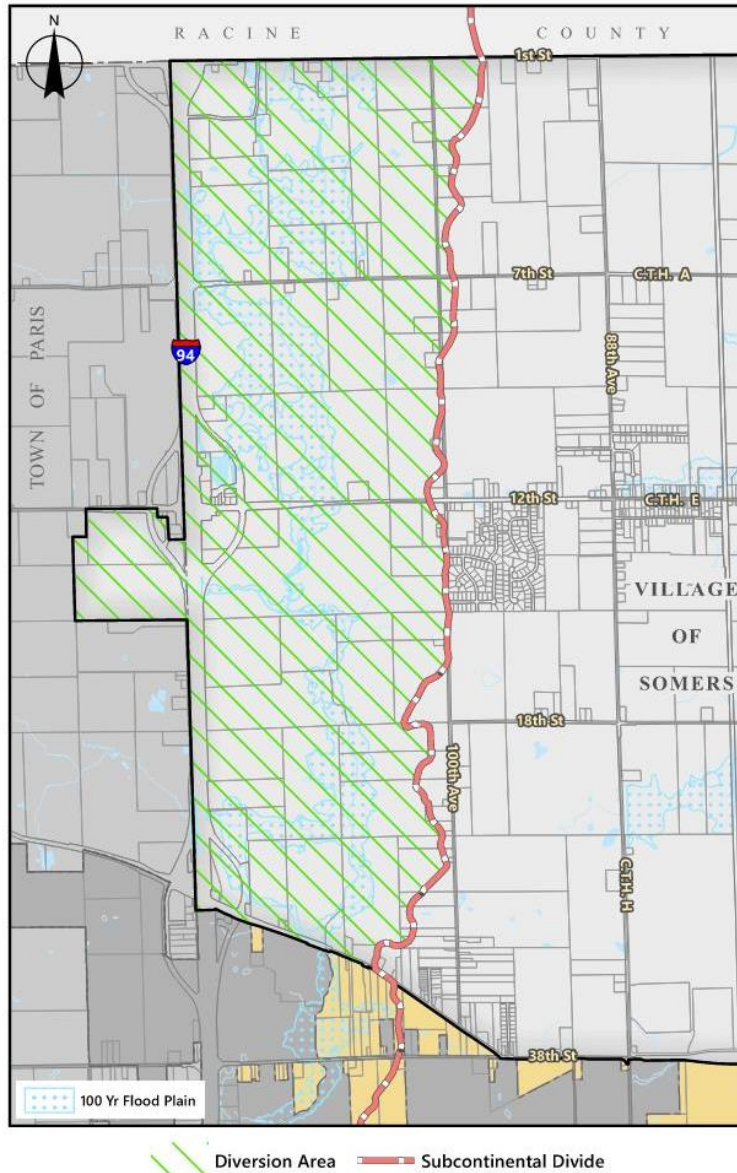


# Village of Somers

## Somers Water Utility

### Annual Water Diversion Report - 2023



March 2024 (Revised May 2024)



# Village of Somers and Somers Water Utility Great Lakes Water Diversion Annual 2023 Report **(Revised May 2024)**

=====

## Summary

The Village of Somers and Somers Water Utility (Village) is submitting this annual report to satisfy the 2021 Diversion Application (2021 Application) requirements of the Wisconsin Department of Natural Resources (DNR)'s approval to the Village's Great Lakes Water Diversion.

Stipulation of the Approval is that the Village must annually report on the following items:

- 1.) The total amount of water diverted monthly within the approved diversion area.
- 2.) The total amount of water sold quarterly (or sold monthly if monthly data is available) to each category of customer within the approved diversion area.
- 3.) The total monthly sewerage flow to the City of Kenosha Wastewater Plant from the diversion area.
- 4.) The total consumptive use as specified by the DNR.
- 5.) A summary of the impact of the implemented Conservation and Efficiency Measures (CEMS) required under Wis. Admin. Code NR 852.04 and NR 852.05, including quantifiable impacts to water use intensity, as defined in Wis. Admin. Code NR 852.03(29).
- 6.) A description of any additional CEMS implemented.

## General

In 2022 the Village built and put into operation a water transfer station to serve the area west of 88<sup>th</sup> Ave, including the Diversion Area. Since there are currently no customers west of 88<sup>th</sup> Avenue and east of the subcontinental divide, all water that passes into the Diversion Area is metered at the transfer station. In the future, there will be customers west of 88<sup>th</sup> Avenue that are not within the Diversion Area; these individual customer meters will be deducted from the meter reading at the water transfer station. Also in 2022, the Village installed a sanitary lift station (Lift Station 1A) that collects all sewage generated in the Diversion Area. The sewage flow meter at the lift station will be utilized to measure all sewage that is returned out of the Diversion Area and sent to the Kenosha Water Utility for processing.

The following were completed in 2023 that reflect water sent into the Diversion Area without wastewater returning to the Great Lakes Basin:

- lawn watering for the Archives and Armory.
- lawn watering for the Kwik Trip Development.

No additional meters were constructed in the Diversion Area in 2023. The Archives and Armory PMML, Wisconsin LLC, at 10475 12<sup>th</sup> Street and Kwik Trip at 11350, 28<sup>th</sup> Street,



continue to receive water in the Diversion Area and fall under the Commercial Category of Customer. The water meters at these locations will be utilized to measure water usage for the category of customer requirements.

Table 1 below summarizes the water introduced into the Diversion Area by the water transfer station, subtracts metered customers (served by the water transfer station) outside of the Diversion Area, and calculates consumptive use by subtracting the sewage flow returned to the Great Lakes Basin. Please note that several new water mains were flushed and placed into service in the second and third quarter of 2023, which resulted in higher-than-expected amount of water diverted. Table 2 below summarizes the metered customers within the Diversion area and water used in 2023.

Consumptive Use

The WDNR defines consumptive use as the sum of the water sold and the water used for flushing minus the total return gallons. Table 1 shows the consumptive use ratio within the Diversion Area in 2023. The higher ratios in the second and third quarters is due to flushing of new water mains.

Table 1. Total Water Introduced and Returned from the Diversion Area

2023	Volume (Gallons)		
	Water Transfer Station & Water Diverted	Sanitary Lift Station	Consumptive Water Use Ratio
Q1	919,000	1,354,000	0.7
Q2	4,700,000	1,393,000	3.4
Q3	4,039,000	1,313,000	3.1
Q4	1,619,000	1,233,000	1.3
Total	11,277,000	5,293,000	2.1

Table 2. Customer Usage

2023	Volume Sold (Gallons)				
	Pritzker Military Archives and Armory 10475 - 12th St	Kwik Trip Store/Gas Station 11350 - 28th St	Kwik Trip Car Wash 11350 - 28th St	Kwik Trip Irrigation 11350 28th St	Total
Q1	86,768	286,484	242,352	0	615,604
Q2	166,056	335,104	172,040	319,396	992,596
Q3	8,228	452,540	325,380	1,089,088	1,875,236
Q4	32,912	394,944	199,716	445,060	1,072,632
<b>Total</b>	<b>293,964</b>	<b>1,469,072</b>	<b>939,488</b>	<b>1,853,544</b>	<b>4,556,068</b>

## Annual 2023 Water Audit

A summary of water use for 2023 is included in the appendix with a complete water audit for 2023. The estimated population served has been revised to adjust the per capita water use of the multi-family customer class. The Village has considerably more multi-family units than originally estimated. Table 3 below summarizes a count of Condominiums and apartments and total bedroom count for each.

Table 3. Multi-Family Population Estimate

	<b>Count</b>	<b>Total Bedrooms</b>	<b>Population</b>
Condominium	75	581	1,348
Apartment	102	1,162	2,696
		<b>Total</b>	<b>4,044</b>

## Impact of Conservation and Efficiency Measures (CEM)

Table 4 (page 5) summarizes the 2021 application data while Table 5 (page 6) summarizes the current 2023 application data for historical per-capita consumption. Note the per-capita consumption data has been adjusted for 2023 and removed for previous years. The total water demand per REU from 2021 was 193 gallons per day (gpd) per REU, while in 2023 it decreased to 181 gpd per REU. The decrease in water use per REU equates to more than a 5 percent reduction, which indicates the Village has met their conservation goal.

Table 7 (Page 8) summarizes the water use efficiency metrics and estimates a water use of 176 gpd per REU.

## Description of Additional CEM's Implemented

The Village expects CEM Item PWS-4 and the future meter reading system and replacement meters to further improve unaccounted water and improve conservation efforts in upcoming years. Staff is currently in the planning stages of obtaining approval from the Public Service Commission of Wisconsin to offer the rebates listed in Table 3.

## Description of Additional Conservation Efforts – Sheridan Road Area

The Village completed construction of water main replacements on Sheridan Road in 2022. The data and graph on Page 9 outline the amounts of water purchased and wastewater returned to Kenosha Water Utility before and after the water main replacements. Year 2023 was the first year the Village also tracked the water sold to the individual homes in the Sheridan Road Area. This collected data confirms the difference in the water purchased from KWU and the amount sold to the customers in the Sheridan Road Area is only different by six percent. The former water mains in this area were leaking. In addition, the unaccounted-for water in the entire Village water system is less than 10 percent (down from 30 percent) for 2023. The difference is water conserved.

Table 4: 2021 Application Data

HISTORICAL PER CAPITA CONSUMPTION									
Year	Total Population <sup>1</sup>	Population Served <sup>2</sup>	Gallons per Capita per Day						Total
			Residential	Commercial	Industrial	Public	Multifamily Residential <sup>3</sup>	Non-Revenue Water Use	
2006	8148	2,236	62.4	45.6	0.0	23.7	-	17.7	149
2007	8120	2,262	72.6	49.1	0.0	39.7	-	36.7	198
2008	8211	2,303	67.6	47.9	0.0	30.9	-	37.5	184
2009	8275	2,388	62.0	50.0	0.0	32.7	-	21.2	166
2010	8356	2,377	78.5	70.3	0.0	19.8	-	18.2	187
2011	8276	2,431	60.4	61.3	0.0	42.3	-	18.7	183
2012	8222	2,406	68.7	75.3	0.0	29.4	-	29.4	203
2013	8128	2,424	57.4	69.2	0.0	42.1	-	(5.8)	163
2014	8271	2,467	50.4	49.3	0.0	42.6	-	17.2	159
2015	8273	2,465	52.8	48.7	0.0	36.9	-	21.6	160
2016	8462	3,099	46.6	41.1	0.0	31.9	-	17.7	137
2017	8615	3,060	53.3	32.3	1.1	29.7	62.0	23.3	202
2018	8827	3,142	53.2	23.3	2.1	28.9	137.9	39.2	284
2019	8371	3,942	50.1	11.6	0.5	21.3	69.7	29.9	183
Average			59.7	48.2	0.3	32.3	89.8	23.0	193.3

Footnotes:

<sup>1</sup> Total population for the Village of Somers was estimated between 2006 and 2016 when the Village incorporated. The estimated Village population between 2006 and 2015 was estimated by subtracting the average Town population in 2016 through 2019 from the Town population between 2006 and 2015. Population data sources include Wisconsin Department of Administration and the United States Census Bureau for census years.

<sup>2</sup> Population served was estimated using residential and multi family customer meters multiplied by the average persons per household of 2.57. A weighted average of 3.39 units per multifamily account was assumed. Per Capita water use for residential and multifamily residential was estimated based on their respective population served for 2017 through 2019.

<sup>3</sup> Prior to 2014, Multifamily Residential was reported as a part of Commercial.

HISTORICAL NUMBER OF CUSTOMERS SERVED						
Year	Number of Customers					Total
	Residential	Commercial	Industrial	Public	Multifamily Residential <sup>1</sup>	
2006	870	116	0	12	-	998
2007	880	109	0	14	-	1,003
2008	896	111	0	15	-	1,022
2009	929	130	0	16	-	1,075
2010	925	141	0	18	-	1,084
2011	946	128	0	17	-	1,091
2012	936	120	0	16	-	1,072
2013	943	120	0	16	-	1,079
2014	960	207	0	9	0	1,176
2015	959	205	0	9	0	1,173
2016	1,206	212	0	9	0	1,427
2017	967	152	2	8	66	1,195
2018	992	157	2	8	68	1,227
2019	1,005	69	2	8	156	1,240

Footnote:

<sup>1</sup> Prior to 2014, Multifamily Residential was reported as a part of Commercial.

Table 5: 2023 Application Data

HISTORICAL PER CAPITA CONSUMPTION										
Year	Total Population <sup>1</sup>	Population Served <sup>2</sup>		Gallons per Capita per Day						
		Residential	Multifamily	Residential	Commercial	Industrial	Public	Multifamily Residential <sup>3</sup>	Non-Revenue Water Use	Total
2008	8211	2,079	-	74.9	53.0	0.0	34.2	-	41.6	204
2009	8275	2,155	-	68.7	57.4	0.0	36.2	-	23.4	186
2010	8356	2,146	-	86.9	80.4	0.0	21.9	-	20.2	209
2011	8276	2,195	-	66.9	71.7	0.0	46.8	-	20.7	206
2012	8222	2,172	-	76.1	87.2	0.0	32.5	-	32.6	228
2013	8128	2,188	-	63.6	80.7	0.0	46.6	-	(6.5)	184
2014	8271	2,227	-	55.8	58.5	0.0	47.2	-	19.0	180
2015	8273	2,225	-	58.5	57.7	0.0	40.8	-	23.9	181
2016	8462	2,798	-	51.6	61.3	0.0	35.4	-	19.6	168
2017	8615	2,243	-	59.1	47.5	1.5	40.6	-	31.8	180
2018	8827	2,301	-	58.9	35.2	2.8	39.4	-	53.5	190
2019	8371	2,332	-	55.5	22.0	0.8	35.9	-	50.3	164
2020	8402	2,343	-	62.3	23.2	0.2	24.5	-	38.6	149
2021	8330	2,348	-	70.4	34.7	5.4	35.0	-	99.8	245
2022	8501	2,285	-	64.7	33.8	4.3	33.3	-	21.0	157
2023	8396	2,332	4,044	65.7	39.8	2.6	12.5	28.9	31.6	181
<b>Average</b>				<b>65.0</b>	<b>52.8</b>	<b>1.1</b>	<b>35.2</b>	<b>28.9</b>	<b>32.6</b>	<b>181.0</b>

Footnotes:

<sup>1</sup> Total population for the Village of Somers was estimated between 2008 and 2015 when the Village incorporated. The estimated Village population between 2008 and 2015 was estimated by subtracting the average Town population in 2016 through 2021 from the Town population between 2008 and 2015. Population data sources include Wisconsin Department of Administration and the United States Census Bureau for census years.

<sup>2</sup> Population served was estimated using residential customers multiplied by the average persons per household of 2.32. For multifamily population served was based on an actual count of bedrooms provided by the Village for apartments and condominiums.

<sup>3</sup> Prior to 2014, Multifamily Residential was reported as a part of Commercial.

HISTORICAL NUMBER OF CUSTOMERS SERVED						
Year	Number of Customers					Total
	Residential	Commercial	Industrial	Public	Multifamily Residential <sup>1</sup>	
2008	896	111	0	15	-	1,022
2009	929	130	0	16	-	1,075
2010	925	141	0	18	-	1,084
2011	946	128	0	17	-	1,091
2012	936	120	0	16	-	1,072
2013	943	120	0	16	-	1,079
2014	960	207	0	9	0	1,176
2015	959	205	0	9	0	1,173
2016	1,206	212	0	9	0	1,427
2017	967	152	2	8	66	1,195
2018	992	157	2	8	68	1,227
2019	1,005	69	2	8	156	1,240
2020	1,010	77	2	22	114	1,225
2021	1,012	81	2	22	125	1,242
2022	985	83	2	22	125	1,217
2023	1,005	93	2	20	130	1,250

Footnote:

<sup>1</sup> Prior to 2014, Multifamily Residential was reported as a part of Commercial.

Table 6: Status of CEM Measures from 2021 Diversion Application

CEM#	Description	Required Elements	Implementation Year	Status
PWS-1	Water Use Audit	Perform a water use audit and prepare written documentation of the audit results using the process outlined in ch PSC 185.	2021	Complete
PWS-2	Leak Detection and Repair Program	Replacement of the Sheridan Road Area water mains.	2022	Complete
PWS-3	Information and Education Outreach	The Village's water conservation goals and AWE tool results will be shared with the residents on the Village website. The information can be found at the following link: <a href="https://www.somers.org/news/2021/07/23/water-conservation/">https://www.somers.org/news/2021/07/23/water-conservation/</a>	2021	Complete
		Partner with UW-Parkside to educate students on water conservation.	Not Started	
PWS-4	Performing Source Measurement	KWU bills the Village for source water and wastewater and the Village bills their residents on a quarterly basis. The data will be plotted and compared to determine discrepancies.	2021	Ongoing
		KWU regularly tests and recalibrates the Somers master supply meters on an annual basis.	2021	Ongoing
		Additional steps may include comparing water sales and wastewater pumped from individual drainage basins - Sheridan Road	2023	Complete
PWS-R1	Distribution System Pressure Management	Pressure will be monitored at three locations: 1) Fire Station No. 2 in KWU Zone 1, Pike Creek Sewage Lift Station in KWU Zone 2, and the discharge line of the Water Transfer Station on 18 <sup>th</sup> Street serving the Somers Zone. All pressure data will be recorded and transmitted to the Utility's SCADA system.	2022	Complete
PWS-R2	Residential Demand Management Program	A future meter reading system will be used to detect abnormal usage at each metering site so that the customer can be made aware of problems, such as a running toilet, before receiving their monthly bill.	2023	Ongoing
		The village will consider implementing residential low-flow showerhead rebates for single family homes. The rebate would consist of a \$20 rebate for residents who purchase and install a WaterSense showerhead in their home.	2024	
		In addition, the Village will implement a voluntary lawn sprinkling restriction that residents can participate in to further support the conservation efforts.	2021	Ongoing
		The village currently maintains a program for residents to contact the Village Clerk if the quarterly water bill is higher than expected.	2021	Ongoing
PWS-R3	Commercial and Industrial Demand Management Program	The village will consider implementing rebates for commercial valve-type ultra-low-flush toilets in commercial or industrial buildings. The rebate would consist of a \$100 rebate for customers who purchase and install a new WaterSense ultra-low-flush toilet in their business.	2024	
		The village maintains a program for commercial and industrial customers to contact the Village Clerk if the quarterly water bill is higher than expected.	2021	Ongoing

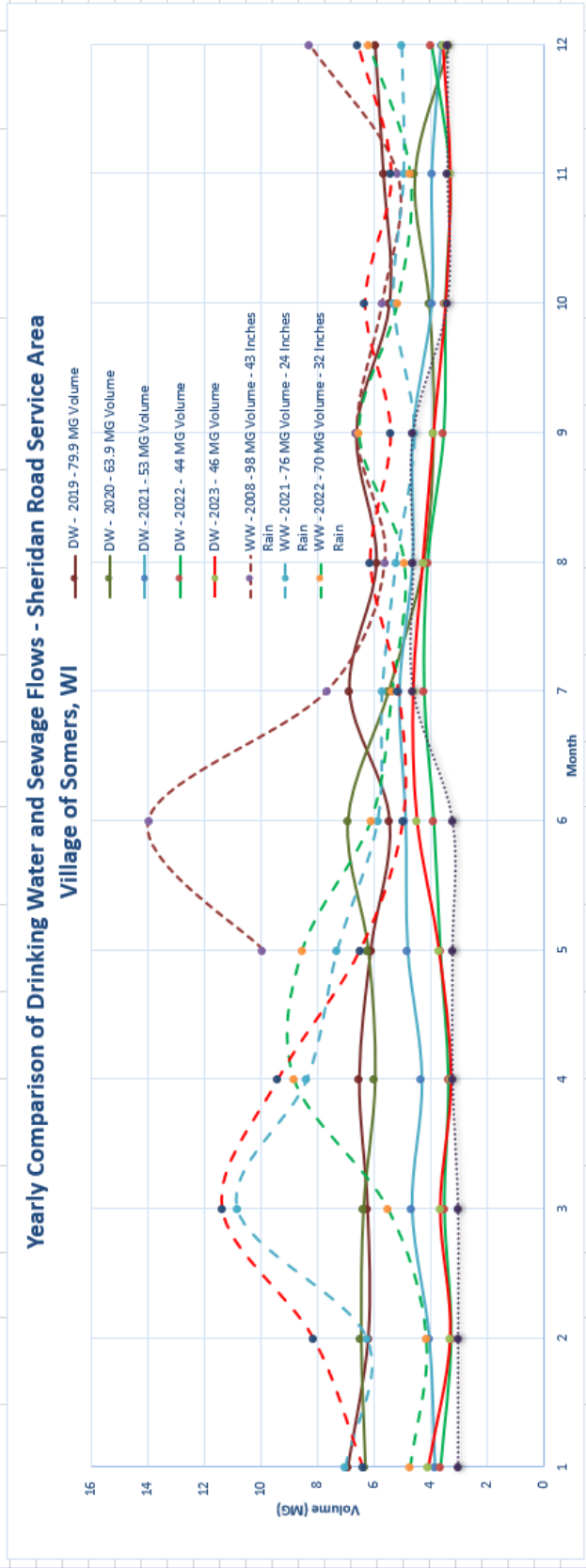
**Table 7: 2023 Water Consumption Per REU—WDNR Spreadsheet**

<b>Calculate Residential Equivalent Units</b>				<b>Calculation Average Day Water Use per REU</b>		
Instructions: Enter system numbers in yellow boxes.				Total Water Sales	165820000	gallons
Meter size	Number of Meters	REU Ratio*	REU	Average Day Water Use	454301.37	gallons/day
5/8	675	1	675	Water Use/REU	176.325	gpd/REU
3/4	275	1	275			
1	237	2.5	592.5			
1 1/4	0	3.7	0			
1 1/2	53	5	265			
2	48	8	384			
2 1/2	0	12.5	0			
3	14	15	210			
4	3	25	75			
6	2	50	100			
8	0	80	0			
10	0	122	0			
12	0	160	0			
Total	1307		2576.5			
* From Wisconsin Public Service Commission						
<b>Calculate Average Residential Per Capita Use</b>						
Instructions: Enter system numbers in yellow boxes						
Connections						
	Q1	Q2	Q3	Q4		
Customer Class	Count	Count	Count	Count	Average	Occupancy Factor** Population
Condo/Apt	126	126	126	126		
Residential	1019	1019	1020	1020	1019.5	2.6 2651
Condo/Apartment Population Calculation						
	Bedroom	Units	Factor	Population	Total	**Based on population occupied housing unit
Apartment	1	0	1.5	0		
Apartment	2		2.5	0		
Apartment	3	102	26.4	2693		
Condo		75	18.0	1350	4043	Total Population 6694
Average Residential Per capita Use						
Water Sold by quarter (Use in Thousands)						Average Residential per capita Use in gpd
	Q1	Q2	Q3	Q4	Total	Population
Customer Class	Water Sold	Water Sold	Water Sold	Water Sold	Total	Population
Condo/Apt	9919	10773	11492	10471	42656	4043
Residential	8672	12413	22727	11522	55334	2651
Total					97990	6694
						40.11
<b>Calculate Maximum Day to Average Day</b>						
	Average Day					
Annual Water Withdrawal	192710000	527972.6 gallons/day				
Maximum Day Withdrawal	836000	20-Aug gallons/day				
Maximum to Average Day Ratio	1.6					



Month	2006		2019		2020		2021		2022		2023						
	Sewage WW (MG)	Precip Inches	Drinking Water DW (MG)	Sewage (MG)	Drinking Water DW (MG)	Drinking Water DW (MG)	Calculated WW/DW	Precip Inches	Drinking Water DW (MG)	Sewage WW (MG)	Calculated WW/DW	Precip Inches	Drinking Water DW (MG)	Individual Water Meters* (MG)	Sewage WW (MG)	Calculated WW/DW	Precip Inches
January		1.30	6.9	7.0	3.8	7.0	1.8	2.08	3.7	4.7	1.3	0.75	4.1	3.0	6.4	2.1	2.01
February		4.13	6.2	6.3	4.1	6.3	1.5	1.00	3.3	4.1	1.3	1.07	3.3	3.0	8.2	2.7	3.78
March		4.33	6.2	10.8	4.7	10.8	2.3	0.79	3.5	5.5	1.6	2.82	3.7	3.0	11.4	3.8	3.16
April		4.18	6.5	8.4	4.3	8.4	1.9	1.09	3.4	8.8	2.6	4.41	3.3	3.2	9.4	2.9	1.60
May	9.9	2.62	6.1	7.3	4.8	7.3	1.5	1.21	3.7	8.5	2.3	2.55	3.7	3.2	6.5	2.0	1.22
June	14.0	5.29	5.4	6.9	4.9	6.9	1.2	2.93	3.9	6.1	1.6	2.88	4.5	3.2	5.0	1.6	1.67
July	7.7	5.16	6.9	5.7	5.1	5.7	1.1	1.49	4.2	5.4	1.3	4.88	4.6	4.6	5.2	1.1	3.89
August	5.6	1.09	5.9	5.2	4.6	5.2	1.1	3.23	4.1	4.9	1.2	2.80	4.3	4.6	6.1	1.3	5.34
September	6.6	5.68	6.6	4.6	4.6	4.6	1.0	1.24	3.5	6.5	1.8	5.15	3.9	4.6	5.4	1.2	2.73
October	5.7	2.92	5.4	5.3	4.0	5.3	1.3	4.71	3.5	5.2	1.5	1.81	3.4	3.4	6.3	1.9	3.79
November	5.2	1.51	5.7	4.9	4.0	4.9	1.2	0.48	3.3	4.7	1.4	0.80	3.3	3.4	5.4	1.6	1.32
December	8.3	5.16	6.0	5.0	3.6	5.0	1.4	3.43	4.0	6.2	1.6	2.48	3.6	3.4	6.6	1.9	2.15
<b>Yearly Total =</b>	<b>97.7</b>	<b>43.4</b>	<b>73.9</b>	<b>76.4</b>	<b>52.6</b>	<b>76.4</b>	<b>1.5</b>	<b>23.7</b>	<b>44.0</b>	<b>70.7</b>	<b>1.6</b>	<b>32.4</b>	<b>45.6</b>	<b>42.7</b>	<b>81.8</b>	<b>1.8</b>	<b>32.7</b>

\*Note residential meter use was adjusted by averaging annual volume per meter and multiplying by the number of missing meters (32 total, see attached list of missing meters).



**APPENDIX**  
**2023 Water Audit**



# AWWA Free Water Audit Software v6.0

FWAS v6.0

American Water Works Association Copyright © 2020, All Rights Reserved.

This spreadsheet-based water audit tool is designed to help quantify and track water losses associated with water distribution systems and identify areas for improved efficiency and cost recovery. It provides a "top-down" summary water audit format and is not meant to take the place of a full-scale, comprehensive water audit format. Auditors are strongly encouraged to refer to the most current edition of AWWA M36 Manual for Water Audits for detailed guidance on the water auditing process and targeting loss reduction levels. This tool contains several separate worksheets. Sheets can be accessed using the tabs at the bottom of the screen, or by clicking the TOC links below.

## Table of Contents (TOC)

- Start Page** The current sheet. Enter contact information and basic audit details.
- Worksheet** Enter the required data on this worksheet to calculate the water balance and data grading.
- Interactive Data Grading** Answer questions about operational practices for each audit input, and the data validity grades will automatically populate.
- Dashboard** Review NRW components, performance indicators and graphical outputs to evaluate the results of the audit.
- Notes** Enter notes to explain how values were calculated, document data sources, and related information about data management practices.
- Blank Sheet** By popular demand! A blank sheet. The world is your canvas.
- Water Balance** The values entered in the Worksheet automatically populate the Water Balance.
- Loss Control Planning** Use this sheet to interpret the results of the audit validity score and performance indicators.
- Definitions** Use this sheet to understand the terms used in the audit process.
- Service Connection Diagram** Diagrams depicting possible customer service connection line configurations.
- Acknowledgements** Acknowledgements for development of the AWWA Free Water Audit Software v6.0.

### AWWA Web Resources for Water Loss Control

<https://www.awwa.org/Resources-Tools/Resource-Topics/Water-Loss-Control>

Items referenced in the Free Water Audit Software v6.0 on the web:

- Data Grading Matrix v6.0
- Example Water Audit v6.0
- Water Audit Compiler v6.0
- AWWA Reports on Performance Indicators
- M36 Manual

If you have questions or comments regarding this software please contact us at: [wlc@awwa.org](mailto:wlc@awwa.org)

## Enter Basic Information

Name of Utility:	Somers Water Utility
Name of Contact Person:	Jason Peters
Email:	jpeters@somers.org
Telephone   Ext.:	262-859-2822
City/Town/Municipality:	Somers
State / Province:	Wisconsin (WI)
Country:	United States
Audit Preparation Date:	May 09 2024
Audit Year:	2023
Audit Year Label:	Calendar (Fiscal, Calendar, etc)
Audit Period Start Date:	Jan 01 2023
Audit Period End Date:	Dec 31 2023
Volume Reporting Units:	Million gallons (US)
Water System Structure:	Hybrid Wholesale + f
Water Type:	Potable Water
System ID Number:	23014211
Validator Name/ID:	n/a
Validator Email:	n/a
Estimated Total Population Served by Water Utility:	3,715

## Key of Input Acronyms

*In order of appearance in the Worksheet*

- VOS** Volume from Own Sources
- VOSEA** VOS Error Adjustment
- WI** Water Imported
- WIEA** WI Error Adjustment
- WE** Water Exported
- WEEA** WE Error Adjustment
- BMAC** Billed Metered Authorized Consumption
- BUAC** Billed Unmetered Authorized Consumption
- UMAC** Unbilled Metered Authorized Consumption
- UUAC** Unbilled Unmetered Authorized Consumption
- SDHE** Systematic Data Handling Errors
- CMI** Customer Metering Inaccuracies
- UC** Unauthorized Consumption
- Lm** Length of mains
- Nc** Number of service connections
- Lp** Average length of (private) customer service line
- AOP** Average Operating Pressure
- CRUC** Customer Retail Unit Charge
- VPC** Variable Production Cost

## Color Key

User input

Calculated

Optional default

## Guidance for the Worksheet

Choosing to enter unit of **percent** or **volume** (applies to VOSEA, WIEA, WEEA, CMI) choose entry option:

1.00%	percent	or
	volume	25.000

Choosing to enter **default** or **custom input** (applies to UUAC, SDHE, UC) choose entry option:

0.25%	default	or
	custom	75.000

## Guidance for the Interactive Data Grading

Use acronym buttons in IDG header to navigate among inputs. Acronym Key above. White = needs answers, orange = complete, clear = not required. Example below.

VOS	VOSEA	WI	WIEA	WE	WEEA	BMAC	BUAC	UMAC	UUAC
SDHE	CMI	UC	Lm	Nc	Lp	AOP	CRUC	VPC	

After clicking an acronym button, answer all visible questions in the order they're presented, choosing best-fit answer

Grade will populate when all visible questions are complete for an input **7**

The limiting criteria will be labeled along the right. If only 1 limiting criterion is shown, improving on that criterion will achieve a higher data grade. If multiple limiting criteria are shown, improving on *each* limiting criterion is necessary to achieve a higher data grade. A complete inventory of data grading criteria is available in the Data Grading Matrix v6.0 (see web resources)

Limiting



# AWWA Free Water Audit Software: Worksheet

FWAS v6.0  
American Water Works Association.  
Copyright © 2020, All Rights Reserved.

Water Audit Report for: **Somers Water Utility**  
Audit Year: **2023** | **Jan 01 2023 - Dec 31 2023** | **Calendar**

To access definitions, click the [input name](#)

Click 'n' to add notes

Click 'g' to determine data validity grade

To edit water system info: [go to start page](#)

All volumes to be entered as: MILLION GALLONS (US) PER YEAR

[Water Supplied Error Adjustments](#)

choose entry option:

## WATER SUPPLIED

VOS	Volume from Own Sources:	<input type="text" value="n"/>	<input type="text" value="g"/>	<input type="text" value="n/a"/>	<input type="text" value="0.000"/>	MG/Yr
WI	Water Imported:	<input type="text" value="n"/>	<input type="text" value="g"/>	<input type="text" value="4"/>	<input type="text" value="192.710"/>	MG/Yr
WE	Water Exported:	<input type="text" value="n"/>	<input type="text" value="g"/>	<input type="text" value="4"/>	<input type="text" value="1.930"/>	MG/Yr

<input type="text" value="n"/>	<input type="text" value="g"/>	<input type="text" value="9"/>	<input type="text" value="0.00%"/>	<input type="text" value="percent"/>
<input type="text" value="n"/>	<input type="text" value="g"/>	<input type="text" value="9"/>	<input type="text" value="0.00%"/>	<input type="text" value="percent"/>

VOSEA  
WIEA  
WEEA

**WATER SUPPLIED:**  MG/Yr

## AUTHORIZED CONSUMPTION

BMAC	Billed Metered:	<input type="text" value="n"/>	<input type="text" value="g"/>	<input type="text" value="7"/>	<input type="text" value="163.890"/>	MG/Yr
BUAC	Billed Unmetered:	<input type="text" value="n"/>	<input type="text" value="g"/>	<input type="text" value="6"/>	<input type="text" value="0.002"/>	MG/Yr
UMAC	Unbilled Metered:	<input type="text" value="n"/>	<input type="text" value="g"/>	<input type="text" value="2"/>	<input type="text" value="0.750"/>	MG/Yr
UUAC	Unbilled Unmetered:	<input type="text" value="n"/>	<input type="text" value="g"/>	<input type="text" value="6"/>	<input type="text" value="6.898"/>	MG/Yr

choose entry option:

MG/Yr

**AUTHORIZED CONSUMPTION:**  MG/Yr

## WATER LOSSES

MG/Yr

### Apparent Losses

Default option selected for Systematic Data Handling Errors, with automatic data grading of 3

SDHE	Systematic Data Handling Errors:	<input type="text" value="n"/>	<input type="text" value="g"/>	<input type="text" value="3"/>	<input type="text" value="0.410"/>	MG/Yr
CMI	Customer Metering Inaccuracies:	<input type="text" value="n"/>	<input type="text" value="g"/>	<input type="text" value="7"/>	<input type="text" value="2.000"/>	MG/Yr
UC	Unauthorized Consumption:	<input type="text" value="n"/>	<input type="text" value="g"/>	<input type="text" value="3"/>	<input type="text" value="0.410"/>	MG/Yr

choose entry option:

<input type="text" value="0.25%"/>	<input type="text" value="default"/>	<input type="text" value="2.000"/>	MG/Yr
<input type="text" value="0.25%"/>	<input type="text" value="default"/>	<input type="text" value="2.000"/>	MG/Yr

[under-registration](#)

Default option selected for Unauthorized Consumption, with automatic data grading of 3

**Apparent Losses:**  MG/Yr

### Real Losses

**Real Losses:**  MG/Yr

**WATER LOSSES:**  MG/Yr

## NON-REVENUE WATER

**NON-REVENUE WATER:**  MG/Yr

## SYSTEM DATA

Lm	Length of mains:	<input type="text" value="n"/>	<input type="text" value="g"/>	<input type="text" value="10"/>	<input type="text" value="41.6"/>	miles	(including fire hydrant lead lengths)
Nc	Number of service connections:	<input type="text" value="n"/>	<input type="text" value="g"/>	<input type="text" value="8"/>	<input type="text" value="1,250"/>		(active and inactive)
	Service connection density:					<input type="text" value="30"/>	conn./mile main
Lp	Are customer meters typically located at the curbstop/property line?					<input type="text" value="No"/>	
	Average length of (private) customer service line:	<input type="text" value="n"/>	<input type="text" value="g"/>	<input type="text" value="1"/>	<input type="text" value="50.0"/>	ft	(average distance between property line and meter)
AOP	Average Operating Pressure:	<input type="text" value="n"/>	<input type="text" value="g"/>	<input type="text" value="6"/>	<input type="text" value="60.0"/>	psi	

## COST DATA

CRUC	Customer Retail Unit Charge:	<input type="text" value="n"/>	<input type="text" value="g"/>	<input type="text" value="5"/>	<input type="text" value="\$5.49"/>	\$/100 cubic feet (ccf)	<b>Total Annual Operating Cost</b>
VPC	Variable Production Cost:	<input type="text" value="n"/>	<input type="text" value="g"/>	<input type="text" value="10"/>	<input type="text" value="\$5.49"/>	\$/Million gallons	

## WATER AUDIT DATA VALIDITY TIER:

**\*\*\* The Water Audit Data Validity Score is in Tier III (51-70). See Dashboard tab for additional outputs. \*\*\***

[go to dashboard](#)

A weighted scale for the components of supply, consumption and water loss is included in the calculation of the Water Audit Data Validity Score

### PRIORITY AREAS FOR ATTENTION TO IMPROVE DATA VALIDITY:

Based on the information provided, audit reliability can be most improved by addressing the following components:

1: Water Imported (WI)
2: Billed Unmetered (BUAC)
3: Billed Metered (BMAC)

### KEY PERFORMANCE INDICATOR TARGETS:

OPTIONAL: If targets exist for the operational performance indicators, they can be input below:

Unit Total Losses:	<input type="text"/>	gal/conn/day
Unit Apparent Losses:	<input type="text"/>	gal/conn/day
Unit Real Losses <sup>A</sup> :	<input type="text"/>	gal/conn/day
Unit Real Losses <sup>B</sup> :	<input type="text"/>	gal/mile/day

If entered above by user, targets will display on KPI gauges (see Dashboard)

2023

VOS

VOSEA

WI

WIEA

WE

WEEA

BMAC

BUAC

UMAC

UUAC

White = incomplete

Orange = complete

Use acronyms for navigation

SDHE

CMI

UC

Lm

Nc

Lp

AOP

CRUC

VPC

FWAS v6.0 American Water Works Association. Copyright © 2020, All Rights Reserved.

Limiting criteria (see Start Page for details)



[go to input](#)

### Volume from Own Sources (VOS) - Data Grading Criteria

[go to notes](#)

**vos**      **Criteria Question**      **Select Best-Fit Answers to All Visible Questions**

vos.0	Did the water utility supply any water from its own sources during the audit year?	No
vos.1		
<p><b>For questions 2-10 below: Choose the answer that applies for those meters that measure &gt;90% of the finished water volume.</b></p> <p><b>In-situ flow accuracy testing</b> = a test process that confirms the flow measuring accuracy of the primary device (the flowmeter), in its installed location, using an independent reference volume.</p> <p><b>Electronic calibration</b> = a process that checks for error in the metering secondary device(s) and/or the tertiary device(s).</p> <p><b>Secondary device</b> can include conversion to mA, meter transmitter or similar instrumentation.</p> <p><b>Tertiary device</b> can include SCADA, historian or other computerized archival system.</p>		
vos.2		
vos.3		
vos.4		
vos.5		
vos.6		
vos.7		
vos.8		
vos.9		
vos.10		
FINAL DATA GRADE FOR THIS AUDIT INPUT:		n/a

[go to input](#) **Volume from Own Sources Error Adjustment (VOSEA) - Data Grading Criteria** [go to notes](#)

<b>vosea</b>	<b>Criteria Question</b>	<b>Select Best-Fit Answers to All Visible Questions</b>
vosea.1		
vosea.2		
vosea.3		
vosea.4		
<b>FINAL DATA GRADE FOR THIS AUDIT INPUT:</b>		<b>n/a</b>

[go to input](#)

### Water Imported (WI) - Data Grading Criteria

[go to notes](#)

wi	Criteria Question	Select Best-Fit Answers to All Visible Questions
wi.0	Did the water utility import any water during the audit year?	Yes
wi.1	What percent of water imported is metered?	>99%
<p><b>For questions 2-10 below: Choose the answer that applies for those meters that measure &gt;90% of the water imported volume.</b>  <b>In-situ flow accuracy testing</b> = a test process that confirms the flow measuring accuracy of the primary device (the flowmeter), in its installed location, using an independent reference volume.  <b>Electronic calibration</b> = a process that checks for error in the metering secondary device(s) and/or the tertiary device(s).  <b>Secondary device</b> can include conversion to mA, meter transmitter or similar instrumentation.  <b>Tertiary device</b> can include SCADA, historian or other computerized archival system.</p>		
wi.2	What is the frequency of electronic calibration?	Annually
wi.3	What level of data transfer errors are checked as part of the electronic calibration process?	Data transfer errors are checked at secondary device(s), but not to tertiary device(s)
wi.4	Is the most recent electronic calibration documentation available?	Yes
wi.5	What is the frequency of in-situ flow accuracy testing?	Annually
wi.6	Is the most recent in-situ flow accuracy testing documentation available?	Yes
wi.7	What are the total volume-weighted average results of in-situ flow accuracy testing (during or closest to audit year)?	At or within $\pm 3\%$
wi.8	Have testing and calibration procedures been closely scrutinized for compliance with procedures described in the AWWA M36 and/or M33 Manual(s)?	Yes
wi.9	Which best describes the frequency of meter readings (data collection frequency as opposed to billing frequency)?	Once per month
wi.10	What is the frequency of data review & correction by Exporting or Importing Utility for data gaps and/or anomalies? These can include numbers that are outside of typical patterns, and zero or 'null' values that may reflect a gap in data recording.	Less frequently than monthly
<b>FINAL DATA GRADE FOR THIS AUDIT INPUT:</b>		<b>4</b>

Limiting

[go to input](#) **Water Imported Error Adjustment (WIEA) - Data Grading Criteria** [go to notes](#)

<b>wiea</b>	<b>Criteria Question</b>	<b>Select Best-Fit Answers to All Visible Questions</b>	
wiea.1	Is an agreement in place between Exporting and Importing Utility for the purchase of water?	Yes, written	Limiting
wiea.2	Are meter accuracy testing or electronic calibration requirements stipulated in the water purchase agreement?	Yes, and stipulated frequency as annual	
wiea.3	Are flow accuracy test and/or electronic calibration results used to inform the error adjustment input in the water audit?	Yes, results are analyzed and a 'no-adjustment' was determined	
wiea.4	Who has access to the import meter readings including current and archived data?	Exporting and Importing Utility	
<b>FINAL DATA GRADE FOR THIS AUDIT INPUT:</b>		<b>9</b>	



[go to input](#)

### Water Exported (WE) - Data Grading Criteria

[go to notes](#)

we	Criteria Question	Select Best-Fit Answers to All Visible Questions	
we.0	Did the water utility export any water during the audit year?	Yes	
we.1	What percent of water exported is metered?	>99%	
<p><b>For questions 2-10 below: Choose the answer that applies for those meters that measure &gt;90% of the water exported volume.</b>  <b>In-situ flow accuracy testing</b> = a test process that confirms the flow measuring accuracy of the primary device (the flowmeter), in its installed location, using an independent reference volume.  <b>Electronic calibration</b> = a process that checks for error in the metering secondary device(s) and/or the tertiary device(s).  <b>Secondary device</b> can include conversion to mA, meter transmitter or similar instrumentation.  <b>Tertiary device</b> can include SCADA, historian or other computerized archival system.</p>			
we.2	What is the frequency of electronic calibration?	Annually	
we.3	What level of data transfer errors are checked as part of the electronic calibration process?	Data transfer errors are checked at secondary device(s), but not to tertiary device(s)	
we.4	Is the most recent electronic calibration documentation available?	Yes	
we.5	What is the frequency of in-situ flow accuracy testing?	None, or Not within last 5 years	
we.6			
we.7			
we.8	Have testing and calibration procedures been closely scrutinized for compliance with procedures described in the AWWA M36 and/or M33 Manual(s)?	No	
we.9	Which best describes the frequency of meter readings (data collection frequency as opposed to billing frequency)?	Less frequently than monthly	Limiting
we.10	What is the frequency of data review & correction by Exporting or Importing Utility for data gaps and/or anomalies? These can include numbers that are outside of typical patterns, and zero or 'null' values that may reflect a gap in data recording.	Less frequently than monthly	Limiting
<b>FINAL DATA GRADE FOR THIS AUDIT INPUT:</b>		<b>4</b>	

go to input
Water Exported Error Adjustment (WEEA) - Data Grading Criteria
go to notes

<b>weea</b>	<b>Criteria Question</b>	<b>Select Best-Fit Answers to All Visible Questions</b>	
weea.1	Is an agreement in place between Exporting and Importing Utility?	Yes, written	Limiting
weea.2	Are meter accuracy testing or electronic calibration requirements stipulated in the water purchase agreement?	Yes, and stipulated frequency as annual	
weea.3	Are flow accuracy test and/or electronic calibration results used to inform the error adjustment input in the water audit?	Yes, results are analyzed and a 'no-adjustment' was determined	
weea.4	Who has access to the import meter readings including current and archived data?	Exporting and Importing Utility	
<b>FINAL DATA GRADE FOR THIS AUDIT INPUT:</b>		<b>9</b>	

[go to input](#)

**Billed Metered Authorized Consumption (BMAC) - Data Grading Criteria**

[go to notes](#)

<b>bmac</b>	<b>Criteria Question</b>	<b>Select Best-Fit Answers to All Visible Questions</b>	
bmac.0	Were any customers metered in the audit year?	Yes	
bmac.1	For billed metered accounts, what % of bills are estimated in a typical billing cycle?	5% or less	
bmac.2	How often does the utility read its customer meters? For systems with multiple read frequencies, select the reading frequency that describes the majority of your customers.	Quarterly	Limiting
bmac.3	Is the BMAC volume pro-rated to represent consumption occurring exactly during the audit period?	No	
bmac.4	How frequently does internal review by utility staff of the BMAC volumes occur?	Every billing cycle	
bmac.5	What level of detail is examined in the internal review of BMAC volumes?	Sum total only	Limiting
bmac.6	When was the most recent billing data review by someone who is independent of the utility billing process?	Within last 3 years	
bmac.7	What level of detail was examined in the review by someone who is independent of the utility billing process?	Third party review includes a check on a sample of accounts	
<b>FINAL DATA GRADE FOR THIS AUDIT INPUT:</b>		<b>7</b>	

[go to input](#) **Billed Unmetered Authorized Consumption (BUAC) - Data Grading Criteria** [go to notes](#)

buac	Criteria Question	Select Best-Fit Answers to All Visible Questions	
buac.0	Was there any billed consumption on unmetered accounts in the audit year?	Yes	
buac.1	What portion of billed accounts are unmetered (% by number of accounts)?	5% or less	
buac.2	Methodology to quantify consumption for unmetered accounts?	Estimated for each unmetered customer OR derived from representative statistical samples of the system	
buac.3	How frequently is unmetered customer consumption estimated?	Quarterly	Limiting
<b>FINAL DATA GRADE FOR THIS AUDIT INPUT:</b>		<b>6</b>	

[go to input](#)

**Unbilled Metered Authorized Consumption (UMAC) - Data Grading Criteria**

[go to notes](#)

umac	Criteria Question	Select Best-Fit Answers to All Visible Questions	
umac.0	Did the water utility have any unbilled-metered consumption in the audit year?	Yes	
umac.1	Does the water utility policy articulate which accounts are exempt from billing?	No	Limiting
umac.2	How many unbilled metered accounts exist?	Unknown	Limiting
umac.3	How often is each unbilled customer meter read? For systems with multiple read frequencies, select the reading frequency that describes the majority of your customers.	Annually	
umac.4	How often are unbilled metered volumes reviewed for error?	Annually	
<b>FINAL DATA GRADE FOR THIS AUDIT INPUT:</b>		<b>2</b>	

[go to input](#) **Unbilled Unmetered Authorized Consumption (UUAC) - Data Grading Criteria** [go to notes](#)

uuac	Criteria Question	Select Best-Fit Answers to All Visible Questions	
uuac.0	On the Worksheet, the status of the default option is:	A system specific volume has been entered	
uuac.1	How well-understood is the extent of unbilled unmetered use?	Majority identified and tracked	
uuac.2	Which best describes the records that are kept for events of unbilled unmetered use?	Documentation exists, but not specific to each event	Limiting
uuac.3	How is the majority of unbilled unmetered use estimated?	By number of events multiplied by typical use estimates	
<b>FINAL DATA GRADE FOR THIS AUDIT INPUT:</b>		<b>6</b>	

[go to input](#)

## Systematic Data Handling Error (SDHE) - Data Grading Criteria

[go to notes](#)

This Data Grading Criteria is hidden when the 'default' input is used on the Worksheet

FINAL DATA GRADE FOR THIS AUDIT INPUT:

3

[go to input](#)

**Customer Metering Inaccuracies (CMI) - Data Grading Criteria**

[go to notes](#)

<b>cmi</b>	<b>Criteria Question</b>	<b>Select Best-Fit Answers to All Visible Questions</b>	
cmi.0	Was there any metered customer usage during the audit period?	Yes	
cmi.1	Do you test meters reactively (when triggered by customer complaint or billing/consumption flag)?	Reactive testing conducted	
cmi.2	For small size customer meters, which best describes the frequency of proactive testing (effort beyond when triggered by customer complaint or billing/consumption flags)?	Recurring, within two years of the audit period	
cmi.3	Which best describes what meters are included in the proactive small size customer meter testing activities?	Testing targeted to subsets of meters ie oldest meters	Limiting
cmi.4	For mid and large size customer meters, which best describes the frequency of the proactive testing program?	Recurring, within 5 years prior to audit period, but less frequently than annually	
cmi.5	Which best describes what meters are included in the proactive mid- and large customer meter testing activities?	Proactive - all large meters are on a testing schedule	
cmi.6	Which best describes how the input was derived?	No test results were used, but at least 50% of meter stock has been replaced within two years of the audit period	
cmi.7	Has the input derivation been reviewed by someone with expert knowledge in the M36 methodology?	No	
cmi.8	To what extent does meter replacement occur and for which meters?	Replacement upon complete failure or special circumstance (as needed)	
cmi.9	Which best describes the reliability of meter installation records?	Records are kept for meter installations, and they include data on installation date, type, size, and manufacturer	
<b>FINAL DATA GRADE FOR THIS AUDIT INPUT:</b>		<b>7</b>	



[go to input](#)

## Unauthorized Consumption (UC) - Data Grading Criteria

[go to notes](#)

This Data Grading Criteria is hidden when the 'default' input is used on the Worksheet

FINAL DATA GRADE FOR THIS AUDIT INPUT:

3

go to input
Length of Mains (Lm) - Data Grading Criteria
go to notes

Lm	Criteria Question	Select Best-Fit Answers to All Visible Questions
Lm.1	How was the input derived?	Derived directly from Mains inventory (GIS, ledger, etc)
Lm.2	Are hydrant laterals included in the input derivation?	Yes
Lm.3	Which best describes how the Mains inventory (GIS, ledger, etc) is kept up to date?	Additions or subtractions are updated in the mains inventory (GIS, ledger, etc), at least annually
Lm.4	Which best describes how the Mains inventory (GIS, ledger, etc) is field validated to confirm field conditions match the inventory?	Field validation is accomplished (i.e. in daily operations or specific validation projects)
FINAL DATA GRADE FOR THIS AUDIT INPUT:		10

[go to input](#)

**Number of Service Connections (Nc) - Data Grading Criteria**

[go to notes](#)

Nc	Criteria Question	Select Best-Fit Answers to All Visible Questions	
Nc.1	How was the input derived?	Extracted from Services inventory (GIS, billing system, etc)	
Nc.2	What is the count of services based on?	Non-premise based, i.e. meter count, customer count	Limiting
Nc.3	Are inactive (but still pressurized) service lines included in the input? These may be metered or unmetered.	Yes	
Nc.4	Which best describes how the inventory of service connections (GIS, billing system, etc) is kept up to date?	Additions or subtractions are updated in the service line inventory (GIS, billing system, etc), at least annually	
Nc.5	Which best describes how the inventory of service connections (GIS, billing system, etc) is field validated to confirm field conditions match the inventory?	Field validation is accomplished for the entire system (i.e. in daily operations or specific validation projects)	
<b>FINAL DATA GRADE FOR THIS AUDIT INPUT:</b>		<b>8</b>	

[go to input](#) **Average Length of (Private) Customer Service Line (Lp) - Data Grading Criteria** [go to notes](#)

Lp	Criteria Question	Select Best-Fit Answers to All Visible Questions	
Lp.0	Are customer meters typically located at the curbside or property line?	No	
Lp.1	How was the input derived?	Guesstimated	Limiting
Lp.2	Which best describes how the Customer Service Line and Meter Locations mapping is kept up to date?	Customer Service Line and Meter Locations inventory is not maintained or updated	Limiting
Lp.3			
Lp.4	Which best describes the policy to define where the utility's ownership of the service line ends, and the customer's ownership of the service line begins?	Policy is clear, and adherence in practice is consistent	
<b>FINAL DATA GRADE FOR THIS AUDIT INPUT:</b>		<b>1</b>	

[go to input](#)

### Average Operating Pressure (AOP) - Data Grading Criteria

[go to notes](#)

aop	Criteria Question	Select Best-Fit Answers to All Visible Questions	
aop.1	Which best describes checks on the boundary integrity for the system's pressure zone(s)?	Not applicable, the system operates as a single pressure zone	
aop.2	Which best describes how one-time pressure readings (i.e. from hydrants) are collected?	Collected annually during routine system flushing and/or hydrant testing	
aop.3	Which best describes where continuous pressure data (via temporary data loggers or permanent telemetry) is collected?	Continuous pressure data is not collected	Limiting
aop.4			
aop.5	How was the input derived?	Calculated from field data as a simple average	
<b>FINAL DATA GRADE FOR THIS AUDIT INPUT:</b>		<b>6</b>	

[go to input](#)

**Customer Retail Unit Charge (CRUC) - Data Grading Criteria**

[go to notes](#)

<b>cruc</b>	<b>Criteria Question</b>	<b>Select Best-Fit Answers to All Visible Questions</b>	
cruc.0	Was any metered consumption billed on a volumetric basis in the audit period?	Yes	
cruc.1	Which best describes the use and reliability of the current rate structure?	Customer bill calculations have been checked to confirm the rate structure is correctly implemented	
cruc.2	Choose the option that best describes how the input was derived	Rate structure has multiple volumetric rates, but only one rate was selected for this input	Limiting
cruc.3	Is there any additional volumetric revenue the utility receives that depends on water meter readings, such as sewer?	No	
cruc.4	Has the input derivation been reviewed by someone with expert knowledge in the M36 methodology?	No	
<b>FINAL DATA GRADE FOR THIS AUDIT INPUT:</b>		<b>5</b>	

[go to input](#)

**Variable Production Cost (VPC) - Data Grading Criteria**

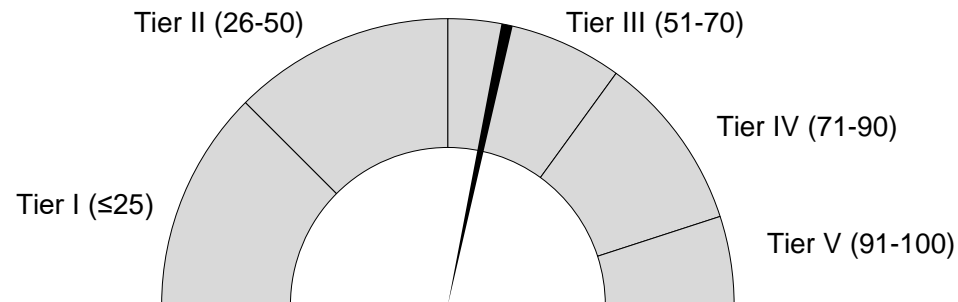
[go to notes](#)

vpc	Criteria Question	Select Best-Fit Answers to All Visible Questions
vpc.1	Choose the option that best describes how the input was derived	Only one source of water exists, which was the basis for the input derivation
vpc.2	<p>Choose the option that best describes which short-run marginal costs have been included in the input, using the definitions below for reference. Short-run marginal costs can include the following:</p> <ul style="list-style-type: none"> <li>- chemicals + power for treatment, typically applicable if the utility is producing/treating water</li> <li>- power for distribution, typically applicable if pumps exist in the distribution network</li> <li>- water acquisition costs, typically applicable if the utility is purchasing water or incurs any extraction costs for withdrawing from a source</li> </ul> <p>Some short-run marginal costs may not be applicable. The auditor should analyze the system characteristics to determine which costs are applicable for inclusion in the VPC input derivation. See also the latest AWWA M36 Manual for further guidance.</p>	All applicable short-run marginal costs are included
vpc.3	<p>Choose the option that best describes which long-run marginal costs have been included in the input, using the definitions below for reference. Long-run marginal costs can include the following:</p> <ul style="list-style-type: none"> <li>- water treatment residuals management, typically applicable if solids are produced from water treatment process</li> <li>- accelerated wear &amp; tear on dynamic equipment, typically applicable if pumps exist for treatment and/or distribution, or any other equipment exists that wears out as a function of use instead of time (i.e. filter media, chemical dosing pumps, uv disinfection bulbs, etc)</li> <li>- payouts for damage claims from main and service line breaks, typically applicable if damage claims are paid by the utility</li> <li>- accelerated expansion of supply capacity, typically applicable if the utility is at or nearing supply capacity, or scarcity costs in water scarce areas</li> <li>- full cost pricing that includes all lifecycle costs and externalities (internalized or not)</li> </ul> <p>Some long-run marginal costs may not be applicable. The auditor should analyze the system characteristics to determine which costs are applicable for inclusion in the VPC input derivation. See also the latest AWWA M36 Manual for further guidance.</p>	Long-run marginal costs have been evaluated for applicability, and all applicable costs are included
vpc.4	Has the input derivation been reviewed by someone with expert knowledge in the M36 methodology?	Yes
<b>FINAL DATA GRADE FOR THIS AUDIT INPUT:</b>		<b>10</b>

### Data Validity

**Data Validity Score: 56** **Data Validity Tier: Tier III (51-70)**

See [Loss Control Planning](#) for Tier Details

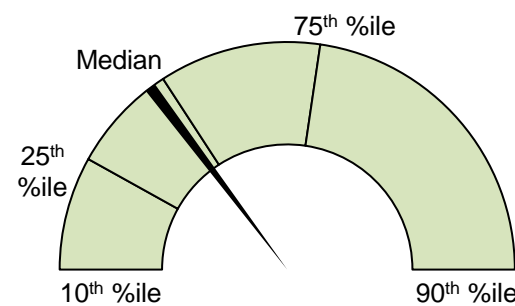


Actual KPI result

### Key Performance Indicators

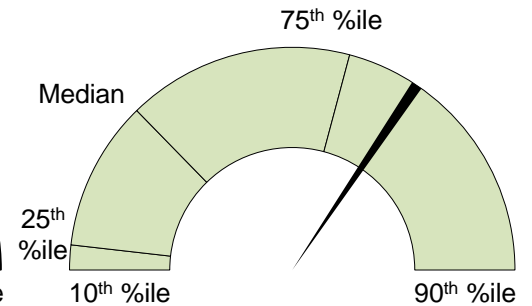
Target (see Worksheet)

gauge %iles per validated industry ranges<sup>2</sup>



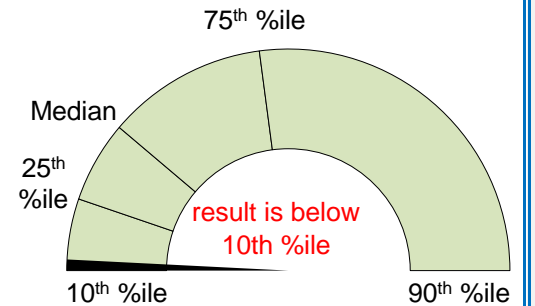
**Total Loss Cost Rate**

16.57 \$/conn/year



**Apparent Loss Cost Rate**

16.50 \$/conn/year



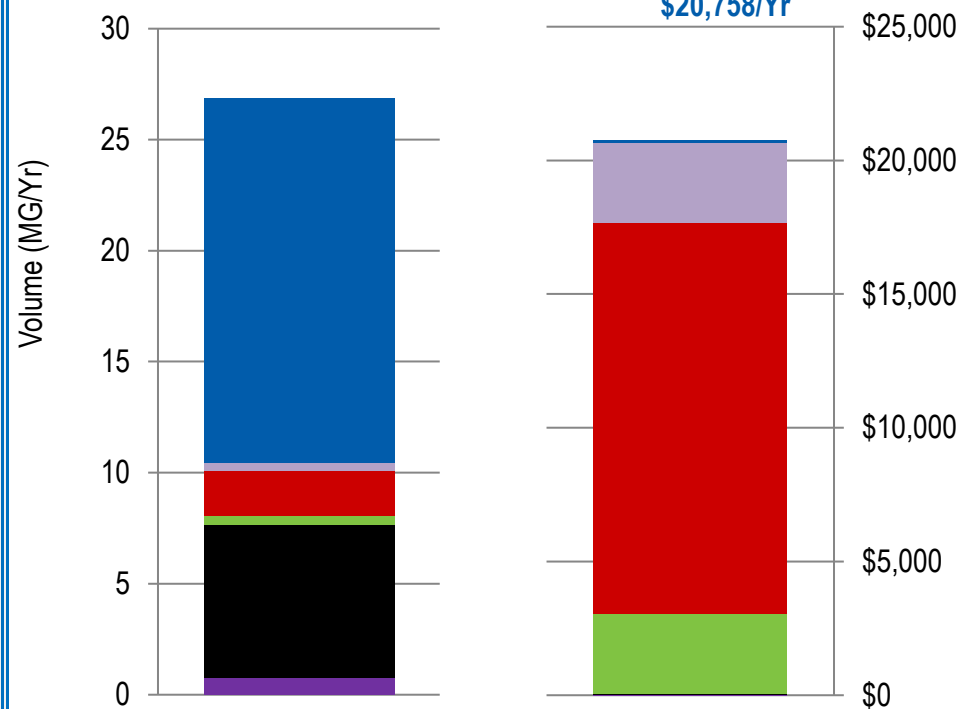
**Real Loss Cost Rate**

0.07 \$/conn/year

### NRW Components Summary

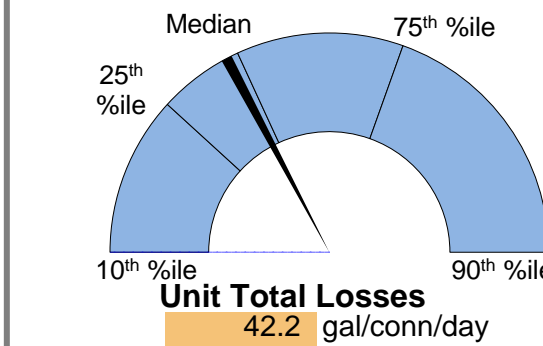
Total Volume of NRW = 27 MG/Yr

Total Cost of NRW = \$20,758/Yr



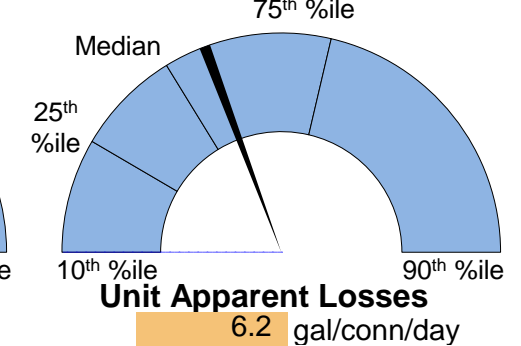
Real Losses	Unauthorized Consumption
Systematic Data Handling Errors	Unbilled Unmetered Auth Cons
Customer Metering Inaccuracies	Unbilled Metered Authorized Cons

	Volume MG/Yr	Value \$/Yr	Basis of Valuation
Apparent Losses	2.8	\$20,625	CRUC
Real Losses	16.4	\$90	VPC
Unbilled Authorized Cons	7.6	\$42	VPC
Non-Revenue Water	26.9	\$20,758	Blended



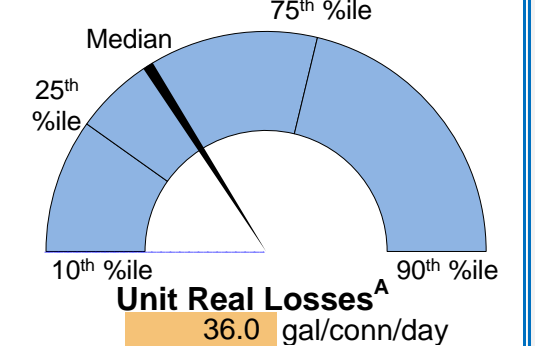
**Unit Total Losses**

42.2 gal/conn/day



**Unit Apparent Losses**

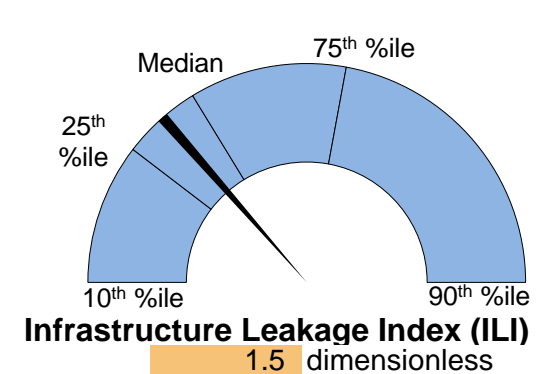
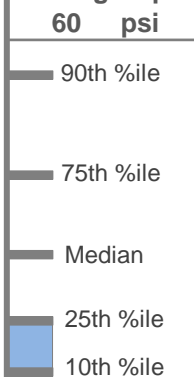
6.2 gal/conn/day



**Unit Real Losses<sup>A</sup>**

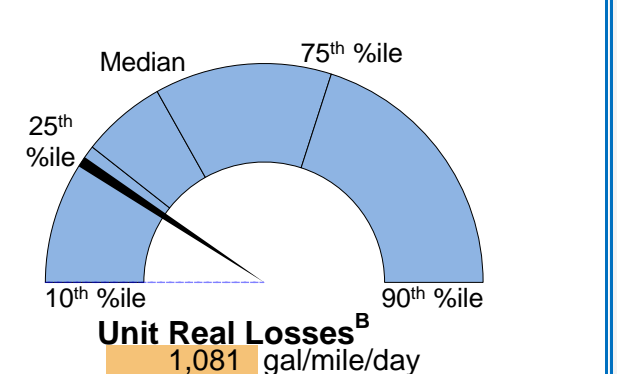
36.0 gal/conn/day

### Average Operating Pressure



**Infrastructure Leakage Index (ILI)**

1.5 dimensionless



**Unit Real Losses<sup>B</sup>**

1,081 gal/mile/day

See UARL definition for additional guidance on the ILI

(UARL) Unavoidable Annual Real Losses 11.0 MG/Yr 24.1 gal/conn/day

### Guidance Information for Key Performance

- The eight indicators shown are the recommended suite per the AWWA Water Loss Control Committee 2020 Position on KPIs<sup>1</sup>.
- A suite of KPIs is necessary, as no single KPI can holistically communicate water loss performance for a given water system.
- See Table 1 below for Uses and Limitations for each KPI, excerpted from the AWWA Water Loss Control Committee Report (2020)<sup>1</sup>, with naming conventions updated.
- Percentiles (%iles) shown on KPI gauges come from Level 1 validated data in the AWWA WLCC Reference Water Audit Dataset (2020)<sup>2</sup>.
- KPI %iles shown above are not segregated by cohorts. Limited KPI data by cohorts may be found in WRF 4695 Guidance Manual, Appendix B (2019)<sup>5</sup>.
- Actual KPI results that fall below 10<sup>th</sup> %ile or above 90<sup>th</sup> %ile do not necessarily imply error, but should be viewed with scrutiny.
- Percentiles not intended to imply targets. Targets may be input by user for operational KPIs, if desired, on Worksheet.
- See UARL and ILI in Definitions tab for discussion of size and pressure limitations.
- Systems that fall on the extreme ends of size or connection density should use caution when interpreting Unit Losses KPIs.



**Table 1**

Source: AWWA Water Loss Control Committee Report (2020)<sup>1</sup>, with naming conventions updated

**2020 AWWA Water Audit Method – Water Audit Outputs and Key Performance Indicators: Uses and Limitations**

Type	Indicator	Description	Suitable Purposes					Uses and Limitations	Principal Users	
			Assessment	Bench-Marking	Target-Setting	Planning	Tracking			
Attribute	Apparent Loss Volume	Calculated by Free Water Audit Software	✓					✓	Assess loss level	Utility, Regulators
	Apparent Loss Cost	Calculated by Free Water Audit Software	✓					✓	Assess cost loss level	Utility, Regulators
	Real Loss Volume	Calculated by Free Water Audit Software	✓					✓	Assess loss level	Utility, Regulators
	Real Loss Cost	Calculated by Free Water Audit Software	✓					✓	Assess loss cost level	Utility, Regulators
	Unavoidable Annual Real Loss (UARL)	Calculated by Free Water Audit Software	✓					✓	Reveal theoretical technical low level of leakage	Utility, Regulators
Volume	Unit Apparent Losses (vol/conn/day)	Strong and understandable indicator for multiple users.	✓	✓	✓	✓		✓	Used for performance tracking and target-setting	Utility, Regulators
	Unit Real Losses <sup>A</sup> (vol/conn/day)	Strong and understandable indicator for multiple users.	✓	✓	✓	✓		✓	Used for performance tracking and target-setting	Utility, Regulators, Policy Makers
	Unit Real Losses <sup>B</sup> (vol/pipeline length/day)	Strong and understandable indicator for use by utilities with low connection density.	✓	✓	✓	✓		✓	Data collection and assessment of systems with “low” connection density	Utility, Regulators, Policy Makers
	Unit Total Losses (vol/conn/day) <b>New KPI</b>	Strong and understandable indicator, suitable for high-level performance measurement.	✓					✓	High level indicator for trending analysis. Not appropriate for target-setting or benchmarking	Utilities, Customers
	Infrastructure Leakage Index (ILI)	Robust, specialized ratio KPI; can be influenced by pressure and connection density.	✓	✓				✓	Benchmarking after pressure management is implemented	Utilities
Value	Apparent Loss Cost Rate (value/conn/year) <b>New KPI</b>	Indicators with sufficient technical rigor. Provide the unit financial value of each type of loss, which is useful for planning and assessment of cost efficiency of water loss reduction and control interventions and programs.	✓				✓	✓	Data collection and assessment on AWWA indicators or contextual parameters to use in conjunction with Loss Cost Rates	Utilities, Regulators, Customers
	Real Loss Cost Rate (value/conn/year) <b>New KPI</b>		✓				✓	✓		Utilities, Regulators, Customers
Validity	Data Validity Tier (DVT)	Strong indicator of water loss audit data quality, if data has been validated. Tier provides guidance on priority areas of activity.	✓	✓			✓	✓	Assess caliber of data inputs of the water audit	Regulators, Utilities



# AWWA Free Water Audit Software: User Notes

FWAS v6.0  
American Water Works Association.  
Copyright © 2020, All Rights Reserved.

**Water Audit Report for: Somers Water Utility**  
**Audit Year: 2023**

**Calendar**  
**Jan 01 2023 - Dec 31 2023**

<b>General Notes:</b>		
<b>Audit Item</b>	<b>Notes on Input Derivation</b>	<b>Notes on Data Validity Grading</b>
<b>Volume from Own Sources (VOS)</b>		
<b>Volume from Own Sources Error Adjustment (VOSEA)</b>		
<b>Water Imported (WI)</b>		
<b>Water Imported Error Adjustment (WIEA)</b>		
<b>Water Exported (WE)</b>		

go to worksheet

go to grading

go to worksheet

go to grading

go to worksheet

go to grading

go to worksheet

go to grading

go to worksheet

go to grading

		Audit Item	Notes on Input Derivation	Notes on Data Validity Grading
<a href="#">go to worksheet</a>	<a href="#">go to grading</a>	<b>Water Exported Error Adjustment (WEIA)</b>		
<a href="#">go to worksheet</a>	<a href="#">go to grading</a>	<b>Billed Metered Authorized Consumption (BMAC)</b>		
<a href="#">go to worksheet</a>	<a href="#">go to grading</a>	<b>Billed Unmetered Authorized Consumption (BUAC)</b>		
<a href="#">go to worksheet</a>	<a href="#">go to grading</a>	<b>Unbilled Metered Authorized Consumption (UMAC)</b>		
<a href="#">go to worksheet</a>	<a href="#">go to grading</a>	<b>Unbilled Unmetered Authorized Consumption (UUAC)</b>		
<a href="#">go to worksheet</a>	<a href="#">go to grading</a>	<b>Systematic Data Handling Errors (SDHE)</b>		
<a href="#">go to worksheet</a>	<a href="#">go to grading</a>	<b>Customer Metering Inaccuracies (CMI)</b>		

		Audit Item	Notes on Input Derivation	Notes on Data Validity Grading
<a href="#">go to worksheet</a>	<a href="#">go to grading</a>	<b>Unauthorized Consumption (UC)</b>		
<a href="#">go to worksheet</a>	<a href="#">go to grading</a>	<b>Length of Mains (Lm)</b>	Excludes 1,055 feet of water mains outside of the municipality.	
<a href="#">go to worksheet</a>	<a href="#">go to grading</a>	<b>Number of Service Connections (Nc)</b>		
<a href="#">go to worksheet</a>	<a href="#">go to grading</a>	<b>Average Length of (private) Customer Service Line (Lp)</b>		
<a href="#">go to worksheet</a>	<a href="#">go to grading</a>	<b>Average Operating Pressure (AOP)</b>		
<a href="#">go to worksheet</a>	<a href="#">go to grading</a>	<b>Customer Retail Unit Charge (CRUC)</b>		
<a href="#">go to worksheet</a>	<a href="#">go to grading</a>	<b>Variable Production Cost (VPC)</b>		

Hello, I am a blank sheet, at your service.

**AWWA Free Water Audit Software**  
**Water Balance**



Water Audit Report for: **Somers Water Utility**

Audit Year: **2023**

**Jan 01 2023 - Dec 31 2023**

Data Validity Tier: **Tier III (51-70)**

FWAS v6.0

American Water Works Association.  
 Copyright © 2020, All Rights Reserved.

Volume from Own Sources (VOS) (corrected for known errors)  0.000	System Input Volume  192.710	Water Exported (WE) (corrected for known errors) 1.930	Billed Water Exported				Revenue Water (Exported)  1.930
		Water Supplied  190.780	Authorized Consumption  171.540	Billed Authorized Consumption  163.892	Billed Metered Consumption (BMAC) (water exported is removed) 163.890	Revenue Water  163.892	
Unbilled Authorized Consumption  7.648	Billed Unmetered Consumption (BUAC) 0.002			Non-Revenue Water (NRW)  26.888			
Water Imported (WI) (corrected for known errors)  192.710		Water Losses  19.240	Apparent Losses 2.819		Unbilled Metered Consumption (UMAC) 0.750	Unauthorized Consumption (UC) 0.410	
				Unbilled Unmetered Consumption (UUAC) 6.898			
				Systematic Data Handling Errors (SDHE) 0.410			
				Customer Metering Inaccuracies (CMI) 2.000			
			Real Losses 16.421	Leakage on Transmission and/or Distribution Mains <i>Not broken down</i>			
				Leakage and Overflows at Utility's Storage Tanks <i>Not broken down</i>			
				Leakage on Service Connections <i>Not broken down</i>			