SCOTTISH WATER
Water Industry Commission for Scotland (WICS) ANNUAL RETURN 2023/24

Section A – Population Data

Contents

Section A – Population Data

1 Table A1: Base Information

1.1 Overview

Table A1 provides information on properties and population served by Scottish Water. It includes a breakdown of all measured and unmeasured household and non-household properties served by Scottish Water with the provision of water and/or wastewater services.

The information in this table is used for the tariff and charging purposes.

1.2 Performance Trends

1.2.1 Lines A1.1-A1.5 - Billed Properties Water

Line A1.1 Unmeasured household billed properties - potable water (including exempt)

As in previous years, the reported property counts in Table A are based on September 2023 information as this represents the mid-point of the financial year. The number of unmeasured households billed for water services (including exempt households) is 2,594,051, an increase of 21,774 (0.85%) in the year from September 2022.

The movement in properties registered at the Scottish Assessors Association (SAA) over the same period is 22,650. The difference between the SAA and the AR24 movement is mainly due to a problem with the assessors for the Orkney and Shetland Islands where SAA properties have been overstated by 100 and 600 properties, respectively. This has been raised with the councils and it is understood they are working with the assessors to resolve the issue.

It is worth noting that the increase in the number of billed household properties is not directly comparable to the number of new connections to Scottish Water's network over the same period due to timing differences between properties being connected to Scottish Water services and coming into charge. For example, houses could be connected to the networks well before they are assigned a council tax band, or before they are occupied, and charges would not apply until then.

There are no Unmeasured Household billed properties with non-potable water.

Line A1.2 Measured household billed properties - potable water

The number of measured household properties billed for potable water has increased by thirteen this in AR24, reversing the previous downward trend, with 334 for AR24 compared to 321 in AR23.

Fourteen properties have moved from non-household to household for measured water, mainly due to a tightening of the rules for rating self-catering properties as a consequence of the Scottish Government's Barclay review of non-domestic rates. The changes, effective from 2022/23 but applied retrospectively from April 2023 onwards, mean that self-catering properties which cannot provide evidence of actual letting for at least 70 days in the previous

year and the intention to let for at least 140 days, cannot retain their business rating and are instead council tax banded as households. Excluding these fourteen properties, the underlying movement in **Line A1.2** is a reduction of one (seven new properties offset by eight moving to council tax based unmeasured charges).

There are no measured household billed properties with non-potable water.

Line A1.3a Unmeasured non-household occupied billed properties - potable water (including exempt)
The number of Unmeasured non-household occupied billed properties reported in **Line A1.3a** has increased from 24,267 in AR23 to 25,432 in AR24. This is a 4.8% change which is the result of a greater number of unmeasured gap sites being created in the year than there were disconnections.

The proportion of gap sites which are unmeasured continues to be higher than for the non-household property base due to challenges gaining access to many gap site premises to enable a meter to be installed. The challenges with access tend to arise from difficulties engaging customers at gap site properties given that it will result in the initiation of charges so there is little incentive for them to facilitate the process. Once brought into charge as unmeasured, customers can use the Reassessment Process to request to have a meter installed free of charge.

Line A1.3b Unmeasured non-household vacant billed properties - potable water (including exempt)
The number of unmeasured non-household vacant billed properties **Line A1.3b** has increased from 3,880 in AR23 to 4,417 in AR24. This is an increase of 13.8% and is a result of net movement from occupied to vacant in this category. The majority of the affected Supply Point IDs (SPIDs) are relatively recent gap sites, suggesting that recording the property as vacant has been the conclusion of the Licensed Provider (LP) efforts to identify the occupier to collect charges.

Line A1.4a Measured non-household occupied billed properties - potable water
Line A1.4a has increased from 121,501 in AR23 to 122,034 in AR24. This is not a material change.

There are eleven non-household properties with a non-potable water supply, the consumption for which is reported in **Line A2.22**. These properties are also included in the counts reported in **Lines A1.4a and A1.4b** as all properties also have a potable supply.

Line A1.4b Measured non-household vacant billed properties - potable water
Vacant measured properties decreased by 7.5% from 9,571 in AR23 to 8,853 in AR24. The decrease in properties was due largely to deregistrations and a net movement from vacant to occupied properties in this category. See table Table 1 below.

Table 1: Measured non-household vacant billed properties - potable water (Line A1.4b)

Line A1.4b	Net movement in line A1.4b	Deregistration	Change of service	Occupied to Vacant	Vacant to Occupied	Gaps/New Connections/ Change of Use
Water	-718	-274	-71	1,742	-2,158	43

Line A1.5 Total number of billed properties – potable water

Line A1.5 is a calculated line. The movement is explained in **Lines A1.1 to A1.4b.** It has increased from 2,731,817 in AR23 to 2,755,121 in AR24. This increase is consistent with the marginally increasing trend reported in previous years.

1.2.2 Lines A1.6-A1.10 - Connected Properties Water

Line A1.6 Unmeasured household connected properties

The number of unmeasured households that are connected to the water service (including exempt and vacant dwellings) has increased from 2,626,382 in AR23 to 2,648,215 in AR24, a comparable % increase to **Line A1.1** (unmeasured household billed properties).

Line A1.7 Measured household connected properties

Line A1.7 has increased from 321 in AR23 to 334 in AR24. This is the same movement as for **Line A1.2**, the reasons for which are described above.

Line A1.8 Unmeasured non-household connected properties

Line A1.8 has increased from 28,147 in AR23 to 29,849 in AR24, an increase of 1,702 (6.0%). Table 2 below shows a breakdown into the component movements with the largest being the registration of gap sites.

Line A1.8 is the sum of **Lines A1.3a and A1.3b**. See note in relation to unmeasured gap site properties in **Line A1.3a** above.

Note: There has continued to be a proportionally higher number of unmeasured gap sites created following a change to the Operational Code allowing Scottish Water to register sites where services had been verified but access had not been granted to the premises to enable a meter to be installed, and a subsequent allocation of additional resource to clear historic cases.

Table 2: The movement in Unmeasured Connected Non-Household Properties (Line A1.8).

Removed

Total Removed	Deregistered/ Permanently Disconnected	Remove Unmeasured Service Element	Unmeasured to Measured
1714	1430	1	283

Added

Total Added	Gap Site/ New Connection/ Change of Use	Unmeasured Service Element Added	Measured to Unmeasured
3416	3132	50	234

1702 Net movement

Line A1.9 Measured non-household connected properties

Line A1.9 has decreased slightly from 131,072 in AR23 to 130,887 in AR24, a decrease of 0.1%. The movement in measured Connected Non-Household Properties is broken down in Table 3:

Table 3: Changes to measured Connected Non-Household Properties (Line A1.9)

Removed

Total Removed	Deregistered/ Permanently Disconnected	Remove Unmeasured Service Element	Unmeasured to Measured
1928	1694	0	234

Added

Total Added	Gap Site/ New Connection/ Change of Use	Unmeasured Service Element Added	Measured to Unmeasured
1743	1447	13	283

-185 Net movement

Line A1.10 Total number of connected properties

Line A1.10 is a calculated line, and changes are explained in **Lines A1.6 to A1.9**. This has increased from 2,785,922 in AR23 to 2,809,285 in AR24 following the increasing trend reported in recent years.

1.2.3   Lines A1.11-A1.15 - Billed Properties Foul Sewerage

Line A1.11   Unmeasured household billed properties (including exempt)

The number of unmeasured households billed for wastewater services (including exempt households) has increased by 20,293 (0.8%) to 2,488,382 in AR24.

The movement in properties registered at the SAA over the same period is 22,650. The difference between the SAA and the AR24 movement is mainly due to fewer properties being connected to Scottish Water's sewerage network than to the water network. The largest increases in connected properties in AR24 have been in rural councils which typically have lower numbers connected to the sewerage network, giving a larger difference between the SAA movement and the AR24 movement in properties.

In addition there was a problem with the assessors for Orkney and Shetland Islands causing SAA properties to have been overstated by 100 and 600 properties, respectively. This has been raised with the councils and it is understood they are working with the assessors to resolve the issue.

As detailed in the commentary to **Line A1.1**, the increase in the number of billed household properties is not directly comparable to the number of new connections to Scottish Water's network over the same period due to timing differences between properties being connected to Scottish Water services and coming into charge.

Line A1.12 Measured household billed properties

Measured household billed properties increased from 62 in AR23 to 67 in AR24, against a previous decreasing trend.

Five properties moved from non-household to household for measured wastewater due to changes in legislation for rating self-catering properties (explained further in relation to **Line A1.2** above). There is no net underlying movement (three new properties are offset by three moving to council tax based unmeasured charges).

Line A1.13a Unmeasured non-household occupied billed properties (including exempt)

Unmeasured non-household occupied billed properties increased by 775 (3.8%) from 20,371 in AR23 to 21,146 in AR24, mirroring the increase seen in corresponding **Line A1.3a**. The increase is due to a significant proportion of gap sites being unmeasured for the reasons explained in relation to **Line A1.3a** above. The increase does not exactly match **Line A1.3a** as not all properties connected for water will also be connected to the sewer network.

Line A1.13b Unmeasured non-household vacant billed properties (including exempt)

The number of unmeasured non-household vacant billed properties **Line A1.13b** has increased from 3,505 in AR23 to 3,954 in AR24. This is an increase of 12.8% and is a result of net movement from occupied to vacant in this category and is explained further in relation to **Line A1.3b** above.

Line A1.14a Measured non-household occupied billed properties

Line A1.14a increased from 98,521 in AR23 to 99,104 in AR24. This is not a material increase and mirrors the movement in the corresponding water **Line A1.4a**.

Line A1.14b Measured non-household vacant billed properties

Line A1.14b decreased by 8.5% from 8,462 in AR23 to 7,745 in AR24. The decrease in properties was due largely to deregistrations, and a net movement from vacant to occupied properties in this category. See Table 4 below.

Table 4: Measured non-household vacant billed properties (Line A1.14b)

A1.14b	Net movement in line A1.14b	Deregistration	Change of service	Occupied to Vacant	Vacant to Occupied	Gaps/New Connections/ Change of Use
Sewerage	-717	-186	-123	1,597	-2,052	47

Line A1.15 Total number of billed properties - foul sewerage

Line A1.15 is a calculated line, and changes are explained in **Lines A1.11 to A1.14b**. This has increased from 2,599,010 in AR23 to 2,620,398 in AR24. This change is not material and continues the marginally increasing trend reported since AR18.

1.2.4 Lines A1.16-A1.20 - Connected Properties Foul Sewerage

Line A1.16 Unmeasured household connected properties

Connected household properties for foul sewerage increased by 20,210 to 2,540,395 in AR24. This increase is comparable with the rise in **Line A1.11** (unmeasured household billed properties).

Line A1.17 Measured household connected properties

Line A1.17 increased from 62 in AR23 to 67 in AR24, in line with the increase in the corresponding billed **Line A1.12**.

Line A1.18 Unmeasured non-household connected properties

Line A1.18 has moved from 23,876 in AR23 to 25,100 in AR24, an increase of 1,224 (5.1%). Table 5 below shows a breakdown of the 1,224 net increase into its component movements, with the largest being the registration of gap sites.

Line A1.18 is the sum of **Lines A1.13a and A1.13b**. See note in relation to unmeasured gap site properties in **Line A1.3** above.

Table 5: Changes to Unmeasured Connected Non-Household Properties (Line A1.18)

Removed

Total Removed	Deregistered/ Permanently Disconnected	Remove Unmeasured Service Element	Unmeasured to Measured
1442	997	189	256

Added

Total Added	Gap Site/ New Connection/Change of Use	Unmeasured Service Element Added	Measured to Unmeasured
2666	2295	145	226

1224 Net movement

Line A1.19 Measured non-household connected properties

Line A1.19 has decreased very slightly from 106,983 in AR23 to 106,849 in AR24. A breakdown of the 134 net decrease into its component parts is shown below in Table 6 below.

Table 6: Changes to Measured Connected Non-Household Properties (Line A1.19)

Removed

Total Removed	Deregistered/ Permanently Disconnected	Remove Unmeasured Service Element	Unmeasured to Measured
1513	1135	152	226

Added

Total Added	Gap Site/ New Connection/Change of Use	Unmeasured Service Element Added	Measured to Unmeasured
1379	1013	110	256

-134 Net movement

Line A1.20 Total number of connected properties

Line A1.20 is a calculated line, and changes are explained in **Lines A1.16 to A1.19**. This has increased from 2,651,106 in AR23 to 2,672,411 in AR24 which is an increase of 21,305 properties (0.8%) and continues the marginally increasing trend reported in previous years.

1.2.5 Lines A1.21-A1.27 - Billed Properties Surface Drainage

Line A1.21 Unmeasured household billed properties (including exempt) not billed for surface drainage.

Line A1.21 has remained at 0 in AR24 as all unmeasured household properties are on a bundled waste charge (comprising both foul sewerage and surface drainage).

Line A1.22 Measured household billed properties not billed for surface drainage

Line A1.22 increased slightly from 11 in AR23 to 12 in AR24.

Line A1.23 Unmeasured non-household billed properties not billed for surface drainage

The number of unmeasured non-household premises with a sewerage service that are not charged for surface drainage has increased in net terms by 93 (21.2%) from 438 in AR23 to 531 in AR24 (See Table 7 below). This is predominantly the result of newly created gap sites which are not connected for property drainage.

Note, **Line A1.23** includes exempt properties.

Table 7: Changes to Unmeasured non-household billed properties not billed for surface drainage (A1.23).

Removed	Deregistered/ Permanently Disconnected	Unmeasured Service Element Added
42	41	1

Added	Gap Site/ New Connection/Change of Use	Remove Unmeasured Service Element
130	84	46

5	Properties moved to unmeasured

93	Net Movement

Line A1.24 Measured non-household billed properties not billed for surface drainage

The number of non-household premises with a metered sewerage service which are not charged for surface drainage increased in net terms by 415 (3.9%) from 10,566 in AR23 to 10,981 in AR24. The movement is broken down into its component parts in Table 8 below. The largest component movement is the removal of Property Drainage charges where properties have been identified not to be connected for surface drainage.

Table 8: Changes to Measured non-household billed properties not billed for surface drainage (A1.24)

Removed

Total	Deregistered/ Permanently Disconnected	Unmeasured Service Element Added
244	106	138

Added

Total	Gap Site/ New Connection/Change of Use	Remove Unmeasured Service Element
664	66	598

-5	Properties moved to unmeasured

415	Net movement

Line A1.25 Household properties billed for surface drainage only

The number of Household properties billed for surface drainage only increased by nine, from 331 in AR23 to 340 in AR24. These properties are directly billed by Scottish Water and are typically the residential portion of mixed-use premises with a metered water supply serving both business and residential parts of the property. Water and foul sewerage are billed via a Licensed Provider

Line A1.26a Non-household occupied properties billed for surface drainage only

Non-household occupied properties billed for surface drainage only, increased from 50,895 in AR23 to 51,775 in AR24. The net increase of 880 (1.7%) is largely attributable to change of use (for example, properties being split or sub-divided) and gap sites brought into charge, which is partly offset by deregistrations processed during the year. See Table 9 below.

Line A1.26b Non-household vacant properties billed for surface drainage only

Line A1.26b increased in net terms by 415 from 8,533 in AR23 to 8,948 in AR24. The increase is largely attributable to gap sites brought into charge, which is partly offset by deregistrations processed during the year. See Table 9 below.

Table 9: Changes to Non-household properties billed for surface drainage only (A1.26a (880) and A1.26b (415)) combined

Removed

Total	Deregistered/ Permanently Disconnected	Unmeasured service Added
2,303	2,082	221

Added

Total	Gap Site/ New Connection/Change of Use	Unmeasured service removed
3,598	3,241	357

1,295 New movement

Line A1.27 Total number of billed properties

Line A1.27 is a calculated line, and changes are explained in **Lines A1.21 to A1.26b**. This has increased from 2,647,754 in AR23 to 2,669,937 in AR24.

Lines A1.28-A1.32 Connected Properties Surface Drainage

Line A1.28 Unmeasured household connected properties

Unmeasured household connected properties has increased by 20,210 from 2,520,185 in AR23 to 2,540,395 in AR24. This change corresponds with the increase in unmeasured household properties connected for foul sewerage, as reported in **Line A1.16**, and reflects the bundled waste charge (comprising both foul sewerage and surface drainage) for these customers.

Line A1.29 Measured household connected properties
Line A1.29 increased by twenty-four from 415 in AR23 to 439 in AR24. Half of this change is due to the addition of twelve properties for Kyle of Bute Lodges, with the remaining movement mostly relating to the nine detailed in **Line A1.25**.

Line A1.30 Unmeasured non-household connected properties
Line A1.30 increased in net terms by 2,426 (2.9%) from 82,866 in AR23 to 85,292 in AR24, mainly due to newly created gap sites (See Table 10).

Table 10: Changes to Unmeasured non-household connected properties (A1.30)

Removed	Deregistered/ Permanently Disconnected	Changes to Services	Change to Measured
3,415	3,039	36	340

Added	Gap Site	New & Change of Use	Change to unmeasured
5,841	3,270	2,203	368

2,426   Net Movement

Line A1.31 Measured non-household connected properties
Line A1.31 decreased slightly from 96,417 in AR23 to 95,868 in AR24. This change is not material, and the numbers are consistent with those reported in previous years.

Line A1.32 Total number of connected properties
Line A1.32 is a calculated line, and changes are explained in **Lines A1.28 to A1.31**. This has increased from 2,699,883 in AR23 to 2,721,994 in AR24.

1.2.6 Lines A1.33-A1.36 - Trade Effluent

Line A1.33 Trade Effluent Number of Billed Properties
The number of billed properties has decreased by nineteen from 1,277 in AR23 to 1,258 in AR24.

In previous years, we have forecast using only those properties that were connected at P06 AND P12. For AR24, this has changed to using Discharge Point IDs (DPID) billed/connected in P12.

The forecast number of billed properties has decreased by four from 1,264 in AR23 to 1,260 in AR24. This is the number of properties that were billed in March 2024.

The methodology used in AR23 would have given a forecast number of 1250.

The confidence grade for the report period and forecast remains at A2 and A3, respectively.

Line A1.34 Connected Properties

The number of billed and connected properties has increased from 3,558 to 3,723.

The forecast number of billed and connected properties based on properties that were billed/connected in March 2024 is 3,829.
The methodology used in AR23 would have given a forecast number of 3,657.

The confidence grade for the current and forecast years remains at A2 and A3, respectively.

Line A1.35 Trade Effluent load receiving secondary treatment.

The total BOD load receiving secondary treatment reported has decreased from 12,245t/yr in AR23 to 10,440t/yr in AR24.

The forecast figure is slightly lower at 10,408t/yr.

The methodology used in AR23 would have given a forecast number of 10,401t/yr.

The confidence grade remains at B4. These figures rely on sampling and volumetric data. The latter partially relied upon LP meter readings for the correct volume calculations.

Line A1.36 Trade Effluent load receiving secondary treatment.

The reported total COD load receiving secondary treatment has also decreased from 24,797t/yr to 22,196t/yr. and the forecast is 22,132t/yr.
The methodology used in AR23 would have given a forecast number of 22,116t/yr.

The confidence grade remains at B4 for the same reasons as A1.35.

1.2.7 Lines A1.37-A1.47 - Vacant Charging and Disconnections

Line A1.37 Non-household permanent disconnection

There were 324 non-household permanent disconnections in AR24, down 45 from 369 in AR23.

Line A1.38 Non-household water properties de-registered from the market

The breakdown of deregistration volume by reason, mirroring those listed in Operational Code Form O, is detailed in Table 11 below. The total for wastewater includes supply points with foul sewerage and/or drainage. Those with surface drainage only (i.e., the 'drainage only' column in Table 11) are a subset of the 'wastewater' column.

The higher number of deregistrations due to properties changing to domestic use in 2023/24 relates to the change in legislation for the rating of self-catering properties arising from the Scottish Government's Barclay review of non-domestic rates, as explained in further detail for **Line A1.2** above.

Table 11: Breakdown of deregistration volume (Line A1.38)

De-registered Properties			
Categories	**Water**	**Wastewater**	**Drainage Only**
Bulk (landlord) Meter	78	91	1

Demolished	57	637	484
Domestic	2351	1864	124
Duplicate SPID	50	74	29
Merged Property	205	1000	746
No Drainage	0	141	141
No Sewerage Connection	0	107	0
No Water Connection	313	0	0
Other	392	773	439
Grand Total	**3,446**	**4,687**	**1,964**

Line A1.39 Non-household wastewater properties de-registered from the market
See Table 11 above.

The number of wastewater properties deregistered in AR24 (4,687) has increased by 1,149 compared with AR23 (3,538).

Line A1.40 Non-household drainage only properties de-registered from the market
See Table 11 above.

The number of drainage-only properties deregistered in AR24 (1,964) has increased by 365 compared with AR23 (1,599).

1.2.8 Lines A1.41-A1.43 - Non-household properties under successful temporary transfer to Scottish Water

Line A1.41 Non-household water properties under successful temporary transfer to Scottish Water
The number of non-household properties which transferred to Scottish Water temporarily has increased from 128 in AR23 to 132 in AR24.

Line A1.42 Non-household wastewater properties under successful temporary transfer to Scottish Water
An error was found in the AR23 figure – the correct number of wastewater properties under successful transfer to Scottish Water in AR23 was 137. This was incorrectly stated as 132. This is because drainage-only properties had been excluded.

The number of wastewater properties increased from 137 in AR23 to 148 in AR24.

Line A1.43 Non-household drainage only properties under successful temporary transfer to Scottish Water
Drainage-only properties have increased from 5 in AR23 to 8 in AR24.

Line A1.44 Non-household water properties pending temporary transfer to Scottish Water
There was one SPID application.

Line A1.45 Non-household wastewater properties pending temporary transfer to Scottish Water

There was one SPID application at March 2024.

Line A1.46 Non-household drainage only properties pending temporary transfer to Scottish Water

There are no pending applications.

Line A1.47 Discontinuation of Trade Effluent Services

This has remained at zero, continuing the trend reported since 2017-18.

1.3 Data

Property counts reported in Table A1 are based on the position on 30 September 2023, representing a snapshot of the mid-point of the financial year, consistent with previous Annual Return submissions.

Unmeasured household property numbers are taken from the 30 September 2023 WIC4 Returns submitted by local authorities.

Measured Household numbers have been sourced from Scottish Water's billing system and provide the numbers billed for water, wastewater and drainage as of 30 September 2023.

The confidence grade for household properties remains at B2 for AR24. The unmeasured household data is sourced from local authority corporate systems in multiple formats and once received by Scottish Water it is held on spreadsheets with some minor derivation required to achieve a consistent format across all local authority areas. This derivation is required due to the reporting constraints of some local authority billing systems.

In previous years, the forecast growth for unmeasured households in property numbers has been based on the assumptions within the SR21 Final Determination. Given that we are now halfway through the regulatory period, AR24 forecast growth has been based on the assumptions in the 2024/25 budget which provide a more current view of the likely forward trend.

Growth has been assumed to be 0.75% on the current year, giving an increase of 19,455 unmeasured household billed properties for water for 2024/25, a lower increase than assumed in the SR21 Final Determination (0.9%).

Because it is a very small and distinct population, the measured households forecast continues to be based on average movement over the last two years. This is consistent with previous years.

The Non-household figures are sourced from settlement reports supplied by the Central Market Agency (CMA), using the September 2023 second reconciliation (R2), which was the latest update available at the end of March 2024.

The presence of a meter at the supply point on the 30 September 2022 has been used to categorise the property as "Measured", or "Unmeasured" if there is no meter.

A confidence grade of B3 has been applied to the figures reported in Table A1 for Non-household properties; this remains consistent with AR23. A confidence grade of B3 is used to

reflect the fact that the data is reported from corporate systems but that the ultimate source is external (CMA) systems; and with a reliance on L to maintain some elements of the data.

Further detailed information on how individual cells were calculated, including the components of the calculation, is contained in the assurance report for the A tables.

In previous years, the forecast growth for non-household properties has been based on the assumptions in the SR21 Final Determination. Given that we are now halfway through the regulatory period, AR24 forecast growth has been based on the assumptions in the 2024/25 budget which provide a more current view of the likely forward trend. Growth has been assumed to be 0.41% for non-household properties in 2024/25.

During the AR24 period there have been further initiatives to continue the improvement of the charging data quality for both household and non-household customers. These have included, for non-household, cleansing of meter location data and verification of connectivity records for non-household premises not billed for surface drainage. For household data, progress has been made with Local Authorities in moving towards the provision of disaggregated household premises data which will enable greater validation against Scottish Water network records to improve data quality. A data specification has been developed, enabling software suppliers to the Local Authorities to provide an impact assessment of the necessary development work and a funding case is now being progressed. None of these initiatives have had a material impact on the reported property counts in AR24.

Table 12, below, shows the net occupancy changes to Non-household properties at the CMA, by year, since 2012. As of March 2024, 9.75% of tradable supply points were flagged as vacant; this is an increase from 8.62% in AR23. As set out in the commentary above occupancy changes from occupied to vacant are largely related to gap sites and reflect the large number of gap sites processed between AR22 and AR23 (due to the suspension of gap site registration during COVID-19 and following a change to the Operational Code) as set out in the AR23 commentary.

Once gap sites have been registered in the market, LPs are required to identify the occupier then bill and collect charges. The conclusion of recovery processes can be that the property is now vacant, and that the owner needs to be billed instead, meaning that there is often a lag between the gap site being registered and a vacancy being identified.

Table 12: Net occupancy changes by year since 2013.

Occupancy status changes in 12 months prior to Annual Return data cut	Occupied to Vacant	Vacant to Occupied	Net change in occupied SPIDs
2013-14	23,334	30,722	7,388
2014-15	22,433	19,806	-2,627
2015-16	25,507	22,713	-2,794
2016-17	24,235	26,796	2,561
2017-18	21,855	25,241	3,386
2018-19	14,232	14,805	573
2019-20	13,336	16,670	3,334
2020-21	25,695	12,590	-13,105
2021-22	11,051	17,784	6,733
2022-23	11,292	15,229	3,937

2023-24	17,937	11,969	-5,968

1.3.1 Trade Effluent Data – Lines A1.33, 1.34, 1.35, 1.36, 3.8 and 3.15

As with previous returns, the data has come from the latest CMA reconciliation runs for the relevant periods. Information on connected properties has been sourced from Scottish Water's Microsoft Dynamics Customer Relationship Management system. Analytical data used to calculate effluent loads has come from Scottish Water's corporate Laboratory Information Management System (LIMS).

The methodology used is the same as for AR23 with the exception that we use the P2 invoice for March (CP12) rather than the P1, and forecast numbers are based on the discharge points that existed at CP12 rather than those that existed at both periods CP06 AND CP12. This has had only a modest effect on numbers.

2   Table A2: Population, Volumes and Loads

2.1   Overview

Table A2 provides information on water volumes and the water balance.

Volume figures record the total volume of water, in megalitres per day, delivered to measured and unmeasured household properties and Non-household properties.

A number of the components included in this table, such as per household consumption, meter under-registration or unmeasured Non-household property use, are used to estimate volumes of water delivered.

Water delivered data is used for charging and tariff balance purposes.

2.2   Performance Trends

2.2.1   Lines A2.1-A2.2 - Summary Population Water

The population numbers reported in **Line A2.1** Winter and **Line A2.2** Summer are derived from the latest base population data, adjusted for the latest available Summer and Winter tourist population data.

The base population data is sourced from the National Records for Scotland (NRS) using the latest published sub-national projections data as at 2018 (as detailed in Section 2.3). The population of Scotland is projected to increase by 1.8% over the 10 years 2018 to 2028.

Tourist population data is taken from Visit Scotland Scottish Accommodation Occupancy Survey, based on the year Jan-Dec 2022. Occupancy rates have returned to pre COVID-19 levels as all travel restrictions implemented during this time have now ended.

The lowest tourist population was in January at 72k visitors, and the highest was July with 165k.

The tourist property occupation statistics data as supplied by Visit Scotland are shown in Table 14 below with AR23 data shown in Table 13 for comparison. The figures in the table are a percentage of full occupancy.

Table 13: 2021 - Visit Scotland Occupation statistics – Reported in AR23

Visit Scotland Category	Jan Rm Occ	Feb Rm Occ	Mar Rm Occ	Apr Rm Occ	May Rm Occ	Jun Rm Occ	Jul Rm Occ	Aug Rm Occ	Sep Rm Occ	Oct Rm Occ	Nov Rm Occ	Dec Rm Occ
Guest House & B&B	2%	1%	5%	10%	28%	51%	64%	74%	63%	48%	40%	29%
Hostel	0%	0%	23%	0%	31%	27%	41%	51%	36%	36%	29%	24%
Hotel	15%	10%	8%	21%	48%	65%	64%	75%	75%	40%	58%	33%
Self-catering	3%	2%	3%	5%	43%	42%	52%	53%	47%	50%	24%	27%
Touring	2%	1%	1%	8%	48%	63%	68%	58%	60%	36%	33%	18%

Table 14: 2022 - Visit Scotland Occupation Statistics – Reported in AR24

Visit Scotland Category	Jan Rm Occ	Feb Rm Occ	Mar Rm Occ	Apr Rm Occ	May Rm Occ	Jun Rm Occ	Jul Rm Occ	Aug Rm Occ	Sep Rm Occ	Oct Rm Occ	Nov Rm Occ	Dec Rm Occ
Guest House & B&B	19%	33%	36%	60%	66%	73%	75%	71%	60%	36%	28%	37%
Hostel	13%	28%	39%	54%	59%	58%	62%	68%	57%	50%	40%	42%
Hotel	40%	55%	44%	67%	65%	72%	84%	84%	47%	63%	50%	45%
Self-catering	20%	30%	30%	42%	41%	51%	60%	55%	54%	45%	28%	32%
Touring	23%	28%	24%	37%	38%	40%	55%	54%	50%	8%	18%	13%

Winter Population – Water (Line A2.1) is calculated by summing the Water Resident Population (Unmeasured and Measured Household Water Populations) and the Water Population Not Resident in Households plus the Water Winter transient Tourist Population. The calculation details are included in Table 15 below.

The increase of 68,371 from AR23, is an increase in Household Population (+10,364), as per NRS projections, and an increase in the Winter Tourist Population (+57,325) as the AR23 figure was low as it was based on a period with COVID-19 travel restrictions (Jan-Dec 2021).

Table 15 – Winter Population components

|	Summary - Population – Water	2022-23	2023-24	Movement
	Population of Unmeasured Household properties	5,218,430	5,228,794	10,364
	Winter Tourist Populations - Water	14,654	71,979	57,325
	Population Not in Households - Water	120,349	121,005	656
	Population of Measured Household properties	678	704	26
A2.1	Winter Population - Water	**5,354,111**	**5,422,482**	**68,371**

Summer Population – Water (Line A2.2) is calculated by summing the Water Resident Population (Measured and Unmeasured Household water population,) the Population Not Resident in Households plus the Summer Transient Tourist Population, as shown in Table 16 below.

The movement from AR23 (23k) is an increase in Household Population (+10,364), as per NRS projections and the continued increase in the tourist population (+11,604) following the lifting of COVID-19 travel restrictions as can be seen in Figure 1.

Table 16 – Summer Population components

	Summary - Population – Water	2022-23	2023-24	Movement
	Population of Unmeasured Household properties	5,218,430	5,228,794	10,364
	Summer Tourist Populations - Water	153,379	164,983	11,604
	Population Not in Households - Water	120,349	121,005	656
	Population of Measured Household properties	678	704	26
A2.2	Summer Population - Water	**5,492,836**	**5,515,486**	**22,650**

Figure 1: Tourist Accommodation Occupancy by Month
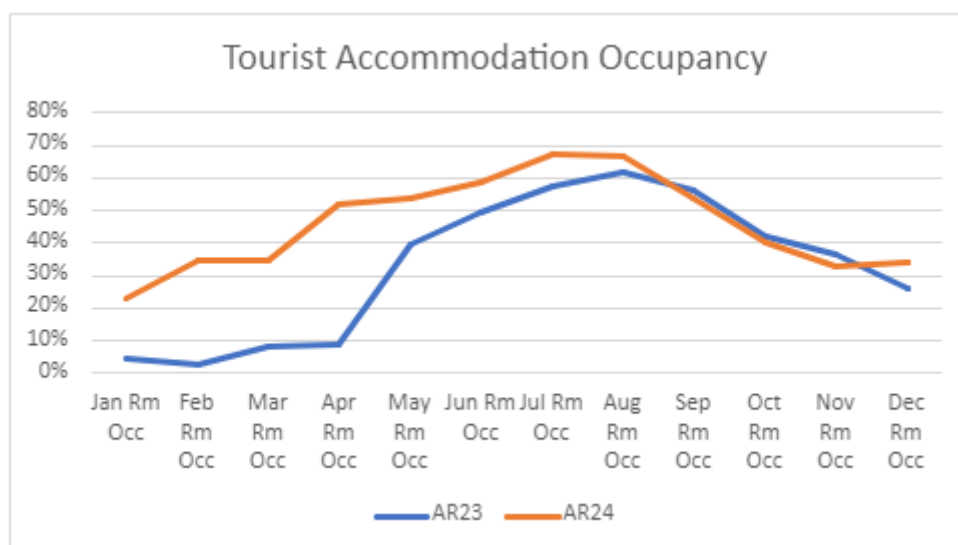
2.2.2 Lines A2.3-A2.5 Household Population Water

Line A2.3 Population of Unmeasured Households with water

This has increased by 10,364 from 5,218,430 in AR23 to 5,228,794 in AR24. This is consistent with the increasing trend seen in recent years. As the population increases the trend is towards smaller Households. People are increasingly living alone or in smaller households.

The ratio of "Dwellings with Water" to "Total Dwellings" (from WIC4 data supplied by the local authorities) is applied to the National Records of Scotland (NRS) Private Household Population to give the "Population of Unmeasured Households with Water" as detailed below. Note, the total in Table 17 does not balance exactly with **Line A2.3** due to rounding as **Line A2.3** is the sum of the individual calculations for each council area.

Table 17: Population of unmeasured households with water.

Dwellings with Water	2,648,214
Total Dwellings	2,721,225
Proportion of Dwellings with Water	97.32%
Private Household population (total number of people living in private households - i.e. excluding communal establishments)	5,371,853
Applying the proportion with Water	97.32%
Population of Unmeasured Households with water	5,227,725

Line A2.4 Population of Measured Households with water

This has increased by 25 from 678 in AR23 to 704 in AR24. This is in line with the increase in the number of unmeasured billed properties, as reported in **Line A1.7**, due to changes in legislation relating to the rating of self-catering properties.

The average Population per Household is calculated from NRS Private Household Populations and NRS Total Households. This average is applied to the number of measured properties for water to give Population in Measured Households with Water.

Line A2.5 Household Population connected to the water service

This calculated field is the sum of **Lines A2.3 and A2.4**. The total connected population has increased from 5,219,110 in AR23 to 5,229,498 in AR24 for the reasons given above.

2.2.3 Lines A2.6-A2.17 Water Balance

Line A2.6 Net distribution input treated water (water put into supply)

AR24 saw a slight increase in Distribution Input (DI) of 2.21MLD (to 1837.73 MLD) from 1835.52 MLD in AR23. Mid-May to mid-June 2023 saw an extended period of hot dry temperatures across all areas of Scotland. The DI rose by c200 Ml/d (10%) during this period. The winter brought a period of cold temperatures from late December through January. An increase in leakage (Line A2.21) which would normally have seen similar increase in DI. However, the extent of the increase in DI was offset by a reduction in Household (Line A2.7) and Non-household (Line A2.10) use.

For AR24, 1.79% of the data was estimated or constant which is down from 2.72% at AR23. This has remained within a range of 1-5% over the past 15 years and is slightly above the fifteen-year average of 2.11%. There was no manually read data for DI (down from 0.73% at AR23 and 1.72% from AR22) with 98.21% based on telemetry data (AR23 96.56%). Seven replacement meters were installed during AR24.

There were no large diameter meter changes during AR24.

Line A2.7 Unmeasured Household volume of water delivered (including losses)

The Household Consumption Monitor estimates this for AR24 as 1059.70 Ml/d. This is down 3.64 Ml/d (0.34%) from AR23 (1,063.34 Ml/d). This is still 6.7% above pre COVID-19 levels of 992.81 Ml/d (AR20); the reduction reflects both the ongoing move towards pre COVID-19 working patterns and, while we did have a period of warm dry weather impacting on DI, the average household increase was not as extreme as the previous year.

Line A2.8 Measured Household volume of water delivered (including losses)

AR24 Measured Household consumption (excluding underground supply pipe leakage) at 0.27 Ml/d is up very slightly on AR23 (+0.02 Ml/d).

Line A2.9 Unmeasured Non-household (NHH) volume of water delivered (including losses)

The volume of water delivered has increased by 1.20 Ml/d to 17.18 Ml/d for AR24. Unmeasured NHH is based on the Rateable Value of the properties. AR24 there were 1,702 more unmeasured NHH than AR23. This explains the majority of the increase, however without more detail we cannot say with certainty that this is the only cause of the increase.

Line A2.10 Measured Non-household volume of water delivered (including losses)

This decreased by 6.74 Ml/d to 359.87 Ml/d during AR24. The decrease was primarily down to a large petrochemical user using around 3 Ml/d less water than the previous year. This decrease at company level follows an increase of 4.83 Ml/d during AR23 due to a return to more normal conditions following COVID-19 restrictions. There were no changes to methodology in the year. It appears that this component of water use is almost back to pre COVID-19 levels.

Line A2.11 Water taken unbilled – legally

This decreased by 3.99 Ml/d to 53.07 Ml/d during AR24 following a 0.26 Ml/d decrease in AR23. This category is made up of nine minor components. The three showing the largest change compared to AR23 are:

- **Legal standpipes** – these have shown a reduction in volume of 2.14 Ml/d going from 21.20 Ml/d to 19.05 Ml/d; total standpipes supplied fell from 2037 (AR23) to 2019 for AR24. The volume of 19Ml/d sits within the range of 17 Ml/d to 23.6 Ml/d reported in the last ten years.

- **Wastewater Treatment Works (WwTW)** – this has reduced by 0.38 Ml/d from 13.16 Ml/d to 12.78 Ml/d due to a decrease in measured volume into those WwTW that are logged and an increase in the Population Equivalent (PE) loads used for extrapolation to non-logged sites. For a sample of WwTW, we take the logged flow volumes and their associated Population Equivalents to generate an average volume of water used per PE. We then multiply that average volume to the PE number of each WwTW owned and operated by Scottish Water.

- **Building Connections -** this has reduced by 1.24 Ml/d from 2.87 Ml/d to 1.63 Ml/d. This volume is calculated using the amount of income generated. There was a change in the billing process for AR24 which has seen a dip in income (and therefore volume), but this is likely to be temporary. There has also been an overall decline in the housing market with a reduction of 11% in the number of houses completed in the 2023 calendar period according to government statistics. The combination of this and the new process has resulted in this year- -on- year reduction.

The other components are all minor changes of less than 0.2 Ml/d. None of the other components have had methodological changes and all are within the variability shown in previous years.

Line A2.12 Water taken unbilled – illegally

As a whole, this has decreased by 0.22 Ml/d to 1.21 Ml/d in AR24. Water taken unbilled illegally is made up of three components:

- **Illegal Standpipe use** (-0.2 Ml/d) - which has reduced in AR24. There were only 30 reports of illegal standpipe use compared to 48 in AR23. The number of reports is multiplied by a standard volume, hence the reduction

- **Hydrant misuse** (+0.003 Ml/d) – which has also reduced for AR24, likely due to the cool and wet end to the summer

- **Void property use** (-0.02 Ml/d)

There were no methodology changes, and all estimated volumes are within the variability witnessed over previous years.

Line A2.13 Water taken unbilled - Distribution System Operational Use (DSOU)

DSOU rose by +0.1 Ml/d from 7.09 Ml/d in AR23 to 7.19 Ml/d in AR24. DSOU is made up of six individual components, the three largest volume changes year on year are:

- Service Reservoir Cleaning (+0.59 Ml/d), which showed a decrease during COVID-19, but this is now returning to pre COVID-19 levels

- The number of water-related customer contacts which have a Water Use Allowance applied, is the second largest change year on year (-0.01 Ml/d)

- Programmed Flushing and Swabbing, with +0.72 Ml/d is the third

There were no methodological changes, and all are within the variability witnessed over the previous years.

The data gathering process for DSOU is monitored centrally to ensure that data returns are received from all related activities and operational areas. We will continue to focus on this process to improve business awareness of the recording method and data requirements.

Line A2.14 Net Consumption (including supply pipe losses)

Net consumption decreased again from AR23 by 13.27 Ml/d from 1,511.76 Ml/d to 1498.49 Ml/d despite an increase in connected properties. We believe this is due to a continued return to pre COVID-19 living and working patterns.

Line A2.15 Distribution losses (including trunk mains and reservoirs)

Distribution losses increased by 15.49 Ml/d from 323.76 Ml/d in AR23 to 339.25 Ml/d in AR24. This is the sum of DI minus Household & Non-household consumption. This is a top-down assessment of water lost during distribution and tends to have more variability than the bottom-up assessment. The reasons for increased distribution losses are described in **Line A2.21**.

Line A2.16 Customer supply pipe losses

This is estimated at 134.03 Ml/d, which is 6.7% higher than the125.59 Ml/d reported in AR23. The explanation for this trend is an increase in losses linked to the summer and winter leakage breakout experienced in June and December.

Line A2.17 Overall water balance

This remained at a confidence grade of B3 for AR24. There were no changes to individual data component confidence grades for AR24.

2.2.4 Lines A2.18-A2.21 - Leakage

Line A2.18 Total Leakage (pre-MLE Adjustment)

Total leakage pre-Maximum Likelihood Estimation (MLE) adjustment increased by 8.14 Ml/d compared to AR23 to 461.84 Ml/d for AR24. This is explained below in **Line A2.22**.

Line A2.19 Water Balance Closing Error

The gap between top-down and bottom-up leakage increased by 18.87 Ml/d to 13.69 Ml/d, which is 0.75% of DI. This is linked to higher summer and winter demand and leakage

experienced in June and December. AR23 the gap was negative at minus 5.18 Ml/d. This widened the gap between top down & bottom-up leakage estimates.

Increased leakage levels in areas upstream of district metered areas were a factor in the widening of the water balance gap in AR24. This area is being reviewed and consideration is being given to the delivery of the required improvements.

Line A2.20 Maximum Likelihood Estimation (MLE) Adjustment

The MLE adjustment for AR24 is 2.26 Ml/d which is an increase from the AR23 value of –0.84 Ml/d. The MLE adjustment changes in relation to the water balance closing error (A2.19). An increased closing error will result in increased MLE adjustment and vice versa. The difference between top down & bottom-up leakage (water balance closing error) increased in AR24 and therefore so did the MLE adjustment. The underlying reason for this increase is a combination of the night use allowances used within the leakage estimation models and an increase in leakage levels upstream of district metered areas.

Line A2.21 Total Leakage (post-MLE Adjustment)

Scottish Water reports MLE leakage of 461.84 Ml/d for AR24 (rounded to 462 in the Performance and Prospects report). This is outwith the target range of 444 Ml/d to 459 Ml/d for AR24. The AR24 leakage value is 8.13 Ml/d higher than the 453.00 Ml/d reported at AR23.

In the following section we outline the reasons why we reported an increase in leakage across the year. See Table 18 for a total leakage post MLE comparison.

Very cold weather between December 2022 and January 2023 – this saw our leakage rate rise in many areas. It is widely accepted that cold weather impacts on ground conditions, water temperature and pipe movement leading to leakage breakout. We recovered well from these events but were impacted by an unseasonably cold period in March 2023 (Figure 2). As a result, we entered AR24 at a higher leakage rate than expected.

An extended warm and dry period then followed from mid-May to late June -this led to increased leakage breakout. Early analysis suggests that larger swings between low and high temperatures across each day have had a negative effect on leakage, probably due to temperature-related ground and pipe movement. The link between temperature changes, ground movement, pipe movement and increased leakage is well established across the water industry. This will become more prominent in the Spring and Summer months in conjunction with future climate change impacts.

Despite committing an additional 10% to 15% of resource in comparison to the previous year it was not possible to suppress the rise in leakage breakout before experiencing a greater than average winter increase. It should be noted that the cumulative repair volume for active leakage management activity was higher in 23/24 than in any of the previous 4 years.

Figure 2 below demonstrates the average temperatures for Scotland in 2022-2023. To the far right of the trend there are periods in December and January where these fell below minus 5 degrees. In specific locations the recorded temperatures were lower. In Glasgow, temperatures fell to minus 11 degrees on the 13 December 2022. As described above it is widely accepted that cold can penetrate well into the ground and cause pipes to contract and move, leading to a rapid increase in leakage. Colder weather can also reduce water temperatures within pipes, leading to similar effects.

Figure 2: 2022-2023 Daily temperature Range:
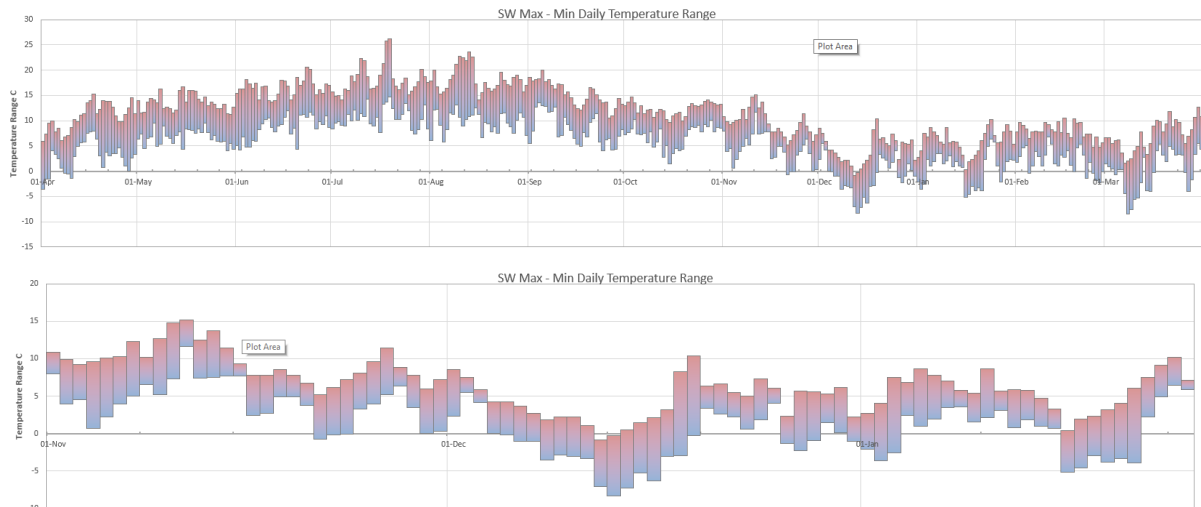
By year-end, the final leakage figure was 462 Ml/d – an increase from 454 Ml/d in 2022/23. This is the first annual increase since 2007, when leakage started being recorded.

We have responded to this increase by creating a Leakage Recovery Mission, chaired by the Customer Services Director. This focus is helping to ensure every role and activity across the business is aligned to deliver the improvement required. We are looking across all areas of our activity and trialling new leakage management approaches to return to our long-term trend of reducing leakage year on year. These include:

- Optimising processes and resources to improve our monitoring and targeting of distribution and upstream losses.

- Developing Trunk Main Area reporting so we can move to a hybrid report using measured and estimated values. This will improve our reported trunk main leakage value and support targeting of reductions.

- Creating a dedicated trunk main Find and Fix Team to improve leakage reduction in this part of the network. The current reconciliation error points to an increase in leakage upstream of the district metered areas and this team will improve that position

- Working with regional contractors to create a distribution find and fix unit that does both activities at the same time. This is aimed at reducing the total time a leak is running and create efficiency in the way the activities are delivered.

- Improving detection techniques and equipment, including electronic listening sticks, correlating noise loggers, sniffer dogs and drones with thermal imaging.

- Embedding our digital acoustic logging process across all areas. This improves conventional acoustic logging processes by identifying areas of interest that would not be offered by the settings logger manufacturers employ. By accessing the raw level and spread sound files we run an algorithm to identify more areas of interest, while minimising false readings. The introduction of this method will provide more areas of interest to be followed up and greater reductions overall.

- Trialling innovative procurement arrangements for leak detection such as FIDO. FIDO is a company which is trying to disrupt the leakage industry and provide greater returns through the use of AI and proprietary acoustic logging devices.

- Further enhancing and optimising our pressure management, a proven technique

for reducing leakage.

Table 18: Total leakage post MLE comparison.

Report Year	Top-Down Leakage (Ml/d)	Bottom-Up Leakage (Ml/d)	MLE Leakage (Ml/d)
AR11	757	693	699
AR12	661	617	629
AR13	617	561	575
AR14	608	553	566
AR15	590	531	544
AR16	531	492	500
AR17	559	480	495
AR18	543	480	492
AR19	472	482	492
AR20	454	467	465
AR21	426	471	463
AR22	431	464	459
AR23	450	455	454
AR24	474	460	462

Line A2.22 Volume of non-potable water delivered

Volume of non-potable water delivered reduced from 15.29Ml/d in AR23 to 14.89 Ml/d in AR24. The decrease is predominantly due to lower consumption at one distillery in the west of Scotland, and at a yeast factory in central Scotland.

2.2.5 Lines A2.23-A2.26 - Water delivered – Components

Line A2.23 Per Household Consumption (Unmeasured Household – excluding supply pipe leakage)

The per Household value for unmeasured properties of 351.63 l/prop/day, excluding underground supply pipe leakage, is down by 2.07% from 359.08 l/prop/day at AR23. This is 1.6% above the pre COVID-19 value of 346.00 l/prop/day at AR20. There was no change of methodology for AR24. There are 134 zones in the Per Household Consumption Monitor which contains 9,422 properties. Each of these properties are representative of one of six socio-economic categories which enables us to extrapolate to the whole of Scotland. There was no substantial change in the proportion of properties across each of the categories. The re-establishment of societal norms in place before COVID-19, alongside cooler summer temperatures, contributed to the fall in Per Household Consumption (PHC).

The socio-economic dataset has been updated and improved. Data supplier CACI launched an updated ACORN dataset during 2024 which they developed from fresh mapping of the Scottish population into one of 7 categories versus 6 in the outgoing product version. As well as having an additional category the revised product has been developed to provide CACI's most accurate picture yet of each household at a postcode level. Scottish Water samples the water consumption of household properties connected to the public water network for the different Acorn categories and extrapolates to the whole connected property base to determine the PHC. This updated data will undergo review and full impact analysis and will be used for reporting the current year, AR25.

Line A2.24 Per Household Consumption (measured household - excluding supply pipe leakage)

The measured Household consumption (excluding supply pipe leakage) at 778.82 l/household/day is 3.8% higher than that of AR23 (750.16 l/household/day).

Within the number of measured households there are a number of larger high consumption customers, largely country properties and farms.

Line A2.25 Meter under-registration (measured Households) (included in water delivered)

Meter under-registration (measured households) (included in water delivered). The estimate of meter under-registration (measured households), is unchanged at 0.01Ml/d.

Line A2.26 Meter under-registration (measured Non-household) (included in water delivered)

The estimate of meter under-registration measured Non-Household at 16.03 Ml/d is 1.78% lower than that of 16.32 Ml/d at AR23. The meter under registration for measured Non-household decreased because it is a fixed percentage of the measured Non-household volume consumed, which decreased as outlined in A2.10.

2.3 Data

The base population data is sourced from the National Records for Scotland (NRS) using the latest published sub-national projections data (data broken down to Local Authority (LA) level).

The Population and Household Projections are usually updated every two years and then accompanied by sub-national population projections and household projections. The national projections based on 2020, published in January 2022, were labelled as 'Interim' to acknowledge uncertainty in the demographic assumptions and the mid-2020 base year due to COVID-19. They did not include sub-national projections. Due to this, we still rely on the NRS 2018-based data for AR24, which is the same data used for AR22 and AR23, as this is the latest data available by LA area.

The projections based on 2023 are expected to be published by the end of 2024, followed by sub-national Population and Household projections in spring/summer 2025.

Three reports are used:

- NRS Population Projections – Projected total population by Scottish Area
- NRS Household Projections – Projected Households by council area
- NRS Household Population Projections – Projected private Household population by council area

In addition, data from the WIC4 return from local authorities is used to determine the ratio of Dwellings with Water to Total Dwellings.

The winter tourist population uses data from Visit Scotland and business classifications from the Address Based Premium (ABP) data set produced by Ordnance Survey. The month with the least winter visitors according to Visit Scotland statistics (January) was chosen.

The Total Population with Water is the sum of four figures, each derived as follows:

Line A2.3 Population of Unmeasured Households with Water:

The ratio of Dwellings with Water to Total Dwellings (from WIC4 data) is applied to the NRS Private Household Population to give the Population in Unmeasured Households with Water.

Line A2.4 Population of Measured Households with Water:

The average Population per Household is calculated from NRS Private Household Populations and NRS Total Households. This average is applied to the number of measured properties for water to give Population in Measured Households with Water.

Population Not in Households with Water - this is taken to be the difference between NRS Total Population and NRS Private Household Population. The ratio of Dwellings with Water to Total Dwellings is then applied to calculate the Population Not in Households with Water.

Winter Tourists with Water - the lowest winter visitor month (January) according to Visit Scotland statistics was used.

Due to the age of the source data (2018), the extrapolation of ratios from the WIC4 report to the population data, and the inclusion of the Winter Tourist Population, the figures are given a confidence grading of B2, consistent with AR23.

There were no major data enhancement projects in AR24 for Household properties. Forecast populations are taken from the NRS projections and ratios applied to the forecast population with water.

3 Table A3: Population, Volumes and Loads Wastewater

3.1 Overview

Table A3 provides information on wastewater related populations, volumes and loads served by Scottish Water.

The change in summary population for wastewater is greatest for the Winter period, showing a 0.98% increase in **Line A3.1**. This increase is mainly due to COVID-19 related travel restrictions during the Winter reporting period used for AR23 (Jan-Dec 2021, based on latest available tourist population data from the Visit Scotland Scottish Accommodation Occupancy Survey at that time), which lowered the occupancy of tourist accommodation. There were no lockdown periods in the Winter reporting period which was used to populate AR24 (Jan-Dec 2022).

3.2 Performance Trends

3.2.1 Lines A3.1-A3.3 - Summary – Population

Line A3.1 Winter

For the Water figures (**Lines A2.1-A2.3**) the base population data is sourced from National Records for Scotland (NRS) using the latest published sub-national projections data. This gives a population increase of 1.8% over the 10 years 2018 to 2028.
Population projections for Scotland are normally published every two years but due to COVID-19 the usual cycles were interrupted. Interim 2020-based projections were published in January 2022 but did not include sub-national population or household projections which contain the detail required by Scottish Water for the annual return. The 2022-based national projections are planned for publication in 2024, with sub-national population and household projections following around five months later.

Tourist population data is taken from the Visit Scotland Scottish Accommodation Occupancy Survey, based on the year Jan-Dec 2022. Occupancy rates have returned to normal levels as all travel restrictions implemented during COVID-19 ended. The month used to measure tourist occupancy was January (52.5k), which is an increase of 40.7k from the COVID-19 impacted AR23 Winter occupancy of 11.7k (based on Visit Scotland data for the period Jan-Dec 2021).

There is also an increase in Population of Unmeasured household properties (8,962) giving an overall increase of 50,272 in **Line A3.1** Winter population – Wastewater as shown in Table 19.

Table 19: Movement in Summary Population – Wastewater – Winter.

	Summary - Population – Wastewater	AR23	AR24	Movement
	Population of unmeasured household properties	5,010,224	5,019,186	8,962
	Population of measured household properties	131	141	10
A3.3	Household Population connected to the Wastewater Service	**5,010,355**	**5,019,327**	**8,972**
	Winter Tourist Populations - Wastewater	11,784	52,480	40,696
	Population Not in Households - Wastewater	116,668	117,272	604
A3.1	Winter Population - Wastewater	**5,138,807**	**5,189,079**	**50,272**

Line A3.2 Summer

The AR24 Summer Population – Wastewater (A3.2) increased by 20,568 from AR23 as shown in Table 20. This is the combined effect of the increase in Household population (+9k), as per NRS projections, and the increase in the Summer Tourist population (+11k).

Table 20: Movement in Summary Population – Wastewater – Summer.

	Summary - Population – Wastewater	AR23	AR24	Movement
	Population of unmeasured household properties	5,010,224	5,019,186	8,962
	Population of measured household properties	131	141	10
A3.3	Household Population connected to the Wastewater Service	**5,010,355**	**5,019,327**	**8,972**
	Summer Tourist Populations - Wastewater	106,244	117,236	10,992
	Population Not in Households - Wastewater	116,668	117,272	604
A3.2	Summer Population - Wastewater	**5,233,267**	**5,253,835**	**20,568**

Line A3.3 Household Population connected to the wastewater service

The value for **Line A3.3** Household Population connected to the Wastewater service increased by 8,972 in AR24 in line with recent years, mirroring the increase seen in the Household Population connected to the water service. It is made up of the population in unmeasured and measured households as detailed in Table 21 below.

Table 21: Movement in Summary Population – Wastewater

	Summary - Population – Wastewater	AR23	AR24	Movement
	Population of unmeasured household properties	5,010,224	5,019,186	8,962
	Population of measured household properties	131	141	10
A3.3	Household Population connected to the Wastewater Service	5,010,355	5,019,327	8,972

3.2.2 Lines A3.4-A3.10 - Sewage Volumes

Line A3.4 Unmeasured household volume (including exempt)

The volume decreased by 1.3% from 859.656 Ml/d in AR23 to 848.568Ml/d in AR24. The reduction is mainly due to the per household water consumption figure used this year of 351.63 litres, compared to 359.08 litres used in AR23. A 95% return to sewer estimation was used in both years.

Line A3.5 Measured household volume

The volume increased from 0.020 Ml/d in AR23 to 0.031 Ml/d in AR24 as recorded by domestic meters.

Line A3.6 Unmeasured Non-household foul volume (including exempt)

The volume increased from 13.220 Ml/d in AR23 to 13.406 Ml/d in AR24. The change has been driven by increases in the number of unmeasured non-household properties resulting from the registration of gap sites as outlined in the commentary for **Line A1.13a**.

Line A3.7 Measured Non-household foul volume

The volume increased from 133.630 Ml/d in AR23 to 136.321 Ml/d in AR24. The top five largest changes are shown by Wastewater Treatment Works (WwTW) catchment in Table 22.

Table 22 - Measured Non-household volume largest increases by WwTW

Plant Nr	WwTW Description	Vol Change
STW000222	DALMARNOCK WWTW NS611627	1.39
STW001986	EDINBURGH PFI WWTW NT286759	0.75
STW001805	HATTON PFI WWTW NO603373	0.50
STW000506	MEADOWHEAD PFI WWTW NS338358	0.25
STW000281	ERSKINE WWTW NS494691	0.16
		3.05

Line A3.8 Trade Effluent (TE) Volume

The average daily TE volume has increased from 66.955Ml/d in AR23 to 77.432Ml/d in AR24.

In previous years, we have forecast using only those properties that were connected at P06 AND P12. For AR24, this has changed to using the DPIDs billed/connected in P12.

The forecast is for this to remain virtually static at 77.522Ml/d.

The main reason for this increase is a reported increase in discharge volume of almost 4M m³ at DPID 15137A. This has been caused by the LP submitting a "bad read" to the CMA leading to the volume being approximately 250% of what is expected.

The forecast volume using the AR23 methodology would have been 77.470Ml/d.

The confidence grades remain at B2 and B4 for the reporting and forecast years, respectively.

Line A3.9 Total volume

As discussed above, this line is a summation of **Lines A3.4 to A3.8.** The overall volume for Sewage has increased from 1,073.481 Ml/d in AR23 to 1,075.758 Ml/d in AR24.

The confidence grade for **Line A3.8** (Report Year + 1) is B4 but given this line contributes approximately 6% of the total we do not believe it has a significant enough effect to change the confidence grade of B3 for Line A3.9 (Report Year + 1). The confidence grades remain at B3 and B4 for the reporting and forecast years, respectively.

Line A3.10 Volume septic tank waste

Septic tank volume is based on movement of tankered waste recorded in the system that supports the management of sludge movement operations, Gemini. As noted, a review of the process was conducted during AR23 which identified previously unreported sites which were included for AR23 and have also been for AR24.

A more detailed review of categories being used to record sludge movement operations was conducted during AR24, with updates to the reporting figures made for the AR24 report. This review has identified some inaccuracies in the recording of the end point for sludge operations, for example the sludge being entered at the sludge treatment facility rather than the treatment works.

The Gemini system and other waste management systems are due to be replaced during SR21, at which point we will take the opportunity to update categories and processes to eliminate the need for offline corrections. This should result in an improvement in the accuracy of septic tank waste at which point we will review the confidence grade for all reportable lines. The volume increased from 117.760 Ml in AR23 to 186.552Ml. As seen in Table 22 the increase in volume reported during AR24 is due to a higher volume of waste being reported at Shieldhall WwTW. The increase at Shieldhall WwTW was mainly due to a higher volume of septic tank sludge. This is due to the inclusion of a previously unreported category. The changes in volume and addition / removals of works which have the greatest impact are shown in Table 23.

Table 23 – Greatest changes in Septic Tank volume at WwTW

Plant Nr	WwTW Description	Change ML	Change Description
STW000547	NEW CUMNOCK WWTW NS622140	0.928	New
STW000710	TOBERMORY WWTW NM488555	0.254	New
STW000719	TROQUEER WWTW 1950 NX971745	0.189	New
STW001985	IRON MILL BAY WWTW 1994 NT061843	0.039	New
STW002389	LOCHFOOT WWTW NX900744	0.021	New
STW000642	SHIELDHALL WWTW NS533659	82.147	Increase
STW000218	DALDOWIE WWTW 1974 NS672622	6.716	Increase
STW001831	LAURENCEKIRK WWTW 1950 NO706721	0.538	Increase
STW003693	NEWTON STEWART WWTW NX424650	0.42	Increase
STW000089	BOWMORE WWTW NR306592	0.222	Increase
STW001712	PERTH CITY WWTW 1971 NO147221	-9.919	Decrease
STW001989	GALASHIELS WWTW NT513351	-4.267	Decrease
STW001975	DALDERSE WWTW 1966 NS903822	-3.829	Decrease
STW001908	LERWICK ROVAHEAD WWTW 2000 HU469448	-3.541	Decrease
STW001543	NIGG WWTW NJ964046	-2.776	Decrease
STW000621	ROTHESAY WWTW 2002 NS100637	-0.058	Removed
STW002331	PORT ELLEN SEP NR372450	-0.035	Removed
STW000480	LOCHMABEN WWTW 1989 NY095817	-0.032	Removed

3.2.3   Lines A3.11-A3.25 - Sewage Load (BOD/yr)

Line A3.11 Unmeasured household load (including exempt)
The load decreased from 109,718.149 t/yr in AR23 to 108,190.313 t/yr in AR24 due to a change in the method used to calculate the load. Septic tank loads are now excluded as instructed in the Water Industry Commission for Scotland (WICS) line definition. In previous years, this was not done. The increase in the population connected to the wastewater network has slightly offset the reduction. The load would have shown a slight increase from the AR23 figure to 109,914 t/yr if septic tanks had been included.

Line A3.12 Measured household load
The load increased from 2.232 t/yr in AR23 to 2.998 t/yr in AR24 due to an increase of five additional measured properties. As with the unmeasured household load, septic tank loads are now excluded as instructed in the WICS line definition. In previous years, this was not

done. The load would have shown a slightly higher increase from the AR23 figure to 3.045 t/yr if septic tanks had been included.

Line A3.13 Unmeasured Non-household foul load (including exempt)
The load decreased from 1,447.071 t/yr in AR23 to 1,434.984 t/yr in AR24. As with the household loads, septic tank loads are now excluded as instructed in the WICS line definition. In previous years, this was not done. The load would have shown an increase from the AR23 figure to 1,468.0 t/yr if septic tanks had been included.

The number of unmeasured non-household properties is assumed to be representative of the total non-households in Scotland and therefore the increase is linked to the increase in volume, the same reason for this is as provided for **Line A3.6.**

A3.14 Measured Non-household foul load
The load increased from 14,632.298 t/yr in AR23 to 14,699.624 t/yr in AR24. The volume and load are intrinsically linked for measured properties therefore the reason for the increase is the same as provided for **Line A3.7**.

As with the household loads, septic tank loads are now excluded as instructed in the WICS line definition. In previous years, this was not done. The load would have shown a greater increase from the AR23 figure to 14,927.1 t/yr if septic tanks had been included.

A3.15 Trade effluent load
The total BOD load discharged to the network has decreased from 12,653.000t/yr in AR23 to 11,434.000t/yr. This is the total load discharged to sewer regardless of whether secondary treatment is provided or not.

The forecast figure is approximately the same at 11,399.000t/yr. The AR23 methodology would have forecast 11,392.000t/yr.

The confidence grades remain at B2 and B4 for the reporting and forecast years, respectively.

A3.16 Total load discharged from primary services
This line is a summation of **Lines A3.11 to A3.15**. The overall load slightly decreased from 138,452.750 t/yr in AR23 to 135,761.919 t/yr in AR24 due to the exclusion of loads at septic tanks this year. The load would also have shown a decrease from the AR23 figure to 137,746.2 t/yr if septic tanks had been included, due to the reduction in the Trade Effluent load.

The confidence grade for **Line A3.12 and Line A3.13** is B4 but given these lines contribute approximately 1% of the total we do not believe it has a significant enough effect to change the confidence grade of B3 for **Line A3.16**. The confidence grades remain at B3 for the reporting and forecast years.

A3.17 Private septic tank load
The load increased from 657.909 t/yr in AR23 to 1184.594 t/yr in AR24 for the same reasons as reported under A3.10.

A3.18 Public septic tank load
The load decreased from 112.593 t/yr in AR23 to 36.017 t/yr in AR24 due to the review of septic tank loads being discharged at works for full treatment as detailed in **Line A3.10**.

A3.19 Other tanker load

The load has increased from 145.673 t/yr in AR23 to 168.564 t/yr in AR24. The greatest changes (positive and negative) are shown in Table 24.

Table 24: Greatest changes in Other Tank loads at WwTW

	BOD t/yr AR23	BOD t/yr AR24	Change
AVONDALE - SHIELDHALL	22.4	47.8	25.3
SEPTIC - SHIELDHALL	24.4	34.2	9.8
SUEZ STONEYHILL - SHIELDHALL	2.9	6.7	3.8
SEPTIC - TROQUEER	1.3	3.4	2.1
SEPTIC - ROVAHEAD	6.1	8.1	2
CATHKIN - SHIELDHALL	2.7	0	-2.7
AUCHENCARROCH - SHIELDHALL	24.8	21.8	-3
SUEZ STONEYHILL - FRASERBURGH	8	3.9	-4.2
ONDEO SLUDGE - SHIELDHALL	7.3	0.1	-7.2
SEPTIC - KINNEIL	9.3	0	-9.3
			16.6

A3.20 Total load entering sewerage system (BOD/yr)

This line is a summation of **Lines A3.16 to A3.19.** Given **Line A3.16** is also a summation in essence this line is a summation of **Lines A3.11 to A3.15 and A3.17 to A3.19**. The overall load decreased from 139,368.925 t/yr in AR23 to 137,151.094 t/yr in AR24. The decrease is mainly due to the reduction in the Trade Effluent load.

The confidence grade for **Line A3.12 and Line A3.13** is B4 but given these lines contribute approximately 1% of the total we do not believe it has a significant enough effect to change the confidence grade of B3 for **Line A3.20**. The confidence grades remain at B3 for the reporting and forecast years.

A3.21 Average COD concentration

There is no change in AR24. Average COD concentration continues to be reported as 350.000mg/l.

A3.22 Average suspended solids concentration

There is no change in AR24. Average suspended solids concentration continues to be reported as 250.000mg/l.

A3.23 Equivalent population served (resident)

There is a slight decrease in population from 6.49 m in AR23 to 6.40 m in AR24. The difference arises from the reduction in the Trade Effluent and the WwTW Sludge components primarily for reasons outlined previously. The figures in the Table 25 below are rounded for clarity, but the totals are calculated using unrounded numbers, therefore the Total PE may not be the sum of of the rows shown.

Table 25: Equivalent Population Served detail.

Description	AR23	AR24	Difference
Unmeasured Household PE	5,009,961	5,018,910	8,949
Measured Household PE	129	139	10
Non Household PE	734,218	748,633	14,415
Trade Effluent PE	572,499	496,557	-75,942
Public ST PE	5,141	1,645	-3,496
Private ST PE	30,041	54,091	24,050
WTW Sludge PE	9,791	24,724	14,933
WwTW Sludge PE	114,672	44,081	-70,591
Other Tanker PE	6,652	7,697	1,045
Return Liquors PE	6,917	6,936	19
Total_PE	**6,490,021**	**6,403,412**	**-86,609**

A3.24 Equivalent population served (resident) (numerical consents)

There is a decrease in population from 6.4 m in AR23 to 6.3 m in AR24. As most WwTW catchments have numerical consents, the reduction is driven by, and in proportion to, the reduction observed in **Line A3.23**. The lower PE is therefore also primarily due to the reduction in the Trade Effluent and the WwTW Sludge components.

A3.25 Total load receiving treatment through PPP treatment works

The load has increased slightly from 52,918.133 t/yr in AR23 to 53,452.721 t/yr in AR24. No additional works came under the operation of Scottish Water during the year therefore the difference is due to increased loads at existing works.

3.2.4 Lines A3.26-A3.28 - Sewage Sludge Treatment and Disposal

The reported mass of wastewater treatment sludge recycled was 118.220ttds in AR24 (compared to 120.200ttds in AR23), of which the majority came from the PPP/PFI works 89.28ttds with the Scottish Water figure equating to 28.940ttds. See Table 26 below.

Table 26: Total sludge disposal for AR23 and AR24.

Line	Description		AR23	AR24	Difference
A3.26	Total sewage sludge disposal	ttds	120.200	118.220	-1.98
A3.27	Total sewage sludge disposal by PPP treatment works	ttds	97.430	89.280	-8.15
	Total sewage sludge disposal by SW (A3.26-A3.27)	ttds	22.770	28.94	6.17

As with previous Annual Return submissions all the Scottish Water figures reported were taken directly from the Scottish Water Corporate Gemini Sludge Management system, and recycling contractors invoice tracker data records, and duty of care documentation. As in previous years we retained the existing confidence grade B4. The confidence grading is due to manual input of data from various sources (i.e., Tanker drivers, 3rd parties), SW is working on a new Waste Management System to replace Gemini and automate data collection and reporting.

The Scottish Water Biosolids Assurance Scheme Certificate of Conformity was awarded on 12th April 2024 and the certificate is valid from 09 June 2024 to 08 June 2025.

A surveillance audit, covering four sites, (Kinneil, Kerse, Perth, Nigg & Invergordon) took place on 25th – 28th March 2024. This comprised of a hybrid audit with three site visits (Kinneil Kerse, Perth & Nigg) as well as a virtual site visit at Invergordon and series of Teams Meetings with Waste Services Team and Scottish Water Scientific. No non-conformances were raised during the audit.

Allanfearn is no longer included in the BAS scope due to current refurbishment of the digesters expected to take 3 years. Nigg is now part of the Scottish Water BAS certification.

3.3 Data

The source data and the methodology used for Wastewater Population is the same as for Water Population, using the ratio of Dwellings with Wastewater to Total Dwellings, from the WIC4 return supplied by the local authorities.

Due to the age of the source data (2018), the extrapolation of ratios from the WIC4 report to the population data, and the inclusion of the Winter Tourist Population, the figures are given a confidence grading of B2, consistent with AR23.

No significant data improvement programmes were undertaken in AR24 for Household properties.

Forecast populations are taken from the NRS projections and ratios applied to the forecast population as described above. These are based on the forecast Dwellings as described in Table A1.

4   Table A4: Population by Local Authority

4.1   Overview

Table A4 provides a breakdown by Local Authority Area of the population figures in **Line A2.1** Water Population – Winter and **Line A3.1** Wastewater Population – Winter. It was first included in the Annual Return for AR22.

4.2   Performance Trends

For details of the movement from AR23 please refer to the commentary above for **Line A2.1** Water Population – Winter and **Line A3.1** Wastewater Population – Winter.

4.3   Data

The source data and the methodology used for Population is the same as for Water Population, **Line A2.1** and Wastewater Population, **Line A3.1**.

As with Water and Wastewater Population (**Lines A2.1 and A3.1**), the figures have been given a confidence grade of B2, consistent with AR23.

No significant data improvement programmes were undertaken in AR24.

The source data and the methodology used for Population is the same as for Water Population, **Line A2.1**. and Wastewater **Line A3.1**. The Winter Tourist numbers used in AR24 are based on the Visit Scotland data for the year Jan-Dec 2022, with the lowest figures for AR24 being from January 2022.

As discussed in the commentary to the A2 tables, the forecast populations are taken from National Records of Scotland projections with the ratio of Dwellings with Water to Total Dwellings applied to give the forecast Population of Unmeasured Households with Water.