Lease Alternative.....	24
III. EAST MAUI.....	26
A. BASELINE CONDITIONS.....	26
B. FUTURE CONDITIONS.....	26
1. Economic Impact Assessment.....	26
2. Fiscal Impact Assessment.....	28

IV.	UPCOUNTRY MAUI.....	29
A.	IMPACTS ON DOMESTIC WATER USE.....	31
1.	Baseline Conditions.....	33
2.	Future Conditions.....	35
B.	IMPACTS ON AGRICULTURAL WATER USE.....	40
1.	Baseline Conditions.....	41
2.	Future Conditions.....	41
V.	NĀHIKU.....	46
A.	BASELINE CONDITIONS.....	46
1.	Recent Sugar Cane Operations (2008-2013).....	46
2.	Interim Diversified Agriculture Operations (2017).....	46
B.	FUTURE CONDITIONS.....	46
VI.	CENTRAL MAUI.....	47
A.	BASELINE CONDITIONS.....	47
1.	Typical Sugar Cane Operations (2006).....	47
2.	Recent Sugar Cane Operations (2008-2013).....	50
3.	Interim Diversified Agriculture Operations.....	51
B.	FUTURE CONDITIONS.....	51
1.	Proposed Action.....	52
2.	No Action Alternative.....	54
3.	Reduced Water Lease Alternative.....	56
VII.	SUMMARY.....	57
A.	EMI OPERATIONS.....	57
B.	EAST MAUI.....	58
C.	NĀHIKU.....	58
D.	UPCOUNTRY MAUI.....	59
1.	Domestic Water Use.....	59
2.	Agricultural Water Use.....	60
E.	CENTRAL MAUI.....	60
VIII.	REFERENCES.....	i

\\MH03\DRIVE\_F\DATA\WOC\E MAUI WATER LEASE\APPLICATIONS\ECONOMIC AND FISCAL STUDY\ECONOMIC AND FISCAL IMPACT.REPORT (REVISED).DOCX

## LIST OF FIGURES

	<u>Page</u>
<b>Figure 1.</b> Map of License Area.....	4
<b>Figure 2.</b> Upcountry Water System and Central Maui Fields.....	12
<b>Figure 3.</b> Upcountry Maui Water System Service Area.....	30

# LIST OF TABLES

<b>Table 1.</b> License Area.....	3
<b>Table 2.</b> Streams in the License Area .....	6
<b>Table 3.</b> Amount of Water Diverted, Future Conditions .....	10
<b>Table 4.</b> EMI Water System Economic and Fiscal Impacts .....	18
<b>Table 5.</b> East Maui Economic and Fiscal Impacts .....	27
<b>Table 6.</b> MDWS Upcountry Water System .....	29
<b>Table 7.</b> Upcountry Maui - Domestic Economic and Fiscal Impacts .....	32
<b>Table 8.</b> Upcountry Maui – Agricultural Economic and Fiscal Impacts .....	43
<b>Table 9.</b> Central Maui Agricultural Economic and Fiscal Impacts .....	48

INTRODUCTION





# I. INTRODUCTION

This Economic and Fiscal Impact Study has been prepared for the Environmental Impact Statement (EIS) for the proposed Water Lease for the Nāhiku, Ke‘anae, Honomanū, and Huelo license areas (collectively the License Area).

## A. PROJECT OVERVIEW

### 1. Background

In May 2001, Alexander & Baldwin, Inc. (A&B) and its subsidiary, East Maui Irrigation Company, Limited (EMI) (also collectively referred to as A&B) requested that the State, pursuant to Hawai‘i Revised Statutes (HRS) § 171-58, offer a long-term (30 year) lease at public auction for the “*right, privilege and authority to enter and go upon*” State-owned lands at Ko‘olau Forest Reserve and Hanawā Natural Area Reserve, Hāna and Makawao, Maui, for the purposes of developing, diverting, transporting and using government-owned waters. The requested lease (Water Lease) would allow the use of government-owned waters from the Nāhiku, Ke‘anae, Huelo, and Honomanū license areas.

### 2. History of Water Leases

Since 1878, A&B, or its predecessors and affiliates, have operated the EMI Aqueduct System, which is an integrated system of diversions, ditches, intakes, siphons, flumes, and tunnels that collects water from streams located on the rainy windward slopes of East Maui. The EMI Aqueduct System transports water to agricultural fields<sup>1</sup> in Central Maui, as well as to the Maui County Department of Water Supply (MDWS) for the domestic-water needs of Upcountry Maui and the Nāhiku community and the irrigation needs of small farms throughout Upcountry Maui, including the County’s Kula Agricultural Park (KAP).

Historically, A&B has had leases from the State of Hawai‘i that authorized the development, diversion, transportation, and use of government-owned waters emanating from approximately 50,000 acres of land (herein referred to as the Collection Area), of which approximately 33,000 acres are owned by the State of Hawai‘i (License Area) and approximately 17,000 acres were owned by A&B. Pursuant to historical rainfall data and long-standing agreements, “government-owned waters” is deemed to be 70 percent of waters that can be diverted from the

---

<sup>1</sup> The Central Maui Agricultural Fields were owned by Hawaiian Commercial & Sugar Company (HC&S), a former division of A&B. Herein, HC&S will be referred to as A&B, collectively with A&B and EMI.

Collection Area east of Honopou Stream; 30 percent of waters from the Collection Area comes from private lands. After the expiration of the terms of the last long-term water lease, the BLNR issued year-to-year revocable permits for the License Area.

It is noted that on June 20, 2018, the Commission on Water Resource Management (CWRM) adopted Findings of Fact, Conclusions of Law, and Decision and Order, setting the Interim Instream Flow Standards (IIFS) for 24 East Maui Streams located within the License Area (CWRM D&O).<sup>2</sup> The proposed Water Lease will be subject to the CWRM D&O and any future in-stream flow standard decisions made during the term of the Water Lease. As a result, the potential future flow of surface water from East Maui will be significantly reduced compared to past water diversions that occurred for over 90 years.

### **3. Purpose and Needs of Water Lease**

The objectives of the proposed Water Lease are:

- **Preserve and maintain the East Maui aqueduct system**

As mentioned above, A&B has had water leases and revocable permits from the State of Hawai'i that authorized the collection of water and operation of the EMI Aqueduct System since 1878. The issuance of the Water Lease would allow the EMI Aqueduct System to continue to provide water to enable approximately 30,000 acres of fields in Central Maui to remain in agriculture, and to supply water to MDWS, which in turn provides water for domestic and agricultural water needs in Upcountry Maui, including the KAP, and for the domestic water needs in the Nāhiku community.

- **Continue to meet domestic and agricultural water demands in Upcountry Maui**

The EMI Aqueduct System supplies water to the MDWS Upcountry Water System, which is the second largest system in the County. It services the

---

<sup>2</sup> The chart on pages 268-269 of the CWRM D&O identifies 25 streams and tributaries, one of which (Ohia/Waianu) is located below the EMI Aqueduct System and has never been diverted into the EMI Aqueduct System. Although the original Petitions to Amend the Interim Instream Flow Standards identified 27 streams, CWRM found that there were 24, not 27, streams that were the subject of the contested case. The difference being that (i) Waikani is not a stream but a waterfall of Wailuānu Stream; (ii) Alo is a tributary of Waikamoi Stream; (iii) Pua'aka'a is a tributary of Kopiliula Stream; and (iv) Piinaau and Palauhulu are separate streams that join together before reaching the ocean. See CWRM D&O, Findings of Fact 56, 2018.

communities of Kula, Pukalani, Makawao, Ha'ikū, Hali'imaile, Waiakoa, Kēōkea, Waiohuli, 'Ulupalakua, Kanaio, Olinda, 'Ōma'opio, Kula Kai, and Pūlehu. The continuation of the use of water through the proposed Water Lease is necessary to continue MDWS's service for agricultural and domestic purposes in Upcountry Maui. In addition, the KAP also draws non-potable water from the MDWS Upcountry Water System to support 31 farm lots. Furthermore, Maui County recently purchased an additional 262 acres in Upcountry Maui, which will be the first phase of a new County agricultural park, in the vicinity of the KAP. The source of water for the new agricultural park will be the same as for the KAP, Reservoir 40, which is sourced by the EMI Aqueduct System.

- **Continue to serve community water demands in the Nāhiku Community**

The Nāhiku community, a small community in East Maui, also draws water directly from the EMI Aqueduct System, with the source of that water being a development tunnel located east of Makapipi Stream, that feeds into the Ko'olau Ditch and is accessed by MDWS. The water serves 43 water meters located along Nāhiku Road (County of Maui, Department of Water Supply, 2019). As stated above, the proposed Water Lease will enable the continued provision of water supply for the Nāhiku community.

- **Continue to provide water for agricultural purposes in Central Maui**

The proposed Water Lease will enable the EMI Aqueduct System to provide continued water service for the cultivation of naturally non-arable lands in Central Maui. Sugar cane activities were terminated in 2016. The Central Maui agricultural lands as well as other lands formerly owned by A&B are now owned by MP Central A LLC, MP Central B LLC, MP CPR LLC, MP East A LLC, not. MP East B LLC, MP West LLC, and MP EMI LLC (individually or collectively referred to as Mahi Pono) which acquired these lands from A&B in December 2018. Since early 2019, MP EMI LLC owns 50% of EMI and is the managing member of EMI; A&B is the other member of EMI. Mahi Pono has prepared a Farm Plan to put as much of the former sugar cane lands into agricultural uses as economically feasible.

#### **4. Overview of License Area**

Collectively, the Nāhiku, Ke'anae, Honomanū, and Huelo License areas encompass approximately 33,000 acres of State Forest Reserve on the north slope of Haleakalā and collectively comprise the License Area. The location of the License Area is illustrated in **Figure 1** and described in **Table 1**.

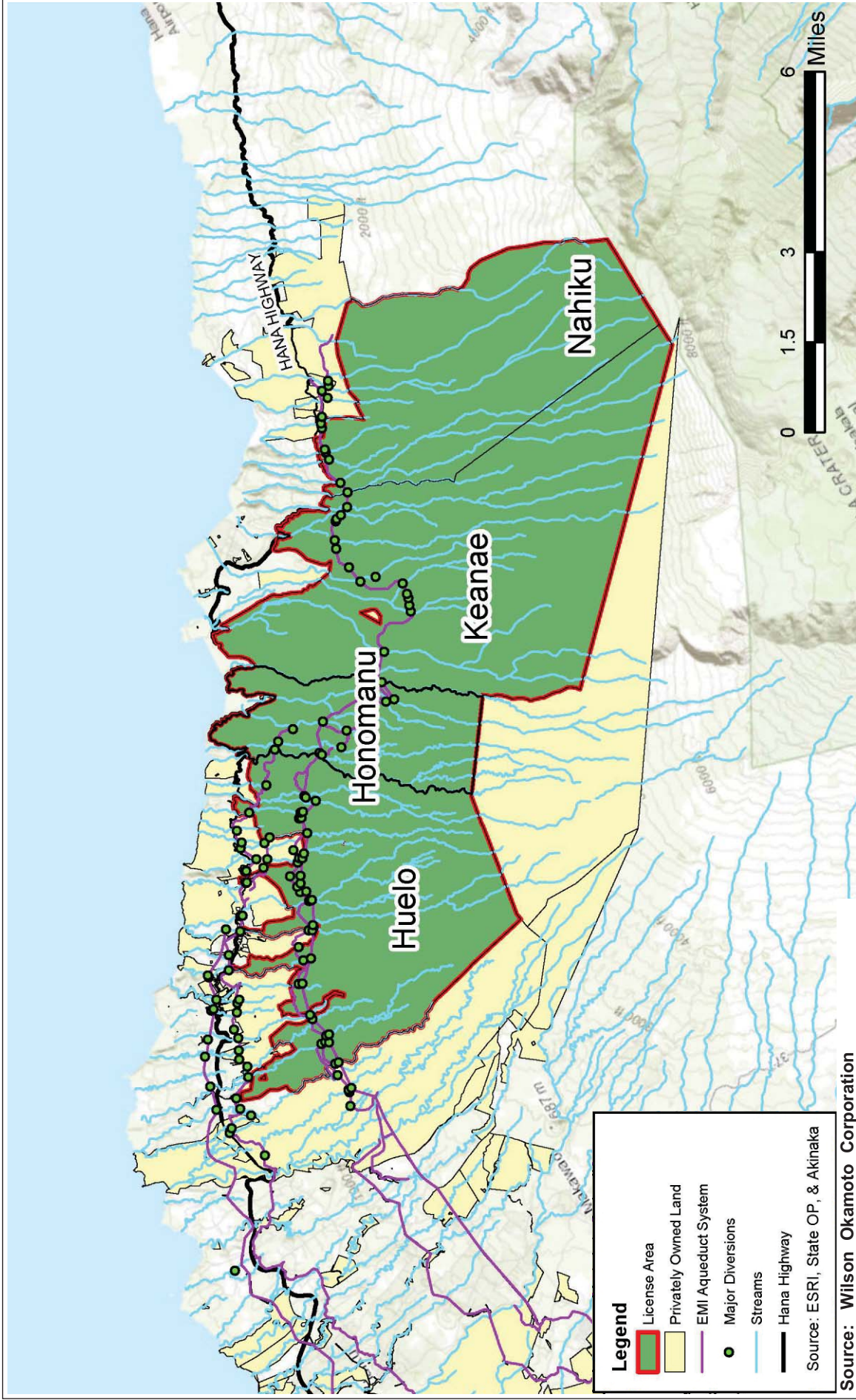


Figure 1

Proposed Water Lease for the Nāhiku,  
Ke'ānae, Honomanū, and Huelo License Area  
Map of License Area



**Table 1. License Area**

<b>License Area</b>	<b>Tax Map Key</b>	<b>Area</b>
Nāhiku	(2)1-2-004:005, 007 (por.)	7,832 acres, more or less
Ke‘anae	(2)1-1-002:002 (por.)	13,007 acres, more or less
Honomanū	(2)1-1-001:044	3,381 acres, more or less
Huelo	(2)1-1-001:050 (2)2-9-014:001, 005, 011, 012, 017	8,752.690 acres, more or less

The License Area is within the Ko‘olau Forest Reserve, with mauka portions within Ke‘anae and Nāhiku, being bordered by the Kipahulu and Hāna Forest Reserve. The Hanawi Natural Area Reserve also lies within the Nāhiku portion of the License Area.

The Water Lease assessed herein will allow the lessee to continue to enter the License Area *“for the purpose of developing, diverting, transporting, and using government-owned waters”* and to maintain and repair existing access roads and trails used as part of the EMI Aqueduct System. The continued operation of the EMI Aqueduct System will deliver water to agricultural lands in Central Maui, as well as to MDWS for domestic and agricultural water needs in Upcountry Maui and the Nāhiku community.

The EMI Aqueduct System diverts water from streams in East Maui, of which the vast majority, 36 streams, are diverted from within the License Area (CWRM D&O). The CWRM D&O calls for the full restoration of 10 streams within the License Area, and reduced diversions in several (12) other License Area streams, some significantly. Thus, the Proposed Action proposes to continue to divert a reduced amount of water from 26 streams within the License Area, with diversions from 12 of these 26 streams at reduced levels in accordance with the CWRM D&O. This report will assess the economic and fiscal impacts of the *“right, privilege, and authority to enter and go upon”* the License Area *“for the purpose of developing, diverting, transporting, and using government-owned waters”* for the 26 streams along with the streams located outside of the License Area but within the larger, 50,000 acre, Collection Area. See **Table 2**.

**Table 2.** Streams in the License Area

License Area	Stream Number	Stream Name	Subject to IIFS	Restoration Status	Median Base Flow at IIFS (cfs)	IIFS Location
Nāhiku License Area	1	Makapipi	Yes	Full	1.3	Above Hana Highway
	2	Hanawi	Yes	Connectivity	4.6	Below Hana Highway
	3	Kapaula	Yes	Connectivity	2.8	On Diversion at Koolau Ditch
Ke'anae License Area	4	Waiaaka	Yes	None	0.77	Above Hana Highway
	5	Paakea	Yes	Connectivity	0.9	At Hana Highway
	6	Waiohue	Yes	Full	5	At Hana Highway
	7	Kopiliula (Puaakaa Tributary)	Yes	Limited	H90 (64% of the Median Base Flow)(For Habitat Restoration)	Below Hana Highway
	8	East Wailuaiki	Yes	Limited	H90 (64% of the Median Base Flow)(For Habitat Restoration)	At Hana Highway
	9	West Wailuaiki	Yes	Full	6	Above Hana Highway
	10	Wailuanui	Yes	Full	6.1	At Hana Highway
	11	Kualani ( or Hamau) (Below Ditch System)	Yes	None (Never Diverted)	N/A	N/A
	12	Waiokamilo	Yes	Full	3.9	Below Diversion at Koolau Ditch
	13	Ohia (or Waianu) (Below Ditch System)	Yes	None (Never Diverted)	4.7	N/A
	14	Palauhulu (Hauoli Wahine and Kano Tributaries)	Yes	Full	11	Above Hana Highway
	15	Piinaau	Yes	Full	14	Above Hana Highway
	16	Puaakaa	Yes	Connectivity	1.1	Above Hana Highway
	17	Puakea	No	N/A	N/A	N/A
	Honomanu License Area	18	Nuaailua	Yes	Connectivity	0.28
19		Honomanu	Yes	Limited	H90 (64% of the Median Base Flow)(For Habitat Restoration)	Above Hana Highway

**Table 2. Streams in the License Area**

License Area	Stream Number	Stream Name	Subject to IIFS	Restoration Status	Median Base Flow at IIFS (cfs)	IIFS Location
	20	Punalau (Kolea and Ulunui Tributaries)	Yes	Limited	H90 (64% of the Median Base Flow)(For Habitat Restoration)	Above Hana Highway
	21	Haipuaena	Yes	Connectivity	4.9	Below Hana Highway
<b>Huelo License Area</b>	22	Puohokamoa	Yes	Connectivity	8.4	Below Hana Highway
	23	Wahinepee	Yes	None	0.9	Above Hana Highway
	24	Waikamoi (Alo Tributary)	Yes	Limited	H90 (64% of the Median Base Flow)(For Habitat Restoration)	Above Hana Highway
	25	Kolea	No	None	N/A	N/A
	26	Punaluu	No	None	N/A	N/A
	27	Kaaiea	No	None	N/A	N/A
	28	Oopuola (Makanali Tributary)	No	None	N/A	N/A
	29	Puehu	No	None	N/A	N/A
	30	Nailiilhaele	No	None	N/A	N/A
	31	Kailua	No	None	N/A	N/A
	32	Hanahana (Ohanui Tributary)	No	None	N/A	N/A
	33	Hoalua	No	None	N/A	N/A
	34	Hanehoi (Huelo (also known as Puolua) Tributary)	Yes	Full	2.54 (1.47 at Huelo)	Upstream of Lowrie Ditch (Downstream of Haiku Ditch at Huelo)
	35	Waipio	No	None	N/A	N/A
	36	Mokupapa	No	None	N/A	N/A
	37	Hoolawa (Hoolawa ili and Hoolawa nui Tributaries)	No	None	N/A	N/A
	38	Honopou (Puniawa Tributary)	Yes	Full	6.5	Below Hana Highway

\* Some of these streams may be identified by other names. The listed names are based on the June 20, 2018 CWRM D&O identified by CWRM and the State Office of Planning's GIS data.  
 \* H<sub>90</sub> is 64% of the median base flow at that stream. These streams are for habitat restoration.  
 \* Cfs – Cubic Feet per Second, the IIFS numeric flow rate at the IIFS location.

## **B. IMPACT ANALYSIS – BASELINE AND FUTURE CONDITIONS**

The Proposed Action that is being assessed in the EIS is the issuance of a long-term (30-year) Water Lease from the BLNR for the continued “*right, privilege, and authority to enter and go upon*” the License Area for the “*purpose of developing, diverting, transporting, and using government owned waters*”, through the existing EMI Aqueduct System which supplies water to domestic and agricultural water users. It is assumed that CWRM D&O defines the maximum amount of stream water that can be diverted, subject to actual need.

This study will assess economic and fiscal impacts for baseline conditions (including certain historical use figures for context), the Proposed Action (preferred alternative), and other future conditions (alternatives), as described below:

### **1. Baseline Conditions**

#### **a. Sugar Cane Cultivation**

A&B cultivated sugar cane in Central Maui for over a century. EMI, a subsidiary of A&B, has operated the EMI Aqueduct System since 1878 to provide irrigation to the Central Maui fields. Water service to the MDWS for Upcountry Maui began in the early 1960's. Although A&B ended sugar cane operations in December 2016, the long history of sugar cane cultivation is a relevant baseline condition for the purposes of assessing economic and fiscal impacts associated with water use from the License Area.

Data from 2008 to 2013 will be used to represent the recent sugar cane cultivation period. The 2008 to 2013 time period was selected because those years are representative of the last six (6) full years of sugar cane operations and because the CWRM D&O reports water diversion and distribution data for these years. It is noted, however, that 2008 to 2013 is not representative of the long-term historic sugar operations because rainfall was below normal, water returned to East Maui streams was large enough to adversely affect sugar cane operations, and HC&S struggled to achieve profitable operations. As such, this report will also provide an analysis of 2006, for the economic and fiscal impacts specifically related to EMI operations and sugar cane cultivation in Central Maui. The 2006 year is representative of the 1987 to 2006 period of “typical” sugar cane operations: rainfall in East Maui was regarded as normal, the restoration of stream flows was not large enough to significantly affect HC&S sugar cane operations, and the plantation was economically healthy. The 2006 analysis will be limited to EMI operations and sugar cane cultivation in Central Maui and will not include economic and fiscal impacts for East



Maui, Upcountry Maui, or Nāhiku as the impacts for these areas in 2006 are not anticipated to be substantially different from the 2008 to 2013 period.

**b. Interim Diversified Agriculture Operations (2017)**

Since the cessation of sugar cane operations in 2016, some of the former cane fields have been transitioned into other agricultural uses. As will be discussed, relative to the Proposed Action below, a mix of diversified agriculture is proposed across the former sugar cane lands, approximately 30,000 acres of which are irrigated by the EMI Aqueduct System. The current “existing condition”, however, is actually an interim condition, with the majority of the fields in a fallow state, following the end of sugar cane cultivation, and diversified agriculture operations in their infancy. This interim condition is expected to change over time as additional fields are transitioned to diversified agriculture. Water use during the interim condition is not representative of the true long-term water demand under the Proposed Action due to the limited active agricultural cultivation during this early transitional period. Thus, while the interim diversified agriculture operations are the current “existing conditions”, the sugar cane cultivation analysis described above provides a more appropriate benchmark to which the Proposed Action and other future condition alternatives may be compared for the purposes of economic and fiscal impacts.

**2. Future Conditions**

The year 2030 is used for analyzing the future conditions alternatives.

**a. Proposed Action**

Under the Proposed Action, it is assumed that through the Water Lease, the State would authorize the right to collect waters emanating from government owned lands up to the maximum amount allowed under the CWRM D&O. Pursuant to the CWRM D&O and based on historic flows, it is estimated that the median amount of water that may be available from the Collection Area would be approximately 87.95 million gallons per day (mgd), measured at Honopou Stream. This estimate is based on historical ditch and stream flows as well as the implemented IIFS under the CWRM D&O. Note that this is a median, and actual ditch flows are expected to range from a low of 21.65 mgd during dry times to a high of 450 mgd (maximum capacity of the EMI Aqueduct System) during large rainfall events. Immediately west and outside of the License Area to Maliko Gulch, the EMI Aqueduct System collects approximately an additional 4.37 mgd from privately owned lands. In total, the median amount of surface water

that may be delivered through the EMI Aqueduct System in compliance with the CWRM D&O is approximately 92.32 mgd.

**b. No Action**

The No Action Alternative would result in no Water Lease being issued by the State. Under the No Action Alternative, the EMI Aqueduct System could continue to divert water from privately owned lands in the Collection Area (i.e., approximately 30 percent of the water available from the Collection Area). Therefore, the median amount of water estimated to be available from the Collection Area at the western boundary of the License Area, which is Honopou Stream, under the No Action Alternative would be approximately 26.39 mgd. Additionally, an estimated 4.37 mgd could be collected from private land from the western boundary of the License Area to Maliko Gulch, for an estimated total of approximately 30.76 mgd water delivered through the EMI Aqueduct System. This is just an estimate, but is the assumption being used in assessing the economic and fiscal impacts of the No Action Alternative.

**c. Reduced Water Lease Alternative**

For this alternative, the Water Lease would authorize less water than allowed under the CWRM D&O. The economic and fiscal impact analysis presented herein will provide a qualitative analysis of potential impacts under the Reduced Water Lease alternative.

The amount of water that would be diverted under the Proposed Action and No Action Alternatives are summarized in **Table 3** below.

**Table 3.** Amount of Water Diverted, Future Conditions

	Median Water Diversion (mgd) Collection Area	
	Total At Honopou Boundary	Total At Maliko Boundary <sup>a</sup>
<b>Proposed Action</b>	87.95 mgd	92.32 mgd
<b>No Action</b>	26.39 mgd	30.76 mgd
<sup>a</sup> An additional 4.37 mgd of water is estimated to be available based on the water that is collected in the area west of the Collection Area to Maliko Gulch.		

**C. AREAS OF POTENTIAL EFFECT**

This study will assess economic and fiscal impacts associated with the baseline and future conditions described above for the following areas of potential effect:

## 1. **East Maui**

Due to the heavy rainfall on the windward slopes of Haleakalā and the many streams in the area, many of the makai communities in East Maui are well suited for growing taro and truck crops. Also, a number of farmers in East Maui have appurtenant and riparian rights to use water from these streams. Collectively, there are about 45 acres in East Maui that are suitable for growing taro, and about 35 acres for truck crops (Plasch Econ Pacific, LLC, 2019). This Study will summarize economic and fiscal impacts related to agricultural operations in East Maui.

## 2. **MDWS Upcountry Water System Service Areas**

As previously noted, the EMI Aqueduct System supplies water to the MDWS Upcountry Maui Water System, which covers approximately 61,500 acres. See **Figure 2**. This Economic and Fiscal Impact Study will assess impacts to the following users within the Upcountry Water System.

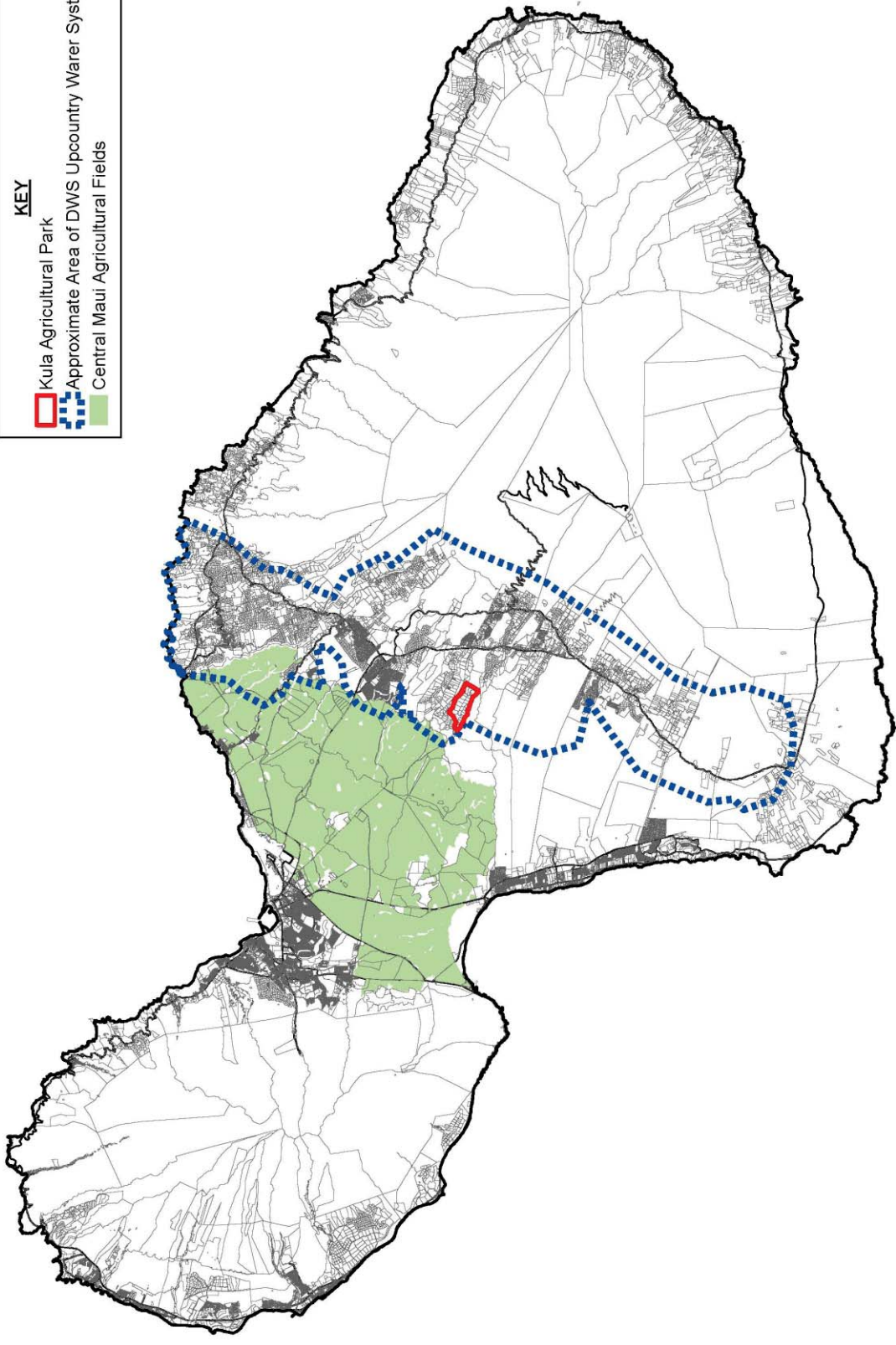
- **Domestic users:** Domestic users include residents, businesses, and public/quasi-public users.
- **Agricultural users:** Based on analysis using data from the County of Maui's 2017 Real Property Tax Assessment information and State Department of Agriculture's Statewide Agricultural Land Use Baseline 2015, approximately 32,500 acres of land are estimated to be in agricultural cultivation within the Upcountry Maui Water System service area. This includes the KAP, which is owned by the County and consists of 31 farm lots ranging in size from 7 acres to 29 acres, for a total of approximately 447 acres. Maui County purchased an additional 262 acres in Upcountry Maui, the first phase of a new County agricultural park, in the vicinity of the KAP. The source of water for the new agricultural park will be the same as for the KAP, Reservoir 40, which is sourced by the EMI Aqueduct System.

## 3. **Nāhiku Community**

The Nāhiku Community, located in East Maui, receives domestic water service from MDWS which is directly sourced from the EMI Aqueduct System, with the source of that water being a development tunnel located east of Makapipi Stream, that feeds into the Ko'olau Ditch and is accessed by MDWS. MDWS services approximately 43 water meters, located along Nāhiku Road (County of Maui, Department of Water Supply, 2019).

**KEY**

-  Kula Agricultural Park
-  Approximate Area of DWS Upcountry Water System
-  Central Maui Agricultural Fields



Source: HC&S; County of Maui, Department of Water Supply

**Figure 2**



**NOT TO SCALE**

**Proposed Water Lease for the Nāhiku,  
Ke‘anae, Honomanū, and Huelo License Area  
Upcountry Water System and Central Maui Fields**



Prepared for: **Wilson Okamoto Corporation**

#### **4. Central Maui**

A&B historically cultivated sugar cane on the fields of Central Maui for over a century. Approximately 30,000 acres of the agricultural fields in Central Maui are irrigated by water diverted by the EMI Aqueduct System. Refer to **Figure 2**. A&B terminated its sugar cane activities in 2016, however, the cultivation of naturally non-arable lands in Central Maui will be maintained to continue Maui's rich agricultural heritage, and to enhance the sustainability and diversity of Maui's economy. The Central Maui agricultural lands are now owned by Mahi Pono, which acquired these lands from A&B in December 2018. Mahi Pono has prepared a Farm Plan to put as much of the former sugar cane lands into agricultural uses as economically feasible. The utilization of water from the EMI Aqueduct System is an essential component for the successful continued use of former sugar cane lands for agricultural purposes.

### **D. METHODOLOGY**

This report was prepared utilizing data from a number of public and private data sources, including the U.S. Census Bureau, State of Hawai'i, Department of Business, Economic Development, and Tourism, CWRM, County of Maui, and Gale Cengage Learning, a private demographic and market data service provider. Information pertaining to economic and fiscal impacts related to agricultural activities have been derived from the *Agricultural and Related Impacts Report* prepared by Plasch Econ Pacific, LLC for the subject EIS.

An overview of the methodology used for the economic and fiscal impact analyses is provided below.

#### **1. Economic Impact Assessment**

The economic impacts presented herein include discussion of operational costs, revenue, employment, and earnings related to the EMI Aqueduct System as well as agricultural operations in East Maui (i.e., taro cultivation), Upcountry Maui, and Central Maui. In addition, with respect to the Upcountry Maui service area, economic impact considerations relate to the resident population and businesses supported by water provided to the MDWS system.

The *Hawai'i State Input-Output Study: 2012 Benchmark Report*, which was prepared by DBEDT in 2016, was utilized to obtain multipliers for direct, indirect, and induced effects for output and employment. Direct impacts refer to immediate effects associated with a change in the economy. Indirect effects relate to inter-industry spending or the secondary impacts of a change. These impacts occur when industries buy goods and services from other local industries. For example,

indirect effects would include purchase of agricultural equipment or supplies by farmers who receive water from the EMI Aqueduct System. Induced effects capture household spending impacts generated when people who benefit from direct or indirect impacts spend their income on local goods and services. For example, an agricultural worker may spend his or her income on groceries or eating out at a restaurant. For the purposes of this report, indirect and induced effects are combined and referred to collectively as “indirect” effects.

## **2. Fiscal Impact Assessment**

Fiscal impacts were analyzed for the State of Hawai'i and County of Maui general funds. This analysis identifies the key revenues, namely taxes, that the State and County would collect. For each major source, a dollar estimate of revenues is provided. It is noted that this study is not intended to provide a comprehensive analysis of all revenue sources that would be impacted but rather focuses on the largest revenue sources, in terms of dollars collected.

In addition to the State and County general funds, the County of Maui's Water Supply Fund and the State's Special Land Development Fund are also assessed.

It is also noted that the City and County of Honolulu derives tax revenues from economic activity on Maui because some of the indirect sales are final sales on O'ahu. These sales are subject to a 0.5 percent excise-tax surcharge that went into effect in 2007.

Throughout the report, dollar amounts are expressed in terms of 2018 purchasing power and market conditions. Dollar amounts after 2018 are not increased to account for inflation, appreciation in property values, changes in labor rates, changes in building costs, or other changes in market conditions.

It is noted that this report contains quantitative analysis using numbers to estimate anticipated impacts. However, these numbers should not be interpreted as precise predictions. Rather, they represent best estimates of what is expected to occur based on available information.

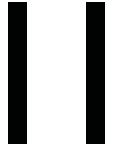
## **E. REPORT ORGANIZATION**

The balance of this report addresses findings of analysis for both economic and fiscal impact parameters. Each of the remaining chapters addresses alternatives associated with the Baseline Conditions as well as Future Conditions as described in Section I.B of this report. From a report organization standpoint, this report provides the findings and qualitative assessment of impacts (where applicable), as follows:

- Chapter II: Impacts related to EMI operations

- Chapter III: Impacts to East Maui
- Chapter IV: Impacts to Upcountry Maui (including impacts to domestic and agricultural water use)
- Chapter V: Impacts to Nāhiku
- Chapter VI: Impacts to Central Maui
- Chapter VII: Summary

EAST MAUI IRRIGATION  
COMPANY WATER USE  
AND OPERATIONS





## II. EAST MAUI IRRIGATION COMPANY WATER USE AND OPERATIONS

This Chapter presents an analysis of the direct economic and fiscal impacts associated with the East Maui Irrigation Company's (EMI) operations for the baseline and future conditions.

### A. BASELINE CONDITIONS

#### 1. Typical Sugar Cane Operations (2006)

The year 2006 is used in this analysis as a representative year for "typical" sugar cane operations during the 20-year period from 1987 to 2006. In 2006, EMI diverted an estimated 156.54 mgd of surface water. Average daily use by MDWS was 3.23 mgd (Plasch Econ Pacific, LLC, 2019).

##### a. Economic Impacts

In 2006, operational costs for EMI was \$2.0 million, or \$0.035 per 1,000 gallons (kgal) of surface water. Operational costs include EMI labor, fringe benefits, materials, professional services, taxes, revocable permit rent to the State, and other expenses. It is noted that this represents the cost to transport the water to Maliko Gulch. There were additional costs for water transportation and storage from Maliko Gulch to MDWS and the Central Maui agricultural fields. However, these additional costs were covered by HC&S. As such, the \$0.035 per kgal cost does not reflect the full cost to provide water to MDWS and Central Maui.

Direct spending by EMI, excluding the revocable permit payment to the State from the operational costs, was \$1.8 million. The purchase of goods and services by EMI and the families of employees generated indirect sales and in turn, these suppliers generated more indirect sales by their purchases of goods and services. The indirect sales are estimated at \$2.2 million. Total direct spending and indirect sales was \$4.0 million, of which \$3.2 million was on Maui and \$0.8 million on Oahu.

EMI employed 16 people in 2006 with a payroll of \$0.8 million. As with indirect sales, EMI operations generated indirect jobs, including those at companies providing supplies and equipment, professional services, and those involved with supplying goods and services to families of employees. EMI operations generated about 7 indirect jobs with an associated payroll of \$0.3 million. The total direct and indirect employment was 23, of which

about 20 were on Maui. The direct and indirect jobs associated with EMI operations supported an estimated 51 people. See **Table 4**, Section 4.c.

EMI revenues primarily consist of the revenue from water delivered to MDWS. EMI also received some land lease revenue, however the amount of lease income was nominal.

**b. Fiscal Impacts**

The MDWS paid EMI \$0.06 per thousand gallons of water delivered for the Upcountry Water System. Based on delivery of 3.23 mgd, MDWS payment to EMI in 2006 was \$70,700.

Associated taxes accrued to the State of Hawai'i General Fund would include General Excise Tax (GET) on direct spending and indirect sales, and payroll taxes paid by employees. GET would be approximately \$42,000, while payroll tax paid by employees is estimated at \$47,400. The total tax revenue accrued to the State in 2006 was approximately \$89,400.

EMI paid \$158,284 in 2006 to the State Special Land Development Fund for the revocable permits for the water, which is equivalent to approximately \$210,800 in 2018 dollars. The Office of Hawaiian Affairs (OHA) receives 20 percent of the revocable permit revenue, while the Department of Hawaiian Home Lands (DHHL) receives 30 percent. This translates to approximately \$42,200 for OHA and \$63,200 for DHHL. Refer to **Table 4**, Section 4.d.

**2. Recent Sugar Cane Operations (2008-2013)**

Between 2008 and 2013, EMI diverted an average of 113.71 mgd (CWRM D&O, 2018, p. 179). Long-term average daily use by the MDWS was estimated by CWRM at 7.1 mgd (CWRM D&O, 2018, p. 143). The remainder was utilized by Hawaiian Commercial & Sugar Co. ((HC&S) a division of A&B) to support A&B's agricultural operations or represents system losses. Refer to **Table 4**, Section 4.a. and Section 4.b.

**a. Economic Impacts**

Average operational costs for EMI between 2008 and 2013 was \$1.6 million, or \$0.039 per kgal. As previously noted, this represents the cost to transport the water to Maliko Gulch; it does not reflect the full cost to provide water to MDWS and Central Maui.

**Table 4. EMI Water System Economic and Fiscal Impacts**

Item	Multiplier or Source	Baseline			Future Conditions	
		Typical Sugar (2006)	Recent Sugar (2008-2013)	Interim Conditions (2017)	Proposed Action	No Action
<b>4.a. EMI SURFACE WATER SOURCE</b>						
License Area	EMI/CWRM	N.E.	105.12	23.99	87.95	26.39 mgd
EMI-owned land	30% of flow	N.E.	31.54	7.20	26.39	26.39 mgd
State-owned land	70% of flow	N.E.	73.58	16.79	61.57	0.00 mgd
Outside of License Area (West of Honopou Stream)	EMI	N.E.	8.59	4.37	4.37	4.37 mgd
Total Water Diverted	CWRM, p. 179; EMI	156.54	113.71	28.36	92.32	30.76 mgd
<b>4.b. EMI SURFACE WATER ALLOCATION</b>						
A&B/HC&S/Other Uses (a)	CWRM, p. 143; EMI	153.31	106.61	25.50	79.92	29.17 mgd
MDWS	CWRM, p. 179; EMI	3.23	7.10	2.86	7.10	0.00 mgd
Total Surface Water Use		156.54	113.71	28.36	87.02	29.17 mgd
<b>4.c. ECONOMIC IMPACTS</b>						
Total Operational Costs	EMI	\$ 2,011,000	\$ 1,632,000	\$ 1,682,000	\$ 2,291,000	\$ 1,444,000 per year
Operational Cost per 1,000 gallons		\$ 0.035	\$ 0.039	\$ 0.162	\$ 0.068	\$ 0.129 per kgal
Direct Spending (Operational Costs - R.P. or Lease Pmt)		\$ 1,800,000	\$ 1,444,000	\$ 1,520,000	\$ 1,440,000	\$ 1,444,000 per year
Indirect Sales	1.22 of Direct Spending	\$ 2,202,000	\$ 1,766,000	\$ 1,859,000	\$ 1,761,000	\$ 1,766,000 per year
Maui	65%	\$ 1,431,000	\$ 1,148,000	\$ 1,208,000	\$ 1,145,000	\$ 1,148,000 per year
Oahu	35%	\$ 771,000	\$ 618,000	\$ 651,000	\$ 616,000	\$ 618,000 per year
Total Direct Spending and Indirect Sales		\$ 4,002,000	\$ 3,210,000	\$ 3,379,000	\$ 3,201,000	\$ 3,210,000 per year
Maui		\$ 3,231,000	\$ 2,592,000	\$ 2,728,000	\$ 2,585,000	\$ 2,592,000 per year
Oahu		\$ 771,000	\$ 618,000	\$ 651,000	\$ 616,000	\$ 618,000 per year
Sales by Excise-Tax Category						
Final Sales/Consumption (taxed at 4%)	55% of payroll	\$ 636,000	\$ 609,000	\$ 438,000	\$ 609,000	\$ 609,000 per year
Intermediate sales (taxed at 0.5%)	residual	\$ 3,366,000	\$ 2,601,000	\$ 2,941,000	\$ 2,592,000	\$ 2,601,000 per year
Employment						
Direct jobs	EMI	16	17	13	17	17 jobs
Indirect jobs	0.43 of direct jobs	7	7	6	7	7 jobs
Maui	65%	4	5	4	5	5 jobs
Oahu	35%	2	3	2	3	3 jobs
Total Direct and Indirect Jobs		23	24	19	24	24 jobs
Maui		20	22	17	22	22 jobs
Oahu		2	3	2	3	3 jobs
Payroll						
Direct Payroll	EMI	\$ 827,000	\$ 757,000	\$ 530,000	\$ 757,000	\$ 757,000 per year
Indirect Payroll		\$ 329,000	\$ 350,000	\$ 267,000	\$ 350,000	\$ 350,000 per year
Maui	\$ 45,500 per job	\$ 202,000	\$ 215,000	\$ 164,000	\$ 215,000	\$ 215,000 per year
Oahu	\$ 52,900 per job	\$ 127,000	\$ 135,000	\$ 103,000	\$ 135,000	\$ 135,000 per year
Total Direct and Indirect Payroll		\$ 1,156,000	\$ 1,107,000	\$ 797,000	\$ 1,107,000	\$ 1,107,000 per year
Maui		\$ 1,029,000	\$ 972,000	\$ 694,000	\$ 972,000	\$ 972,000 per year
Oahu		\$ 127,000	\$ 135,000	\$ 103,000	\$ 135,000	\$ 135,000 per year
Residents Supported						
Maui	2.25 per job	46	49	37	49	49 people
Oahu	2.13 per job	5	5	4	5	5 people
Total		51	54	42	54	54 people

**Table 4. EMI Water System Economic and Fiscal Impacts**  
(continued)

Item	Multiplier or Source	Baseline			Future Conditions		Units
		Typical Sugar (2006)	Recent Sugar (2008-2013)	Interim Conditions (2017)	Proposed Action	No Action	
<b>4.d. FISCAL IMPACTS</b>							
<b>County of Maui Water Supply Fund</b>							
Water Service Fee Rate from MDWS (b)		\$ 0.06	\$ 0.06	\$ 0.06	\$ 0.10	\$ -	per kgal
Water Service Fee from MDWS		\$ 70,700	\$ 155,500	\$ 62,600	\$ 268,900	\$ -	per year
<b>State of Hawaii General Fund</b>							
Payroll Tax	4.10% of payroll	\$ 47,400	\$ 45,400	\$ 32,700	\$ 45,400	\$ 45,400	per year
General Excise Tax		\$ 42,000	\$ 37,000	\$ 33,000	\$ 37,000	\$ 37,000	per year
Final sales/consumption (taxed at 4%)	4%	\$ 25,000	\$ 24,000	\$ 18,000	\$ 24,000	\$ 24,000	per year
Intermediate Sales (taxed at 0.5%)	0.50%	\$ 17,000	\$ 13,000	\$ 15,000	\$ 13,000	\$ 13,000	per year
Total Tax Revenues		\$ 89,400	\$ 82,400	\$ 65,700	\$ 82,400	\$ 82,400	per year
<b>State of Hawaii (Special Land Development Fund)</b>							
Revocable Permit (c)		\$ 210,800	\$ 187,900	\$ 162,200	N/A	N/A	per year
Long-Term Lease Payment (d)	\$0.038 per 1,000 gallons	N/A	N/A	N/A	\$ 846,700	\$ -	per year
Disbursement to OHA	20% of RP or Lease	\$ 42,200	\$ 37,600	\$ 32,400	\$ 169,300	\$ -	per year
Disbursement to DHHL	30% of RP or Lease	\$ 63,200	\$ 56,400	\$ 48,700	\$ 254,000	\$ -	per year

Notes:

- (a) Other Uses includes system losses.
- (b) MDWS pays \$0.06 per kgal to EMI under the existing agreement between the two entities. In 2030, EMI's operational cost per kgal will exceed the current \$0.06 per kgal rate. The 2030 water service fee rate is calculated based on the ratio of operational cost to MDWS service fee for 2008-2013.
- (c) Between 2006 and 2017, the revocable permit rent was \$158,283.84. The values have been adjusted to be reported in 2018 dollars.
- (d) The lease payment would be based on an appraisal conducted prior to issuance of the lease. For the purpose of this analysis, the payment is based on the equivalent per unit rate under the Revocable Permit established by the BLNR in November 2018. The Revocable Permit rent was set at \$19,247.02 per month or \$230,964.02 per year. Assuming 16.8 mgd is diverted under the Revocable Permit, the rate would translate to \$230,964 / (16.8 mgd x 1,000,000 x 365 days) / 1,000 = \$0.038 / \$1,000 gallons.

Direct spending by EMI, excluding the revocable permit payment to the State from the operational costs, was \$1.4 million. Total direct spending and indirect sales was \$3.2 million, of which \$2.6 million was on Maui.

EMI employed an average of 17 people between 2008 and 2013, with a payroll of \$0.8 million. Total direct and indirect jobs was 24, with an associated payroll of \$1.1 million. Refer to **Table 4**, Section 4.c.

As was the case in 2006, EMI revenues primarily consisted of the revenue from water delivered to MDWS.

**b. Fiscal Impacts**

Based on an average usage of 7.1 mgd, MDWS payments to EMI totaled approximately \$155,500 per year.

GET would average approximately \$37,000 per year while payroll tax paid by employees is estimated at \$45,400 annually. The total tax revenue accrued to the State was approximately \$82,400 per year.

EMI paid \$187,900 to the State Special Land Development Fund for the revocable permits for the water, including approximately \$37,600 for OHA and \$56,400 for DHHL. Refer to **Table 4**, Section 4.d.

**3. Interim Diversified Agriculture Operations (2017)**

In 2017, 28.36 mgd of surface water was diverted from East Maui, of which, 23.99 mgd is estimated to come from the Collection Area. MDWS used 2.86 mgd in 2017, which is significantly less than the 7.1 mgd EMI provided to MDWS historically. MDWS use of surface water from EMI was low in 2017 because heavy rainfall increased supplies from other County Sources that depend on rainfall (Plasch Econ Pacific, LLC, 2019). Refer to **Table 4**, Section 4.a. and Section 4.b.

**a. Economic Impacts**

In 2017, EMI operational costs were \$1.7 million. Due to the reduced water volume in 2017, the per unit operating cost for EMI was higher at \$0.162 per kgal, compared to \$0.039 per kgal in 2008 to 2013. Direct spending by EMI, excluding the revocable permit payment to the State, was \$1.5 million. Total direct spending and indirect sales was \$3.4 million, of which \$2.7 million was on Maui.

EMI employed 13 people in 2017, with a payroll of \$0.5 million. Total direct and indirect jobs was 19, with an associated payroll of \$0.8 million. Refer to **Table 4**, Section 4.c.

**b. Fiscal Impacts**

Based on MDWS' water use of 2.86 mgd, MDWS paid \$62,600 to EMI for the delivery of surface water. Total State GET and payroll tax revenues would be \$65,700.

EMI paid \$162,200 to the State Special Land Development Fund for the revocable permits for the water with the same proportional disbursements to OHA and DHHL. Refer to **Table 4**, Section 4.d.

**B. FUTURE CONDITIONS**

Due to the nature of the EMI Aqueduct System, the operational costs are largely fixed, with minimal variable costs. Future operational costs for the EMI Aqueduct System are anticipated to be similar to the average cost experienced during the recent sugar operations period (2008-2013). As will be discussed below, the operational costs (i.e., maintenance, repair, and personnel) are assumed to be the similar across all future conditions alternatives, with the only variation being the amount of the Water Lease payments owed to the State. Beyond that, costs are not anticipated to fluctuate based on the amount of water diverted. Therefore, while costs remain constant, the per unit cost for delivery of water increases as the amount of water diverted decreases.

**1. Proposed Action**

Under the Proposed Action, for purposes of this report, it is assumed that the State would lease water to EMI up to the maximum amount allowed by the CWRM D&O. This would translate to an estimated 87.95 mgd from the License Area. An additional 4.37 mgd is estimated to be available to be collected between Honopou and Maliko Streams, outside of the License Area, for an estimated total diversion of 92.32 mgd. Refer to **Table 4**, Section 4.a.

**a. Economic Impact Assessment**

Total operational costs for EMI labor, fringe benefits, materials, professional services, taxes, water lease, and other expenses are projected to be \$2.3 million per year. This would translate to \$0.068 per kgal. Refer to **Table 4**, Section 4.c.

It is noted that an unknown factor in EMI's operating cost is the annual lease payment to DLNR. For the purposes of this analysis, the Lease payment has been calculated based on the equivalent per unit cost under the existing 2019 revocable permit. The revocable permit rent payment sent in November 2018 was \$230,964.24, which represents an increase from the rent that was historically paid. Assuming 16.8 mgd is diverted

from the License Area under the revocable permit, the rent rate would translate to \$0.038 per thousand gallons. This rate of \$0.038 is assumed as the basis for the annual lease payment to DLNR. However, the actual Water Lease rental amount will be based on an appraisal conducted prior to issuance of the Water Lease. Should the Water Lease amount be higher or lower, the operational costs of the EMI Aqueduct System would be adjusted accordingly.

Direct spending by EMI, excluding the long-term lease payment to the State from the operational costs, is forecasted to be \$1.4 million. Total direct spending and indirect sales is estimated at \$3.2 million, of which \$2.6 million would be on Maui.

EMI is expected to employ a staff of 17 people with a payroll of \$0.8 million. Total direct and indirect jobs was 24, with an associated payroll of \$1.1 million. The direct and indirect jobs associated with EMI operations would support an estimated 54 residents. Refer to **Table 4**, Section 4.c.

**b. Fiscal Impact Assessment**

Under the Proposed Action, it is assumed that the rate MDWS pays to EMI will increase because EMI's per unit operating cost will increase because fixed costs will be spread out over a lower volume of water diverted and possible higher lease payments to the State compared to historic payments. As previously mentioned, it is estimated that EMI's operating cost under the Proposed Action would be \$0.068 per kgal, which is higher than the current MDWS payment to EMI of \$0.06 per kgal. The actual rate MDWS will pay to EMI in 2030 will be subject to a future agreement between the two (2) entities. However, for the purposes of this analysis, the 2030 water service fee rate is estimated to be \$0.10, which has been calculated based on the ratio of operational cost to MDWS service fee for 2008 to 2013. Under this assumption, EMI would receive an estimated \$268,900 in 2030 from MDWS.

As previously noted, the amount paid to the State Special Land Development Fund for the Water Lease would be based on an appraisal conducted prior to lease issuance. Assuming the amount of the Water Lease is based on the equivalent per unit cost under the existing revocable permits, the annual payment to the Special Land Development Fund would be \$846,700. Of this, \$169,300 would be disbursed to OHA and \$254,000 would be set aside for the DHHL.

GET revenue would be estimated at \$37,000 while payroll tax would be \$45,400 per year. Refer to **Table 4**, Section 4.d.

## 2. **No Action Alternative**

The No Action Alternative would result in no Water Lease issued from the State. EMI could continue to divert non-government-owned water from the Collection Area (i.e., approximately 30 percent of the water available from the Collection Area) plus the 4.37 mgd from that portion of the Collection Area that is derived from privately owned lands between Honopou Stream and Maliko Gulch. Under this Alternative, it is assumed that an estimated total of 26.39 mgd is available to be diverted from the Collection Area (30 percent of total flow within the Collection Area) and 4.37 mgd is collected between Honopou and Maliko Gulch, west of the License Area, for a total estimated diversion of 30.76 mgd. Refer to **Table 4**, Section 4.a.

### a. **Economic Impact Assessment**

Under the No Action Alternative, the cost to operate and maintain the EMI Aqueduct System is assumed to be similar due to the fixed nature of operating costs. The EMI Aqueduct System needs to be maintained regardless of the amount diverted. The No Action Alternative results in an approximately 70 percent reduction in the amount of water from the bulk of the Collection Area compared to the Proposed Action, while the amount of water collected between Honopou and Maliko Gulch, west of the License Area remains unchanged. The only change in the operating cost would be that no Water Lease payment would be made to the State. This would reduce operating costs to approximately \$1.4 million. This translates to \$0.129 per kgal, which is nearly 90 percent higher than the Proposed Action (\$0.068). Direct spending of EMI, excluding the Water Lease payment, and associated indirect sales would be similar to those described for the Proposed Action. A staff of 17 employees is expected, with an associated payroll of \$0.8 million. Refer to **Table 4**, Section 4.c.

For the purposes of the analysis, it is assumed that the entire EMI Aqueduct System continues to be maintained under the No Action Alternative. However, assessment of flow data could result in decisions to reduce the size of the EMI Aqueduct System to reduce operation and maintenance costs. For example, due to the reduced water flow, EMI may decide to abandon lower elevation ditches and limit diversions to the higher elevation ditches only. This would reduce the operation and maintenance cost of the EMI Aqueduct System and reduce the cost per kgal of water. However, potential system reductions are not known at this time and cannot be



determined until there is actual flow data to analyze and determine how best to optimize the EMI Aqueduct System.

It is also noted that EMI may determine that it is not economically feasible to operate and maintain the system at all under the No Action Alternative.

**b. Fiscal Impact Assessment**

Due to the reduced amount of water under the No Action Alternative, there may not be water available to provide to MDWS' Upcountry Water System. The water delivery agreements between the County and A&B are contingent upon the Lease being issued, therefore, if no Lease is issued, it is assumed that the delivery of water to MDWS would terminate. If this were to be the case, there would be no payment from MDWS to EMI. Payroll and GET revenue would be similar to the Proposed Action. However, if the State does not issue the Water Lease, there would be no payment from EMI to the State's Special Land Development Fund under the No Action Alternative and no funds would be disbursed to OHA and DHHL. Refer to **Table 4**, Section 4.d.

**3. Reduced Water Lease Alternative**

The Reduced Water Lease Alternative would result in water diversion from the License Area of an amount estimated between 26.39 mgd (No Action) and 87.95 mgd (Proposed Action). An additional 4.37 mgd is estimated to be available between Honopou and Maliko Gulch, outside of the License Area.

**a. Economic Impact Assessment**

Inasmuch as the costs to operate the EMI Aqueduct System are fixed, it is assumed that EMI's total operational cost would be similar to the other alternatives, with the exception of the amount of lease payment to the State. The operating cost per kgal would range from \$0.068 per kgal to \$0.129 per kgal, depending on the amount of water that would be available. Direct spending of EMI, excluding the Water Lease payment, and associated indirect sales would be similar to those described for the Proposed Action. Similar to the other alternatives, a staff of 17 employees would be expected, with an associated payroll of \$0.8 million.

**b. Fiscal Impact Assessment**

Depending on how much water is available under a Reduced Water Lease Alternative, there may or may not be water available to provide to MDWS' Upcountry Water System. Payment from MDWS would be dependent on

the availability of water under this alternative and could range from no payment to up to \$268,900. Assuming rates equivalent to the existing revocable permits, the amount of the Water Lease to the State Special Land Development Fund would also depend on the amount of water leased and is estimated to range from nothing to \$846,700 annually.

EAST MAUI



### III. EAST MAUI

Due to the heavy rainfall on the windward slopes of Haleakalā and the many streams in the area, many of the makai communities in East Maui are well suited for growing taro and truck crops. Also, a number of farmers in East Maui have appurtenant and riparian rights to use water from these streams. There are about 45 acres in East Maui that are suitable for growing taro and about 35 acres for truck crops. The economic and fiscal impacts related to East Maui are based on *the Agricultural and Related Impacts Report* prepared by Plasch Econ Pacific, LLC.

#### A. BASELINE CONDITIONS

A number of East Maui farmers divert stream water to irrigate taro lo'i and small farms. Taro farming is difficult and labor-intensive, and the net returns are modest. Nevertheless, many farmers are attracted to the lifestyle and to growing this culturally significant crop. Farmers in East Maui have reported that past surface-water diversions to supply water to Central Maui left insufficient water in the streams for them to take full advantage of the agricultural potential in East Maui.

#### B. FUTURE CONDITIONS

As previously mentioned, on June 30, 2018, the Commission on Water Resource Management (CWRM) adopted Findings of Fact, Conclusions of Law, and Decision and Order (D&O), setting the Interim Instream Flow Standards (IIFS) for 24 East Maui Streams located within the License Area. The CWRM D&O returns free flowing water, with no upstream diversions, to all streams which have historically supported significant taro cultivation. As a result, ample stream water should now be available to irrigate taro lo'i and the small farms relying on East Maui streams. As previously noted, there are about 45 acres in East Maui that are suitable for growing taro and about 35 acres for truck crops. See **Table 5**, Section 5.a. This accounting includes only the existing and potential farms in East Maui affected by the CWRM D&O, and excludes all other East Maui farms.

It is assumed that above mentioned lands suitable for taro and truck crops would be fully cultivated under the future conditions. For all three (3) alternatives (Proposed Action, No Action Alternative, and Reduced Water Lease Alternative), the economic and fiscal impacts of agricultural cultivation in East Maui will be the same.

##### 1. Economic Impact Assessment

The taro farms and other farms in East Maui that depend on stream flows would produce at full development about 1.0 million pounds per year of taro, and about 400,000 pounds per year of other crops (refer to **Table 5**, Section 5.b.). The resulting direct sales would be about \$1.4 million per year. Indirect sales generated

**Table 5. East Maui Economic and Fiscal Impacts**

Item	Baseline Conditions		Future Conditions (2030)		Units
	Recent Sugar (2008-2013)	Interim Conditions (2017)	Proposed Action	No Action	
<b>5.a. Agricultural Land Use</b>					
Taro farms	N.E.	N.E.	44.8	44.8	acres
Other farms	N.E.	N.E.	35.1	35.1	acres
Total			79.9	79.9	
<b>5.b. Economic Impacts</b>					
Production					
Taro Farms	N.E.	N.E.	\$ 1.0	\$ 1.0	m lbs/yr
Other Farms	N.E.	N.E.	\$ 0.4	\$ 0.4	m lbs/yr
Sales					
Direct Sales					
Taro Farms	N.E.	N.E.	\$ 1.0	\$ 1.0	million/yr
Other Farms	N.E.	N.E.	\$ 0.4	\$ 0.4	million/yr
Total	N.E.	N.E.	\$ 1.4	\$ 1.4	million/yr
Indirect Sales					
Maui	N.E.	N.E.	\$ 1.0	\$ 1.0	million/yr
Oahu	N.E.	N.E.	\$ 0.5	\$ 0.5	million/yr
Total Direct and Indirect Sales	N.E.	N.E.	\$ 2.9	\$ 2.9	million/yr
Maui	N.E.	N.E.	\$ 2.3	\$ 2.3	million/yr
Oahu	N.E.	N.E.	\$ 0.5	\$ 0.5	million/yr
Profits					
Maui	N.E.	N.E.	\$ 0.3	\$ 0.3	million/yr
Employment					
Direct/On-Site Jobs					
Taro	N.E.	N.E.	11	11	jobs
Other Crops	N.E.	N.E.	3	3	jobs
Total	N.E.	N.E.	14	14	jobs
Indirect Jobs, Offsite					
Maui	N.E.	N.E.	4	4	jobs
Oahu	N.E.	N.E.	2	2	jobs
Total Jobs	N.E.	N.E.	21	21	jobs
Maui	N.E.	N.E.	19	19	jobs
Payroll					
Direct Payroll					
Taro	N.E.	N.E.	\$ 0.4	\$ 0.4	million/yr
Other Crops	N.E.	N.E.	\$ 0.1	\$ 0.1	million/yr
Total	N.E.	N.E.	\$ 0.5	\$ 0.5	million/yr
Indirect Payroll					
Maui	N.E.	N.E.	\$ 0.3	\$ 0.3	million/yr
Oahu	N.E.	N.E.	\$ 0.2	\$ 0.2	million/yr
Total Payroll	N.E.	N.E.	\$ 0.8	\$ 0.8	million/yr
Maui	N.E.	N.E.	\$ 0.7	\$ 0.7	million/yr
Residents Supported					
Maui	N.E.	N.E.	42	42	people
Oahu	N.E.	N.E.	5	5	people
Total	N.E.	N.E.	47	47	people
<b>5.c. Fiscal Impacts</b>					
State Revenues	N.E.	N.E.	\$0.067	\$0.067	million/yr
Maui County Property Taxes	N.E.	N.E.	\$0.0001	\$0.0001	million/yr
C&C Honolulu, Excise Tax Surcharge	N.E.	N.E.	\$0.0003	\$0.0003	million/yr

Source: Plasch Econ Pacific, LLC

by the purchase of goods and services would be about \$1.5 million per year. Thus, total direct and indirect sales would be about \$2.9 million per year (with rounding), of which about \$2.3 million would be on Maui and \$500,000 on O'ahu. Profits from farm operations and indirect sales would be about \$300,000.

Full development of the taro farms and other farms in East Maui that depend on stream flows would result in about 14 jobs and generate about 7 indirect jobs, for a total of about 21 jobs. The payroll is expected to reach about \$500,000 for the direct jobs and \$800,000 for all direct and indirect jobs. The direct and indirect jobs provided will support an estimated 47 residents, most of which would be on Maui. Refer to **Table 5**, Section 5.b.

## **2. Fiscal Impact Assessment**

The taro farms and other farms in East Maui that depend on stream flows would generate approximately \$67,000 per year in State taxes at full development. For the County of Maui, property taxes will total about \$100 per year. The City and County of Honolulu will derive about \$300 per year from the excise tax surcharge. Refer to **Table 5**, Section 5.c.

UPCOUNTRY MAUI

IV

## IV. UPCOUNTRY MAUI

The Maui County Department of Water Supply (MDWS) is responsible for the development, operation, and maintenance of the municipal water system and supply and serves approximately 90 percent of the population on the island of Maui. On Maui, MDWS manages nine (9) public water systems as defined by the State of Hawai'i, Department of Health (DOH) under the State Drinking Water Act: Central Maui (Wailuku), West Maui (Lahaina), Upcountry (Makawao), and East Maui (Hāna); each encompasses a number of sub-districts.

The MDWS Upcountry Water System relies on three (3) surface water sources for potable water, one of which is delivered by the EMI Aqueduct System through the Wailoa Ditch to the Kamole Water Treatment Plant (WTP), and the other two (2) Olinda, and Piiholo Water Treatment Plants, are sourced from lands owned previously by A&B and not by Mahi Pono and waters delivered to the plans through MDWS higher elevation aqueducts (the Upper and Lower Waikamoi flumes) maintained by EMI. All three (3) sources are addressed through a contractual agreement. Because the agreements between the County and A&B/EMI are contingent upon the Lease being issued, the supply of water to MDWS could terminate if no Lease is issued.

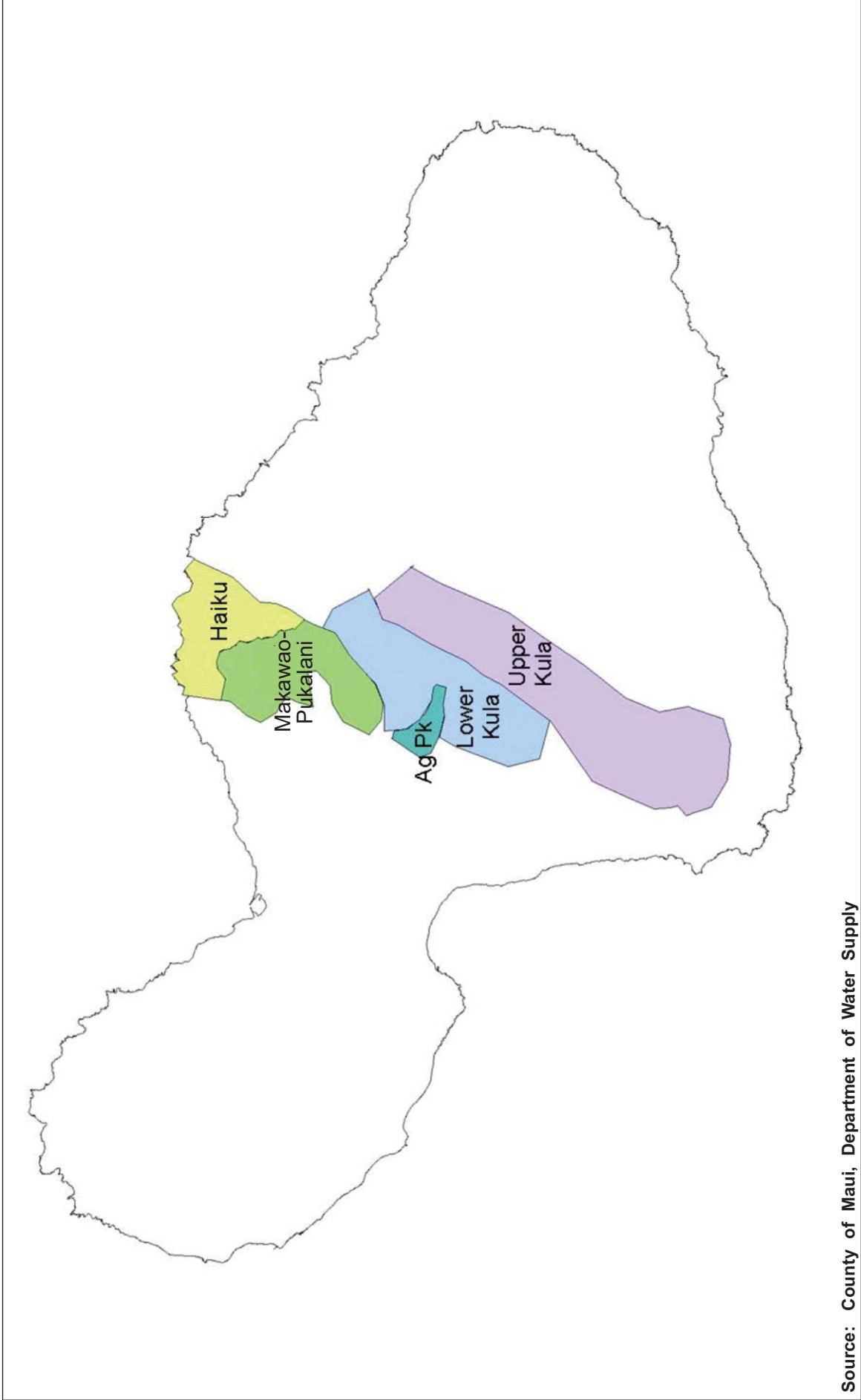
Over the years, MDWS has received surface water from EMI through a series of contracts. The original contract, referred to as the “Master Water Agreement”, was entered into in 1961 and was later replaced by a 1973 “Memorandum of Understanding”, which had an initial term of 20 years, and was amended some 11 times. In 2018, a new water delivery agreement was entered into which provides for continued delivery of water to MDWS and confirms that water delivery to the County is subject to EMI securing rights related to water permits and the Water Lease from the State. As reported in the CWRM D&O, the long-term average for deliveries to MDWS from the EMI Aqueduct System is 7.1 mgd. The water delivery agreement provides for potentially even greater deliveries to MDWS under certain circumstances and at certain locations.

**Figure 3** shows the approximate location of MDWS Upcountry Water System service areas and **Table 6** shows three (3) potable sub-systems within MDWS Upcountry Water System.

**Table 6.** MDWS Upcountry Water System

Sub-System	Communities Served	Primary Water Facility
Upper Kula	Kula, Waiakoa, Keokea, Ulupalakua, Kanaio	Olinda WTP
Lower Kula	Olinda, Kula Kai, Omaopio, Pulehu	Piiholo WTP
Makawao	Haiku, Haliimaile, Makawao, Pukalani	Kamole WTP Haiku and Kaupakalua Wells





Source: County of Maui, Department of Water Supply

Figure 3

Proposed Water Lease for the Nāhiku,  
Ke‘anae, Honomanū, and Huelo License Area  
Upcountry Maui Water System Service Area



NOT TO SCALE

Prepared for: Wilson Okamoto Corporation



Approximately 80 to 90 percent of water delivered within the MDWS Upcountry Maui Water System is supplied by surface water and the remainder is by groundwater (wells) (CWRM, 2018, p. 211). As noted above, one (1) of the water sources that MDWS Upcountry District relies on for potable water is delivered by the EMI Aqueduct System through the Wailoa Ditch. The two (2) other surface water sources arise on land previously owned by A&B and now owned by Mahi Pono. The surface water delivered by Wailoa Ditch is treated at the Kamole WTP, which has the largest production capacity of the three (3) WTPs within the MDWS Upcountry District. Refer to **Table 6**.

Under normal conditions, the three (3) potable water systems operate independently and treated surface water constitutes the majority of water delivered to Upcountry Maui customers. However, during drought conditions, MDWS implements the following strategies as needed:

- Water is pumped from the Makawao System to the Lower Kula System to supplement water supply from the Piiholo WTP.
- The Pookela Well is operated to supplement water supply from the Kamole WTP.
- Water is pumped from the Lower Kula System up to the Upper Kula System (Brown and Caldwell, 2014).

Based on the foregoing, water from EMI's Aqueduct System's Wailoa Ditch services the Makawao Sub-system under normal conditions. However, during drought conditions, water delivered through the EMI Aqueduct System could be pumped to the Lower Kula and Upper Kula Systems if needed.

It is noted that in 1993, MDWS determined that the Upcountry Water System had insufficient supply for fire protection, domestic, and irrigation purposes to take on new or additional services without detriment to existing customers. A water meter priority list for landowners who had applied for water service in the area was established in 1994. As of January 3, 2019, there were 1,650 applicants on the water meter list (MDWS, 2019).

## **A. IMPACTS ON DOMESTIC WATER USE**

Economic and fiscal impacts related to domestic water use in Upcountry Maui are presented in **Table 7** and summarized below.

Table 7. Upcountry Maui - Domestic Economic and Fiscal Impacts

Item	Multiplier or Source	Baseline Conditions			Future Conditions (2030)		
		Recent Sugar (2008-2013)	Interim Conditions (2017)	Proposed Action	No Action	Units	
<b>7.a. MDWS Usage</b>							
<b>Water Usage</b>							
Total Use, Baseline	CWRM, p. 213; MDWS Annual Report	7.90	7.93	7.90	7.90	7.90 mgd	
Residential, Commercial, Institutional Use	60% CWRM p. 210	4.74	4.76	4.74	4.74	4.74 mgd	
Agriculture	40% CWRM p. 210	3.16	3.17	3.16	3.16	3.16 mgd	
Increased Water Demand, 2030	CWRM, p. 213	N/A	N/A	7.95	7.95	7.95 mgd	
Total Use, Future		N/A	N/A	15.85	15.85	15.85 mgd	
<b>Water Source</b>							
EMI	CWRM, p. 143; EMI	7.10	2.86	7.10	7.10	0 mgd	
Other Existing DWS Water Sources		N.E.	N.E.	N.E.	N.E.	N.E.	
New DWS Water Source	CWRM, p. 214	N/A	N/A	7.95	7.95	15.05 mgd	
<b>7.b. Economic Impacts</b>							
<b>Residents Served by Upcountry Water System</b>							
Number of Residents	CWRM, p. 210; Gale Cengage Learning	35,251	37,128	43,675	43,675	N.E. residents	
Households	2.62 people per household	13,461	14,178	16,678	16,678	N.E. households	
Total Household Income	\$77,400 per household	\$ 1,041,882,000	\$ 1,097,358,000	\$ 1,290,862,000	\$ 1,290,862,000	N.E.	
Consumption Expenditures	55% of HH income	\$ 573,035,100	\$ 603,546,900	\$709,974,100	\$709,974,100	N.E.	
Residential Property Value	COM Real Prop. Tax	N.E.	\$ 2,313,684,000	\$2,721,670,000	\$2,721,670,000	N.E.	
<b>Businesses Served by Upcountry Water System</b>							
Number of Businesses	Gale Cengage Learning, 2018	830	880	1,100	1,100	N.E. businesses	
Employees	Gale Cengage Learning, 2018	5,100	5,400	6,700	6,700	N.E. people	
Payroll	\$ 45,500 per job	\$ 232,050,000	\$ 245,700,000	\$ 304,850,000	\$ 304,850,000	N.E.	
Direct Sales	\$164,000 per employee	\$ 836,400,000	\$ 885,600,000	\$ 1,098,800,000	\$ 1,098,800,000	N.E.	
Less Resident Consumption Exp. in area	30% of resident spending	\$ 171,911,000	\$ 181,064,000	\$ 181,064,000	\$ 181,064,000	N.E.	
Net Direct Sales		\$ 664,489,000	\$ 704,536,000	\$ 917,736,000	\$ 917,736,000	N.E.	
Profit	10% of Direct Sales	\$ 83,640,000	\$ 88,560,000	\$ 109,880,000	\$ 109,880,000	N.E.	
Commercial Business Property Value	COM Real Prop. Tax	N.E.	\$ 145,811,683	\$ 180,914,000	\$ 180,914,000	N.E.	
<b>Total Economic Impacts</b>							
Total Direct Sales		\$ 1,237,524,100	\$ 1,308,082,900	\$ 1,627,710,100	\$ 1,627,710,100	N.E.	
Total Residential and Commercial Property Value		N.E.	\$ 2,459,496,000	\$ 2,902,584,000	\$ 2,902,584,000	N.E.	
<b>7.c. Fiscal Impacts</b>							
<b>County of Maui</b>							
<b>Water Supply Fund</b>							
Water Service Fee Rate to EMI (a)		\$ 0.06	\$ 0.06	\$ 0.10	\$ 0.10		
Water Purchase from EMI		\$ 155,500	\$ 62,600	\$ 268,900	\$ 268,900		
Unit Cost of Water Development	Brown and Caldwell						
Basal Well Development		N/A	N/A	\$ 34	\$ 34	per kgal	
Basal Well and Reservoir Development		N/A	N/A	--	--	38 per kgal	
Life-Cycle Cost of Water Development							
Basal Well Development		N/A	N/A	\$ 1,217,081,000	\$ 1,217,081,000		
Basal Well and Reservoir Development		N/A	N/A	--	--		
Water Service Fee Revenue from Upcountry	\$4.00 per 1,000 gal. (avg.)	\$ 11,534,000	\$ 11,578,000	\$ 23,141,000	\$ 23,141,000	per year	

N.E. - Not Estimated

Notes:  
 (a) MDWS pays \$0.06 per kgal to EMI under the existing agreement between the two entities. In 2030, EMI's operational cost per kgal will exceed the current \$0.06 per kgal rate. The 2030 water service fee rate is calculated based on the ratio of operational cost to MDWS service fee for 2008-2013.

1. **Baseline Conditions**

a. **Recent Sugar Cane Operations (2008-2013)**

Between 2008 and 2013, the Upcountry Water System used an average of 7.9 mgd. Approximately 60 percent of MDWS' water use in the Upcountry System is for residential, commercial, or institutional use while 40 percent is for agricultural users. An average of 7.1 mgd was provided by the EMI Aqueduct System (CWRM, 2018, p. 143 and 213). Refer to **Table 7**, Section 7.a.

i. **Economic Impacts**

In 2010, there were approximately 35,300 people and 13,500 households within the Upcountry Water System service area (CWRM, 2018, p. 210). Based on a median household income of \$77,400, households in the Upcountry Water System area had a collective income of \$1.0 million.

It is estimated that there were approximately 830 businesses in Upcountry Maui in 2010, employing 5,100 individuals. Total payroll is estimated at \$232.1 million and direct sales revenue associated with these businesses is estimated to be \$836.4 million. Refer to **Table 7**, Section 7.b.

ii. **Fiscal Impacts**

Revenues and expenditures related to MDWS activities go to the County's Water Supply Fund. Based on the average amount of water delivered by the EMI Aqueduct System between 2008 and 2013, it is estimated that MDWS paid \$155,500 to EMI.

The County of Maui assesses water service fees based on 18 different use classifications (i.e., single-family, multi-family, industrial, etc.). The same water rates are charged across the nine (9) water systems in Maui County. The average water service fee rate Countywide is \$4.00 per kgal. Based on this rate and water usage between 2008 and 2013, water service fees averaged \$11.5 million annually from Upcountry Maui. Refer to **Table 7**, Section 7.c.

**b. Interim Diversified Agriculture Operations (2017)**

According to the MDWS Annual Report, the Upcountry Water System used 7.9 mgd in 2017, which is consistent with historic trends (County of Maui, Department of Water Supply, 2017 and 2018). In 2017, 2.86 mgd was provided by EMI. MDWS use of surface water from the EMI Aqueduct System was low in 2017 because heavy rainfall increased supplies from other County sources that depend on rainfall (Plasch Econ Pacific, LLC, 2019). Refer to **Table 7**, Section 7.a.

**i. Economic Impacts**

In 2017, there were estimated 37,100 residents and 14,200 households within the Upcountry Maui Water System service area. Based on a median household income of \$77,400, households in Upcountry Maui had a collective income of \$1.1 billion and consumption expenditures of \$603.5 million. Residential property values within the Upcountry Maui Water System service area was approximately \$2.3 billion in 2017.

There were approximately 880 businesses in Upcountry Maui in 2017, employing 5,400 individuals. Total payroll is estimated at \$245.7 million. Direct sales associated with these businesses were approximately \$885.6 million. Commercial property values within the Upcountry Maui Water System service area were approximately \$145.8 million in 2017.

In total, direct sales from residents' consumption expenditures and Upcountry Maui businesses are estimated at \$1.3 billion and residential and commercial property value is approximately \$2.5 billion. Refer to **Table 7**, Section 7.c.

In addition to residents and businesses serviced by MDWS in Upcountry Maui, there are also numerous public uses that benefit from water from the EMI Aqueduct System and MDWS. These public uses include but are not limited to, public and private schools, fire stations, community centers, and parks. As previously mentioned, the MDWS system also services agricultural users including the Kula Agricultural Park. Impacts related to agricultural water use in Upcountry Maui will be discussed separately in Section B of this Chapter.

ii. **Fiscal Impacts**

Based on an assumed delivery of approximately 2.86 mgd from the EMI Aqueduct System in 2017, MDWS would have paid \$62,600. Based on the average water service fee rate Countywide of \$4.00 per kgal and the assumed water usage in 2017, water service fees of \$11.6 million were collected from Upcountry Maui and deposited into the Water Supply fund. Refer to **Table 7**, Section 7.c.

2. **Future Conditions**

For the period between 2004 and 2013, the average customer water use for the Upcountry Maui Water System varies between 6 mgd and 10 mgd, with an average of 7.9 mgd (CWRM, 2018, p. 213). An assumed 7.1 mgd was supplied by the EMI Aqueduct System through the Wailoa Ditch (CWRM, 2018, p. 143). MDWS projects that by 2030, the population of the area served by the Upcountry Maui Water System will grow to 43,675 residents, with a predicted additional water need of 1.65 mgd (CWRM, 2018, p. 214). In addition to water demand resulting from population growth, additional water is needed to meet the demands of the applicants on the water meter waiting list. As such, MDWS anticipates that it will need to develop between 4.2 mgd and 7.95 mgd, in addition to the approximately 7.1 mgd long term average provided through the EMI Aqueduct System, to meet demands through 2030, including present use, expected increased demand due to population growth, and a percentage of new connections from the current priority list for water meters (CWRM, 2018, p. 214). For the purposes of this analysis, it is assumed that the full 7.95 mgd will be needed to meet future demands through 2030.

The MDWS has evaluated a variety of strategies to meet the long-term future demands in the Upcountry Maui System and/or respond to reductions in the surface water supply. The strategies that have been determined to be most cost effective consist of combinations of additional basal well capacity and/or construction of raw water storage reservoirs. New basal well development would involve construction of new wells at the 1,300 foot elevation and/or wells at the 1,800 foot elevation, along with transmission pipelines, storage tanks, and booster pump stations. It is noted that MDWS entered into a Consent Decree in 2003 that requires that the MDWS conduct rigorous cost/benefit analyses of other water source options before developing groundwater in the East Maui Region. According to an assessment by Brown and Caldwell, development of additional basal wells may be a *“viable strategy to meet future needs from a technical perspective; however, there are legal issues that must be resolved before MDWS can proceed”* (Brown and Caldwell, 2014). In addition, the hydrogeological viability of the wells would need to be assessed.

Constructing additional raw water storage reservoirs to store water from wet periods for use during dry periods presents another strategy to meet future water demand. MDWS evaluated reservoirs ranging in size from 100 million gallons (mgal) to 300 mgal to serve the Olinda, Piihola, and/or Kamole WTPs. The analysis determined that the most cost-effective reservoirs would be reservoirs designed to feed the Piihola WTP or the Kamole WTP (Brown and Caldwell, 2014).

New reservoirs have high capital costs but lower operational and maintenance costs compared to groundwater wells. There must be sufficient source water available to fill the reservoir. In comparison, new wells carry relatively lower capital costs but require transmission and storage improvements and have higher operational costs due to the cost of pumping groundwater. It is also noted that there is risk associated with drilling new wells because of the uncertainty of the quantity and quality of water that would be found. The assessment prepared by Brown and Caldwell opined that it would be easier to develop new basal wells than to construct new storage reservoirs due to the need for capital financing mechanisms to construct expensive reservoirs, and potential environmental issues associated with constructing a new reservoir in the Lower Kula area (Brown and Caldwell, 2014).

As will be discussed below, depending on the amount of water available to MDWS from the EMI Aqueduct System, one or more of the aforementioned strategies will be required to meet water needs for the Upcountry Maui Water System.

**a. Proposed Action**

Under the Proposed Action scenario, it is assumed that there will be sufficient water available through the State Water Lease to allow MDWS to receive 7.1 mgd through the Wailoa Ditch. MDWS would need to develop the additional 7.95 mgd to meet future demands through 2030. Refer to **Table 7**, Section 7.a.

**i. Economic Impact Assessment**

The County of Maui projects that the population in the Upcountry Maui service area will grow to approximately 43,700 in 2030 (CWRM, p. 210). This would translate to an estimated 16,700 households. Assuming a median household income of \$77,400, households in the Upcountry Maui service area are anticipated to have a collective income of \$1.3 billion and consumption expenditures of \$710.0 million. Residential property values within Upcountry Maui are estimated to grow to \$2.7 billion.

Assuming proportional growth in line with population, there will be an estimated 1,100 businesses in Upcountry Maui in 2030, employing 6,700 individuals. Total payroll would be estimated at \$304.9 million, while direct sales associated with these businesses would be \$1.1 billion. Commercial property values within Upcountry Maui are estimated to grow to \$180.9 million.

In total, direct sales from residents' consumption expenditures and Upcountry businesses are estimated at \$1.6 billion and residential and commercial property value is approximately \$2.9 billion. Refer to **Table 7**, Section 7.b.

As previously noted, the Upcountry Maui Water System also services numerous public uses, including public and private schools, fire stations, community centers, and parks.

## ii. **Fiscal Impact Assessment**

With 7.1 mgd of water from the EMI Aqueduct System under the Proposed Action, for the purposes of this report, it is assumed that MDWS will need to develop 7.95 mgd of new water sources to meet future demands through 2030. The Brown and Caldwell analysis indicates that incremental basal wells would be a strategy to meet future demands assuming no reduction in surface water flows. Under the Brown and Caldwell analysis, the life-cycle unit cost of developing and operating wells is \$34 per (kgal).<sup>3</sup> It is noted that the life-cycle unit cost to develop new water for Upcountry customers is high. In comparison, a similar analysis conducted for the Central Maui Water System showed a unit cost of less than \$10 per kgal, or less than one third the cost of Upcountry Maui water development (Brown and Caldwell, 2014). The total life-cycle cost for 7.95 mgd of new wells is \$1.2 billion. The life-cycle cost is expressed as the net present value of all the costs incurred over 25 years, including capital, operating, and maintenance costs.

As previously mentioned, that the rate that MDWS pays to EMI will increase by 2030 because EMI's per unit operating cost will increase. The actual rate MDWS will pay to EMI will be subject to a future agreement between the two (2) entities. However, for the

---

<sup>3</sup> Cost as reported in 2014 Brown and Caldwell analysis has been inflation-adjusted to be reflected in 2018 dollars.



purposes of this analysis, the 2030 water service fee rate is estimated to be \$0.10, which has been calculated based on the ratio of operational cost to MDWS service fee for 2008 to 2013. Under this assumption, MDWS would pay an estimated \$268,900 per year to EMI.

Water service rates vary by class of users (i.e., residential, commercial, agricultural, etc.). The average MDWS water service rate Countywide is \$4 per kgal. Inasmuch as the same water rates are charged across the nine (9) water systems in Maui County, there are many factors that determine the water service rate. Therefore, it is difficult to predict what the water service rate would be in 2030. However, it is noted that the life-cycle unit cost to develop new water for Upcountry customers of \$34 per kgal far exceeds the current average water service rate of \$4 per kgal. It is assumed that MDWS would seek a variety of funding sources to cover the cost to develop new wells. This may include County capital improvement program funds as well as State and/or Federal funds. Nevertheless, due to the significant cost of new water source development, it would be reasonable to expect that water service rates would increase in the future to offset the costs of new water sources. As noted above, the County's water rate structure is uniform for all customers; water rates are not dependent on the service area a customer is located in (Brown and Caldwell, 2014). Therefore, under MDWS' current rate structure, the increases would apply Countywide because rates do not vary by service area. Refer to **Table 7**, Section 7.c.

**b. No Action Alternative**

The No Action Alternative would result in no Water Lease from the State. Under the No Action Alternative, EMI could continue to divert some portion of the water within the Collection Area, including west of Honopou Stream. However, this would be limited to an estimated median amount of 26.39 mgd, plus 4.37 mgd, for a total of 30.76 mgd on average. As discussed in Chapter II, it is unclear whether it will be financially feasible to continue to run the EMI Aqueduct System under the No Action Alternative. The operational costs of the EMI Aqueduct System are largely fixed; as such, reducing the amount of water diverted from the Collection Area by 70 percent under the No Action Alternative would significantly increase the cost of transporting the water, on a per unit basis. As previously mentioned, the water delivery agreements between the County and A&B are contingent upon the Lease being issued; if no Lease is issued, it is assumed that the

delivery of water to MDWS would terminate. Therefore, under the No Action Alternative, it is assumed that MDWS would need to find a replacement water source for the 7.1 mgd that is currently supplied by the EMI Aqueduct System through the Wailoa Ditch. In addition, new water source would be required to meet the future water demand of 7.95 mgd by 2030. In total, MDWS would need to develop 15.05 mgd of new water source under the No Action Alternative. Refer to **Table 7**, Section 7.a.

i. **Economic Impact Assessment**

Under the No Action Alternative, population and business growth may be constrained if development of replacement and new water sources cannot keep pace with demand. As such, the number of residents, households, and businesses in the Upcountry Maui Water System service area may very well be less than what is projected for the Proposed Action. The extent to which population and business growth is constrained would be dependent on MDWS' implementation of strategies to replace and develop new water source. As such, it is difficult to quantify potential population, household impacts under this Alternative. However, it is anticipated that economic and household growth factors would be negatively impacted.

ii. **Fiscal Impact Assessment**

Potential strategies for replacement and new water sources for Upcountry Maui include a combination of incremental basal wells and/or new raw water storage reservoirs. According to Brown and Caldwell, the life-cycle unit cost to develop wells and reservoirs for Upcountry Maui if surface water is reduced is estimated to be \$38 per kgal (Brown and Caldwell, 2014)<sup>4</sup>. With the higher water source demand of 15.05 mgd, this would translate to a total life-cycle cost of \$2.6 billion, compared to \$1.2 billion under the Proposed Action. The significantly higher costs associated with the No Action Alternative would impact the County's Water Supply Fund and would be expected to have a corresponding impact to MDWS finances and on ratepayers Countywide, not just in the Upcountry Maui Water System service area. Refer to **Table 7**, Section 7.c.

---

<sup>4</sup> Cost has been inflation-adjusted to be reflected in 2018 dollars.

c. **Reduced Water Lease Alternative**

The Reduced Water Lease Alternative would involve the issuance of the Water Lease authorizing amounts less than the maximum amount allowed under the IIFS. Depending on the amount of water authorized under the Water Lease, MDWS may receive no water from the Wailoa Ditch or some amount up to 7.1 mgd. The greater the reduction in the amount authorized under the Water Lease, proportionally less water will be available to MDWS.

i. **Economic Impact Assessment**

Depending on how much water is available under a Reduced Water Lease Alternative, there may or may not be water available to provide to MDWS' Upcountry Maui Water System. If water is provided to the County, it may be less than the current 7.1 mgd provided from the EMI Aqueduct System. As noted in the No Action Alternative above, population and business growth may be constrained if water supply for Upcountry Maui is not able to keep pace with demand. The degree to which economic growth would be constrained would be dependent on the amount of water available under a Reduced Water Lease Alternative and how much of that water, if any, would be available for MDWS.

ii. **Fiscal Impact Assessment**

Similar to the economic impacts described above, the fiscal impacts of a Reduced Water Lease Alternative would be dependent on the amount of water available, if any, to MDWS. If a Water Lease is issued that authorizes an amount that is not sufficient to supply MDWS and the Central Maui farmlands, the impacts would be similar to the No Action Alternative where the County would face higher costs for developing replacement and new water sources. If, on the other hand, a Water Lease is granted with a sufficient allocation to allow for 7.1 mgd currently provided to MDWS to continue, the fiscal impacts to the County would be similar to the impacts described for the Proposed Action.

**B. IMPACTS ON AGRICULTURAL WATER USE**

Approximately 40 percent of MDWS' usage in the Upcountry Maui Water System is agricultural use. This includes non-potable water provided to the Kula Agricultural Park (KAP) through diversions from the same streams that serve the Kamole WTP through the Wailoa Ditch. Water for the KAP is stored in two (2) reservoirs with a total capacity of 5.4

million gallons. The KAP consists of 31 farm lots ranging in size from 7 to 29 acres, and which are owned by the County of Maui. Maui County has recently purchased an additional 262 acres in Upcountry Maui, the first phase of a new County agricultural park, in the vicinity of the KAP. The source of water for the new agricultural park will be the same as for KAP, Reservoir 40, which is sourced by the EMI Aqueduct System.

Economic and fiscal impacts related to agricultural water use in Upcountry Maui are based on the *Agricultural and Related Economic Impacts Report* prepared by Plasch Econ Pacific, LLC.

## 1. **Baseline Conditions**

### a. **Economic Impact Assessment**

The *Agricultural and Related Economic Impacts Report* provided an analysis of Upcountry Maui agricultural activities in 2017 as the baseline scenario. In 2017, farmers at the Kula Ag Park and other farms in Upcountry Maui who relied on water from the EMI Aqueduct System produced an estimated 12.5 million pounds of crops per year. Annual farm sales were about \$12.5 million and indirect sales were about \$13.8 million. Total direct and indirect sales were about \$26.3 million per year, of which about \$21.5 million was on Maui and about \$4.8 million on O'ahu. Profits from farm operations and indirect sales were an estimated \$2.6 million per year. See **Table 8**, Section 8.a. and 8.b.

### b. **Fiscal Impact Assessment**

In 2017, the farms at the Kula Ag Park and other farms in Upcountry Maui that rely on water from the EMI Aqueduct System would have generated about \$45,000 per year in State taxes. For the County of Maui, property taxes and rents paid to the County by farmers at the Kula Ag Park totaled less than \$54,000 per year. The City and County of Honolulu will derive about \$2,000 per year from the excise tax surcharge. Refer to **Table 8**, Section 8.c.

## 2. **Future Conditions**

### a. **Proposed Action**

Under the Proposed Action, EMI will continue to supply water to the MDWS for Upcountry Maui, including for agricultural water use. It is also noted that as part of the County's purchase of the 262-acre expansion of the KAP, EMI has agreed to supply the water for the expansion. The additional water will come from water savings due to infrastructure improvements to the

reservoir and pumps that serve the KAP that will reduce system losses (Plasch Econ Pacific, LLC, 2019). The actual amount of water delivered from the EMI Aqueduct System is not anticipated to increase in order to serve the 262-acre expansion.

i. **Economic Impact Assessment**

Under the Proposed Action, 262 acres of fallow sugar cane lands would be converted to expand the KAP. The cost of this conversion is estimated at \$1.3 million over a five-year development period, or \$0.26 million per year. Indirect sales of \$0.32 million would be expected, for total direct and indirect expenditures of \$0.6 per year for five (5) years.

By 2030, farm activity in Upcountry Maui is expected to increase due to the 262-acre expansion of the Kula Ag Park. The farmers at the KAP and other farms in Upcountry Maui who will rely on water from the EMI Aqueduct System are projected to produce an estimated 15.1 million pounds of crops per year. Annual farm sales are expected to reach about \$15.1 million, and indirect sales about \$16.7 million. Total direct and indirect sales will be about \$31.8 million per year, of which about \$26.0 million will be on Maui and about \$5.9 million on O'ahu. Profits from farm operations and indirect sales are expected to reach about \$3.2 million per year. Refer to **Table 8**, Section 8.b.

ii. **Fiscal Impact Assessment**

The development activity associated with the expansion of the KAP would generate cumulative State tax revenues of about \$180,000.

The County of Maui would derive negligible tax revenues from development activity.

From an operational standpoint, farmers at the KAP and other farms in Upcountry Maui that rely on water from the EMI Aqueduct System would generate about \$54,000 per year in State taxes. For the County of Maui, property taxes and rents paid to the County by farmers at the KAP would total about \$85,000 per year. The increase from 2017 is largely due to the increase in rental income from the 262-acre expansion of the KAP. The City and County of Honolulu would derive about \$2,000 per year from the excise tax surcharge. Refer to **Table 8**, Section 8.c.

**Table 8. Upcountry Maui – Agricultural Economic and Fiscal Impacts**

Item	Baseline Conditions		Future Conditions (2030)		Units
	Recent Sugar (2008-2013)	Interim Conditions (2017)	Proposed Action	No Action	
<b>8.a. Agricultural Land Use</b>					
Kula Ag Park	N.E.	447	709	-	acres
Other farms	N.E.	800	800	-	acres
Total	N.E.	1,247	1,509	-	acres
<b>8.b. Economic Impacts</b>					
<b>Development Activity</b>					
Increase in crop acreage	N.E.	N/A	262	-	acres
Development Period	N.E.	N/A	5	-	years
Expenditures on field preparations	N.E.	N/A	\$ 1.3	-	million/yr
Annual average expenditures and sales					
Expenditures on field preparations	N.E.	N/A	\$ 0.26	-	million/yr
Indirect Sales	N.E.	N/A	\$ 0.32	-	million/yr
Total Expenditures and Indirect Sales	N.E.	N/A	\$ 0.6	-	million/yr
Employment					
Direct/on-site jobs, field preparations	N.E.	N/A	5.2	-	jobs
Indirect jobs, offsite	N.E.	N/A	2.3	-	jobs
Total job	N.E.	N/A	7.5	-	jobs
Payroll					
Direct Payroll	N.E.	N/A	\$ 0.21	-	million/yr
Indirect Payroll	N.E.	N/A	\$ 0.10	-	million/yr
Total	N.E.	N/A	\$ 0.31	-	million/yr
<b>Operations</b>					
Production					
Kula Ag Park	N.E.	4.5	7.1	-	m lbs/yr
Other	N.E.	8.0	8.0	-	m lbs/yr
Total	N.E.	12.5	15.1	-	m lbs/yr
Sales					
Direct Sales					
Kula Ag Park	N.E.	\$ 4.5	\$ 7.1	-	million/yr
Other	N.E.	\$ 8.0	\$ 8.0	-	million/yr
Total	N.E.	\$ 12.5	\$ 15.1	-	million/yr
Indirect Sales	N.E.	\$ 13.8	\$ 16.7	-	million/yr
Maui	N.E.	\$ 9.0	\$ 10.9	-	million/yr
Oahu	N.E.	\$ 4.8	\$ 5.9	-	million/yr
Total Direct and Indirect Sales	N.E.	\$ 26.3	\$ 31.8	-	million/yr
Maui	N.E.	\$ 21.5	\$ 26.0	-	million/yr
Oahu	N.E.	\$ 4.8	\$ 5.9	-	million/yr
Profits	N.E.	\$ 2.6	\$ 3.2	-	million/yr
Employment					
Direct/on-site jobs					
Kula Ag Park	N.E.	30	47	-	jobs
Other	N.E.	53	53	-	jobs
Total	N.E.	83	101	-	jobs
Indirect jobs, offsite	N.E.	40	48	-	jobs
Maui	N.E.	26	31	-	jobs
Oahu	N.E.	14	17	-	jobs
Total jobs	N.E.	123	149	-	jobs
Payroll					
Direct Payroll					
Kula Ag Park	N.E.	\$ 1.0	\$ 1.7	-	million/yr
Other	N.E.	\$ 1.9	\$ 1.9	-	million/yr
Total	N.E.	\$ 2.9	\$ 3.5	-	million/yr
Indirect Payroll	N.E.	\$ 1.9	\$ 2.3	-	million/yr
Maui	N.E.	\$ 1.2	\$ 1.4		
Oahu	N.E.	\$ 0.7	\$ 0.9		
Total	N.E.	\$ 4.8	\$ 5.8	-	million/yr
Residents supported					
Maui	N.E.	245	297	-	people
Oahu	N.E.	30	36	-	people
Total	N.E.	275	333	-	people

**Table 8.** Upcountry Maui – Agricultural Economic and Fiscal Impacts  
(continued)

Item	Baseline Conditions		Future Conditions		Units
	Recent Sugar (2008-2013)	Interim Conditions (2017)	Proposed Action	No Action	
<b>8.c. Fiscal Impacts</b>					
Development Activity, Cumulative					
State Revenues	N.E.	-	\$ 0.18	-	million/yr
Maui County Property Taxes	N.E.	-	N.E.	-	million/yr
C&C Honolulu, Excise Tax Surcharge	N.E.	-	N.E.	-	million/yr
Operations					
State Revenues		\$ 0.45	\$ 0.54	-	million/yr
Maui County Revenues		\$ 0.54	\$ 0.85	-	million/yr
C&C Honolulu, Excise Tax Surcharge		\$ 0.0020	\$ 0.0020	-	million/yr

Source: Plasch Econ Pacific, LLC

**b. No Action Alternative**

As previously discussed, a limited amount of water could be diverted under the No Action Alternative. Under the No Action Alternative, the supply of water delivered by the EMI Aqueduct System to the MDWS is presumed to drop to zero because the agreements with the County provide that the delivery of water is contingent upon the Lease being issued. Therefore, it is assumed that MDWS would need to find a replacement water source. Several years would be required to develop new sources. Assuming domestic customers would have priority over agricultural customers, farmers in Upcountry Maui would lack water to irrigate their crops until the new water sources are operational. As a result, farms would be required to close or relocate to Central Maui. Even after the new water source is operational, little commercial farming is expected to return to Upcountry Maui because of the better agronomic conditions in Central Maui.

**i. Economic Impact Assessment**

Under the No Action Alternative, farming activity and economic impacts are expected to be near zero for the farms that depend on water from the EMI Aqueduct System.

**ii. Fiscal Impact Assessment**

Taxes generated under the No Action Alternative are expected to be near zero.

c. **Reduced Water Lease Alternative**

For the Reduced Water Lease Alternative, the impacts would be proportional to the amount of water delivered to MDWS that would be available for agricultural use.



**NĀHIKU**

**V**

## V. NĀHIKU

Nāhiku is a small rural community in east Maui located makai of Hana Highway in the vicinity of mile marker 25. The Nāhiku community is characterized by rural residential uses. There is no significant commercial development in Nāhiku. MDWS receives water directly from the EMI Aqueduct System for the Nāhiku community, with the source of that water being a development tunnel located east of Makapipi Stream, that feeds into the Ko'olau Ditch and is accessed by MDWS in the Ko'olau Ditch near Makapipi Stream. There are approximately 43 water meters, all located along Nāhiku Road (County of Maui, Department of Water Supply, 2019).

### A. BASELINE CONDITIONS

#### 1. Recent Sugar Cane Operations (2008-2013)

In 2013, there were 43 connections to MDWS' Nāhiku system, serving a population of 107 people. The average daily flow to the Nāhiku community was 41,000 gallons per day in 2013 (County of Maui, Department of Water Supply, 2019). Given the small population of Nāhiku and the lack of commercial land uses, the economic and related fiscal impacts for the Nāhiku community are considered negligible.

#### 2. Interim Diversified Agriculture Operations (2017)

The Nāhiku area is designated "Agricultural" by the State Land Use Commission and has not experienced significant population growth. As noted under the Historic Sugar Cane Operations period, economic and related fiscal impacts for the Nāhiku community are considered negligible.

### B. FUTURE CONDITIONS

Due to its "Agricultural" land designation, the Nāhiku community is not anticipated to experience significant population growth through 2030. The 41,000 gallons per day provided to the Nāhiku community is expected to continue under the Proposed Action. As previously noted, it is unclear whether it will be financially feasible to continue to operate and maintain the EMI Aqueduct System under the No Action Alternative or the Reduced Water Lease Alternative. If operation of the EMI Aqueduct System is discontinued under the No Action Alternative or the Reduced Water Lease Alternative, the Nāhiku community would be adversely impacted as it would lose its source of potable water. If, however, the EMI Aqueduct System does continue to operate, the amount of water required for Nāhiku is negligible and it is assumed that water could continue to be delivered to the community.

CENTRAL MAUI | VI

## VI. CENTRAL MAUI

A&B historically cultivated sugar cane on the fields of Central Maui for over a century. These Central Maui fields were irrigated by water from the EMI Aqueduct System, brackish groundwater, and surface water from Wailuku Water Co. The economic and fiscal impacts related to Central Maui are derived from the *Agricultural and Related Impacts Report* prepared by Plasch Econ Pacific, LLC. It is noted that the impact analysis is based on approximately 30,000 acres of Central Maui fields that were historically serviced by EMI and supplemental brackish groundwater. Excluded from the analysis were fields west of Maui Veterans Highway that were irrigated with surface water from the West Maui Ditch System and supplemental brackish water.

### A. BASELINE CONDITIONS

#### 1. Typical Sugar Cane Operations (2006)

As previously mentioned, the year 2006 is used in this analysis as a representative year for “typical” sugar cane operations for the 20-year period from 1987 to 2006. Rainfall in East Maui was regarded as normal, the restoration of stream flows was not large enough to significantly affect HC&S operations, and the plantation was economically healthy.

For the 2006 crop year, HC&S grew sugar cane on about 35,180 acres, including 29,430 acres in the EMI service area (approximately 84 percent). See **Table 9**, Section 9.a.

#### a. Economic Impact Assessment

For the 2006 crop, HC&S produced about 145,200 tons of raw sugar, and sold sugar and energy to generate about \$101 million in direct sales. The purchase of goods and services by HC&S and the families of employees generated indirect sales and, in turn, these suppliers generated more indirect sales by their purchases of goods and services. The indirect sales are estimated at \$91 million. Total direct and indirect sales were \$191 million, of which about \$160 million was on Maui and about \$32 million on Oahu. Profits from sugar operations and indirect economic sales were estimated at \$19 million.

HC&S employed about 630 workers, including planters, irrigation workers, harvesters, truck drivers, mill workers, office workers, supervisors, etc. As with indirect sales, sugar operations generated indirect jobs, including those at companies providing agricultural supplies and equipment, office supplies and equipment, repair services, etc. Other indirect jobs included

**Table 9. Central Maui Agricultural Economic and Fiscal Impacts**

Item	Baseline Conditions			Future Conditions		Units
	Typical Sugar (2006)	Recent Sugar (2008-2013)	Interim Conditions (2017)	Proposed Action	No Action	
<b>9.a. Agricultural Land Use</b>						
Sugar Cane Operations						
Fields Serviced by EMI and groundwater	29,427	30,320				acres
Total Plantation	35,177	36,176				acres
Diversified Agriculture						
Crops						
Community Farm				800	300	acres
Orchards				12,850	4,180	acres
Tropical fruits				600	200	acres
Row and annual crops				1,200	400	acres
Energy crops			200	500	200	acres
Total crops			200	15,950	5,280	acres
Pasture						
Irrigated				4,700	3,800	acres
Unirrigated			500	9,100	20,670	acres
Total Pasture			500	13,800	24,470	acres
Green energy (solar)				250	250	acres
Total				30,000	30,000	acres
<b>9.b. Economic Impacts</b>						
<b>Sugar Cane Operations</b>						
Production (raw sugar)	145,182	136,324				tons/yr
Direct Sales, sugar and related sales	\$ 100.7	\$ 115.6				million/yr
Indirect Sales	\$ 90.7	\$ 104.1				million/yr
Maui	\$ 58.9	\$ 67.6				million/yr
Oahu	\$ 31.7	\$ 36.4				million/yr
Total Direct and Indirect Sales	\$ 191.4	\$ 219.7				million/yr
Maui	\$ 159.7	\$ 183.3				million/yr
Oahu	\$ 31.7	\$ 36.4				million/yr
Profits	\$ 19.1	\$ 22.0				million/yr
Employment						
Direct/On-site Jobs	630	620				jobs
Indirect Jobs	712	701				jobs
Maui	463	455				jobs
Oahu	249	245				jobs
Total Jobs	1,342	1,321				jobs
Maui	1,093	1,075				jobs
Oahu	249	245				jobs
Payroll						
Direct Payroll	\$ 48.5	\$ 34.3				million/yr
Indirect Payroll	\$ 34.2	\$ 33.7				million/yr
Maui	\$ 21.1	\$ 20.7				million/yr
Oahu	\$ 13.2	\$ 13.0				million/yr
Total Payroll	\$ 82.7	\$ 68.0				million/yr
Maui	\$ 69.5	\$ 55.0				million/yr
Oahu	\$ 13.2	\$ 13.0				million/yr
Residents Supported						
Maui	2,459	2,420				people
Oahu	531	522				people
Total	2,989	2,942				people
<b>Diversified Agriculture Development Activity</b>						
Field Preparations						
Cropland				15,950	5,280	acres
Pastures, irrigated				4,700	3,800	acres
Pastures, unirrigated				9,100	20,670	acres
Building Space				319,000	105,600	sf
Green energy (solar)				37.5	37.5	mW
Development Period				10	6	years
Expenditures and Sales						
Total Development Expenditures				\$ 214.7	\$ 144.8	million
Average Annual Development Expenditures				\$ 21.5	\$ 24.1	million/yr
Indirect Sales				\$ 18.5	\$ 18.8	million/yr
Maui				\$ 12.0	\$ 12.2	million/yr
Oahu				\$ 6.5	\$ 6.6	million/yr
Total Expenditures and Indirect Sales				\$ 39.9	\$ 42.9	million/yr
Maui				\$ 33.5	\$ 36.3	million/yr
Oahu				\$ 6.5	\$ 6.6	million/yr
Profits				\$ 4.0	\$ 4.3	million/yr
Employment						
Direct/on-site jobs				208	176	jobs
Indirect jobs, offsite				119	116	jobs
Maui				77	76	jobs
Oahu				42	41	jobs
Total jobs				326	293	jobs
Maui				285	252	jobs
Oahu				42	41	jobs
Payroll						
Direct payroll				\$ 8.8	\$ 7.7	million/yr
Indirect payroll				\$ 5.7	\$ 5.6	million/yr
Maui				\$ 3.5	\$ 3.4	million/yr
Oahu				\$ 2.2	\$ 2.2	million/yr
Total payroll				\$ 14.5	\$ 13.3	million/yr
Maui				\$ 12.3	\$ 11.1	million/yr
Oahu				\$ 2.2	\$ 2.2	million/yr
Residents Supported						
Maui						
Oahu				641	567	people
Total				88	87	people

**Table 9. Central Maui Agricultural Economic and Fiscal Impacts  
(continued)**

Item	Baseline Conditions			Future Conditions		Units
	Typical Sugar (2006)	Recent Sugar (2008-2013)	Interim Conditions (2017)	Proposed Action	No Action	
<b>Diversified Agriculture Operations</b>				730	654	people
Beef cattle (cow and calf units)						
Pasture, irrigated				4,700	3,800	units
Pasture, unirrigated				2,600	5,906	units
Total				7,300	9,706	units
Agriculture Production						
Community Farm				8	3	m lbs/yr
Orchards				321.3	104.5	m lbs/yr
Tropical Fruits				9	3	m lbs/yr
Row and annual crops				N.E.	N.E.	
Energy crops				N.E.	N.E.	
Calves				4,326	5,752	calves/yr
Energy Production				82,125	82,125	mWh/yr
Sales						
Direct Sales						
Crop Sales						
Community Farm				\$ 8.0	\$ 3.0	million/yr
Orchards				\$ 128.5	\$ 41.8	million/yr
Tropical Fruits				\$ 13.5	\$ 4.5	million/yr
Row and annual crops				\$ 4.8	\$ 1.6	million/yr
Energy crops			\$ 0.4	\$ 1.1	\$ 0.4	million/yr
Total crops			\$ 0.4	\$ 155.9	\$ 51.3	million/yr
Calves			\$ 0.1	\$ 4.8	\$ 6.3	million/yr
Energy sales				\$ 8.2	\$ 8.2	million/yr
Total Direct Sales			\$ 0.5	\$ 168.9	\$ 65.9	million/yr
Indirect Sales			\$ 0.5	\$ 160.7	\$ 57.7	million/yr
Maui			\$ 0.3	\$ 104.4	\$ 37.5	million/yr
Oahu			\$ 0.2	\$ 56.2	\$ 20.2	million/yr
Direct and Indirect Sales			\$ 1.1	\$ 329.5	\$ 123.5	million/yr
Maui			\$ 0.9	\$ 273.3	\$ 103.4	million/yr
Oahu			\$ 0.2	\$ 56.2	\$ 20.2	million/yr
Profits			\$ 0.1	\$ 33.0	\$ 12.4	million/yr
Employment						
Direct/on-site jobs			7	793	273	jobs
Indirect jobs, offsite			3	349	120	jobs
Maui			2	227	78	jobs
Oahu			1	122	42	jobs
Total jobs			10	1,142	393	jobs
Maui			9	1,020	351	jobs
Oahu			1	122	42	jobs
Payroll						
Direct payroll			\$ 0.3	\$ 28.5	\$ 9.9	million/yr
Indirect payroll			\$ 0.1	\$ 16.8	\$ 5.8	million/yr
Maui			\$ 0.1	\$ 10.3	\$ 3.6	million/yr
Oahu			\$ 0.1	\$ 6.5	\$ 2.2	million/yr
Total payroll			\$ 0.5	\$ 45.3	\$ 15.6	million/yr
Maui			\$ 0.4	\$ 38.8	\$ 13.4	million/yr
Oahu			N.E.	\$ 6.5	\$ 2.2	million/yr
Residents Supported						
Maui			19	2,294	790	people
Oahu			2	260	90	people
Total			21	2,554	879	people
<b>9.c. Fiscal Impacts</b>						
<b>Sugar Cane Operations</b>						
State Revenues	\$ 5.88	\$ 5.08				million/yr
Maui County Property Taxes	\$ 0.05	\$ 0.07				million/yr
C&C Honolulu, Excise Tax Surcharge		\$ 0.04				million/yr
<b>Diversified Agriculture Development Activity</b>						
State Revenues				\$ (0.01)	\$ (1.22)	million/yr
State Taxes				\$ 1.86	\$ 1.90	million/yr
Energy Subsidy				\$ (1.88)	\$ (3.13)	million/yr
Maui County Property Taxes				N.E.	N.E.	
C&C Honolulu, Excise Tax Surcharge				\$ 0.01	\$ 0.01	million/yr
<b>Diversified Agriculture Operations</b>						
State Revenues			\$ 0.03	\$ 4.46	\$ 1.66	million/yr
Maui County Property Taxes			\$ 0.02	\$ 0.80	\$ 0.65	million/yr
C&C Honolulu, Excise Tax Surcharge			\$ -	\$ 0.14	\$ 0.05	million/yr

Source: Plasch Econ Pacific, LLC

those involved with supplying goods and services to families, including grocery workers, store clerks, restaurant workers, service providers, etc. Sugar operations generated about 710 indirect jobs in 2006. The total direct and indirect employment was 1,300, of which about 1,100 jobs were on Maui. The payroll was about \$48.5 million for the direct jobs and \$82.7 million for all direct and indirect jobs. The direct and indirect jobs provided by sugar operations supported an estimated 3,300 residents. Refer to **Table 9**, Section 9.b.

**b. Fiscal Impact Assessment**

In 2006, sugar operations generated about \$5.9 million in State tax revenues and rental payments paid to the State. Most of the revenues were derived from excise taxes on consumption expenditures by families supported by the direct and indirect jobs that were provided personal income taxes paid by these same families. The revenues were low because the sale of the exported sugar was exempt from the excise taxes. Property taxes paid by HC&S to the County of Maui were about \$50,000 per year. Refer to **Table 9**, Section 9.c.

**2. Recent Sugar Cane Operations (2008-2013)**

This baseline time period covers impacts for a six-year period between 2008 and 2013, prior to the termination of sugar cane cultivation. The plantation shut down operations over a two-year period ending in 2016.

Between 2008 and 2013, HC&S cultivated 36,180 acres of sugar cane, of which about 30,320 acres were in the EMI service area (approximately 84 percent). Refer to **Table 9**, Section 9.a.

**a. Economic Impact Assessment**

For the 2008 to 2013 period, HC&S produced an average of about 136,300 tons of raw sugar per year (a decrease of 8.9 tons from 2006), and sold sugar and energy to generate annual revenues of about \$116 million in direct sales (an increase of about \$15 million). Total direct and indirect sales averaged nearly \$220 million per year, of which an estimated \$183 million was on Maui and \$36 million on Oahu. Profits from sugar operations and indirect sales were estimated at \$22 million.

For the 2008 to 2013 period, average employment and payroll was slightly less than the 2006 period. HC&S employed about 620 workers and indirect employment is estimated at 700 workers. Payroll for direct jobs was estimated at \$34.3 million, while total payroll for direct and indirect jobs was

\$68.0 million (Plasch Econ Pacific, LLC, 2019). Refer to **Table 9**, Section 9.b.

**b. Fiscal Impact Assessment**

For the 2008 to 2013 period, sugar operations generated an average of about \$5.1 million in State tax revenues and rental payments paid to the State. Property taxes paid by HC&S to the County of Maui were about \$70,000 per year. The increase from 2006 was due to a higher tax rate. The City and County of Honolulu derived about \$40,000 per year from the excise tax surcharge. Refer to **Table 9**, Section 9.c.

**3. Interim Diversified Agriculture Operations**

In 2017, about 200 acres in Central Maui were used to grow the energy crop, pongamia, and about 500 acres were for unirrigated pasture. Refer to **Table 9**, Section 9.a.

**a. Economic Impact Assessment**

In 2017, there were limited cattle grazing and pongamia cultivation in Central Maui. However, both operations were under development producing negligible revenues in 2017. These activities generated an estimated 10 direct and indirect jobs with total payroll of \$0.5 million. Refer to **Table 9**, Section 9.b.

**b. Fiscal Impact Assessment**

In 2017, diversified agriculture operations in Central Maui generated about \$30,000 in tax revenues. Property taxes paid by HC&S to the County of Maui were about \$20,000 per year. Property taxes decreased because of the land was assessed at a lower value following the close of sugar operations. The City and County of Honolulu derived negligible revenues from the excise tax surcharge. Refer to **Table 9**, Section 9.c.

**B. FUTURE CONDITIONS**

The Central Maui agricultural lands are now owned by Mahi Pono, which acquired these lands from A&B in December 2018. Mahi Pono's current plans for Central Maui envision cultivating a broad range of food and non-food crops for local consumption and export, including orchard crops (citrus, macadamia nuts, coffee, avocado, etc.), tropical fruits, vegetables and melons, row crops, annual crops, energy crops, and grass-fed cattle. In addition, the company plans to lease some of its land to other farmers at favorable terms, including relatively low rents for long-term periods.



## 1. **Proposed Action**

Mahi Pono has developed an initial Farm Plan that is consistent with the anticipated surface water supply from East Maui under the IIFS. The 30,000-acre Farm Plan calls for a mix of crops, irrigated and unirrigated pasture, and green energy (solar farm). Over one-third of the land scheduled for crop farming is being prepared or will soon be prepared for farming. Refer to **Table 9**, Section 9.a.

### a. **Economic Impact Assessment**

#### i. **Development Activities**

Implementation of the Mahi Pono Farm Plan would require conversion of former sugar cane lands into cropland, irrigated pasture, and unirrigated pasture. An estimated 319,000 square feet of building space (for washing and packing areas, storage, offices, etc.) would be required, as well as the development of a 37.5 mW solar farm with storage batteries. The total development expenditures would be about \$214.7 million, or an average expenditure of about \$21.5 million per year assuming a 10-year development period. Indirect sales associated with development activities are estimated to be \$18.5 million per year for a total of \$39.9 million per year, of which \$33.5 million would be on Maui and \$6.5 million on Oahu. Profits on development activity and indirect sales would be about \$4.0 million per year.

Direct and indirect employment associated with the development activities to implement the Mahi Pono Farm Plan would average about 326 jobs, of which 285 jobs would be on Maui and 42 jobs on Oahu. Actual employment would vary over the 10-year development period. Payroll for the direct and indirect jobs would average \$14.5 million per year and these jobs would support an estimated 730 residents. Refer to **Table 9**, Section 9.b.

#### ii. **Operations**

Full development of the Mahi Pono Farm Plan under the Proposed Action would result in a substantial amount of crop production, including about 8 million pounds per year from the Community Farm, 321 million pounds per year from orchards, and 9 million pounds per year of tropical fruits, plus production from row crops, annual crops, and energy crops. Annual sales are expected to reach \$155.9 million. The pastures would support a cattle herd of about 7,300 cow-and-calf animal units, produce over 4,300 calves

per year, and generate revenues of about \$4.8 million per year. The solar farm would generate about 82,125 mW of electricity per year, with revenues of about \$8.2 million per year. Combined farm and energy revenues would reach \$168.9 million per year in direct sales, which would exceed the 2006 revenues from sugar production of \$101 million, and the \$116 million average for the 2008 to 2013 period.

Purchases of goods and services by farmers and the families of employees would generate indirect sales and, in turn, these suppliers would generate more indirect sales by their purchase of goods and services. The indirect sales are estimated at about \$160.7 million per year.

Total direct and indirect sales would be about \$329.5 million per year, of which about \$273.3 million would be on Maui and about \$56.2 million on Oahu. Profits from farm operations, energy operations, and indirect sales would be about \$33 million.

At full build out, farm employment is expected to reach about 790 jobs, or about 160 more than provided by sugar operations in 2006. The jobs would be typical of those provided by diversified-crop farming and ranching-managing soils and pests, operating and maintaining irrigation systems, planting crops, pruning trees, harvesting crops, sorting and washing crops, packing crops, trucking crops to markets and shipping terminals, moving cattle among pastures, maintaining fences, marketing, accounting, etc. The increase in employment would be gradual, with most jobs filled by former sugar cane workers, skilled workers from Maui and other islands, recent graduates of agricultural programs at Hawai'i high schools and colleges, and unskilled workers who would receive on-the-job training.

In addition to direct jobs, the purchase of goods and services by farmers and ranchers and by the families of their employees would generate an estimated 350 jobs. In total, about 1,140 direct and indirect jobs would be supported, including about 1,000 jobs on Maui. Payroll is estimated at \$45.3 million for all direct and indirect jobs. The direct and indirect jobs would support an estimated 2,550 residents. Refer to **Table 9**, Section 9.b.

**b. Fiscal Impact Assessment**

**i. Development Activities**

The conversion of Central Maui farmlands from sugar cane to diversified agriculture and green energy would generate an average of about \$1.9 million per year in State taxes, for a 10-year cumulative total of about \$18.6 million. However, developers of solar farms receive a State subsidy of \$500,000 per 1 mW of generating capacity. For the planned green energy (solar farm), the State subsidy would average about \$1.88 million per year, year cumulative total of about \$18.8 million. Thus, State tax revenues from development minus the energy subsidy would result in a cumulative loss of about \$100,000 (with rounding). Given the nature of Hawai'i's tax system, the County of Maui would derive negligible tax revenues from the anticipated development activity. Over the 10-year development period, the City and County of Honolulu would derived cumulative excise tax surcharges of about \$1.0 million. Refer to **Table 9**, Section 9.c.

**ii. Operations**

Diversified agricultural operations would generate an estimated \$4.5 million in State tax revenues by 2030. Property taxes paid by to the County of Maui would be about \$800,000 per year. The City and County of Honolulu would derived about \$140,000 per year from the excise tax surcharge. Refer to **Table 9**, Section 9.c.

**2. No Action Alternative**

As previously mentioned, the No Action Alternative would result in no Water Lease from the State, however the EMI Aqueduct System could divert some portion of the water within the Collection Area if it deemed it economically feasible to do so. Under the No Action Alternative, Mahi Pono would need to implement a scaled-down Farm Plan to account for the reduced irrigation water. This scaled-down Farm Plan would involve a significant reduction in acreage dedicated to crop cultivation and an increase in unirrigated pasture. Refer to **Table 9**, Section 9.b.

**a. Economic Impact Assessment**

**i. Development Activities**

The total cost for developing the scaled-down Farm Plan under the No Action Alternative would be \$144.8 million, or an average of

about \$24.1 million per year over a six-year development period. Indirect sales are expected to average \$18.8 million per year for total development expenditures of \$42.9 million per year, of which \$36.3 million would be on Maui and \$6.6 million on Oahu. Profits on development activity and indirect sales would be about \$4.3 million per year.

Direct and indirect employment associated with the development activities to implement the scaled-down Farm Plan would average about 295 jobs, of which 250 jobs would be on Maui and 40 jobs on Oahu. Actual employment would vary over the 6-year development period. Payroll for the direct and indirect jobs would average \$13.3 million per year and these jobs would support an estimated 570 residents. Refer to **Table 9**, Section 9.b.

ii. **Operations**

The scaled-down Mahi Pono Farm Plan under the No Action Alternative would result in about one-third as much crop production as the Proposed Action: about 3 million pounds per year from the Community Farm, 104.5 million pounds per year from orchards, and 3 million pounds per year of tropical fruits, plus production from row crops, annual crops, and energy crops. Annual sales are expected to reach \$51.3 million. The pastures would support a cattle herd of about 9,700 cow-and-calf animal units, produce nearly 9,700 calves per year, and generate revenues of about \$6.3 million per year. The solar farm would generate about 82,125 mW of electricity per year, with revenues of about \$8.2 million per year.

Combined farm and energy revenues would reach about \$65.9 million per year in direct sales and \$57.7 million per year in indirect sales for a total of \$123.5 million per year, of which about \$103.4 million would be on Maui and \$20.2 million on Oahu. Profits from farm operations, energy operations, and indirect sales would be about \$12.4 million.

The scaled-down Farm Plan under the No Action Alternative would result in about one-third as much employment as the Proposed Action: about 270 direct jobs, 120 indirect jobs, and 390 total jobs. Payroll for direct and indirect jobs is estimated at \$15.6 million. The direct and indirect jobs would support an estimated 880 residents. Refer to **Table 9**, Section 9.b.

**b. Fiscal Impact Assessment**

**i. Development Activities**

For the No Action Alternative, the conversion of Central Maui farmlands from sugar cane to diversified agriculture and green energy would generate an average of about \$1.9 million per year in State taxes, for a 6-year cumulative total of about \$11.4 million. For the planned green energy (solar farm), the State subsidy would average about \$3.1 million per year, for a 6-year cumulative total of about \$18.8 million. Thus, State tax revenues minus the energy subsidy would average a negative \$1.2 million per year, for a 6-year cumulative total of a negative \$7.3 million. Again, the County would derive negligible tax revenues from the anticipated development activity. The City and County of Honolulu would derived cumulative excise tax surcharges of about \$60,000. Refer to **Table 9**, Section 9.c.

**ii. Operations**

For the No Action Alternative, State tax revenues would be less than half that of the Proposed Action: about \$1.7 million per year. Property taxes paid by to the County of Maui would be about \$650,000 per year. The decrease from the previous alternative is because more land would be used for pasture, which is assessed at a lower value than cropland. The City and County of Honolulu will derived about \$50,000 per year from the excise tax surcharge. Refer to **Table 9**, Section 9.c.

**3. Reduced Water Lease Alternative**

For the Reduced Water Lease Alternative, the impacts would be proportional to the amount of water diverted through the EMI Aqueduct System.

SUMMARY

VII

## VII. SUMMARY

The Proposed Action (proposed Water Lease) assessed herein would allow for continued domestic and agricultural water service to the Maui Department of Water Supply (MDWS) Upcountry System and Nāhiku Community while also providing water for agricultural cultivation in Central Maui. The Water Lease would be subject to the June 2018 Findings of Fact, Conclusions of Law, and Decision and Order (D&O) adopted by the Commission on Water Resource Management (CWRM), which set the Interim Instream Flow Standards (IIFS) for 24 East Maui Streams located within the License Area.<sup>5</sup> As a result, the potential future flow of surface water from East Maui will be significantly reduced compared to past water diversions that occurred for over 90 years. Pursuant to the CWRM D&O, ample stream water should be available to irrigate taro loʻi and the small farms relying on East Maui Streams.

This Study has assessed the economic and fiscal impacts associated with EMI operations as well as on East Maui farming, the MDWS Upcountry Water System service area, Nāhiku community, and agricultural cultivation in Central Maui. Below is a summary of the economic and fiscal impacts anticipated for these areas of potential effect.

### A. EMI OPERATIONS

The Proposed Action would allow EMI to divert an estimated 87.95 mgd from the License Area, along with an additional 4.37 mgd from lands west of the License Area, for an estimated total diversion of 92.32 mgd. EMI operating costs are largely fixed and are anticipated to be similar to the average operating cost experienced during recent sugar operations. EMI operating costs are assumed to be similar across all alternatives, with the only variation being the amount of Water Lease payments made to the State. As such, while costs remain relatively constant, the per unit cost for delivery of water increases as the amount of water diverted decreases. Total operational costs for EMI are expected to be \$2.3 million per year, or \$0.068 per kgal, under the Proposed Action, compared to \$1.4 million or \$0.129 per kgal under the No Action Alternative.

---

<sup>5</sup> The chart on pages 268-269 of the CWRM D&O identifies 25 streams and tributaries, one of which (Ohia/Waianu) is located below the EMI Aqueduct System and has never been diverted into the EMI Aqueduct System. Although the original Petitions to Amend the Interim Instream Flow Standards identified 27 streams, CWRM found that there were 24, not 27, streams that were the subject of the contested case. The difference being that (i) Waikani is not a stream but a waterfall of Wailuānui Stream; (ii) Alo is a tributary of Waikamoi Stream; (iii) Puaʻakaʻa is a tributary of Kopiliula Stream; and (iv) Piinaau and Palauhulu are separate streams that join together before reaching the ocean. See CWRM D&O, Findings of Fact 56, 2018.

Economic impacts associated with EMI operations, excluding the Water Lease payment to the State, would be similar for the Proposed Action and No Action alternatives. Total direct spending and indirect sales is estimated at \$1.4 million. EMI is expected to employ a staff of 17 people with a payroll of \$0.8 million.

Under the Proposed Action, EMI would contribute Lease payments to the State Special Land Development Fund based on an appraisal conducted prior to Lease issuance. Assuming the amount of the Water Lease is based on the equivalent per unit cost under revocable permit rent set in November 2018, the annual payment to the Special Land Development Fund would be \$846,700, including set-asides for the Office of Hawaiian Affairs and the Department of Hawaiian Home Lands of \$169,300 and \$254,000, respectively.

It is noted that under the No Action Alternative, assessment of flow data could result in decisions to reduce the size of the EMI Aqueduct System to reduce operation and maintenance costs. However, potential system reductions are not known at this time and cannot be determined until there is actual flow data to analyze and determine how best to optimize the EMI Aqueduct System. It is also noted that EMI may determine that it is not economically feasible to operate and maintain the system at all under the No Action Alternative.

## **B. EAST MAUI**

The CWRM D&O setting the IIFS for East Maui Streams returns free flowing water, with no upstream diversions, to all streams which have historically supported significant taro cultivation. Ample stream water should be available for taro farms and other small farms in East Maui. There are about 45 acres in East Maui suitable for growing taro and about 35 acres for truck crops.

The impacts of East Maui farming activity would be the same for the Proposed Action, No Action, and Reduced Water Lease Alternatives. At full development, East Maui farms would produce about 1.0 million pounds per year of taro and about 400,000 pounds per year of other crops, resulting in \$2.9 million in direct and indirect sales per year. Farms would support a total of 21 direct and indirect jobs. State revenues, Maui County property taxes, and City and County of Honolulu excise tax surcharge revenues associated with East Maui farming activities would be nominal.

## **C. NĀHIKU**

The Proposed Action would allow for the continued water service for the approximately 43 water meters in the Nāhiku community. It is unclear whether it will be financially feasible to continue to operate and maintain the EMI Aqueduct System under the No Action Alternative or the Reduced Water Lease Alternative. If operation of the EMI Aqueduct



System is discontinued under the No Action Alternative or the Reduced Water Lease Alternative, the Nāhiku community would be adversely impacted as it would lose its source of potable water.

## **D. UPCOUNTRY MAUI**

### **1. Domestic Water Use**

Between 2004 and 2013, average customer water use for the Upcountry Maui Water System was 7.9 mgd, including 7.1 mgd supplied by the EMI Aqueduct System through the Wailoa Ditch. MDWS anticipates it will need to develop up to 7.95 mgd of new water source to meet future demands in Upcountry Maui through 2030.

Under the Proposed Action, it is assumed that EMI will continue to supply 7.1 mgd to MDWS. The rate MDWS pays to EMI will increase from the existing agreement of \$0.06 per kgal because EMI's per unit operating cost will increase as a result of fixed costs being spread out over a lower volume of water diverted and possible higher lease payments to the State compared to historic payments.

MDWS would need to develop the additional 7.95 mgd to meet future demands. An analysis conducted by Brown and Caldwell indicates that incremental basal wells would be a strategy to meet future demands, assuming no reduction in surface water flows. The life-cycle unit cost of developing and operating wells is \$34 per kgal, which far exceeds the current average water service rate of \$4 per kgal. The total life-cycle cost for 7.95 mgd of new wells is \$1.2 billion. It is assumed that MDWS would seek a variety of funding sources to cover the cost to develop the new wells. Nevertheless, due to the significant cost of new water source development, it would be reasonable to expect that the water service rate would increase.

Under the No Action Alternative, it is assumed that MDWS would need to find a replacement water source for the 7.1 mgd that is currently supplied by the EMI Aqueduct System in addition to the 7.95 mgd required to meet future water demands. In total, MDWS would need to develop 15.05 mgd of new water source. Potential strategies for replacement and new water sources for Upcountry Maui include a combination of incremental basal wells and/or new raw water storage reservoirs. According to Brown and Caldwell, the life-cycle unit cost to develop wells and reservoirs for Upcountry Maui if surface water is reduced is \$38 per kgal. This would translate to \$2.6 billion, compared to \$1.2 billion under the Proposed Action. The significantly higher costs associated with the No Action Alternative would impact the County's Water Supply Fund and would be expected to have a corresponding impact to MDWS finances and on the ratepayers Countywide.

In 2017, there were approximately 37,100 residents and 14,200 households within the Upcountry Maui service area. These households had a collective income of \$1.1 billion and residential property values within the Upcountry Maui service area was about \$2.3 billion. There were approximately 880 businesses in Upcountry Maui in 2017, employing 5,400 individuals with a payroll estimated at \$245.7 million. The County of Maui projects that population in Upcountry Maui will grow to approximately 43,700 (16,700 households). It is estimated that there would be 1,100 businesses in Upcountry Maui employing 6,700 individuals in 2030. Under the No Action Alternative, population and business growth may be constrained if development of replacement and new water sources cannot keep pace with demand. As such, the number of residents, households, and businesses in Upcountry Maui may be less than what is currently projected for 2030 under the Proposed Action.

## **2. Agricultural Water Use**

Approximately 40 percent of MDWS' customers in Upcountry Maui are agricultural users. In addition, MDWS provides non-potable water to the Kula Agricultural Park (KAP), which consists of 31 farm lots totaling 447 acres. Maui County has recently purchased an additional 262 acres in Upcountry Maui for the expansion of the KAP. The Proposed Action would allow farming to continue and expand at the KAP, and continue at other farms that irrigate crops with water from the EMI Aqueduct System. In total, about 1,510 acres would be farmed in 2030, and this farming would generate about \$31.8 million per year in direct and indirect sales, about 150 direct and indirect jobs, and about \$5.8 million in payroll for these jobs.

Under the No Action Alternative, there may not be water available for MDWS from the EMI Aqueduct System. Assuming domestic customers would have priority over agricultural customers with respect to new water source development, farmers in Upcountry Maui would lack water to irrigate their crops until the new water sources are operational. As a result, farms would be required to close or relocate to Central Maui. Even after the new water source is operational, little commercial farming is expected to return to Upcountry Maui because of the better agronomic conditions in Central Maui. Therefore, farming activity is expected to be near zero for the farms that depended on water from the EMI Aqueduct System in 2017.

## **E. CENTRAL MAUI**

The Proposed Action will enable the EMI Aqueduct System to continue to provide water service for the cultivation of agricultural lands in Central Maui. Mahi Pono has prepared a Farm Plan that calls for a mix of crops, irrigated and unirrigated pasture, and green energy (solar farm). Full development of the Mahi Pono Farm Plan would result in

substantial crop production and \$155.9 million in direct crop sales. Total combined farm sales, including crops, cattle, and energy revenues would reach \$168.9 million per year in direct sales, which would exceed the 2006 revenues from sugar production of \$101 million, and the \$116 million average for 2008 to 2013. Farm employment is expected to reach 790 jobs, or about 160 more than provided by sugar operations in 2006. Diversified agricultural operations would generate an estimated \$4.5 million in State tax revenues by 2030. Property taxes paid by to the County of Maui would be about \$800,000 per year. The City and County of Honolulu would derived about \$140,000 per year from the excise tax surcharge.

Under the No Action Alternative, Mahi Pono would need to implement a scaled-down Farm Plan to account for the reduced irrigation water. This scaled-down Farm Plan would result in a significant reduction in acreage dedicated to crop cultivation and an increase in unirrigated pasture.

The Proposed Action, when compared to the No Action Alternative, would result in three (3) times as much food production, including greater food self-sufficiency and more exports, about \$206 million per year more in direct and indirect sales, about 750 more direct and indirect jobs, and \$29.7 million per year more in total payroll. Development activity associated with preparing fields and related improvements would last four (4) years longer and have higher development-related sales and employment. The Proposed Action would result in about 11,570 acres more of green open space in the form of farms and irrigated pastures (20,650 acres versus 9,080 acres).

The Reduced Water Lease Alternative would see impacts that are proportional to the amount of water diverted through the EMI Aqueduct System.

REFERENCES

VIII

## VIII. REFERENCES

Brown and Caldwell, Petition to Amend Interim Instream Flow Standards for Waikamoi, Puohokamoa, Haipuaena, Punalau/Kolea, Honomanu, West Wailuaiki, East Wailuaiki, Kopiliula, Puakaa, Waiohue, Paakea, Kapaula & Hanawi Streams, Case No. CCH-MA13-01, Letter to Mr. Caleb P. Row, Deputy Corporation Counsel, December 23, 2014.

Commission on Water Resource Management, Petition to Amend Interim Instream Flow Standards for Honopou, Hanehoi/Puolua (Huelo), Waikamoi, Alo, Wahinepee, Puohokamoa, Haipuaena, Punalau/Kolea, Honomanu, Nuaailua, Piinaau, Palauhulu, Ohia (Waianu), Waiokamilo, Kualani (Hamau), Wailuanui, Waikani, West Wailuaiki, East Wailuaiki, Kopiliula, Puakaa, Waiohue, Paakea, Waiaaka, Kapaula, Hanawi, and Makapipi Streams, Findings of Fact, Conclusions of Law, & Decision and Order (CCH-MA 13-01), June 20, 2018.

County of Maui, Department of Water Supply, (Draft) Maui Island Water Use & Development Plan, 2019.

County of Maui, Department of Water Supply, Fiscal Year 2017 Annual Report, 2017.

County of Maui, Department of Water Supply, Fiscal Year 2018 Annual Report, 2018.

County of Maui, Department of Water Supply, Upcountry Priority List, January 3, 2019.

County of Maui, Real Property Assessment Division, 2017 RPT Full Assessment Listing for 2017, 2017.

Gale Cengage Learning, Business Summary Report, 2018.

Gale Cengage Learning, Complete Demographic Comparison Report, 2018.

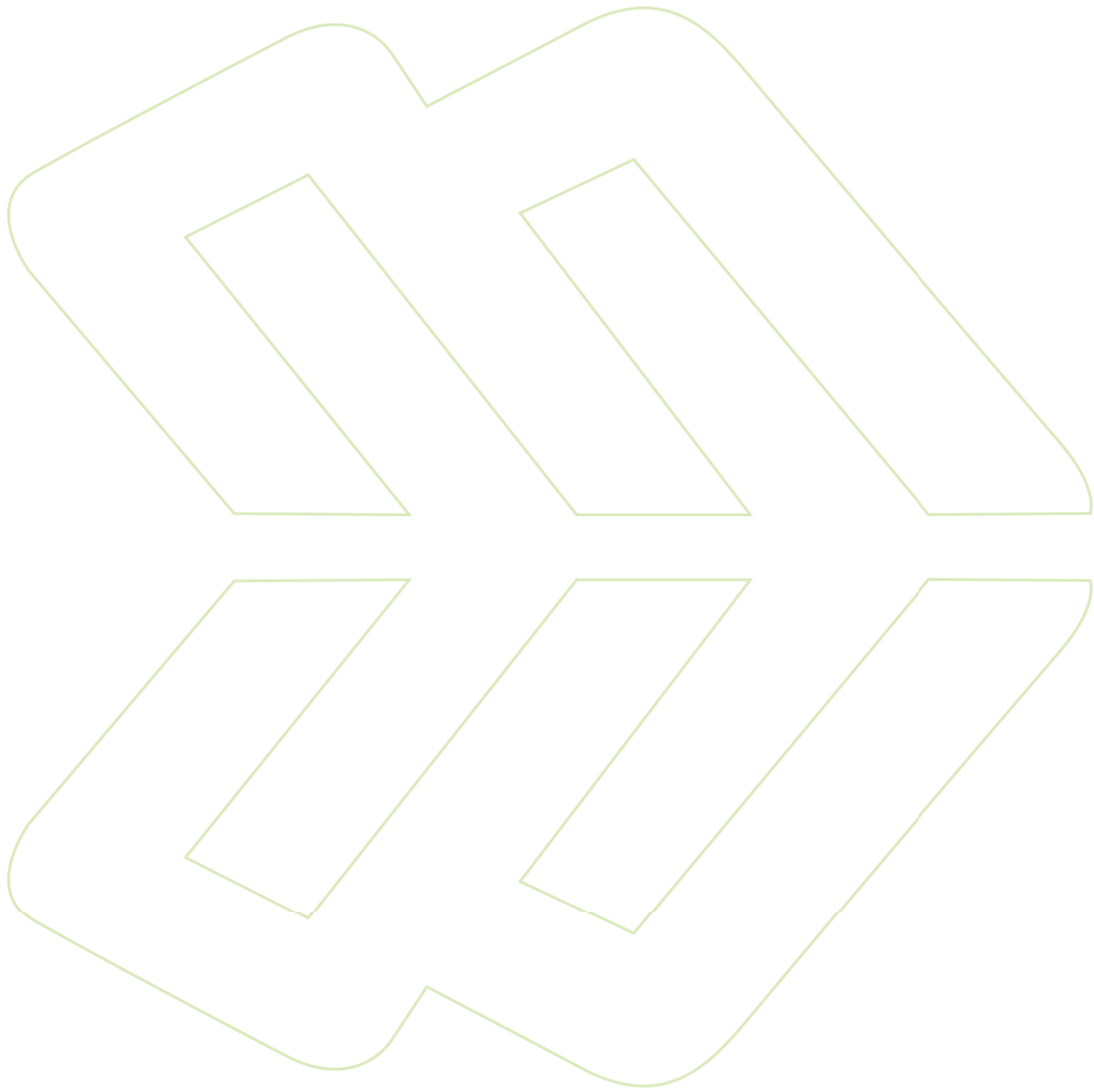
Gale Cengage Learning, Household Summary Report, 2018.

Plasch Econ Pacific, LLC, East Maui Water Lease: Agricultural and Related Impacts, 2019.

State of Hawai'i, Department of Agriculture, Statewide Agricultural Land Use Baseline 2015, 2016.

State of Hawai'i, Department of Business, Economic Development, & Tourism, The Hawai'i State Input-Output Study: 2012 Benchmark Report, August 2016.

U.S. Census Bureau, 2010 Census.



**MUNEKIYO HIRAGA**

Planning. Project Management. Sustainable Solutions.