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December 29, 2021

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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.

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Attachment

Summary of Revisions Made to the Draft Maui Island Water Use and Development Plan

The Agriculture and Public Trust Committee has placed the draft Maui Island Water Use and Development Plan on its agenda fourteen times since the beginning of this year. During that time, the committee worked closely with various community leaders and groups, members of the administration, and representatives from relevant state agencies to produce a draft plan which evenly addresses existing concerns and anticipated needs for the future regarding water.

In addition to minor updates and updates to data and statistics throughout the document, the following is a summary of the major revisions made to the draft Maui Island Water Use and Development Plan by the Agriculture and Public Trust Committee:

1. The “Addendums” section of the plan was incorporated throughout the corresponding areas of the document.
2. After receiving input from the ‘Aha Moku councils, we added additional information to the “Ka Pa‘akai Analysis” section and added a new section to the document under “Introduction and Technical Approach,” entitled “Historical and Cultural Context of the Regulatory System.” These sections discuss Native Hawaiian water and cultural rights, including information on the Public Trust Doctrine, riparian rights, correlative rights, kuleana rights, konohiki rights, and the duty of State agencies to protect Native Hawaiian traditional and customary rights.
3. The Consent Decree and the Board of Water Supply Temporary Investigative Group Report, dated October 17, 2019, as Amended and Approved December 19, 2019, regarding the feasibility of purchasing and maintaining the EMI Water Delivery System, were added to the appendices of the document.
4. In order to address the concerns provided by various community groups, strategies were added to each aquifer sector area and to Part II: Water Resource Adequacy, Island Wide Strategies & Recommendations. The revised strategy tables are attached as a red-lined document.

The Committee greatly appreciates the attention and expertise shared by the community and our resource people from private, county, and state agencies, without which this collaborative update would not be possible. Mahalo nui!

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	
6	Reduce non-potable use of Wailuku Aquifer Sector basal and high level water to the extent feasible.	Maximize water quality Manage water equitably Maintain consistency with	CWRM MDWS MDEM		

	Prioritize available recycled water and brackish water for non-potable uses where available in the Central Aquifer Sector.	General and Community Plans		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 <u>for commercial, landscape and the application for planned energy crops. other non-potable irrigation applications.</u>	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 Waiʻale Road Stormwater Drainage as potential to offset stream diversions associated with Spreckels and Waiheʻe 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

Table 15-39 Summary of Recommended Strategies Central ASEA

	<u>STRATEGY</u>	<u>PLANNING OBJECTIVES</u>	<u>ESTIMATED COST</u>	<u>IMPLEMENTATION</u>	
				<u>AGENCY</u>	<u>TIME-FRAME</u>
RESOURCE MANAGEMENT					
<u>1</u>	<u>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.</u>	<u>Maintain sustainable resources</u> <u>Protect water resources</u> <u>Protect and restore streams</u> <u>Maximize efficiency of water use</u> <u>Minimize adverse environmental impacts</u>	<u>N/A</u>	<u>Maui County A&B Properties/EMI</u>	<u>1,2</u>
CONVENTIONAL WATER SOURCE STRATEGIES					
<u>2</u>	<u>Assess alternative options to restructure and process the existing Upcountry Meter Priority List to improve processing rate and adequate source development.</u>	<u>Provide adequate volume of water supply</u> <u>Maximize reliability of water service</u>	<u>N/A</u>	<u>MDWS</u>	<u>1,2</u>
<u>3</u>	<u>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.</u>	<u>Provide adequate volume of water supply</u> <u>Maximize reliability of water service</u> <u>Minimize adverse environmental impacts</u>	<u>\$4.5 – 6.0 /1000 gallons</u>	<u>MDWS</u> <u>DLNR</u> <u>Public/private partnerships</u>	<u>1,2</u>
<u>4</u>	<u>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.</u>	<u>Provide adequate volume of water supply</u> <u>Maximize reliability of water service</u> <u>Minimize adverse environmental impacts</u>	<u>\$3.71* /1000 gallons</u>	<u>CWRM</u> <u>USGS</u> <u>MDWS</u>	<u>1,2</u>
<u>5</u>	<u>Explore Pā‘ia-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.</u>	<u>Provide adequate volume of water supply</u> <u>Maximize reliability of water service</u>	<u>N/A</u>	<u>Maui County</u>	<u>1,2</u>
	<u>STRATEGY</u>	<u>PLANNING OBJECTIVES</u>	<u>ESTIMATED</u>	<u>AGENCY</u>	<u>TIME</u>

			<u>COST</u>		<u>FRAME</u>
<u>6</u>	<u>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.</u>	<u>Provide adequate volume of water supply</u> <u>Maximize reliability of water service</u>	<u>N/A</u>	<u>Maui County MDWS A&B Properties</u>	
<u>7</u>	<u>Pursue hydrologic studies needed to explore the Ha‘i‘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.</u>	<u>Minimize cost of water supply</u> <u>Provide adequate volume of water supply</u> <u>Maximize reliability of water service</u> <u>Maintain consistency with General and Community Plans</u>	<u>Surface water \$5.15 /1000 gal (20 yr) (construction cost \$50M, Operational \$1.47/1000 gal)</u> <u>Groundwater \$3.71/1000 gal</u>	<u>MDWS</u>	<u>1,2</u>
<u>ALTERNATIVE WATER SOURCE STRATEGIES</u>					
<u>8</u>	<u>Consider alternative sources of irrigation water including 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.</u>	<u>Maintain sustainable resources</u> <u>Protect and restore streams</u> <u>Minimize adverse environmental impacts</u> <u>Maximize efficiency of water use</u> <u>Maintain consistency with General and Community Plans</u>	<u>N/A</u>	<u>Maui County DEM Mahi Pono</u>	<u>1,2</u>
<u>9</u>	<u>Expand distribution from the Kahului WWTF for commercial, landscape and other non-potable irrigation applications. Potential available recycled water is 4.2 mgd.</u>	<u>Maximize efficiency of water use</u> <u>Maintain consistency with General and Community Plans</u>	<u>\$6.7M</u>	<u>MDEM</u>	<u>1,2</u>
<u>10</u>	<u>MDWS and MDEM collaborate to identify private-public partnerships, state, and federal funding sources to maximize utilization of recycled water produced at the Kihei WWTF and supplemental non-potable sources for seasonal use of R-1 water.</u>	<u>Maximize efficiency of water use</u> <u>Maintain consistency with General and Community Plans</u>	<u>(Transmission South Kihei to Wailea \$21M)</u>	<u>MDEM MDWS</u>	<u>1,2</u>

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

Table 16-41 Summary of Recommended Strategies Koʻolau 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.	Seek dedicated, long-term and broad based core funding for maintaining and expanding watershed protection areas and providing for watershed maintenance in East Maui and Hāna watersheds for habitat protection and water security.	Maintain sustainable resources. Protect water resources. Protect and restore streams.	\$0.8M – \$1M per year	MDWS Maui County CWRM DLNR	1
2.	Support and promote community grassroots initiatives to collaborate with state and land owner partnerships to increase participation in natural resource management and to ensure adequate access and opportunities for traditional uses of the region’s natural resources. Use established moku process to consult on resource management.	Maintain sustainable resources. Protect water resources. Protect and restore streams.	N/A	Public-private partnerships Aha Moku DLNR Maui County	1
3.	Support collaborative hydrogeological studies to inform impact from climate change and future well development on groundwater health for Haʻi kū and Honopou Aquifers. <u>Support additional hydrological studies to improve recharge estimates to include the best available information in establishing sustainable yield.</u>	Maintain sustainable resources. Protect water resources. Protect and restore streams.		CWRM USGS MDWS	2
4.	Convene sector-based drought workshops to assist stakeholders in developing or improving their individual drought/water conservation plans. Focus in the Koʻolau Sector should be on catchment systems and contingency supply to supplement or substitute catchment when necessary.	Provide adequate volume of water supply. Maximize reliability of water service.	\$50K/year	CWRM NRWA	2
<u>5.</u>	<u>Add steam gauges in streams to ensure adequate decision making data is captured prior to any decision making in an area Aquifer or stream.</u>	<u>Maintain sustainable resources.</u> <u>Protect water resources.</u>	<u>Need data to determine costs</u>	<u>CWRM</u> <u>USGS</u>	<u>1</u>

		<u>Protect and restore streams.</u> <u>Maximize reliability of water service.</u>			
<u>6.</u>	<u>Determination of legal ownership of all aspects of the EMI Water Delivery System (from TIG Report)</u>	<u>Good governance</u> <u>Manage water equitably</u>	<u>N/A</u> <u>use new position created</u> <u>Principal archeologist assistant</u>	<u>Office of the Managing Director</u>	<u>1</u>
<u>7.</u>	<u>Conduct an engineering report and cost analysis of the current EMI Delivery system. (from TIG Report)</u>	<u>Maximize reliability of water service.</u>	<u>\$50-100,000</u>	<u>Mayor's Office</u> <u>Office of the Managing Director</u> <u>County Council</u>	<u>1</u>
<u>8.</u>	<u>Conduct a study to determine the annual costs of maintaining the EMI System; including an assessment of liability issues. (from TIG Report)</u>	<u>Good governance</u> <u>Maximize reliability of water service.</u>	<u>\$50-100,000</u>	<u>Mayor's Office</u> <u>Office of the Managing Director</u> <u>County Council</u>	<u>1</u>
<u>9.</u>	<u>Conduct a study of the potential revenues based on domestic water and agricultural water sales. (from TIG Report)</u>	<u>Good governance</u> <u>Maximize reliability of water service.</u>	<u>\$50-100,000</u>	<u>Mayor's Office</u> <u>Office of the Managing Director</u> <u>County Council</u>	<u>1</u>
<u>10.</u>	<u>Evaluate policy of relying upon A&B/Mahi Pono water leases to provide county domestic water. Private system owner with stakeholders may require water sold at market rates to the county. (from TIG Report)</u>	<u>Good governance</u> <u>Maximize reliability of water service.</u> <u>Manage water equitably</u>	<u>\$50-100,000</u>	<u>Mayor's Office</u> <u>Office of the Managing Director</u> <u>County Council</u>	<u>1</u>
<u>11.</u>	<u>Conduct a study on feasibility of county obtaining water lease for domestic water, as well as the county acquiring system and developing a community based model (water authority, public company models) to ensure adequate water provided for community needs. (from TIG Report)</u>	<u>Good governance</u> <u>Maximize reliability of water service.</u> <u>Manage water equitably</u>	<u>\$50-100,000</u>	<u>Mayor's Office</u> <u>Office of the Managing Director</u> <u>County Council</u>	<u>1</u>
<u>12.</u>	<u>Evaluate a policy and state legislation creating home rule for</u>	<u>Good governance</u>	<u>N/A</u>	<u>Mayor's office</u>	<u>1</u>



	<u>water related matters, including the granting of water leases for waters located in Maui County.</u>	<u>Maximize reliability of water service.</u>		<u>Office of Managing Director Corporation Counsel</u>	
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Table 17-38 Summary of Recommended Strategies Hāna ASEA

STRATEGY	PLANNING OBJECTIVES	ESTIMATED COST	IMPLEMENTATION	
			AGENCY	TIME-FRAME
RESOURCE MANAGEMENT				
5. Seek dedicated, long-term and broad based core funding for maintaining and expanding watershed protection areas and providing for watershed maintenance in East Maui and Hāna watersheds for habitat protection and water security.	Maintain sustainable resources Protect water resources Protect and restore streams	\$0.8M – \$1M per year	MDWS Maui County CWRM DLNR	1
6. Support and promote community grassroots initiatives to collaborate with state and land owner partnerships to increase participation in natural resource management and to ensure adequate access and opportunities for traditional uses of the region’s natural resources. Use established moku process to consult on resource management	Maintain sustainable resources Protect water resources Protect and restore streams	N/A	Public-private partnerships Aha Moku DLNR Maui County	1
CONVENTIONAL WATER SOURCE STRATEGIES				
7. Complete optimization studies/source development analysis for the MDWS Hāna subsystem (PWS 217) in order to assess basal well development needs by 2025. Costs of regional well development is not assessed. Compare to 20 year life cycle costs estimated for Haiku/Central well development	Provide adequate volume of water supply Maximize reliability of water service Minimize adverse environmental impacts Provide for DHHL needs	\$3.55 per 1,000 gallons	MDWS DHHL	2
8. The Commission on Water Resource Management to establish Instream Flow Standards on a stream-by-stream basis to protect the public interests of the Hāna aquifer sector. Recognizing that other regions with competing off-stream needs must be prioritized, this strategy is proposed as a medium to long-term implementation time frame. <u>Assure that the Hana aquifer sector area kuleana, cultural, domestic, and agricultural needs are met prior to allowing water leave the region.</u>	Protect and restore streams Protect cultural resources Maintain sustainable resources Protect water resources	N/A	CWRM USGS	2

9.	Convene sector-based drought workshops to assist stakeholders in developing or improving their individual drought/water conservation plans. Focus in the Hāna sector should be on catchment systems and contingency supply to supplement or substitute catchment when necessary.		\$50,000	MDWS CWRM DOH	2
18	<u>Ensure DHHL water resource reservation requests are allocated to meet DHHL water needs for the Waikiu Project.</u>	<u>Provide for DHHL needs</u>	N/A	<u>CWRM</u>	<u>1</u>
19	<u>Prohibit the commercial bottling of water from the region.</u>	<u>Maintain sustainable resources</u>	<u>N/A</u> <u>Maui county ordinance</u> <u>State ordinance</u>	<u>Maui County Council</u> <u>State legislature</u>	<u>1</u>
20	<u>When prioritizing additional available water resources, Kuleana users have the highest priority, followed by cultural uses, then affordable housing.</u>	<u>Protect cultural resources</u> <u>Manage water equitably</u>	N/A	<u>CWRM</u> <u>Maui County</u>	<u>1</u>

Table 18-25 Summary of Recommended Strategies Kahikinui ASEA

STRATEGY	PLANNING OBJECTIVES	ESTIMATE D COST	IMPLEMENTATION		
			1: Short-term 1 – 5 years	2: Long-term 5 – 20 years	
			AGENCY	TIME-FRAME	
RESOURCE MANAGEMENT					
<u>10.2</u>	Support and provide broad based funding to sustain and expand watershed protection and restoration on a landscape level on leeward Haleakalā for long term habitat augmentation and water security.	Maintain sustainable resources Protect water resources Protect and restore streams	\$950,000 per year	MDWS Maui County	1
<u>11.2</u>	Support and promote regional grassroots, homestead community and moku initiatives to collaborate with state and land owner partnerships to ensure participation and adequate access and opportunities for traditional uses of the region’s natural resources.	Maintain sustainable resources Protect water resources Protect and restore streams	N/A	Public-private partnerships Aha Moku DLNR Maui County	1
CONVENTIONAL WATER SOURCE STRATEGIES					
<u>12.2</u>	DHHL proposed strategies in the 2017 State Water Projects Plan: fog drip catchment system. Recommendation is to combine with groundwater development to supply build-out of Kahikinui homesteads.	Provide for DHHL needs Provide adequate volume of water supply Maximize reliability of water service Minimize adverse environmental impacts	\$1.8M capital cost	DHHL	1, 2
<u>13.2</u>	MDWS Upper Kula system accommodate existing priority list applications. Potential additional demand (4,000 gpd) depend on MDWS groundwater source development for Upcountry System. Regional domestic groundwater development and catchment systems, including fog drip supplement supply.	Provide adequate volume of water supply Maximize reliability of water service	N/A	MDWS	1,2

<p>14.2</p>	<p>MDWS and KR collaboratively explore two alternatives: a) improving the existing non-potable system; and b) dual water system with a potable well providing for potable needs as a separate system, and a non-potable system remain to be served by surface water for agricultural use. Explore technical and financial assistance and grant opportunities. <u>Develop non-potable or potable water source and delivery options for fire protection for the Kaupo System and Kahikinui DHHL homestead area.</u></p>		<p>Non-potable system \$750K, \$35,8K per meter</p> <p>Potable system \$2.6M, \$123.9K per meter</p>	<p>MDWS Kaupō Ranch DOH SDWB RCAC HRWA</p>	
<p>15.2</p>	<p>Convene sector-based drought workshops to assist stakeholders in developing or improving their individual drought/water conservation plans. Focus on ranching and may include retaining experts in respective sectors.</p>		<p>\$50,000</p>	<p>CWRM DLNR DOFAW, NRCS, DOA, DHHL, MDWS, USDA Farm Services Agency Kaupō Ranch, Ulupalakua Ranch, Haleakalā Ranch</p>	

Table 19-40 Summary of Recommended Strategies, Lahaina ASEA

STRATEGY	PLANNING OBJECTIVES	ESTIMATED COST	IMPLEMENTATION		
			AGENCY	TIME-FRAME	
RESOURCE MANAGEMENT					
<u>16.2</u>	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
<u>17.2</u>	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					
<u>18.2</u>	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					
<u>19.3</u>	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	MDSWS Public Water Systems	1, 2
<u>20.31</u>	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 Honolulu aquifers	Maintain sustainable resources Protect water resources Minimize adverse environmental impacts Manage water equitably	N/A	MDSWS Private purveyors DHHL	1
<u>32</u>	<u>Develop non-potable groundwater to offset reduced stream flow diversions to meet established IIFS and provide reliable drought source.</u>	<u>Protect and restore streams</u> <u>Protect cultural resources</u> <u>Provide adequate volume of water supply</u>	<u>N/A</u>	<u>MDWS</u> <u>Private purveyors</u> <u>DHHL</u>	<u>1</u>
<u>21.3</u>	Install a gage at Kanahā stream	Maintain sustainable	\$25K - \$35K	MDSWS	1

	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	
22.3	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
23.3	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					
910.	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
101.	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

WATER RESOURCE ADEQUACY, ISLAND WIDE STRATEGIES & RECOMMENDATIONS

Table 13-1 Summary of Recommended Strategies

<u>STRATEGY</u>	<u>PLANNING OBJECTIVES</u>	<u>ESTIMATED COST</u>	<u>IMPLEMENTATION</u>		
			1: Short-term 1 – 5 years	2: Long-term 5 – 20 years	
			<u>AGENCY</u>	<u>TIME-FRAME*</u>	
			* -	* -	
RESOURCE MANAGEMENT					
Watershed Management					
<u>1.</u>	<u>Continue Maui County financial support for watershed management partnerships' fencing, alien plant control, and weed eradication efforts.</u>	<u>Maintain sustainable resources</u> <u>Protect water resources</u> <u>Protect and restore streams</u>	<u>\$2 million per year/\$8 per watershed acre (249,362 acres).</u>	<u>MDWS</u> <u>Maui County</u>	<u>1</u>
<u>2.</u>	<u>Promote increased distribution of funding for watershed protection and active reforestation to reflect multiple values and ecosystem services.</u>	<u>Maintain sustainable resources</u> <u>Protect water resources</u> <u>Protect and restore streams</u>	<u>N/A</u>	<u>Private water purveyors</u> <u>Land-owners</u> <u>DLNR</u>	<u>1</u>
<u>3.</u>	<u>Expand watershed protection to lower elevations below 3,000 feet.</u>	<u>Maintain sustainable resources</u> <u>Protect water resources</u> <u>Protect and restore streams</u>	<u>TBD. Funding does not come from water rates as these are not critical watershed areas that supply domestic water. These protections are classified as other eco services and are funded from the general fund, the State, and private organizations and landowners.</u>	<u>Maui County</u> <u>Land owners</u> <u>DLNR</u> <u>Private organizations</u>	<u>1</u>
<u>4.</u>	<u>Expand watershed protection to incorporate the ahupua'a as a whole and utilize ahupua'a resource management practices.</u>	<u>Maintain sustainable resources</u> <u>Protect water resources</u> <u>Protect and restore streams</u> <u>Protect cultural resources</u>	<u>N/A</u>	<u>Public-private partnerships</u> <u>Aha Moku</u> <u>DLNR</u> <u>Maui County</u>	<u>1</u>
<u>5.</u>	<u>When applicable, the Department of Water Supply will advocate for mauka to</u>	<u>Maintain sustainable resources</u> <u>Protect water resources</u>	<u>N/A</u> <u>Lo'i restoration projects can start</u>	<u>DWS</u>	<u>1</u>

WATER RESOURCE ADEQUACY, ISLAND WIDE STRATEGIES & RECOMMENDATIONS

	<u>makai stream connectivity and increase kalo cultivation when providing testimony to State and Federal agencies.</u>	<u>Protect and restore streams</u> <u>Protect cultural resources</u> <u>Minimize adverse environmental impact</u>	<u>from \$50,000.</u> <u>Site specific.</u>		
<u>6.</u>	<u>Enable and assist in providing Native Hawaiian water rights and cultural and traditional uses through active consultation and participation.</u> <u>The County will advocate for public water trust uses, including kuleana use, cultural usage, and stream restoration when providing testimony to State and Federal agencies in addition to supporting domestic uses.</u>	<u>Protect and restore streams</u> <u>Protect cultural resources</u>	<u>N/A</u>	<u>CWRM</u> <u>Mayor's Office</u> <u>Maui County Corporation</u> <u>Counsel</u>	<u>1</u>
<u>7.</u>	<u>Consult with the Native Hawaiian community, including kanaka maoli, and local experts on resource management.</u> <u>Establish water representative of each Moku, create advisory role, and a partnership.</u>	<u>Maintain sustainable resources</u> <u>Protect water resources</u> <u>Minimize adverse environmental impacts</u>	<u>N/A</u> <u>Policies and strategies recommended by those being consulted should take priority during plan implementation.</u>	<u>MDWS</u> <u>Council</u> <u>Aha Moku</u>	<u>1</u>
<u>8.</u>	<u>Use scientific studies to support decision making in tandem with local traditional Native Hawaiian empirical data and observations.</u> <u>Study hydrogeologic and ecological conditions and increase monitoring to create timely and more accurate data for decision making.</u>	<u>Maintain sustainable resources</u> <u>Protect water resources</u> <u>Minimize adverse environmental impacts</u>	<u>N/A</u> <u>Adopt policies to incorporate traditional Native Hawaiian knowledge of an area combined with scientific studies.</u>	<u>MDWS</u> <u>Council</u> <u>Aha Moku</u> <u>USGS</u>	<u>1</u>
<u>9.</u>	<u>Actively seek 'ike kūpuna generational knowledge along with scientific data.</u>	<u>Maintain sustainable resources</u> <u>Protect water resources</u> <u>Protect cultural resources</u> <u>Minimize adverse environmental impacts</u>	<u>N/A</u>	<u>MDWS</u>	<u>1</u>

WATER RESOURCE ADEQUACY, ISLAND WIDE STRATEGIES & RECOMMENDATIONS

<u>10.</u>	<p><u>Establish and maintain regular communication with Aha Moku Councils to assess the effect of water development and water development policies on kanaka maoli rights and Hawaiian culture and practices. Actively seek input from those practicing their culture and those with historical knowledge. Create an advisory group by ordinance to address these policies and provide accountability.</u></p>	<p><u>Maintain sustainable resources</u> <u>Protect water resources</u> <u>Protect and restore streams</u> <u>Protect cultural resources</u> <u>Minimize adverse environmental impacts</u></p>	<u>N/A</u>	<u>MDWS Council</u>	<u>1</u>
<u>11.</u>	<p><u>Provide training for MDWS employees on traditional Hawaiian resource management, including ahupua'a resource management strategies, importance of ecosystem health, ability to create additional water through resource management, nearshore and stream ecosystems, public trust responsibilities, kanawai policies, and connection between water and Hawaiian culture and spirituality (mo'o).</u></p>	<p><u>Maintain sustainable resources</u> <u>Protect water resources</u> <u>Protect and restore streams</u></p>	<u>TBD</u>	<u>MDWS</u>	<u>1</u>
<u>12.</u>	<p><u>Use drought conditions as a baseline to evaluate water supply and effects of water use to the extent practical.</u></p>	<p><u>Maintain sustainable resources</u> <u>Protect water resources</u> <u>Minimize adverse environmental impacts</u></p>	<u>N/A</u>	<u>MDWS</u>	<u>1</u>
<u>13.</u>	<p><u>Quantify the impact of watershed management on groundwater recharge and distribute funding proportionately. DWS initiated a study by USGS to quantify hydrologic impact from watershed mgt and restoration. The complexity of the question proposed that USGS expand research to a statewide level.</u></p> <p><u>Prioritize efforts by impact, expand funding from private purveyors, State and other beneficiaries.</u></p>	<p><u>Maintain sustainable resources</u> <u>Protect water resources</u></p>	<u>\$160,000 for USGS study.</u>	<u>MDWS</u> <u>USGS</u> <u>Private water purveyors</u> <u>CWRM</u>	<u>1</u>

WATER RESOURCE ADEQUACY, ISLAND WIDE STRATEGIES & RECOMMENDATIONS

<u>14.</u>	<p><u>Improve groundwater and surface water resources and diversion monitoring by CWRM. Encourage CWRM to enforce. Provide stream monitoring gauges for streams. Act as ombudsman for stream users who report non-compliance.</u></p>	<p><u>Maintain sustainable resources</u> <u>Protect water resources</u></p>	<p><u>N/A</u> <u>Adopt water permit condition and policies that require system owners to install stream monitors and allow access to the property to facilitate monitoring and stream standards enforcement.</u></p>	<p><u>MDWS</u> <u>Maui County</u></p>	<u>1</u>
<u>15.</u>	<p><u>Restrict land uses with high risk of well contamination near drinking wells</u> Note: <u>Within the proposed regulated areas, the proposed Wellhead Protection Ordinance would allow the following located more than 50 feet from wells or well fields that supply public water systems: a lot or facility (other than an aquatic animal production facility) where animals will be stabled or confined and fed or maintained for a total of 45 days or more in any 12-month period, and where crops, vegetation forage growth, or post-harvest residues are not sustained in the normal growing season over any portion of the lot or facility (excludes pasture).</u></p>	<p><u>Protect water resources</u> <u>Minimize adverse environmental impacts</u></p>	<p><u>N/A</u> <u>Develop and adopt well head protection ordinance.</u></p>	<p><u>Council</u></p>	<u>1</u>
<u>16.</u>	<p><u>Protect and recharge groundwater during non-drought periods to stabilize supply.</u></p> <p><u>Reduce pumping, increased surface water use after public trust uses are met, aggressive conservation, and alternative sources.</u></p>	<p><u>Maintain sustainable resources</u> <u>Protect water resources</u> <u>Minimize adverse environmental impacts</u></p>	<p><u>N/A</u></p>	<p><u>MDWS</u></p>	<u>1</u>
<u>17.</u>	<p><u>No new stream diversions for non-instream uses until interim flow standards are adopted.</u></p>	<p><u>Maintain sustainable resources</u> <u>Protect water resources</u> <u>Minimize adverse environmental impacts</u></p>	<p><u>N/A</u></p>	<p><u>MDWS</u> <u>CWRM</u> <u>DLNR</u></p>	<u>1</u>

WATER RESOURCE ADEQUACY, ISLAND WIDE STRATEGIES & RECOMMENDATIONS

	<u>(Could extend to no new diversion or increased diversion).</u>				
18.	<p><u>Stream restoration agricultural water returned to stream as much as is practical.</u></p> <p><u>(Decrease agricultural use of streams).</u></p>	<p><u>Maintain sustainable resources</u></p> <p><u>Protect water resources</u></p> <p><u>Minimize adverse environmental impacts</u></p>	N/A	MDWS CWRM	<u>1</u>
19.	<p><u>Increase use of surface water for municipal affordable housing needs during wet season when all public trust uses are satisfied, including kuleana and traditional and cultural users.</u></p> <p><u>(Expand treatment facilities and obtain reservoirs. Consider permitting and dam liability issues.)</u></p>	<p><u>Manage water equitably</u></p> <p><u>Reflect Mayor’s policy and upcoming codification of water allocation for additional municipal water allocation based on Na Wai ‘Ehā CWRM ruling</u></p>	N/A	Maui County	<u>1</u>
20.	<p><u>When adopted IFS for protected kuleana and instream uses have been satisfied, then support water transport for affordable housing use.</u></p> <p><u>Support diversified ag economy with low cost untreated source.</u></p>	<p><u>Manage water equitably</u></p> <p><u>Reflect Mayor’s policy and upcoming codification of water allocation for additional municipal water allocation based on Na Wai ‘Ehā CWRM ruling</u></p>	N/A	Maui County	<u>1</u>
21.	<p><u>Increase County oversight of well drilling in non-designated groundwater management areas.</u></p> <p><u>Encourage CWRM to increase the analysis of well permits, including spatial distribution and evaluation of well impacts on the quantity and quality of nearby water resources.</u></p> <p><u>Affirm the County’s commitment to exercise its ability to comment on all well permits in Maui County, including both public and private, on behalf of cultural users and local communities.</u></p> <p><u>Amend State law to grant the County the authority to</u></p>	<p><u>Maintain sustainable resources</u></p> <p><u>Protect water resources</u></p> <p><u>Protect and restore streams</u></p> <p><u>Minimize adverse environmental impacts</u></p>	<p><u>Adopt ordinance</u></p> <p><u>Provide funding for oversight and well surveys</u></p>	MDWS Council Mayor’s Office CWRM	<u>1,2</u>

WATER RESOURCE ADEQUACY, ISLAND WIDE STRATEGIES & RECOMMENDATIONS

	<p><u>undertake a larger role in the well permit process.</u></p> <p><u>Require consultation with local Native Hawaiians as part of the oversight process.</u></p>				
22.	<p><u>Protect dry native forests and wetlands. Provide funding for management and develop and adopt ordinances to protect these areas.</u></p>	<p><u>Maintain sustainable resources</u></p> <p><u>Minimize adverse environmental impacts</u></p>	TBD	MDWS Council	<u>1</u>
23.	<p><u>Keep stormwater drainage in same area for aquifer recharge. Develop and adopt an ordinance</u></p>	<p><u>Maintain sustainable resources</u></p> <p><u>Protect water resources</u></p> <p><u>Minimize adverse environmental impacts</u></p>	N/A	MDPW Council	<u>1</u>
24.	<p><u>Prohibit infilling of wetland areas. Develop and adopt an ordinance to that effect.</u></p>	<p><u>Maintain sustainable resources</u></p> <p><u>Protect water resources</u></p> <p><u>Protect and restore streams</u></p> <p><u>Minimize adverse environmental impacts</u></p>	N/A	Council	<u>1</u>
25.	<p><u>Protect undergroundwater by:</u></p> <ol style="list-style-type: none"> <u>1. Improving the blasting permit process and ensuring mitigation to protect cultural impacts</u> <u>2. Surveying private well users to investigate water being taken from aquifers</u> <u>3. Providing more oversight over private well users.</u> 	<p><u>Maintain sustainable resources</u></p> <p><u>Protect water resources</u></p> <p><u>Minimize adverse environmental impacts</u></p>	TBD	CWRM Council	<u>1</u>
26.	<p><u>Request notification to kuleana water users and neighboring property owners when well permits are applied for.</u></p>	<p><u>Maintain sustainable resources</u></p> <p><u>Protect water resources</u></p> <p><u>Protect cultural resources</u></p> <p><u>Minimize adverse environmental impacts</u></p>	N/A	CWRM	<u>1</u>
27.	<p><u>Encourage and assist with CWRM enforcement of IIFS and IFS, to the extent possible. If policies are being set based upon unenforced standards, then not enough water will be available.</u></p>	<p><u>Maintain sustainable resources</u></p> <p><u>Protect water resources</u></p> <p><u>Protect and restore streams</u></p> <p><u>Protect cultural resources</u></p> <p><u>Minimize adverse environmental impacts</u></p>	N/A	MDWS Mayor's Office Aha Moku Local community members Council	<u>1</u>
28.	<p><u>Provide stream monitors for all streams to ensure accurate data is being used in decision making</u></p>	<p><u>Maintain sustainable resources</u></p> <p><u>Protect water resources</u></p>	\$24,000 - \$40,000 per stream.	MDWS USGS	<u>1, 2</u>

WATER RESOURCE ADEQUACY, ISLAND WIDE STRATEGIES & RECOMMENDATIONS

	<u>and as an enforcement mechanism. Prioritize streams listed under the USGS.</u>	<u>Protect and restore streams</u> <u>Minimize adverse environmental impacts</u>			
29.	<u>Encourage CWRM to accept volunteer assistance from a qualified community task force for enforcement of IIFS and IFS in areas where needed. This includes working with community members to set up a process to qualify a community task force.</u>	<u>Minimize adverse environmental impacts</u> <u>Protect water resources</u>	<u>N/A</u>	<u>CWRM</u> <u>Qualified community task force</u>	<u>1</u>
Water Quality Management					
30.	<u>Implement well siting criteria to avoid contaminated groundwater supplies and unnecessary risks to public health.</u>	<u>Maximize water quality</u>	<u>Potentially increased pumping costs for higher elevation wells. Site specific.</u>	<u>MDWS</u> <u>Public Water Systems</u>	<u>1</u>
31.	<u>Adopt wellhead protection measures for potable wells.</u>	<u>Protect water resources</u> <u>Maximize water quality</u>	<u>DOH grant funded public outreach and research completed.</u>	<u>MDWS</u> <u>Maui County</u>	<u>1</u>
32.	<u>Educate the farming community in sustainable farming practices to reduce negative impacts from agricultural practices on water resources.</u>	<u>Protect water resources</u> <u>Maximize water quality</u>	<u>Outreach within multiple agency budgets. From \$5,000 annually.</u>	<u>DOA</u> <u>DOH</u> <u>MDWS</u> <u>HRWA</u> <u>SWCD</u>	<u>1</u>
33.	<u>Update assessment of potential contaminating activities around drinking water supply and support increased monitoring of potable wells as needed.</u>	<u>Maximize water quality</u>	<u>\$10,000 - \$20,000, five-year updates.</u>	<u>Maui County</u> <u>MDWS</u>	<u>1</u>
34.	<u>Explore options to replace the use of chloramines in the Upcountry water system.</u>	<u>Maximize water quality</u>	<u>TBD</u>	<u>MDWS</u> <u>Council</u>	<u>1</u>
Conservation – Demand Side					
35.	<u>Retrofits/direct installation and sub-metering programs, distribution of water-efficient</u>	<u>Maintain sustainable resources</u> <u>Maximize efficiency of water use</u>	<u>MDWS ongoing and pilot programs.</u>	<u>MDWS</u>	<u>1</u>

WATER RESOURCE ADEQUACY, ISLAND WIDE STRATEGIES & RECOMMENDATIONS

	<u>fixtures and retrofits for existing users and facilities</u>	<u>Minimize cost of water supply</u>	<u>\$108,000 year 1 – 3.</u>		
<u>36.</u>	<u>Smart meters retrofits.</u>	<u>Maintain sustainable resources</u> <u>Maximize efficiency of water use</u> <u>Minimize cost of water supply</u>	<u>Depends on existing meters and model, conversion from \$150/meter.</u>	<u>Private water purveyors</u> <u>MDWS</u>	<u>2</u>
<u>37.</u>	<u>Landscaping and irrigation system incentives and requirements, targeting dry areas.</u> <u>Incentivize turf removal policies. Require low impact project design for on-site water retention, such as xeriscaping improvements rebate, irrigation controllers, residential greywater program, permeable surfaces with required maintenance and native and climate change adaptable plant use.</u>	<u>Maintain sustainable resources</u> <u>Maximize efficiency of water use</u> <u>Minimize cost of water supply</u> <u>Manage water equitably</u>	<u>\$245,000 annually for incentives, \$0 for requirements.</u>	<u>Maui County Parks Dept.</u> <u>MDWS</u> <u>County Council Planning Dept.</u> <u>Planning Commissions</u>	<u>1</u>
<u>38.</u>	<u>Public information and education: sustainability working group; technology/innovation transfer programs; recognition program; public events; participation in recognized Federal and industry programs (such as WaterSense); advertising</u>	<u>Maintain sustainable resources</u> <u>Maximize efficiency of water use</u> <u>Minimize cost of water supply</u>	<u>MDWS ongoing programs.</u> <u>\$50,000 annually.</u>	<u>MDWS</u> <u>HRWA</u> <u>Public Water Systems</u>	<u>1</u>
<u>39.</u>	<u>Landscaping guidelines, audit and retrofit, landscape Ordinance.</u>	<u>Maintain sustainable resources</u> <u>Maximize efficiency of water use</u> <u>Minimize cost of water supply</u>	<u>Staff time.</u> <u>Retrofit depends on audit.</u>	<u>MDWS</u>	<u>1</u>
<u>40.</u>	<u>Market/customer surveys followed by rebates and incentives: high efficiency fixtures, washing machines, toilets and urinals; hotel awards program</u>	<u>Maintain sustainable resources</u> <u>Maximize efficiency of water use</u> <u>Minimize cost of water supply</u>	<u>\$70,000 annually (excluding outdoor incentives).</u>	<u>MDWS</u>	<u>1</u>
<u>41.</u>	<u>Revise Maui County Code to require high efficiency fixtures in all new construction.</u>	<u>Maintain sustainable resources</u> <u>Maximize efficiency of water use</u> <u>Minimize cost of water supply</u>	<u>N/A</u>	<u>Maui County</u> <u>MDWS</u> <u>County Council</u>	<u>1</u>

WATER RESOURCE ADEQUACY, ISLAND WIDE STRATEGIES & RECOMMENDATIONS

	<p><u>Develop a comprehensive water conservation Ordinance to include xeriscaping regulations.</u></p> <p><u>Water efficient home: estimated added construction cost \$25,000 (6 percent increase in property value).</u> <u>LEED certified home: estimated. added construction cost \$86,000 (18 percent increase in property value).</u></p>	<p><u>Manage water equitably</u></p>			
<u>42</u>	<p><u>Aggressive tiered rate structure based on audit and rate study.</u></p> <p><u>Create a new water user category for hotels and resorts with a tiered fee structure that promotes water conservation by increasing the cost for the highest tier.</u></p> <p><u>Meet with other high water users to determine if high use is due to need or if system repairs are needed. Develop strategies for encouraging the repair of water leaks for high water users.</u></p>	<p><u>Maintain sustainable resources</u> <u>Maximize efficiency of water use</u> <u>Minimize cost of water supply</u> <u>Manage water equitably</u></p>	<u>N/A</u>	<u>Maui County</u> <u>MDWS</u>	<u>1</u>
<u>43</u>	<p><u>Agricultural programs: irrigation efficiency audits, technical assistance, rebates, technical working groups.</u></p>	<p><u>Maintain sustainable resources</u> <u>Maximize efficiency of water use</u> <u>Minimize cost of water supply</u> <u>Provide for agricultural needs</u></p>	<p><u>Outreach within multiple agency budgets. From \$10,000 annually.</u></p>	<u>DOA</u> <u>DOH</u> <u>MDWS</u> <u>HRWA</u> <u>SWCD</u>	<u>1</u>
<u>44</u>	<p><u>Greywater incentives.</u></p>	<p><u>Maintain sustainable resources</u> <u>Maximize efficiency of water use</u></p>	<p><u>MDWS 2year pilot program. \$80,000.</u></p>	<u>Maui County</u> <u>MDWS</u>	<u>2</u>
<u>45</u>	<p><u>Encourage rainwater catchment for irrigation, including through education and outreach.</u></p>	<p><u>Maintain sustainable resources</u> <u>Maximize efficiency of water use</u></p>	<u>N/A</u>	<u>DOH</u> <u>Private water purveyors</u> <u>Maui County</u>	<u>1</u>
<u>46</u>	<p><u>Revise Maui County Code and/or provide incentives:</u></p>	<p><u>Maintain sustainable resources</u></p>	<u>N/A</u>	<u>Maui County</u>	<u>1,</u> <u>2</u>

WATER RESOURCE ADEQUACY, ISLAND WIDE STRATEGIES & RECOMMENDATIONS

	<u>water conserving design and landscaping in new development (such as xeriscaping that targets dry areas), and water efficient irrigation systems</u>	<u>Maximize efficiency of water use</u> <u>Minimize cost of water supply</u> <u>Manage water equitably</u>			
47.	<u>Revise Maui County Code and/or provide incentives: water efficient building design integrating alternative sources (such as greywater or catchment).</u>	<u>Maintain sustainable resources</u> <u>Maximize efficiency of water use</u> <u>Minimize cost of water supply</u> <u>Manage water equitably</u>	<u>N/A</u>	<u>Maui County</u>	<u>2</u>
48.	<u>Restrict outdoor water waste: disallow overspray and runoff, water wasting, and require hose nozzles.</u> <u>Address watering behaviors with education and outreach.</u>	<u>Maintain sustainable resources</u> <u>Maximize efficiency of water use</u> <u>Minimize cost of water supply</u>	<u>N/A</u>	<u>Maui County MDWS drought rules</u>	<u>2</u>
49.	<u>Create measurable conservation policies for all areas at all times.</u>	<u>Maintain sustainable resources</u> <u>Maximize efficiency of water use</u> <u>Minimize cost of water supply</u> <u>Manage water equitably</u>	<u>N/A</u>	<u>Maui County MDWS water shortage rules Council</u>	<u>1</u>
50.	<u>"Lead by Example" conservation and efficiency projects.</u>	<u>Maintain sustainable resources</u> <u>Maximize efficiency of water use</u> <u>Minimize cost of water supply</u> <u>Manage water equitably</u>	<u>N/A</u>	<u>MDWS Maui County Parks Dept.</u>	<u>2</u>
51.	<u>Require WaterSense (efficiency) standard for new development and existing retrofits.</u>	<u>Maximize efficiency of water use</u>	<u>N/A</u> <u>Amend Maui County Code</u>	<u>MDWS County Council</u>	<u>1,2</u>
52.	<u>Require water conservation landscape measures for resorts, golf courses, and public facilities.</u>	<u>Maximize efficiency of water use</u>	<u>N/A</u> <u>Amend Maui County Code</u>	<u>MDWS County Council</u>	<u>1</u>
Conservation – Supply Side					
53.	<u>Perform annual comprehensive water audits.</u>	<u>Maximize efficiency of water use</u> <u>Minimize cost of water supply</u>	<u>Staff costs only, free software and training.</u>	<u>MDWS Public Water Systems</u>	<u>1</u>
54.	<u>Fund and implement a continuous leak detection program.</u>	<u>Maximize efficiency of water use</u> <u>Minimize cost of water supply</u>	<u>From \$100,000 annually.</u>	<u>MDWS Large Public Water Systems</u>	<u>1</u>

WATER RESOURCE ADEQUACY, ISLAND WIDE STRATEGIES & RECOMMENDATIONS

<u>55.</u>	<u>Maintain and operate the water system to minimize the sources of water loss.</u>	<u>Maximize efficiency of water use</u> <u>Minimize cost of water supply</u>	<u>N/A</u>	<u>MDWS</u> <u>Private water purveyors</u>	<u>1</u>
<u>56.</u>	<u>Reduce water loss of potable and non-potable systems.</u> <u>Implement and advocate for surface water efficiency programs, such as improvements to diversions, conveyances, storage, and meters to reduce water loss. Line or reline leaking reservoirs and ditches.</u>	<u>Maximize efficiency of water use</u>	<u>N/A</u>	<u>Maui County</u> <u>MDWS</u> <u>Private purveyors</u> <u>CWRM</u>	<u>1, 2</u>
Conservation – Agricultural Uses					
<u>57.</u>	<u>Research, support, and use less water consumptive crops and climate adapted crops.</u>	<u>Maintain sustainable resources</u> <u>Maximize efficiency of water use</u> <u>Manage water equitably</u>	<u>N/A</u>	<u>DOA</u>	<u>2</u>
<u>58.</u>	<u>Improve irrigation management and efficiency.</u>	<u>Maintain sustainable resources</u> <u>Maximize efficiency of water use</u> <u>Manage water equitably</u>	<u>N/A</u>	<u>UH CTAHR</u> <u>USDA</u> <u>SWCD</u> <u>Hawai'i Farm Bureau Hawai'i Organic Farmers Association</u>	<u>2</u>
<u>59.</u>	<u>Maintain the integrity of plantation irrigation systems including reservoirs.</u>	<u>Maximize efficiency of water use</u> <u>Provide for agricultural needs</u>	<u>N/A</u>	<u>Public-private partnerships (EMI, MLP, WWC, West Maui Land)</u> <u>Maui County</u> <u>DLNR</u> <u>DOA</u>	<u>2</u>
<u>60.</u>	<u>Augment agricultural water supplies with alternative resources.</u>	<u>Maintain sustainable resources</u> <u>Manage water equitably</u> <u>Provide for agricultural needs</u>		<u>MDPW</u> <u>DLNR</u>	<u>2</u>
<u>61.</u>	<u>Require non-potable and R-1 water use for agriculture where available and appropriate (such as north Kihei Bayer fields).</u>	<u>Maintain sustainable resources</u>	<u>N/A</u> <u>Adopt Ordinance.</u>	<u>MDWS</u> <u>Council</u> <u>MDEM</u>	<u>1</u>
Conservation – Energy					
<u>62.</u>	<u>Pursue comprehensive energy management.</u>	<u>Minimize adverse environmental impacts</u> <u>Minimize cost of water supply</u>	<u>N/A</u>	<u>MDWS</u> <u>Public Water Systems</u> <u>Maui County</u> <u>Energy</u>	<u>1</u>

WATER RESOURCE ADEQUACY, ISLAND WIDE STRATEGIES & RECOMMENDATIONS

				<u>Management Program</u>	
63.	<u>Increase energy efficiency and improve load management.</u>	<u>Minimize adverse environmental impacts</u> <u>Minimize cost of water supply</u>	<u>Currently being assessed.</u>	<u>MDWS</u> <u>Public Water Systems</u> <u>Maui County Energy Management Program</u>	<u>2</u>
64.	<u>Increase alternative energy generation and use.</u>	<u>Minimize adverse environmental impacts</u>	<u>N/A</u>	<u>MDWS</u> <u>Public Water Systems</u> <u>Maui County Energy Management Program</u>	<u>2</u>
65. CONVENTIONAL WATER SOURCE					
65.	<u>Support collaborative hydrogeological studies of impacts from climate change and future well development on groundwater health.</u>	<u>Maintain sustainable resources</u> <u>Protect water resources</u>	<u>From \$600,000, joint funding. Site and resource specific.</u>	<u>CWRM</u> <u>MDWS</u> <u>Public Water Systems</u> <u>USGS</u>	<u>1</u>
66.	<u>Develop groundwater within sustainable yield to provide sufficient supply for growth, maintaining a buffer to account for potential future drought impact and prospective adjustments in aquifers lacking hydrologic studies.</u>	<u>Maintain sustainable resources</u> <u>Maximize reliability of water service</u>	<u>Site specific, see regional sectors.</u>	<u>CWRM</u> <u>MDWS</u> <u>Private water purveyors</u>	<u>1</u>
67.	<u>Promote the highest quality water for the highest end use.</u>	<u>Manage water equitably</u>	<u>N/A</u>	<u>CWRM</u> <u>MDWS</u> <u>Private water purveyors</u>	<u>1</u>
68.	<u>Protect and prioritize public trust uses in allocating groundwater in regions of limited resources and conflicting needs.</u>	<u>Manage water equitably</u> <u>Provide for Department of Hawaiian Home Lands needs</u>	<u>N/A</u>	<u>CWRM</u> <u>MDWS</u> <u>DHHL</u>	<u>1</u>
69.	<u>Increase monitoring of groundwater sources to assess and reduce seawater intrusion and chloride levels in potable and non-potable wells throughout developed aquifers.</u>	<u>Maintain sustainable resources</u> <u>Minimize adverse environmental impacts</u>	<u>From \$50,000 annually. Site specific.</u>	<u>CWRM</u> <u>USGS</u>	<u>2</u>
70.	<u>Promote well siting and distribution strategies for all public water systems to ensure optimal spacing and withdrawals for aquifer health and equitable use.</u>	<u>Maintain sustainable resources</u> <u>Manage water equitably</u>	<u>N/A</u>	<u>CWRM</u> <u>Maui County</u> <u>MDWS</u> <u>Private water purveyors</u>	<u>2</u>

WATER RESOURCE ADEQUACY, ISLAND WIDE STRATEGIES & RECOMMENDATIONS

71.	<u>Formalize demand response plans for water purveyors that address water shortage and aquifer changes.</u>	<u>Maintain sustainable resources</u> <u>Maximize reliability of water service</u>	<u>None</u>	<u>CWRM</u> <u>MDWS</u> <u>Private water purveyors</u>	<u>2</u>
72.	<u>Develop a water availability rule to provide certainty in land use planning and ensure that reliable source and infrastructure capacity is provided within a reasonable time for planned growth.</u>	<u>Maximize reliability of water service</u> <u>Maintain consistency with General and Community Plans</u>	<u>None</u>	<u>Maui County</u> <u>MDWS</u>	<u>2</u>
73.	<u>Increase system flexibility so that regional sources can be moved to support areas of need, both within the municipal systems and between regional public water systems.</u>	<u>Maximize reliability of water service</u> <u>Maximize efficiency of water use</u>	<u>See regional sectors.</u>	<u>MDWS</u>	<u>2</u>
74.	<u>Ensure that public/private groundwater development agreements reflect the public trust needs and are in keeping with the water allocation priorities of the MIP.</u>	<u>Maximize reliability of water service</u> <u>Manage water equitably</u> <u>Maintain consistency with General and Community Plans</u>	<u>N/A</u>	<u>Maui County</u> <u>MDWS</u> <u>Public Water Systems</u>	<u>2</u>
75.	<u>Develop groundwater to maximize reliability of potable supply and as contingency in areas currently dependent on surface water.</u>	<u>Maximize reliability of water service</u>	<u>See regional sectors.</u>	<u>MDWS</u> <u>Public Water Systems</u>	<u>2</u>
76.	<u>Diversify supply for agricultural use to increase reliability.</u>	<u>Provide for agricultural needs</u> <u>Maximize reliability of water service</u>	<u>See regional sectors.</u>	<u>DOA</u> <u>Maui County</u> <u>Private water purveyors</u>	<u>2</u>
77.	<u>Encourage CWRM to prioritize establishing IFS for diverted streams with potential conflicting uses.</u>	<u>Protect and restore streams</u> <u>Minimize adverse environmental impacts</u> <u>Manage water equitably</u> <u>Protect cultural resources</u>	<u>N/A</u>	<u>CWRM</u>	<u>2</u>
78.	<u>Defer any new surface water diversions to meet new projected demand.</u>	<u>Protect and restore streams</u> <u>Protect cultural resources</u>	<u>N/A</u>	<u>CWRM</u> <u>Maui County</u>	<u>1</u>
79.	<u>Balance existing diversions with alternative sources for agriculture to mitigate low-flow stream conditions.</u>	<u>Provide for agricultural needs</u> <u>Maximize reliability of water service</u>	<u>N/A</u>	<u>DOA</u> <u>Maui County</u> <u>Private water purveyors</u>	<u>2</u>
80.	<u>Maximize efficiencies in surface water transmission, distribution, and storage.</u>	<u>Maximize efficiency of water use</u>	<u>N/A</u>	<u>Private water purveyors (EMI, MLP, WWC, West Maui Land)</u>	<u>2</u>

WATER RESOURCE ADEQUACY, ISLAND WIDE STRATEGIES & RECOMMENDATIONS

81.	<u>Add raw water storage to increase reliable supply once instream flow standards are established.</u>	<u>Maximize reliability of water service</u>	<u>See regional sectors.</u>	<u>MDWS</u>	<u>2</u>
82.	<u>Increase treatment plan capacity at water treatment plant facilities to accommodate additional treatment in wet season.</u>	<u>Maximize reliability of water service</u> <u>Minimize cost of water supply</u>	<u>See regional sectors.</u>	<u>MDWS</u>	<u>2</u>
83.	<u>Support plans and programs to develop additional sources of water for irrigation purposes.</u>	<u>Provide for agricultural needs</u> <u>Maximize reliability of water service</u>	<u>See regional sectors.</u>	<u>DOA</u> <u>Maui County</u> <u>Private water purveyors</u>	<u>1</u>
84.	<u>Prioritize delivery and use of agricultural water within County agricultural parks for cultivation of food crops for local consumption.</u>	<u>Provide for agricultural needs</u> <u>Maximize reliability of water service</u>	<u>N/A</u>	<u>Maui County</u> <u>EMI</u> <u>MDWS</u>	<u>2</u>
85.	<u>Regional basal well development:</u> <u>1. Require studies to show adequate capacity to meet cultural uses, kuleana uses, stream restoration, resident, and agricultural needs within the area prior to transport.</u> <u>2. Outreach to cultural users to survey their water needs and establish their water usage based upon needs, not actual usage. Many streams are dry due to diversions which hamper cultural usage; with additional water, cultural usage will increase.)</u> <u>3. Assess well capacity and number of wells needed and perform cost-benefit analysis.</u> <u>4. Require surveys of private wells to increase accuracy of aquifer withdrawal rates.</u> <u>5. Maintain a buffer to sustainable yield.</u> <u>6. Require USGS studies of the interaction between ground and surface water and potential impacts from pumping prior to funding well development.</u>	<u>Maintain sustainable resources</u> <u>Manage water equitably</u> <u>Protect cultural resources</u> <u>Minimize adverse environmental impacts</u>	<u>TBD</u>	<u>MDWS</u>	<u>1</u>

WATER RESOURCE ADEQUACY, ISLAND WIDE STRATEGIES & RECOMMENDATIONS

86.	<p><u>Develop and maintain back up wells even if more expensive to mitigate drought, equipment failure, chlorides or other source or supply problems and avoid use restrictions.</u></p> <p><u>Consider and discuss utilizing existing private wells with unused capacity during drought emergencies by mutual agreement of the parties.</u></p>	<p><u>Maximize efficiency of water use</u></p> <p><u>Maximize reliability of water service</u></p>	<u>TBD</u>	<u>MDWS</u>	<u>1</u>
87.	<p><u>Diversify to the most cost-effective combination of groundwater, surface water, and aggressive conservation with some temporary cutbacks acceptable during drought and equipment failure.</u></p>	<p><u>Maximize efficiency of water use</u></p> <p><u>Maximize reliability of water service</u></p>	<u>No costs associated.</u>	<u>MDWS</u>	<u>2</u>
88.	<p><u>Require private public systems to develop in a manner that facilitates potential connection to the Maui DWS system or integrated management.</u></p>	<p><u>Maximize reliability of water service</u></p>	<u>N/A</u> <u>Amend Maui County Code</u>	<u>MDWS Council</u> <u>Private water system owners</u>	<u>1</u>
89.	<p><u>Increase connection between Maui DWS subdistricts.</u></p>	<p><u>Maximize reliability of water service</u></p>	<u>TBD</u>	<u>MDWS</u>	<u>1</u>
90.	<p><u>Maintain and manage plantation ditch systems for continued potable and non-potable water conveyance. Explore cost of investing in existing system, resolving ownership issues, and management issues.</u></p>	<p><u>Maximize reliability of water service</u></p>	<u>TBD</u>		<u>1</u>
91.	<p><u>Research land title when acquiring property for water system use or development to ensure lands were legally transferred to current owner.</u></p>	<p><u>Manage water equitably</u> <u>Protect cultural resources</u></p>	<u>N/A</u>	<u>MDWS Managing Director's Office/Principal Archeologist Corporation Counsel</u>	<u>1</u>
92.	<p><u>Conduct study of water system ownership and management models, such as water authority and public company.</u></p>	<p><u>Manage water equitably</u> <u>Maximize efficiency of water use</u></p>	<u>\$50,000 - \$100,000.</u>	<u>MDWS Council</u> <u>Mayor</u>	<u>2</u>
<u>ALTERNATIVE WATER SOURCE</u>					
93.	<p><u>Expand requirement for new development to connect to</u></p>	<p><u>Protect water resources</u></p>	<u>N/A</u>	<u>Maui County</u>	<u>2</u>

WATER RESOURCE ADEQUACY, ISLAND WIDE STRATEGIES & RECOMMENDATIONS

	<u>recycled water infrastructure if practical.</u>	<u>Maintain consistency with General and Community Plans</u>			
94.	<u>Promote closer collaboration between MDWS and MDEM to master plan and utilize DWSRF funding to maximize recycled water use.</u>	<u>Maximize efficiency of water use, Maintain consistency with General and Community Plans</u>	<u>N/A</u>	<u>Maui County MDEM MDWS</u>	<u>2</u>
95.	<u>Explore expansion of “scalping plants” (small-scale membrane filter systems that put effluent closer to reuse locations) in designated growth areas.</u>	<u>Maximize efficiency of water use, Maintain consistency with General and Community Plans</u>	<u>N/A</u>	<u>MDEM</u>	<u>2</u>
96.	<u>Inform and educate the residential and commercial community of easy, affordable rainfall catchment for recharge and garden use.</u>	<u>Protect water resources</u>	<u>Outreach within multiple agency budgets. From \$5,000 annually.</u>	<u>DOH MDWS</u>	<u>2</u>
97.	<u>Provide incentives for residential or commercial rainwater catchment systems. Evaluate water quality issues prior to adoption of strategy. Allow water catchment systems on properties with water meters, provided there is no connection between the two.</u>	<u>Protect water resources Maintain consistency with General and Community Plans</u>	<u>MDWS pilot program \$45,000 over 2 years.</u>	<u>MDWS</u>	<u>2</u>
98.	<u>Explore and promote opportunities for large volume stormwater runoff for agricultural irrigation.</u> <u>Capture flash supply as raw water storage for treatment or utilize reservoirs to store irrigation supply for diverse agriculture.</u>	<u>Provide for agricultural needs</u>	<u>N/A</u>	<u>DLNR DOA MDPW</u>	<u>2</u>
99.	<u>Explore a program to use small greywater systems for small residential and commercial development use.</u>	<u>Maximize reliability of water service</u>	<u>N/A Amend State and possibly County regulations.</u>	<u>MDWS Council DOH for commercial rainwater use</u>	<u>1</u>

WATER RESOURCE ADEQUACY, ISLAND WIDE STRATEGIES & RECOMMENDATIONS

*Abbreviations:

CWRM	Commission on Water Resource Management
DHHL	State of Hawai'i Department of Hawaiian Home Lands
DLNR	State of Hawai'i Department of Land and Natural Resources
DOA	State of Hawai'i Department of Agriculture
DOH	State of Hawai'i Department of Health
EMI	East Maui Irrigation Company
HRWA	Hawai'i Rural Water Association
Maui County	Maui County Administration and Maui County Council
MDEM	Maui County Department of Environmental Management
MDPW	Maui County Department of Public Works
MDWS	Maui County Department of Water Supply
MLP	Maui Land and Pineapple Company
SWCD	Soil and Water Conservation District
UH CTAHR	University of Hawai'i College of Tropical Agriculture and Human Resources
USDA	U.S. Department of Agriculture
USGS	U.S. Department of the Interior, U.S. Geological Survey
WWC	Wailuku Water Company

**Implementation Timeframe

- 1: Short-term 1 – 5 years
- 2: Long-term 5 – 20 years