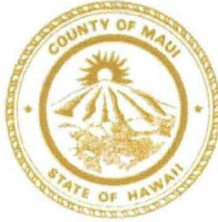


MICHAEL P. VICTORINO
Mayor

JEFFREY T. PEARSON, P.E.
Director

HELENE KAU
Deputy Director



DEPARTMENT OF WATER SUPPLY
COUNTY OF MAUI
200 SOUTH HIGH STREET
WAILUKU, MAUI, HAWAI'I 96793
www.mauiwater.org

June 24, 2020

Honorable Michael P. Victorino
Mayor, County of Maui
200 South High Street
Wailuku, Hawai'i 96793

APPROVED FOR TRANSMITTAL


Acting Mayor

6/29/20
Date

For Transmittal to:

Honorable Yuki Lei K. Sugimura, Chair
Water, Infrastructure, and Transportation Committee
Maui County Council
200 S. High Street
Wailuku, Hawai'i 96793

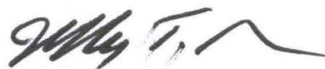
Dear Chair Sugimura,

SUBJECT: Maui Island Water Use and Development Plan (WIT-25)

In response to your June 17, 2020 request, please find attached an addendum to the Draft Maui Island Water Use and Development Plan submitted to Maui County Council on March 22, 2019.

We hope you find this information useful. Should you have any questions, please contact me at Ext. 7834 or Planning Program Manager Eva Blumenstein at Ext. 4163.

Sincerely,



Jeffrey T. Pearson, P.E.
Director

RECEIVED

2020 JUN 26 PM 1: 47

OFFICE OF THE MAYOR



OFFICE OF THE
COUNTY CLERK
2020 JUN 29 PM 2: 31

RECEIVED

ADDENDUM

June 23, 2020

The following section is added to the Draft Maui Island Water Use and Development Plan (WUDP) to provide updated information on water resource supply and demand that developed after the Draft WUDP was submitted to the Board of Water Supply on August 10, 2018, approved without revisions by the Board of Water Supply on January 22, 2019 and subsequently submitted to the Maui County Council on March 22, 2019.

Major changes that impact water resources occurred throughout the development of this plan: cessation of sugarcane cultivation, reopening of contested cases, contested case decision and orders and establishment of Interim Instream Flow Standards. This addendum addresses the following issues occurring in the years 2018 through 2019:

1. Contested cases, integrating designated surface water management area water use permits, interim instream flow standards and appurtenant rights
2. Interim instream flow standard assessments and decisions
3. Adopted revisions to aquifer sustainable yields
4. Published agricultural plans and irrigation projections for Mahi Pono LLC

Revisions were made to Chapter 14, 15, 16 and 19.

Chapter 14 Wailuku Aquifer Sector

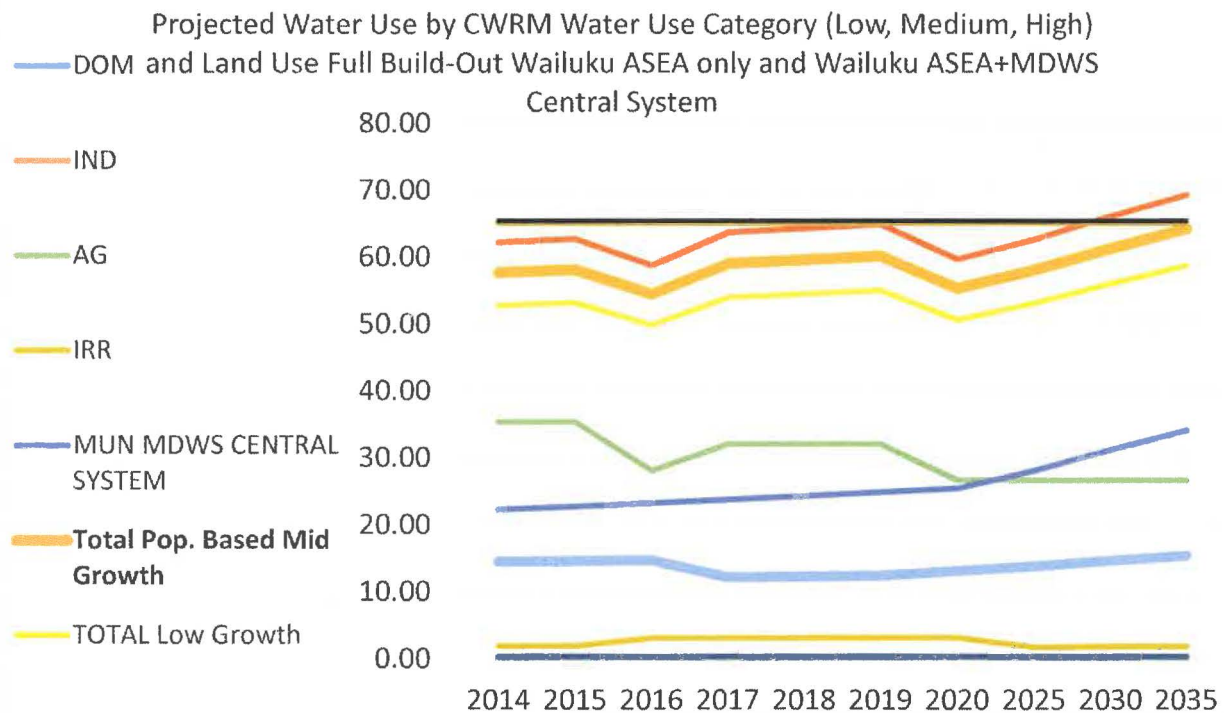
Surface Water Use Permit Applications, Integration of Appurtenant Rights and Amendments to the Interim Instream Flow Standards, Nā Wai `Ehā Surface Water Management Area (CCH-MA15-01)

The Hearing officer’s November 2017 proposed decision and order (D&O) for the Nā Wai `Ehā contested case is incorporated into the March 2019 Draft WUDP. The Commission on Water Resource Management (CWRM) has yet to adopt a decision and order. Demand and supply strategies may need to be adjusted when a final decision on IIFS and water use permit allocations are issued.

Hawaiian Commercial and Sugar Company and Mahi Pono LLC filed a Joint Motion for Withdrawal and Substitution of Parties for Surface Water Use Permit Application #2206. CWRM granted the motion in September 2019. Mahi Pono requested 11.22 million gallons per day (mgd) for crops on 3,740 acres between Kuihelani and Maui Veterans highways. The proposed irrigation amount of 16.6 mgd in the November 2017 D&O is adjusted to **11.22 mgd** as the selected demand scenario. The tables are revised to reflect Mahi Pono demand decrease of 5.2 mgd (16.6 – 11.2 mgd) for a total Agricultural demand of 26.69 mgd from year 2020 - 2035.

14.6.7 Population Growth Based Water Demand Projection Analysis

Figure 14-29 Projected Water Use by CWRM Category to 2035, Population Growth Based (Low, Medium, High) Wailuku ASEA + MDWS Central System; Wailuku ASEA only (medium) Land Use Full Build-Out Wailuku ASEA only (mgd)



ADDENDUM

Table 14-34 Projected Water Use by CWRM Category to 2035, Wailuku ASEA and MDWS Central System (mgd)

CWRM CATEGORY	2014	2015	2016	2017	2018	2019	2020	2025	2030	2035
POPULATION BASED WAILUKU ASEA AND MDWS CENTRAL SYSTEM										
Domestic	0.0311	0.0311	0.086	0.088	0.090	0.092	0.094	0.104	0.116	0.126
Industrial	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Agriculture	35.380	35.380	28.114	32.092	32.092	32.092	26.692	26.692	26.692	26.692
Irrigation			3.081	3.091	3.101	3.111	3.161	3.214	3.275	3.332
Municipal*	22.274	22.699	23.219	23.751	24.295	24.852	25.421	28.100	31.224	34.134
Military	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TOTAL Pop. Based Mid Growth	57.685	58.111	54.501	59.022	59.578	60.146	55.328	58.064	61.256	64.230
TOTAL Low Growth	52.753	53.142	49.841	53.975	54.484	55.004	50.597	53.100	56.019	58.738
TOTAL High Growth	62.231	62.690	58.796	63.673	64.272	64.886	59.687	62.640	66.083	69.291
Total Pop. Based Mid Growth WAILUKU ASEA only	14.484	14.587	14.713	12.141	12.273	12.407	13.092	13.797	14.626	15.392
LAND USE BUILD OUT BASED WAILUKU ASEA										
County Zoning	65.103	65.103	65.103	65.103	65.103	65.103	65.103	65.103	65.103	65.103
DHHL	0.293	0.293	0.293	0.293	0.293	0.293	0.293	0.293	0.293	0.293
TOTAL Land Use Based	65.396	65.396	65.396	65.396	65.396	65.396	65.396	65.396	65.396	65.396

*MDWS includes Central Maui/Wailuku District services throughout Wailuku AND Central ASEAs. Existing and Projected use includes DHHL.

An agreement among Mahi Pono, Hui o Nā Wai `Ehā and the Office of Hawaiian Affairs was reached over Mahi Pono's water commitments for the surface water use permit where Mahi Pono agreed to:

- Provide comprehensive and continual monitoring and public reporting of data relating to its water diversions, deliveries and uses, subject to independent verification by the Commission
- Bypass the Waiale Reservoir, which will avoid the reservoir's significant seepage losses of 6 to 8 mgd
- Close the low-flow intake for the Spreckels Ditch on Wailuku River
- If requested, assist in the restoration of the po`owai of the North Waihe`e `auwai in partnership with hui and the Waihe`e community
- Seek opportunities for native shrubland ecosystem restoration with native species conducive to the region.

ADDENDUM

- Work in good faith with the hui and OHA to facilitate communication and public transparency.
- Diligently investigate losses in Mahi Pono’s sections of the water delivery system, dedicating \$250,000 to this effort, which will include more in-stream, in-system and on-farm water measuring equipment¹

14.7.2 Source Adequacy vs. Population Growth Based Demand Projections

Figure 14-30 Population Mid-Growth Based 20-Year Water Demand Projections and Available Resources, Wailuku ASEA and Kahului Aquifer (mgd)

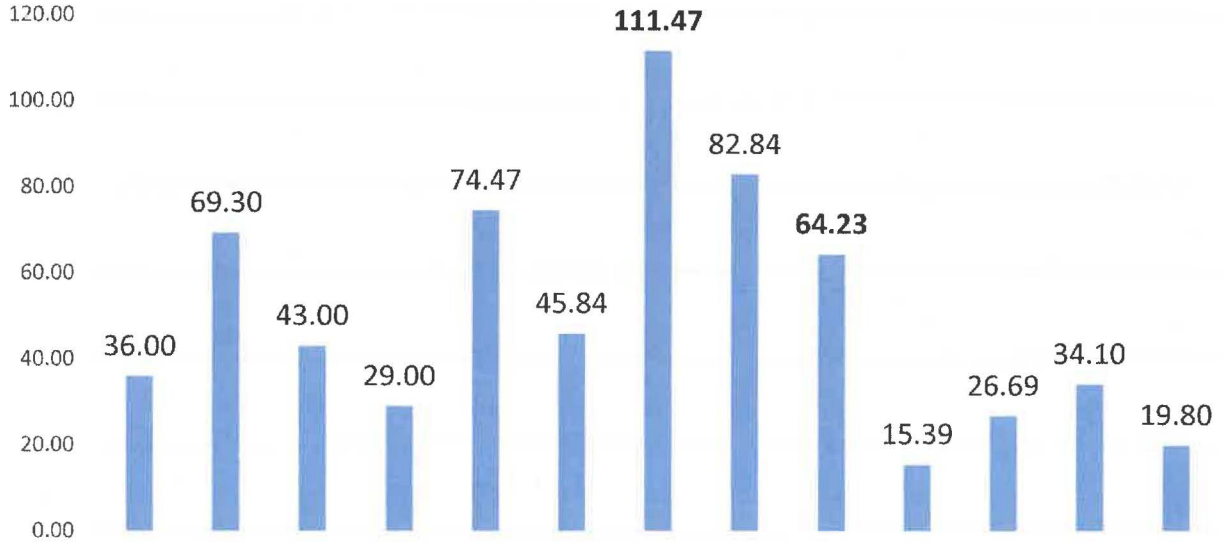


Table 14-35 Population Mid-Growth Based 20-Year Water Demand Projections and Available Resources, Wailuku ASEA and Kahului Aquifer (mgd)

Groundwater Sustainable Yield (SY)	36.00
Kahului Aquifer	1
Nā Wai `Ehā Q50	69.30
Nā Wai `Ehā Q90	43.00
Nā Wai `Ehā IIFS Draft	29.00
Surface Water incl. Kahakuloa Q50	74.47
Surface Water incl. Kahakuloa Q90	45.84
TOTAL AVG YIELD (Q⁵⁰, SY WAILUKU ASEA+ Kahului Aquifer 1 mgd)	111.47
TOTAL DROUGHT YIELD (Q⁹⁰, SY WAILUKU ASEA)	82.84
Pop-based mid-growth incl. MDWS Central System	64.23
Pop-based mid-growth Wailuku ASEA only	15.39
Agricultural Demand Only	26.69
Nā Wai `Ehā Surface Water Use Permits (SWUPs)	34.10
`Āo Aquifer Groundwater Use Permits (GWUPs)	19.80

¹ Cerizo, Kehaulani, Maui News, *Maui Pono, Hui Reach Water Pact*, November 20, 2019

ADDENDUM

14.7.3 Alternative Sources within the Central Aquifer Sector Area

Figure 14-31 Population Mid-Growth Based 20-Year Water Demand Projections, and Available Conventional and Alternative Resources, Wailuku ASEA and Kahului Aquifer in Central ASEA (mgd)

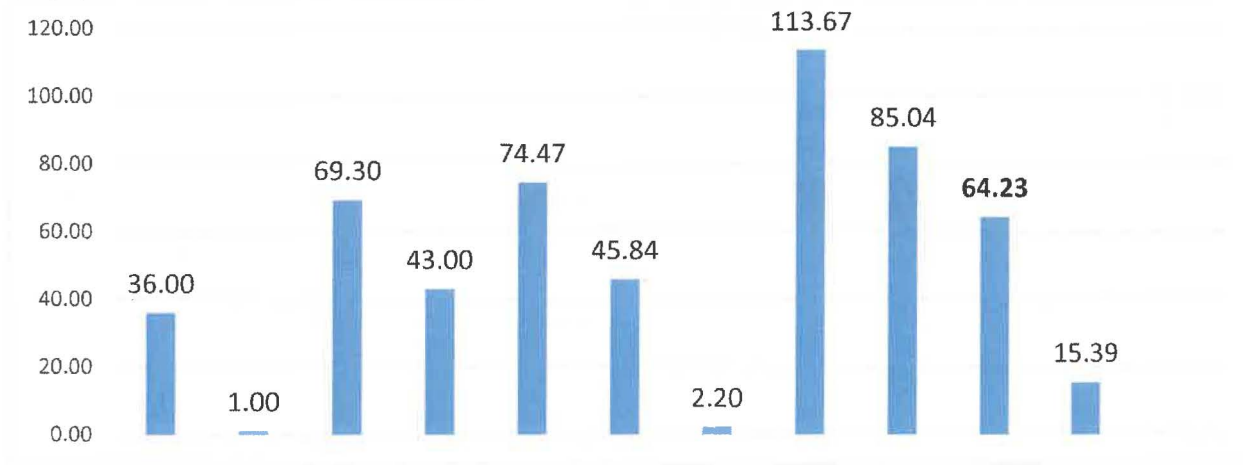


Table 14-37 Population Mid-Growth Based 20-Year Water Demand Projections, Available Conventional and Alternative Resources, Wailuku ASEA and Kahului Aquifer in Central ASEA (mgd)

WAILUKU ASEA Sustainable Yield	36.00
CENTRAL ASEA Kahului Aquifer Sustainable Yield	1.00
Nā Wai `Ehā Surface Water Median Flow (Q ⁵⁰)	69.30
Nā Wai `Ehā Surface Water Drought Flow (Q ⁹⁰)	43.00
Surface Water incl. Kahakuloa Median Flow (Q ⁵⁰)	74.47
Surface Water incl. Kahakuloa Drought Flow (Q ⁹⁰)	45.84
CENTRAL ASEA Recycled Water	2.2
WAILUKU ASEA and Kahului Aquifer Average Total Yield	113.67
WAILUKU ASEA and Kahului Aquifer Drought Total Yield	85.04
Pop-based mid-growth incl. MDWS Central System	64.23
Pop-based mid-growth Wailuku ASEA Only	15.39

14.8.1 Resource Management

The West Maui Mountains Watershed Partnership changed name to Mauna Kahalawai Watershed Partnership.

14.8.5 Alternative Water Source Strategies

While the HC&S Diversified Agriculture Plan included bioenergy crops within the irrigation areas of Nā Wai `Ehā irrigation infrastructure, the Mahi Pono farm plan does not. Strategy #8 to expand recycled water distribution from the Kahului Wastewater Treatment Facility for planned energy crops is adjusted. Recycled water expansion and decreased use of injection wells is

ADDENDUM

desirable and has potential to offset commercial and landscape irrigation demand in the Kahului region. **Strategy #8** is amended as follows: Expand distribution from the Kahului WWTF for commercial, landscape and other non-potable irrigation applications. Potential available recycled water is 4.2 mgd. Lead agency is MDEM.

14.9 Recommendations

**Table 14-40 Selected Demand Scenario: Projected Water Demand and Supply Options
Wailuku ASEA and MDWS Central System**

DEMAND (MGD)	2014	2015	2020	2025	2030	2035
MDWS Potable Wailuku and Central ASEA	22.274	22.699	25.421	28.100	31.224	34.134
MDWS Potable export to Central ASEA	17.664	17.990	20.574	23.090	26.093	28.828
MDWS Potable Wailuku ASEA only	4.610	4.709	4.847	5.010	5.131	5.307
Total Potable:	22.274	22.699	25.421	28.100	31.224	34.134
Non Potable (AG, IRR, DOM)	35.411	35.411	29.907	29.965	30.032	30.095
Other, Non Potable (water losses)	2.730	2.730	2.730	2.730	2.730	2.730
Total Non-Potable	38.141	38.141	32.637	32.695	32.762	32.825
TOTAL DEMAND	60.415	60.841	58.058	60.794	63.986	66.960
SUPPLY (MGD)	2014	2015	2020	2025	2030	2035
Potable Groundwater Wailuku ASEA	20.353	19.909	19.939	21.355	19.071	16.493
Iao Aquifer GWMA	17.28	16.430	15.939	14.255	12.171	9.593
Waihee Aquifer	3.479	3.479	4.000	4.900	4.900	4.900
Waikapu Aquifer	0.000	0.000	0.000	2.200	2.000	2.000
Potable Groundwater Import Kahului Aquifer (Maui Lani Wells)	0.930	1.090	1.090	1.090	1.090	1.090
Non Potable Groundwater	0.400	0.408	0.457	0.505	0.561	0.613
Iao Aquifer GWMA	0.341	0.348	0.377	0.405	0.441	0.493
Waihee Aquifer	0.058	0.06	0.08	0.1	0.12	0.12
Potable surface water (Wailuku River)	0.990	1.700	3.200	3.200	3.200	3.200
Non potable surface water	36.161	36.154	30.600	30.610	30.622	30.632
Waikapu Stream	2.957	2.957	2.957	2.957	2.957	2.957
Wailuku River	5.438	4.728	3.228	3.228	3.228	3.228
Waiehu Stream	0.833	0.833	0.833	0.833	0.833	0.833
Waihee River	8.327	8.327	8.327	8.327	8.327	8.327
Nā Wai `Ehā multiple sources	18.606	19.308	15.255	15.265	15.276	15.287
Recycled Water (South Maui MDWS Service Area)*	1.580	1.580	2.080	2.280	2.280	2.280
Water Conservation	0.000	0.000	0.692	1.755	3.163	4.651
Potable Groundwater Import Ko`olau ASEA (Haiku Aquifer)	0.000	0.000	0.000	0.000	4.000	8.000
TOTAL SUPPLY	60.414	60.841	58.058	60.794	63.986	66.960

ADDENDUM

Table 14-41 Summary of Recommended Strategies Wailuku ASEA

STRATEGY	PLANNING OBJECTIVES	ESTIMATED COST	IMPLEMENTATION		
			AGENCY	TIME-FRAME	
RESOURCE MANAGEMENT					
1	Continue Maui County financial support for watershed management partnerships' fencing and weed eradication efforts.	Maintain sustainable resources Protect water resources Protect and restore streams	\$1.1M to \$1.7M - per year (from all funding sources)	MDWS Maui County	1
2	Establish a diverse working group to address alternative structures for future management of the watershed lands and sustained operations of the WWC ditch system	Maintain sustainable resources Protect water resources Protect and restore streams	N/A	Aha Moku Hui O Nā Wai `Ehā OHA Maui County Wailuku Water Company	1
CONVENTIONAL WATER SOURCE STRATEGIES					
3	Adapt pumpage of constructed wells in Waikapū Aquifer with guidance from the 2015 USGS groundwater flow model results, when available.	Provide adequate volume of water supply Maximize reliability of water service Minimize adverse environmental impacts Minimize cost of water supply	\$4.25* /1,000 gallons	MDWS Waikapū Properties LLC USGS	1, 2
4	Explore new basal well development in the southern portion of Waihe`e aquifer based on results of USGS groundwater model and best pumping scenarios. Monitor impact on existing production wells and aquifer transition zone from development of Mendez wells.	Provide adequate volume of water supply Maximize reliability of water service Minimize adverse environmental impacts Minimize cost of water supply	N/A (costs only assessed for northern portion of aquifer)	MDWS	1
STRATEGY	PLANNING OBJECTIVES	ESTIMATED COST	AGENCY	TIME-FRAME	
5	Continue exploration of East Maui well development in consideration of reliable capacity for planned growth areas, including the MDWS Central Maui System. Initiate a hydrologic study to determine any negative impact on existing ground and surface water sources, streamflow and influences from dikes.	Maintain sustainable resources Provide adequate volume of water supply Maximize reliability of water service Minimize adverse environmental impacts Minimize cost of water supply	\$3.71*/1000 gallons CWRM USGS MDWS	1	

ADDENDUM

6	Reduce non-potable use of Wailuku Aquifer Sector basal and high level water to the extent feasible. Prioritize available recycled water and brackish water for non-potable uses where available in the Central Aquifer Sector.	Maximize water quality Manage water equitably Maintain consistency with General and Community Plans		CWRM MDWS MDEM MDP	
7	Monitor outcome of the East Maui Streams contested case and final Instream Flow Standards, available ditch flow and water quality implications of blending the water source to determine benefits and viability of interconnecting the MDWS Central Maui and Upcountry Systems.	Maximize reliability of water service Maximize efficiency of water use Minimize cost of water supply	N/A	MDWS	2
ALTERNATIVE WATER SOURCE STRATEGIES					
8	Expand distribution from the Kahului WWTF for commercial, landscape and other non-potable irrigation applications.	Maximize efficiency of water use Maintain consistency with General and Community Plans	\$6.7M	MDEM	1 2
9	Identify private-public partnerships, state and federal funding sources to maximize utilization of recycled water produced at the Kīhei WWTF and supplemental non-potable sources for seasonal use of R-1 water.	Maximize efficiency of water use Maintain consistency with General and Community Plans	(Transmission South Kīhei to Wailea \$21M)	MDEM MDWS	1 2
10	Explore the Wai`ale Road Stormwater Drainage as potential to offset stream diversions associated with Spreckels and Waihe`e Ditches and supplement irrigation sources for agricultural water demands in Central Maui.	Minimize adverse environmental impacts Maximize efficiency of water use Maintain sustainable resources	\$10.0M	DPW DOA HC&S	2

*20-year total cost includes upfront capital costs, operation and maintenance, repair and replacement and does not include inflation and other economic factors

ADDENDUM

Chapter 15 Central Aquifer Sector

The decision and order (D&O) issued June 20, 2018 for East Maui Streams Contested Case was incorporated into the March 2019 Draft WUDP. The D&O addressed Hawaiian Commercial and Sugar Company's (HC&S) transition to diversified agriculture and the projected irrigation demand.

HC&S sale of the entire plantation to Mahi Pono LLC occurred after publishing of the Draft WUDP. MDWS analyzed irrigation demand for the March 2019 crop plans with 2019 – 2020 plant dates. Department of Agriculture crop water duty was applied to estimate a total irrigation demand of 15.58 mgd for 3,868 cultivated acres in the year 2019 – 2020.

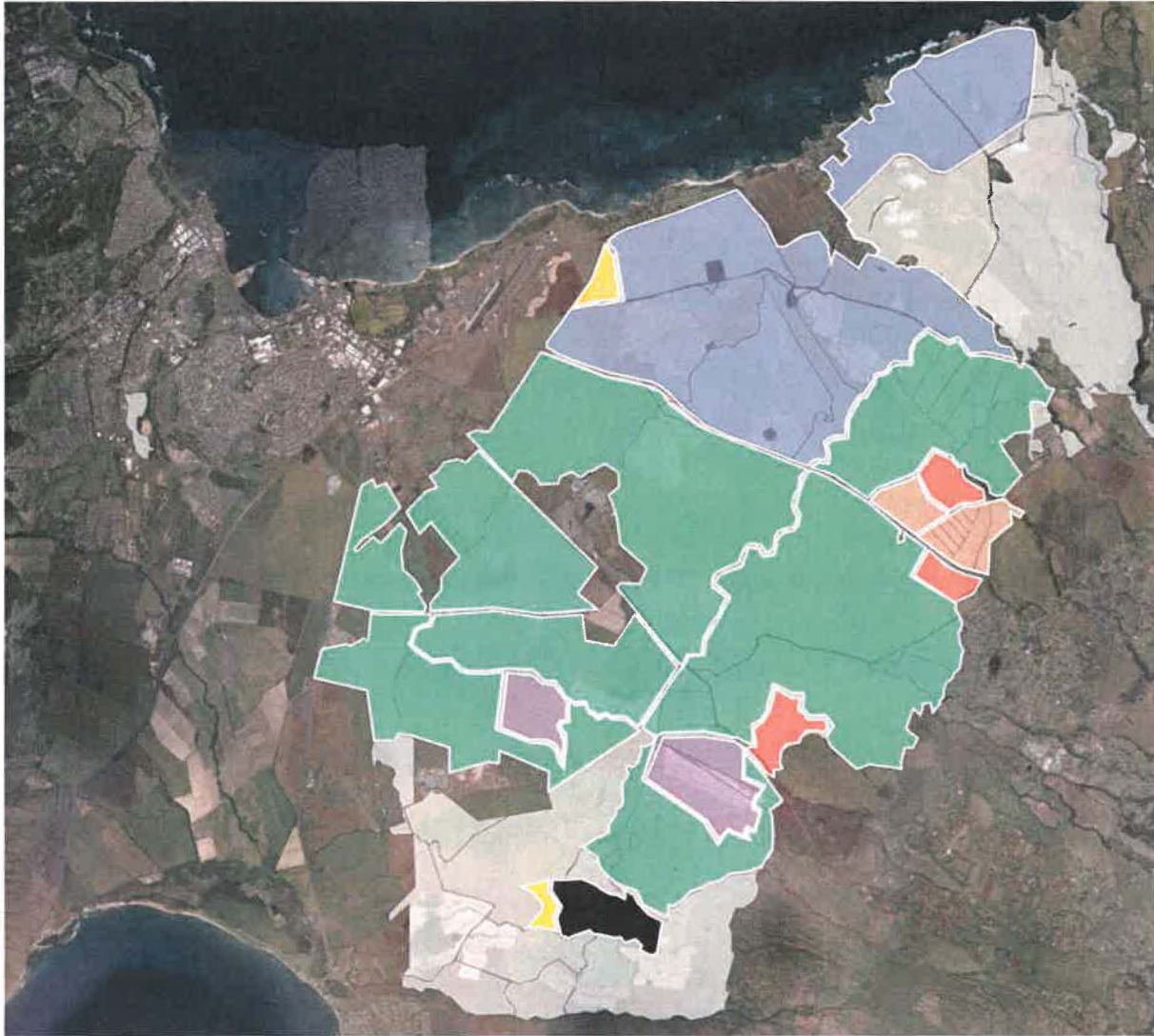
The majority of Central Maui fields are not currently in active cultivation. The Mahi Pono farm plan projects its 2030 vision and use of the total amount of water available from the EMI system after compliance with IIFS requirements in the 2018 D&O. The farm plan assumes that water available for use after system losses from the EMI system is about 65.8 mgd, supplemented with brackish groundwater equal to 20 % of surface water (16.47 mgd) for a total of 82.35 mgd.²

Proposed Use	Acres	Gallon Per Acre a Day	Surface MGD	Groundwater MGD	Total MGD	Annual MGD	% of Total
Community Farm	800	3,392	1.87	0.83	2.70	987	3.28%
Orchards (citrus, mac nuts, beverage crops)	12,850	5,089	53.39	12.04	65.43	23,883	79.48 %
Tropical Fruits	600	4,999	2.07	0.87	2.94	1,073	3.57%
Row and Annual Crops	1,200	3,392	3.14	0.95	4.09	1,491	4.96%
Energy Crops	500	3,392	1.18	0.53	1.70	622	2.07%
Pasture, irrigated	4,700	1,161	4.20	1.25	5.46	1,992	6.63%
Pasture, unirrigated	9,100	0	0	0	0	0	0.00%
Green Energy	250	0	0	0	0	0	0.00%
Total	30,000	2,744	65.86	16.47	82.33	30,047	100%

Mahi Pono's water use will be incremental and expected to evolve. An estimated 10 years is required to prepare the plantation fields and plant crops. Another 5 – 12 years for orchard trees to reach maturity. The Mahi Pono Farm Plan is illustrated in Figure 2-6 from the East Maui Water Lease Draft Environmental Impact Statement.

² Alexander & Baldwin, East Maui Irrigation Company Draft Environmental Impact Statement for the Proposed Lease for the Nahiku, Ke'anae, Honomanu, and Huelo License Areas. September 9, 2019, Table 2-1

ADDENDUM



LEGEND	
Orchard Crops	– GREEN
Irrigated Pasture	– BLUE
Unirrigated Pasture	– GREY
Row & Annual Crops	– PURPLE
Community Farm	– RED
Tropical Fruits	– ORANGE
Energy Crops	– BLACK
Green Energy	– YELLOW

The following tables are revised to reflect Mahi Pono’s projected irrigation demand.

15.6.5 Agricultural Demand Projections

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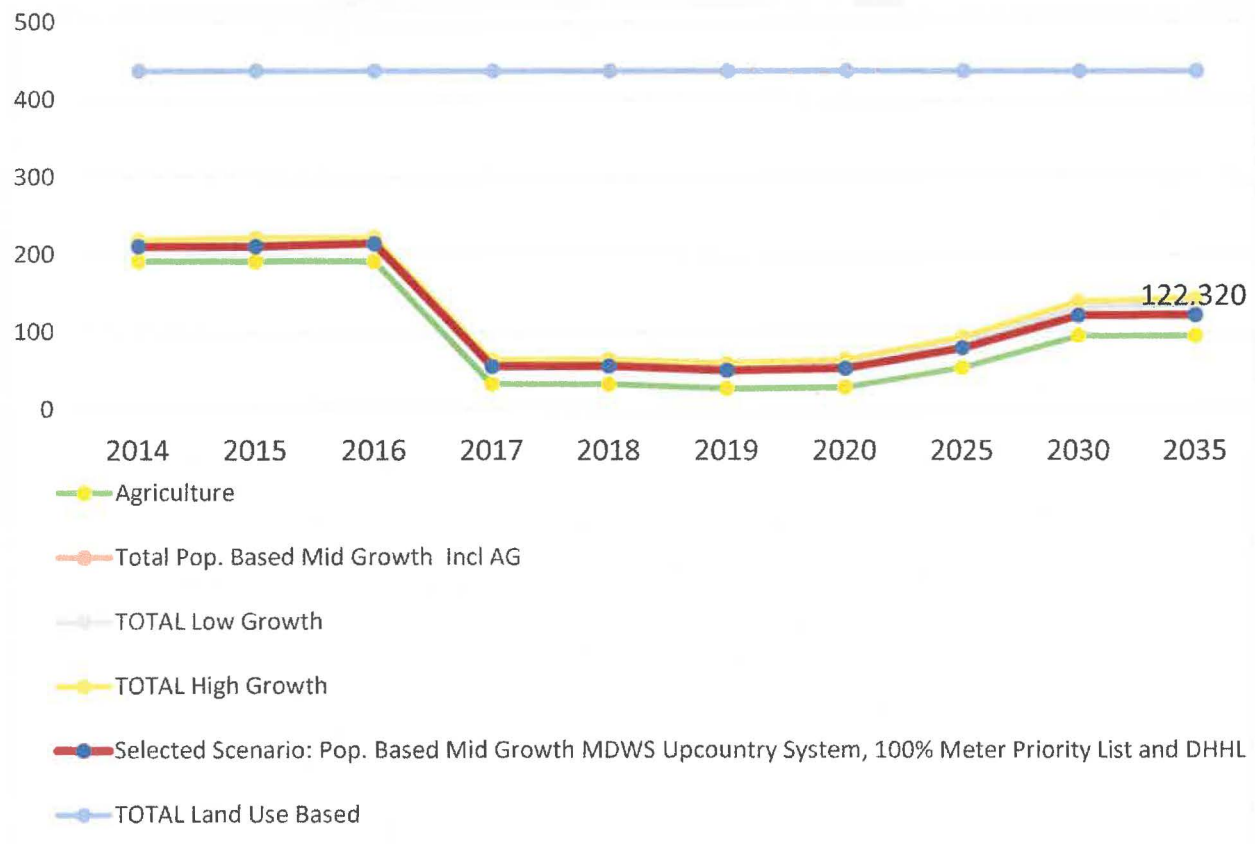
Table 15-31 Projected Low to High Agricultural Demand for Mahi Pono Farm Plan 2019 - 2035

	Low-Growth Scenario 2019 Crop Plans	Mid-Growth Scenario 50% of Farm Plan	High-Growth Scenario: 100% of Farm Plan
Time Frame	2020	2030	2035
Irrigated Acres	3,868	10,325	20,650
Irrigation Demand (mgd)	15.58	41.16	82.33

15.6.7 Population Growth-Based Water Demand Projections Analysis

The selected 20-year projected demand scenario for the Central ASEA is population mid-growth based, that account for the MDWS Upcountry system as a whole, with the addition of DHHL needs and the Upcountry Meter Priority List. Substituting the HC&S Diversified Agriculture Plan with Mahi Pono Farm Plan, total 2035 demand is projected to **122.32 mgd**, a decrease from 128.105 mgd.

Figure 15-26 Projected Water Use to 2035, Population Growth Based (Low, Medium, High) Central ASEA + MDWS Upcountry System + Upcountry Meter Priority List + DHHL (mgd)

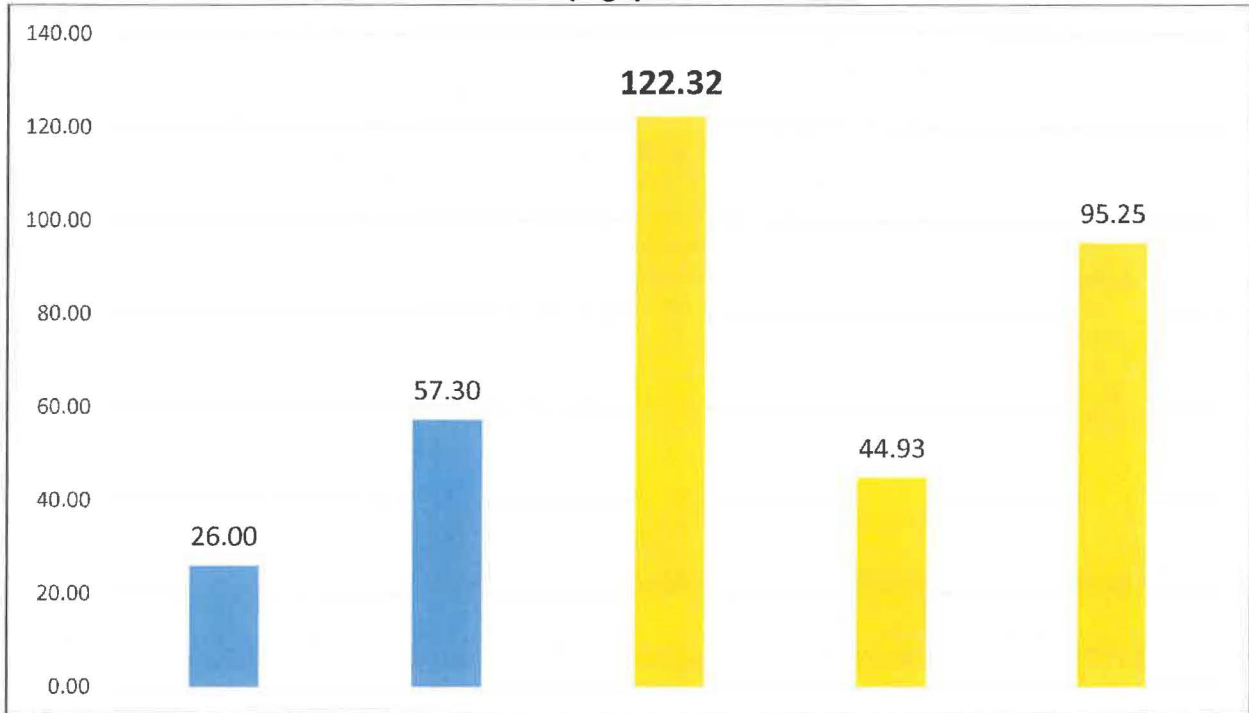


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15.7.2 Source Adequacy vs. Population-Growth Based Water Demand Projections (20-Year)

Total population growth-based demand in the Central ASEA as a separate hydrologic unit is about 44.9 mgd. As stated previously, the MDWS Central System is addressed in the Wailuku ASEA Report. Total Central ASEA water use demand not accounted for elsewhere in this WUDP update is therefore **122.32 mgd**.

Figure 15-27 Population Mid-Growth Based 20-Year Water Demand Projections and Available Water Resources within the Central ASEA (mgd)

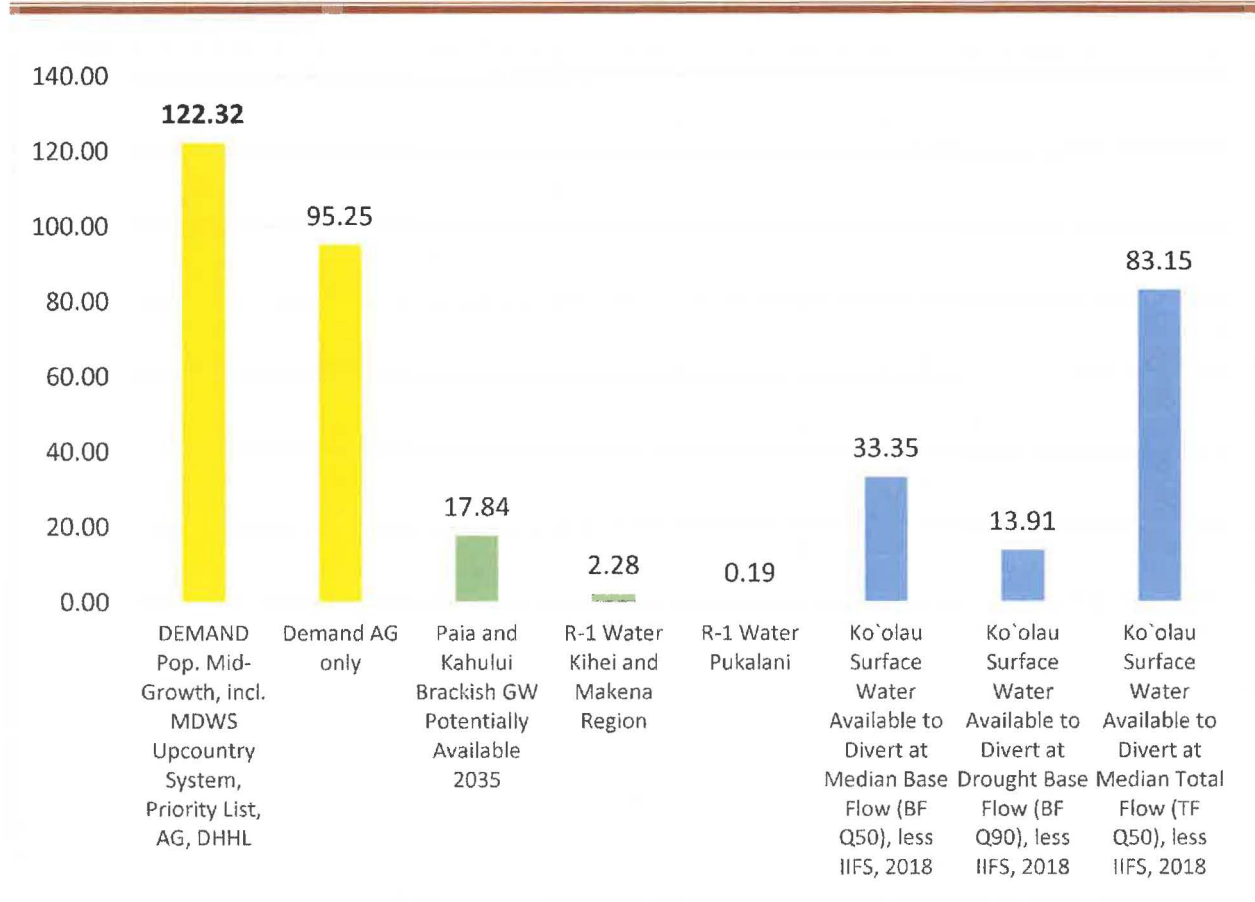


Groundwater Sustainable Yield	26.00
Pā`ia and Kahului Brackish GW Available in 2014	57.30
DEMAND Pop. Mid-Growth, incl. MDWS Upcountry System, Priority List, Land use based AG and DHHL (excl. MDWS Central System)	122.32
Demand Pop. Mid-Growth CENTRAL ASEA hydrologic unit only	44.93
Demand AG only	95.25

15.7.4 Surface Water Imports from Ko`olau Aquifer Sector Area

Figure 15-28 Population Mid-Growth Based 20-Year Water Demand Projections and Available Water Resources (2014 and 2018), Central ASEA and Ko`olau Surface Water Imports (mgd)

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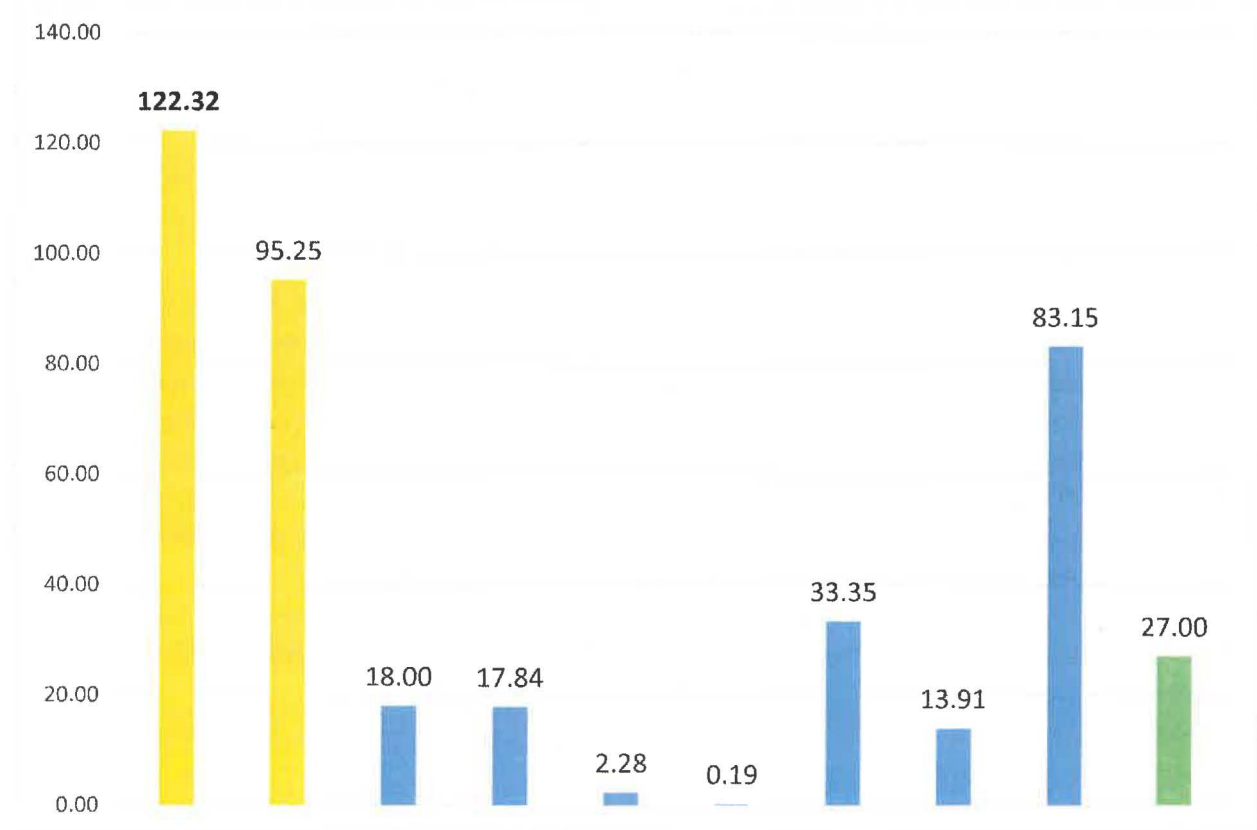


15.7.5 Groundwater Imports from Ko'olau Aquifer Sector Area

Figure 15 -29 Population Mid-Growth Based 20-Year Water Demand Projections and 2018 Estimated Available Water Resources, Central ASEA, Ko'olau Surface Water and Groundwater Imports

DEMAND Pop. Mid-Growth, incl. MDWS Upcountry System, Priority List, AG, DHHL	122.32
Demand AG only	95.25
Makawao and Kamaole GW Sustainable Yield	18.00
Pā'ia and Kahului Brackish GW Potentially Available 2035	17.84
R-1 Water Kihei and Makena Region	2.28
R-1 Water Pukalani	0.19
Ko'olau Surface Water Available to Divert at Median Base Flow (BF Q50), less IIFS, 2018	33.35
Ko'olau Surface Water Available to Divert at Drought Base Flow (BF Q90), less IIFS, 2018	13.91
Ko'olau Surface Water Available to Divert at Median Total Flow (TF Q50), less IIFS, 2018	83.15
Ko'olau GW Sustainable Yield	27.00

ADDENDUM



15.8.3 Conventional Water Source Strategies

Table 15-35 Available East Maui Streams and Brackish Groundwater Resources for (HC&S) Mahi Pono

Available Median Baseflow (BF Q ⁵⁰) to Divert at Wailoa Ditch	Streams West of Honopou to Maliko	Available Total Flow (TF) Wailoa Ditch, Est.	Brackish (pro-rated based on total irrigation)	Total Available Median BF	Total Available TF
20.35	8	78.14	16.4	44.75	94.54

A relative decrease in agricultural irrigation demand for Mahi Pono LLC compared to HC&S Diversified Agriculture Plan does not change **Strategy #6**. Alternative sources of irrigation water including wastewater reuse, recycled stormwater runoff and brackish well water is desirable to mitigate low flow stream conditions.

15.8.5 Alternative Water Source Strategies

The Mahi Pono farm plan proposed energy crop does not appear to be within feasible distance to an expansion of the Kahului Wastewater Treatment Facility distribution system. However, upgrade from R-2 to R-1 recycled water will make water reuse available for a broader range of

ADDENDUM

end uses, including edible crops. R-1 water can displace irrigation water otherwise diverted from Nā Wai `Ehā or East Maui streams. **Strategy #9** is amended as follows: Expand distribution from the Kahului WWTF for commercial, landscape and other non-potable irrigation applications. Potential available recycled water is 4.2 mgd. Lead agency is MDEM.

15.9 Recommendations

With adjustments for Mahi Pono projected needs, agricultural non potable demand can be met to about 93% based on estimated Total Flow available from Wailoa Ditch. The selected demand and supply scenario assumes that 6 mgd of potable surface water is allocated for expanded surface water use at Kamole Weir to meet growth of the MDWS Upcountry water system. In the alternative that groundwater from Haiku aquifer is the most feasible supply option to meet the needs of MDWS Upcountry water system instead, up to 102 mgd of non-potable water supply (surface water, brackish groundwater and recycled water) would be available to meet 99% of non-potable demand for the Central ASEA.

Table 15-38 Selected Scenario Projected Water Demand and Supply Options Central ASEA and MDWS Upcountry System

DEMAND (MGD)	2014	2015	2020	2025	2030	2035
MDWS Potable (Upcountry excl. Priority List)	7.610	7.693	8.155	8.292	8.432	8.530
Priority List	7.3	7.3	7.3	7.3	7.3	7.3
Municipal Private Potable	0.235	0.239	0.268	0.295	0.327	0.356
DHHL Potable Kahului Aquifer	0.000	0.000	1.734	1.734	1.734	1.734
DHHL Potable Kamaole Aquifer	0.000	0.000	0.349	0.349	0.810	0.813
Total Potable Demand:	15.145	15.232	17.806	17.970	18.603	18.734
Irrigation Non Potable	3.683	3.744	4.201	4.627	5.133	5.591
Agriculture, Non Potable	191.452	191.452	28.495	54.075	95.245	95.245
Industrial, Non Potable	0.208	0.211	0.237	0.261	0.290	0.316
DHHL, Non Potable	0.000	0.000	2.434	2.434	2.434	2.434
Total Non-Potable	195.343	195.408	35.368	61.398	103.103	103.587
TOTAL DEMAND	210.487	210.640	53.174	79.368	121.706	122.320
SUPPLY (MGD)	2014	2015	2020	2025	2030	2035
Pot. Groundwater Central ASEA Kahului Aquifer (serving MDWS Central System) * ¹	1.093	1.093	1.093	1.093	1.093	1.093
Pot. Groundwater Kahului Aquifer (non MDWS) * ²	0.161	0.161	1.895	1.895	1.895	1.895
Pot. Groundwater Central ASEA Kamaole Aquifer	0.027	0.027	0.027	1.036	1.497	1.500
Pot. Groundwater Central ASEA Pā`ia Aquifer* ³	0.248	0.998	0.998	0.998	1.500	1.500
Pot. Groundwater Central ASEA Makawao Aquifer	0.139	0.500	0.500	1.300	2.000	3.000
Pot. Groundwater Ko`olau ASEA Haiku Aquifer	0.81	0.81	1.4	1.4	1.4	1.4
Pot. Surface water	6.460	7.700	7.700	7.700	11.700	11.700
Water Conservation	0.000	0.000	0.519	1.195	1.989	2.676

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TOTAL POTABLE SUPPLY	7.845	10.196	13.039	13.629	20.086	21.776
Unmet Potable Demand	-7.300	-5.036	-4.767	-4.341	1.483	3.043
Non Pot. Groundwater Kahului Aquifer* ⁴	28.906	28.906	2.169	4.769	10.056	10.056
Non Pot. Groundwater Pā`ia Aquifer	29.258	29.258	8.361	8.361	8.361	8.361
Non Pot. Groundwater Kamaole Aquifer	2.826	2.888	3.345	3.991	4.277	4.735
Non Pot. Groundwater Makawao Aquifer	0.220	0.220	0.220	0.220	0.220	0.220
Non Pot. Surface Water Ko`olau BF* ⁵	133.943	134.133	27.473	28.500	28.500	28.500
Recycled Water (South Maui WWTF) Offset MDWS Central System* ⁶	2.280	2.280	2.280	2.280	2.280	2.280
Recycled Water Kahului WWTF) * ⁶	0.000	0.000	3.000	3.000	3.000	3.000
Recycled Water Upcountry	0.19	0.19	0.19	0.19	0.19	0.19
TOTAL NON-POTABLE SUPPLY (BF)	195.343	195.594	41.758	46.031	51.604	52.062
Unmet Non-Potable Demand	0.000	0.000	0.000	-15.367	-51.499	-51.525
TOTAL NON-POTABLE SUPPLY (TF)	195.343	195.594	41.758	90.451	96.024	96.482
Unmet Non-Potable Demand based on TF	0.000	0.000	0.000	0.000	-7.079	-7.105
TOTAL SUPPLY	203.187	205.790	54.797	104.080	116.110	118.258

*¹accounted for in Wailuku ASEA Supply

*² May also supply Pulehunui Ind. Development +3.8 mgd, source adequacy TBD

*³Includes Old Maui High School Project 0.75 mgd, source TBD

*⁴ Available brackish water 20% ratio of surface water irrigation: 2030 on 16.4 mgd divided between Paia and Kahului aquifers

*⁵ Available stream flow range from <28.5 mgd (BF) during drought to >78 mgd total flow. 72.9 mgd for Mahi Pono & KAP if 6 mgd to Kamole Weir

*⁶ Potential alternative source for Ag. Not counted as available supply

Table 15-39 Summary of Recommended Strategies Central ASEA

	STRATEGY	PLANNING OBJECTIVES	ESTIMATED COST	IMPLEMENTATION	
				AGENCY	TIME-FRAME
RESOURCE MANAGEMENT					
1	Explore funding and conduct a cost benefit analysis of improvements to the EMI non-potable conveyance system to mitigate losses and preserve existing reservoirs at risk of decommissioning. Priority components and associated costs TBD.	Maintain sustainable resources Protect water resources Protect and restore streams Maximize efficiency of water use	N/A	Maui County A&B Properties/EMI	1,2
CONVENTIONAL WATER SOURCE STRATEGIES					
2	Assess alternative options to restructure and process the existing Upcountry Meter Priority List to improve processing rate and adequate source development.	Provide adequate volume of water supply Maximize reliability of water service	N/A	MDWS	1,2

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3	Explore new basal well development in the Makawao Aquifer to accommodate growth Upcountry and add reliable new source. Potential yield is up to 3 mgd.	Provide adequate volume of water supply Maximize reliability of water service Minimize adverse environmental impacts	\$4.5 – 6.0 /1000 gallons	MDWS DLNR Public/ private partnerships	1,2
4	Explore East Maui well development in combination with Makawao Aquifer basal groundwater to meet projected demand on the MDWS Upcountry System. Initiate a hydrologic study to determine any negative impact on existing ground and surface water sources, stream flow and influences from dikes. Potential yield is > 6 mgd.	Provide adequate volume of water supply Maximize reliability of water service Minimize adverse environmental impacts	\$3.71* /1000 gallons	CWRM USGS MDWS	1,2
5	Explore Pā`ia Aquifer for non-potable demand, and potable use with additional treatment as necessary to serve projects included in the Maui Island Plan that cannot feasibly be serviced by MDWS source and infrastructure. Estimated demand for the Maui High School Campus is about 0.75 mgd.	Provide adequate volume of water supply Maximize reliability of water service	N/A	Maui County	1,2
	STRATEGY	PLANNING OBJECTIVES	ESTIMATED COST	AGENCY	TIME FRAME
6	Execute a long-term source agreement for use and maintenance of the Wailoa Ditch that ensures adequate non-potable supply for the Kula Agricultural Park expansion and potable supply for projected MDWS Upcountry System needs over the planning period.	Provide adequate volume of water supply Maximize reliability of water service	N/A	Maui County MDWS A&B Properties	
7	Pursue hydrologic studies needed to explore the Ha`ikū Aquifer and an updated ditch flow analysis to optimize raw water storage and treatment plant capacity at Kamole Weir in order to expedite the most feasible new source. Surface water strategies are contingent on a long-term agreement with A&B Properties allocating adequate surface water for the MDWS Upcountry System.	Minimize cost of water supply Provide adequate volume of water supply Maximize reliability of water service Maintain consistency with General and Community Plans	Surface water \$5.15 /1000 gal (20 yr) (construction cost \$50M, Operational \$1.47/1000 gal) Groundwater \$3.71/1000 gal	MDWS	1,2
ALTERNATIVE WATER SOURCE STRATEGIES					
8	Consider alternative sources of irrigation water including	Maintain sustainable resources	N/A	Maui County DEM	1,2

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	wastewater reuse, recycled stormwater runoff, and brackish well water in land use permitting to mitigate low flow stream conditions. Require alternative sources for irrigation when reasonably available in county discretionary land use permitting.	Protect and restore streams Minimize adverse environmental impacts Maximize efficiency of water use Maintain consistency with General and Community Plans		HC&S	
9	Expand distribution from the Kahului WWTF for commercial, landscape and other non-potable irrigation applications. Potential available recycled water is 4.2 mgd.	Maximize efficiency of water use Maintain consistency with General and Community Plans	\$6.7M	MDEM	1,2
10	MDWS and MDEM collaborate to identify private-public partnerships, state and federal funding sources to maximize utilization of recycled water produced at the Kīhei WWTF and supplemental non-potable sources for seasonal use of R-1 water.	Maximize efficiency of water use Maintain consistency with General and Community Plans	(Transmission South Kīhei to Wailea \$21M)	MDEM MDWS	1,2

Chapter 16 Ko`olau Aquifer Sector

The decision and order (D&O) issued June 20, 2018 for East Maui Streams Contested Case was incorporated into the March 2019 Draft WUDP. Water demand within the Central ASEA that relies on water exports from Ko`olau ASEA is addressed in Chapter 15. Adjusted water export projections for Mahi Pono LLC, Upcountry Agriculture and municipal needs are provided in the tables below.

BLNR Lease

A&B Properties submitted a Draft Environmental Impact Statement (EIS) to be accepted by the Board of Land and Natural Resources (BLNR) on September 9, 2019. Once a Final EIS is published and accepted by BLNR, the State of Hawai`i will conduct appraisals of the water from the license areas, produce lease agreements and a watershed management plan before putting the water lease to public auction. Mahi Pono LLC states that it can implement its proposed farm plan once BLNR issues a water lease.³ In the event that water lease is not granted to convey surface water from Ko`olau ASEA to Central and Upcountry Maui, alternative scenarios will have to be developed for surface water conveyance, agricultural and municipal demand scenarios.

Sustainable Yield

The Commission on Water Resource Management updated statewide sustainable yields (SY) in the 2019 Water Resource Protection Plan. Honopou aquifer system SY was revised from 25 mgd to 16 mgd. Haiku aquifer system SY was revised from 27 mgd to 24 mgd. The WUDP does not propose source development within Honopou aquifer. Groundwater development in Haiku aquifer as proposed in Chapter 14 and 15 to meet potable demand is well within revised SY. No adjustment is made to proposed strategies. 2019 SY is shown in Table A-1 of this Addendum.

³ Alexander & Baldwin, East Maui Irrigation Company Draft Environmental Impact Statement for the Proposed Lease for the Nahiku, Ke'anae, Honomanu, and Huelo License Areas. September 9, 2019

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Table 16-36 Projected Water Use by Water Use Category based on Population Growth (Low, Medium and High) and Land Use Full Build-Out to 2035 (gpd)

Category/ Growth Scenario	2014	2015	2016	2017	2018	2019	2020	2025	2030	2035
<i>Population-Based</i>										
Domestic	7,795	7,875	7,897	7,919	7,942	7,964	7,987	8,059	8,130	8,158
Industrial	00	00	00	00	00	00	00	00	00	00
Municipal DWS System*	979,871	989,863	992,687	995,511	998,335	1,001,158	1,003,982	1,013,003	1,022,018	1,025,562
Municipal Private PWS ⁴	14,793	14,944	14,987	15,029	15,072	15,114	15,157	15,293	15,429	15,483
Military	00	00	00	00	00	00	00	00	00	00
Subtotal Pop. Based Mid	1,002,459	1,012,682	1,015,571	1,018,459	1,021,348	1,024,237	1,027,126	1,036,355	1,045,578	1,049,204
TOTAL Mid	1,002,459	1,012,682	1,015,571	1,018,459	1,021,348	1,024,237	1,027,126	1,036,355	1,045,578	1,049,204
TOTAL Low	1,002,459	926,111	928,753	931,395	934,037	936,678	939,320	947,760	956,195	959,511
TOTAL High	1,002,459	1,092,435	1,102,388	1,018,459	1,021,348	1,024,237	1,027,126	1,036,355	1,045,578	1,049,204
Irrigation Ko'olau ASEA	1,695	1,695	1,695	1,695	1,695	1,695	1,695	1,695	1,695	1,695
DHHL ⁵	0	0	0	0	0	0	6,871,400	6,871,400	6,871,400	6,871,400
AG Ko'olau ASEA	21,078,745	21,078,745	21,271,826	21,466,676	21,663,311	21,861,747	22,062,001	23,091,122	24,168,248	25,294,494 ⁶
Surface Water Export for Agricultural & Irrigation	133,943,000	134,133,000	116,139,000	25,000	25,000	27,473,000	28,500,000	54,075,000	66,300,000	66,300,000
Surface Water Export for Municipal	6,460,000	7,700,000	7,700,000	7,700,000	7,700,000	7,700,000	11,700,000	11,700,000	11,700,000	11,700,000
TOTAL⁷	162,485,899	163,926,122	146,128,092	30,211,830	30,411,354	58,060,679	70,162,222	96,775,572	110,086,921	85,922,299

⁴ Based on 63,000 gpd potable use and 13,500 gpd non-potable use projection from DHHL's SWPP.

⁵ Based on SWPP, 2017 Final Report, Tables 3.7 and 4.7. Cumulative Average Day Demand (gpd).

⁶ Based on 20 percent estimated increase in agricultural water demand from 2015 to 2035.

⁷ Based on Mid-Growth Projection.

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Category/ Growth Scenario	2014	2015	2016	2017	2018	2019	2020	2025	2030	2035
<i>Land Use Full Build-Out Based⁸</i>										
County (Zoning) (Excl. AG)	1,913,798	1,913,798	1,913,798	1,913,798	1,913,798	1,913,798	1,913,798	1,913,798	1,913,798	1,913,798
DHHL (Excl. AG)	28,000	28,000	28,000	28,000	28,000	28,000	28,000	28,000	28,000	28,000
Total, (Excl. AG)	1,941,798	1,941,798	1,941,798	1,941,798	1,941,798	1,941,798	1,941,798	1,941,798	1,941,798	1,941,798
TOTAL (Incl. AG):	81,008,934	81,008,934	81,008,934	81,008,934	81,008,934	81,008,934	81,008,934	81,008,934	81,008,934	81,008,934

⁸ Land Use Full Build-Out Based analysis determined to be less accurate than Population-Based analysis (above).

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Table 16-40 Ko`olau ASEA Selected Demand Scenario: Projected Water Demand and Supply Options

DEMAND (MGD)	2015	2020	2025	2030	2035
MDWS Potable Groundwater for use Within Ko`olau ASEA* ¹	0.82	0.831	0.839	0.846	0.849
Other Potable Demand within Ko`olau ASEA	0.085	0.086	0.086	0.087	0.088
MDWS Potable Surface water for use Within Ko`olau ASEA* ²	0.104	0.105	0.106	0.107	0.107
Potable Surface Water Ko`olau ASEA* ¹	7.7	7.7	7.7	11.7	11.7
Total Potable Demand (not including MDWS Upcountry System)	0.085	0.086	0.086	0.087	0.088
Non-Potable Demand within Ko`olau ASEA	21.08	22.064	23.093	24.17	25.297
DHHL Non-Potable Demand* ⁵	0	6.375	6.375	6.375	6.375
Total Non-Potable Demand (Excluding Exports)	21.08	28.439	29.468	30.545	31.672
Total Demand (excluding exports)	21.165	28.524	29.554	30.632	31.759
SUPPLY (GPD)	2015	2020	2025	2030	2035
Ha`ikū ASYA Potable GW* ¹	0.830	0.831	0.839	0.846	0.849
Other Potable Ha`ikū ASYA	0.005	0.005	0.005	0.005	0.005
Other Potable Honopou ASYA	0.013	0.013	0.013	0.013	0.013
Other Potable Ke`anae ASYA	0.067	0.068	0.068	0.069	0.069
Potable Surface Water Ko`olau ASEA* ²	7.700	7.700	7.700	11.700	11.700
Total Potable Supply (excluding exports)	0.085	0.086	0.086	0.087	0.087
Non-Potable Groundwater Ha`ikū ASYA* ³	0.017	0.025	0.037	0.054	0.081
Non-Potable Surface Water for Use Within Ko`olau ASEA	21.064	22.039	23.056	24.116	25.216
Non-Potable Surface Water for Export to Central ASEA* ² * ⁴	134.133	40.200	65.775	78.000	78.000
Non-Potable DHHL supply from Pi`ina`au Stream* ⁵	0.000	4.275	4.275	4.275	4.275
Non-Potable DHHL supply from Waiokamilo Stream* ⁵	0.000	2.100	2.100	2.100	2.100
Total Non-Potable Supply (excluding exports)	21.080	28.439	29.468	30.545	31.673
TOTAL SUPPLY (within Ko`olau ASEA, excluding exports)	21.165	28.525	29.554	30.632	31.760

*¹ MDWS Upcountry System demand and supply are accounted for in Table 15-38 of the Central ASEA chapter.

*² MDWS surface water exported to Kamole Weir and then used to serve Ko`olau MDWS customers.

*³ Includes groundwater used within Ko`olau ASEA for irrigation and ag pumpage.

*⁴ 28.5 mgd base flow. Available streamflow range from <28.5 mgd drought base flow to >78 mgd total flow.

*⁵ Based on SWPP, 2017. Totals are entered in table to align with WUDP planning time increments.

Chapter 19 Lahaina Aquifer Sector

The Commission on Water Resource Management (CWRM) adopted Interim Instream Flow Standards (IIFS) for the following streams: Ukumehame, Olowalu, Launiupoko, Kaua`ula, Kahoma and Kanahā streams. Instream flow standard assessments were completed in 2019 for Honokowai, Honolulu, and Honokōhau streams. IIFS are intended and assumed to satisfy instream uses, including kalo lo`i. Where IIFS reduces available stream water for non-instream uses, such as agriculture, irrigation and municipal needs, adjusted water use, projected demand and supply and water resource strategies are summarized below.

Kahoma Stream

The Kahoma Stream IFS of 3.49 mgd was adopted on November 20, 2018. During median stream flow conditions, 0.257 mgd may be available for off stream uses after IIFS are satisfied. No additional stream flow is available during drought conditions. Agricultural irrigation demand of about 0.416 mgd will need to be met by groundwater from Launiupoko aquifer. No increase in agricultural irrigation is projected considering water supply limits. No expansion of reclaimed water distribution is projected for this area.

Kanahā Stream

Kanahā Stream, a smaller tributary of Kahoma Stream, is diverted by the MDWS for potable drinking water and also provides non-potable water to one local resident and Lahainaluna High School. The MDWS will be required to reduce its Kanahā Water Treatment Facility diversion by 0.55 mgd from Kanahā Stream under average flow conditions, with additions of 0.13 and 0.12 mgd to accommodate additional lo`i kalo being planted and supplying continuous flow in Kanahā Stream for a IIFS of 1.55 mgd. The 2019 WUDP strategy assumed less surface water would be available from 2025 on. The adjusted strategy for MDWS is an additional 0.24 mgd needed from Launiupoko aquifer to offset surface water (1.04 mgd instead of 0.8 mgd).

Ukumehame Stream

The CWRM adopted an IIFS of 2.9 mgd for Ukumehame Stream below its main diversion at 220 feet above sea level. IIFS will satisfy taro demand 0.13 mgd. Agricultural and irrigation demand, totaling 0.11 mgd by 2035 can be met by stream flow during median stream flow conditions but not during drought conditions. The revised strategy is an additional 0.11 mgd non potable groundwater use from existing wells.

Olowalu Stream

The CWRM adopted an IIFS of 2.33 mgd for Olowalu Stream (below its 130-foot-elevation abandoned U.S. Geological Survey gaging station). Olowalu Water could still meet its 0.196 mgd agricultural water demand and its 0.141 mgd landscaping irrigation demand during median

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stream flow conditions but not during drought conditions. The revised strategy is an additional 0.337 mgd non potable uses from existing or new well in Olowalu aquifer during drought. Pump capacity of existing well is 0.36 mgd.

Launiupoko Stream

Launiupoko Stream flow was proposed to stay the same because it rarely meets the ocean. Launipoko Irrigation Company (LIC) diverts water from Kaua`ula and Launiupoko streams for non-potable agriculture and landscape irrigation. Median amount diverted in 2017 was 0.24 mgd CWRM assessed water demand for all agricultural crops identified in LIC service area to 0.303 mgd which can be met during median stream flow conditions. During drought 0.077 mgd must be supplemented from Launiupoko aquifer. Landscape irrigation demand is also projected to be mitigated by targeted conservation measures.

Kaua`ula Stream

The CWRM adopted an IIFS of 3.36 mgd (below its main diversion at 1,540 feet) and 4.1 mgd (below kuleana users at 270 feet). LIC has urged all its customers to evaluate their water usage and be prepared to take “extreme measures to conserve water” and place a moratorium on new connections to adapt to the IIFS. LIC does not prioritize customer use, such as agriculture over landscape irrigation.⁹ Potable system backup and aggressive conservation may mitigate source shortage until groundwater wells are on line. LIC no longer deems stream diversions economically feasible and analyzes alternate water sources for non-potable uses.¹⁰ The supply strategy is groundwater from Launiupoko aquifer to supplement 0.396 mgd agricultural irrigation and 0.969 mgd landscape irrigation demand. Landscape irrigation demand of 5,000 gpa for 193.8 acres is projected to be mitigated by targeted conservation measures.

Honolua and Honokōhau Streams, Honokōhau Ditch

CWRM has not established IIFS for Honolua and Honokōhau streams. Following storm damage and a waste complaint filed on April 23, 2019 by Ka Malu O Kahalawai and West Maui Preservation Association against Maui Land and Pineapple company, CWRM staff determined 4.0 mgd of water removed from Honokōhau Stream but not used as wasted. Storm damage left the intake on Honolua stream inoperable resulting in full natural mauka to makai flow. The Commission requested that modifications be made to the diversions prior to establishing IIFS.¹¹In consistency with established IIFS for West and East Maui streams, *potential* IIFS could restore 64% of median baseflow and ensure sufficient flow for offstream public trust needs most of the time. It is assumed that MDWS and DHHL needs will be satisfied during median flow conditions. R-1 reclaimed water should supplement non-potable demand for new

⁹ Launiupoko Irrigation Co. Inc. Notice regarding impacts of Commission of Water Resource Management interim instream flow standards for Kaua`ula Stream, April 4, 2018

¹⁰ Launiupoko Irrigation Co. Inc letter to Commission on Water Resource Management, April 4, 2018

¹¹ CWRM Staff Submittal 11/20/19

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development, including MDWS and DHHL. Non-public trust uses, including golf course and resort irrigation should plan for groundwater and alternative supply to substitute stream flow during drought conditions.

Honokowai Stream and Ditch

Surface water diverted from Honokowai Stream and tributaries Kapaloa and Amalu Streams feed Honokowai Ditch. Median ditch flow in 1994 was 4.74 mgd. The ditch serves Kā`anapali Development Corporation coffee irrigation and landscaping of agricultural subdivisions. CWRM assessed irrigation demand for coffee to 4.04 mgd. It is assumed that future IIFS will restore a portion of streamflow, possibly 64% of median base flow. The supply strategy is groundwater from Honokowai aquifer and expansion of recycled R-1 water supply to supplement 4.04 mgd agricultural irrigation and an estimated 0.7 mgd landscape irrigation demand.

The following tables are revised to reflect adopted IIFS, Instream Flow Standard Assessment Reports (IFSAR) and CWRM staff investigations.

19.2.2 Water Resources

Table 19-3 Stream Diversions, Gages and IIFS by Watershed Unit

Aquifer System	Unit No.	Hydrologic Unit	Area (mi ²)	No. of Diversions	No. of Gages	Interim IFS [HAR]/IFS (MGD)
Ukumehame	6003	Pāpalaua	4.88	0	0	HAR §13-169-48
Ukumehame	6004	Ukumehame	8.28	1	2	2.90 mgd
Olowalu	6005	Olowalu	8.4	2	3	2.33 mgd
Launiupoko	6006	Launiupoko	6.6	1	1	HAR §13-169-48
Launiupoko	6007	Kaua`ula	8.44	1	5	3.36 mgd/4.1 mgd
Launiupoko	6008	Kahoma (+ Kanaha)	8.5	7	8	3.49 mgd + 1.55 mgd
Honokōwai	6009	Wahikuli	9.79	0	0	HAR §13-169-48, amended 8/17/1994
Honokōwai	6010	Honokōwai	8.86	2	6	HAR §13-169-48
Honokahua	6011	Kahana	9.07	1	1	HAR §13-169-48
Honokahua	6012	Honokahua	5.35	0	0	HAR §13-169-48
Honolua	6013	Honolua	4.79	4	4	HAR §13-169-48
Honokōhau	6014	Honokōhau	11.58	8	2	HAR §13-169-48
Honokōhau	6015	Anakaluahine	2.73	0	0	HAR §13-169-48

Sources: CWRM, *State Water Resources Protection Plan*, 2008; CWRM STAFF SUBMITTAL for the March 20, 2018 meeting of the COMMISSION ON WATER RESOURCE MANAGEMENT, Kahului, Maui Amended Interim Instream Flow Standards for the Surface Water Hydrologic Units of Ukumehame (6004), Olowalu (6005), Launiupoko, (6006), and Kaua`ula (6007), Maui.

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Table 19-5 Surface Water Units, Natural Streamflow, Diversions, and 1989 Declarations of Water Use

Unit Code	Hydrologic Unit Name	Lowest Median Streamflow Q50 (mgd)	Lowest Q70 (mgd)	Lowest Q90 (mgd)	Lowest Q95 (mgd)	No. of Diversions	Water Reported Diverted 2011-2015 Ave. (mgd)	Water Reported Diverted 2017 in IIFS Assessment	Declared Water Use 1989 (mgd)	Estimated Water Use of Individuals Interpretation of 1989 Decl. of Water Use (mgd)	Kuleana Parcels
6003	Pāpalaua	0	0	0	0	0	0		0		
6004	Ukumehame	3.23	2.585	2.067	1.938	1	0	0.016	4.888		Yes
6005	Olowalu	3.940	2.908	2.196	2.003	2	1.622	1.45	4.556	0.002	Yes
6006	Launiupoko	0.304	0.265	0.226	0.220	1	0.405	0.24	0.728		
6007	Kaua`ula	6.137	4.589	3.359	3.101	1	2.610	4.58	6.008	0.0267	Yes
6008	Kahoma	3.747	3.49	1.873	1.292	7	0.416	0.313	5.626		Yes
	Kanahā	3.165	2.908	2.649	2.584	0	1.6216	1.71	0	0.0795	
6009	Wahikuli	Dry at least 50% of the time				0					
6010	Honokōwai*	3.488	2.908	2.65	2.196	2	0		0		Yes
6011	Kahana	Dry at least 50% of the time				0					
6012	Honokahua	Dry at least 50% of the time				0					
6013	Honolua	2.455	0.776	0	0	4	0		0	0.023	Yes
6014	Honokōhau	13.566	10.341	7.752	7.106	8	13.540	5.62	0.011	0.316	Yes
6015	Anakaluahine	0	0	0	0	0	0		0		
Total		40.033	30.771	22.449	20.439	27	20.215		22.916	0.447	

Source: Diversions, Declared Use 1989, Reported Water Diverted 2011-2015: CWRM Reports. Discharges (Q figures): USGS Scientific Investigations Report 2016-5103. Kuleana parcels-MDWS interpretation of location based on Office of Hawaiian Affairs GIS data, 2009. Est. Water Use—interpretation of 1989 Dec. of Water Use (Individuals): Interpreted and summarized by MDWS based on 1989 Declarations of Water Use, Circular 123, Volumes 1 and 2, CWRM, September 1992, for individuals (excludes municipal, commercial, quasi-public, homeowner association landscape irrigation, etc.); duplicated claims of use are counted once; livestock watering operations are not counted. Declarations and MDWS interpretation has not been verified by CWRM

Updates 2020: CWRM IFSAR: PR201701, PR201702, PR201703, PR201704, PR201808-6008, PR201901-6010, PR201902-6013, R201903-6014

*Combined flow of tributaries Amalu and Kapalooa streams. A development tunnel provides dike impounded groundwater to Kapalooa stream.

ADDENDUM

19.5.1 Water Use by Type

Table 19-6 Reported Pumpage, Estimated Surface Water Use and Reclaimed Wastewater by Type, Lahaina ASEA, 2014 (mgd)

Aquifer	Domestic	Industrial	Agriculture	Irrigation	Municipal	Military	Total
Total No. of Production Wells	4	0	6	32	40	0	82
Honokōhau	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Honolua	0.000	0.000	0.000	0.035	2.566	0.000	2.601
Honokōwai	0.000	0.000	0.000	0.049	3.003	0.000	3.052
Launiupoko	0.000	0.000	0.000	0.119	0.360	0.000	0.479
Olowalu	0.000	0.000	0.000	0.069	0.000	0.000	0.069
Ukumehame	0.000	0.000	0.000	0.000	0.007	0.000	0.007
Total Groundwater Pumpage	0.000	0.000	0.000	0.271	5.936	0.000	6.208
% of Pumpage	0%	0%	0%	4%	96%	0%	100%
Surface Water							
Kanaha Stream	0.000	0.000	0.000	0.000	1.763	0.000	1.763
Kahoma Stream	0.000	0.000	0.416	0.000	0.000	0.000	0.416
Ukumehame Stream	0.000	0.000	0.045	0.004	0.000	0.000	0.049
Olowalu Stream	0.000	0.000	0.196	1.426	0.000	0.000	1.622
Kaua`ula Stream	0.000	0.000	0.396	2.214	0.000	0.000	2.610
Launiupoko Stream	0.000	0.000	0.405		0.000	0.000	0.405
Honokowai Stream	0.000	0.000	4.750	0.700	0.000	0.000	5.450
Honokōhau Ditch	0.000	0.000	0.300	2.008	1.536	0.000	3.844
Honokōhau Ditch losses, estimated							3.939
Total Surface Water Diverted	0.000	0.000	6.508	6.352	3.299	0.000	20.098
Percent of Surface Water Diverted	0.000	0.000	32%	32%	16%	0.000	
Reclaimed WW	0.000	0.000	0.000	1.330	0.000	0.000	0.630
TOTAL	0.000	0.000	6.508	7.953	9.235	0.000	26.936

Source: CWRM Well Pump Quantities Database, 2014;

Updates 2020: CWRM IFSAR: PR201701, PR201702, PR201703, PR201704, PR201808-6008, PR201901-6010, PR201902-6013, R201903-6014, CWRM Staff Submittal 11/20/19

ADDENDUM

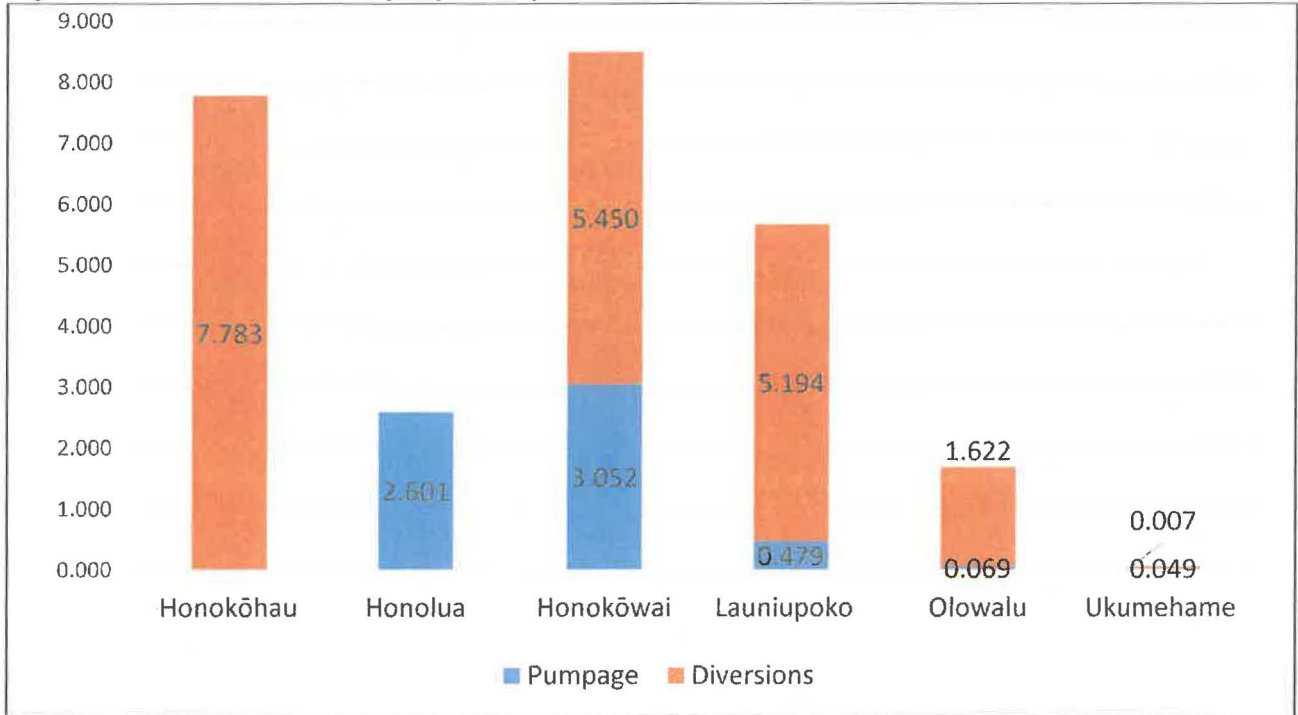
Table 19-7 Estimated End Use of Surface Water Diversions

Use Type	End Use (mgd)	Percent
Irrigation	6.352	32
Agriculture	6.508	32
Municipal	3.299	16
Water losses	3.939	20
Total	20.098	100

Source Updates 2020: CWRM IFSAR: PR201701, PR201702, PR201703, PR201704, PR201808-6008, PR201901-6010, PR201902-6013, R201903-6014, CWRM Staff Submittal 11/20/19

19.5.2 Water Use by Resource

Figure 19-17 Water Source by Aquifer System Area, 2014 (mgd)



Source: CWRM Well Pumpage Reports. Surface water updates 2020: CWRM IFSAR: PR201701, PR201702, PR201703, PR201704, PR201808-6008, PR201901-6010, PR201902-6013, R201903-6014

Table 19-21 Estimated Surface Water End Use, Lahaina ASEA

Use Type	End Use (mgd)	Percent
Irrigation	6.352	32
Agriculture	6.508	32
Municipal	3.299	16
Water losses	3.939	20
Total	20.098	100

Source Updates 2020: CWRM IFSAR: PR201701, PR201702, PR201703, PR201704, PR201808-6008, PR201901-6010, PR201902-6013, R201903-6014, CWRM Staff Submittal 11/20/19

Figure 19-18 is deleted.

19.6.5 Agricultural Demand Projections

Non-potable agricultural irrigation mid-growth demand scenario is represented by updated end use assessments and projected increases in IFSAR. Updated agricultural demand projections exceed the high growth scenario (2015 Crop Baseline with a 1% annual increase) and therefore includes the established high growth scenario with no further adjustment.

19.6.6 Irrigation Demand Projections

Landscape irrigation projections for golf courses, resort common areas and luxury homes are represented by updated end use assessments and projected increases in IFSAR. Increase demand is based on visitor unit growth: 1.15 percent annually with number of visitor units projected to grow about 14 percent in West Maui over 20 years.¹² Increased demand is projected to be offset by targeted conservation for landscaping and design in build-out.

Figure 19-29 growth scenario is revised to reflect demand projections for agricultural and landscape irrigation.

Figure 19-29 Lahaina ASEA Projected Population Growth and Land Use Build-Out Based Water Demand, 2015 – 2035 (Excludes Land Use Based Demand with AG) (mgd)

¹² Maui County Socio-Economic Forecast Report, 2014

ADDENDUM

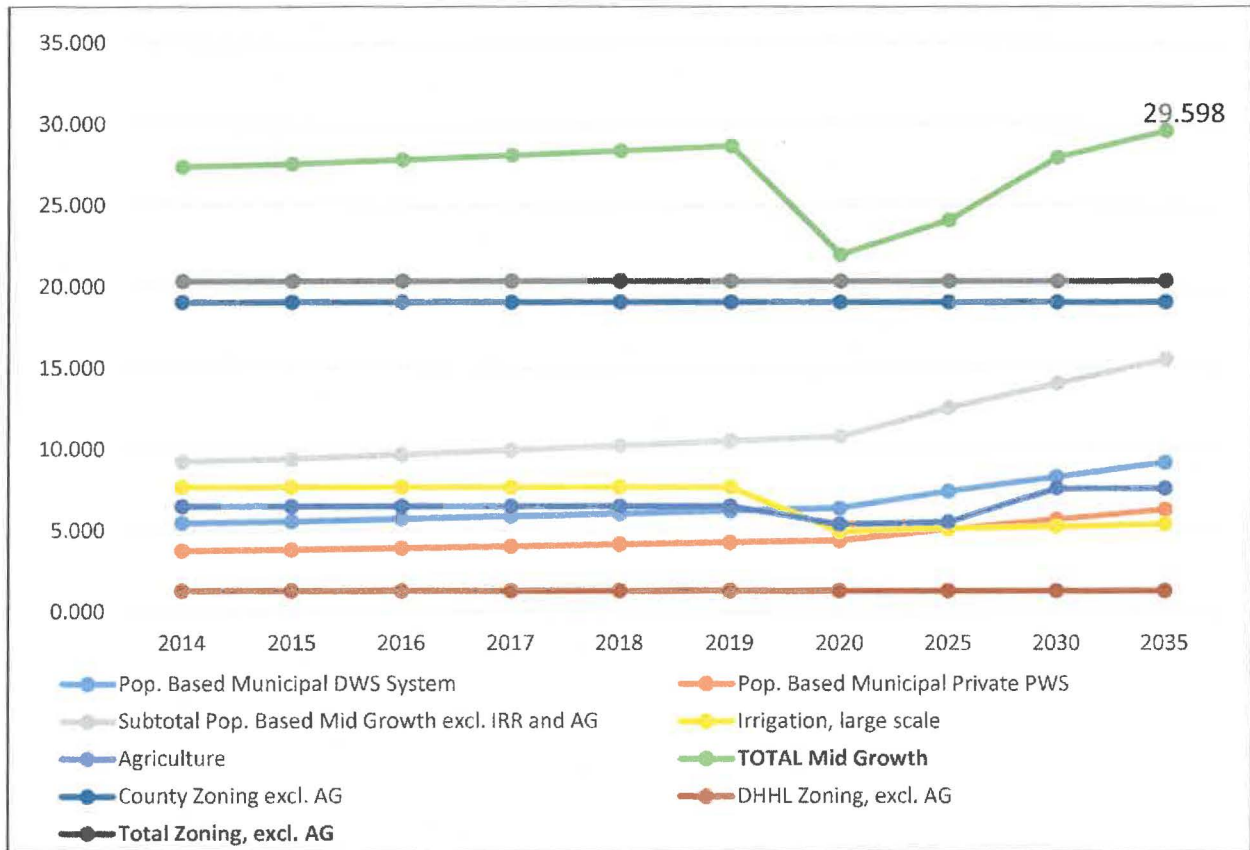


Table 19-35 Projected Water Use by Water Use Category based on Population Growth (Low, Mid and High) and Land Use Full Build-Out to 2035 (mgd)

	2014	2015	2016	2017	2018	2019	2020	2025	2030	2035
Population Based										
Domestic	0.036	0.037	0.038	0.039	0.040	0.041	0.042	0.049	0.055	0.060
Industrial	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Agriculture	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Irrigation	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Municipal DWS System	5.478	5.574	5.729	5.888	6.052	6.220	6.393	7.442	8.315	9.191
Municipal Private PWS	3.757	3.823	3.929	4.038	4.151	4.266	4.384	5.104	5.703	6.303
Military	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Subtotal Pop. Based Mid Growth excl. large IRR and AG	9.271	9.434	9.696	9.965	10.243	10.527	10.819	12.595	14.073	15.554
IRR, large scale/surface water	7.682	7.682	7.682	7.682	7.682	7.682	4.941	5.132	5.265	5.402

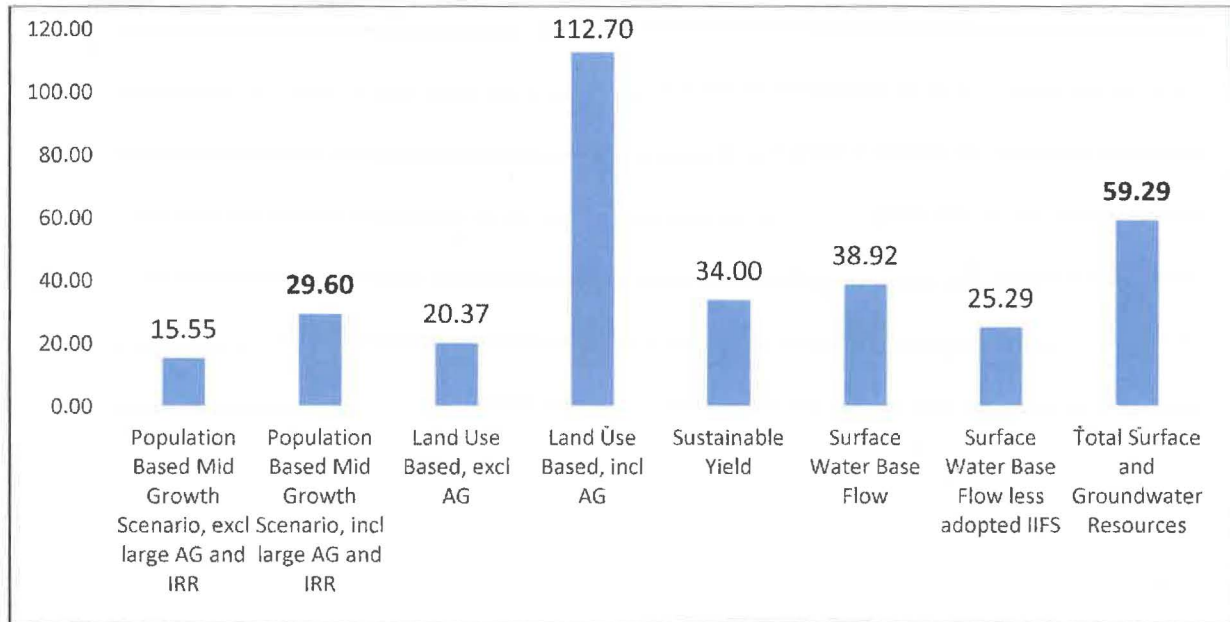
ADDENDUM

AG, surface water	6.508	6.508	6.508	6.508	6.508	6.508	5.393	5.531	7.611	7.611
Est. Honokōhau Ditch losses*	3.939	3.939	3.939	3.939	3.939	3.939	0.842	0.865	1.020	1.030
TOTAL Mid Growth	27.400	27.563	27.825	28.094	28.372	28.656	21.996	24.123	27.969	29.598
TOTAL Low Growth	27.400	26.757	26.997	27.243	27.497	27.756	21.071	23.047	26.766	28.268
TOTAL High Growth	27.400	28.307	28.589	28.880	29.180	29.486	22.848	25.116	29.078	30.823
Land Use Full Build-out Based										
County (Zoning) (Excl. AG)	19.070	19.070	19.070	19.070	19.070	19.070	19.070	19.070	19.070	19.070
DHHL (Excl. AG)	1.295	1.295	1.295	1.295	1.295	1.295	1.295	1.295	1.295	1.295
Total, (Excl. AG)	20.365	20.365	20.365	20.365	20.365	20.365	20.365	20.365	20.365	20.365
TOTAL (Incl. AG) not shown on chart	112.700	112.700	112.700	112.700	112.700	112.700	112.700	112.700	112.700	112.700

*3.9 mgd missing 2014 - 2019. 2020 on, est. based on Nā Wai `Ehā 7%

19.7.1 Source Adequacy vs. Land Use Full Build-Out Based Water Projections

Figure 19-30 Land Use Full Build-Out and Population Mid-Growth Based Water Demand Projections, Lahaina ASEA, 2035



ADDENDUM

Based on revised agricultural and landscape irrigation projections, total selected 2035 demand for Lahaina ASEA is **29.6 mgd** within a range of 28.2 to 330.8 mgd (instead of 34.5 mgd).

19.8.1 Resource Management

Watershed Protection

The West Maui Mountains Watershed Partnership changed name to Mauna Kahalawai Watershed Partnership.

19.8.2 Conservation

Agricultural Water Systems Water Loss Mitigation: Strategy #3

Storm damage and a waste complaint filed on April 23, 2019 by Ka Malu O Kahalawai and West Maui Preservation Association against Maui Land and Pineapple company triggered a much needed assessment and repairs of the Honokōhau Ditch and stream diversion works.¹³ Repairs were completed in May 2020. Pending a review of the assessment, Strategy #3 is not amended.

19.8.3 Conventional Water Source Strategies

Groundwater Development to Meet Population Growth

MDWS will be required to reduce its Kanahā Water Treatment Facility diversion by 0.55 mgd from Kanahā Stream under average flow conditions, with additions of 0.13 and 0.12 mgd to meet an IIFS of 1.55 mgd. The adjusted strategy for MDWS is an additional 0.24 mgd needed from Launiupoko aquifer to offset surface water (1.04 mgd instead of 0.8 mgd).

Table 19-36 Groundwater Source Development to Meet Population Growth-Based Demand in Lahaina ASEA 2035 (mgd)

Aquifer System	Existing Source Capacity	2035 Projected Demand	Source Need*	Total Develop	Sustainable Yield	Yield Remaining
Honokōhau	0.00	0.00	0.00	0.00	9.00	9.00
Honolua	3.40	2.74	2.00	5.40	8.00	2.60
Honokōwai	3.00	8.47	1.80	4.80	6.00	1.20
Launiupoko	0.65	4.37	4.50	5.39	7.00	1.61
Olowalu	0.07	0.11	0.30	0.37	2.00	1.63
Ukumehame	0.01	0.01	0.10	0.11	2.00	1.89
Surface WTF	3.56			3.56		
Total	10.69	15.72	8.70	19.39	34.00	14.61

¹³ Staff Submittal for the meeting of the Commission on Water Resource Management, November 20, 2019

ADDENDUM

*Projected demand, additional 21 % to account for peak demand (19.63 mgd), less developed source capacity for region
 Source: MDWS Water Resources & Planning Division, 2017. Revised 2020

Non-Potable Groundwater Development

Projected 2035 landscape irrigation demand of 5.4 mgd and agricultural irrigation demand of 7.6 mgd is anticipated to be offset by targeted conservation and expanded recycled water use. Brackish groundwater near the coast is not appropriate for all crops and landscaping plants. Additional use of existing basal wells and new well development will be necessary to offset restored stream flow and at a minimum as contingency supply during drought stream flows. Non potable groundwater development needs based on IIFS established to date is projected to 5.06 mgd by 2025. Expansion of recycled water distribution takes time but is anticipated to offset roughly 3 mgd. Conservation measures should further mitigate landscape irrigation needs over the planning period.

Strategy # 6 (NEW): Develop non potable groundwater to offset reduced stream flow diversions to meet established IIFS and provide reliable drought source. This strategy meets planning objectives to protect and restore streams, protect cultural resources, provide reliable and adequate volume of water supply.

Surface Water Seasonal Use

Strategy #6, now renumbered Strategy #7, supports established IIFS and ensures protection of in-stream needs, including kuleana, traditional and customary and ecosystem needs, that are most vulnerable in dry season. As additional groundwater supplies are developed to meet off-stream needs, a seasonal approach mitigate surface water diversions during dry season, but take advantage of affordable surface water for treatment when it's plentiful during the wet winter months.

19.9 Recommendations

Table 19-39 Selected Demand Scenario: Projected Water Demand and Supply Options

	2014	2015	2020	2025	2030	2035
Domestic Potable	0.036	0.037	0.042	0.049	0.055	0.060
MDWS Potable	5.478	5.574	6.393	7.442	8.315	9.191
Municipal Private Potable	3.757	3.823	4.384	5.104	5.703	6.303
Total Potable Demand	9.271	9.434	10.819	12.595	14.073	15.554
Irrigation Non-Potable	7.682	7.682	4.941	5.132	5.265	5.402
Agriculture Non-Potable	6.508	6.508	5.393	5.531	7.611	7.611
DHHL Agriculture Non-Potable*	0.000	0.000	0.000	0.000	2.080	2.080
Taro met by IIFS	2.349	2.349	2.349	2.349	2.349	2.349
Honokōhau Ditch water loss, est.**	3.939	3.939	0.842	0.865	1.020	1.030
Total Non-Potable Demand	18.129	18.129	11.177	11.528	13.896	14.044
TOTAL DEMAND	27.400	27.563	21.996	24.123	27.969	29.598

ADDENDUM

Potable Surface Water Supply	3.299	3.299	3.500	2.460	2.460	2.460
Honokōhau Ditch	1.536	1.536	1.700	1.700	1.700	1.700
Kanaha Stream	1.763	1.763	1.800	0.760	0.760	0.760
Potable Groundwater Supply	5.972	6.153	7.319	10.135	11.613	13.094
Honokōhau Aquifer	0.000	0.000	0.000	0.000	0.000	0.000
Honolua Aquifer	2.566	2.747	3.440	4.100	4.300	4.300
Honokowai Aquifer***	3.003	3.003	3.696	3.700	3.800	4.000
Launiupoko Aquifer	0.360	0.360	0.360	2.040	3.240	4.540
Olowalu Aquifer	0.036	0.036	0.036	0.370	0.370	0.370
Ukumehame Aquifer	0.007	0.007	0.007	0.110	0.110	0.110
Total Potable Supply	9.271	9.452	10.819	12.595	14.073	15.554
Non Potable Surface Water Supply	16.839	16.839	7.181	2.642	4.787	4.854
Honokōhau Ditch	6.247	6.247	2.097	2.298	4.443	4.510
Honokowai Stream	5.450	5.450	4.740	0 - 4.74	0 - 4.74	0 - 4.74
Kahoma Stream	0.416	0.416	0 - 0.257	0 - 0.257	0 - 0.257	0 - 0.257
Kanaha Stream	0.040	0.040	0.040	0.040	0.040	0.040
Launiupoko Stream	0.405	0.405	0.304	0.304	0.304	0.304
Kaua`ula Stream	2.610	2.610	0 - 0.277	0 - 0.277	0 - 0.277	0 - 0.277
Olowalu Stream	1.622	1.622	0 - 0.337	0 - 0.337	0 - 0.337	0 - 0.337
Ukumehame Stream	0.049	0.049	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33
Non-Potable Groundwater Supply	0.000	0.000	1.863	5.067	2.650	2.320
Honolua Aquifer	0.000	0.000	0.000	0.000	0.000	0.000
Honokowai Aquifer	0.000	0.000	0.000	3.101	1.090	0.867
Launiupoko Aquifer	0.000	0.000	1.477	1.511	1.097	0.982
Olowalu Aquifer	0.000	0.000	0.337	0.342	0.347	0.352
Ukumehame Aquifer	0.000	0.000	0.049	0.114	0.116	0.119
Recycled R-1****	1.330	1.330	1.330	3.000	5.230	5.230
Conservation 8% per capita	0.000	0.000	0.820	0.820	1.229	1.639
Total Non-Potable Supply	18.169	18.169	11.194	11.528	13.896	14.044
TOTAL SUPPLY	27.440	27.621	22.013	24.123	27.969	29.598

Table Notes:

*DHHL incl. in Non-pot Ag. Consider R-1/Honokohau Ditch blend

**3.9 mgd missing 2014 - 2019. 2020 on, est. based on Nā Wai `Ehā 7%

***DHHL 0.77 mgd reservation of Honokowai aquifer

****R-1 expansion offset non pot Honokowai GW

Strategies in Table 19-40 are renumbered to add Strategy #6

ADDENDUM

Table 19-40 Summary of Recommended Strategies, Lahaina ASEA

STRATEGY	PLANNING OBJECTIVES	ESTIMATED COST	IMPLEMENTATION		
			AGENCY	TIME-FRAME	
RESOURCE MANAGEMENT					
1.	Continue Maui County financial support for watershed management partnerships' fencing and weed eradication efforts.	Maintain sustainable resources Protect water resources Protect and restore streams	\$0.7M - \$0.8M - per year/\$14 per watershed acre (47,321 ac)	MDWS Maui County	1
2.	Support local initiatives that seek mauka to makai/traditional ahupua`a management. Educate and raise public awareness of ahupua`a management to foster partnerships for use and management of stream waters	Maintain sustainable resources Protect water resources Protect and restore streams	N/A	Public-private partnerships Aha Moku DLNR Maui County	1
CONSERVATION					
3.	Undertake comprehensive study of Maui Land & Pine, former Pioneer Mill and Lahainaluna ditches in AWUDP update	Maintain sustainable resources Protect water resources Protect and restore streams Protect cultural resources	N/A	DOA Private purveyors MDWS	1, 2
CONVENTIONAL WATER SOURCE STRATEGIES					
4.	Develop basal groundwater wells to provide adequate water supply for planned population growth, maintaining a buffer to sustainable yield	Provide adequate volume of water supply Maximize reliability of water service Minimize adverse environmental impacts Minimize cost of water supply	3.50/1,000 gallons	MDWS Public Water Systems	1, 2
5.	Ensure "smart source development" guided by available data and modeling results to optimize pumpage, mitigate salt water intrusion and preserve regional resources with adequate distribution to Launiupoko and Honolua aquifers	Maintain sustainable resources Protect water resources Minimize adverse environmental impacts Manage water equitably	N/A	MDWS Private purveyors DHHL	1
6.	Develop non potable groundwater to offset reduced stream flow diversions to meet established IIFS and provide reliable drought source.	Protect and restore streams Protect cultural resources Provide adequate volume of water supply	N/A	MDWS Private purveyors DHHL	1
7.	Install a gage at Kanahā stream	Maintain sustainable	\$25K - \$35K	MDWS	1

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	above existing intakes to collect stream flow data in order to initiate assessment of Instream Flow Standards. Prioritize IFS for diverted streams.	resources Protect water resources Manage water equitably	installation. Annual monitoring \$15K/year	CWRM USGS	
8.	Seasonal use of surface water to take advantage of affordable supply in wet season and shift non-instream needs to groundwater and alternative supply when available in dry season to promote stream restoration	Protect and restore streams Protect cultural resources Provide adequate volume of water supply Minimize cost of water supply	Surface water use: \$1.90 - \$2.15/1000 gal Basal well from \$3.50/1000 gal	CWRM MDWS Private purveyors	1, 2
9.	Interconnect MDWS subsystems and develop contingency agreements between purveyors in the region.	Maximize reliability of water service Maximize efficiency of water use	\$12.3M	MDWS Private purveyors DHHL	2
ALTERNATIVE WATER SOURCE STRATEGIES					
10	Support capital improvement funding for recycled water projects and needed infrastructure expansion in the Lahaina region to offset potable water to the maximum extent feasible.	Maximize efficiency of water use Maintain consistency with General and Community Plans	\$25.9M	DEM MDWS Private purveyors Private developers	2
11	Explore Kahoma Stream flood control project to collect and convey storm-water for agricultural use.	Minimize adverse environmental impacts Maximize efficiency of water use	\$12.9M	DPW DOA	2

ADDENDUM

Table A-1 Sustainable Yields Comparison as Established by the Commission on Water Resource Management

ASEA	ASYA	2019 SY RANGE	2008 SY	2019 SY	CHANGE
Wailuku	Waikapu	~ 3-8	3	3	0%
Wailuku	Iao	~ 10-28	20	20	0%
Wailuku	Waihee	~ 6-23	8	8	0%
Wailuku	Kahakuloa	~ 5-8	5	5	0%
Lahaina	Honokōhau	~ 9-17	9	9	0%
Lahaina	Honolua	~ 8-11	8	8	0%
Lahaina	Honokowai	~ 6-16	6	6	0%
Lahaina	Launiupoko	~ 7-18	7	7	0%
Lahaina	Olowalu	~ 2-7	2	2	0%
Lahaina	Ukumehame	~ 2-6	2	2	0%
Central	Kahului	~ 1-10	1	1	0%
Central	Pā`ia	~ 7-33	7	7	0%
Central	Makawao	~ 7-25	7	7	0%
Central	Kamaole	~ 11-16	11	11	0%
Koolau	Haiku	~ 24-31	27	24	-11%
Koolau	Honopou	~ 16-29	25	16	-36%
Koolau	Waikamoi	~ 37-46	40	37	-8%
Koolau	Keanae	~ 75-96	83	75	-10%
Hana	Kuhiwa	~ 14-38	16	14	-13%
Hana	Kawaipapa	~ 31-48	48	31	-35%
Hana	Waihoi	~ 18-24	18	18	0%
Hana	Kipahulu	~ 15-57	42	15	-64%
Hana	Kaupo	~ 13-17	16	13	-19%
Hana	Nakula	~ 7-15	7	7	0%
Hana	Lualailua	~ 11-15	11	11	0%
Maui Island			429	357	-17%

Source: State of Hawaii Commission on Water Resource Management and Townscape Inc. Resource Protection Plan 2019 Update