Samoa Bureau of Statistics

Environment Statistics

Water Accounts Samoa 2021-2022

Foreword

This report presents information on the physical and monetary supply and use of water in Samoa's economy for the financial year 2021-22. It is the 7th edition of the Water Accounts Samoa (WAS) since its first publication in 2015.

The water accounts compilation closely followed and aligned with the United Nation System of Environmental-Economic Accounting 2012 (UN-SEEA 2012) Central Framework and SEEA-Water 2012. The conceptual framework is a standardized information system, which is capable of harmonizing information from different sources and is used for derivation of water statistics and indicators. It generally records the flow of water from the environment into the economy, its uses in the economy and return flows back into the environment.

The report provides useful and basic water statistics and water-related indicators that can be used for inform water policies and monitoring purposes. Some of the basic water statistics and aggregates are abstracted water, water use, distributed water use, wastewater discharged to treatment plant and water losses. The water-related indicators include implicit prices, water productivity, water use per capita, water use per household and distributed water use expenditure by industry and households.

I am hopeful that this report will provide the necessary statistical information for the betterment of water management and development in Samoa through informed policies and strategic planning.

I would like to acknowledge the usual contributions of our valued water partners and all stakeholders for sharing and providing the water data and information for our water accounts compilation.

Leota Aliielua Salani
Government Statistician/ CEO

Contents

Executive Summary

The Water Account Samoa for the financial year 2021-22 (WAS 2021-22) presents information on the physical and monetary supply and use of water in Samoa. This is the 7th edition of the Physical Supply and Use of Water Account for Samoa and it provides the highlights of water statistics, aggregates and indicators with comparison to the previous years. This account compilation closely followed the United Nation System of Environmental-Economic Accounting Central Framework 2012 (UN-SEEA CF 2012) and SEEA-Water 2012 guidelines and principles.

Key Statistics

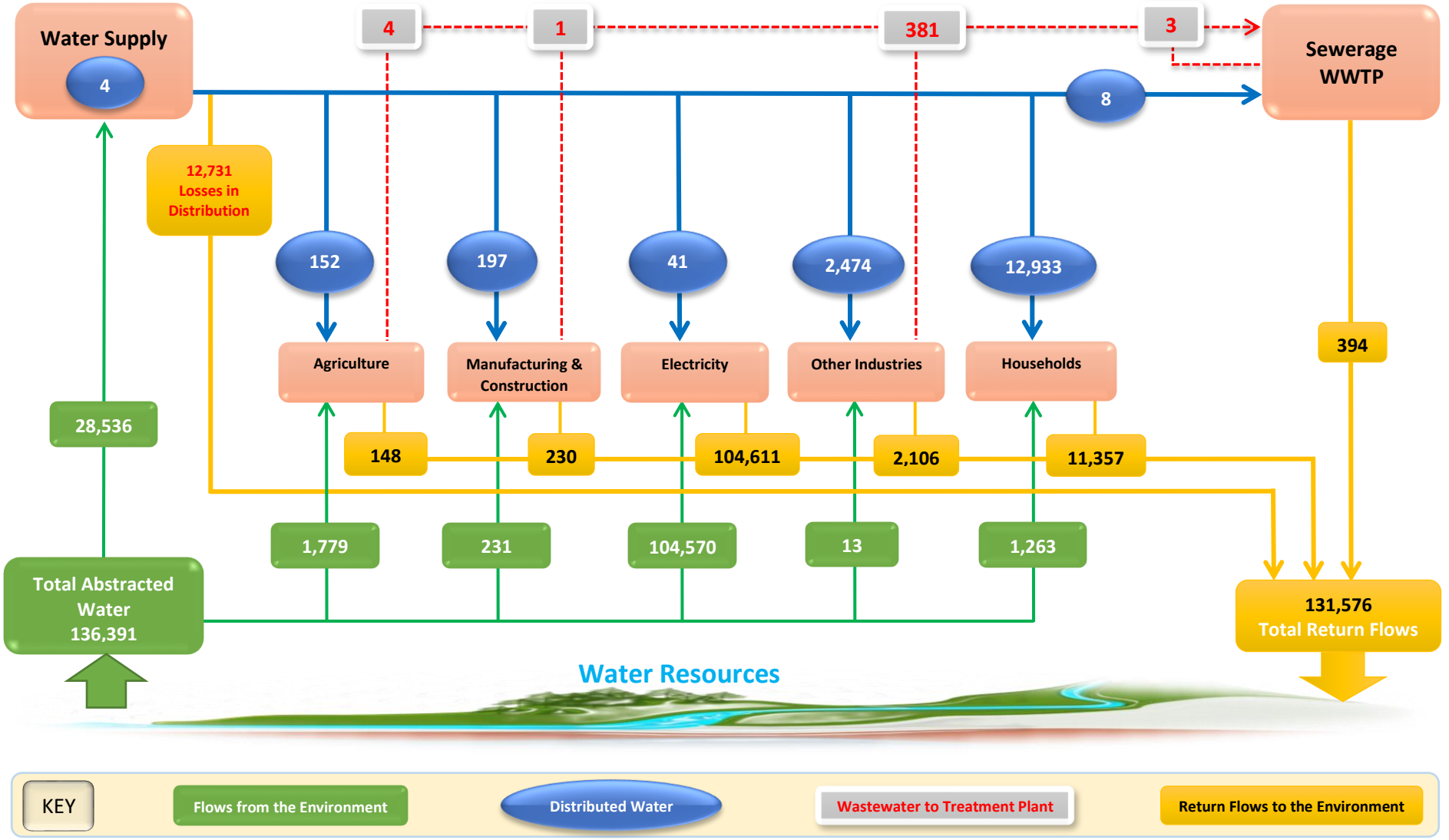
In 2021-22,

- Total Abstracted Water decreased by 19.2% to 136,391 megalitres[1] (ML) (from 168,757 ML in 2020-21)
- Household water use also decreased by 3.7% to 14,196 ML (from 14,743 ML in 2020-21)
- Industry water use decreased by 18.9% to 138,394 ML (from 170,542 ML in 2020-21).
- Total Distributed Water Use decreased by 1.9% to 15,809 ML (from 16,076 ML in 2020-21)
- Households paid an average of $1.30 per m^3 of distributed metered water, down by 5.0% from $1.38 in 2020-21
- Industry paid an average of $1.89 per m^3 of distributed metered water, down by 7.7% from $2.04 in 2020-21
- Wastewater treated at Wastewater Treatment Plant decreased by 13.8% to 389.0 ML (from 451.5 ML in 2020-21)
- Proportion of households with metered water supply increased by 1.1% from 86.6% in 2020-21 to 87.7% in 2021-2022

Figure 1 summarizes the physical flows of water from the environment into the economy, its flows within the economy and water returning back to the environment

[1] *1 ML = 1,000 Cubic meters (m^3)*
1m^3 = 1,000 Litres (L)

Figure 1: Physical Supply and Use Water Flows for Samoa, 2021-22 in Megalitres (ML)



1. Account Results and Findings

1.1 Physical Water Supply and Use

Table 1: Summary Table for Physical Water Supply and Use, Samoa 2017-18 to 2021-22 (ML).

	2017-18	2018-19	2019-20	2020-21	2021-22
1. Abstracted Water by Water Source					
Surface Water	105,317	153,893	129,212	160,573	126,663
Ground Water	6,637	7,146	7,448	6,505	8,466
Rainwater (a)	1,702	1,700	1,691	1,679	1,263
Total	**113,656**	**162,739**	**138,351**	**168,757**	**136,391**
2. Abstracted Water by Industry & Households					
Electricity	80,050	130,060	106,230	137,700	104,570
Agriculture	1,864	1,844	1,899	1,797	1,779
Manufacturing and Construction	66	333	297	154	231
Other Industries	25	19	54	13	13
Water Supply Industry	29,949	28,783	28,180	27,415	28,536
Sewerage	0	0	0	0	0
Total Industries	111,954	161,039	136,660	167,078	135,129
Total Households	1,702	1,700	1,691	1,679	1,263
Total	**113,656**	**162,739**	**138,351**	**168,757**	**136,391**
3. Distributed Water Use by Industry & Households					
Electricity	12	57	61	16	41
Agriculture	83	106	134	101	152
Manufacturing and Construction	348	367	259	157	197
Other Industries	3,314	3,265	2,668	2,716	2,474
Water Supply Industry	6	4	4	8	4
Sewerage	16	78	18	15	8
Total Industries	3,779	3,878	3,144	3,012	2,876
Total Households	12,399	12,512	12,706	13,064	12,933
Total	**16,178**	**16,389**	**15,850**	**16,076**	**15,809**
4. Total Water Use by Industry & Households(b)					
Electricity	80,062	130,117	106,291	137,716	104,611
Agriculture	1,947	1,950	2,033	1,898	1,931
Manufacturing and Construction	414	700	556	310	428
Other Industries	3,339	3,284	2,722	2,728	2,486
Water Supply Industry	29,955	28,787	28,184	27,423	28,540
Sewerage (c)	396	501	449	466	397
Total Industries	116.113	165.340	140.235	170.542	138.394
Total Households	14,101	14,212	14,397	14,743	14,196
Total	**130,214**	**179,552**	**154,632**	**185,285**	**152,590**

Source: Samoa Bureau of Statistics
Note:
(a) Rainwater is estimated only for the proportion of households not supplied by piped water supply
(b) Total Water Use is the sum of Abstracted water use + Distributed water use + Wastewater collected (by the Sewerage industry)
(c) Including collection of wastewater via Wastewater Treatment Plan

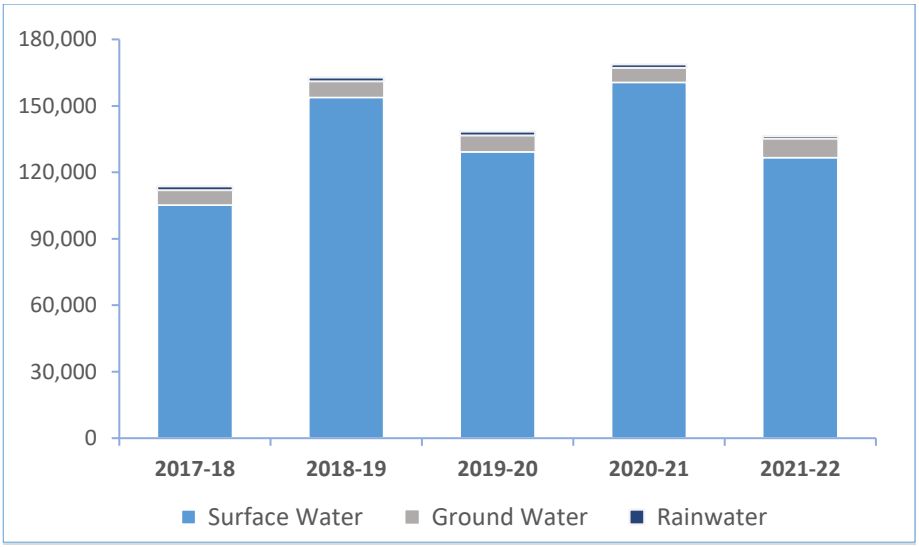
1.2 Abstracted Water

In 2021-22, an estimated total of 136, 391 ML of water was abstracted water[2] from the environment into Samoa's economy, a decrease of about 19.2 % or 32,366 ML of water when compared with 2020-21. The decline was attributed to the decrease in abstracted water for hydro electricity generation from 137,700 ML in 2020-21 to 104,570 ML in 2021-22. As usual, water abstraction for hydroelectricity generation by the Electricity industry is the main user of total abstracted water, accounting for almost 77.0% in 2021-22.

1.2.1. Abstracted water by Water Source

Surface water remains as the main water source for abstracted water, accounting for almost 93.0% or 126,663 ML of total water abstracted in 2021-22. Groundwater and rainwater accounts for the remaining 6.2% or 8,466 ML and less than 1.0% or 1,263 ML respectively (Refer **Chart 1**).

Chart 1: Total Abstracted Water by Water Source, Samoa 2017-18 to 2021-22 (ML)



Source: Samoa Bureau of Statistics

1.2.2. Abstracted water by Purpose of Use

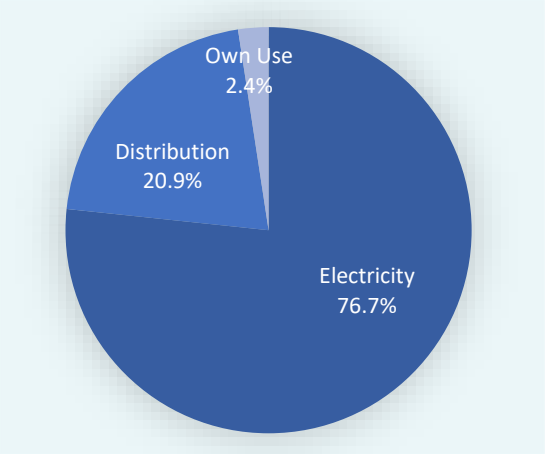
Electricity: 76.7 % or 104,570 ML of total abstraction was abstracted water by the Electricity Industry for hydropower and the vast majority of this water is returned back to the environment

[2] **Abstracted water** refers to water that is directly abstracted from the environment.

Distribution: 20.9% or 28,536 ML of water was abstracted water by the water supply industry mainly for supplying industries and households.

Own use: The remaining 2.4% or 3,285 ML of water was abstracted water for own use by industries and households (Refer **Chart 2**).

Chart 2: Proportion of Total Abstracted Water by Purpose of Use, Samoa 2021-22



Out of the 3,285 ML or 2.4 % of abstracted water for own use, Agriculture industry accounted for 54.1 % or 1,779 ML while Households accounted for about 38.4 % or 1,263ML. Manufacturing and Construction accounted for about 231 ML or 7.0 %. The remaining 12.5 ML or less than 1.0% was abstracted water by Other Industries (Refer **Chart 3**).

Chart 3: Percentage of Abstracted water for own use by Selected Industries and Households, Samoa 2021-2022 [3]

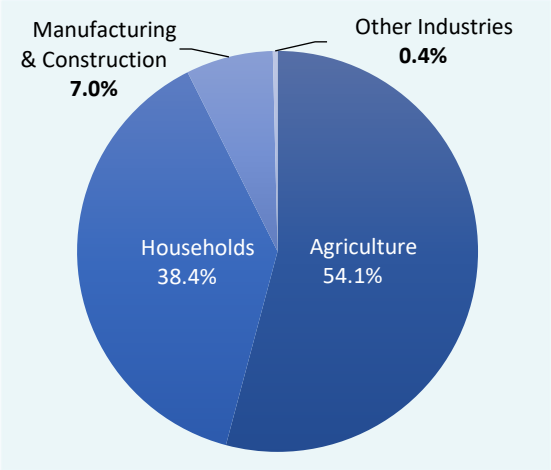
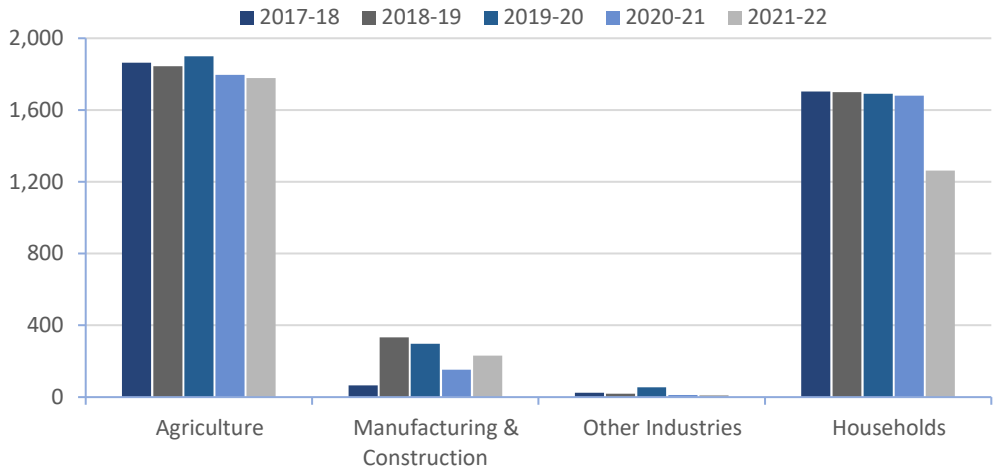


Chart 4 summarizes abstracted water for own use from 2017-18 to 2021-22. Agriculture[4] industry is the dominant industry throughout the five-year period. In 2021-22, abstracted water by households decreased by almost 25.0% or 416 ML compared to 1,679 ML in 2020-2021. The main contributing factor was the increased number of households connected to piped water hence less households depended on abstracted water from other sources such as rainwater

[3] **Chart 3 & 4** exclude abstracted water by the Electricity Industry and abstracted water for distribution by the Water Supply Industry. It only includes abstracted water for own use by the selected industries and households.
[4] **Abstracted water** use for Agriculture is estimated only for livestock.

Chart 4: Abstracted Water for Own Use by Selected Industries & Households, Samoa 2017-18 to 2021-22 (ML)



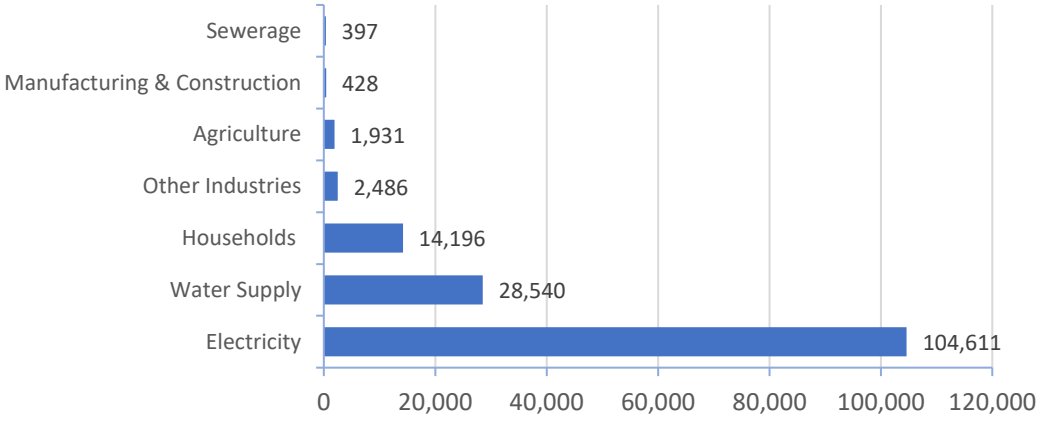
Source: Samoa Bureau of Statistics

1.3 Water Use

Total water use in 2021-22 was estimated to be 152,590 ML. As depicted in **Chart 5** below, Electricity is the dominant user of water, accounting for 68.6% or 104,611 ML of total water use, which is used for hydroelectricity generation. The water supply industry used about 18.7% or 28,540 ML of water. Households used about 14,196 ML or about 9.3% of total water use. The remaining 3.4% or 5,242 was used by the following industries;

- Other Industries 1.6 % or 2,486 M
- Agriculture 1.3% or 1,931 ML;
- Manufacturing and Construction 0.3% or 428 ML;
- Sewerage 0.2% or 397

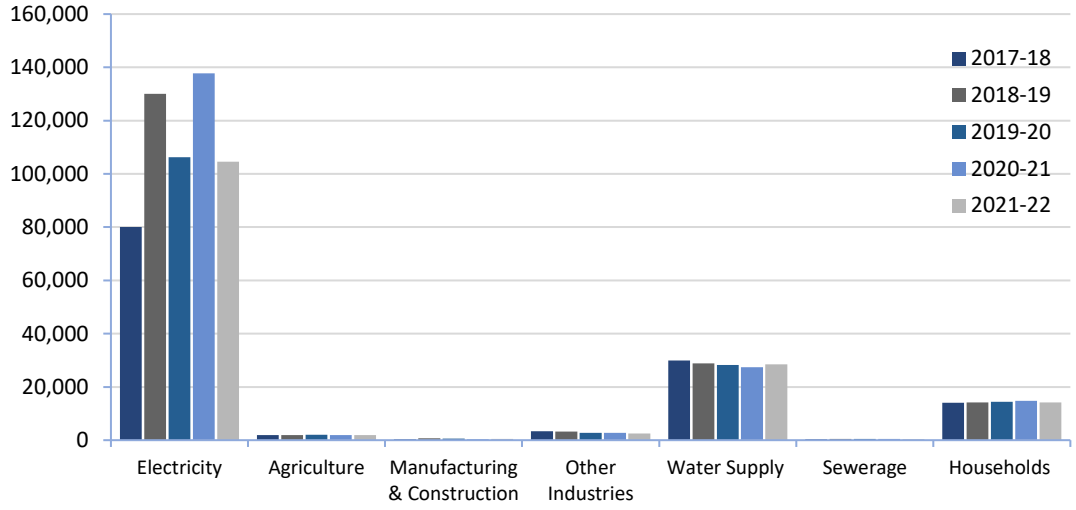
Chart 5: Total Water Use by Industries and Households, Samoa 2021-22 (ML)



Source: Samoa Bureau of Statistics

As shown in **Chart 6**, Electricity is the main user of water, accounted for the majority of water use across all the financial years 2017-18 to 2021-22.

Chart 6: Total Water Use by Industries and Households, Samoa 2017-18 to 2021-22 (ML)



Source: Samoa Bureau of Statistics

1.4 Distributed Water [5] Use

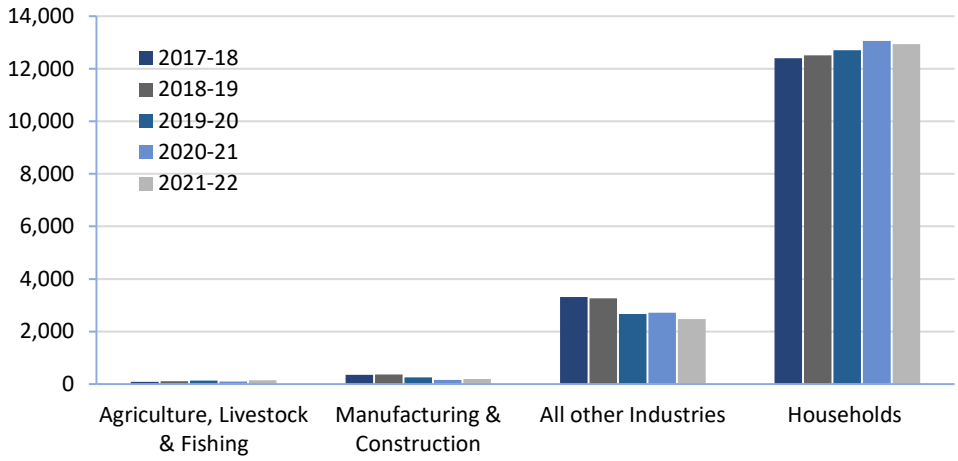
- **Total Distributed Water Use**

Of 28,536 ML of abstracted water by the Water Supply industry for distribution in 2021-22, about 55.4% or 15,809 ML was supplied and used by industry and households. The remaining 44.6% or 12,727 ML of the abstracted water for distribution was non-revenue water (NRW) [6] or water losses.

As depicted in **Chart 7**, households used most of the distributed water between 2017-2018 and 2021-2022. In 2021-22, households accounted for 81.8% or 12,933 ML of total distributed water followed by all other Industries with 15.6% or 2,474 ML. The remaining 3.0% or 402 ML was used by the Manufacturing and Construction industry accounting for 1.2% or 197 ML, the Agriculture industry with 1.0% or 152 ML, the Electricity industry with 0.7% or 41 ML and the Water Supply and Sewerage industry with 0.1% or 12 ML.

[5] **Distributed water** refers to water flows from one user (or supplier) to another user after abstraction. It includes water supplied by the water suppliers to industries and households where an economic transaction occurs.
[6] **NRW** (non-revenue water) refers to all water losses including real losses (e.g. leakages & overflows from storage), apparent losses (e.g. illegal connections) and unbilled authorized consumption (e.g. water carting, firefighting and other use for operational purposes).

Chart 7: Total Distributed Water Use by Selected Industries and Households, Samoa 2017-18 to 2021-22

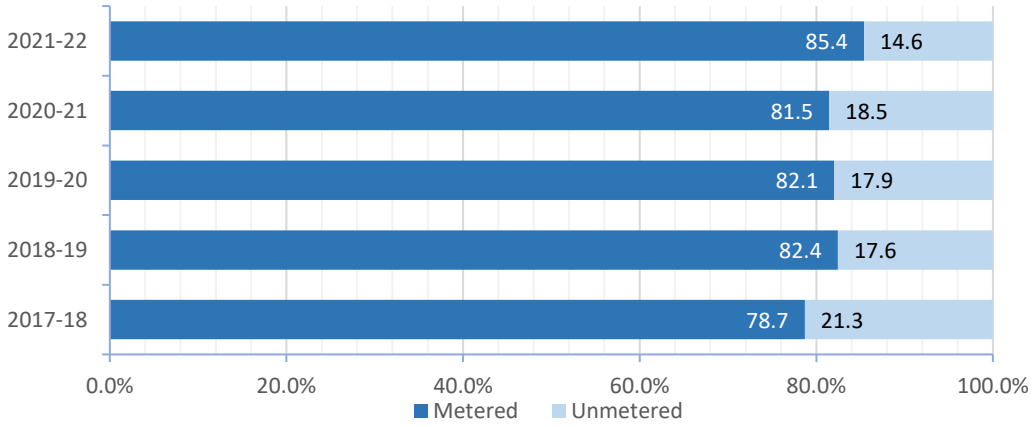


Source: Samoa Bureau Statistics

- Distributed Metered and Unmetered Water Use

In 2021-22, distributed metered water use accounted for 85.4% or 13,502 ML of total distributed water use, an increase of about 1.3% or 178 ML reported in 2020-2021. The remaining 14.6% or 2,307 ML was distributed unmetered water use. Chart 8 depicts the gradual increase in distributed metered water use since 2017-18.

Chart 8: Distributed Metered and Unmetered Water Use, Samoa 2017-18 to 2021-22 (ML)

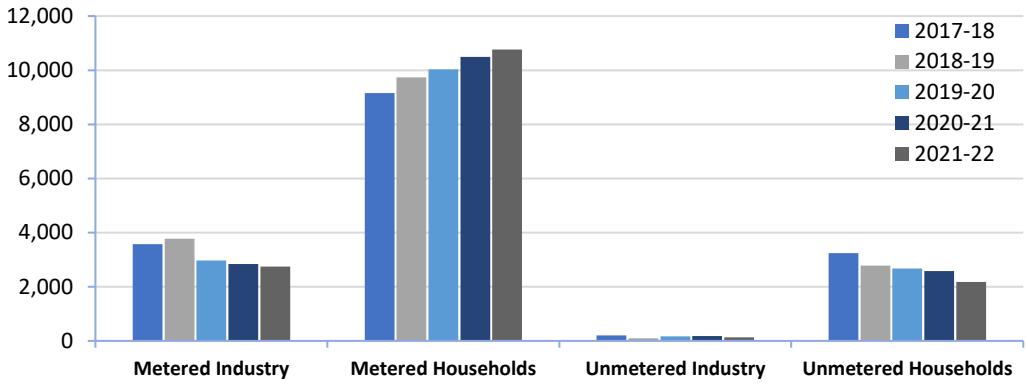


Source: Samoa Bureau of Statistics

- Distributed Metered and Unmetered Water Use by Industry and Households

In 2021-22, metered households water use accounted for most of the total distributed water use with 68.1 % or 10,758 megalitres while unmetered industry accounted for the least with about 0.8% or 131 ML (Refer Chart 9).

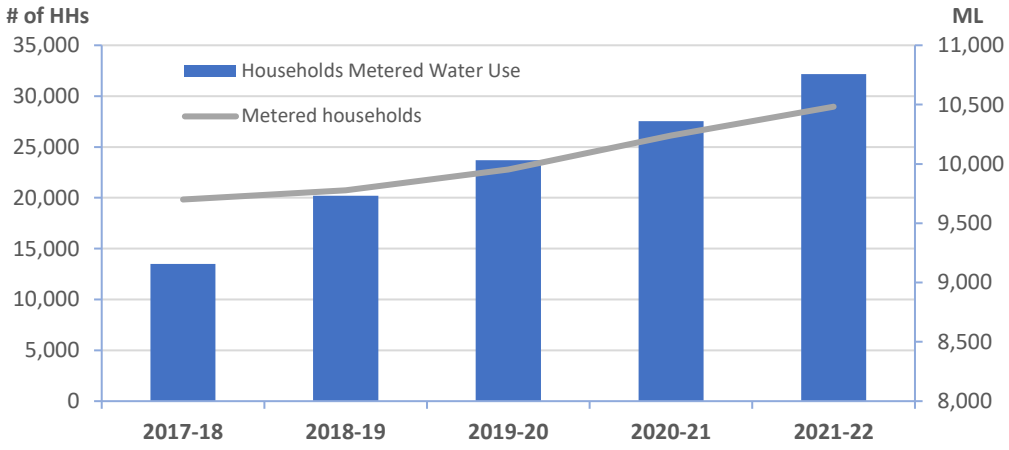
Chart 9: Distributed Metered and Unmetered Water Use by Industry and Households, Samoa 2017-18 to 2021-22 (ML)



Source: Samoa Bureau of Statistics

Households metered water use has increased since 2017-18. This increase is mainly attributed to the increase in the number of metered households' connections as shown below in Chart 10.

Chart 10: Number of Metered Households and Metered Households Water Use, Samoa 2015-16 to 2021-22



Source: Samoa Water Authority & Samoa Bureau of Statistics.

1.5 Monetary Supply and Use

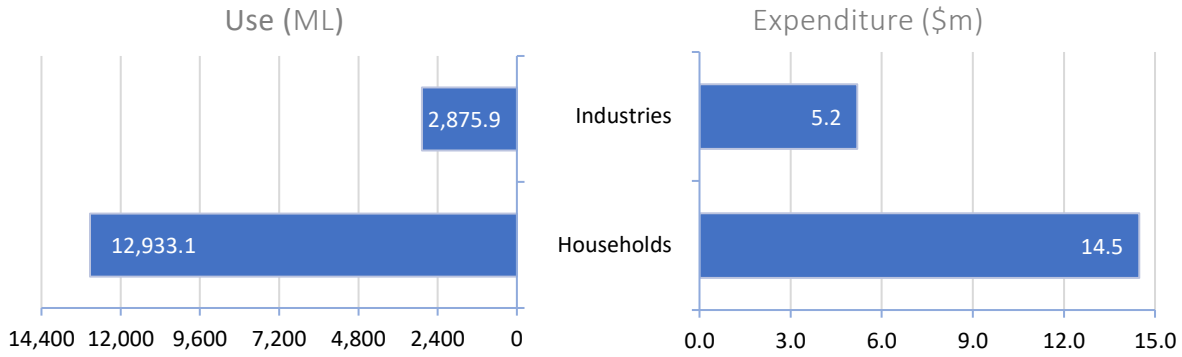
Coverage of financial information is still limited to distributed water use. In 2021-22, the total expenditure[7] on distributed water was $19.7 million Tala, a decline of about 5.2% from $20.8 million Tala in 2020-21.

[7] Expenditure does not include any water-related subsidies that might have been received by the supplier of water or use of water. Furthermore, expenditures do not necessarily cover all costs of supplying water.

- Expenditure on Distributed Water Use by Industry and Households

Out of the $19.7 million Tala expenditure on total distributed water use in 2021-22, about 73.6% or $14.5 million Tala was paid by households which used most of the distributed water (81.8% or 12,933 ML). Industries makes up the remaining 26.4% or $5.2 million Tala of total expenditure on distributed water use (Refer **Chart 7**).

Chart 7: Expenditure and use of distributed water, Samoa 2021-22



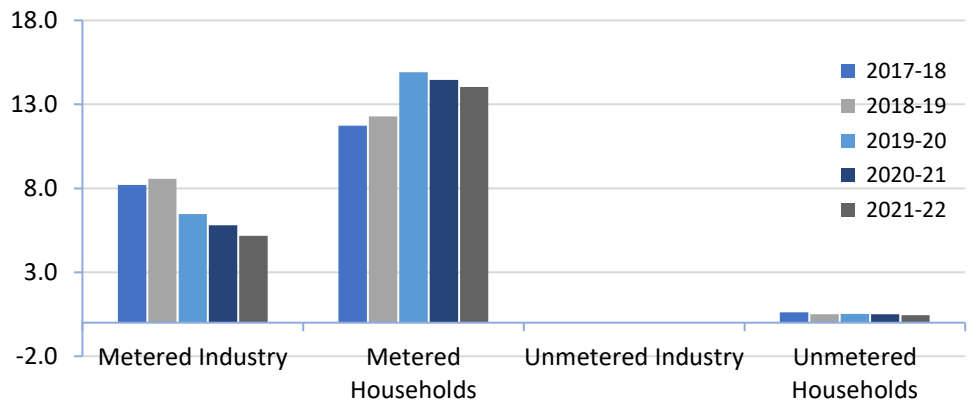
Source: Samoa Bureau of Statistics

- Expenditure of Distributed Metered and Unmetered Water Use

In 2021-22, metered households paid the highest share among the various categories for distributed metered water use with 71.3 % or $14.0 million Tala. Unmetered Industry spent the least with about 0.1% or $0.02 million Tala of total distributed water use.

Chart 11 depicts the decline in expenditure on distributed water use by both industry and households in 2021-22 compare to 2020-21. The main contributing factor was the introduction of the 20.0% decrease in tariff rates for all water use customers of the main water supplier in November 2021 (Refer **Appendix 8.3**).

Chart 11: Expenditure of Metered and Unmetered Water Use, Samoa 2017-18 to 2021-22 ($m)



Source: Samoa Bureau of Statistics

By industry (Refer **Table 3**), the most significant contributors to the Total Expenditure on distributed water apart from households were the Education industry and Other service activities industry with an estimated WST$0.9 million (4.8%) and WST$0.7 million (3.7%), respectively.

Table 3: Estimated Expenditure on Distributed Water Use, Samoa 2021-22 (WST$).

Industries	Expenditure	%
Households	14,493,695.14	73.60
Education	943,461.03	4.79
Other service activities	734,561.79	3.73
Human health and social work activities	638,800.94	3.24
Public administration and defence	576,969.00	2.93
Accommodation and food service activities	546,451.77	2.77
Wholesale and retail trade	455,942.91	2.32
Manufacturing	300,276.24	1.52
Agriculture	295,162.24	1.50
Transportation and storage	182,042.24	0.92
Arts, entertainment and recreation	123,637.36	0.63
Construction	77,668.10	0.39
Electricity industry	77,355.88	0.39
Real estate activities	71,946.39	0.37
Financial and insurance activities	53,725.36	0.27
Activities of extraterritorial organizations	50,357.09	0.26
Information and communication	21,746.43	0.11
Sewerage	7,117.00	0.04
Administrative and support service activities	5,897.07	0.03
Water supply industry	4,949.42	0.03
Professional, scientific and technical activities	4,562.50	0.02
Mining and quarrying	2,565.71	0.01
Waste management	862.38	0.00
Total Expenditure	**19,692,200**	**100.00**

Source: Samoa Water Authority, Independent Water Scheme Association and Samoa Bureau of Statistics

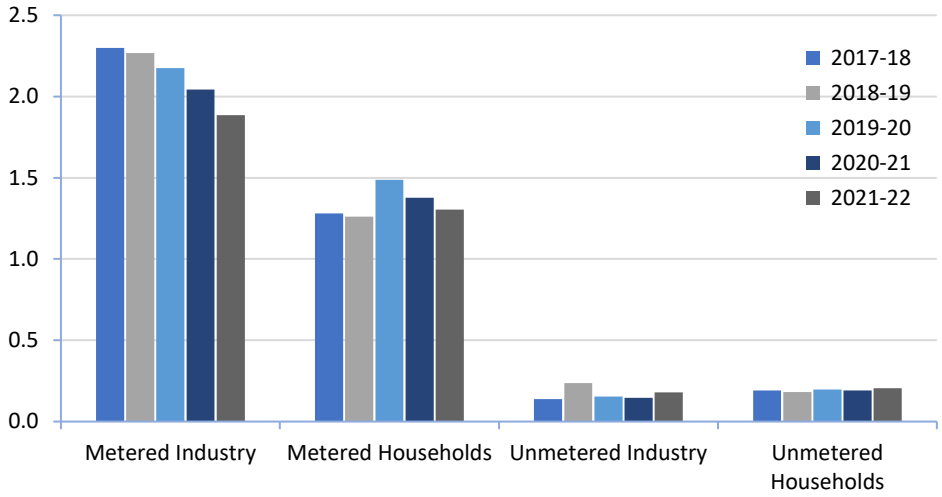
1.6 Implicit Prices [8]

In 2021-22, the average price per cubic meter of distributed water use for metered industry was calculated to be $1.89 while distributed water use for unmetered industry was calculated to be $0.18 per cubic meter. Implicit price for distributed metered water used by households

[8] **Implicit Price** is imputed as the Water expenditure divided by water supplied ($/m^3). Refer Footnote 5 for expenditure definition used.

was calculated to be $1.30 while unmetered households was $0.20, implying that unmetered water is cheaper than metered water (Refer **Chart 12**).

Chart 12: Implicit Price for Distributed Water Use, Samoa 2017-18 to 2021-22 (WST$/m³)



Source: Samoa Bureau of Statistics.

Implicit price for metered industry has decreased since 2017-18 while metered households have decreased since 2019-20. Implicit price for metered households, has decreased by 5.3% or $0.07 from $1.38 in 2020-21 to $1.30 in 2021-22.

Table 4: Monetary Supply and Use Table, Samoa 2017-18 to 2021-22

Volume (ML)	2017-18	2018-19	2019-20	2020-21	2021-22
Metered Water Use	**12,729.50**	**13,512.28**	**13,005.32**	**13,324.76**	**13,502.31**
Industry	3,573.20	3,779.79	2,975.12	2,836.11	2,744.50
Households	9,156.30	9,732.49	10,030.20	10,488.65	10,757.80
Unmetered Water Use	**3,446.10**	**2,877.20**	**2,844.25**	**2,751.40**	**2,306.63**
Industry (a)	205.67	98.09	168.79	176.17	131.36
Households (b)	3,240.43	2,779.10	2,675.46	2,575.23	2,175.27
Total Distributed Water	**16,175.60**	**16,389.48**	**15,849.57**	**16,076.16**	**15,808.94**
Expenditure ($m)					
Metered Water Use	**19.94**	**20.84**	**21.39**	**20.24**	**19.21**
Industry	8.21	8.57	6.47	5.79	5.17
Households	11.73	12.27	14.92	14.45	14.03
Unmetered Water Use	**0.65**	**0.53**	**0.55**	**0.52**	**0.47**
Industry (c)	0.03	0.02	0.03	0.03	0.02
Households (d)	0.62	0.51	0.53	0.49	0.44
Total Expenditure	**20.59**	**21.37**	**21.94**	**20.76**	**19.68**

Implicit Price ($/m³)					
Metered Industry	2.30	2.27	2.17	2.04	1.89
Metered Households	1.28	1.26	1.49	1.38	1.30
Unmetered Industry	0.14	0.24	0.15	0.15	0.18
Unmetered Households	0.19	0.18	0.20	0.17	0.20

Source: Samoa Water Authority, Independent Water Scheme Association and Samoa Bureau of Statistics

Note:

(a) Unmetered water use for industry was estimated by calculating the average metered water use for each individual industry
(b) Unmetered household water use was estimated by calculating the average household metered water use.
(c) Expenditure for unmetered water use for SWA was provided while IWSA unmetered industry water use was estimated using flat rate of WST$10
(d) Expenditure for unmetered households was estimated by WST$10 maintenance fee/month for IWSA customers while SWA customers was provided.

1.7 Water Productivity

Water Productivity is the amount of GDP generated per cubic meter of water abstracted, calculated by GDP (nominal GDP) divided by total water abstracted. **Table 5** highlights water productivity over the last five financial years. Samoa's economy in 2021-22 produced $17.47 of GDP from every cubic meter of total water abstracted compared with $12.99 produced in 2020-21. Overall, Samoa's water productivity has decreased from $19.75 in 2017-18 to $17.47 in 2021-22 implying that the amount of GDP generated by every cubic meter of water abstracted has decreased,

Table 5: Samoa Water Productivity for the financial years 2017-18 to 2021-22

Financial Years	Total Water Abstracted m³	GDP ($m)	Water Productivity (WST$/m³)
2017-18	114,144,000	2,254.4	19.75
2018-19	163,005,000	2,390.1	14.66
2019-20	106,208,849	2,344.1	17.21
2020-21	168,757,240	2,191.4	12.99
2021-22	136,391,418	2,382.5	17.47

Source: Samoa Bureau of Statistics

1.8 Wastewater and Treatment Plant

The Wastewater Treatment Plant (WWTP) operated by SWA is used mainly by some businesses and government ministries within the Apia business area. There are no households connected to this wastewater treatment plant.

In 2021-22, a total of 388.8 ML of wastewater was discharged to the Wastewater Treatment Plant by all industries in 2021-22, a decrease of about 13.9% or 62.8 ML compared to 451.5 ML in 2020-21. (Refer **Table 6**).

Table 6: Volume of Wastewater Discharged to WWTP, Samoa 2017-18 to 2021-22 (ML)

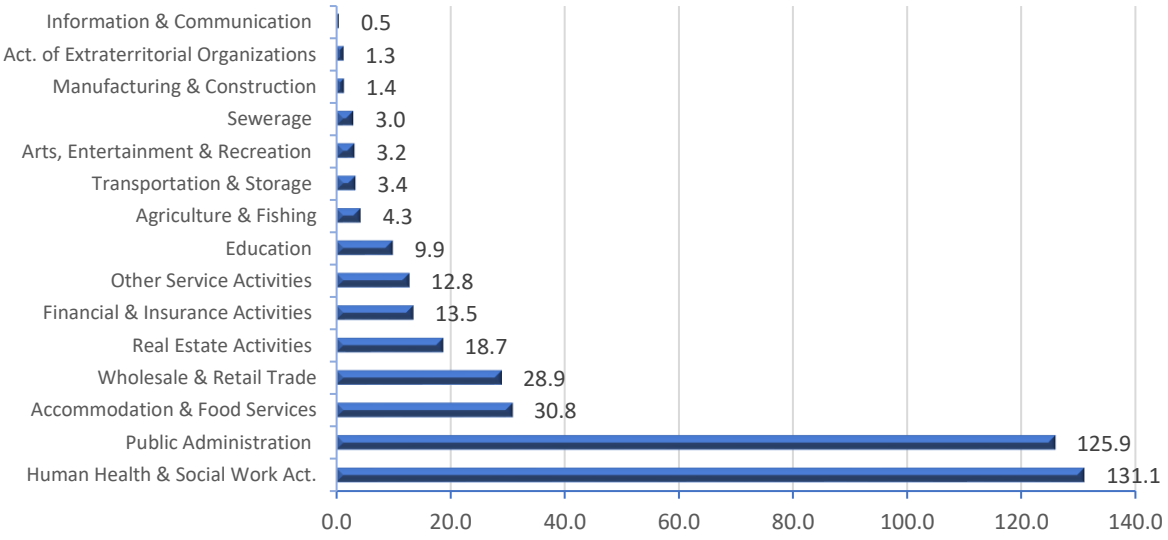
Industries	2017-18	2018-19	2019-20	2020-21	2021-22
Human health and social work activities	118.6	115.5	117.0	138.5	131.1
Public administration and defence	80.2	111.8	119.7	136.5	125.9
Wholesale and retail trade	33.6	47.3	44.2	37.8	28.9
Accommodation & food service activities	53.9	45.4	42.7	27.2	30.8
Financial and insurance activities	38.7	43.5	41.1	25.1	13.5
Other service activities	12.6	21.5	11.9	13.3	12.8
Real estate activities	17.5	13.1	24.6	37.9	18.7
Sewerage	7.2	6.8	4.8	2.7	3.0
Agriculture	5.0	5.5	5.2	6.4	4.3
Arts, Entertainment and Recreation	3.9	5.1	6.2	3.7	3.2
Education	5.6	4.5	7.1	9.2	9.9
Information and communication	2.0	1.2	0.7	0.6	0.5
Activities of extraterritorial organizations	0.5	0.9	2.2	0.7	1.3
Manufacturing and construction	0.7	0.8	1.9	2.2	1.4
Transportation and storage	0.3	0.4	1.6	9.7	3.4
Total wastewater discharge	**380.2**	**423.1**	**430.9**	**451.5**	**389.0**

Source: Samoa Water Authority (SWA).

Human Health and Social Work Activities accounted for most of the wastewater discharged with 131.1 ML (33.7%), followed by the Public Administration industry with 125.9 ML (32.4%).

Conversely, Activities of Extraterritorial Organization industry together with Information and Communication accounted for the least of the wastewater discharged with 1.3 ML (0.3%) and 0.5 ML (0.1%) respectively (Refer **Chart 14**).

Chart 14: Volume of Wastewater Discharged to WWTP by Industry, 2021-22 (ML)



Source: Samoa Water Authority

An estimated total payment of about $2.1 million Tala was recorded for all the wastewater discharged by different industries to the Wastewater Treatment Plant in 2021-22, a decrease of about 13.4 % from $2.4 million Tala in 2020-21.

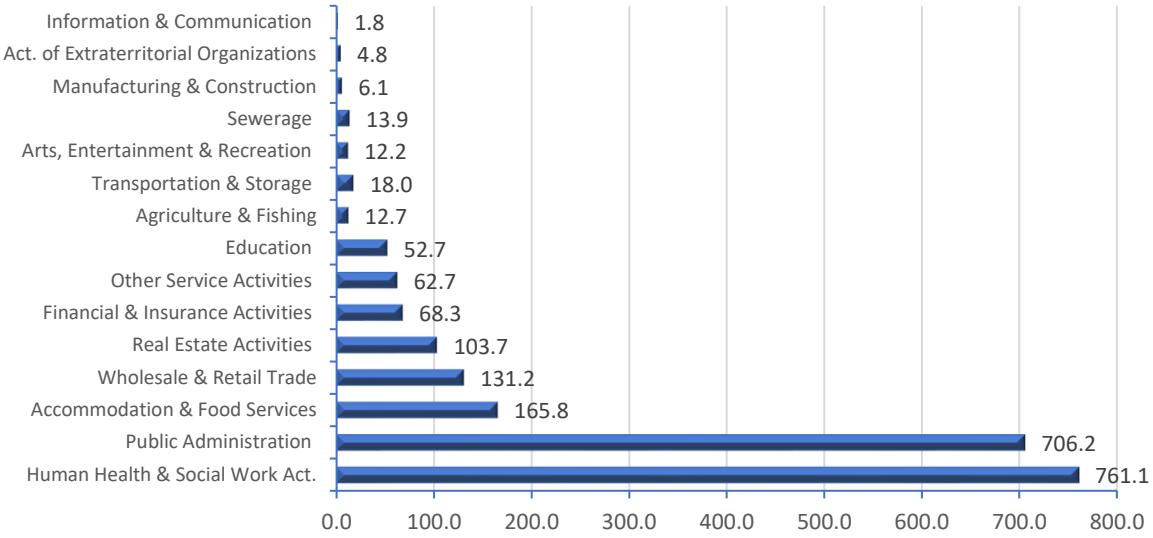
Table 7: Expenditure on Wastewater Treatment Water Plant Usage, 2017-18 to 2021-22 ($)

Industries	2017-18	2018-19	2019-20	2020-21	2021-22
Human health & social work act.	686,930.9	666,417.0	677,460.6	803,046.5	761,141.0
Public administration and defence	439,241.6	612,123.5	663,274.3	762,246.1	706,230.4
Wholesale & retail trade	159,482.7	202,564.2	188,901.6	156,606.8	131,186.7
Accommodation & food services	301,857.7	230,009.9	229,662.6	145,692.5	165,775.8
Financial and insurance activities	218,984.6	247,164.9	232,141.8	134,020.3	68,328.3
Other service activities	63,758.9	107,157.9	57,355.1	64,710.3	62,690.3
Real estate activities	97,372.1	71,818.4	137,833.8	216,568.6	103,691.6
Sewerage	38,291.5	35,683.7	247,48.5	12,667.8	13,945.1
Agriculture	14,473.3	16,907.2	16,961.2	21,156.2	12,673.0
Arts, entertainment & recreation	15,780.2	20,814.7	26,981.7	14,108.2	12,181.0
Education	27,423.2	22,290.1	38,281.2	46,242.0	52,652.3
Information and communication	9,087.8	4,922.1	25,38.1	2,209.8	1,834.7
Activities of extraterritorial org.	1,858.5	3,076.5	9,199.5	2,457.0	4,843.9
Manufacturing and construction	2,292.5	2,709.0	9,177.7	11,183.7	6,145.1
Transportation and storage	1,011.5	1,456.0	7,519.8	55,215.4	17,969.3
Total Expenditure	**2,077,847.0**	**2,245,125.1**	**2,322,037.5**	**2,448,131.2**	**2,121,288.5**

Source: Samoa Water Authority

Human Health and Social Work Activities spent the most with $761,141 Tala or 35.9% of total expenditure, while Information and Communication industry spent the least with $1,834 Tala accounting for only 0.1% of total expenditure (Refer **Chart 15**).

Chart 15: Expenditure on Wastewater Discharged to WWTP by Industry, 2021-22 ($)



Source: Samoa Water Authority

1.9 Other Key Water Indicators

1.9.1 Key Indicators for Water Use, Samoa 2015-16 to 2021-22

	Unit	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22
Water Use by Industries	ML	105,666.0	86,629.0	116,113.2	165,340.0	140,235.4	170,541.8	138,393.2
Water Use by Industries (excl Electricity & Water Supply)	ML	7,806.0	8,279.0	6,096.2	6,435.8	5,760.3	5,402.7	5,242.0
Water Use by Households	ML	13,574.0	13,994.0	14,101.5	14,211.8	14,396.6	14,743.1	14,195.8
Total Water Use	**ML**	**119,240.0**	**100,623.0**	**130,214.7**	**179,551.8**	**154,632.0**	**185,284.9**	**152,589.0**
Total Water Use (excl Electricity & Water Supply)	**ML**	**21,380.0**	**22,273.0**	**20,197.7**	**20,647.6**	**20,156.9**	**20,145.8**	**19,437.8**
Estimated Population (June) (a)	Persons	195,109	196,795	200,059	200,890	201,690	204,032	206,567
Estimated Number of Households (June)	Households	28,693	28,940	29,420	29,543	29,660	30,005	31,290
Estimated Number of Metered Households	Households	18,768	19,686	19,832	20,737	22,793	25,982	27,447
Water Use per Capita(b) (excl Electricity & Water Supply)	m^3 per capita	109.6	113.2	101.0	102.8	99.9	98.7	94.1
Total Household Water Use Per Households (c)	**m^3 per HHs**	**473.1**	**483.5**	**479.3**	**481.1**	**485.4**	**491.4**	**453.7**
Percentage of Households with Metered Water Use (d)	%	65.4	68.0	67.4	70.2	76.8	86.6	87.7

Source: Samoa Bureau of Statistics

Note:

(a) Estimate based on the annual growth rate of 0.87 percent from PHC 2016 except for the year 2016. Revised population for PHC 2021 with an annual growth rate of 0.98 percent thereafter from PHC 2021
(b) Calculated by total water use excluding Electricity and Water Supply, divided by the total population multiply by 1000
(c) Calculated by water use by households divided by the total number of households multiply by 1000
(d) Calculated by Total number of metered households divided by total number of households

1.9.2 Key Water Indicators for Water Expenditure, Samoa 2015-16 to 2021-22

	Product	Unit	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22
Expenditure by Industry	Distributed	$m	6.6	7.2	8.2	8.6	6.5	5.8	5.2
Expenditure by Households	Distributed	$m	10.4	11.2	12.4	12.8	15.4	14.9	14.5
Total Expenditure by Industry and Households	**Distributed**	**$m**	**16.9**	**18.4**	**20.7**	**21.4**	**21.9**	**20.8**	**19.7**
Expenditure by Industry (a)	Wastewater	$m	1.8	3.4	2.1	2.2	2.3	2.4	2.1
Total Expenditure by Industry	**Wastewater**	**$m**	**1.8**	**3.4**	**2.1**	**2.2**	**2.3**	**2.4**	**2.1**
Volume of Water Used by Industry	Distributed	ML	3,714.0	4,042.0	3,779.0	3,877.9	3,143.9	3,012.2	2,875.8
Volume of Water Used by Households	Distributed	ML	12,985.0	13,357.0	12,399.0	12,511.6	12,705.7	13,063.9	12,933.1
Expenditure per m^3 of Water Used by Industry (b)	Distributed	$/$m^3$	1.77	1.79	2.18	2.22	2.07	1.93	1.81
Expenditure per m^3 of Water Used by Households (c)	Distributed	$/$m^3$	0.80	0.84	1.00	1.02	1.22	1.14	1.12
Estimated Population as of 30 June	Population	persons	195,109	196,795	200,059	200,890	201,690	204,032	206,567
Total Expenditure by Industry and Households per Capita (d)	**Distributed**	**$ per capita**	**86.8**	**93.5**	**103.4**	**106.4**	**108.8**	**101.8**	**95.3**
Estimated Number of Households at 30 June	Households	households	28,693	28,940	29,420	29,543	29,660	30,005	31,290
Total Household Expenditure per Household (e)	**Distributed**	**$ per household**	**360.9**	**386.4**	**422.8**	**432.6**	**520.8**	**498.0**	**463.2**

Source: Samoa Bureau of Statistics

Note: $m: in million Tala

(a) WWTP (Wastewater Treatment Plant). Households not connected to WWTP
(b) Calculated by Expenditure by Industry divided by Volume of water used by Industry
(c) Calculated by Expenditure by Households divided by Vol. of Water used by households
(d) Calculated by Total expenditure divided by Estimated population
(e) Calculated by Expenditure by Households divided by estimated number of households

2. Accounts Methodology

The Water Account, Samoa 2021-22 is produced by the Samoa Bureau of Statistics and it closely followed the System of Environmental Economic Accounting Central Framework 2012 (SEEA-CF 2012). The account focused on Physical Supply and Use of water and some monetary supply and use for Samoa. The methodology for this compilation is very much similar to the previous water account 2019-20 with few changes to some of the data and methods. Due to the delay in water data provision, the bureau was not able to compile the 2020-21 account on time but it is included in this edition.

2.1 Concepts

The WAS 2021-22 was developed using the SEEA Central Framework and it started in 2013 with Samoa's first account published in 2015 for the financial years 2011-12 to 2013-14. The WAS supply and use tables represent the flows of water from the environment to the economy, within the economy and going back to the environment.

The monetary supply and use are limited to distributed water use by industries and households. It includes the monetary value associated with the use of distributed water and using of the Waste Water Treatment Plant for sewage discharge. The key concepts are as followed;

Abstracted Water (flows from the environment)

Abstracted water refers to water that is removed from any source or the environment, either permanently or temporarily for consumption and production activities (SEEA Water, s 3.26). Water used for hydroelectricity is also abstracted water. Abstracted water is disaggregated according to purpose (for hydroelectricity, for distribution and for own use) and type of water source.

Water Use

Total water use of an industry is computed as the sum of the amount of abstracted water and the amount of water received from other economic units (distributed water and wastewater collected). Although it might be perceived that water abstracted for distribution is counted twice-first as a use when water is abstracted by the distributing industry and second when it is delivered to other user – water abstracted for distribution is a water use of the distributing industry even though that industry is no the end-user of the water (SEEA Water, s 3.31).

Water Supply

Water leaving or flowing out from an economic unit. It is computed as the sum of water supply to other economic units (distributed water and wastewater) and water supply to the environment or return flows (SEEA Water, s 3.40).

Expenditure

Refers only to the cost paid by economic units and households for distributed water use and water discharged to the wastewater treatment plant. It does not include any water-related subsidies that might have been received by the supplier of water or use of water. Furthermore, expenditures do not necessarily cover all the costs of supplying water.

Classification of Industries

The WAS uses the International Standard Industrial Classification Revision 4 (ISIC Rev.4) for its industry classification.

Wastewater

Wastewater represents water that is no longer needed by an economic unit and discharged to the wastewater treatment plant. The SWA only recorded wastewater treated by the wastewater treatment plant.

Return Flows

Represents the flows of water from industries and households tot the environment. It does not include the flows of water to wastewater treatment plant but includes wastewater from economic units that flows directly to the environment.

2.2 Data Sources

Data for WAS are sourced from different sources such as government ministries and corporations, non-governmental organizations, private sector and existing census and surveys conducted by the bureau.

Water Supply Industries

The two main water suppliers provide the core data for the WAS compilation through administrative data. The administrative data provided the following information;

- Water production (abstracted water) by sources of water (surface & groundwater)
- number of connections (metered & unmetered)
- estimated coverage by population and households

- metered water supply by volume (m3) and value ($WST)
- unmetered water by value
- wastewater collected/discharged to the treatment plant and value by individual industry
- water losses as non-revenue water (distribution losses)

Water Abstraction Licensing

The Ministry of Natural Resources and Environment (MNRE) administered the licensing of water abstraction for all types of water use. Most of these licenses are issued to Construction companies, Water Supply Industries, the hydropower electricity, manufacturing companies and some to other service activities. The administrative data includes;

- water user
- purpose of abstraction
- rate of abstraction and operational time
- duration of license

Hydroelectricity Water Use

The Electric Power Corporation (EPC) provides the administrative data on the water use for hydropower. The hydroelectricity water use is provided by quarter.

- name and location of stations
- amount of water abstracted by month or quarter

Agriculture, Livestock and Fishing

The core data for Agriculture and Livestock is the number of livestock. The Agriculture Census Data and Agriculture Survey provided this information. There is no information on the water use for livestock in Samoa, hence documented water requirements by FAO (FAO, 1995, *Water requirement Livestock*. [Fact Sheet]) was used to estimate the abstracted water use by livestock.

- number of livestock by type of livestock
- average water use by livestock type (FAO)

Households Census and Surveys

The bureau conducts its Population and Housing Census every five years and Agriculture Census every ten years with Agriculture Surveys in between every five years. These provide demographic information as well as livestock information for the accounts.

- Census household counts
- Average household size
- Livestock numbers by livestock type

2.3 Methods

Physical Water Supply and Use

Abstracted water use for different industries is calculated using different data sources. All the abstracted water is used to calculate the amount of water that is taken off the environment (flows from the environment). The following provide the methods used for each industry;

Water Supply Industry

Water production by surface water and groundwater (boreholes) provide the backbone of abstracted water for water supply industry. For the unmetered community managed water supply systems, the average metered water use for households and individual industry is used to estimate the water production or abstracted water.

Agriculture, Livestock and Fishing

Abstracted water Agriculture is only estimated for livestock. Most of the agricultural crops for Samoa are mainly rainfed, hence making it difficult to estimate abstracted water use due to lack of data.

The abstracted water by livestock presented in this report is slightly different to the data presented in the previous account in 2019-20. This is due to a huge difference between numbers of livestock estimated for years without Agriculture census compared with Agriculture census's years livestock numbers. Because of that, a simple straight-line method was used to estimate the number of livestock using the Agriculture Census 1999 as the base year and the Samoa Agriculture Census 2019.

The livestock numbers are then multiplied to the average water requirements by each livestock type to estimate the abstracted water by livestock.

Manufacturing and Construction

The abstraction licensing data provided by MNRE, is the sole information available and used to estimate the abstracted water by manufacturing and construction. The abstraction rate and operational time are used to estimate annual figures for each industry. For 2021-22, attempts were made to collect data directly from major road construction companies but it was not successful.

Hydro Electricity

The Electric Power Corporation's water abstraction is used to compute the amount of water abstracted water for hydro power. The data is provided monthly or quarterly.

Households abstracted water

According to the 2021 Population and Household Census, a proportion of about 8.5% of total population or 2,656 households depended on other sources other than distributed water by the water suppliers. For the purpose of this account, that percentage is assumed to be self-abstracting water from other sources mainly rainwater. The estimated abstracted water use by these households is computed using the average metered household water use multiplied by the number of households not supplied by piped water.

Distributed Water Use

The detailed customer use data from one of the main water suppliers was classified to relevant industry using the International Standard Industry Classification (ISIC Rev.4) before tabulation and analysis. The bulk of water users (industry & households) have metered water supply. The average water use for metered individual industry and metered households is used to estimate the unmetered water use by industry and households.

On the other hand, the community managed water supply systems are mostly unmetered except one scheme where metered were installed for monitoring water use and losses. Water fees are paid based on households' consumption with very low rates. Proportions from that scheme was used to estimate production and supply for the other 26 schemes.

Monetary Supply and Use

Abstracted water use and return flows are not valued as there is a lack of available information and data. The monetary information is limited to only the distributed water use and wastewater to treatment plant. Value of distributed metered and unmetered water use are provided as well as expenditure paid by industry for their wastewater discharged to the wastewater treatment plant.

For community managed water supply systems, monthly maintenance fee paid by households is used to estimate the value of distributed water use for the unmetered water schemes.

3. Industries Classification

Industry is a group of establishments engaged in the same or similar activities. The bureau classified establishments according to relevant industry based on the International Standard Industrial Classification of All Economic Activities, Revision 4 (ISIC Rev.4). With data sets and information scattered across different data sources and custodians, the classification task was challenging. However, the following industries are the major ones used throughout this report for the purpose of water accounts.

Agriculture: Includes Agriculture, Forestry and Fishing. Livestock Is also included.

Electricity: Includes Electricity, Gas and Air Conditioning

Manufacturing and Construction: Includes Manufacturing, Mining and Quarrying and Construction

Water Supply Industry: Only includes Water Supply Industry (ISIC E, Division 36)

Sewerage: Refers only to Sewerage Industry (ISIC E, Division 37)

Other Industries refers to the following industries;

- Accommodation and Food Service Activities
- Activities of Extraterritorial Organizations and bodies
- Administrative and Support Service Activities
- Arts, Entertainment and Recreation
- Education
- Financial and Insurance Services
- Human Health and Social Work Activities
- Information and Communication
- Other Service Activities
- Professional, Scientific and Technical Activities
- Public Administration and Defence
- Real Estate Activities
- Transportation and Storage
- Waste Management
- Wholesale and Retail Trade; repair of motor vehicles

4. Abbreviations and Acronyms

WST$	Samoan Tala
$m	in million Tala
%	percentage
Act.	Activities
EPC	Electric Power Corporation
Est.	Estimated
FAO	Food and Agriculture Organization of the United Nations
HHs	Households
ISIC Rev.4	International Standard Industrial Classification Revision 4
IRWS	International Recommendations for Water Statistics
IWSA	Independent Water Scheme Association
m^3	cubic metre
ML	megalitres (1,000 cubic metres)
MNRE	Ministry of Natural Resources and Environment
na	not available
PHC	Population and Household Census
SBS	Samoa Bureau of Statistics
SEEA-CF	System of Environmental Economic Accounting Central Framework
SEEA-Water	System of Environmental Economic Accounting for Water
SWA	Samoa Water Authority
UN	United Nations
UN-SIAP	United Nations Statistical Institute for Asia and the Pacific
Vol.	Volume
WAS	Water Account Samoa
``WWTP	Wastewater Treatment Plant

5. Conclusion and Way Forward

Water Account constitute a very powerful tool for improving water management as they provide basic information for the derivation of many water-related statistics and indicators. Water Account Samoa is a statistical compilation of water data and information to produce water aggregates and indicators which are useful for inform policy making pertaining to water management and development in Samoa. With improved availability of water data and information, the water accounts will be very useful in providing more indicators in relation to socio-economic and environmental pillars of Samoa's economy.

There are efforts to further align and integrate the physical supply and use of water with other economic data and the System of National Accounts.

6. Feedback on the Accounts

For more information or any feedback on any issue with the water accounts 2021-22, please don't hesitate to contact;

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7. Acknowledgement

This edition of the Water Account Samoa, for the financial year 2021-22 is a result of a combine effort of our valuable partners and stakeholders with their usual assistance and collaboration by providing the required data and information. On that note, we would like to record our sincere gratitude to our colleagues at SWA, EPC, MNRE and IWSA.

We would also like to acknowledge the technical expertise of Mr.Sokol Vako from the UN-SIAP for his valuable feedback and assistance.

8. Appendices

8.1 Physical Water Supply Table, Samoa 2021-22 (ML)

PHYSICAL SUPPLY TABLE	Industries (by ISIC)							Households	Accumulation	Flows from the Environment	TOTAL SUPPLY
	Agriculture, Forestry & Fishery (ISIC A)	Mining, Quarrying and Manufacturing (ISIC B & C)	Electricity, gas, steam & air conditioning supply (ISIC D)	Water collection, treatment & supply (ISIC 36)	Sewerage (ISIC 37)	Other Industries	**Total Industry**				
1. Sources of Abstracted Water:											
Inland Water Resources										135,129	135,129
Surface water										126,663	126,663
Groundwater										8,466	8,466
Other Water Sources (Rainwater)										1,263	1,263
TOTAL SUPPLY ABSTRACTED WATER										**136,391**	**136,391**
2. Water:											
For distribution				15,809			**15,809**				**15,809**
For own use	1,779	231	104,570	1,263	-	13	**107,855**				**107,855**
3. Wastewater and reused water:											
Total Wastewater	4	1	-	-	3	380	**389**	-			389
of which: wastewater to treatment	4	1	-	-	3	380	**389**	-			389
of which: own treatment	-	-	-	-	-	-	**-**	-			-
TOTAL WASTEWATER AND REUSED WATER	4	1	-	-	3	380	**389**	-			**389**
4. Return flows of water:											
To inland water resources	148	230	104,611	12,731	309	2,106	**120,135**	11,357			131,492
To other sources	-	-	-	-	85	-	**85**	-			85
TOTAL RETURN FLOWS	148	230	104,611	12,731	394	2,106	**120,220**	11,357			**131,576**
of which: losses in distribution	-	-	-	12,731	-	-	**12,731**	-			12,731
5. Evaporation of abstracted water, transpiration and water incorporated into products:											
Evaporation of abstracted water											
Transpiration											
Water incorporated into products	1,779	197	-	-	-	-	1,976	2,839			4,815
TOTAL WATER EVAPORATED, TRANSPIRED AND INCORPORATED INTO PRODUCTS	1,779	197	-	-	-	-	**1,976**	2,839			**4,815**
6. TOTAL SUPPLY	**1,931**	**428**	**104,611**	**28,540**	**397**	**2,486**	**138,394**	**14,196**		**136,391**	**152,589**

Source: Samoa Bureau of Statistics

Note-: Nil or not available

8.2 Physical Water Use Table, Samoa 2021-22 (ML)

PHYSICAL USE TABLE	Industries (by ISIC)							Households	Accumulation	Flows to the Environment	TOTAL USE
	Agriculture, Forestry & Fishery (ISIC A)	Mining & Quarrying & Manufacturing (ISIC B)	Electricity, gas, steam & air conditioning supply (ISIC D)	Water collection, treatment & supply (ISIC 36)	Sewerage (ISIC 37)	Other Industries	**Total Industry**				
1. Sources of Abstracted Water:											
Inland Water Resources	1,779	231	104,570	28,536	-	13	**135,129**				135,129
Surface water	1,779	207	104,570	20,107	-	-	**126,663**				126,663
Groundwater	-	25	-	8,429	-	13	**8,466**				8,466
Other Water Sources (Rainwater)	-	-	-	1,263	-	-	**1,263**				1,263
TOTAL USE ABSTRACTED WATER	1,779	231	104,570	29,799	-	13	**136,391**				**136,391**
2. Water (use):											
Distributed water	152	197	41	4	8	2,474	**2,876**	12,933			**15,809**
Own use of water	1,779	231	104,570	-	-	13	**106,593**	1,263			**107,855**
3. Wastewater and reused water:											
Total Wastewater				-	389	-	**389**				389
of which: wastewater received from other units				-	389		**389**				389
of which: own treatment	-	-	-	-	-	-	-	-			-
TOTAL WASTEWATER AND REUSED WATER	-	-	-	-	389	-	**389**	-			**389**
4. Return flows of water:											
To inland water resources										131,492	131,492
To other sources										85	85
TOTAL RETURN FLOWS										131,576	**131,576**
5. Evaporation of abstracted water, transpiration and water incorporated into products:											
Evaporation of abstracted water										-	-
Transpiration										-	-
Water incorporated into products									4,815		4,815
TOTAL WATER EVAPORATED, TRANSPIRED AND INCORPORATED INTO PRODUCTS									4,815	-	**4,815**
6. TOTAL USE	**1,931**	**428**	**104,611**	**28,540**	**397**	**2,486**	**138,394**	**14,196**	**4,815**	**131,576**	**152,589**

Source: Samoa Bureau of Statistics

Note: -: Nil or not available

8.3 Samoa Water Authority Tariff Rates

Water User	Consumption	Tariff Rates		
		Before July 2019	Effective Jul 2019 (a)	Effective Nov 2021 (b)
Households	**Consumption/Month (m3)**	**$/m³**	**$/m³**	**$/m³**
1	1 to 15	0.50	0.77	0.61
2	15 to 40	1.40	1.67	1.34
3	Morre than 40	1.90	2.17	1.74
Commercials	**Consumption/Month (m3)**	**$/m³**	**$/m³**	**$/m³**
1	Less than 40	1.50	1.77	1.42
2	More than 40	2.00	2.27	1.82
Flat Rate	**Consumer**	**$/month**	**$/month**	**$/month**
1	Residential / Domestic	20.00	20.00	16.50
2	Non-Household / Commercial	32.00	32.00	25.60

Source: Samoa Water Authority

Note:

a. New rates implemented by the authority in 2019
b. 20.0% reduction implemented by government

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