



# Level 1 Validation Summary Notes/Certificate

This document includes detailed notes about utility practices as reviewed during third-party level-one water audit validation.

## Call Information

### Utility

System Name: Kapalua (204)

Audit Period: CY2022

System Participants: Julian Gandara, Stephen Green, Hawaii Water Service (HWS)

Call Date: 6/26/2023

### Validator

Validator: Neal Fujii, Nicholas Ing

Validator Qualifications: Equivalent to AWWA CA-NV Section Level 1 Validation Certification

Validator General Comments: Comparing CY2021 with CY2022 Water Supplied decreased 41 MG, Authorized Consumption increased 12 MG, Water Losses decreased 52 MG, Real Losses decreased 53 MG.

In 2022 Kapalua repaired a major leak in a distribution line, which is suspected of leaking since 2021. There may be some issues with data inconsistencies between previous owner and current owner (HWS). CY 2022 was the first year that data was compiled solely by HWS. The current billing system combines both potable and non-potable (including irrigation), which makes it difficult to extract appropriate consumption. HWS staff believes that the year-to-year data inconsistencies could be caused by data handling errors.

Hawaii Water Service (HWS) purchased the Kapalua Water Company System and began to operate the system on May 1, 2021. Due to the change in ownership, it was difficult for HWS to obtain complete records for CY2021.

Validators recommend the following for Kapalua: investigate the high variability in reported volumes of water supplied and authorized consumption from year to year; begin to test the production meters and large customer meters; conduct a leak detection survey; and consider establishing DMAs in suspected high-leak areas. Since Kapalua wells are in a newly established Commission on Water Resource Management designated water management area, efforts to reduce real losses will be scrutinized by CWRM.

## Past Year's Activity:

### Data Management

- HWS staff completed an AWWA water audit and a level-1 water audit validation.
- With increased development (construction) in Kapalua, the count of temporary construction meters has increased. Staff have replaced some

### Loss Recovery

- Reported leaks are promptly repaired.
- In 2022, Kapalua staff replaced several leaking isolation valves and PRVs in the system.

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temporary construction meters and more closely tracked this consumption volume (counted in BMAC).

- Kapalua continues its customer meter replacement program based on AWWA M6 recommendations. Small, manually read meters are changed to AMI.

### Opportunities:

#### Data Management

- Further investigation may be needed to determine if it is possible to isolate the tank that is filled after well meters without interrupting potable water service for the system. If possible, isolating the tank would allow Kapalua staff to compare the volume of water entering the tank with the volume of water registered by the master meter. This comparative accuracy test would help quantify inaccuracy in the well meters.

#### Loss Recovery

- Data management opportunities will take priority at this time.
- Leak detection program may be implemented based on results of a pilot leak detection project in another system (Kalaeloa/Barbers Point, Oahu).

### Selected Metrics & Signatures:

Metric	Units	Value
Miles of Mains		27.5 [27.5]
Count of Service Connections		488 [404]
Variable Production Cost	\$/MG	\$3,529 [\$2,302]
Customer Retail Unit Cost	\$/kgal	\$4.17 [\$4.86]
Real Losses per Connection per Day	gal/conn/day	N/A
Real Losses per Mile of Main	gal/mile/day	1,055 [6,373]
Cost of Real Losses per Mile of Main	\$/mile/yr	
Infrastructure Leakage Index	Ratio	N/A
Apparent Losses per Connection per Day	gal/conn/day	21 [20]
Cost of Apparent Losses per Connection	\$/conn/yr	

[bracketed values represent previous audit period]

Validator Signature:  Name: Neal Fujii

Utility Executive Signature:  Name: Julian Gandara

## Validation Call Notes

Audit Input	Grade	Audit Input Notes	Data Validity Grade Notes
Volume from Own Sources	3	<p><b>Source Meter Profile:</b> The system is supplied by two wells that feed to one tank. Between that tank and another larger tank there is a takeoff to some customers. The rest of the system is fed after the larger tank. New propeller well meters were installed in 2020.</p> <p><b>Derivation:</b> Manual reads from production meters as archived.</p> <p><b>Comments:</b> Every month there are an estimated 180 minutes of flush to waste run time. There is a typical number of start and stops for the wells per month. The flush to waste occurs before the well meters. Input derivation from supporting documents confirmed. Exclusion of non-potable volumes confirmed. The wells are owned by MLP and HWS purchases this water, however this is considered VfOS and entered into this field.</p>	<p><b>Approximate Percent of Volume Metered:</b> 100%</p> <p><b>Approximate Percent Tested and/or Calibrated:</b> New meters installed in 2020</p> <p><b>Calibration Frequency:</b> None.</p> <p><b>Volumetric Testing Frequency:</b> None.</p> <p><b>Volumetric Testing Method:</b> n/a.</p> <p><b>Comments:</b> No additional comments.</p>
Volume from Own Sources Master Meter and Supply Error Adjustment	3	<p><b>Derivation:</b> Left blank in absence of available test data.</p> <p><b>Change in Storage Considered:</b> No.</p> <p><b>Comments:</b> No additional comments.</p>	<p><b>Source Meter Read Method:</b> Manual.</p> <p><b>Source Meter Read Frequency:</b> 3 times/week.</p> <p><b>Data Review Practices:</b> 3 time/week</p> <p><b>Real-Time Storage Level Monitoring:</b> Yes.</p> <p><b>Comments:</b> SCADA system monitors reservoir levels in real time.</p>
Water Imported	n/a	<p><b>Import Meter Profile:</b> n/a</p> <p><b>Derivation:</b> n/a</p> <p><b>Comments:</b> n/a</p>	<p><b>Approximate Percent of Volume Metered:</b> n/a</p> <p><b>Approximate Percent Tested and/or Calibrated:</b> n/a</p> <p><b>Calibration Frequency:</b> n/a</p> <p><b>Volumetric Testing Frequency:</b> n/a</p> <p><b>Volumetric Testing Method:</b> n/a</p> <p><b>Comments:</b> n/a</p>
Water Imported Master Meter and Supply Error Adjustment	n/a	<p><b>Derivation:</b> n/a</p> <p><b>Comments:</b> n/a</p>	<p><b>Import Meter Read Method:</b> n/a</p> <p><b>Import Meter Read Frequency:</b> n/a</p> <p><b>Data Review Practices:</b> n/a</p> <p><b>Comments:</b> n/a</p>
Water Exported	3	<p><b>Export Meter Profile:</b> After the wells and before the storage tanks there is an export to the County of Maui. The export meter is a Badger propeller type 3" and manually read. The meter is maintained by the County of Maui.</p> <p><b>Comments:</b> Maui DWS tested the export meter in 2020 and did not find any inaccuracies. Input derivation from supporting documents confirmed (J.G. 6/26/2023 e-mail). Exclusion of non-potable volumes confirmed. Exclusion from BMAC input confirmed. Note that HWS (Kapalua) does not bill MDWS for this export. MLP bills MDWS for this water.</p>	<p><b>Approximate Percent of Volume Metered:</b> 100%</p> <p><b>Approximate Percent Tested and/or Calibrated:</b> 100%</p> <p><b>Calibration Frequency:</b> None.</p> <p><b>Volumetric Testing Frequency:</b> Done in 2020.</p> <p><b>Volumetric Testing Method:</b> Comparative apparatus.</p> <p><b>Comments:</b> Meter was tested in 2020 using test port run through a separate meter.</p>

Water Exported Master Meter and Supply Error Adjustment	n/a	<p><b>Derivation:</b> Left blank in absence of available test data.</p> <p><b>Comments:</b> No additional comments.</p>	<p><b>Export Meter Read Method:</b> Manual.</p> <p><b>Export Meter Read Frequency:</b> Monthly.</p> <p><b>Data Review Practices:</b> Monthly.</p> <p><b>Comments:</b> n/a</p>
Billed Metered Authorized Consumption	6	<p><b>Derivation:</b> Direct from customer meter readings.</p> <p><b>Customer Meter Profile:</b> Badger meters replaced in 2019 to 2020.</p> <p><b>Read Frequency:</b> Monthly.</p> <p><b>Reading Technology:</b> Mixture of manual and AMI. Large meters &gt;2" are manually read.</p> <p><b>Age Profile:</b> All meters are 3 years old.</p> <p><b>Comments:</b> Complete customer potable meter replacement completed in 2019-2020. Exclusion of non-potable volumes confirmed.</p>	<p><b>Approximate Percent Metered:</b> 100%</p> <p><b>Small Meter Testing Practices:</b> Reactive - complaint based or flagged-consumption testing only.</p> <p><b>Number of Small Meters Tested:</b> None</p> <p><b>Large Meter Testing Practices:</b> None.</p> <p><b>Number of Large Meters Tested:</b> n/a</p> <p><b>General Replacement Practices:</b> Customer meter replacement program is based on AWWA M6 recommendations. Small manually read meters are changed to AMI.</p> <p><b>Billing Data Review:</b> Unknown</p> <p><b>Comments:</b> No additional comments.</p>
Billed Unmetered Authorized Consumption	n/a	<p><b>Profile:</b> n/a</p> <p><b>Derivation:</b> n/a</p> <p><b>Comments:</b> n/a</p>	<p><b>Policy for Metering Exemptions:</b> n/a</p> <p><b>Comments:</b> n/a</p>
Unbilled Metered Authorized Consumption	n/a	<p><b>Profile:</b> There are no unbilled metered accounts.</p> <p><b>Derivation:</b> n/a</p> <p><b>Comments:</b> Select</p>	<p><b>Policy for Billing Exemptions:</b> n/a</p>
Unbilled Unmetered Authorized Consumption	5	<p><b>Profile:</b> Default "Hawaii default" value of 0.25% was applied.</p> <p><b>Comments:</b> No additional comments.</p>	<p><b>Comments:</b> Default grade applied.</p>
Unauthorized Consumption	5	<p><b>Comments:</b> Default input applied.</p>	<p><b>Comments:</b> Default grade applied.</p>
Customer Metering Inaccuracies	3	<p><b>Derivation:</b> New meters assume accuracy at least 2% or less.</p> <p><b>Comments:</b> No additional comments.</p>	<p><b>Customer Meter Testing:</b> Limited (upon request AND consumption flag only).</p> <p><b>Customer Meter Replacement:</b> Completed meter replacement project in 2019.</p> <p><b>Comments:</b> No additional comments.</p>
Systematic Data Handling Errors	5	<p><b>Comments:</b> Default input applied.</p>	<p><b>Comments:</b> Default grade applied.</p>

Length of Mains	7	<p><b>Derivation:</b> Water master plan + nonpotable mains were excluded from this value.</p> <p><b>Hydrant Laterals Included:</b> Uncertain.</p> <p><b>Comments:</b> Water mains are C900 and ductile iron. Length of mains value was modified (27.5 miles) during the validation call. Supporting documentation may have contained non-potable system LoM.</p>	<p><b>Map Format:</b> Paper &amp; Digital</p> <p><b>Asset Management Systems:</b> Not currently in place.</p> <p><b>Map Update Process:</b> Accomplished through normal work order processes.</p> <p><b>Comments:</b> Assume that the Master Plan Length of Mains was derived from GIS.</p>
Number of Service Connections	9	<p><b>Derivation:</b> Standard report run from billing system.</p> <p><b>Basis for Query:</b> Customer meters.</p> <p><b>Comments:</b> Only includes the potable customers. Number of Service Connections value was modified (488) during the validation call. Supporting documentation may have contained non-potable system NoSC.</p>	<p><b>Field Validation:</b> Accomplished through normal meter reading processes and replacement of meter stock.</p> <p><b>Estimate of Error:</b> Less than 1%.</p> <p><b>Comments:</b> No additional comments.</p>
Average Operating Pressure	3	<p><b>How Pressure is Maintained:</b> Water is pumped from the wells to the storage tank. The system is then gravity fed from the storage tanks. There are two pressure reducing valves in the system. Pressure at PRVs is regularly taken.</p> <p><b>Pressure Range:</b> Average 75 psi</p> <p><b>Derivation:</b> Inferred from observations of pressure readings in field or review of pressure measurements.</p> <p><b>Comments:</b> HWS will continue to collect and monitor pressure data in this system.</p>	<p><b>Pressure Data Collection:</b> Hydrant pressures taken during routine system flushing and/or hydrant testing.</p> <p><b>Real-Time Monitoring:</b> No real-time monitoring currently in place.</p> <p><b>Hydraulic Model:</b> None currently in place.</p> <p><b>Comments:</b> No additional comments.</p>
Annual Operating Cost	10	<p><b>Derivation:</b> From official financial reports.</p> <p><b>Comments:</b> No additional comments.</p>	<p><b>Auditing Practices:</b> Annually by a third party CPA.</p> <p><b>Comments:</b> No additional comments.</p>
Customer Retail Unit Cost	9	<p><b>Rate Structure:</b> Tiered rate structure</p> <p><b>Derivation:</b> Total consumptive revenue divided by Billed Metered Authorized Consumption.</p> <p><b>Comments:</b> No additional comments.</p>	<p><b>M36 Review:</b> Input calculations have not been reviewed by an M36 water loss expert.</p> <p><b>Comments:</b> No additional comments.</p>
Variable Production Cost	5	<p><b>Primary Costs:</b> Own sources only.</p> <p><b>Secondary Costs:</b> None currently included.</p> <p><b>Comments:</b> Maui Land and Pineapple owns the wells that supply Kapalua Water System. VPC includes the cost of purchased water from MLP and water treatment chemicals. Electrical cost may be included in the purchase cost agreement.</p>	<p><b>M36 Review:</b> Primary costs only. Input calculations have not been reviewed by an M36 water loss expert.</p> <p><b>Comments:</b> No additional comments.</p>