July 14, 2021

MEMO TO: APT-57 File

F R O M: Shane M. Sinenci, Chair
Agriculture and Public Trust Committee

SUBJECT: **TRANSMITTAL OF INFORMATIONAL DOCUMENT RELATING TO THE WATER USE AND DEVELOPMENT PLAN FOR MAUI** (APT-57)

The attached informational document pertains to Item 57 on the Committee's agenda.

apt:ltr:057afile02:kmat

Attachment

Projecting water demand for the Wailuku ASEA hydrologic unit only (not including the entire MDWS Central System) is shown in the table below. Low to high population growth rates are consistent with low to high growth rates established for the community plan districts in the 2014 Socio-Economic Forecast.

Table 14-29 Projected Low, Base and High Population Based Water Demand to 2035, Wailuku ASEA (mgd)

CASE	2015	2016	2017	2018	2019	2020	2025	2030	2035
Base Case	4.709	4.737	4.765	4.792	4.820	4.847	5.010	5.131	5.307
High Case	5.080	5.110	5.140	5.170	5.199	5.229	5.405	5.535	5.725
Low Case	4.307	4.332	4.357	4.382	4.408	4.433	4.582	4.692	4.853

Source: MDWS, 2017.

Population Growth Based Demand in Planned Growth Areas

The Directed Growth Plan was adopted as the primary purpose of the MIP to accommodate population and employment growth in a manner that is fiscally prudent, safeguards, the island's natural and cultural resources, enhances the built environment, and preserves land use opportunities for future generations. The Directed Growth Plan establishes the location of future development and provides a framework for future community plan and zoning changes and guides the development of the county's short-term and long-term capital improvement plan budgets. [58] According to the updated 2014 socio-economic forecast, over a third of projected population and housing demand is concentrated to the Wailuku-Kahului region.

Hydrologic units are not isolated as water is naturally and mechanically conveyed from high yield watersheds and aquifers to population centers and planned growth areas. Water sources in Wailuku ASEA will continue to meet population growth based demand throughout Central and South Maui. Projected water transports of Wailuku ASEA resources through the MDWS Central Maui System as a whole is therefore addressed in this Sector report under *MDWS Water Demand Projections*. Groundwater sources in the Kahului aquifer, within the Central ASEA hydrologic unit, supplement the MDWS Central System and must also be factored into the analysis of resource adequacy. Planned growth areas within and outside the Wailuku ASEA that is completely or partially serviced by water resources from Wailuku ASEA are discussed below.

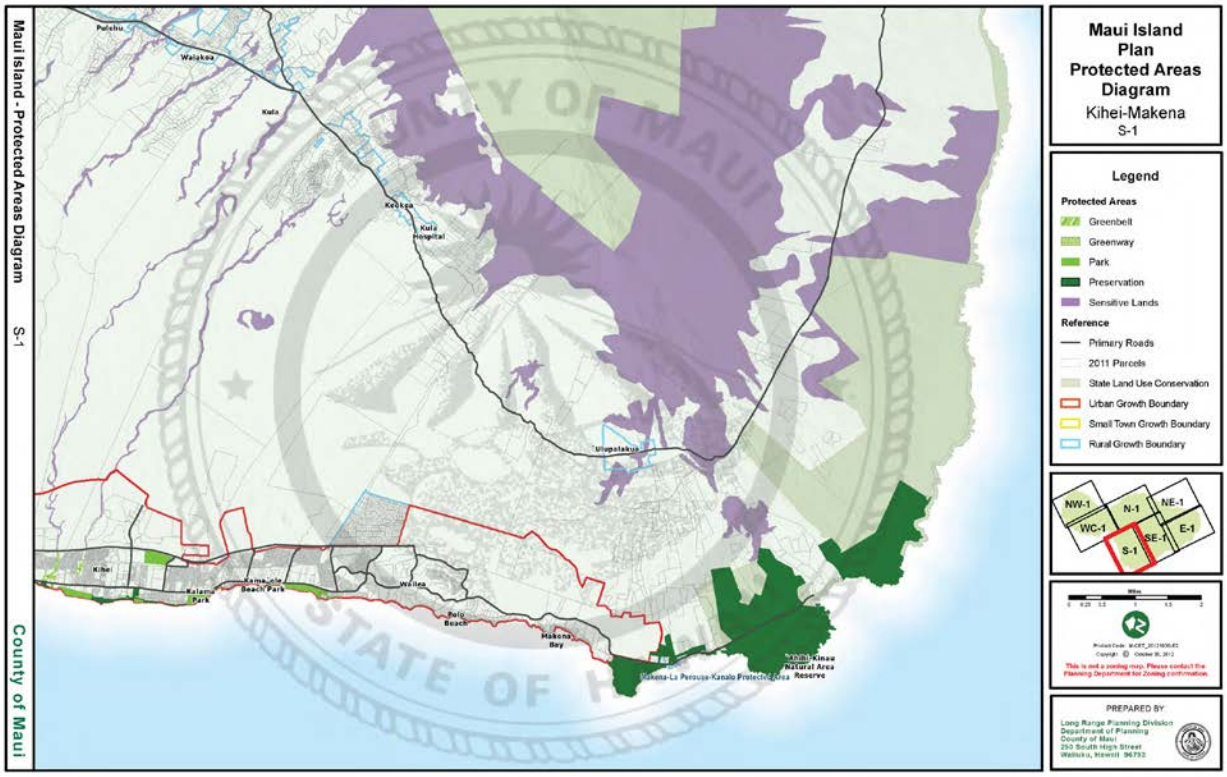
Urban infill will be a major source of additional housing units in the Wailuku-Kahului community plan region. There are four new planned growth areas: Wai`ale, Pu`unani, Kāhili Rural Residential and Waikapū Tropical Plantation Town.

Wailuku-Kahului Planned Growth Areas

The MIP recommends new multi-family development to have at least 15 to 25 units per acre net density in areas such as Lower Main Street, Happy Valley, Pi`ihana and Waiehu areas. The

[58] Maui County General Plan 2030, Maui Island Plan page 8-2

Figure 14-26 Kīhei – Mākena – Planned Protected Areas



Projected demand for planned growth to meet population and housing needs in the designated growth areas is summarized in the table below. As stated above, planned growth areas within and outside the Wailuku ASEA that are completely or partially serviced by water resources from Wailuku ASEA are included.

Table 14-30 Planned Growth Wailuku ASEA and MDWS Central Maui System Service Area

Planned Growth Area	# Units	# Acres	Projected Demand (mgd)
Wai`ale	300+2,254	50+495	1.40 – 1.52
Pu`unani	450/TBD	209	0.75
Kāhili Rural Residential	TBD	218	0.65
Waikapū Tropical Plantation Town	1433	502	0.86 – 1.51
North Kīhei Residential	600	95	0.29 - 0.36
Kīhei Mauka, , and Pulehunui	1,500	583	0.90 – 1.75
Maui Research and Technology Park	1,250	437	0.98 – 1.03
Pulehunui	N/A	639	3.83
TOTAL		**3,228**	**9.6 – 11.04**

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	32.092	32.092	32.092	32.092
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**	**60.728**	**63.464**	**66.656**	**69.630**
TOTAL Low Growth	52.753	53.142	49.841	53.975	54.484	55.004	55.535	58.038	60.957	63.676
TOTAL High Growth	62.231	62.690	58.796	63.673	64.272	64.886	65.513	68.465	71.909	75.116
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.

14.7.2 Source Adequacy vs Population Growth Based Demand Projections

Wailuku ASEA water resources currently supply the population centers in Central and South Maui through existing transmission and storage infrastructure. It is assumed that groundwater, and to a lesser extent, surface water, will continue to supply planned growth around existing infrastructure within sustainable limits. Based on the population projections, future water demand for the Wailuku ASEA including the MDWS Central System will increase from about 57 mgd to about 69 mgd by 2035, within a range of 63 – 75 mgd. Long term projections are trends with expected short-term variations. Factors that especially impact growth in the Wailuku and Central Maui region are large master-planned communities. Development project entitlements should be monitored and considered as needed to adjust projected source development needs over the planning period.

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

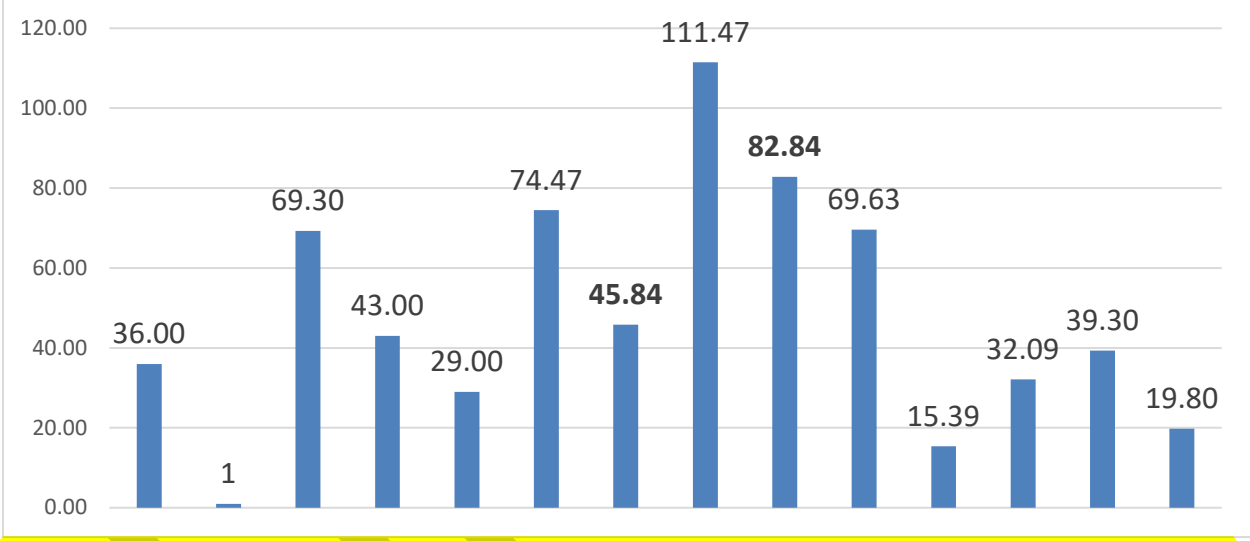


Table 14-35 Population Mid-Growth Based 20-Year Water Demand Projections and Available Resources, Wailuku ASEA and Kahului Aquifer (mgd) (use as legend for Figure 14-30)

Groundwater Sustainable Yield (SY)	36.00
Nā Wai `Ehā Surface Water Median Flow (Q^{50})	69.30
Nā Wai `Ehā Surface Water Low Flow (Q^{90})	43.00
Nā Wai `Ehā Surface Water Proposed IIFS 2017	29.00
Surface Water incl. Kahakuloa Median Flow (Q^{50})	74.47
Surface Water incl. Kahakuloa Low Flow (Q^{90})	45.84
TOTAL AVG YIELD (Q^{50}, SY WAILUKU ASEA+ Kahului Aquifer 1 mgd)	**111.47**
TOTAL DROUGHT YIELD (Q^{90}, SY WAILUKU ASEA)	**82.84**
DEMAND Pop-based mid-growth incl. MDWS Central System	**69.63**
Demand Pop-based mid-growth Wailuku ASEA only	15.39
Agricultural Demand only	32.09
Nā Wai `Ehā Surface Water Use Permits (SWUPs)	39.30
`Īao Aquifer Groundwater Use Permits (GWUPs)	19.80

Page 17, Table ES.4 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)						
Potable Groundwater Wailuku ASEA	**20.353**	**19.909**	**19.939**	**21.355**	**19.071**	**16.493**
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
Potable surface water	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
Recycled Water (South Maui MDWS Service Area)*	1.580	1.580	2.080	2.280	2.280	2.280
Water Conservation (-8% per capita)	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**

*Includes MDWS wells in Kahului Aquifer
**Includes AG served by Na Wai Eha

Page 19, ES.5.2 Central Aquifer Sector Synopsis

The selected 20-year projected demand scenario is the mid growth population based projections, Department of Hawaiian Homeland planned growth and outstanding demand on the Upcountry Meter Priority List. Irrigation demand for Mahi Pono Farm Plan is projected to range between a low 15.6 mgd to a high 82.3 mgd. 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.

Table 14-41 below summarizes recommended strategies and indicates the planning objectives that each strategy supports. Estimated costs are, unless indicated otherwise, life cycle costs for the twenty-year planning period per 1,000 gallons. Life cycle costs include capital, operational and maintenance costs and include inflationary effects. Costs to develop and implement sustainability projects are not quantified per volume water supply. Lead agencies, or organization to implement a strategy is proposed as a starting point. The timeframe for implementation is indicated as short term – less than 5 years, and long term- 5 – 20 years. Many strategies are multi-year actions with implementation beginning within 5 years and continuing through the long term (indicated as 1, 2).

Table 14-41 Summary of Recommended Strategies Wailuku ASEA

	STRATEGY	PLANNING OBJECTIVES	ESTIMATED COST	IMPLEMENTATION 1: Short-term 1 – 5 years 2: Long-term 5 – 20 years	
				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
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 and the application for planned energy crops.	Maximize efficiency of water use Maintain consistency with General and Community Plans	$6.7M	MDEM HC&S	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

have no access to the water. The current county administration has preliminary plans to acquire and operate the WWC system. WWC, Wahi Ho`omalu, and Maui County are among the large landowners responsible for management of their watershed lands. Beyond implementation of the IIFS, once adopted, a long term strategy to sustain ditch operations, land management and adequate access for ahupua`a residents and all stream users is needed. It is recommended that all parties take an adaptive management approach.

Strategy #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. Adequate funding, watershed land ownership, liability, costs and insurance options for maintaining unlined ditches and reservoirs, as well as county bargaining unit contract restrictions are issues. Potential parties are Hui O Nā Wai `Ehā, OHA, Maui County, Aha Moku and major landowners.

Water Quality

Issue and Background: `Īao and Waihe`e aquifers are the primary sources for Maui Department of Water Supply (MDWS) largest customer base. Wells drilled over the last decades in these aquifers are in agricultural and urban areas where land uses pose a potential risk of contaminating the underlying groundwater. Proactive measures are needed to protect existing potable wells from potential sources of contamination. Development of new groundwater sources must consider surrounding land uses to not unnecessarily put public health at risk. Wellhead protection and future well siting are addressed under island-wide strategies #6 "Implementing well siting criteria to avoid contaminated groundwater supplies and unnecessary risks to public health" and #7 "Adopt wellhead protection measures for potable wells."

14.8.2 Conservation

The Wailuku-Kahului Community Plan and the input from the WUDP public process identified an overall planning objective to "maximize efficiency of water use" and the following supply augmentation and demand controls:

- Promote conservation of potable water through use of treated waste water effluent for irrigation.
- Reuse treated effluent from the County's waste water treatment system for irrigation and other suitable purposes in a manner that is environmentally sound.
- Provide incentives for water and energy conservation practices.
- Promote energy conservation and renewables.
- Incorporate drought tolerant plant species and xeriscaping in future landscape planting.

Qualitative criteria to evaluate and measure resource strategies against this planning objective include:

- Per capita water use decreased
- Potable and irrigation systems water loss decreased

- Community water education increased
- Incentives for water conservation increased
- Renewable energy use increased

Issue and Background: The recommended supply and demand side conservation strategies outlined in Section 12.2 apply island wide. MDWS is the single largest municipal water purveyor in the region with residential use making up 60% of total customer water use. The MDWS Central Maui System (also known as the Wailuku District) shows the same downward trend in water use per service as other MDWS systems. Approximately 15 mgd of potable groundwater and less than 1 mgd of surface water originating in the Wailuku aquifer sector is used throughout Kahului, Mā`alaea, Kīhei and Mākena in the Central aquifer sector. These areas are dry microclimates with less than 15 inches of rainfall per year. There is great potential for further conservation targeting residential and commercial irrigation using potable water supply. Based on empirical data, average consumption per residential water service is about 23% higher on the dry south shore compared to Waikapū and Wailuku with higher rainfall. It can be assumed that the higher use to large extent represents incidental yard irrigation.

Demand Side Conservation Measures

Demand side conservation strategies recommended in Section 12.2 that would target outdoor uses of potable water include comprehensive water conservation ordinance to include xeriscaping regulations, landscaping and water efficient irrigation system incentives.

The cost-effectiveness of conservation strategies is an important consideration in developing and sustaining a conservation program. As discussed under Section 12.2, cost-effectiveness compares the costs of a portfolio of programs to promote water savings with the costs the utility and its customers would otherwise incur. In evaluating cost-effectiveness, MDWS compared the costs to develop and deliver new sources of water to meet future demand with the savings attributed to conservation. Cost savings vary with the portfolio of conservation programs selected, market penetration, timeframe and other assumptions. A preliminary analysis of the proposed conservation measure portfolio outlined in Section 12.2 shows that doubling current investments (MDWS annual FY14 – FY17 conservation budget, excluding leak detection is $170,000) would result in net capital and operational savings. The potential for a net savings is also expected for the MDWS Central Maui System due to the need for new source development.

Recommended demand side conservation measures at all levels and type of use for public water systems outlined in Table 13-1 (strategies # 10 – 25) apply to the Wailuku ASEA and the MDWS Central Maui System as a whole. Because the areas served by the MDWS Central Maui System are planned growth areas to support the lion share of new housing, conservation measures that are implemented in the design and build phase rather than retrofits and incentives are important strategies. Strategies #17, 22 and 25 outlined in Table 13-1 are especially appropriate in planned growth areas:

- Revise county code to require high efficiency fixtures in all new construction. Develop a comprehensive water conservation ordinance to include xeriscaping regulations.

- Revise County Code: Water conserving design and landscaping in new development (xeriscaping targets dry areas).
- Revise County Code and/or incentivize water- efficient building design that integrates alternative sources (greywater, catchment).

Supply Side Conservation Measures

The sustainable and efficient use of water resources, as well as the capacity and integrity of water systems, can be improved by accounting for water as it moves through the system and taking actions to ensure that water loss is prevented and reduced to the extent feasible.

A water audit provides a data driven analysis of water flowing through a water system from source to customer point-of-service and is the critical first step in determining water supply efficiency and responsible actions to manage and reduce water loss consistent with available source, operational and financial resources.[69]. Comprehensive audits for all MDWS systems are performed annually. Public water systems serving a population of 1,000 or more and those within water management areas regardless of population served are required to submit annual water audits beginning July 1, 2020. There are no other large public water systems in the aquifer sector but the Hawaii Nature Center (PWS 240) in `Īao Valley is in a designated surface water and groundwater management area. The average water loss for public water systems in the United States is 16 percent, with up to 75 percent of that loss able to be recovered.[70] The preliminary results of a fiscal year 2017 water audit for MDWS Central Maui System indicate water losses of 15.7%, due to inaccurate meters on both consumer and production side, main leaks and flushing. The results will guide MDWS maintenance and repair programs. Part II Strategy # 28 addresses water system maintenance and operations to minimize sources of water loss.

Agricultural Water Systems Water Loss Mitigation

Issue and Background: The Wailuku Water Company plantation ditch system is the focal point for the objectives that seek to provide sufficient water to all permittees and allocations within Nā Wai `Ehā. System losses were determined by a 1988 study to about 11.6% of total diversions. WWC has repaired structures and ditches since, resulting in a reduction of system losses to about 7.34% of total diversions. With five reservoirs closed after 2010, WWC has reduced system losses to 4.97%, which is well below American Water Works Association standards and US Department of Agriculture guidance. To further reduce losses by converting

[69] USEPA. Using Water Audits to Understand Water Loss. A Joint Presentation of the USEPA Office of Groundwater and Drinking Water and the American Water Works Association, 1/26/2012. https://www3.epa.gov/.../waterinfrastructure/docs/water-audits_presentation_01-2012.pdf *Accessed March 29, 2017.*

[70] US EPA, Water Audits and Water Loss Control for Public Water Systems https://www.epa.gov/sites/production/files/2015-04/documents/epa816f13002.pdf Accessed March 24, 2017.

open ditch segments to cement lined ditch would require $5M investment.[71] WWC system operations and costs would be addressed by a working group as proposed in Strategy #2 above.

14.8.3 Conventional Water Source Strategies

Conventional water sources include groundwater (wells and tunnels) and surface water (stream diversions).

Planning objectives related to groundwater and surface water source use and development identified in the WUDP update public process include:

- Manage water equitably
- Provide for Department of Hawaiian Homelands needs
- Provide for agricultural needs
- Protect cultural resources
- Provide adequate volume of water supply
- Maximize reliability of water service
- Minimize cost of water supply

The Maui Island Plan objective 6.3.2 to "increase the efficiency and capacity of the water systems" applies island wide. The adopted policy is to "acquire and develop additional sources of potable water", with the action item to "pursue development of additional potable water sources to keep pace with the County's needs".

The MIP also calls for a continual assessment of the current and future adequacy of water supplies in a holistic way, including the establishment of appropriate principles and standards; determining the capital improvements that would be required to treat and deliver the needed water, and the best ways to pay for these improvements.

Planning objectives and policies related to water availability and use identified in the Wailuku-Kahului Community Plan are:

- Coordinate water system improvement plans with growth areas to ensure adequate supply and a program to replace deteriorating portions of the distribution system. Future growth should be phased to be in concert with the service capacity of the water system.
- Coordinate the construction of all water and public roadway and utility improvements to minimize construction impacts and inconveniences to the public.
- Coordinate expansion of and improvements to the water system to coincide with the development of residential expansion areas.

Implementing actions include:

- Adopt a water allocation plan for the region and require use of water from Central Maui Water System for future development to be subject to water allocation plan.

[71] 2014 Mediated Agreement, FOF, WWC Opening Brief