



SCOTTISH WATER

Water Industry Commission for Scotland (WICS) ANNUAL RETURN 2022/23

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Section A - Base Information

1 Table A1: Base Information

Overview

Table A1 provides information on properties and population served by Scottish Water. It includes a breakdown of all metered and unmetered 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 Water Delivered unit cost analysis and for tariff and charging purposes.

Performance Trends

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

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

As in all previous years, the reported property counts in Table A are based on September information as this represents the mid-point of the financial year. The number of unmeasured households billed for water services (including exempt households) is 2,572,277, an increase of 17,985 (0.7%) in the year from September 2021.

The movement in properties registered at the Scottish Assessors Association (SAA) over the same period is 25,700. The difference between the SAA and the AR23 movement is mainly due to an anomaly in the data provided by Angus Council (of around 6,000) and reported in AR22. Their report double counted some properties that had moved from a 'No Reduction' category into a 'Reduction' category. This has now been corrected in the data provided for AR23.

It is worth noting that the increase in the number of billed household properties is not directly comparable to the number of new connections due to timing differences between properties being connected to our services and coming into charge. For example, houses could be connected to our networks well before they are assigned a council tax band, or before they are occupied, and charges would not apply until these have taken place.

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

A1.2 Measured household billed properties - potable water

There is a downward trend of Measured household properties billed for potable water continues, with 321 for AR23, compared to 345 in AR22. The decreasing trend is attributable to customers switching to Council Tax-based unmeasured charges, which the customer determines to be more economical for them.

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

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 20,589 in AR22 to 24,267 in AR23. This is a 17.9% change and is the result of unmeasured gap sites being created in the year.

A change to processes 29 and 30 of the Operational Code was approved by the Technical Panel and published in March 2020 to enable Scottish Water to register unmeasured gap sites where services had been verified but access had not been granted to the premises to enable a meter to be installed. Shortly afterwards the registration of gap sites was repeatedly suspended during SW-19 restrictions. In early 2022, additional resources were allocated to reduce the backlog of outstanding gap site requests, including those which could not historically be progressed due to lack of access to install a meter. This change to the Operational Code, and subsequent allocation of additional resource to clear historic cases, has resulted in a significant increase in unmeasured gap sites being registered between AR22 and AR23.

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 decreased from 3,925 in AR22 to 3,880 in AR23. This is not a material change and represents the net effect of properties moving to occupied or metered services.

A1.4a Measured non-household occupied billed properties - potable water

Line A1.4a has increased from 120,800 in AR22 to 121,501 in AR23. This is an increase of 0.6%, predominantly attributable to new connections and gap sites being brought into charge.

There are 11 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.

A1.4b Measured non-household vacant billed properties - potable water

Vacant measured properties increased very slightly by 63 from 9,508 in AR 22 to 9,571 in AR23. The 0.7% increase in properties was the net total effect of properties changing to and from occupied, deregistrations, disconnections, new connections and gap sites being brought into charge.

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 2,709,459 in AR22 to 2,731,817 in AR23. This increase is consistent with the marginally increasing trend reported in previous years.

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

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 2,607,439 in AR22 to 2,626,382 in AR23.

The forecast growth for Unmeasured Households is based on the assumptions within the SR21 Final Determination. For AR24 growth is assumed to be 0.9% on the current year Properties for Water, giving an increase of 23,151 for Unmeasured Household Billed Properties (A1.1) and an increase of 23,637 for Unmeasured Household Connected Properties (A1.6). The Measured Households forecast is based on average movement over the last two years. This is consistent with previous years.

A1.7 Measured household connected properties

Line A1.7 has decreased from 345 in AR22 to 321 in AR23. This is not a material change and continues to follow the decreasing trend reported in previous years as customers switch to Council Tax-based unmeasured charges which they deem to be more economical.

A1.8 Unmeasured non-household connected properties

Line A1.8 has increased from 24,514 in AR22 to 28,147 in AR23, an increase of 14.8%. Table 1 below shows a breakdown of the 3,633 net increase in Line A1.8 from AR22 to AR23 into the component movements with the largest being the registration of gap sites.

A change to processes 29 and 30 of the Operational Code was approved by the Technical Panel and published in March 2020 to enable Scottish Water to register unmeasured gap sites where services had been verified but access had not been granted to the premises to enable a meter to be installed. Shortly afterwards the registration of gap sites was repeatedly suspended during COVID-19 restrictions. In early 2022, additional resources were allocated to reduce the backlog of outstanding gap site requests, including those which could not historically be progressed due to lack of access to install a meter. This change to the Operational Code and subsequent allocation of additional resource to clear historic cases has resulted in a significant increase in unmeasured gap sites being registered between AR22 and AR23.

Table 1: The movement in Unmeasured Connected Non-Household Properties (A1.8).

Removed

Total Removed	Deregistered/ Permanently Disconnected	Remove Unmeasured Service Element	Unmeasured to Measured
1183	891	2	290

Added

Total Added	Gap Site/ New Connection/ Change of Use	Unmeasured Service Element Added	Measured to Unmeasured
4816	4702	22	92

3633	Net movement
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A1.9 Measured non-household connected properties

Line A1.9 has increased from 130,308 in AR22 to 131,072 in AR23. an increase of 0.6%. The movement in measured Connected Non-Household Properties is broken down as follows:

Table 2: Changes to measured Connected Non-Household Properties (A1.9)**Removed**

Total Removed	Deregistered/ Permanently Disconnected	Remove Unmeasured Service Element	Unmeasured to Measured
1658	1560	6	92

Added

Total Added	Gap Site/ New Connection/ Change of Use	Unmeasured Service Element Added	Measured to Unmeasured
2422	2128	4	290

764	Net movement
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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 2,762,606 in AR22 to 2,785,922 in AR23 following the increasing trend reported in recent years and marginally above the previous year's forecast, largely due to the higher number of gap sites processed.

Lines A1.11-A1.15 - Billed Properties Foul Sewerage**A1.11 Unmeasured household billed properties (including exempt)**

Line A1.11 increased by 16,831 (0.7%) to 2,468,089 in AR23.

The movement in properties registered at the Scottish Assessors Association (SAA) over the same period is 25,700. The difference between the SAA and AR23 movement is mainly due to an anomaly in the data provided by Angus Council (of around 6,000) and reported in AR22. Their report double counted some properties that had moved from a 'No Reduction' category into a 'Reduction' category. This has now been corrected in the data provided for AR23.

A1.12 Measured household billed properties

Line A1.12 reduced from seventy-four in AR22 to sixty-two in AR23, in line with the decreasing trend reported since AR18 as customers switch to Council Tax-based unmeasured charges which they deem to be more economical.

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

Unmeasured non-household occupied billed properties increased by 2,779 (15.8%) from 17,592 in AR22 to 20,371 in AR23, mirroring the increase seen in corresponding line A1.3a. The increase is largely related to gap sites created in the year. The increase is not an exact like-for-like increase as not all properties connected for water will also be connected to the sewer network.

A change to processes 29 & 30 of the Operational Code was approved by the Technical Panel and published in March 2020 to enable Scottish Water to register unmeasured gap sites where services had been verified but access had not been granted to the premises to enable a meter to be installed. Shortly afterwards the registration of gap sites was repeatedly suspended during COVID-19 restrictions. In early 2022, additional resources were allocated to reduce the backlog of outstanding gap site requests, including those which could not historically be progressed due to lack of access to install a meter. This change to the Operational Code and the subsequent

allocation of additional resources to clear historic cases has resulted in a significant increase in the registration of unmeasured gap sites between AR22 and AR23.

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

Line A1.13b reduced from 3,551 in AR22 to 3,505 in AR23. This is not a material change and represents the net effect of properties moving to occupied or metered services.

A1.14a Measured non-household occupied billed properties

Line A1.14a increased from 97,946 in AR22 to 98,521 in AR23. This is an increase of 575 (0.6%), predominantly attributable to new connections and gap sites being brought into charge. This increase mirrors the movement in the corresponding water line A1.4a.

A1.14b Measured non-household vacant billed properties

Line A1.14b increased very slightly 8,462 in AR23, this is an increase of 3 on AR22. This is not a material change. The increase in properties was the net total effect of properties changing to and from occupied, deregistrations, disconnections, new connections and gap sites being brought into charge.

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 2,578,880 in AR22 to 2,599,010 in AR23. This change is not material and continues the marginally increasing trend reported since AR18.

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

A1.16 Unmeasured household connected properties

The Connected Household Properties – Wastewater increased by 17,696 to 2,520,185 in AR23. This increase is higher than Billed Household movement (line A1.11), as it includes newly connected properties which are initially vacant and which are, therefore, not included in the number of billed households.

A1.17 Measured household connected properties

Line A1.17 reduced from 74 in AR22 to 62 in AR23. This change continues the marginally decreasing trend reported in previous years due to customers switching to Council Tax-based unmeasured charges, which they determine to be more economical for them. The same reduction can also be seen in the corresponding billed line A1.12.

A1.18 Unmeasured non-household connected properties

Line A1.18 has moved from 21,143 in AR22 to 23,876 in AR23, an increase of 2,733 (12.9%). Table 3 below shows a breakdown of the 2,733 net increase into its component movements with the largest being the registration of gap sites. This increase in unmeasured properties is due to a change in approach to the gap site process which is explained further above in relation to Line A1.13a. As shown in Table 3 below, only a very small proportion of the increase in unmeasured properties in line A1.18 is the result of properties changing from measured (87 out of total 3,739 increase).

Table 3: Changes to Unmeasured Connected Non-Household Properties (A1.18).**Removed**

Total Removed	Deregistered/ Permanently Disconnected	Remove Unmeasured Service Element	Unmeasured to Measured
1006	524	211	271

Added

Total Added	Gap Site/ New Connection/Change of Use	Unmeasured Service Element Added	Measured to Unmeasured
3739	3519	133	87

2733 Net movement
A1.19 Measured non-household connected properties

Line A1.19 has increased from 106,405 in AR21 to 106,983 in AR23. This change is not material and continues the marginally increasing trend reported in previous years. A breakdown of the 578 net increase into its component parts is shown below in Table 4.

Table 4: Changes to Measured Connected Non-Household Properties (A1.19)**Removed**

Total Removed	Deregistered/ Permanently Disconnected	Remove Unmeasured Service Element	Unmeasured to Measured
1322	1012	223	87

Added

Total Added	Gap Site/ New Connection/Change of Use	Unmeasured Service Element Added	Measured to Unmeasured
1900	1530	99	271

578 Net movement
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 2,630,111 in AR22 to 2,651,106 in AR23 which is an increase of 21,374 properties (0.8%) and continues the marginally increasing trend reported in previous years.

Lines A1.21-A1.27 - Billed Properties Surface Drainage**A1.21 Unmeasured household billed properties (including exempt) not billed for surface drainage.**

Line A1.21 has remained at 0 in AR23.

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

Line A1.22 increased slightly from 9 in AR22 to 11 in AR23.

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

The number of non-household premises with an unmeasured sewerage service that are not charged for surface drainage has increased in net terms by 79(22.0%) from 359 in AR22 to 438 in AR23 (see Table 5). This is predominantly the result of newly created gap sites which are not connected for property drainage.

Per previous query, A1.23 includes exempt properties.

Table 5: Changes to Unmeasured non-household billed properties not billed for surface drainage (A1.23).

<u>Removed</u>	<u>Deregistered/ Permanently Disconnected</u>	Unmeasured Service Element Added
<u>50</u>	<u>18</u>	<u>32</u>
<u>Added</u>	<u>Gap Site/ New Connection/Change of Use</u>	Remove Unmeasured Service Element
<u>127</u>	<u>115</u>	<u>12</u>

2 Properties moved to unmeasured

79 Net Movement

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 360(3.5%) from 10,206 in AR22 to 10,566 in AR23. The movement is broken down into its component parts in Table 6 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 6: Changes to Measured non-household billed properties not billed for surface drainage (A1.24)

Removed

Total	Deregistered/ Permanently Disconnected	Unmeasured Service Element Added
223	100	123

Added

Total	Gap Site/ New Connection/Change of Use	Remove Unmeasured Service Element
585	173	412

2 Properties moved to unmeasured

360 Net movement

A1.25 Household properties billed for surface drainage only

It has been identified during the population of AR23 that Line A1.25 has been wrongly reported as zero in previous years. The value for AR23 is 331 and the figure for AR22 should have been 389. 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.

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

Non-household occupied properties billed for surface drainage only, increased from 49,413 in AR22 to 50,895 in AR23. The net increase of 1,482(3.0%) is largely attributable to gap sites brought into charge, which is partly offset by deregistrations processed during the year.

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

Line A1.26b increased in net terms by 192 from 8,341 in AR22 to 8,533 in AR23. The increase is largely attributable to gap sites brought into charge, which is partly offset by deregistrations processed during the year.

Table 7: Changes to Non-household properties billed for surface drainage only (A1.26a (1,482) and A1.26b (192)) combined

Removed

Total	Deregistered/ Permanently Disconnected	Unmeasured service Added
1,865	1,624	241

Added

Total	Gap Site/ New Connection/Change of Use	Unmeasured service removed
3,539	3,103	436

1,674 New movement

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 2,626,060 in AR22 to 2,647,754 in AR23.

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

A1.28 Unmeasured household connected properties

Line A1.28 increased 17,696 from 2,502,489 in AR22 to 2,520,185 in AR23. 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.

A1.29 Measured household connected properties

Line A1.29 decreased from 483 in AR22 to 415 in AR23. This change is larger than usual due to a reduction of 86 properties previously billed for Property Drainage at Raigmore Hospital, following a change in the number of properties at the site listed at the SAA.

A1.30 Unmeasured non-household connected properties

Line A1.30 increased in net terms by 4,328 or 5.5% from 78,538 in AR22 to 82,866 in AR23, mainly due to newly created gap sites (see Table 8). This is largely due to a change in approach to the gap site process as outlined above in relation to Line A1.13a.

Table 8: Changes to Unmeasured non-household connected properties (A1.30)

Removed	Deregistered/ Permanently Disconnected	Changes to Services	Change to Measured
2,518	2,130	7	381

Added	Gap Site	New & Change of Use	Change to unmeasured
6,846	4,971	1,588	287

<u>4,328</u>	Net Movement
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A1.31 Measured non-household connected properties

Line A1.31 increased from 96,199 in AR22 to 96,417 in AR23. This change is not material, and the numbers are consistent with those reported in previous years.

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 2,677,709 in AR22 to 2,699,883 in AR23.

Lines A1.33-A1.36 - Trade Effluent

A1.33 Trade Effluent Number of Billed Properties

The number of billed properties has decreased by 1 to 1,277 for AR23 from 1,278 properties in AR22.

The forecast number of billed properties has decreased by 5 from 1,269 in AR22 to 1,264 for AR23. This is the number of properties that existed at September 2022 that were also billed at March 2023.

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

A1.34 Connected Properties

The number of billed and connected properties has increased from 3,512 to 3,558.

The forecast number of billed and connected properties based on properties that were billed/connected at September 2022 and at March 2023 is 3,501.

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

A1.35 Trade Effluent load receiving secondary treatment.

The total BOD load receiving secondary treatment reported has increased from 11,562T/yr in AR22 to 12,245T/yr in AR23.

The forecast figure is slightly lower at 12,220T/yr.

Part of the observed increase is due to a change in reporting methodology. Historically, negative volumes were included in the calculation. These produced negative loads which depress the overall figure. This year there were 142 Discharge points DPIDs that returned an overall negative volume for AR23. Where a volume is negative, we have treated it as zero, resulting in there being no volume or load for that DPID.

The historical method would have produced a load of 12,109T/yr, a difference of 136T.

The confidence grade remains at B4 these figures rely on sampling and volumetric data, the latter being reliant on Licensed Providers reading meters for the volume calculations to be correct.

A1.36 Trade Effluent load receiving secondary treatment.

The reported total COD load receiving secondary treatment has also increased from 23,816T/yr to 24,797T/yr and the forecast is 24,759T/yr.

Again, part of this increase is down to a change in the methodology. The historical method would have produced a load of 24,268T.

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

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

A1.37 Non-household permanent disconnection

There were 369 non-household permanent disconnections in AR23, down 98 from 467 in AR22. The high number in AR22 was largely due to the clearance of disconnections from AR21 which could not be processed due to COVID-19 access restrictions.

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 9 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 of in Table 9) are a subset of the 'wastewater' column.

Table 9: Breakdown of deregistration volume (A1.38)

De-registered Properties			
Categories	Water	Wastewater	Drainage Only
Bulk (landlord) Meter	131	48	9
Demolished	83	382	254
Domestic	1435	1136	87
Duplicate SPID	67	45	16
Merged Property	258	863	571
No Drainage	0	129	129
No Sewerage Connection	0	136	0
No Water Connection	198	0	0
Other	286	799	533
Grand Total	2458	3538	1599

A1.39 Non-household wastewater properties de-registered from the market

See Table 9 above.

The number of wastewater properties deregistered in AR23 (3,538) has reduced 3,032 compared with AR22 (6,570). AR22 was higher than prior years due to the large number of 'No Drainage' deregistrations related to the introduction of a single combined drainage charge in April 2021.

A1.40 Non-household drainage only properties de-registered from the market

See Table 9 above.

The number of drainage-only properties deregistered in AR23 (1,599) has reduced by 3,252 compared with AR22 (4,851). AR22 was higher than prior years due to the large number of 'No Drainage' deregistrations related to the introduction of a single combined drainage charge in April 2021.

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

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 127 in AR22 to 128 in AR23.

While transitioning to their new billing system during AR23, Business Stream temporarily paused the legal portion of their debt recovery process. This reduced the number of potential cases and applications for temporary transfer.

A1.42 Non-household wastewater properties under successful temporary transfer to Scottish Water

The number of wastewater properties decreased from 134 in AR22 to 132 in AR2 as customers paid the outstanding debt against which the inhibition had been secured on the property.

A1.43 Non-household drainage only properties under successful temporary transfer to Scottish Water

Drainage-only properties have decreased from 7 to 5, as customers paid their outstanding debt.

A1.44 Non-household water properties pending temporary transfer to Scottish Water

The number of applications to the temporary transfer process has declined and there are no pending applications.

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

The number of applications to the temporary transfer process has declined and there are no pending applications.

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

The number of applications to the temporary transfer process has remained the same as in AR22 and there are no pending applications.

A1.47 Discontinuation of Trade Effluent services

This has remained at 0, continuing the trend reported since 2017-18.

Data

Unmeasured household property numbers are taken from the 30 September 2022 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 at 30 September 2022.

The confidence grade for Household Properties remains at B2 for AR23. 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 reporting constraints with some local authority billing systems.

The forecast growth for Unmeasured Households is based on the assumptions within the SR21 Final Determination for AR24 growth is assumed to be 0.9% on the current year Billed Properties for Water, giving an increase of 26,637 for AR24. The Measured Households forecast is 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 2022 second reconciliation (R2), which was the latest update available at the end of March 2023.

The vacancy status, which is used to determine whether the property is 'occupied' or 'vacant,' was sourced from the September settlement report, using the vacancy indicator effective on the 30 September 2022.

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 AR22. 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 Licensed Providers 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.

The SR21 Final Determination assumes 0.75% growth in Non-household revenue which comprises both fixed and volumetric charges. Non-household consumption is on a long-term downward trend so a slightly higher 1% increase in Non-household property numbers has been forecast in the A Tables for AR24.

Over the last year 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, the transfer of address ownership from Licensed Providers to Scottish Water enabling future validation against external data sources and, for Household, pilot work to validate Local Authority billing records against Scottish Water network systems to identify anomalies. None of these initiatives have had a material impact on the reported property counts in AR23.

Table 10, below, shows the net occupancy changes to Non-household properties at the CMA, by year, since 2012. As of March 2023, 8.62% of tradable supply points were flagged as vacant; this

is a further decrease from 9.97% last year as the Wholesale Charge Deferral Scheme, introduced in response to COVID-19, came to an end.

Table 10: Net occupancy changes by year since 2012.

Occupancy status changes in 12 months prior to Annual Return data cut	Occupied to Vacant	Vacant to Occupied	Net change in occupied SPIDs
2012	33,938	27,896	-6,042
2013	23,334	30,722	7,388
2014	22,433	19,806	-2,627
2015	25,507	22,713	-2,794
2016	24,235	26,796	2,561
2017	21,855	25,241	3,386
2018	14,232	14,805	573
2019	13,336	16,670	3,334
2020	25,695	12,590	-13,105
2021	11,051	17,784	6,733
2022	11,292	15,229	3,937

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

As with previous returns, the bulk of 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 LIMS (Laboratory Information Management system).

The methodology used is the same as for AR22, but we now treat negative volumes and loads as if they were zero, as outlined in the commentary for Lines A1.35 and A1.36 above.

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 mega litres per day, which is 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

A2.1 Winter and A2.2 Summer

The population numbers reported in A2.1 winter and 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 2021. The impact of COVID-19 travel restrictions had a significant impact on the winter and early spring tourist numbers reported for 2021, which are used to derive the AR23 values, meaning the AR23 tourist populations may be underestimated. We recognise this anomaly. However, in the absence of an alternative data source and to maintain a consistent approach, we have continued to apply the same methodology as prior years.

The minimum tourist population was in March 2021; however, the minimum meteorological winter month was February with 14.6K. For comparison, the pre-COVID-19 winter population averaged circa 70K.

The maximum 2021 summer tourist month was August with 153.4K, when travel restrictions were eased in Scotland. By comparison, the last reported summer tourist population unaffected by COVID-19 was AR21 (2019 data) where the maximum summer tourist month was 156.2K.

The tourist property occupation statistics data as supplied by Visit Scotland are shown in Table 11 below with comparison to the AR22 highlighting the effect of COVID-19 on these numbers. The figures in the table are a percentage of full occupancy.

Table 11: 2020 - Visit Scotland Occupation statistics – Reported in AR22

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	21%	13%	20%	0%	0%	1%	4%	43%	36%	21%	16%	8%
Hostel	31%	25%	0%	0%	0%	0%	0%	29%	23%	13%	0%	29%
Hotel	53%	44%	35%	0%	1%	1%	15%	53%	53%	38%	26%	19%
Self-catering	24%	29%	19%	5%	3%	4%	19%	51%	45%	39%	11%	4%
Touring	16%	16%	14%	0%	0%	0%	14%	66%	61%	39%	9%	3%

Table 12: 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%

Winter Population – Water (A2.1) is calculated by summing of 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 13 below.

The decrease of 2,403 from AR22, is an increase in Household population (+11,152), as per NRS projections, which is offset by the decrease in the Winter Tourist population (-13,813) which is explained above.

Table 13: Error! Reference source not found..

	Summary - Population – Water	2021-22	2022-23	Movement
	Population of unmeasured household properties	5,207,278	5,218,430	11,152
	Winter Tourist Populations - Water	28,467	14,654	-13,813
	Population Not in Households - Water	120,037	120,349	312
	Population of measured household properties	732	678	-54
A2.1	Winter Population - Water	5,356,514	5,354,111	-2,403

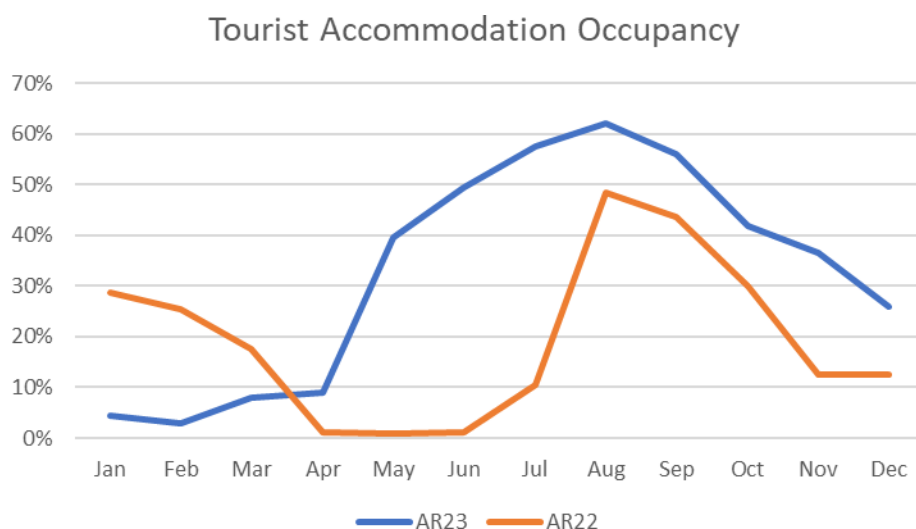
Summer Population – Water (A2.2) is calculated by summing the Water Resident Population (measured and unmeasured household water population,) the Population Not Resident in Households plus the Summer Transient Tourist Population, as shown in Table 14 below.

The movement from AR22 (48k) is mainly due to the increase in the tourist population following the lifting of COVID-19 travel restrictions as can be seen in Figure 1. This shows that for nine months of the AR23 they are greater than the comparable months in AR22.

Table 14: Summary Population – Water – Summer.

Summary - Population – Water		2021-22	2022-23	Movement
	Population of unmeasured household properties	5,207,278	5,218,430	11,152
	Summer Tourist Populations - Water	116,888	153,379	36,491
	Population Not in Households - Water	120,037	120,349	312
	Population of measured household properties	732	678	-54
A2.2	Summer Population - Water	5,444,935	5,492,836	47,901

Figure 1: Tourist Accommodation Occupancy by Month



2.2.2 Lines A2.3-A2.5 Household Population Water

A2.3 Population of unmeasured households with water

The population of unmeasured households with water has increased by 11,152 from 5,207,278 in AR22 to 5,218,430 in AR23. This is consistent with the increasing trend seen in recent years. As the population increases and trends towards smaller households. People are increasingly living alone or in smaller households. More than a third of households are just one person living alone.

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.

Table 15: Population of unmeasured households with water.

Dwellings with Water	2,626,382
Total Dwellings	2,699,484
Proportion of Dwellings with Water	97.3%
Private household population (total number of people living in private households - i.e. excluding communal establishments)	5,362,814
Applying the proportion with Water	97.3%
Population of unmeasured households with water	5,218,430

A2.4 Population of measured households with water

This has reduced by 54 from 732 in AR22 to 678 in AR23 which is consistent with the trend reported in previous years and reflects the movement of household customers switching to Council Tax based charges.

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.

A2.5 Household population connected to the water service

This is a calculated field, being the sum of lines A2.3 and A2.4. The total connected population has increased from 5,208,010 in AR22 to 5,219,108 in AR23 for the reasons given above.

2.2.3 Lines A2.6-A2.17 Water Balance

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

AR23 saw a slight decrease in Distribution Input of -1.43MLD (to 1835.52 MLD) from 1836.95 MLD in AR22. The summer of 2022 saw record breaking temperatures across all areas of the UK. Scotland reported a record temperature of 34.8c on the 19th of July and slightly less intense heat in the second week of August. The extreme temperatures caused a significant increase in domestic and non-domestic water use. The distribution input rose by c150 MI/d (8%) during this period. In contrast the winter brought a period of extremely cold temperatures from mid to late December. Temperatures thereafter rose quickly, and the resulting thaw brought a large increase in bursts on both the public and private network. The Distribution Input increased by over 300ML/d during this time due to the increase in leakage.

For AR23 2.72% of the data was estimated or constant which is down from 3.73% at AR22. This has remained within a range of 1-5% over the past 14 years and is slightly above the fourteen-year average of 2.13%. Manually read data accounts for 0.73% of DI (down from 1.72% at AR22 and 3.63% from AR21) with 96.55% based on telemetry data (AR22 94.55%).

There have been four replacement meters installed during AR23. A change to a regional delivery model resulted in some delays while processes were established in the first half of the year.

There have been no large diameter meter changes during AR23.

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

The Household Consumption Monitor estimates an Unmeasured Household Volume of Water Delivered for AR23 of 1,063.34 MI/d. This is down 14.96 MI/d (1.4%) from AR22 (1,078.3 MI/d). While this is still +7.1% above pre-COVID-19 levels of 992.81 MI/d (AR20) the drop is reflective of an ongoing move towards pre pandemic working patterns. This drop in domestic consumption took place despite the extreme summer temperatures and associated increase in water use. The hot weather lifted domestic consumption by an additional 87 MLD across the month of July compared to July 2019 which saw much lower summer temperatures. But even allowing for periods of extreme hot weather, the unmeasured household volume of water delivered, which peaked during the Pandemic, declined.

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

Measured household consumption (excluding underground supply pipe leakage) at 0.25 MI/d is 4% higher than the 0.24 MI/d reported at AR22. A similar increase was witnessed the previous year when we moved from 0.22 MI/d for AR21 to 0.24 MI/d Reported measured households reduced from 345 in AR22 to 321 in AR23. We believe the increase in consumption is due to the

weather impacts experienced through the year as seen in unmeasured volumes. The measured household volume of 0.25 MI/d is not a significant component of the water balance. The reduction in numbers of measured properties is due to customers determining that it is more cost effective for them to be on an unmetered supply.

A2.9 Unmeasured non-household volume of water delivered (including losses)

This volume of water delivered has increased by 0.73 MI/d to 15.98 MI/d for AR23. This follows the same pattern as measured non-household volumes (A2.10) and is considered to be a return to more normal conditions following COVID-19 restrictions.

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

This increased by 4.83 MI/d to 366.61 MI/d during AR23. The increase follows an increase of 21.2 MI/d during AR22 due to 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-pandemic levels.

A2.11 Water taken unbilled – legally

This decreased by 0.26 MI/d to 57.06 MI/d during AR23 following a 1.14 MI/d decrease in AR22. Water taken unbilled legally is made up of 9 minor components. The three showing the largest change compared to AR22 are:

- **Legal standpipes**, which have shown a reduction of 2.45 MI/d going from 23.64 MI/d to 21.20 MI/d; total standpipes supplied fell from 2243 (AR22) to 2037 for AR23; total volume recorded through those standpipes that are metered fell from 19.36 MI/d (AR22) to 17.55 MI/d for AR23
- **Wastewater Treatment Works** use, which has gone up 2.44 MI/d from 10.72 MI/d to 13.16 MI/d due to an increase in measured volume into those WwTW that are logged and an increase in the PE (population equivalent) loads used for extrapolation to non-logged sites
- **Scottish Water jetting**, which has shown a decrease of 0.39 MI/d from 0.72 MI/d to 0.33 MI/d.

The other components are all very minor changes of less than 0.1 MI/d. None of the components have had any methodology changes and all are within variability shown in previous years.

A2.12 Water taken unbilled – illegally

Water taken unbilled illegally as a whole has decreased by 0.12 MI/d to 1.43 MI/d in AR23. Water taken unbilled illegally is made up from three components, Illegal Stand pipes (-0.06 MI/d), Hydrant misuse (-0.04 MI/d) & Void property use (-0.02 MI/d). There have been no methodology changes, and all are within the variability witnessed over the previous years.

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

DSOU rose by +0.27 MI/d from 6.82 MI/d in AR22 to 7.09 MI/d in AR23. DSOU is made up of 6 individual components, the three largest volume changes year on year are SR Cleaning (+0.52 MI/d), which showed a decrease during the COVID-19 period but this is now returning to pre COVID-19 levels, Customer contacts for water, is the second largest change year on year (-0.20 MI/d) and Programmed flushing and swabbing, with -0.04 MI/d. There have been no methodology changes, and all are within the variability witnessed over the previous years.

A2.14 Net Consumption (including supply pipe losses)

Net consumption decreased again from AR22 by 9.52 MI/d from 1,521.27 MI/d to 1,511.76 MI/d despite an increase in connected properties. We believe this is due to a continued return to pre-COVID-19 living and working patterns.

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

Distribution losses increased by 8.08 MI/d from 315.69 MI/d in AR22 to 323.76 MI/d in AR23. This is the sum of distribution input minus HH & NHH consumption. This is a top-down assessment of water lost during distribution and tends to have more variability than the bottom-up assessment. It can sometimes show an increase when the more accurate bottom-up assessment shows a decrease as it has done this year.

A2.16 Customer supply pipe losses

The estimate of customer supply pipe losses, at 125.59 MI/d, is 8.9% higher than that of 115.24 MI/d at AR22. The explanation for this trend is an increase in losses linked to the winter leakage breakout experienced in December.

A2.17 Overall water balance

The overall water balance remained at a confidence grade of B3 for AR23. There have been no changes to individual data component confidence grades this year.

2.2.4 Lines A2.18-A2.21 - Leakage

A2.18 Total Leakage (pre-MLE Adjustment)

Total leakage pre MLE adjustment fell by 9.38 MI/d compared to AR22 to 454.54 ML/d for AR23. This is explained below.

A2.19 Water Balance Closing Error

The gap between top-down and bottom-up leakage decreased by 27.77 MI/d to –5.21 MI/d, which is –0.28% of DI. This is largely due to an improved methodology for calculating the non-household element of the DMA base minimum night line, which has resulted in increase in estimated non household night use and a decrease in bottom-up leakage. This has closed the gap between top down & bottom-up leakage estimates.

A2.20 MLE Adjustment

The MLE adjustment for AR23 is –0.84 MI/d which is a reduction from the AR22 value of –5.52 MI/d. 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) decreased this year and therefore so did the MLE adjustment.

A2.21 Total Leakage (post-MLE Adjustment)

Scottish Water reports MLE leakage of 453.71 MI/d for AR23 (rounded to 454 in the Performance and Prospects report). This is within the target range of 458ML/d to 443ML/d for AR23. The AR23 leakage value is 4.68 MI/d lower than the 458.39 MI/d reported at AR22 (Table 11).

Following a detailed review with key comparator company, Welsh Water, we identified that the allowances applied for non-household customers water use at night were low. This was adversely affecting the reporting of District Metered Area and total leakage levels. This year we updated our non-household night use allowances in line with this review. This calculation only impacts the bottom-up estimate of leakage as the top-down element continues to use the total metered volume from the corporate meter billing reporting system.

Before the development of our leakage management system, Flowsense, software limitations prevented us changing from five categories of non-domestic property type. These categories used industry averages developed during studies carried out for “managing leakage reports” in 1994. Recognising the importance of achieving the most robust non-domestic night use estimate, we

worked with Welsh Water to map our non-domestic properties to their 15 categories and assessed the volume using Welsh monitored values. The monitored values are taken from specific non-domestic meters to provide a representative position for all properties of similar type.

Working on the basis that the water used at night will be similar despite different geographies we assessed the average billed volume to provide a comparison. With these results we will use the Welsh value where the average billed volume is higher in Scotland and apply a discounted value where it is lower.

This results in a lower weighted average of 15.99l/prop/hr when comparing to the Welsh Water value of 23.9l/prop/hr. Applying the lower weighted average of 15.99l/prop/hr is a conservative step and allows for further improvement when we have specific Scottish night use data. This also results in an improved reconciliation error which highlights that the calculation has improved our overall method of leakage estimation as it brings the bottom-up and top-down estimates closer together.

The improvements also support more effective targeting of active leakage management activities as we have a more robust estimate of night use across all our DMA's.

Further analysis of other companies shows that moving to the value of 15.99 l/prop/hr remains conservative and allows for further improvement in years to come. Table 16 below illustrates this conservative position against anonymised English companies.

Table 16: Total leakage post MLE comparison.

Company	Average NHHNU (l/p/hr)
Scottish Water: Current	8.92
Scottish Water: Proposed	15.99
Welsh Water	23.90
Company A	15.00
Company B	53.04
Company C	30.84
Company D	28.36

During AR23 discussions with our auditor confirmed the need to provide specific Scottish night use values for the different categories. It is recognised that this will take some time to achieve and currently the potential roll out of smart meters to non-domestic customers will be the best route. Should this not happen we will have to consider the development of a non-domestic monitor to provide representative values across the different categories.

Table 17: Total leakage post MLE comparison.

Report Year	Top-Down Leakage (MI/d)	Bottom-Up Leakage (MI/d)	MLE Leakage (MI/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

2.2.5 A2.22 Volume of non-potable water delivered

Volume of non-potable water delivered increased from 12.91MI/d in AR22 to 15.29MI/d in AR23. The increase is predominantly due to 2.4MI/d higher consumption at one distillery in the north of Scotland.

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

A2.23 Per Household Consumption (unmeasured household – excluding supply pipe leakage)

The per household value for unmeasured properties of 359.08 l/prop/day, excluding underground supply pipe leakage, is down by 3.2% from 371.12 l/prop/day at AR22. This is 3.8% above the pre-pandemic value of 346.00 l/prop/day at AR20. There was no change of methodology for AR23. There are 135 zones in the Per Household Consumption Monitor which contains 9,644 properties. Each of these properties is 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 like those in place before the pandemic contributed to the fall in PHC.

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

The measured household consumption at 750.16 l/household/day is 9.62% higher than that of 684.35 l/household/day for AR22. This increase is likely due to the hot weather witnessed during AR22 however due to there being only 321 metered households in Scotland (345 at AR22) we would also expect some volatility in this value.

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

The estimate of meter under-registration (measured households), at 0.011 MI/d is slightly higher than that of 0.010 MI/d at AR22.

A2.26 Meter under-registration (measured non-households) (included in water delivered)

The estimate of meter under-registration measured non-households at 16.32 MI/d is 1.32% higher than that of 16.11 MI/d at AR22.

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 normally published every two years and are followed by sub-national population projections and household projections. The 2020-based national projections, published in January 2022, were classified as 'Interim' to recognise the period of uncertainty in the mid-2020 base year and in setting long-term demographic assumptions following the onset of the COVID-19 pandemic. They were not followed by sub-national projections. Therefore, we continue to use the NRS 2018-based data for AR23, the same data used for AR22, as this is the most recent data split by LA area.

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 lowest winter visitor month according to Visit Scotland statistics (February) was used.

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

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.

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:

Population Not in Households 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 (February) 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 AR22.

No significant data improvement programmes were undertaken this year for Household properties.

Forecast populations are taken from the NRS projections and ratios applied to the forecast population.

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 a 0.7% increase reported in A3.2 Summer. This increase is mainly due to COVID-19 related travel restrictions no longer being in place in Scotland in summer 2021, the year used to derive tourist populations for AR23.

The greatest change in sewage volumes for wastewater is a 124.5% increase reported in A3.10 Volume of septic tank waste. The greatest change in sewage load for wastewater is a 207.5% increase reported in A3.17 Private septic tank load. These increased mainly due to improvements in the reporting process with the inclusion of an additional 20 wastewater treatment works receiving sludge from septic tanks.

The greatest change in sewage sludge treatment and disposal for wastewater is a 7.7% decrease reported in A3.27 Total sewage sludge disposal by PPP treatment works. This decrease is mainly due to the end of two PFI contracts which means the sites are no longer reported as PPP treatment works. The sites which have been adopted by Scottish Water are - Fort William, Allanfeearn, Nigg, Persley, Peterhead and Fraserburgh.

3.2 Performance Trends

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

A3.1 Winter

As for the Water figures (A2.1 – A2.3) the base population data is sourced from the 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.

The impact of COVID-19 restrictions in the first few months of 2021 resulted in a Tourist occupancy of approximately 11.7k, which is half the COVID-19 impacted 2020 lowest winter month, December.

The increase in Population of Unmeasured household properties (10k) is offset by the drop in tourist population (-11k), giving an overall drop of 962 in A3.1 Winter population – Wastewater as shown in Table 18.

Table 18: Movement in Summary Population – Wastewater – Winter.

Summary - Population – Wastewater		AR22	AR23	Movement
	Population of unmeasured household properties	5,000,492	5,010,224	9,732
	Population of measured household properties	157	131	-26
A3.3	Household Population connected to the Wastewater Service	5,000,649	5,010,355	9,706
	Winter Tourist Populations - Wastewater	22,712	11,784	-10,928
	Population Not in Households - Wastewater	116,408	116,668	260
A3.1	Winter Population - Wastewater	5,139,769	5,138,807	-962

A3.2 Summer

The AR23 Summer Population – Wastewater (A3.2) increased by 37,178 from AR22 as shown in Table 19. This is the combined effect of the increase in Household population (+10k), as per NRS projections, and the increase in the Summer Tourist population (+27k) following the relaxation of COVID-19 travel restrictions in summer 2021.

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

Summary - Population – Wastewater		AR22	AR23	Movement
	Population of unmeasured household properties	5,000,492	5,010,224	9,732
	Population of measured household properties	157	131	-26
A3.3	Household Population connected to the Wastewater Service	5,000,649	5,010,355	9,706
	Summer Tourist Populations - Wastewater	79,032	106,244	27,212
	Population Not in Households - Wastewater	116,408	116,668	260
A3.2	Summer Population - Wastewater	5,196,089	5,233,267	37,178

A3.3 Household Population connected to the wastewater service

The value for A3.3 Household Population connected to the Wastewater service increased by 9,706 in AR23 in line with recent years, mirroring the increase in 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 20 below.

Table 20: Movement in Summary Population – Wastewater.

Summary - Population – Wastewater		AR22	AR23	Movement
	Population of unmeasured household properties	5,000,492	5,010,224	9,732
	Population of measured household properties	157	131	-26
A3.3	Household Population connected to the Wastewater Service	5,000,649	5,010,355	9,706

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

A3.4 Unmeasured household volume (including exempt)

The volume decreased by 4.5% from 899.952MI/d in AR22 to 859.656MI/d in AR23. The reduction is mainly due to the per household water consumption figure used this year of 359.08 litres, compared to 378.55 litres used in AR22. A 95% return to sewer estimation was used in both years.

A3.5 Measured household volume

The volume decreased from 0.027MI/d in AR22 to 0.020MI/d in AR23 as recorded by domestic meters.

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

The volume increased from 12.559MI/d in AR22 to 13.220MI/d in AR23. 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.

A3.7 Measured non-household foul volume

The volume increased from 129.669MI/d in AR22 to 133.630MI/d in AR23. The change has been driven by there being fewer COVID-19 lockdown periods compared to AR22 affecting businesses and consumers.

A3.8 Trade Effluent Volume

As noted at A1.35 and A1.36, 142 out of the 1277 DPIDs that existed at P06 returned negative volumes. Historically these negative volumes have been included in the figures to produce the figure for A3.8, but this year, negative volumes have been treated as zero. This means the volume of trade effluent discharged has increased from 61.039MI/d in AR22 to 66.955MI/d.

The forecast is for this to remain virtually static at 66.834I/d. This is calculated by pro-rating the current year's volume, based on the number of DPIDs billed at P06 that were still active at P12.

Using the old methodology, the figures would have been 65.346MI/d for the reporting year and 65.245MI/d for the forecast.

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

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 decreased from 1,103.2MI/d in AR22 to 1,073.5MI/d in AR23. This is solely due to the overriding reduction in the unmeasured household volume (including exempt).

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.

A3.10 Volume septic tank waste

Septic tank volume is based on movement of tankered waste recorded in the Gemini system. The volume has increased from 52.459MI in AR22 to 117.760MI. Following a review of the reporting process in AR23, previously unreported wastewater treatment works that receive sludge from septic tanks were identified, some of which may have received sludge in previous years but had not been included in the total volume reported. The inclusion of these works resulted in a net increase of 20 sites from AR22 and a 125% increase in volume.

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

A3.11 Unmeasured household load (including exempt)

The load slightly increased from 109,504t/yr in AR22 to 109,718t/yr in AR23. This is due to the increase in population of unmeasured household properties, as seen in the calculation for Line

A3.3. The number of measured household properties is not representative of the total households in Scotland hence it is not used to calculate unmeasured household load but rather the population of households is used.

A3.12 Measured household load

The load decreased from 3.149t in AR22 to 2.232t in AR23. The volume and load are intrinsically linked for measured properties therefore the reason for the increase is the same as provided for Line A3.5.

A3.13 Unmeasured non-household foul load (including exempt)

The load increased from 1,375.2t/yr in AR22 to 1,447.1t/yr in AR23. The number of measured 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 14,198.7t/yr in AR22 to 14,632.3t/yr in AR23. 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.

A3.15 Trade effluent load

As with A1.35 and A1.36, negative loads have been treated as zero in this return.

The total BOD load discharged to the network has increased from 12,022t/yr to 12,653t/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 12,629t/yr. (*Old methodology - 12,476t*).

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

Again, these loads include the DPIDs where the volume is negative. If these are excluded, the reporting year load increases to 12,749t and the forecast to 12,619t.

A3.16 Total load discharged from primary services

This line is a summation of **Lines A3.11 to A3.15**. The overall load slightly increased from 137,103.171t/yr in AR22 to 138,452.750t/yr in AR23 given each contributing line increased but the main contributor, A3.11, only slightly increased.

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 affect 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 213.958t/yr in AR22 to 657.909t/yr in AR23 for the same reasons as reported under A3.10.

A3.18 Public septic tank load

The load decreased from 129.279t/yr in AR22 to 112.593t/yr in AR23. Septic tanks are emptied when a customer requests us to do so which leads to variability year on year. Over the last five years load has been between 110.19t/yr to 164.63t/yr therefore we consider this year's 13% reduction as being part of normal variation.

A3.19 Other tanker load

The load has increased from 105.491t/yr in AR22 to 145.673t/yr in AR23. In AR22, the Other Tanker loads were 130.5t/yr rather than the reported 105.5t/yr as a result of some waste suppliers not being identified during manual data calculations. The process has now been improved with new data quality checks. This has resulted in an increase in the post submission AR22 Other Tanker loads BOD from 105.5t/yr to 130.5t/yr. These additional works are listed in Table 21 below.

Table 21: Additional WwTW receiving Other Tanker Loads (A3.19).

Plant Number	Other Tanker
STW000320	SEPTIC - GIRVAN
STW000642	ARMSTRONG - SHIELDHALL
STW000642	AUCHENCARROCH - SHIELDHALL
STW000642	CATHKIN - SHIELDHALL
STW000642	GARLAF - SHIELDHALL
STW000642	SHEWALTON - SHIELDHALL
STW001551	NETHER DALLACHY - FRASERBURGH
STW001551	SUEZ STONEYHILL - FRASERBURGH

Cumnock WwTW received lower loads in AR22 to comply with its licenced pH parameters and this year there were no loads reported.

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 slightly increased from 137,551.899t/yr in AR22 to 139,368.925t/yr in AR23. This slight increase is mainly due to the small increase in unmeasured household load (including exempt) which is the main contributing line to total load entering sewerage system.

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 affect 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 AR23. Average COD concentration continues to be reported as 350mg/l.

A3.22 Average suspended solids concentration

There is no change in AR23. Average suspended solids concentration continues to be reported as 250mg/l.

Table 11: Summary Population – Water - Winter	18
Table 13: Total leakage post MLE comparison	23
Table 14: Total leakage post MLE comparison	24

A3.23 Equivalent population served (resident)

There is a slight increase in population from 6.45m in AR22 to 6.49m in AR23. This increase is caused by the 'return to normal' following COVID-19, and to some extent, in non-household (measured and unmeasured) loads, as described in A3.14. There has also been an increase in the unmeasured household load. Table 17 below details the changes in equivalent population served. The actual figures for population equivalents within the rows of Table 17 are not whole numbers but rather fractions and therefore when summing these the total is affected by rounding error. However, the Total PE in Table 22 is correct.

Table 22: Average Suspended Solids Concentration (A3.23).

Description	AR22	AR23	Difference
Unmeasured_Household_PE	5,000,187	5,009,961	9,774
Measured_Household_PE	158	129	-29
Non_Household	711,138	734,218	23,080
Trade_Effluent_PE_RY	530088	572,499	42411
SumOfPublic_ST_PE	5,903	5,141	-762
SumOfPrivate_ST_PE	9,770	30,041	20,271
SumOfWTW_Sludge_PE	12,737	9,791	-2,946
SumOfWwTW_Sludge_PE	162,424	114,672	-47,752
Other_Tanker_PE	4,817	6,652	1,835
Return_Liquors_PE	11,633	6,917	-4,716
Total_PE	6,448,854	6,490,021	41,167

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

There is an increase in population from 5.6m in AR22 to 6.4m in AR23. The change is a result of the inclusion of Absolute values from SEPA licences being included under the classification of 'Numerical' consents for the first time. SEPA licences are now held in a Power BI report, which requires data to be extracted and joined with population data at catchment, Local Authority and Scottish Water region levels. There has been a period of learning to fully understand the structure of the data in the licence report and the development of the best methods of integration with data held in other systems. The benefits of the new reporting system are now being realised with the identification of data that had been previously missed.

A3.25 Total load receiving treatment through PPP treatment works

The load has decreased from 63,078.295t/yr in AR22 to 52,918.133t/yr in AR23 due to the contract for the operation of Highland and Aberdeen PPP works ending and their operation transferred to Scottish Water during the year. These sites are referenced below (A3.26-A3.28).

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

The reported mass of wastewater treatment sludge recycled was 120.200ttds in AR23 (compared to 119.150ttds in AR22), of which the majority came from the PPP/PFI works 97.43ttds with the Scottish Water figure equating to 22.77ttds.

Table 23: Total sludge disposal for AR22 and AR23.

Line	Description		AR22	AR23	Diff
A3.26	Total sewage sludge disposal	ttds	119.15	120.20	1.05
A3.27	Total sewage sludge disposal by PPP treatment works	ttds	105.57	97.43	-8.14
n/a	<i>Total sewage sludge disposal by SW (A3.26 – A3.27)</i>	<i>ttds</i>	<i>13.58</i>	<i>22.77</i>	<i>9.19</i>

Two PFI contracts came to an end with the assets being incorporated into Scottish Water. Highland PFI (Fort William and Allanfearn) in June 22, and Grampian PFI (Nigg, Persley, Peterhead and Fraserburgh) in October 22.

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 (ie tanker drivers, third parties), Scottish Water 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 08 June 2022 and is valid to 08 June 2023.

A surveillance audit, covering three sites, (Galashiels, Girvan and Troqueer) took place on 25-28 April 2023. This comprised of a hybrid audit with two site visits (Galashiels & Troqueer) as well as virtual desktop audits. No non-conformances were raised during the audit, and the new certificate has been issued which is valid from 09 June 2023 to 08 June 2024.

The two PFI sites that recycle biosolids to agriculture recently returned to Scottish Water - namely Allanfearn and Nigg. These sites are Biosolids Assurance Scheme certified. The certification for both sites is held by Scottish Water Services Grampian. This will be adopted and amalgamated into the Scottish Water certification when their certificate expires on the 22 October 2023.

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 last year.

No significant data improvement programmes were undertaken this year 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 A2.1 Water Population – Winter and A3.1 Wastewater Population – Winter. It was first requested by WICS for AR22

4.2 Performance Trends

For detail of the movement from AR22 please refer to the commentary above for lines A2.1 Water Population – Winter and 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 (A2.1 and A3.1), the figures are given a confidence grading of B2, consistent with last year.

No significant data improvement programmes were undertaken this year.

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 AR23 are based on the Visit Scotland data for the year Jan-Dec 2021. The Winter Tourist Population is usually based on the January figures as this often represents the lowest visitor numbers in the year. This year the lowest figures are those from February 2021. The impact of COVID-19 restrictions in the first few months of 2021 resulted in an occupancy of approximately 11.7k, which is half the COVID-19 impacted 2020 lowest winter month.

As with Water and Wastewater Population, the figures are given a confidence grading of B2, consistent with last year.

No significant data improvement programmes were undertaken this year.

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

Section B – Outputs to Customers

5 Table B1: Restrictions on water use

5.1 Overview

Prior to AR22, the B1 table only reported on % of population affected by hosepipe bans. For the AR22 submission, this was amended to cover the use of Water Shortage Orders (WSOs) rather than Hosepipe Bans, reflecting the current legislation. AR22 was the first year that Scottish Water reported on WSOs as part of the AR submission. Additional reporting lines B1.6 to B1.8 were also added in AR22 to report the number of red drought impacts trigger breaches (B1.6) as well as the number of supply systems monitored / not monitored against drought trigger levels (B1.7 and B1.8).

5.2 Performance Trends

B1.1: Household population connected to the water service

The “Household population connected to the water services” is calculated as outlined in Table 24 below. Please note that these numbers are also reported in Table A2. The reported number is 5,339 (000, rounded from 5,339,457). This does not include the transient tourist population.

The population reported in Line B1.1 also includes ‘population not in households’ (an extra 120,349). This is consistent with the total of zonal populations used in the calculation of SoSI reported in the Table B9.

Table 24: Calculations for household population connected to the water service.

Line description and number	Value
Unmeasured household population (line A2.3)	5,218,430 ²
Measured household population (line A2.4)	678 ¹
Population not in households – Water	120,349
Total	5,339,457

Population not in households 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.

The term ‘population not in households’ describes the estimates of population generally assumed to be currently in prison or hospitals. Section 2.2.2 of the commentary document describing them as ‘Population not in households’ 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.’

AR23 total population has increased by 11,386 (only a 0.21% change) compared to AR22’s total reported population of 5,328,071 - overwhelming majority of the change (11,152) occurring in the Unmeasured household population category.

¹ reported as 0.68 in line A 2.3 due to rounding.

² reported as 5218.43 in line A 2.3 due to rounding.

B1.2: Population affected by ordinary water shortage orders

The definition and requirements for an ordinary Water Shortage Order (WSO) are detailed in Part 7 of the Water Resources (Scotland) Act [2013](#). A WSO is typically likely to entail hosepipe bans or non-essential use bans.

This measure is the sum of the population impacted by WSO in the reporting year. This number is derived from the number of people affected by a WSO; the total for the year being the sum of each discrete WSO. This includes where a WSO may have to be imposed more than once in a WRZ in the year.

Zero ordinary WSOs were imposed in AR23 (same as AR22). Consequently, the confidence grade of AX has been applied (as per WICS AR23 guidance – “The X grade is generally only likely to be appropriate where a zero has been entered”)

B1.3: % Population affected by ordinary water shortage orders

This measure is a calculated line and is the result of **Line B1.2**, the number of people that were subject to WSOs in the year, divided by **Line B1.1**, the total household population reported. The percentage population affected by WSOs this year is zero%.

As there were zero WSOs imposed in AR23, the confidence grade of AX has been applied.

B1.4: Population affected by emergency water shortage orders

The definition and requirements for an emergency Water Shortage Order (eWSO) are detailed in Part 7 of the Water Resources (Scotland) Act 2013. An eWSO may be similar to an ordinary WSO but would be implemented more quickly. An eWSO could also be used to implement cover more significant supply restrictions such as rota-cuts and standpipes.

This measure is the sum of the population impacted by an eWSO in the reporting year. This number is derived from the number of people affected by an eWSO; the total for the year being the sum of each discrete order, including where eWSOs may have to be imposed more than once in a WRZ in the year.

Zero eWSOs were imposed in AR23 (same as AR22), consequently a confidence grade of AX has been applied.

B1.5: % Population affected by emergency water shortage orders

This measure is a calculated line and is the result of **Line B1.4**, the number of people that were subject to eWSOs in the year, divided by **Line B1.1** the total reported household population reported. This is the first year this line has been reported therefore no comparison with previous years can be made.

As there were zero eWSOs imposed in AR23, the confidence grade of AX has been applied.

B1.6: Monitored reservoir sources breaching the drought impacts (red) trigger

The drought impacts trigger levels for any given water supply system are set out in its Drought Plan document. Each supply system will have a different level of drought risk as well as different potential drought plan options which may be required. However, an overview of the different drought impacts trigger levels is provided below in Figure 2

Figure 2: Drought impacts trigger levels.

Normal Operation	Reservoir levels are within normal range for time of year. Assets managed under normal operational regime.
Close Monitoring	Reservoir levels below normal for time of year. Early warning that operational measures may be required if levels continue to drop.
Drought Watch	Action likely to be required to reduce demand on the system, such as network re-zoning or active leakage control. If applicable, prepare applications for fast-track CAR / water shortage orders to request permission to use additional sources or reduce compensation flows. Consider establishing Drought Group (which will further expand if the drought continues into the amber and red phases).
Drought Warning	Submit applications for fast-track CAR variation / water shortage order to allow time to be granted prior to red phase and for planning and construction of augmentation arrangements. Continuing demand reduction measures including targeted customer communications to promote water efficiency (pre-requisite for SEPA fast-track CAR applications).
Drought Impacts	Implement fast-track CAR variation / water shortage order actions such as additional supplies, reduced compensation, reductions or prohibition of non-essential use or third party abstractions. Extended demand restrictions.
Emergency	Widespread drought requiring strategic options. Further details are listed in relevant drought plan or drought contingency plan, or in the absence of these the drought contingency plan framework generic checklists.

There were two zones which entered the red drought impacts trigger level during AR23, detailed in Table 25 below:

Table 25: Zones in red drought impacts trigger level.

System	Duration in Red trigger	Population*
Glendevon WTW	1 week	202,274
Roberton WTW	7 weeks	34,781

** Population based on equivalent WOA-level for each WTW system listed. (For Glendevon this includes both the Glendevon WOA and also Glenfarg & Glendevon WOA.)*

This reporting line was included for the first time in AR22, with four zones entering the red drought impacts trigger level in 2021-22 (Muirdykes, Picketlaw, Stornoway, Tolsta). The lower number of zones entering drought impacts trigger level this year in AR23 is reflective of the different weather conditions experienced in summer 2022 compared to 2021. In 2022, the most significant dry weather was experienced in the South and East of Scotland (e.g. Borders, Fife, East Lothian). In contrast, the dry spring and summer of 2021 mainly affected the West and North of the country and was more widespread and intensive which resulted in the higher number of drought impacts triggers.

5.2.1 Lines B1.7 and B1.8: Total number of supply systems

The reported numbers for these lines are based on a count of the number of water supply systems which are reported internally on a weekly basis in the Water Update Report. This report is used for the monitoring of water resource availability and the communication of potential or on-going drought risk the reporting groups are determined mainly by the configuration and operation of the supply sources, which in turn determines how the drought trigger levels are modelled. As a result, a supply system may be comprised of a single loch / reservoir source feeding a single WTW, or alternatively may be based on the combined storage of multiple reservoirs (e.g. up to five reservoirs in the case of the Glendevon WTW system). These combined systems may feed a single WTW, or in some cases can be used conjunctively to supply multiple WTWs (e.g. Glasgow, Edinburgh and Dundee supply systems). The majority of supply systems (80 out of 86) monitored against drought trigger levels are loch / reservoir storage systems, however, there are also six river sites monitored which are also reported against river flow percentile trigger levels. Four of these river

sites are large river abstraction locations and two are indicator sites for nearby groundwater sources where resource levels are influenced by surface water river levels.

When these additional reporting lines were first introduced in for AR22 and there was insufficient time to agree an appropriate reporting line definition. For AR22 therefore, these lines were listed as the 'total number of reservoir sources monitored against drought triggers. This meant that the reporting line was therefore inconsistent with the reporting in line B1.6 (number of systems entering drought impacts trigger). The line definition has therefore been revised for AR23 so that lines B1.6, B1.7 and B1.8 are consistent and meaningful.

B1.7: Total number of supply systems monitored against drought trigger levels

The total number of supply systems monitored in the AR23 reporting year is 86.000.

For AR22, this line was reported based on an individual count of loch / reservoir sources monitored (116). This equated to 86 supply systems, the same as reported for AR23.

B1.8: Total number of supply systems not monitored against drought trigger levels

The total number of supply systems not monitored in AR23 reporting year is 146.000. This number is based on the number of WTW's which are not included in the weekly water resource monitoring. The supply systems which are not directly reported on each week are mostly river or groundwater source systems where the standard reservoir storage and drought trigger reporting format is not directly applicable. Smaller loch and reservoir systems are also excluded where there is not sufficient monitoring or model availability to enable weekly reporting against drought trigger levels. These additional systems will still be covered by standard surveillance monitoring and checks by our operational staff. It is worth noting that the 146 supply systems not covered in the weekly monitoring report represent 5% of the total population supplied by Scottish Water.

For AR22, this line was reported based on an individual count of loch / reservoir sources monitored (73). However, this excluded the number of river sources and groundwater supply systems.

5.3 Data

5.3.1 Data sources and confidence grades

Data sources and confidence grades are detailed in the Performance Trends section, where relevant.

5.3.2 Data Improvement Programmes

There were no data improvement programmes during AR23.

5.3.3 Assumptions used for forecast data

It is not feasible to forecast AR24 data for lines B1.2 to B1.8. The impact and extent of drought conditions and the subsequent need for water restrictions cannot be reliably forecast from year to year due to it being externally influenced by weather patterns. We do however monitor the situation closely throughout the year and have a range of planning and operational mitigation measures (e.g. drought plans) which are implemented to manage drought risk.

6 Table B2: Pressure and interruptions

6.1 Overview

Table B2 provides information on properties receiving low water pressure and interruptions to supply.

During AR23, customers from 7,657 properties contacted us relating to experiencing low pressure, but these were covered by the allowable exclusions (such as abnormal demand, one-off incidents

etc), being a decrease of 664 (8%) from the 8,321 reported in AR22. After removal of the exclusions, the number of properties below reference level (for definition of reference level see WICS Annual Return Reporting Requirements, Section B - Chapter 2) at end of year (Line B2.3) is 224, a slight increase from the 222 properties reported at the start of the year.

Despite an increase in the reported number of water mains bursts (Line E6.19 increased 15% compared to AR22), the number of properties experiencing interruptions to supply (ITS) reduced across all durations in AR23 compared to that reported in AR22. In AR23 there were no major events which impacted ITS, (the highest property count affected by an Interruption to Supply was 2500 for 2 hours and the highest duration was 11.5 hours for 672 properties) despite the increase in mains bursts due to comparatively colder weather and thaws in December and January during AR23 than during AR22. This can be widely attributed to improved planning and preparation for severe weather events.

6.2 Performance Trends

6.2.1 Lines B2.1-B2.4 – Properties receiving pressure/flow below reference level

The number of properties that have received pressure below the reference level covered by the allowable exclusions has been assessed to be 7,657 (Line B2.4) and it has been derived from the AR23 customer contacts data for pressure and intermittent supply. This represents an 8% decrease of 664 from last year's reported figure of 8,321. It should be noted that not all customer experiencing low pressure will contact Scottish Water about pressure issues. The figures included in lines B2.1 To B2.4 are summarised in Table 26 below.

At the end of AR23 the overall number of low-pressure properties below the reference level (Line B2.3), increased by two properties from 222 in AR22 to 224 in AR23. The increase comprises three properties added due to better information, one added due to asset deterioration and two properties removed due to asset improvements.

During AR23, the 177 properties within 10.5m head of service reservoirs where the required service level cannot be met (Part of Line B2.3) has remained the same as the previous year. The 47 (remainder of Line B2.3) properties reported as the year end figure on the low pressure register and used for OPA scoring has been static throughout the first three quarters of the year with an increase of two properties towards the end of Q3 AR23. This ultimately produced a relatively flat trend line across the year when compared to the rise and fall observed in AR22. During AR24, we expect the number of properties below the reference level for OPA scoring to be within the range of 25 to 40 properties at the year end. Whilst we have projects to remove properties from the register, we also expect new additions.

Table 26: Summary of properties receiving pressure / flow below reference level for AR23.

Line Reference	AR23
Total connected properties (Line B2.1 – BF Line A.10)	2,785,922
Properties receiving low pressure but excluded from line B2.3 (Line B2.4)	7,657
Properties below reference level at start of year (Line B2.2)	222
Properties below reference level at end of year (Line B2.3)	224
Net increase/decrease	+ 2

6.2.2 Lines B2.5-B2.9 - Properties affected by planned interruptions

Table 27: Properties affected by planned interruptions in AR22 and AR23.

Line reference		AR22	AR23	Variance	%
B2.5	Less than 3 hours planned and warned	32756	26421	-6,515	-19.89%
B2.6	More than 3 hours planned and warned	37532	34241	-3,291	-8.76%
B2.7	More than 6 hours planned and warned	3849	6229	2,380	61.83%
B2.8	More than 12 hours planned and warned	0	0	0	0.00%
B2.9	More than 24 hours planned and warned	0	0	0	0.00%

Planned interruptions lasting more than 3 hours in AR23 (Line B2.6) affected 34,241 properties, a reduction of 3,291 (8.76%) from AR22. This was largely driven by improved planning and network control.

Planned interruptions lasting more than 6 hours in AR23 (Line B2.7) affected 6,229 properties, an increase of 2,380 (61.8%) from AR22, also due to increase in Rehab/Mains renewal work recovering from Covid-19. In AR23 Scottish Water spent a total of £41m on MA001 Recurring Customer Interruptions, this was an increase of £21m on AR22. Therefore, the 61.8% increase in planned interruptions is driven by the increased spend in mitigating and addressing repeat customer interruptions.

There were no planned interruptions lasting more than 12 or 24 hours in the last 2 years (Lines B2.8 and B2.9).

6.2.3 Lines B2.10-B2.14 - Properties affected by unplanned interruptions

AR23 saw a reduction in properties experiencing unplanned interruptions to supply across all durations. There were no extreme events (like last year's storms) which caused large scale impact to our network resulting in interruptions to supply. This can be attributed to improved planning and preparation for severe weather events. Performance in this table improved significantly when compared against AR22.

A comparison of the number of properties affected by unplanned interruptions to supply is provided in Table 28 below.

Table 28: Properties affected by unplanned interruptions in AR22 and AR23.

Line reference		AR22	AR23	Variance	%
B2.10	Less than 3 hours unplanned	252943	209640	-43,303	-17.12%
B2.11	More than 3 hours unplanned	114815	92460	-22,355	-19.47%
B2.12	More than 6 hours unplanned	6759	5065	-1,694	-25.06%
B2.13	More than 12 hours unplanned	1626	541	-1,085	-66.73%
B2.14	More than 24 hours unplanned	531	26	-505	-95.10%

6.2.4 Lines B2.15-B2.19 - Interruptions caused by third parties

Overall Interruptions caused by third parties (and outside Scottish Water's control) has increased in AR23 compared to AR22 (Table 29 below).

Table 29: Summary of interruptions to supplies caused by third parties for AR22 and AR23.

Line reference		AR22	AR23	Variance	%
B2.15	Less than 3 hours caused by third parties	8004	9744	1,740	21.74%
B2.16	More than 3 hours caused by third parties	5474	7129	1,655	30.23%
B2.17	More than 6 hours caused by third parties	2133	2347	214	10.03%
B2.18	More than 12 hours caused by third parties	9	120	111	1233.33%
B2.19	More than 24 hours caused by third parties	1	2	1	100.00%

There were 24 more events caused by third party damage when compared to AR22, with a total of 292 events. This has caused an increase in the number of properties which have been affected by interruptions caused by third parties.

6.2.5 Lines B2.20-B2.24 - Unplanned interruptions (overrun of planned interruptions)

There was an increase in the number of events less than three hours in duration overran their planned times this year when compared to AR22. The increase in the number of properties affected can be attributed to one event which was an overrun of a short, planned shut affecting 4,500 properties for less than 3 hours.

The number of properties affected by overruns of more than three hours has reduced, partly due to improved stakeholder communication and network controls. Whilst overruns for more than six hours had a small increase.

A comparison of individual lines for AR22 and AR23 is contained in Table 30 below.

Table 30: Summary of unplanned interruptions (overrun of planned interruptions) for AR22 and AR23.

Line reference		AR22	AR23	Variance	%
B2.20	Less than 3 hours unplanned (overruns of planned interruptions)	670	5180	4,510	673.13%
B2.21	More than 3 hours unplanned (overruns of planned interruptions)	1597	1121	-476	-29.81%
B2.22	More than 6 hours unplanned (overruns of planned interruptions)	45	49	4	8.89%
B2.23	More than 12 hours unplanned (overruns of planned interruptions)	10	0	-10	-100.00%
B2.24	More than 24 hours unplanned (overruns of planned interruptions)	1	0	-1	-100.00%

Line B2.25 - Average supply interruption greater than three hours (minutes per property)

Table 31: Average supply interruption greater than three hours (minutes per property) for AR22 and AR23.

Line reference		AR22	AR23	Variance	%
B2.25	Average supply interruption greater than three hours (mins per prop)	16.55	14	-2	-14.32%

Average supply interruption greater than 3 hours (minutes per property) was 14.18 mins/property which is 14 minutes 10 seconds per property (**Line B2.25**) compared with 16.55 mins/property in AR22. This decrease can be attributed to a reduction in significant ITS events driven by weather events against the previous year.

6.2.6 Lines B2.26-B2.29 - Total weighted properties for OPA

As explained in the commentary for B2.10 - B2.14, there was an overall decrease in properties experiencing unplanned interruptions to supply this reporting year. This can be attributed to improved planning and preparation for the impact of severe weather events in addition to improved planning and network control in regard to all ITS events.

A comparison of total weighted properties for OPA for AR23 is provided in Table 32 below and shows an overall decrease.

Table 32: Total weighted properties for OPA for AR22 and AR23.

Line reference		AR22	AR23	Variance	%
B2.26	Total number of properties restored > 6 hours	6804	5114	-1690	-25%
B2.27	Total number of properties restored > 12 hours	1636	541	-1095	-67%
B2.28	Total number of properties restored > 24 hours	532	26	-506	-95%
B2.29	Total weighted properties for OPA (>6 hours)	9504	5707	-3,797	-40%

It should be noted the weighting has only been applied to Line B2.29.

Table 33: Calculations applied for total weighted properties.

Line ref	Description		OPA weight
B2.26	Total number of properties restored > 6 hours	B2.12+B2.22	1
B2.27	Total number of properties restored > 12 hours	B2.13+B2.23	2
B2.28	Total number of properties restored > 24 hours	B2.14 + B2.24	4
B2.29	Total weighted properties for OPA (>6 hours)	1*(B2.26 - B2.27)+2*(B2.27-B2.28)+4*(B2.28)	

B2.30 Total minutes lost per property

Total minutes lost per connected property for all interruptions but excluding those caused by a Third Party.

Table 34: Total minutes lost per property for AR22 and AR23.

Line reference		AR22	AR23	Variance	%
B2.30	Total minutes lost per property	25.58	22.13	-3.45	-13%

There is a reduction in the total minutes lost per property for all durations of 3 minutes 27 seconds per property.

B2.31 Total properties impacted by interruptions to supply

The total properties impacted for all interruptions but excluding those caused by a Third Party.

Table 35: Total properties impacted by interruptions to supply for AR22 and AR23.

Line reference		AR22	AR23	Variance	%
B2.31	Total properties impacted by interruptions to supply	440207	369063	-71,444	-16%

71,144 fewer properties were impacted by an ITS event in AR23. Comparing to AR22 we have seen a reduction in the total number of unplanned ITS events across all durations, with 801 less unplanned ITS events when comparing to AR22.

B2.32 Number of incidents that trigger a warning/alert

The total number of events that triggered an alert and resulted in an interruption to supply.

Table 36: Number of incidents that trigger a warning / alert for AR22 and AR23.

Line reference		AR22	AR23	Variance	%
B2.32	Number of incidents that trigger a warning/alert	67	90	+23	34%

AR23 has seen a rise in the number of events which have triggered an alert and had an interruption to supply.

This means that more events have met the criteria set out in the SHOUT process, which then triggers an alert. The process sets out criteria whereby any event with the potential to meet or exceed the criteria triggers an alert. The criteria are shown in the table below.

Table 37: SHOUT process alert triggers.

Type of Incident	AMBER	RED
WATER SUPPLY		
No water for greater than 3 hours	400 to 6000 Properties	Greater than 6000 Properties
No water for greater than 6 hours	150 to 3000 Properties	Greater than 3000 Properties
No water for greater than 12 hours	1 to 3000 Properties	Greater than 3000 Properties

6.3 Investment

6.3.1 Low pressure

We continue to mature our Poor (Low) Pressure Management Approach (MA070). Our promotion Policy Criteria covers a two-tiered approach:

1. Properties where we are unable to provide 1 bar pressure at the property boundary and are included on the Low-Pressure Register (LPR).
2. Properties with a measured pressure between above 1 bar, but below 1.5 bar and with three or more contacts per annum or five or more times in three years.

We have investigated all properties that were on the LPR prior to SR21, along with improvements to the process for investigating new properties for addition onto the LPR. We have committed £310k so far in SR21 to deliver five capital projects to remove eleven properties from the LPR. A further £460k has been committed to date on projects delivering the planned work required for the interventions to remove a further 25 low pressure properties captured on the LPR. We have also committed an investment of £620k in the promotion of 13 projects to alleviate low pressure issues to around 80 properties that breach the second Policy Criteria (less than 1.5 bar pressure plus customer contacts).

We have a forecast of a further £2.1m investment allocated to MA070. Figure 3 shows the investment per annum and per delivery stage.

Figure 3: Investment per annum and per delivery stage



We have supported a WRc project “CP642 Low Pressure Developing a National Reporting Methodology for Properties at Risk of Low Pressure”. The objective of this project was to work collaboratively as an industry (England, Scotland, and Wales) to review monitoring and reporting approaches and agree a reporting methodology for properties that receive or are likely to continue to receive low pressure supply. The project report is at the final draft stage.

6.3.2 Interruptions to supply

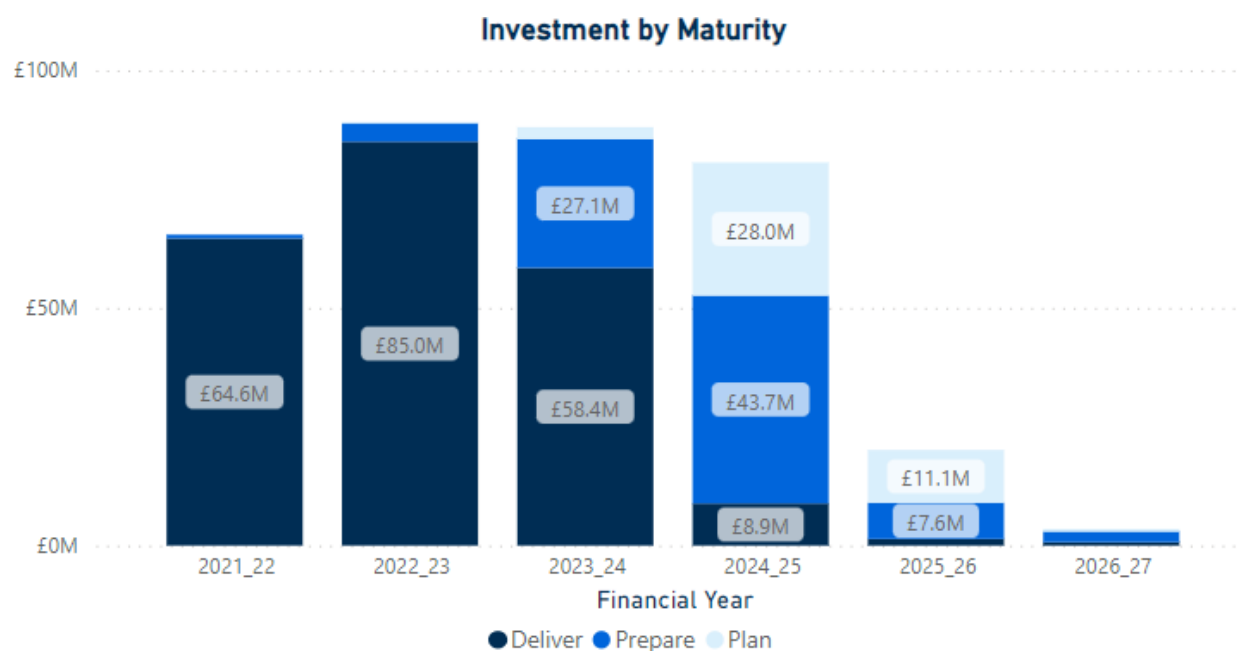
We continue to mature our Management Approaches that cover bursts and interruptions. The relevant management approaches are:

- MA001 Recurring Customer Interruptions (RCI) – the Policy Criteria is no more than three interruptions in 12 months or five interruptions in three years
- MA015 Interruptions to Supply – covering output from our Asset Risk Models, Asbestos Cement (AC) Water Mains Accelerated Replacement, Transient / Pressure Management and Responsive Mains Repairs

Asbestos Cement (AC) water mains are the asset that cause most of the recurring interruptions to supply, with between 70%-80% of the investment in small diameter water mains being targeted to replace deteriorating AC pipes. A recent UKWIR study (Report WM03D03) has confirmed that Scottish Water has the second-longest length of AC water mains in the UK and those water mains are subjected to the UK's most aggressive (for AC material) waters. AC pipes deteriorate due to the leaching of lime from the pipe wall in soft water (acidic or low alkalinity) environments. This leaching of lime results in a loss of strength in the pipe wall. The weakened AC pipe reaches a point when it can no longer withstand pressures – the thinner the original wall thickness; the quicker the pipe takes to deteriorate. It is well known within the water industry that once an AC water main starts to fail, the rate of failure can increase rapidly.

Up to the end of AR23 period, we have committed almost £155m in responsively repairing water mains and activities to minimise the rate of failure, such as mains rehabilitation & transient pressure management. Figure 4 shows the investment per annum and per delivery stage.

Figure 4: Interruptions - Investment per annum (£M) and per delivery stage across SR21 to SR27.



6.4 Data

6.4.1 Lines B2.2-B2.4 - Low Pressure

Information on properties receiving low pressure is held on Scottish Water's Low Pressure Register within Microsoft Dynamics. Potential, new low-pressure problems are identified from customer contacts and investigations in connection with investment projects and operational changes. All property numbers contained in Microsoft Dynamics are address-specific and have been subject to data cleansing and checking by pressure logging.

During AR22, Scottish Water initiated investigations at existing properties where it was believed the historically reported low pressure could be resolved or was erroneous. The pressure was logged at identified sites and, where relevant, the properties were removed from the register. No new investigations were initiated by Scottish Water to identify new low-pressure properties during the year.

There were no substantial changes to the methodology of previous years.

- Newly developed Low Pressure Register platform on Microsoft Dynamics is planned to be commissioned at the end of April 2023 and it gives better information on case status and an improved reporting on performance figures.
- During AR22 and AR23, planned pressure logging activities were introduced to help manage cases and areas with pressure related contacts.

6.4.2 Assumptions used for forecast data

There is an assumption made for adding one property per month to the Low Pressure Register with forecasting figure of 4 balanced across each case type. Hence, the forecast data for lines B2.2a to B2.2c has been evenly spread across the 2023/24 period. As for the forecast data for the removal of properties, these have been predicted based on live projects expected to be completed on site by the end of March 2024.

6.4.3 Lines B2.5-B2.32 - Interruptions to Supply

Source of Data and Confidence Grades

Data related to Interruptions to Supply is held on the following software packages:

- Incident related data is captured in Ops Logs by our field technicians where it is monitored and assessed by the Intelligence Control Centre, who are monitoring the event as it happens.
- Once the event is closed it created an ITS event in Scottish Water Customer Relationship Management Software (CRM), Microsoft Dynamics. It is here where events over 6 hours are fully investigated, and data is cleansed. Reports are then produced via Power Bi.

Interruptions to Supply data has a confidence grade of A2.

All incident and property data reported in these lines by Scottish Water is held in corporate systems, where data input follows an auditable process.

Data Improvement Programmes

There are no data improvement programmes planned.

Assumptions made for forecast data

Forecasting for Lines B2.5-B2.32 is based on 5-year historical data and using an average point

7 Table B3 - Sewage – Internal Flooding

7.1 Overview

In AR23 the total annual rainfall volume increased in comparison to AR22, however fewer short duration high intensity storms were experienced. In general, with fewer dry periods, ground conditions are more permeable because of consistent relatively high levels of saturation; allowing more surface water to drain naturally rather than enter the sewers. The level of rainfall experienced in most events was such that our sewer network was able to drain effectively resulting in less flooding due to overloaded sewers.

Last year we completed 18 investment projects to reduce the risk of internal sewer flooding to 58 properties on the at-risk register (greater than 10% chance of occurrence per annum) and communities ranging from projects to protect individual properties to upsizing the sewer and surface water networks and large-scale projects to prevent flooding to specific communities, predominantly areas of cities or towns where flooding has been a repeat issue.

We endeavour to provide long term resolution to customers at the highest risk of sewer flooding but where that is not possible, we can implement shorter term mitigation measures such as installing flood doors, smart air bricks and non-return valves. We invested £1.7m installing such mitigations measures at 236 properties in the last year. This was the first year of piloting an enhanced mitigation service to customers in all risk categories of internal flooding to ensure they are better protected for intense rainfall events.

Table B3 provides a summary of Scottish Water's Internal Flooding performance for the year AR23.

7.2 Performance Trends

Line B3.1 – Number of properties connected to sewerage system

The content of this line is brought forward from Table A1, Line A1.20. The number of properties reported in this category increased from 2,630,111 in AR22 to 2,651,106 in AR23.

Lines B3.2 - B3.5 Annual Flooding – Overloaded Sewers

A comparison with the previous year's performance is provided in Table 38 below.

Table 38: Summary of flooding incidents and properties flooded in AR22 and AR23.

Line ref	Descriptions	AR22	AR23	Variance	%
B3.2	Number of properties flooded in the year	291	48	-243	-83.5%
B3.3	Number of flooding incidents in the year	142	40	-102	-71.8%
B3.4	Number of flooding incidents attributed to severe weather	74	10	-64	-86.5%
B3.4a	Number of properties flooded during the year due to severe weather	163	13	-150	-92%
B3.5	Props. where flooding limited to uninhabited cellars only (o/loaded sewers)	55	7	-48	-87.3%

The above figures show a significant reduction in relation to both the number of Internal Flooding Overloaded Sewer (IFOS) incidents and the number of properties affected by those incidents in comparison to AR22.

In AR23 the total annual rainfall volume increased in comparison to AR22, however fewer short duration high intensity storms were experienced. In general, with fewer dry periods, ground conditions are more permeable because of consistent relatively high levels of saturation; allowing more surface water to drain naturally rather than enter the sewers. The level of rainfall experienced

in most events was such that our sewer network was able to drain effectively resulting in less flooding due to overloaded sewers.

To illustrate the rainfall conditions described above, Figure 5: 2015-2022 Rainfall Volumes shows rainfall volumes from 2015-2022 as well as a percentage comparison of rainfall experienced against long term average rainfall (1981-2010). In relation to this average, it can be seen that Scotland received approx. 87% of average rainfall in AR22, rising to 95% of average in AR23. (Equivalent UK-wide values are also provided for comparison only).

Figure 5: 2015-2022 Rainfall Volumes

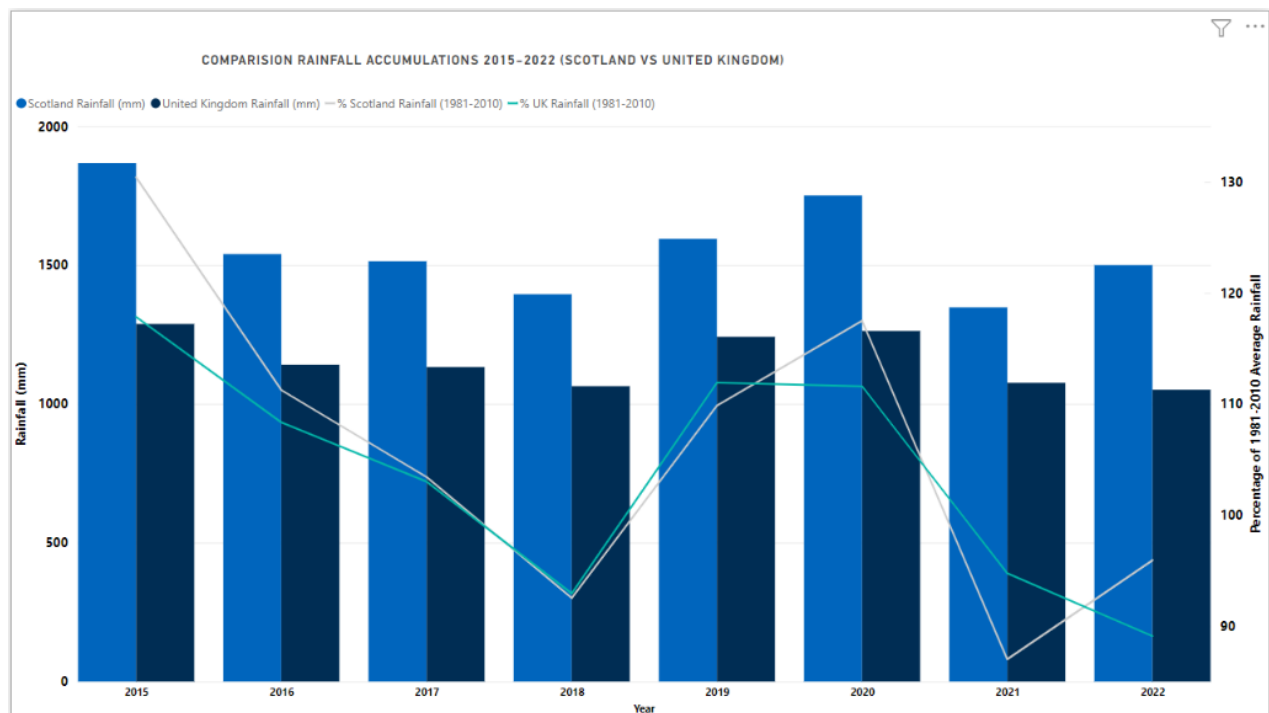
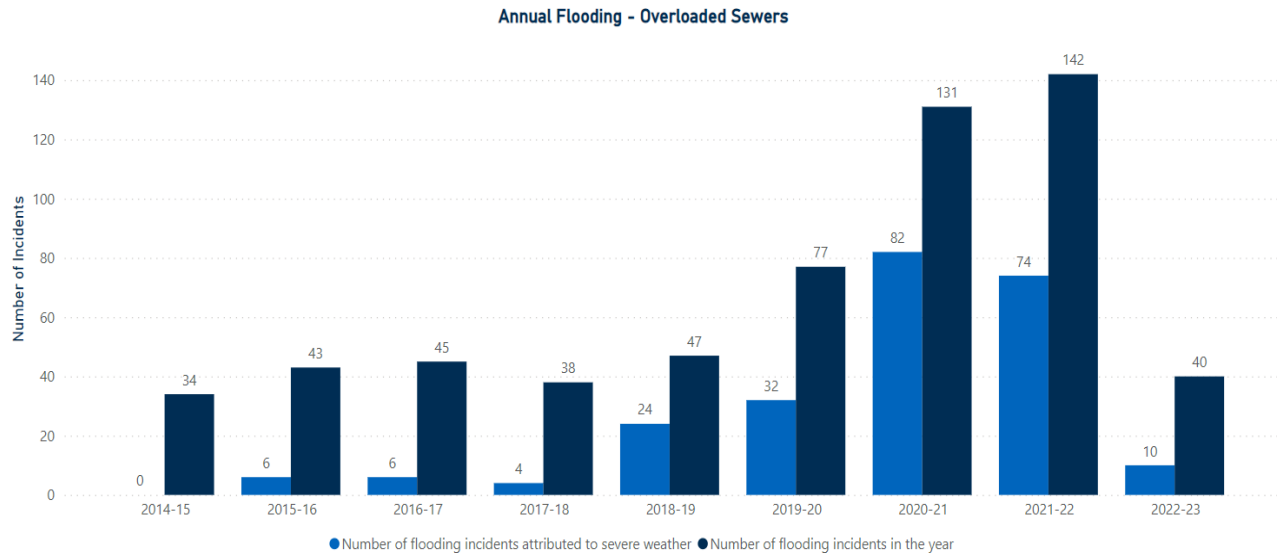


Figure 6 below depicts the total number IFOS incidents from AR15-AR23 in comparison to the number of those incidents eligible for severe weather exemption in each of the years. Years with high numbers of severe weather exemptions illustrate the impact of short duration high intensity storms.

Figure 6: Internal Flooding Overloading Incidents (including & excluding severe weather incidents).



Specifically relating to B3.4, sewer flooding incidents are eligible for severe weather exemptions if they occur in >10-year storm events at properties not featuring on the Internal At Risk Register (ARR) at 2 in 10 or 1 in 10 at the time of the incident or subsequently by year end following Flooding Investigation Team (FIT) investigation. If multiple properties are affected by an incident an exemption is only applied if all properties do not feature on the internal ARR as above.

A marked increase in high intensity summer storms was seen across the period 2019-2021, which is borne out in the numbers in B3 Figure 2 relating to severe weather exemptions. Summer 2022 reverted to numbers similar to the years preceding 2019.

In addition, since 2021, 236 properties have had flood mitigations measures installed which has potentially reduced the number of customers experiencing and reporting flooding. Of these 236 properties, 81 were provided with mitigation measures via the piloting of an enhanced mitigation service to customers. Further information on this enhanced service, which includes protection to properties experiencing repeat internal flooding in severe weather, is provided in the Investment section of this commentary. Scottish Water has an ongoing programme of work to provide flood mitigation measures to protect customers who experience, or are at risk of, sewer flooding.

7.2.1 Lines B3.6-B3.13 - Annual Flooding – Other Causes

B3.6 - Number of properties flooded in the year (Main Sewers Only)

The number of properties in this category has increased from 74 in AR22 to 93 in AR23. This increase can be attributed to a single incident where 18 properties were affected by a large blockage in a main sewer with the issue exacerbated by a storm. Such an incident did not occur within AR22.

B3.7 - Number of properties flooded in the year (All Sewers)

The number of properties in this category has increased from 279 in AR22 to 329 in AR23.

This increase can be partially attributed to the above-mentioned flooding incident where 18 properties were affected by a large blockage in a main sewer with the issue exacerbated by a storm. The remaining variance is attributable to the typical annual variance in system performance.

B3.8 - Properties which have flooded more than once in the last ten years (other causes)

In AR22, on the advice of the Assurer, we reported using the data available since Scottish Water moved to Microsoft Dynamics. Therefore, Line B3.8 was based on properties which flooded more than once since April 2019.

In AR23 we have been asked to base our reporting on 10 years of data, using an amalgamation of 5 years of data from Microsoft Dynamics (current operational system) and 5 years of data from Promise (previous system). The issues associated with this approach were discussed during the audit, and it was recognised that the confidence grading would be low.

For AR23, the number of properties reported in this line has therefore increased from 53 to 188. This increase is due to the above change in methodology to report the full 10 years of data. Had we continued to report as per AR22, adding in one further year of data from Microsoft Dynamics, the number of properties would have increased from 53 to 64.

Repeat internal flooding incidents are monitored through the Flood Management Action Plan (FMAP) process and the Sewer Response Alternative Resolution Management (ARM) process which was introduced in February 2021 and was rolled out across the central belt of Scotland by January 2022. This process identifies properties with repeat flooding more than three times in any two-year period, providing a higher confidence for this information, allowing us to identify the cause and promote remedial action such as rehabilitation of the sewer.

B3.9 - Flooding incidents and B3.9a number of properties flooded due to equipment failure

The number of incidents in this category has decreased from 7 in AR22 to 6 in AR23.

The number of properties flooded in this category has decreased from 7 in AR22 to 6 in AR23.

Scottish Water has introduced an improved, proactive, scheduled maintenance programme for all mitigations delivered by the Flooding Team to reduce the potential for equipment failure.

The Maintenance Schedule Task process has also been enhanced to promote regular remedial work where required for single sewer lengths and small areas of sewer network and enhanced maintenance for CSOs and pumping stations.

B3.10 - Flooding incidents and B3.10a number of properties flooded due to blockages

The number of incidents in this category has increased from 54 in AR22 to 62 in AR23.

The number of properties flooded in this category has increased from 66 in AR22 to 82 in AR23.

Scottish Water does not have a regular, proactive sewer maintenance programme for single sewer assets or small areas of sewer network. We do have a duty to maintain our sewers although this does not constitute a duty to have a proactive inspection regime. However, in AR23 the Maintenance Schedule Task process has been enhanced to promote regular remedial and proactive inspection work where required for single sewer lengths and small areas of sewer network and enhanced maintenance for CSOs and pumping stations.

B3.11 - Flooding incidents and B3.11a number of properties flooded due to sewer collapses

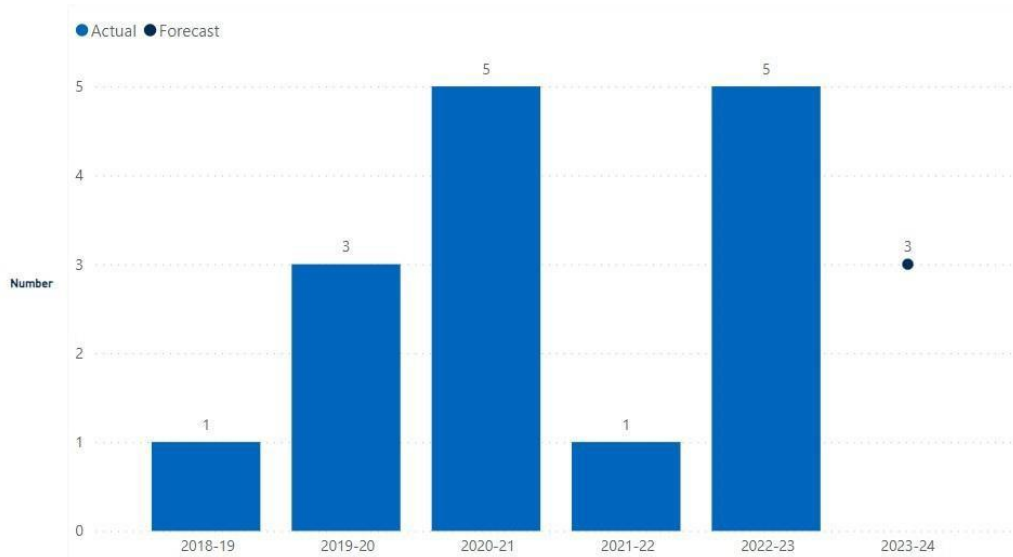
The number of incidents in this category has risen from 1 in AR22 to 5 in AR23.

The number of properties flooded in this category has risen from 1 in AR22 to 5 in AR23.

Increased CCTV surveys by Sewer Response may have resulted in an increase in the identification of sewer collapses from 1 to 5, however, as shown in Figure 7 below, the variance in data could also be attributed to the typical annual variance in system performance.

Figure 7: Flooding incidents due to sewer collapses.

B3.11 Flooding incidents due to sewer collapses



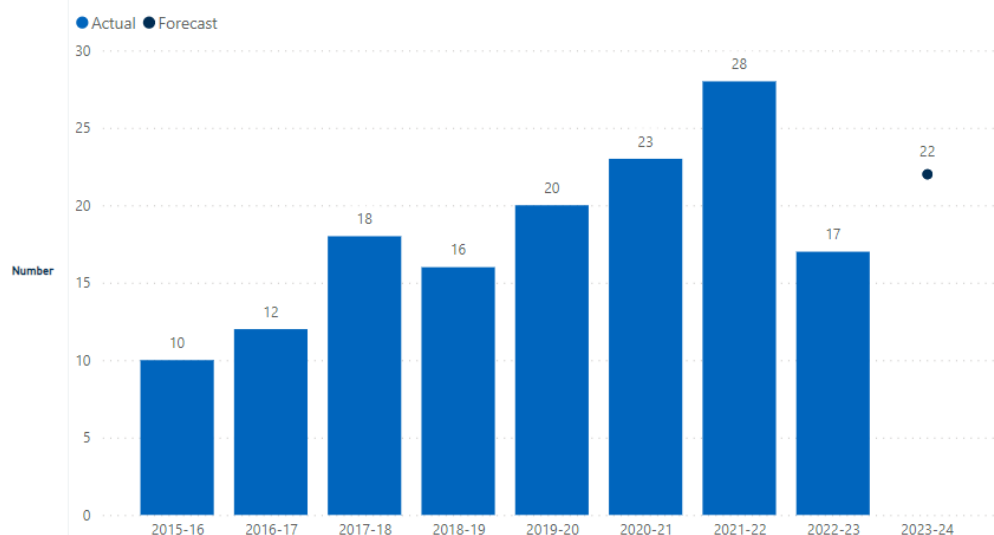
B3.12 - Props. where flooding limited to uninhabited cellars only (other causes)

The number of properties in this category has decreased from 28 in AR22 to 17 in AR23.

This variance is attributable to the typical annual variance in system performance as shown in Figure 8 below. Performance in this category in AR23 is similar to that seen in the years preceding 2019. These years did not experience the increased level of high intensity summer storms that were seen across the period 2019-2021.

Figure 8: Properties where flooding limited to uninhabited cellars (other causes).

B3.12 Props. where flooding limited to uninhabited cellars only (other causes)

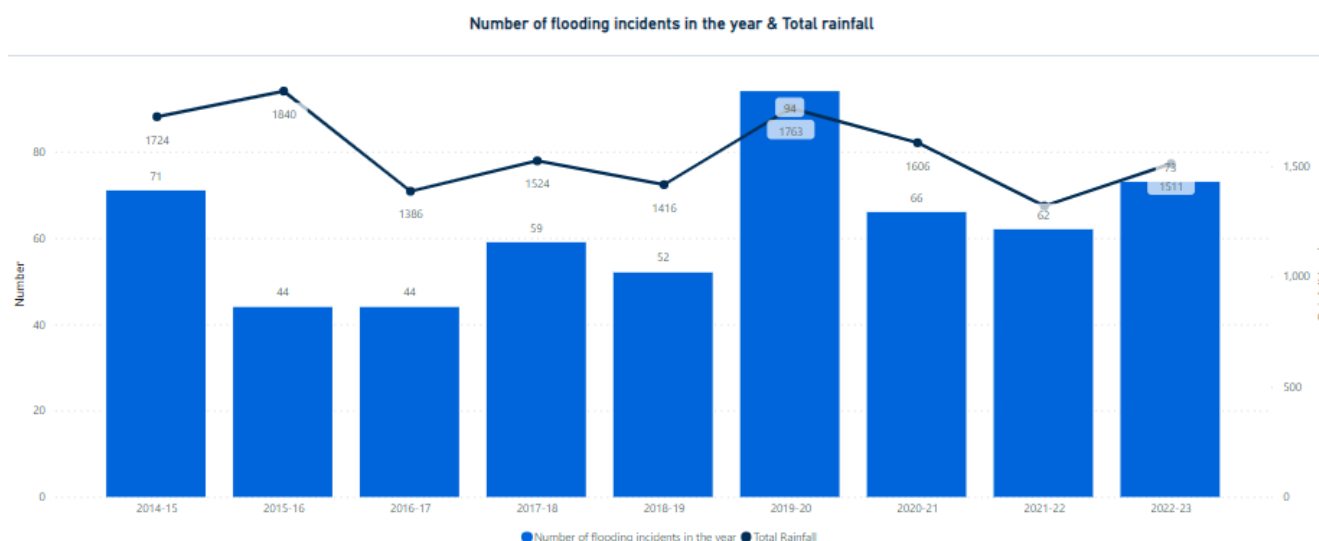


B3.13 - Number of flooding incidents in the year

The number of incidents in this category has increased from 62 in AR22 to 73 in AR23. This is calculated as the sum of lines B3.9, B3.10 and B3.11.

This variance is attributable to the typical annual variance in system performance, as shown in Figure 9 below. Across most years, increases in incidents follow the same pattern as the increases in rainfall. The average number of incidents over the past 5 years was 69, and the average over the 9 years shown was 62.

Figure 9: Number of flooding incidents in the year (other causes) & total rainfall



7.2.2 Lines B3.14-B3.17 - Properties on the "At Risk" Register - (i) At risk summary

B3.14 - 2 in 10 at end of year

The number of properties reported in this category has increased from 180 in AR22 to 189 in AR23.

B3.15 - 1 in 10 at end of year

The number of properties reported in this category has risen from 110 in AR22 to 136 in AR23.

B3.16 - Total 1 in 10 and 2 in 10 properties at risk at end of year

The number of properties reported in this category has increased from 290 in AR22 to 325 in AR23 (circa 12% increase). The value in this line is the sum of Lines B3.14 and B3.15.

The increase in the total Internal At Risk Register (ARR) reflects increased investigation closures and the introduction in April 2021 of the latest available rainfall analysis benchmark dataset (FEH13).

FEH13 improves on the previous rainfall dataset (FEH99) as it uses updated rainfall data, providing more accurate return periods. Had we continued to use FEH99 we would have expected fewer additions to the ARR for the same investigations.

Additional resource was introduced to Scottish Water's Flooding Investigation Team enabling the closure of the backlog of investigations from the rainfall events experienced in AR22, as well as AR23 investigations, resulting in a higher than usual number of additions to the ARR in AR23.

A small number of additions to the ARR in AR23 can be attributed to greater intelligence arising through the solution development process.

B3.17 1 in 20 risk at end of year

The number of properties reported in this category has increased from 165 in AR22 to 228 in AR23. The increase in the total Internal At Risk Register (ARR) reflects the increased investigation closures and the introduction of the latest available rainfall analysis benchmark dataset (FEH13).

FEH13 improves on the previous rainfall dataset (FEH99) as it uses updated rainfall data, providing more accurate return periods. Had we continued to use FEH99 less additions would have been made to the ARR for the same investigations.

Additional resource was introduced to Scottish Water's Flooding Investigation Team enabling the closure of the backlog of investigations from the rainfall events experienced in AR22, as well as AR23 investigations, resulting in a higher than usual number of additions to the ARR in AR23.

A small number of additions to the ARR in AR23 can be attributed to greater intelligence arising through the solution development process.

7.2.3 Lines B3.18-B3.19 - Properties on the "At Risk" Register - (ii) Problem status of properties on the register

B3.18 - Solved but temporary or being tested

The number of properties reported in this category has increased from 158 in AR22 to 203 in AR23

AR22 158/290 (54% of ARR) (i.e., Line B3.18/Line B3.16)

AR23 203/325 (62% of ARR) (i.e., Line B3.18/Line B3.16)

To protect our customer's properties whilst we develop and deliver longer term flood alleviation schemes, Scottish Water has introduced a target to investigate the potential to offer to mitigate a minimum of 70% of the properties on internal ARR at 1in10 and 2in10. This currently equates to 228 Internal ARR properties.

This focus has driven a shift from 158 properties of the ARR in AR22 to 203 properties in AR23 having mitigations installed.

Overall, we addressed the equivalent of 73% as we have 203 of ARR properties with mitigation installed and 36 of ARR properties where Scottish Water was either unable to mitigate or the customer refused the offer of mitigation.

Table 39: Properties on ARR solved but temporary or being tested.

Total properties on ARR	325
B3.18 - Solved but temporary or being tested	203
B3.19 – Number of properties on ARR still to be resolved	122
Attrition (Unable to mitigate/Customer Refusal)	36

B3.19 - Number of properties on the At Risk register still to be resolved

The number of properties reported in this category has fallen from 132 in AR22 to 122 in AR23.

AR22 132/290 (46% of ARR) (i.e., Line B3.19/Line B3.16)

AR23 122/325 (38% of ARR) (i.e., Line B3.19/Line B3.16)

This focus has driven a reduction in the number of properties not resolved either by mitigation or solution development from 132 of the ARR in AR22 to 122 in AR23 of which, as per B3.18, 36 properties will remain without mitigation due to being unable to mitigate or customer refusal.

Table 40: Properties on ARR still to be resolved.

Total properties on ARR	325
B3.18 - Solved but temporary or being tested	203
B3.19 – Number of properties on ARR still to be resolved	122
Attrition (Unable to mitigate/Customer Refusal)	36

7.2.4 Lines B3.20-B3.22 - Properties on the "At Risk" Register - (iii) Annual changes to register

B3.20 - Removed by Scottish Water action

The number of properties reported in this category has increased from 35 in AR22 to 58 in AR23.

Last year we completed 18 investment projects to reduce the risk of internal sewer flooding to 58 properties on the at-risk register (greater than 10% chance of occurrence per annum) and communities ranging from projects to protect individual properties to upsizing the sewer and surface water networks and large-scale projects to prevent flooding to specific communities, predominantly areas of cities or towns where flooding has been a repeat issue.

B3.21 - Removed because of better information

The number of properties reported in this category has decreased from 4 in AR22 to 2 in AR23.

The two removals this year were erroneously added to the internal ARR in August 2022 and subsequently removed in September 2022 following review by the Catchment Planner.

Overall, the number of removals due to better information is consistently low representing the high confidence/accuracy of investigations, which has been further improved in recent years with the introduction of Flooding Investigation Reports (FIRs).

B3.22 – Added because of better information

The number of properties in this category has significantly increased from 15 in AR22 to 95 in AR23.

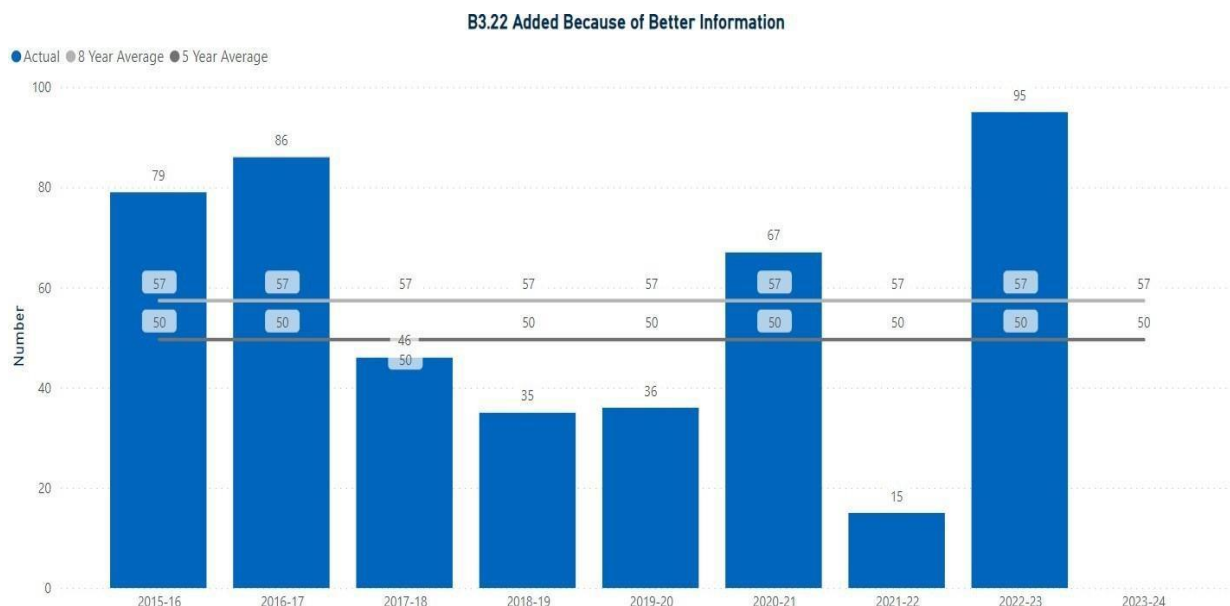
This increase is a result of the combined effect of clearing the AR22 investigation backlog and the introduction of enhanced rainfall analysis (FEH13).

Increases in investigation demand following AR21 and AR22 rainfall events led to a significant increase in timescales for investigation completions. Additional resource was introduced to Scottish Water's Flooding Investigation Team to enable these investigations to be completed, resulting in an improved process, reducing the average time to complete investigations, which is now targeted at 20 weeks.

All backlog investigations from AR22 were closed during AR23 resulting in higher than usual number of additions to the internal ARR. Of the 95 properties added, nine were added due to flooding incidents in AR23.

The average number of ARR additions over the last 5 years has been approximately 50 properties per year, and, over the 8 years shown in Figure 10 below, the average number of ARR additions has been 57.

Figure 10: Added because of better information.



B3.23 - Percentage of population at risk of sewer flooding in a 1-in-50-year storm, based on modelled predictions

The percentage of the population at risk of sewer flooding in a 1-in-50-year storm, based on modelled predictions, was calculated at 4% in AR22 and remains unchanged in AR23.

The data is the result of modelling carried out to assess the risk of flooding from our sewers in compliance with Section 16 of the Flood Risk Management (Scotland) Act 2009. The modelling covers around 90% of the population of Scotland. This modelling is updated every 6 years and an updated national assessment is not expected to be undertaken until the end of FRM cycle 2 in AR28.

7.3 Investment

The enhancement of our Flooding Investigation Team enabling the closure of the backlog of investigations from AR21 and AR22 has seen a sharper rise in ARR additions in AR23. However, our Management Approach for SR21 (MA020) to reduce flood risk to customers impacted by repeat high consequence internal sewer flooding where not disproportionately expensive, combined with our ambition to never disrupt the lives of our customers or communities and never flood customers properties due to incapacity in our sewers under normal weather conditions, has seen us commit £56.52m so far in SR21 to deliver 31 capital projects to reduce the risk of internal sewer flooding to 99 properties and remove customers from our internal ARR. This actual spend per property is in line with our Management Approach for SR21 forecast.

Our prioritised flooding programme currently has a latest best estimate of £188m of project value. Taking into account previous investment in SR15 for these prioritised projects the forecasted Latest Best Estimate (LBE) for SR21 spend is £142m, which is expected to rise as projects mature.

The approved Investment Planning Scenario 2023 (IPS23) funding for the flooding programme (MA020) is £142m. Assuming such levels of investment in sewer flooding is available this may be spent before the end of the investment period to deliver a reduction on the risk of sewer flooding and removal of 165 properties from the internal ARR and 122 locations from the external ARR.

As part of our SR21 Management Approach, we are piloting an enhanced Mitigation Service to provide protection to customers from the risk of flooding through provision of mitigation measures whilst permanent solutions are being identified and implemented. This enhanced pilot covers the following:

- Properties which experience internal flooding at 5% chance of flooding in a year (1:20)
- Properties which experience repeat internal flooding during severe weather events
- Properties which experience frequent/high impact external flooding

This has seen an increased investment of £1.43m to provide mitigation measures to 190 properties to reduce the impact of internal flooding so far in AR23.

The enhancement of our mitigations programme implemented in AR23 drives a forecast of a further £5.6m for mitigations for 746 properties to be delivered throughout the remainder of SR21.

The ability of Scottish Water to achieve the forecast performance and investment is largely dependent on the weather experienced throughout the period. AR21/AR22 experienced a number of short-duration, high intensity storms resulting in a higher than forecast number of sewer overloading incidents.

Although AR23 experienced an increase in average rainfall, this encompassed less short duration, high intensity storms and this, combined with fewer dry periods meaning ground conditions were more permeable because of consistent relatively high levels of saturation, meant that our sewer network was able to drain effectively, resulting in less sewer overloading incidents.

Should we experience a return to an increase in short duration high intensity storms with no respite over the remainder of the investment period, we may find that our actual number of sewer overloading incidents, ARR additions and mitigation provision, exceeds the forecasted numbers.

7.4 Data

7.4.1 Data sources and confidence grades

Data about Internal Flooding is held on the following software packages:

- Cases/Calls regarding internal flooding incidents and properties affected are held within Scottish Water Customer Relationship Management Software (CRM), **Microsoft Dynamics**
- **Salesforce Field Service** software collates flooding data and integrates with Microsoft Dynamics providing the Flooding Team with more detailed, accurate and comprehensive information regarding flooding incidents and affected properties.
- The **Flooding Database** which contains all internal flood risk information, including the Internal **“At Risk” Register**, is held on InfoNet.

Scottish Water has adjusted the confidence grading for lines B3.2-B3.13 (with the exception of B3.8) from a B3 to an A3. The implementation of the new corporate Field Services software (Salesforce) implemented in January 2021, and rolled out throughout AR22/23, integrated with our corporate Customer Relationship Management software (Microsoft Dynamics), has greatly improved our data capture.

All incident and property data reported in these lines by Scottish Water is now held in corporate systems, where data input follows an auditable process. We intend to monitor the accuracy of this over AR24 and forecast that we will likely increase our confidence grading to A2.

B3.8 has a confidence grading of B4 as the 10-year combined figure is made up of an amalgamation of data from both Microsoft Dynamics software and the historic Promise software, which is then reconciled within a spreadsheet.

Once this 10-year data is solely extracted from Microsoft Dynamics (in AR30) we will be able to increase the overall confidence grading to A2.

7.4.2 Lines B3.14-23 have the following confidence grades:

- B3.14, B3.15 and B3.16 - B2
- B3.17 - B3
- B3.18 and B3.19 - B3
- B3.20, B3.21 and B3.22 - B2
- B3.23 - B4

The data informing the above reporting lines is held on a non-corporate, fully auditable database (Flooding Database). Our rigorous and thorough flood investigation process provides higher accuracy for B3.14 - B3.16 and B3.20 - B3.22.

B3.17 has been graded B3 as although new additions to this category follow the same investigation process as above, it is considered that the completeness and accuracy of more historic records in this category is lower.

B3.18 and B3.19 remain graded a B3 as per AR22 as our data improvement programme is not at a level of maturity to allow this grade to increase.

B3.23 remains at B4 as an updated national assessment is not expected to be undertaken until the end of FRM cycle 2 in AR28.

7.4.3 AR23 Data Improvement Programmes

Mitigations Programme

Significant effort has been made to bring all data relating to mitigation measures together (B3.18 and B3.19). A new team has been created, focusing specifically on mitigating our customers' properties, meaning that our mitigations and the data behind them will be more robust going forward.

Whilst some data improvement relating to mitigation measures has occurred, the level of maturity is not sufficient to allow an upgrade of confidence grade for these lines at this time.

7.4.4 AR24 Data Improvement Programmes

The following improvements are planned during 2023-24:

Automation of IFOS process

Introduction of the use of Microsoft Dynamics for our sewer flooding investigation process.

- Increase of confidence grading from A3 to A2. (B3.2 to B3.5)
- Use of corporate system
- Auditable
- Controlled data entry
- Enhanced reporting capabilities

Flooding Database Upgrade

The Geographic Information System (GIS) corporate system is under investigation as a potential repository for all flooding and mitigation data.

- Increase of confidence grading from B3/B2 to A3/A2. (B3.14 to B3.22)
- Use of corporate system
- Auditable
- Controlled data entry
- Enhanced reporting capabilities

1 in 20 Review

Review of historic 1 in 20 ARR entries

Assumptions used for forecast data

Forecasting has been provided for all lines in Table B3.

Forecasting for Lines B3.2-B3.13 is based on 3-year and 5-year average incident and property data related to sewer flooding.

Forecasting for Lines B3.14-B3.22 is based on the current “At Risk” Register position and predicted additions and removals from the “At Risk” Register. These predicted additions and removals are based on historic addition trends and the current status of the Flooding Programme.

Line B3.23 is forecasted to remain the same as an updated national assessment is not expected to be undertaken until the end of Flood Risk Management (FRM) cycle 2 in AR28.

Confidence grades for forecasted lines B3.2 – B3.22 have been set at C4. As above, the forecasted numbers are based on average / historic data as well as current status data. A ‘C’ grading is appropriate given the estimated nature of the forecast. It is recognised that most lines are highly weather dependent, therefore should we experience a return to an increase in short duration high intensity storms, the forecasted numbers may increase significantly.

8 Table B3a - Sewage External Flooding

8.1 Overview

In AR23 the total annual rainfall volume increased in comparison to AR22, however fewer short duration high intensity storms were experienced. In general, with fewer dry periods, ground conditions are more permeable because of consistent relatively high levels of saturation; allowing more surface water to drain naturally rather than enter the sewers. The level of rainfall experienced in most events was such that our sewer network was able to drain effectively resulting in less flooding due to overloaded sewers.

Last year we completed nine investment projects which, in addition to reducing internal flooding risk, reduced the risk of external sewer flooding to thirty-three locations. As part of this, Scottish Water has started to address the highest priority External At Risk Register areas delivering one project solely with an external flooding driver, which reduced the risk at areas.

Table B3a provides a summary of Scottish Water's External Flooding performance for AR23.

8.2 Performance Trends

8.2.1 Lines B3a.1-B3a.5 - Annual Flooding summary - (i) Overloaded sewers

Table 41: Summary of flooding incidents and properties flooded in AR22 and AR23.

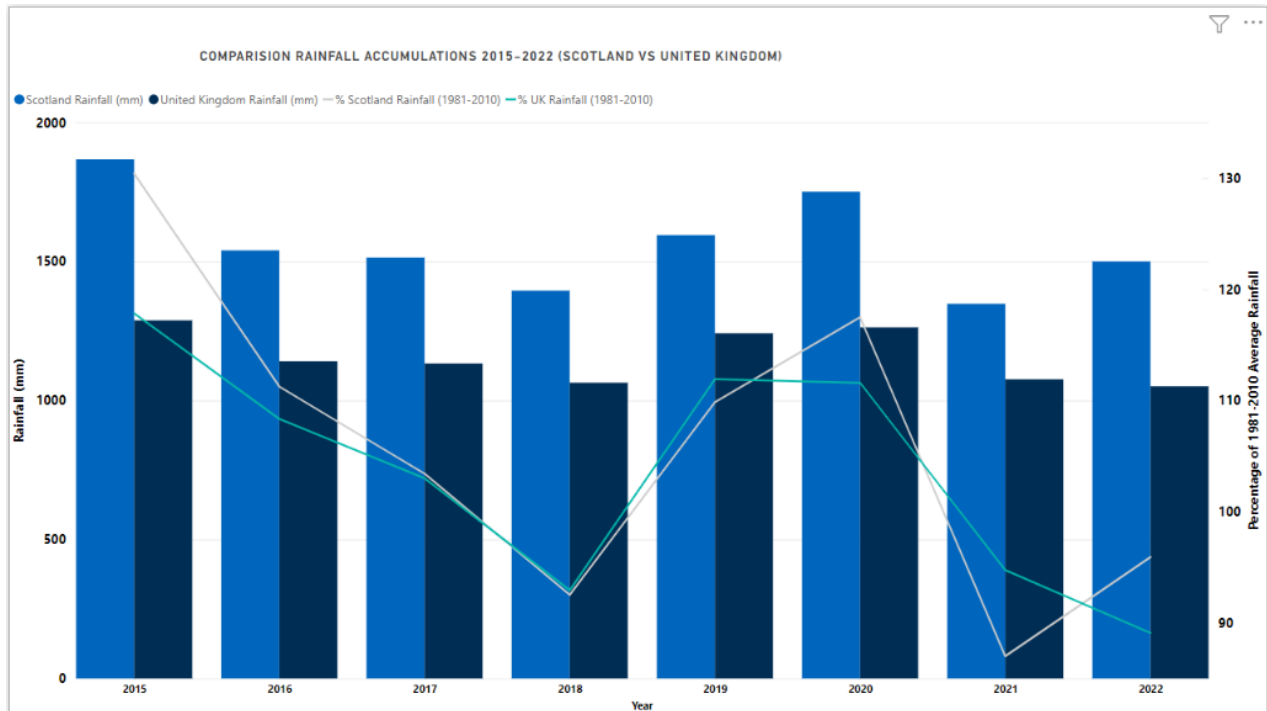
Line ref	Descriptions	AR22	AR23	Variance	%
B3a.1	Areas flooded externally in the year	350	157	-193	-55.1%
B3a.2	Curtilage flooding incidents in the year	137	68	-69	-50.3%
B3a.3	Highway flooding incidents	96	72	-24	-25%
B3a.4	Other flooding incidents	27	14	-13	-48.1%
B3a.5	Total flooding incidents	260	154	-106	-40.8%

The above figures show a significant reduction in relation to both the number of External Flooding Overloaded Sewer (EFOS) incidents and the number of areas affected by those incidents in comparison to AR22.

In AR23 the total annual rainfall volume increased in comparison to AR22, however fewer short duration high intensity storms were experienced. In general, with fewer dry periods, ground conditions are more permeable because of consistent relatively high levels of saturation; allowing more surface water to drain naturally rather than enter the sewers. The level of rainfall experienced in most events was such that our sewer network was able to drain effectively resulting in less flooding due to overloaded sewers.

To illustrate the rainfall conditions described above, Figure 11 shows rainfall volumes from 2015-2022 as well as a percentage comparison of rainfall experienced against long term average rainfall (1981-2010). In relation to this average, it can be seen that Scotland received approx. 87% of average rainfall in AR22, rising to 95% of average in AR23. (Equivalent UK-wide values are also provided for comparison only).

Figure 11: 2015-2022 Rainfall Volumes.



B3a.6 - External flooding incidents (overloaded sewers attributed to severe weather)

The number of external flooding incidents is much greater than the number of internal flooding incidents and resource implications prevent these being investigated in the same way.

Scottish Water's Flooding Investigation Team does not currently review all external flooding incidents. In AR23 we have started to identify, review and assess high priority and high impact external flooding incidents, and this will continue to AR24, expanding to include medium priority incidents. However, as we do not investigate all external flooding incidents it is considered not appropriate for us to attribute incidents to severe weather and therefore claim exemptions.

In addition, exclusions for severe weather in relation to internal flooding have a direct bearing on OPA, while external flooding does not. As a result, priority is given to internal incidents.

8.2.2 Lines B3a.7-B3a.10 - Annual Flooding summary – (ii) Other causes

B3a.7 - Areas flooded externally in the year (other causes)

The number of areas in this category has decreased from 3,863 in AR22 to 3,346 in AR23.

Scottish Water does not have a regular proactive sewer maintenance programme for single sewer assets or small areas of sewer network. We do have a duty to maintain our sewers although this does not constitute a duty to have a proactive inspection regime. However, in AR23 the Maintenance Schedule Task process has been enhanced to promote regular remedial and proactive inspection work where required for single sewer lengths and small areas of sewer network and enhanced maintenance for CSOs and pumping stations.

B3a.8 - Flooding incidents (other causes - equipment failure)

The number of incidents in this category has risen from 12 in AR22 to 16 in AR23. The number of incidents in this category has risen from 12 in AR22 to 16 in AR23.

In AR23 the Maintenance Schedule Task process has been enhanced to promote regular remedial and proactive inspection work where required for single sewer lengths and small areas of sewer network and enhanced maintenance for CSOs and pumping stations.

B3a.9 - Flooding incidents (other causes - blockages)

The number of incidents in this category has fallen from 1,356 in AR22 to 1,319 in AR23.

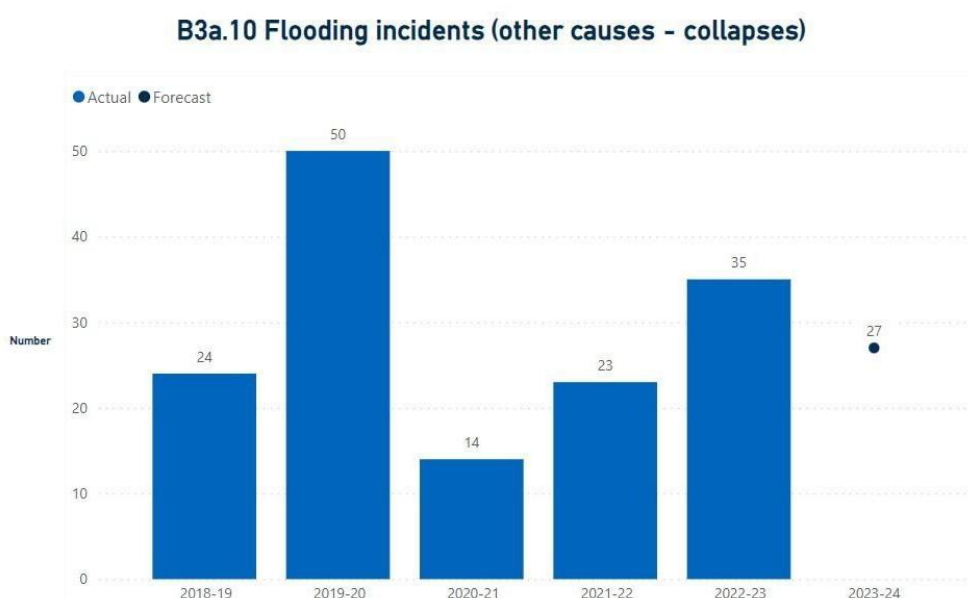
Scottish Water does not have a regular proactive sewer maintenance programme for single sewer assets or small areas of sewer network. We do have a duty to maintain our sewers although this does not constitute a duty to have a proactive inspection regime. However, in AR23 the Maintenance Schedule Task process has been enhanced to promote regular remedial and proactive inspection work where required for single sewer lengths and small areas of sewer network and enhanced maintenance for CSOs and pumping stations.

B3a.10 - Flooding incidents (other causes - collapses)

The number of incidents in this category has increased from 23 in AR22 to 35 in AR23.

Increased CCTV surveys by Sewer Response may have resulted in an increase in the identification of sewer collapses however, the variance in data could also be attributed to the typical annual variance in system performance, as shown in Figure 12 below.

Figure 12: Flooding incidents other causes – collapses.



8.2.3 Lines B3a.11-B3a.14 - Areas on the 1:10, 2:10, 1:20 at risk register – (i) At risk summary

B3a.11 - 2 in 10 risk at end of year

The number of areas reported in this category has increased from 1,526 in AR22 to 1,652 in AR23.

B3a.12 - 1 in 10 risk at end of year

The number of areas reported in this category has increased from 1,002 in AR22 to 1,007 in AR23.

Ba3.13 - 1 in 20 risk at end of year

The number of areas reported in this category has increased from 101 in AR22 to 140 in AR23.

Line B3a.14 - 1 in 10, 2 in 10, 1 in 20 risk at end of year

The value in this line is the sum of lines B3a.11, B3a.12 and B3a.13.

The number of areas reported in this category has increased from 2,629 in AR22 to 2799 in AR23.

The increase (circa 6%) in the total External At Risk Register (ARR) reflects increased investigation closures. All backlog investigations from AR22 were closed during AR23 resulting in higher than usual number of additions to the External ARR (and Internal ARR).

FEH13 improves on the previous rainfall dataset (FEH99) as it uses updated rainfall data, providing more accurate return periods. Had we continued to use FEH99 less additions would have been made to the ARR for the same investigations.

As expected, the introduction of FEH13 from April 2021, has resulted in properties which would previously been considered as above the 1in20 risk level now falling within the 1in20 risk level and properties previously considered in the 1in20 risk level falling within the 2in10 and 1in10 risk levels.

8.2.4 Lines B3a.15-B3a.16 - Areas on the 1:10, 2:10, 1:20 at risk register - (ii) Problem status

B3a.15 - Problems solved by temporary measures or subject to testing

The number of areas reported in this category has increased from 134 in AR22 to is 205 in AR23.

AR22 134/2629 (5% of ARR) (i.e., Line B3a.15/Line B3a.14)

AR23 205/2799 (7% of ARR) (i.e., Line B3a.15/Line B3a.14)

Table 42: Total properties on ARR – problems solved by temporary measures or subject to testing.

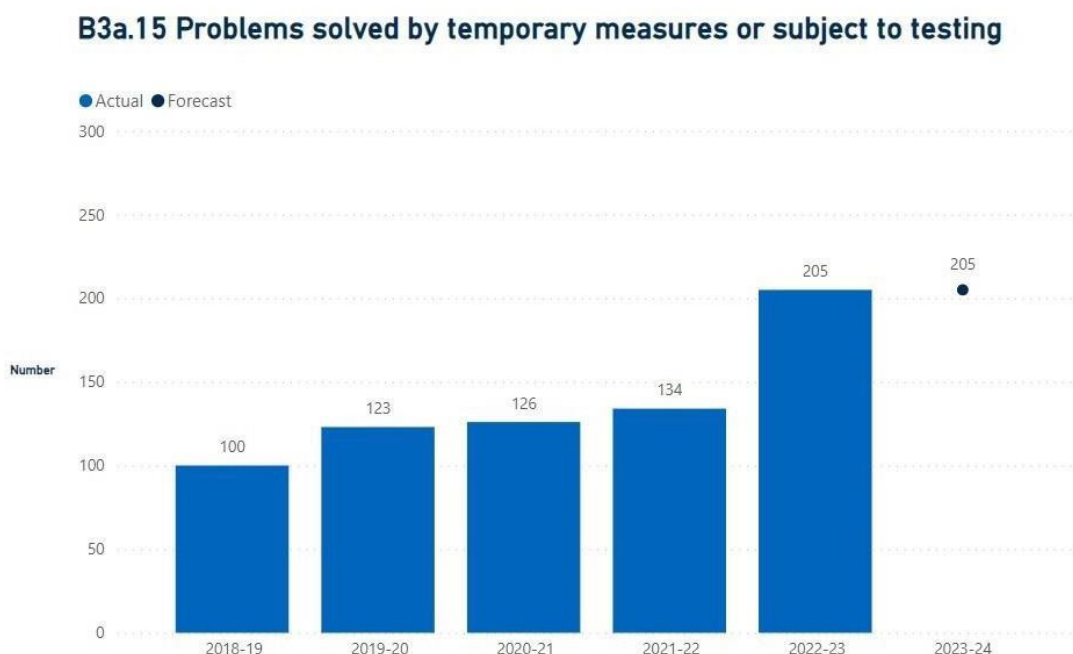
Total properties on ARR	2799
B3a.15 - Problems solved by temporary measures or subject to testing	205
B3a.16 – Problems awaiting solution	2594

In line with our Management Approach, we are piloting our enhanced Mitigation Service to deliver temporary measures to include areas which experience frequent/high impact external flooding and properties which experience repeat internal flooding due to severe weather. This, in conjunction with the backlog of investigations from AR22 being closed during AR23, has resulted in a sharp increase in this category.

Currently this figure represents areas on the External ARR with any temporary measures, including those with temporary measures which only protect against internal flooding out with our Internal ARR. Our intention in AR24 is to separate flood risk reduced by temporary measures into internal only and external only categories.

Figure 13 below shows the number of mitigated areas reported in line B3a.15 across the last 5 years.

Figure 13: Solved by temporary measures AR19-23.



B3a.16 - Problems awaiting solution

The number of areas reported in this category has increased from 2,495 in AR22 to 2,594 in AR23.

AR22 2,495/2,629 (95% of ARR) (i.e., Line B3a.16/Line B3a.14)

AR23 2,594/2,799 (93% of ARR) (i.e., Line B3a.16/Line B3a.14)

Table 43: Total properties on ARR – problems awaiting solution.

Total properties on ARR	2799
B3a.15 - Problems solved by temporary measures or subject to testing	205
B3a.16 – Problems awaiting solution	2594

The backlog of investigations from AR22 being closed during AR23, has resulted in an increase in this category.

As part of our SR21 Management Approach, we are piloting an enhanced Mitigation Service to deliver temporary measures to areas which experience frequent/high impact external flooding and commit investment to reduce flood risk to customers impacted by repeat high consequence external sewer flooding where not disproportionately expensive which may improve future performance in this category.

8.2.5 Lines B3a.17-B3a.21 - Areas on the 1:10, 2:10, 1:20 at risk register - (iii) Annual changes to 1:10, 2:10, 1:20 register

B3a.17 - Removed by Scottish Water action

The number of areas reported in this category is has decreased from 44 in AR22 to 33 in AR23.

The 33 removals in AR23 resulted from Scottish Water delivering nine investment projects to reduce the risk of external sewer flooding. As part of this, Scottish Water has started to address the highest priority External At Risk Register areas delivering one project solely with an external flooding driver, which reduced the risk at 5 areas.

B3a.18 - Removed because of better information

The number of areas reported in this category has decreased from 45 in AR22 to 28 in AR23.

The data cleanse exercise in AR22 had caused an inflated number of removals in this category last year.

B3a.19 - Added because of better information

The number of areas reported in this category has increased from 97 in AR22 to 244 in AR23.

Additional resource was introduced to Scottish Water's Flooding Investigation Team enabling the closure of the backlog of internal investigations from AR22, as well as AR23 investigations. Many of these internal investigations had associated external flooding areas and the investigations of these clusters has resulted in an increased number of additions due to better information.

B3a.20 - Added because of increased demand

All additions to the External ARR are identified as being due to better information. Scottish Water carries out Network Impact Assessments for all new development, ensuring that they do not adversely impact the network. This negates the need to add properties due to increased demand.

For this reason, Line B3a.20 is reported as zero. We would be happy to discuss the possibility of removing this line in future Annual Return submissions.

B3a.21 - Moved from external to internal register

The number of areas reported in this category has increased from 2 in AR22 to 13 in AR23.

This increase may be attributed to the introduction of additional resource to Scottish Water's Flooding Investigation Team enabling the closure of the backlog of internal flooding investigations from AR22, AR23 investigations and external flooding project development.

During the investigation process for these internal flooding incidents, some properties previously recorded as at risk of external flooding were identified as having experienced internal flooding. This resulted in a number of locations being moved from the External ARR to the Internal ARR.

In addition, greater intelligence arising through the solution development process resulted in a small number of locations moving from the External ARR to the Internal ARR.

8.3 Investment

The enhancement of our Flooding Investigation Team enabling the closure of the backlog of investigations from AR21 and AR22 has seen a sharper rise in ARR additions in AR23.

However, our Management Approach (MA020) to reduce flood risk to customers impacted by repeat high consequence internal sewer flooding where not disproportionately expensive, combined with our ambition to never disrupt the lives of our customers or communities and never flood customers properties due to incapacity in our sewers under normal weather conditions, has seen us commit £56.52m so far in SR21 to deliver 31 capital projects to reduce the risk of internal sewer flooding to 99 properties and remove customers from our internal ARR. This investment has also reduced the risk of external flooding to 33 areas.

Our prioritised flooding programme currently has a latest best estimate of £188m of project value. Taking into account previous investment in SR15 for these prioritised projects the forecasted LBE for SR21 spend is £142m, which is expected to rise as projects mature.

The approved Investment Planning Scenario 2023 (IPS23) funding for the flooding programme (MA020) is £142m. Assuming such levels of investment in sewer flooding is available this may be spent before the end of the investment period to deliver a reduction on the risk of sewer flooding and removal of 165 properties from the internal ARR and 122 locations from the external ARR.

The ability of Scottish Water to achieve the forecast performance and investment is largely dependent on the weather experienced throughout the period. AR21/AR22 experienced a number of short duration high intensity storms resulting in a higher than forecast number of sewer overloading incidents.

Although AR23 experienced an increase in average rainfall, this encompassed less short duration high intensity storms and this, combined with fewer dry periods meaning ground conditions were more permeable because of consistent relatively high levels of saturation, meant that our sewer network was able to drain effectively, resulting in less sewer overloading incidents.

Should we experience a return to short duration high intensity storms with no respite over the remainder of the investment period, we may find that our actual number of sewer overloading incidents and ARR additions exceeds the forecasted numbers.

8.4 Data

8.4.1 Data sources and confidence grades

Data about external flooding is held on the following software packages:

- Cases/Calls regarding external flooding incidents and properties affected are held within Scottish Water Customer Relationship Management Software (CRM), Microsoft Dynamics
- Salesforce Field Service software collates flooding data and integrates with Microsoft Dynamics providing the Flooding Team with more detailed, accurate and comprehensive information regarding flooding incidents and affected locations.
- The Flooding Database which contains all external flood risk information, including the External “At Risk” Register, is held on InfoNet.

Scottish Water has adjusted the confidence grading for lines B3a.1 – B3a.10 from a B4 to an A4. The implementation of the new corporate Field Services software (Salesforce) implemented in January 2021, and rolled out throughout AR22/23, integrated with our corporate Customer Relationship Management software (Microsoft Dynamics), has greatly improved our data capture.

All incident and location data reported in these lines by the Flooding Team is now held in corporate systems, where data input follows an auditable process.

There is a known issue with property/area counts for external flooding incidents. Most external flooding incidents are currently reporting as one property or area affected. We plan to resolve this during AR24.

We intend to monitor the accuracy of this data over AR24 and forecast that we will increase our confidence grading to A3.

The AR23 and forecasted AR24 confidence grades for these lines are lower than the confidence grades given to the equivalent lines in Table B3 as the Flooding Investigation Team does not review all external flooding incidents. However, in AR23 we have started to review and assess high priority and high impact incidents, and this will continue in AR24, expanding to include medium priority cases.

Lines B3a.11-21 remain graded at B4 as per AR22. The data informing these reporting lines is held on a non-corporate, fully auditable database. The confidence grade given for these lines is lower than the confidence grade given to the equivalent lines in Table B3 as approximately 10%-15% of the External "At Risk" Register data is of poor quality; inherited from Scottish Water predecessor organisations.

8.4.2 AR23 Data Improvement Programmes

Mitigations Programme

Significant effort has been made to bring all data relating to mitigation measures together (B3a.15 and B3a.16). A new team has been created, focusing specifically on mitigating our customers' properties, meaning that our mitigations and the data behind them will be more robust going forward.

Whilst some data improvement relating to mitigation measures has occurred, the level of maturity is not sufficient to allow upgrade of confidence grade for these lines.

EFOS Investigation Programme

In AR23 we have started to review and assess high priority and high impact incidents.

AR24 Data Improvement Programmes

The following improvements are planned during 2023-24:

Flooding Database Upgrade

The Geographical Information System (GIS) corporate system is under investigation as a potential repository for all flooding and mitigation data.

- Increase of confidence grading from B4 to A4. (B3a.11 to B3a.21)
- Use of corporate system
- Auditable
- Controlled data entry
- Enhanced reporting capabilities

Salesforce/Microsoft Dynamics Location Count

There is a known issue with property/area counts for external flooding incidents. Most external flooding incidents are currently reporting as one property or area affected. We plan to resolve this during AR24.

EFOS Investigation Programme

In AR24 we will continue to review and assess high priority and high impact incidents and will expand the programme to include medium priority cases.

Mitigation Programme

Currently the reported figure for areas protected by temporary measures represents areas on the External ARR with any temporary measures, including those with temporary measures which only

protect against internal flooding out with our Internal ARR. Our intention in AR24 is to separate flood risk reduced by temporary measures into internal only and external only categories.

8.4.3 Assumptions used for forecast data

Forecasting has been provided for all lines in Table B3a.

Forecasting for Lines B3a.1-B3a.10 is based on 3-year and 5-year average incident and area data related to sewer flooding.

Forecasting for Lines B3a.11-B3a.21 is based on the current "At Risk" Register position and predicted additions and removals from the "At Risk" Register. These predicted additions and removals are based on historic addition trends and the status of the Flooding Programme.

Confidence grades for forecasted lines B3a.1 - B3a.21 have been set at C4. As above, the forecasted numbers are based on average / historic data as well as current status data. A 'C' grading is appropriate given the estimated nature of the forecast. It is recognised that most lines are highly weather dependant, therefore should we experience a return to an increase in short duration high intensity storms, the forecasted numbers may increase significantly.

9 Table B4: Customer service

9.1 Overview

Table B4 provides information on written complaints and telephone contacts received by Scottish Water. Scottish Water is reporting a decrease in the number of formal complaints received in AR23 i.e. 476 compared to 614 in AR22. In December and January, we had some challenges due to freezing weather and then a thaw with high levels of customer contacts, despite this our complaint levels only rose slightly in this period.

Despite of the high level of contacts in December and January, there has also been a decrease across AR23 in telephone contacts 320,907 compared to 324,939.

9.2 Performance Trends

B4.1 Formal complaints (number of written complaints received)

There has been a significant decrease in the number of formal complaints received in AR23 i.e., 476 compared to 614 in AR22, a decrease of 22%.

Table 44 below shows the change in volume and percentage across the service areas this year:

Table 44: Change in volume and percentage of formal complaints across service types for the AR23 period.

Service Type	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Total	Volume change AR22 to AR23	% Change AR22 to AR23
Byelaws	0	0	0	0	0	0	0	0	0	0	0	0	0.	0.	0%
CMA Data Amendment	1	0	0	0	0	0	0	0	0	1	1	0	3.	-4.	-57%
Connection	1	0	0	1	0	3	1	0	0	0	0	0	6.	5.	500%
Developer Connection	0	0	0	0	0	0	0	0	1	0	0	1	2.	1.	100%
Disconnections / Connections	1	0	0	0	0	0	0	0	0	0	0	0	1.	1.	100%
Enquiry	0	0	0	0	0	0	0	0	0	1	0	0	1.	-4.	-80%
Infrastructure	6	6	7	4	5	5	7	5	4	8	5	4	66.	-24.	-27%
Metering	0	3	0	0	0	2	1	0	2	0	0	0	8.	0.	0%
Planned Works/ Maintenance	1	2	1	0	1	0	2	3	1	1	3	3	18.	4.	29%
Waste Water	18	14	12	11	16	11	18	10	12	15	11	19	167.	-42.	-20%
Water Quality	2	0	1	0	0	1	1	1	0	0	0	0	6.	-8.	-57%
Water Supply	13	14	10	11	26	16	17	17	23	14	14	22	197.	-68.	-26%
Wholesale Allowance	0	0	0	0	0	0	1	0	0	0	0	0	1.	1.	100%
Total: Apr 22 - Mar 23	43	39	31	27	48	38	48	36	43	40	34	49	476.	-138.	-22%

The top three Service Types of complaints in AR22 remain the top three in AR23 these are Infrastructure, Wastewater and Water Supply. All three Service Types have all reduced from AR22 as shown in Table 45.

Table 45: Top 3 service types for complaints across the AR23 period.

Service Type	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Total	Volume change AR23 to AR22	% Change AR23 to AR22
Infrastructure	6	6	7	4	5	5	7	5	4	8	5	4	66.	-24.	-27%
Waste Water	18	14	12	11	16	11	18	10	12	15	11	19	167.	-42.	-20%
Water Supply	13	14	10	11	26	16	17	17	23	14	14	22	197.	-68.	-26%

The main Service Reasons for each of the top 3 Service Types complaints changes AR23 to AR22 is as noted below: -

Infrastructure – of the reduction of 24 complaints in the above table the main changes between AR23 and AR22 in the Service Reason for the complaint were: a decrease of 14 complaints relating to 'Cover / Ironwork Fault / Fix'; and a decrease of 8 complaints relating to 'Issue with Scottish Water Premise'

Wastewater – out of the reduction of 42 complaints in the above table, the main changes between AR23 and AR22 in the Service Reason for the complaint were a decrease of 28 complaints relating to 'Choke / Blockage' and a decrease of 8 complaints relating to 'Odour from Sewer'.

Water Supply – out of the reduction of 68 complaints in the above table, the main changes between AR23 and AR22 in the Service Reason for the complaint were a decrease of 46 complaints relating to 'Burst / Leak', a decrease of 14 complaints relating to 'Pressure / Intermittent Supply' and a decrease of 8 complaints relating to 'No Water'.

B4.2 Regulator upheld complaints

Scottish Water is reporting zero regulator upheld complaints in AR23. Which is the same as in AR22.

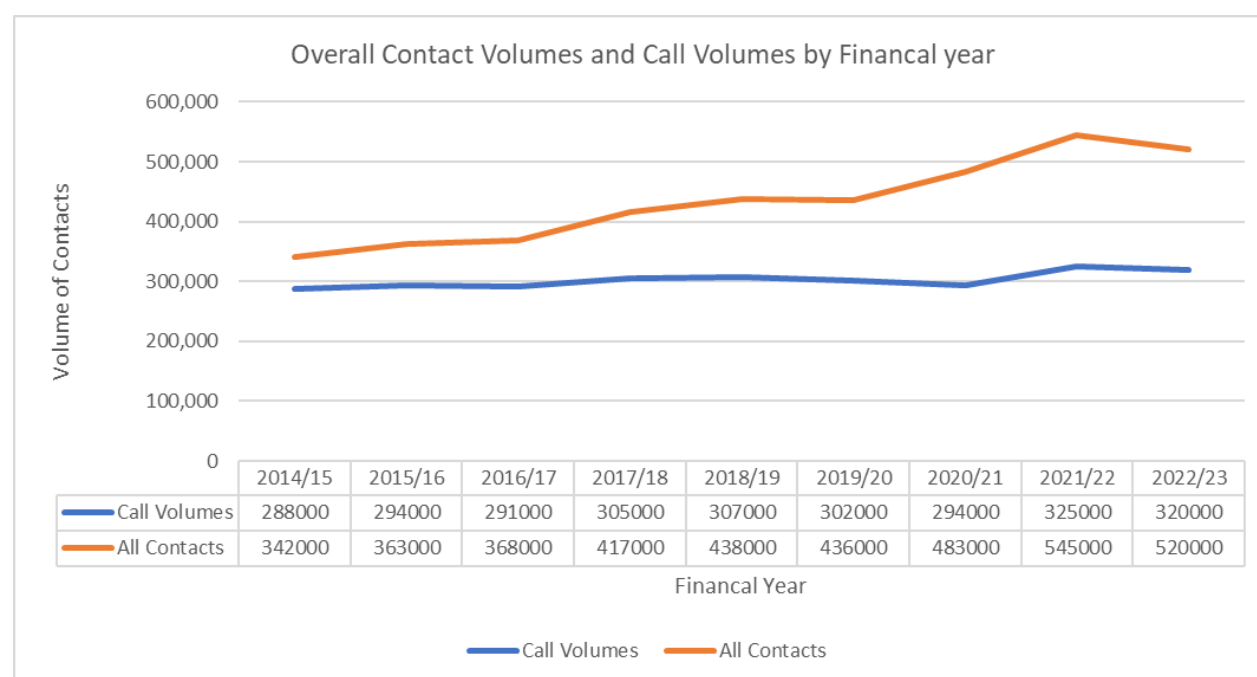
B4.3 No. dealt with within 5 working days

All 476 complaints were dealt with within 5 working days. This mirrors AR22's performance of all 614 which were also dealt with within 5 working days.

9.2.1 Lines B4.4-B4.11 - Telephone Contacts

Telephone is still the main channel of choice for our customers with 61% of all contacts being by telephone; however, we have seen other channels share of the overall contacts increasing. Some of these channels are captured within Household CEM in Lines B5.18 E-mail contacts, B5.19 Social Media Contacts and B5.20 Portal tables. Figure 14 below shows the trend of customers using all contact channels v call volumes only. (Figures rounded to the nearest 1000).

Figure 14: Overall contact and call volumes by financial year from 2014/15 to 2022/23.

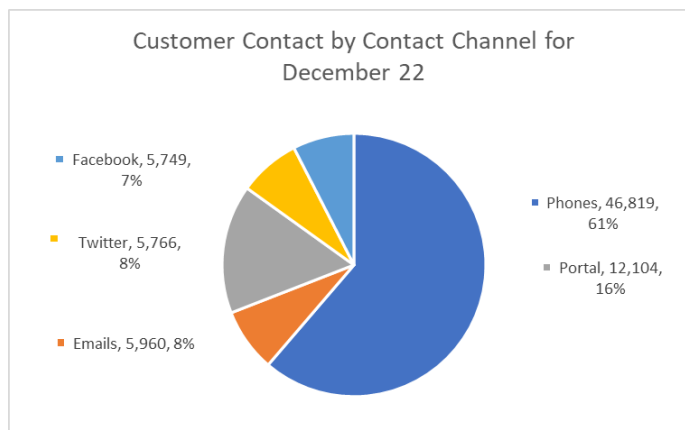


B4.4 Total calls received on customer contact lines

We received 320907 calls in AR23 compared to 324,939 calls in AR22, a drop of 4,032 calls or an overall 1.24% decrease against AR22. B4 Figure 3 below shows the calls received on customer contact telephone lines broken down by month. With call volumes less than AR22 for the first 8 months of the year, this was followed by a spike in calls in December which continued in January.

In total, we received over 75,000 contacts across all channels for the month of December, as shown in Figure 15, and there were over 172,000 website visits to our Current Service Updates page in the month.

Figure 15: Breakdown of customer contacts by channel for December 22.

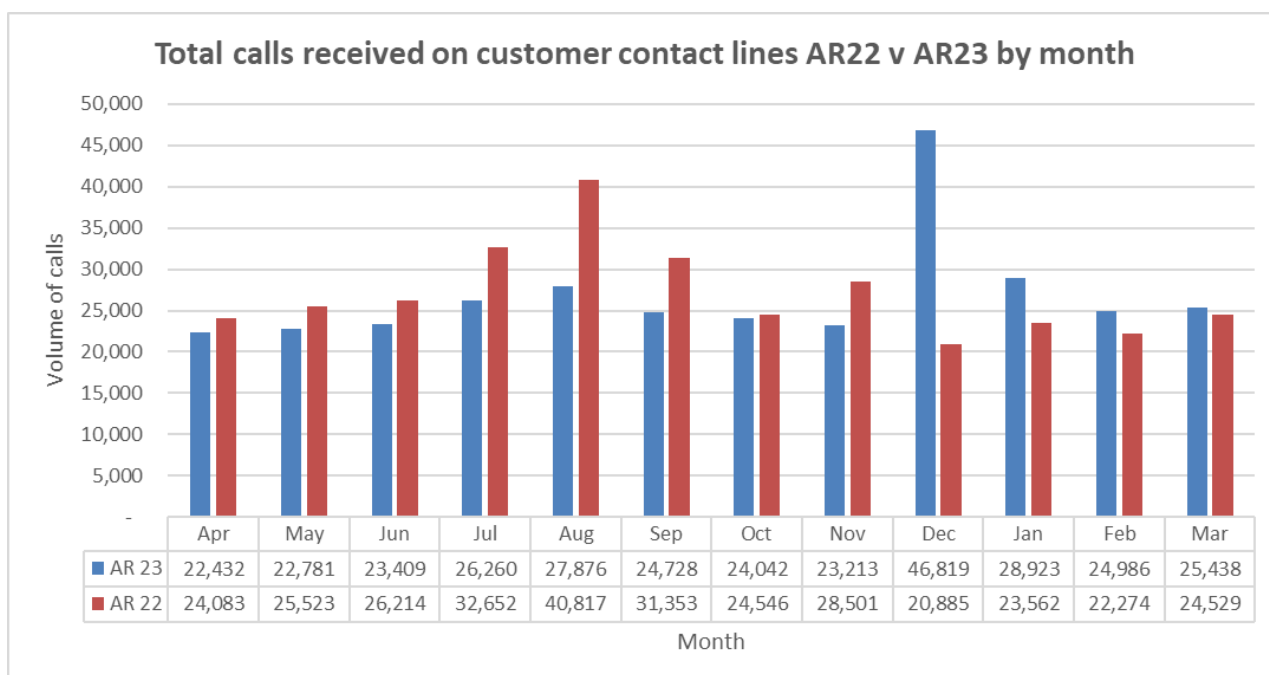


During December, Scotland experienced a period of disruptive winter weather including snow, freezing temperatures and flooding. Temperatures dropped below freezing in most parts of the country from the 3 December and between 8 and 14 December they widely reached between -6 and -11°C. This was followed by a rapid thaw between 17 and 19 December.

These conditions resulted in an increase in burst water pipes, both in Scottish Water's own network as well as in customer properties and commercial premises, as well as customers experiencing a loss of water supply due to frozen private services. For further detail on burst water pipes this can be found in Line E6.19 of the commentary.

Teams worked hard to maintain and restore supplies to customers and support them with private frozen pipe issues where possible, we had over 200 people trained within a 48-hour period to assist customers calling us and provided a rapid response bottled water service to around 2000 customers. In the same month we saw Go the Extra Mile (GEM) nominations increase from 115 in November to 157 in December, confirming whilst it was a challenging time for customers and Scottish Water colleagues many customers did appreciate the efforts being made.

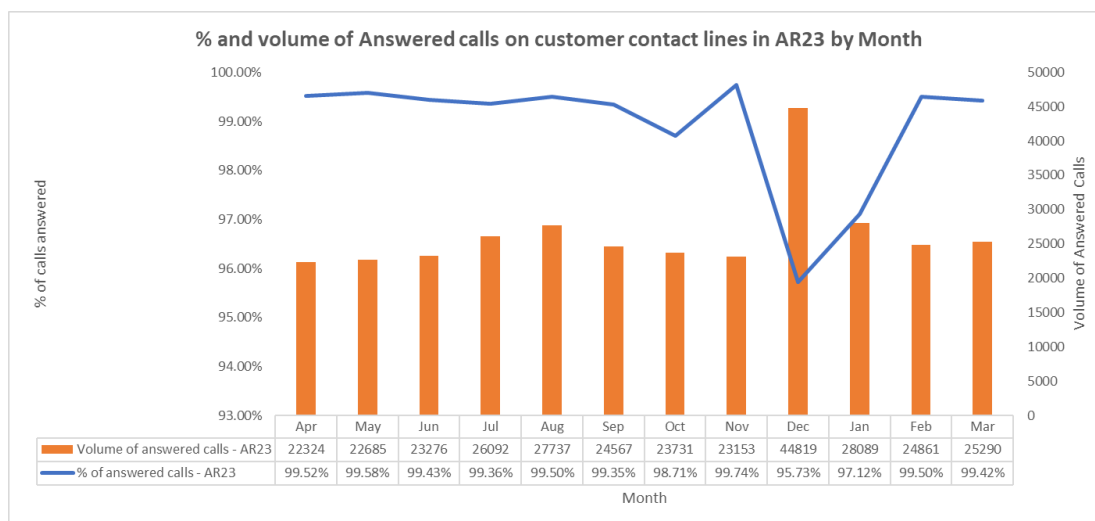
Figure 16: Total calls received on customer contact lines by month for AR22 and AR23.



B4.5 Total calls answered on customer contact lines

We answered 316,624, or 98.66%, of calls in AR23 compared to 311,494 or 95.86% in AR22. As with Line B4.6 performance dropped in December and January due to the issues discussed in B4.4. Figure 17 below shows the impact of December and January on the % of calls answered and the volume answered. With December having 44819 answered calls the highest of the year, however December was also the lowest % of calls answered at 95.73%. January had the second highest answered calls at 28089 and the second lowest % of calls answered at 97.12%.

Figure 17: Percent and volume of answered calls on customer contact lines per month for AR23.



B4.6 Total calls answered within 30 seconds on customer contact lines

There were 273,906 calls, or 85.35% of calls, answered within 30 seconds compared to 262,259 calls, or 80.71% of calls, answered within 30 secs in AR21.

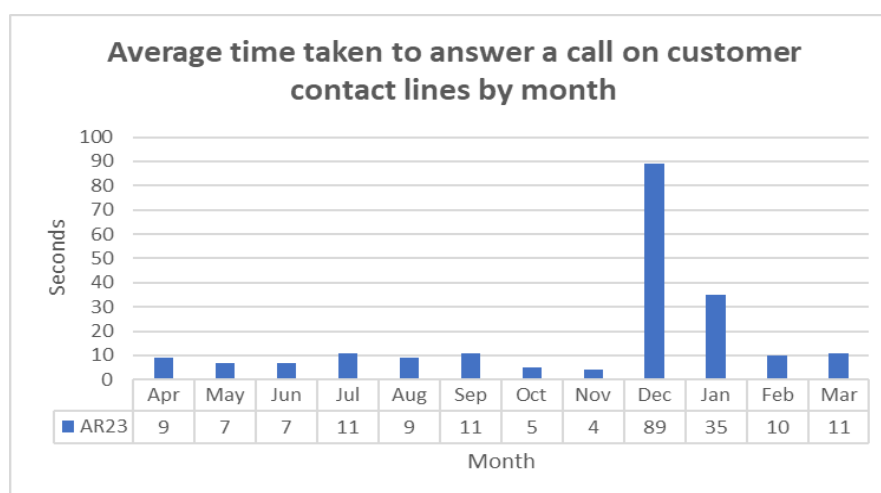
B4.7 Total calls answered in more than 30 seconds on customer contact lines

There were 42,718 calls answered in more than 30 seconds (13.31%) compared to 49,235 (15.15%) calls in AR23.

B4.8 Average time taken to answer a call on customer contact lines

The average time taken to answer a call on customer contact lines was 20 seconds compared to 60 seconds in AR22. Figure 18 below shows the individual months average time, which shows the impact on our service in December when average time to answer a call increased to 89 seconds and then into January when it dropped to 35 seconds, which was above our third highest time of 11 seconds. In these months extra resource was brought in using our external additional call handler Teleperformance and volunteers within Scottish Water trained up to help manage the high spike in call volumes.

Figure 18: Average time taken (seconds) to answer calls on customer contact lines per month for AR23.



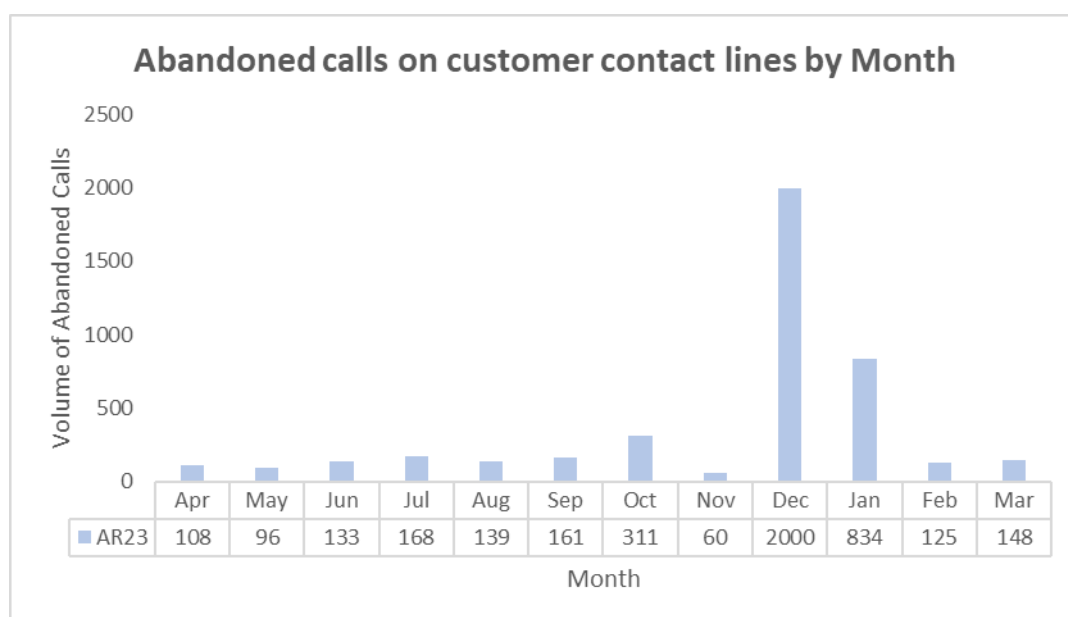
B4.9 All lines busy

There were zero instances of all lines busy compared to 1 in AR22.

B4.10 Total of abandoned calls on customer contact lines

The Total of abandoned calls on customer contact lines were 4,283 calls compared to 13,445 calls in AR22. Figure 19 below shows the split of these contact over the year and highlights the impact of December and January on the volumes.

Figure 19: Abandoned calls on customer contact lines by month for AR23.



B4.11 Total Telephone complaints

The total number of telephone contacts recorded at initial conversation as a complaint/fault was 94,251 compared with 100,084 in previous year. Looking at the four main service areas of contacts these are the main trends Wastewater contacts increased by 0.4 % or 123 contacts increase from AR22, Water Supply and Water Quality have reduced by 6.7% and 29.4% or 3153 and 3880 contacts from AR22, and Infrastructure (missing/damaged ironwork) has seen a slight increase of 6.9% or 851 contacts from AR22. This information is shown in Table 46 below.

Table 46: 4 main service areas of telephone complaints across the AR23 period.

Service	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Total	Diff to AR22
Infrastructure	1077	1033	1015	1032	1255	1055	993	1053	1104	1145	1137	1283	13182	851
Waste Water	2312	2345	2149	2131	2226	2251	2088	2281	1970	2611	2490	2837	27691	123
Water Quality	650	724	939	1027	1082	881	830	812	532	562	619	647	9305	-3880
Water Supply	3022	2765	3235	3761	4197	3447	3376	3615	5874	3820	3312	3203	43627	-3153

9.3 Data

9.3.1 Data sources and confidence grades

In this reporting year data for customer contacts and written complaints is taken from our Customer Record Management MS *Dynamics*. Telephone statistics come direct from calls logged on Scottish Water's telephony management system, *Puzzel*.

There have been no changes to confidence grades from AR22.

9.3.2 Data improvement programmes

There were no data improvement programmes this year.

9.3.3 Assumptions used for forecast data

The forecast for Line B4.1 is a roll up of the forecast for lines B5.7, B6.5 and B6.31

The forecast ranges for Lines B4.4, B4.9 and B4.10 are based on the last 5 years of data, with Lines B4.5 to B4.8 and B4.11 are based on the data of the last 3 years with the highest volume being the top of the range and the low volume being the bottom.

10 Table B5: Household customer service

10.1 Overview

The purpose of the Household Customer Experience Measure (hCEM) is to capture service levels delivered to household customers and provide a robust means of measuring the quality of, and tracking changes in, the service experience provided to household customers. Performances against a number of quantitative and qualitative indicators are combined to produce an Annual hCEM Score out of 100.

For SR21 we have updated the methodology by the removal of the All lines busy/Calls Abandoned element and the addition of an Escalation element. Throughout AR21 we successfully ran the SR15 and SR21 hCEM measures in parallel to test whether these were comparable, confirming that the changes would not result in significant differences in the measurement.

10.2 Performance Trends

10.2.1 Lines B5.1-B5.8 - Household CEM

B5.1 hCEM overall score

The hCEM overall score increased from 86.09 in AR22 to 86 (rounded from 86.45) in AR23, an increase of 0.36.

The improvement was driven on the Quantitative side of the measure with all the elements performing better or remaining on par from AR22. Reductions in Escalations and Formal Complaints having a positive impact and improving the overall quantitative component.

On the qualitative side of the measure only the Customer Experience Survey improved from AR22.

In our forecasting for AR24, we have selected a mid-point from our predicted range for each of the individual hCEM components (as reported in other B5 lines below). However, for forecasting the Overall Score we have calculated that score using the individual mid-point values forecast for each component.

B5.2 Customer experience survey

Customer experience survey (CES) has increased from 92.39% in AR22 to 92.41% in AR23, an increase of 0.02%, as shown in B5 Table 1 below. The number of surveys returned increased from 15,181 in AR22 to 16,052 in AR23, this has increased due to more survey's being sent out in AR23. With Septic tanks HH having greater volume of surveys due to extra contractors being utilised to reduce backlog work and Water Quality returns also increasing due to a review of open cases which when no further work was required these cases would be closed. There was a higher proportion of surveys in the 5-7 scores bracket which had the effect of driving up the satisfaction score.

Table 47: Customer experience survey scores for AR22 and AR23.

CES Survey	AR23	% of total	AR22	% of total	Change	% Change
1-4 Scores	1218	7.59%	1155	7.61%	63	-0.02%
5-7 Scores	14834	92.41%	14026	92.39%	808	0.02%
Total Returns	16052	100.00%	15181	100.00%	871	

Table 48 below looks at the three largest elements of the survey Septic Tanks HH (household), Water Supply and Wastewater, there has been improvements in Septic Tanks HH and Wastewater with a slight dip in Water Supply. Septic Tanks HH had a very positive year improving by 0.89% from AR22 to AR23, this was in part due to contractors being employed so backlog tanks were being emptied and the planning team were dedicating a large portion of time doing call backs to keep customers informed about delays and prioritising emergency de-sludges.

Table 48: 3 largest areas of customer experience survey for AR22 and AR23.

Service area	% of return volume AR23	AR23 score	AR22 score	Difference between AR23 - AR22
Septic Tanks HH	25.45%	94.98%	94.09%	0.89%
Waste Water	42.25%	92.32%	92.08%	0.24%
Water Supply	26.20%	92.18%	92.26%	-0.08%

Table 49 below shows the Septic Tanks HH and CES Performance since AR20. With Septic Tanks HH individual score always above the CES score in every AR year in the table

Table 49: Septic Tanks HH performance since AR20.

	Septic tanks HH	CES	Difference Between Septic tanks and CES
AR23	94.98%	92.41%	2.57%
AR22	94.09%	92.39%	1.70%
AR21	96.53%	94.09%	2.44%
AR20	94.33%	93.31%	1.03%

Table 50 below shows the volume of Wastewater returns and % of those returns against all the returns. Wastewater has always made up the largest % of returns, so this year's split is following the usual trend.

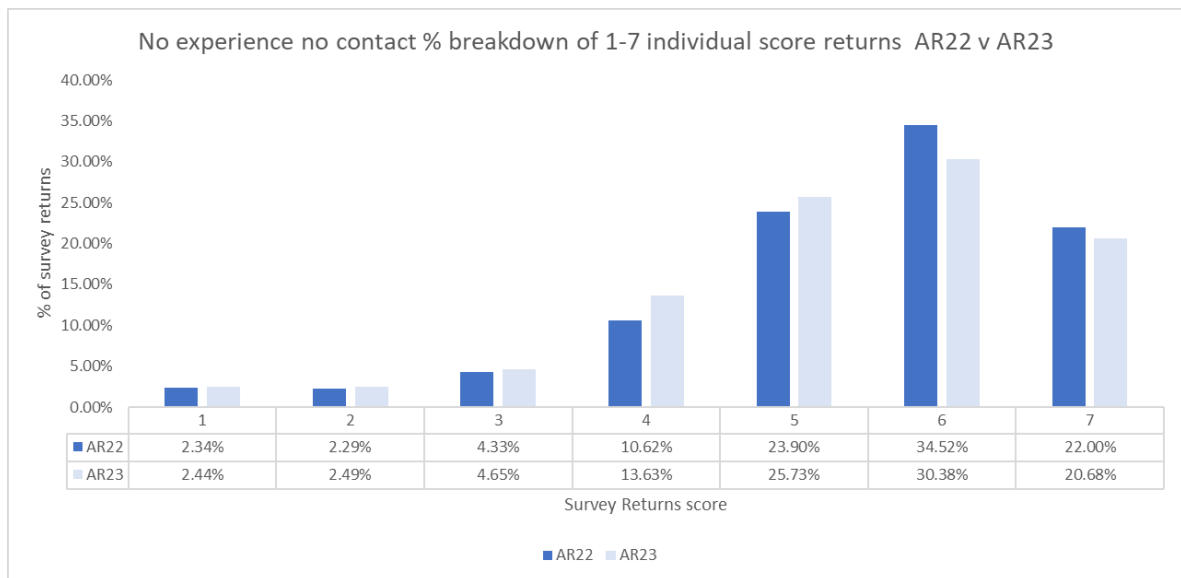
Table 50: Number of wastewater returns and percent of total returns.

	Wastewater Returns	% of Wastewater Return of all Returns
AR23	6782	42.25%
AR22	6426	42.33%
AR21	7872	51.85%
AR20	7650	50.39%

B5.3 No experience no contact

No experience no contact has decreased from 93.46% last year to 91.70% this year, a decrease of 1.76%. When looking at the scoring of the survey returns there is a movement from the very satisfied and satisfied score 7 and 6 to the less satisfied score of 5 and the neither dissatisfied nor satisfied score of 4. This is visualised in Figure 20 below.

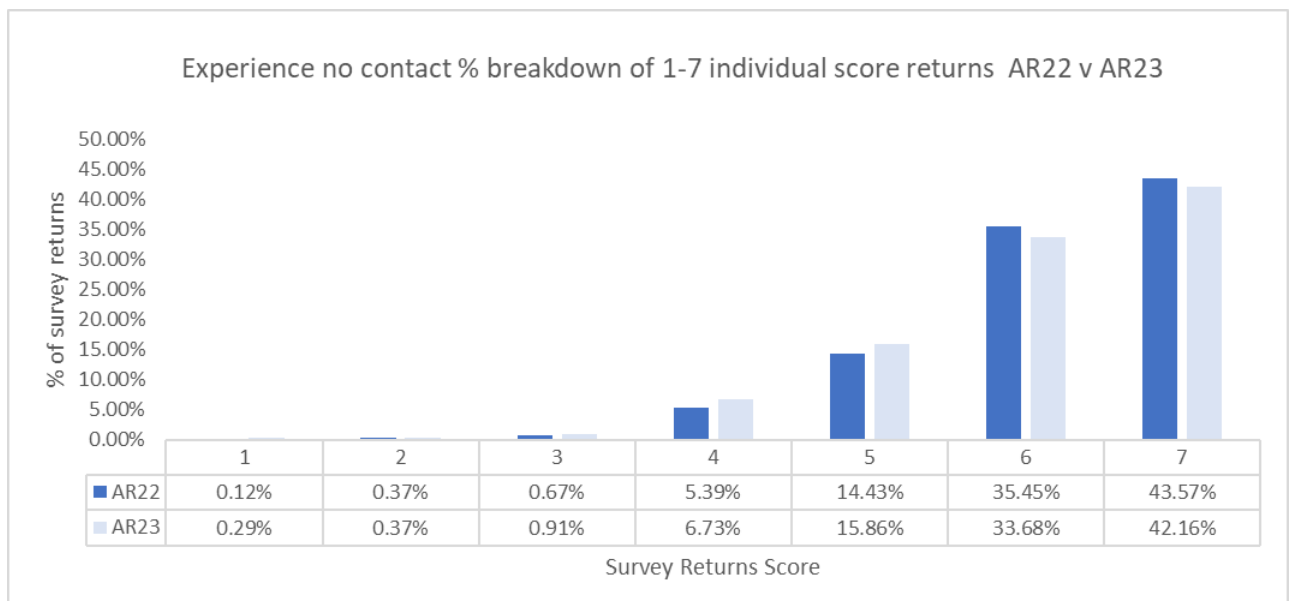
Figure 20: Percent breakdown of “No experience no contact” 1-7 individual score returns for AR22 and AR23.



B5.4 Experience no contact

Experience no contact has decreased from 80.42% last year to 76.79% this year, a decrease of 3.63%. When looking at the scoring of the survey returns this has a similar trend to **Line B5.3** with movement from the very satisfied and satisfied score 7 and 6 to the less satisfied score of 5, and the neither dissatisfied nor satisfied score of 4. This is visualised in Figure 21 below.

Figure 21: Percent breakdown of “Experience no contact” 1-7 individual score returns for AR22 and AR23.



B5.5 Escalations

Escalations have decreased from 769 in AR22 to 559 in AR23, a decrease of 210. This has been across the majority of the categories with the three main areas Water Supply, Wastewater and Infrastructure (missing/damaged ironwork) all decreasing, as shown in Table 51 below.

Table 51: hCEM escalations across the AR23 period.

hCEM 22-23	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	YTD	Volume change AR22 to AR23	% Change AR22 to AR23
Enquiry	2	8	7	7	9	12	8	3	5	5	6	3	72	6	0.78%
Infrastructure	3	12	11	10	21	13	12	12	3	6	9	11	112	-35	-4.55%
Metering	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00%
Planned Works/ Maintenance	1	0	2	0	1	1	0	1	0	0	1	1	7	-11	-1.43%
Waste Water	12	15	11	13	13	16	8	12	7	21	23	13	151	-133	-17.30%
Water Quality	1	4	4	1	2	1	2	1	0	2	1	1	19	-16	-2.08%
Water Supply	9	8	11	14	32	14	13	10	26	12	6	14	155	-64	-8.32%
Total	28	47	46	45	78	57	43	39	41	46	46	43	559	-210	-27.31%

B5.6 Service issue contacts

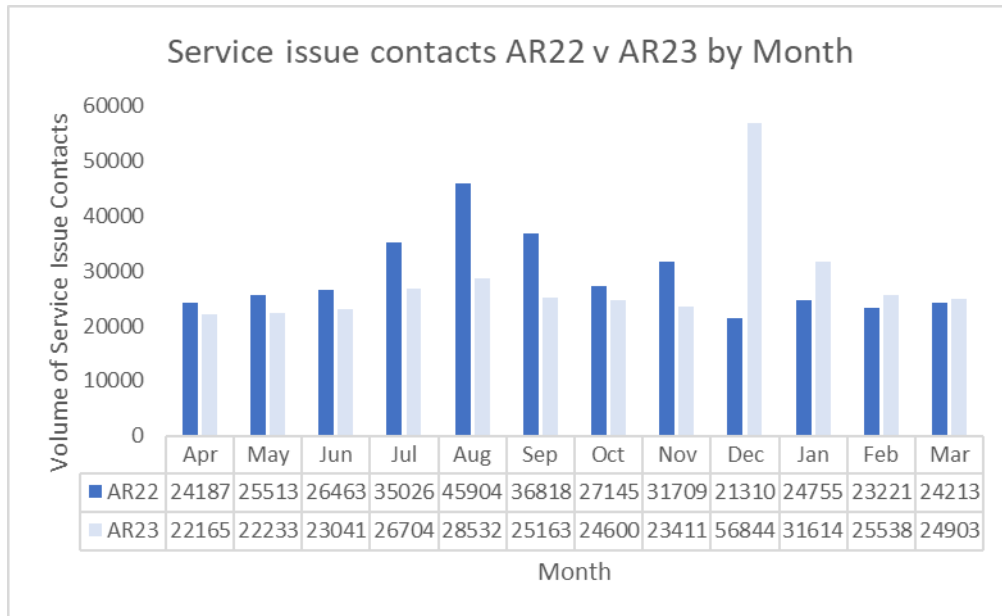
Service issue contacts decreased from 346,264 in AR22 to 334,748 in AR23, a decrease of 11,516 or 3.33%.

In AR23 customers are continuing to use telephone as the main way to contact Scottish Water to report a fault, however we have seen more customers using our portal in AR23. As with Line B4.4 there is a very similar trend in Service Issue Contacts, the first 8 months of AR23 having less contacts than the same period in AR22. This was followed by a spike in calls in December 2022 which continued in January 2023, as shown in Figure 22 below. During December, Scotland experienced a period of disruptive winter weather including snow, freezing temperatures and flooding. Temperatures dropped below freezing in most parts of the country from 3 December and between 8 and 14 December they widely reached between -6 and -11 degrees Celsius. This was followed by a rapid thaw between 17 and 19 December 2022.

These conditions resulted in a widespread increase in burst pipes, both in Scottish Water's own network as well as in customer properties and commercial premises, as well as customers experiencing a loss of water supply due to frozen private services.

In some areas the increase in demand caused by burst pipes led to demand outstripping supply resulting in action needing to be taken to protect customer supplies.

Figure 22: Service issue contacts by month for AR22 and AR23.



B5.7 Formal complaints

Formal complaints have decreased from 469 in AR22 to 307 in AR23, a decrease of 162, or 34.54%. Table 52 below shows the volume and % change from AR22 to AR23 for the top three areas of complaints, Wastewater, Water Supply and Infrastructure (missing or faulty cover) all decreasing.

Table 52: Top 3 areas for formal complaints across the AR23 period.

	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Total	Vp time Change AR22 to AR23	%Change AR22 to AR23
Infrastructure	5	6	6	4	5	4	6	5	3	6	5	4	59	-27	-31.40%
Waste Water	14	9	9	9	14	9	13	7	7	11	7	15	124	-63	-29.94%
Water Supply	8	2	4	6	17	7	9	6	15	10	10	12	106	-88	-39.08%

Table 53 below compares AR23 against the average for AR20 to AR22 for each of the top three areas which shows a reduction over the three main service types.

Table 53: Top 3 area comparison to AR20-22 average.

Service Type	AR20 to AR22 Average	AR23	AR23 v 3 Year Ave	AR23 v 3 Year Ave %
Infrastructure	76	59	-17	-22.37%
Waste Water	161	124	-37	-22.98%
Water Supply	146	106	-40	-27.40%

The main Service Reasons for each of the top 3 Service Types complaints changes AR23 to AR22 is as noted below: -

Infrastructure – out of the reduction of 27 complaints in the above table, the main changes between AR23 and AR22 in the Service Reason for the complaint were a decrease of 14 complaints relating to 'Cover / Ironwork Fault / Fix' and a decrease of 8 complaints relating to 'Issue with Scottish Water Premise'

Wastewater – out of the reduction of 53 complaints in the above table, the main changes between AR23 and AR22 in the Service Reason for the complaint were a decrease of 38 complaints relating to 'Choke / Blockage' and a decrease of 8 complaints relating to 'Odour from Sewer'.

Water Supply – out of the reduction of 68 complaints in the above table, the main changes between AR23 and AR22 in the Service Reason for the complaint were a decrease of 44 complaints relating to 'Burst / Leak', a decrease of 14 complaints relating to 'Pressure / Intermittent Supply' and a decrease of 6 complaints relating to 'No Water'.

B5.8 Regulatory upheld complaints

There were zero regulatory upheld complaints in AR23. This mirrors our performance from AR22.

B5.9 - Customer Satisfaction Survey

This was a call handling survey which we no longer measure and have no equivalent. However, when this was last reported the figure was 4.67.

10.2.2 Lines B5.10-B5.16 - Assessed Customer Service

Scottish Water no longer captures Assessed Customer Service performance for OPA, as of April 2021 and, therefore, the information is no longer available. As our score has not changed since SR15, we assume that performance has been maintained. The Assessed Customer Service score is used to calculate the SR15 OPA for comparative purposes. A fixed score of 37.5 is used for the calculation as this was consistently achieved throughout the 2015 – 2021 period. We suggest that these lines are deleted for future Annual Returns. However, for completeness, we have repeated our most recent commentary (pre-SR21) for the component lines below.

B5.10 Revenue and Debt Collection

Scottish Water's performance in relation to revenue and debt collection from domestic customers is dependent on the performance of the thirty-two local authorities (LAs) who manage these customer relationships along with us. Scottish Water also manages a few metered domestic customers.

It is not practical to measure the performance of each of the 32 LAs. The assessment previously included a sample of five LAs plus our metered customer revenue and debt collection facilities. The sample LAs chosen were Clackmannanshire, Glasgow City, Scottish Borders, Shetland Islands and South Ayrshire. WICS had previously endorsed this approach following trial assessment with What Works Scotland.

We have not altered this since WaterWatch Scotland (WWS) was disbanded on the 15 August 2011, as Scottish Water has little or no ability to alter the way in which LAs decide to bill customers. There is also a scoring element within this section which relates to the Watervoice Assessment of debt and revenue collections, as Watervoice no longer exists as an organisation its views of the debt and revenue procedures of the 32 LAs cannot be ascertained.

Given actual data is not available and for the purposes of this submission, we have reported the previous year's score of 2.

B5.11 Information to Customers

We do not send any unsolicited mail, apart from our leaflet explaining charges, to our customers. All of the required information is available on our website or available upon request. Our approach of not sending unsolicited mail is a positive feature, as this in itself can be a cause for complaint for customers.

Given actual data is not available and for the purposes of this submission, we have reported the previous year's score of 1.

B5.12 Telephone Contact Hours

We operate a 24/7 Customer Engagement Centre, and this has not changed since 2002. For the purposes of this submission, we have reported the previous year's score of 1.

B5.13 Compensation Policy

We previously operated two compensation policies for customers, the Guaranteed Service Standards (GSS) and Price Promise compensation policy. From year commencing 2015/16 Scottish Water has combined these two policies and increased the standard value of what was the GSS compensation policy from £20, to £30. The new Service Standards policy remains similar in structure to previous years.

Given actual data for this line is not available and for the purposes of this submission, we have reported the previous year's score of 1.

B5.14 Supply Pipe Repair Policy

We operate a supply pipe repair policy and publicise this to customers via our website. Specific data on this measure is no longer captured. We have therefore reported the previous year's score of 1.

B5.15 Service for Disabled and Elderly Customers

We use our website to let customers know about the additional services we provide to meet the needs of those in vulnerable circumstances. Scottish Water operates a Priority Services Register to prioritise these customers in the event of a loss of supply. Specific data on this measure is no longer captured. We have therefore reported the previous year's score of 1.

B5.16 Complaints Handling

The written complaints audit underwent changes after WWS was disbanded in August 2011. WWS audited 25 complaints selected randomly on an annual basis. In agreement with WICS, we moved to a method of ongoing self-assessment for this measure, whereby 25 randomly selected complaints were audited under the same criteria on a quarterly basis. The average score recorded from the four quarterly periods was used to calculate the performance for this section. Specific data on this measure is no longer captured. We have therefore reported the previous year's score of 1.

This audit no longer takes place as there is no ongoing OPA requirement.

10.2.3 Lines B5.17-B5.24 - Service Issue Contacts – household customers

Over the course of the year there were 334,748 (Lines B5.6 and B5.24) service issue contacts received from household customers by our Customer Engagement Centre. This is a drop of almost 12,000 on the previous year.

The individual elements are outlined below.

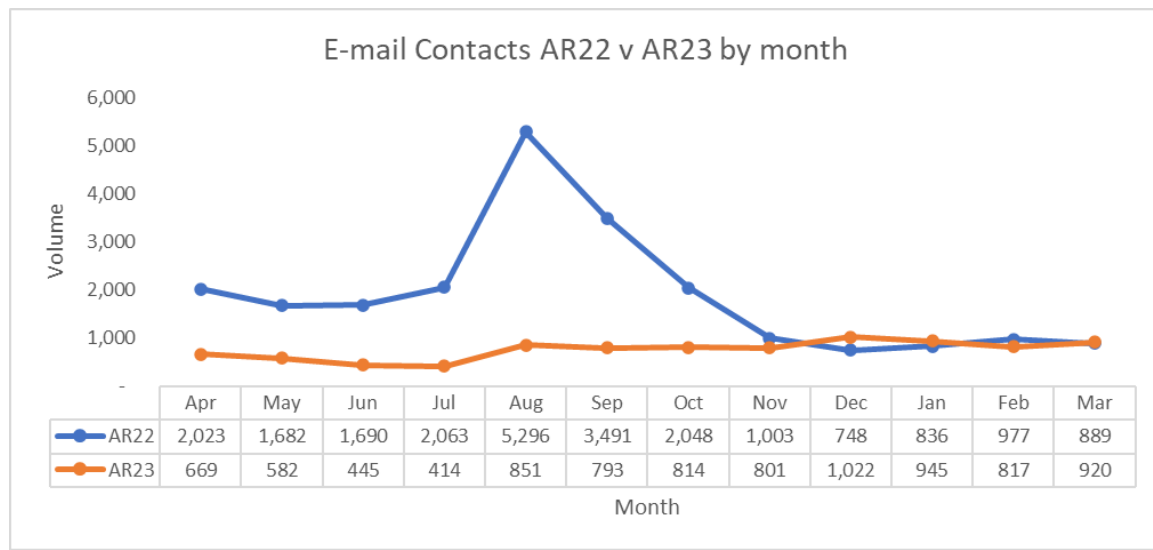
B5.17 Phone Contacts

Phone Contacts decreased from 320,254 last year to 316,432 this year, a decrease of 3,822, or 1.19%. This line follows the same trend as Lines B4.4 and B5.6.

B5.18 E-mail Contacts

E-mail Contacts decreased from 22,746 last year to 9,073 this year, a decrease of 11,451, or 60.11%. Figure 23 below shows the change in email volumes with the first 8 months of AR23 showing an improvement on AR22. The reason for the change in trend seen in December and January is discussed in Line B5.6 above. For reference in AR22 between August 2021 and October 2021 elevated manganese levels were experienced throughout the Daer operational area resulting in multiple manganese PCV failures and extensive customer contacts affecting a population of 329,347.

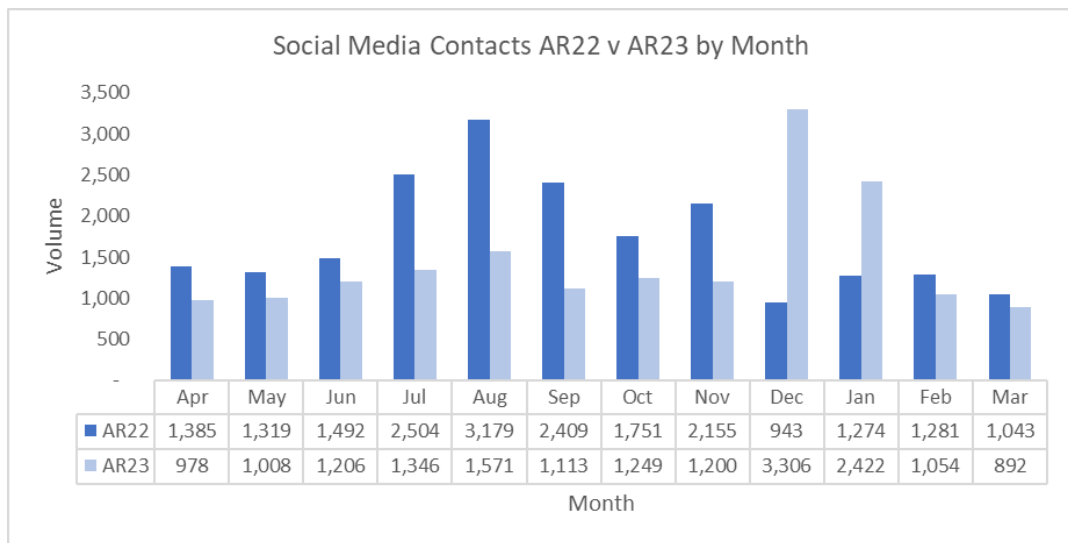
Figure 23: Email contacts per month for AR22 and AR23.



B5.19 Social Media Contacts

Social Media Contacts have decreased from 20,735 last year to 17,345 this year, a decrease of 3,390, or 16.35%. Following a similar trend to Phone calls and emails (Lines B5.17 and B5.18) Figure 24 below shows volumes below AR22 levels for the first 8 months of AR23 before spiking in December and January as discussed in B5.6 above.

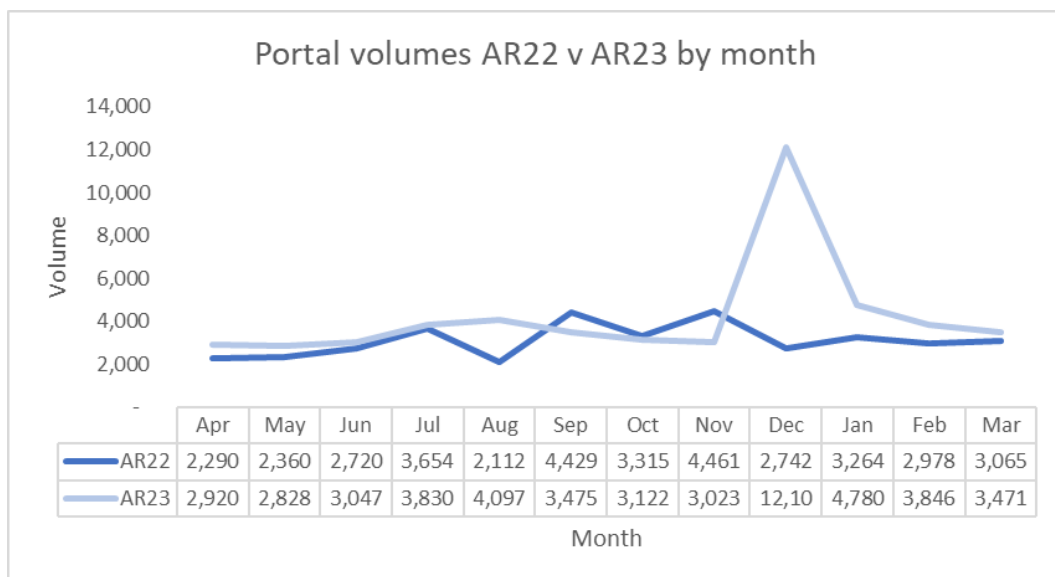
Figure 24: Social media contacts per month for AR22 and AR23.



B5.20 Portal

Portal contacts have increased from 37,390 last year to 50,543 this year, an increase of 13,153, or 35.18%. In AR23 this is the only increasing contact channel with customers moving away from email to the portal, also during busy times on main contact channel (telephone) customers are made aware of the online portal to report a fault as an alternative. B5 Figure 25 below demonstrates the majority of months have increased on AR22 levels and previously mentioned in prior lines December and January had spikes in volumes.

Figure 25: Portal contact volumes per month for AR22 and AR23



B5.21 Total Contacts

This year saw a decrease in the total number of contacts from 401,125 in AR22 to 393,393 in AR23, down 7,732 or 1.93%.

This was across the majority of our customer contact channels with the exception of portal contacts which increased.

B5.22 Wanted Contact

Wanted Contact increased from 34,929 last year to 38,729 this year, an increase of 3,800, or 10.88%.

The increase in wanted contacts is mainly due to the improved reporting of additional calls from the customer after their initial contact. A process was developed to categorise these contacts allowing Scottish Water to get a better understanding of these calls. From this improvement in data capture, we are now able to identify calls from a customer's point of view. For example, to alter an appointment, phone back as requested by Scottish Water or offer praise after a visit. Table 54 below shows the top five service reasons and volume of contacts for each of the three examples above.

Table 54: Top 5 service reasons and volume of contacts for call backs, praise and appointment alteration. For AR23.

Service Reason	Call back as per SW	Praise - Work complete and no further issues	Rearrange/Cancel attendance	Total
Choke / Blockage	388	89	285	762
No Water	325	14	313	652
Pressure/Intermittent Supply	165	12	245	422
Burst / Leak	222	29	121	372
Toby	108	32	175	315

B5.23 Non-household Contacts

Non-Household Contacts increased from 19,932 in AR22 to 19,916 to AR23, a decrease of 16, or 0.08%. Refer to **line B6.14** for further details.

B5.24 Total Service Issue Contacts (total 'unwanted' HH contacts)

This is the same as **Line B5.6** (see above).

Lines B5.25-B5.30 - Household Customer Experience

These lines report the various numbers of survey responses and are used to calculate components of the hCEM qualitative score.

B5.25 Customer experience survey – total

This increased from 15,181 last year to 16,052 this year, an increase of 871, or 5.74%.

B5.26 Customer experience survey – satisfied

This increased from 14,026 last year to 14,834 this year, an increase of 808, or 5.76%.

B5.27 No experience, no contact survey – total

The total increased from 4,166 last year to 4,371 this year, an increase of 205, or 4.92%.

B5.28 No experience, no contact survey – satisfied

This increased from 3,893 last year to 4,008 this year, an increase of 115, or 2.96%.

B5.29 Experience, no contact survey – total

This decreased from 1,370 last year to 1,189 this year, a decrease of 181, or 13.20%.

B5.30 Experience, no contact survey – satisfied

This decreased from 1,102 last year to 913 this year, a decrease of 189, or 17.14%.

10.2.4 Lines B5.31-B5.42 - Household Customer Experience Measure

10.2.5 B5.31 Household customer experience target (range)

This changed to a target range of 85.0-87.78 for AR22 and has remained unchanged for AR23. For the purposes of the WICS information request we have established a baseline figure of 85, which is the lower point of the target.

B5.32 Household customer experience - total score

This is the same as **Line B5.1**.

The reported score in this line is the sum of lines B5.34 and B5.39. The confidence grade for this line is B3 reflecting the confidence grades for Line B5.34 and B5.39.

B5.33 Total connected properties at year end

The total is 2,626,703 for AR23. This represents an increase from the 2,607,784 reported in AR22 of 18,919. As in previous years we cannot calculate this number using the definition provided, as we cannot count connections to individual properties. As such this figure is the sum of Lines A1.6 and A1.7, which is the total number of properties (measured and unmeasured) connected to Water. Water is used as proxy for total connected properties as it has a higher number of connected properties compared to Wastewater

B5.34 hCEM quantitative score

This is 42.83 for AR23 and represents an increase from the 41.74 reported in AR22 of 1.09. The improvement to the score was driven mainly by reductions in the Formal Complaint and Escalation elements in lines B5.36 and B5.37 below. For clarity this represents a decrease in 1.23 points lost in AR22 compared to 0.88 in AR23 for Escalations and a decrease in 1.50 points lost in AR22 compared to 0.97 in AR23

The confidence grade is A3 to reflect the confidence grade allocated to one of the component lines (B5.35 which is A3).

B5.35 Service issue contacts (points lost)

This is 5 (rounded from 5.31) for AR23 and represents a decrease from 5.53 reported in AR22 of 0.22. For further details refer to **Line B5.6**.

B5.36 Escalations (points lost)

This is 1 (rounded from 0.88) for AR23. This represents a decrease of 0.34 from the 1.23 reported in AR22. For further details refer to **Line B5.5**.

B5.37 Written complaints (points lost)

This is 1 (rounded from 0.97) for AR23 and represents a decrease of 0.53 from the 1.50 reported in AR22. For further details refer to **Line B5.7**.

B5.38 Regulator upheld complaints (points lost)

This is zero for AR23 and remains the same as AR22 levels.

B5.39 hCEM qualitative score

This is 43.63 for AR23. This represents a decrease of 0.72 from the 44.35 reported in AR22. The change to the score was driven by the No Experience No Contact and Experience No Contact elements.

The confidence grade for this line is B2 to reflect the lowest confidence grade allocated to the

component line B5.40.

B5.40 Customer experience survey (points lost)

This is 2 (rounded from 2.21) for AR23, which represents a decrease of 0.01 from the 2.22 reported in AR22. For further detail refer to Line B5.2.

The score reported in this line is calculated using the values reported in Lines B5.2, B5.25 and B5.26. All four lines have the same confidence grade, B2.

B5.41 No experience, no contact (points lost)

This is 1 (rounded from 1.45) for AR23, which represents an increase of 0.31 from the 1.14 reported in AR22. For further detail refer to Line B5.3.

The score reported in this line is calculated using the values reported in lines B5.3, B5.27 and B5.28 all of which have a confidence grade of A2. As a consequence, the confidence grade for Line B5.41 is A2.

B5.42 Experience, no contact (points lost)

This is 3 (rounded from 2.71) for AR23, which represents a decrease of 0.43 from the 2.28 reported in AR22. For further detail refer to Line B5.4.

The score reported in this line is calculated using the values reported in lines B5.4, B5.29 and B5.30. All have a confidence grading of A2. As a consequence, the confidence grade for Line B5.42 is A2.

10.3 Data

10.3.1 Data sources and confidence grades

Data for these tables are derived from Scottish Water's corporate systems, the details can be found in the hCEM Reporter's report. However, for clarity Phone call volumes come from *Puzzel* our telephony management system, social media volumes come from *Sparkscentral*, emails, portal contacts, wanted contacts, escalations, formal complaints, and regulatory upheld complaints is taken from our Customer Record Management *MS Dynamics*. Customer Experience Survey data is provided by *Rant and Rave* with No Experience No Contact and Experience No Contact data being provided by YouGov.

Line B5.35

Service issue contacts (points lost) has had its confidence grading altered to A3 from A1. This is due to the line which makes up this Line B5.24 having the A3 confidence grading.

Line B5.41

No experience, no contact points (points lost) has had its confidence grading altered to A2 from A1. This is due to the line which makes up this Line B5.3 having the A2 confidence grading.

There are no further changes to confidence gradings.

10.3.2 Data improvement programmes

No significant data improvements were carried out in the year.

10.3.3 Assumptions used for forecast data

In our forecasting for AR24, we have selected a mid-point from our predicted range for each of the individual hCEM components. However, for forecasting the Overall hCEM Score we have calculated that score using the individual mid-point values forecast for each component.

11 Table B6 Non household customer service

11.1 Introduction

The purpose of the Non-household Customer Experience Measure (nhCEM) and the Development Customer Experience Measure (dCEM) is to capture the service levels delivered to non-household and development customers and provide a robust means of measuring the quality of, and tracking changes in, the service experience provided to non-household and development customers. Performances against several quantitative and qualitative indicators are combined to produce an Annual Score out of 100 for each measure.

In AR22 the dCEM had a sole focus on the development community and was shadow reported. There was a change in methodology in AR23 with Emails and Portal Contacts added to Service Issue Contacts, and a change in the calibration measure. It continued to be shadow reported in AR23 and will go live in AR24.

11.2 Performance Trends

There have been no changes to the nhCEM methodology from AR22, but dCEM methodology has changed (see Introduction above)

11.2.1 Lines B6.1-B6.7 - Non-household CEM

B6.1 nhCEM overall score

This has decreased slightly from 87.26 to 86.70, a decrease of 0.54 points, or 0.62%.

There have been mixed fortunes in each of the components within the Quantitative and Qualitative measures.

The Quantitative measure had fewer Service Issue Contacts in AR23 compared to AR22 (see Line **B6.4** below), and fewer Escalations (see Line **B6.6** below). However, there was an increase in Formal Complaints (see Line **B6.5** below). The net result was an increase in the Quantitative score from 45.07 in AR22 to 45.21 in AR23 – an increase on 0.14 nhCEM points (see Line **B6.42** below)

The Qualitative measure had an increase in Licensed Provider Satisfaction, from 96.48% in AR22 to 98.41% in AR23. This was offset by a decrease in Business End User Satisfaction, from 90.61% in AR22 to 87.95% in AR23. The net result was a decrease in the Qualitative score from 42.20 in AR22 to 41.52 in AR23 – a decrease of 0.67 nhCEM points (see Line **B6.47** below)

B6.2 LP Experience Survey

This score increased from 96.48% in AR22 to 98.41% in AR23, an increase of 1.92%. The number of surveys returned decreased from 1426 in AR22 to 1235 in AR23.

The confidence grade for this line is A2, to reflect the confidence grades in B6.21 – B6.24, B6.47 and B6.50.

The Licensed Provider score was 100% for five months in AR23 – a marked improvement from AR22 (which only had one month at 100%).

Initiatives to maintain and improve LP experience included:

Fortnightly team workshops with topics based on the feedback from LPs via the experience survey e.g. if scored low on re-assessment, we would review comments and create a re-assessment workshop.

There was a higher than usual turn-over of staff in teams managing service to LPs in AR23 and a whole day's training was devoted to the LP Experience Survey, making sure new starts knew how important feedback is from LPs and how we can improve our service.

Weekly Root Cause Analysis (RCA) meetings to review scores and identify learnings. Whilst not a new activity, everyone in the team was involved, even using Root Cause Analysis on jobs that scored 6s and 7s, and there were some improvements that could come out of these jobs.

In response to lower scores on particular issues, any responses back to LPs from the team on those issues were reviewed by a Team Coach to make sure it was answering the questions asked, recognising concerns raised in the survey.

Table 55: LP experience surveys.

	1	2	3	4	4 - 2	3 - 1	3 - 1 (as %)
LP Surveys	AR22	% of total	AR23	% of total	% Movement in proportion	Volume Movement	Volume Movement %
Score 1-4	52	3.52%	20	1.59%	-1.92%	-32	-61.54%
Score 5-7	1426	96.48%	1235	98.41%	1.92%	-191	-13.39%
Total Returns	1478	100.00%	1255	100.00%		-223	-15.09%

B6.3 Business End User Survey

This score dropped from 90.61% in AR22 to 87.95% in AR23, a decrease of 2.67%. The number of surveys returned increased from 927 in AR22 to 1,004 in AR23, however there was a lower proportion of surveys in the 5-7 bracket which had the effect of driving down the satisfaction score (see Table 56 below)

The confidence grade for this line is B2, to reflect the confidence grades in B6.25, B6.26 and B6.48 and B6.51

Table 56: BEU Surveys.

	1	2	3	4	4 - 2	3 - 1	3 - 1 (as %)
BEU Surveys	AR22	% of total	AR23	% of total	% Movement in proportion	Volume Movement	Volume Movement %
Score 1-4	87	9.39%	121	12.05%	2.67%	34	39.08%
Score 5-7	840	90.61%	883	87.95%	-2.67%	43	5.12%
Total Returns	927	100.00%	1004	100.00%		77	8.31%

The reduction in the satisfaction survey score of 2.67% was due to a jump in the number of dissatisfied scores (scores that fall into the 1-4 bracket). AR23 saw the number of returns in this bracket increase by 34, which pushed up the overall level of dissatisfaction from 9.39% last year to 12.05% this year.

The main reasons for these changes were an increase in 'Time / scheduling delay' in emptying septic tanks (which rose by 12 negative returns) and issues relating to Scottish Water being unable to resolve the issue for a variety of reasons.

The months of July 2022, September 2022 and October 2022 saw dissatisfaction spike to the highest months in three years. Main causes of dissatisfaction were issues with the service provided and resolution times. The scores falling into the lowest category (score 1) were up 60% from last year (77 scores of 1 compared to 48 last year)

B6.4 Service issue contacts (WSD & CSC)

These decreased from 31,598 in AR22 to 30,586 in AR23, a reduction of 1,012 contacts, or 3.20%. This figure is brought forward from B6.17. The total monthly volumes are shown on Figure 26 below, and the annual breakdown of these totals by component is shown in the table below but is further covered in the commentary below relating to Service Issue Contacts Lines B6.8 to B6.16. The confidence grade for this line is A3.

Figure 26: Volume of service issue contacts (WSD and CSC) by month for AR22 and AR23.

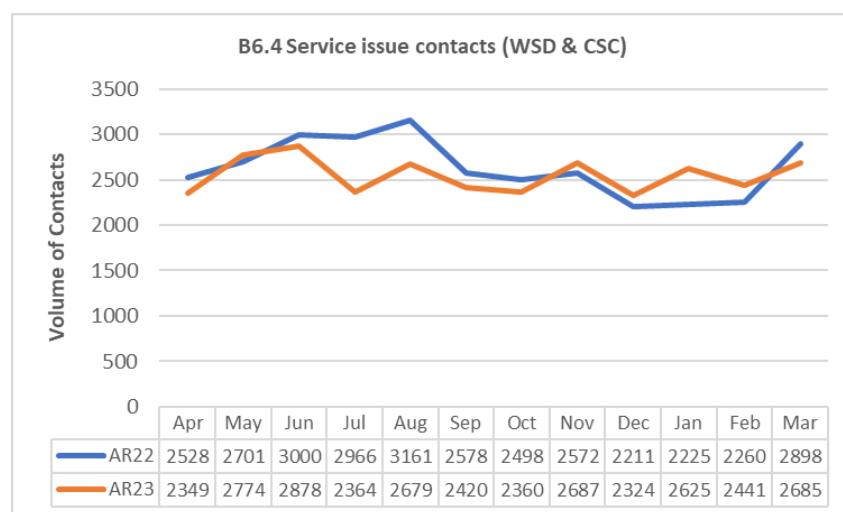


Table 57 below breaks down the total contacts by contact channel.

Table 57: Total contacts broken down by contact channel.

Service Issue Component	B6 Table ref		AR22	AR23	Change	% Change
Service Issue Contacts - WSD All Calls	B6.8	+	4,395	3,720	(675)	(15.36%)
Service Issue Contacts - WSD Total Emails	B6.9	+	3,976	4,597	621	15.62%
Service Issue Contacts - WSD Total Portal	B6.10	+	25,775	24,418	(1,357)	(5.26%)
Service Issue Contacts - WSD Bulk Uploads	B6.11	+	3,112	1,093	(2,019)	(64.88%)
less Service Issue Contacts - WSD Total Wanted	B6.12	-	20,775	17,953	(2,822)	(13.58%)
Service Issue Contacts - Wholesale Service Desk	B6.13	= 1	16,483	15,875	(608)	(3.69%)
Service Issue Contacts - CEC All Contacts	B6.14	+	19,932	19,916	(16)	(0.08%)
less Service Issue Contacts - CEC Wanted Contacts	B6.15	-	4,817	5,205	388	8.05%
Service Issue Contacts - Customer Engagement Centre	B6.16	= 2	15,115	14,711	(404)	(2.67%)
Total Service Issue Contacts	B6.17	= 1 + 2	31,598	30,586	(1,012)	(3.20%)

B6.5 Formal complaints

These increased from 143 in AR22 to 163 in AR23. This represents an increase of 20 complaints, or 13.99%. Table 58 below shows the top five areas of formal complaints. The main areas that saw this increase were Wastewater (+11), and Planned Works / Maintenance (+5) - (26% of all complaints related to Wastewater in AR23, compared to 22% in AR22). This figure is brought forward from B6.19.

Table 58: Top 5 areas of formal complaint.

2022-23	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Total	Volume Change AR22 v AR23	% change AR22 v AR23
Infrastructure	1	0	1	0	0	1	1	0	1	2	0	0	7.	3.	75.00%
Metering	0	3	0	0	0	2	0	0	2	0	0	0	7.	1.	16.67%
Planned Works/ Maintenance	0	1	1	0	1	0	0	2	0	1	1	0	7.	5.	250.00%
Waste Water	4	5	3	2	2	2	5	3	5	4	4	4	43.	11.	34.38%
Water Supply	5	12	6	5	9	9	8	11	8	4	4	10	91.	0.	0.00%

B6.6 Escalations

These decreased from 131 in AR22 to 101 in AR23, a drop of 30 Escalations, or 22.90%. This figure is brought forward from B6.18.

In AR22 there were 85 escalations via the Wholesale Desk and 46 via the Customer Engagement Centre (total 131).

In AR23 there were 70 escalations via the Wholesale Desk and 31 via the Customer Engagement Centre (total 101).

The tables below break down the escalations raised via the Wholesale Desk (Table 59) and the Customer Engagement Centre (B6 Table 6) by service reason, and compare AR23 to AR22

Wholesale Desk escalations were 70 in AR23, compared to 85 in AR22. A reduction of 15, or 17.65%

Table 59: Wholesale Desk escalations by service reason and month for AR23, and change compared to AR22.

Service Reason	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Total AR23	Volume Change AR22 to AR23
Billing Dispute	-	-	-	-	-	2	-	-	-	-	-	-	2	2
Burst Allowance	-	-	-	-	-	-	2	-	-	-	-	-	2	-
Byelaws Proactive Inspection	-	-	-	-	-	-	-	-	-	-	-	-	-	-1
Charging Enquiry	1	1	-	-	-	-	-	-	-	-	1	3	6	2
Deregistration	-	3	-	-	3	2	-	2	1	1	2	-	14	-25
ERRA	1	-	-	-	-	-	-	-	-	-	-	-	1	1
Gap Site	-	-	-	-	-	-	-	-	-	1	-	-	1	-4
LP General Enquiry	-	-	-	1	2	-	-	-	-	-	-	-	3	-6
Meter Verification	-	-	1	-	3	1	2	1	2	2	-	-	12	5
New Connection SPID Request	-	-	-	-	1	-	-	-	-	-	-	-	1	1
Shared Supply	-	2	-	2	1	1	-	-	-	-	-	1	7	4
SW Meter Accuracy Test	-	-	-	-	-	1	-	-	-	-	-	-	1	1
SW Meter Exchange for LP	-	-	-	-	1	-	1	-	-	1	-	-	3	-
SW Meter Fault and Repair	1	-	1	1	1	-	-	-	-	1	1	-	6	-1
SW Meter Install	-	-	-	1	-	-	-	-	1	-	-	-	2	1
SW Permanent Disconnection	1	-	1	1	-	-	-	-	-	-	-	-	3	2
TE Consent Review	-	-	-	-	-	-	-	-	-	-	-	-	-	-2
Toby	-	-	-	-	-	-	-	-	1	-	-	-	1	1
Unmetered Reassessment	-	2	-	-	2	-	-	1	-	-	-	-	5	4
Grand Total	4	8	3	6	14	7	5	4	5	6	4	4	70	-15

The main movements were:

- A reduction of 25 escalations relating to deregistration (39 in AR22 and 14 in AR23)
- A reduction of 6 escalations relating to LP General Enquiries (9 in AR22 and 3 in AR23)
- A reduction of 4 escalations relating to Gap Sites (5 in AR22 and 1 in AR23)
- An increase of 5 escalations relating to Meter Verifications (7 in AR22 and 12 in AR23)
- An increase of 4 escalations relating to shared supply (3 in AR22 and 7 in AR23) and a similar increase in unmetered reassessments (1 in AR22 and 5 in AR23)

Customer Engagement Centre Escalations were 31 in AR23, compared to 46 in AR22. A reduction of 15, or 32.61%

Table 60: Customer Engagement Centre escalations by service reason and month for AR23, and change compared to AR22.

Service Reason	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Total AR23	Volume Change AR22 to AR23
Burst / Leak	1	-	-	1	-	-	-	-	-	-	-	-	2	0
Choke / Blockage	-	-	-	1	1	-	2	1	2	1	4	1	13	-4
Cover / Ironwork Fault / Fix	-	-	-	-	-	-	-	-	-	-	-	-	-	-1
Damaged Sewer Pipe	-	-	-	-	-	-	-	-	-	-	-	-	-	-2
General Enquiry	-	1	-	-	2	-	-	-	-	1	-	-	4	0
Issue with SW Premise	-	-	-	-	-	-	-	-	-	2	1	-	3	3
Lead Renewal	-	-	-	-	-	-	-	-	-	-	-	-	-	-4
Location Mains/Services/Sewers	-	-	-	-	-	-	-	-	-	-	-	-	-	-1
No Water	-	-	-	-	-	-	-	-	2	-	-	-	2	1
Odour from sewer	-	-	-	-	-	-	-	-	-	-	-	-	-	-1
Pressure/Intermittent Supply	-	1	-	1	1	-	-	-	-	-	-	1	4	-1
Roadwork / Traffic Issue	-	-	-	-	-	-	-	-	-	-	-	-	-	-2
Septic tank enquiry	-	-	1	-	-	-	-	-	-	-	-	-	1	1
Toby	-	-	-	-	-	-	1	-	1	-	-	-	2	-4
Total	1	2	1	3	4	0	3	1	5	4	5	2	31	-15

The main movements were:

- A reduction of 4 escalations relating to Choke / Blockage (17 in AR22 and 13 in AR23)
- A reduction of 4 escalations relating to Lead Renewal (4 in AR22 and 0 in AR23)
- A reduction of 4 escalations relating to Toby (6 in AR22 and 2 in AR23)

B6.7 Regulatory complaints

There were 0 regulatory upheld complaints in AR23, and this mirrors our performance from AR22. This figure is brought forward from B6.20.

11.2.2 Lines B6.8-B6.17 - Service Issue Contacts - non-household customers

Service Issue Contacts were down 1,012 (or 3.20%) from AR22 (see Table 61 below of contacts by contact channel – also refer to the commentary in lines B6.8 to B6.17 below).

Table 61: Number of service issue contacts by non-household customers by contact channel for AR22 and AR23.

Service Issue Component	B6 Table ref	AR22	AR23	Change	% Change
Service Issue Contacts - WSD All Calls	B6.8	4,395	3,720	(675)	(15.36%)
Service Issue Contacts - WSD Total Emails	B6.9	3,976	4,597	621	15.62%
Service Issue Contacts - WSD Total Portal	B6.10	25,775	24,418	(1,357)	(5.26%)
Service Issue Contacts - WSD Bulk Uploads	B6.11	3,112	1,093	(2,019)	(64.88%)
less Service Issue Contacts - WSD Total Wanted	B6.12	20,775	17,953	(2,822)	(13.58%)
Service Issue Contacts - Wholesale Service Desk	B6.13	16,483	15,875	(608)	(3.69%)
Service Issue Contacts - CEC All Contacts	B6.14	19,932	19,916	(16)	(0.08%)
less Service Issue Contacts - CEC Wanted Contacts	B16.15	4,817	5,205	388	8.05%
Service Issue Contacts - Customer Engagement Centre	B6.16	15,115	14,711	(404)	(2.67%)
Total Service Issue Contacts	B6.17	31,598	30,586	(1,012)	(3.20%)

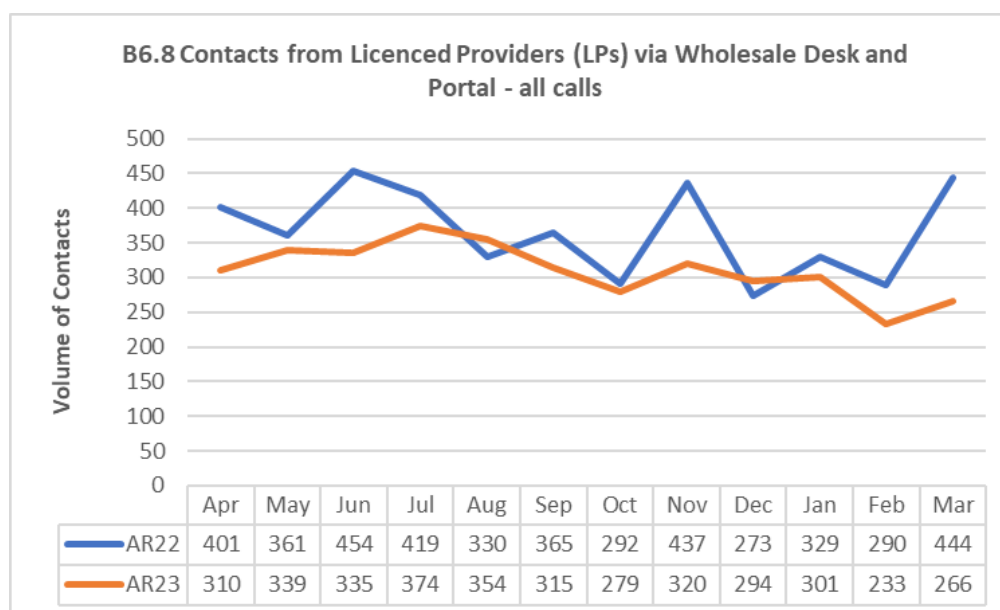
B6.8 Contacts from Licenced Providers (LPs) via Wholesale Desk and Portal - all calls

These contacts decreased from 4,395 in AR22 to 3,720 in AR23, a decrease of 675, or 15.36%.

There has been a general reduction in calls this year particularly compared with the spikes experienced in June 2021, November 2021 and March 2022, as per Figure 27 below. This is likely

to relate to LP behaviours whereby they are choosing to email Wholesale Service Desk over calling in some instances.

Figure 27: Volume of contacts from Licenced Providers (LPs) via Wholesale Desk and Portal (all calls) by month for AR22 and AR23.

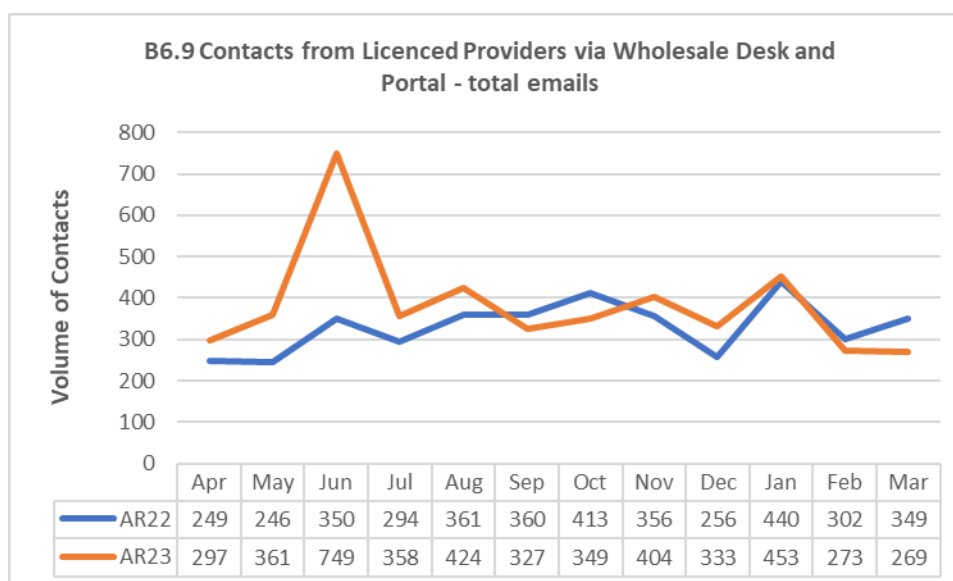


B6.9 Contacts from Licenced Providers via Wholesale Desk and Portal - total emails

These contacts increased from 3,976 in AR22 to 4,597 in AR23, an increase of 621, or 15.62%.

There was a spike in June 2022 and fluctuations throughout the rest of the year, as per Figure 28 below. The main reason for this spike in emails for June 2022 is due to an IT issue involving automatic email responses bouncing back and forward continually from one customer. This generated an additional 401 emails during 3 and 4 June 2022. Other general increases are likely to relate to LP behaviours whereby they are choosing to email Wholesale Service Desk over calling in some instances.

Figure 28: Volume of contacts from Licenced Providers via Wholesale Desk and Portal (total emails) by month for AR22 and AR23.



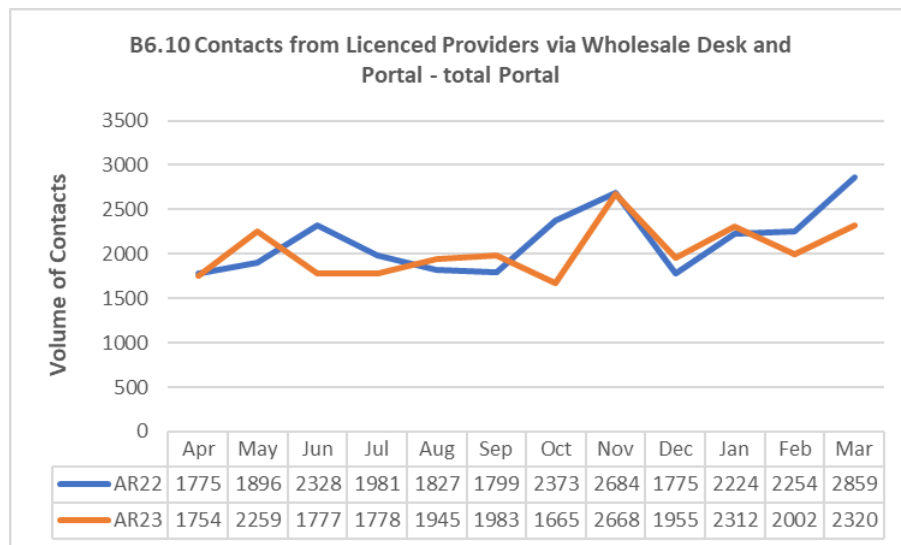
B6.10 Contacts from Licenced Providers via Wholesale Desk and Portal - total Portal

These contacts decreased from 25,775 in AR22 to 24,418 in AR23, a decrease of 1,357, or 5.26%.

There were spikes in May 2022, November 2022, January 2023 and March 2023, with fluctuations throughout the rest of the year, as per Figure 29 below. The general spikes for the portal during particular months would suggest it relates to LP behaviour. E.g. (March is the last month of the financial year, LP's submitting requests around the festive period i.e., November and January).

The main reason for the decrease in the overall Portal submissions is likely due to the improvements made to the LP Submissions Portal itself whereby the LP can easily view previous site visit packs together in the same place. This in turn has helped the LP to see that there may have already been an answer to their question at first glance. This information was present in the Portal prior to this, however, were more difficult for the LP to locate previously.

Figure 29: Volume of contacts from Licenced Providers via Wholesale Desk and Portal (total Portal) by month for AR22 and AR23.

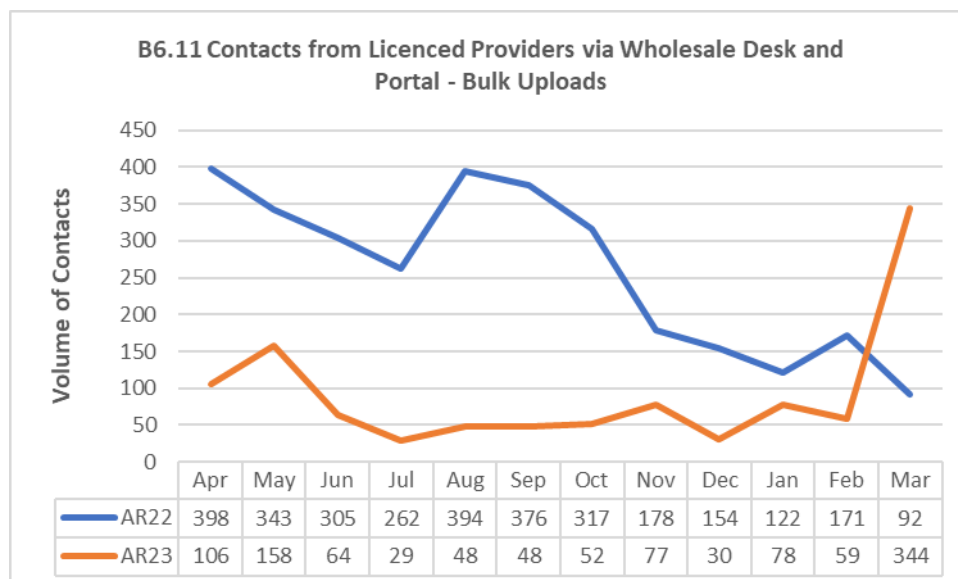


B6.11 Contacts from Licenced Providers via Wholesale Desk and Portal - Bulk Uploads

These contacts decreased from 3,112 in AR22 to 1,093 in AR23, a reduction of 2,019, or 64.88%.

Contacts fell every month of the year, except March 2023, when Licensed Providers bulk upload exemption applications ahead of the final deadline at financial year-end (most applications came earlier in the year in AR22). See Figure 30 below.

Figure 30: Volume of contacts from Licenced Providers via Wholesale Desk and Portal (bulk uploads) by month for AR22 and AR23.

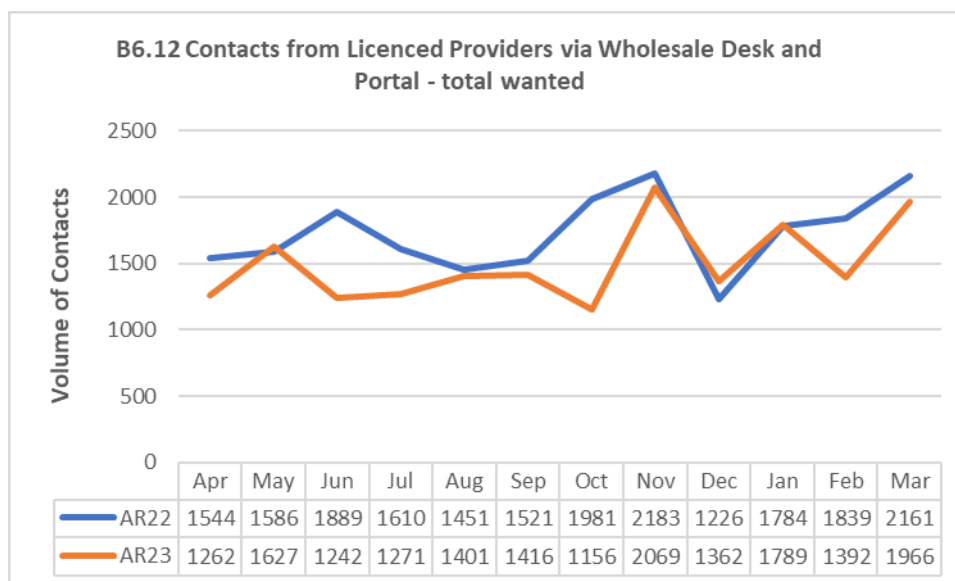


B6.12 Contacts from Licenced Providers via Wholesale Desk and Portal - total wanted

These decreased from 20,775 in AR22 to 17,953 in AR23, a reduction of 2,822, or 13.58%.

There were downward spikes in June 2022, October 2022, and February 2023 as per Figure 31 below.

Figure 31: Volume of contacts from Licenced Providers via Wholesale Desk and Portal (total wanted) by month for AR22 and AR23.



B6.13 Contacts from Licenced Providers via Wholesale Desk and Portal - contacts adjusted for permitted exclusions

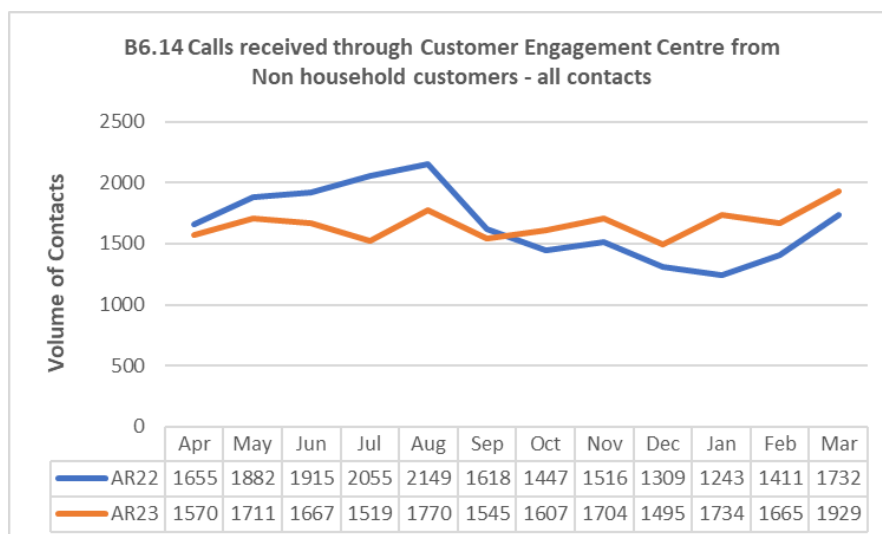
These contacts, adjusted for permitted exclusions, decreased from 16,483 in AR22 to 15,875 in AR23, a decrease of 608, or 3.69% (the reason for this is explained in the narrative to Lines B6.8 to B6.12 above).

B6.14 Calls received through Customer Engagement Centre from Non household customers - all contacts

These contacts decreased from 19,932 in AR22 to 19,916 in AR23, a decrease of 16 or 0.08%.

Contacts were down the first 6 months of AR23 compared to AR22, but up the next 6 months, as per Figure 32 below.

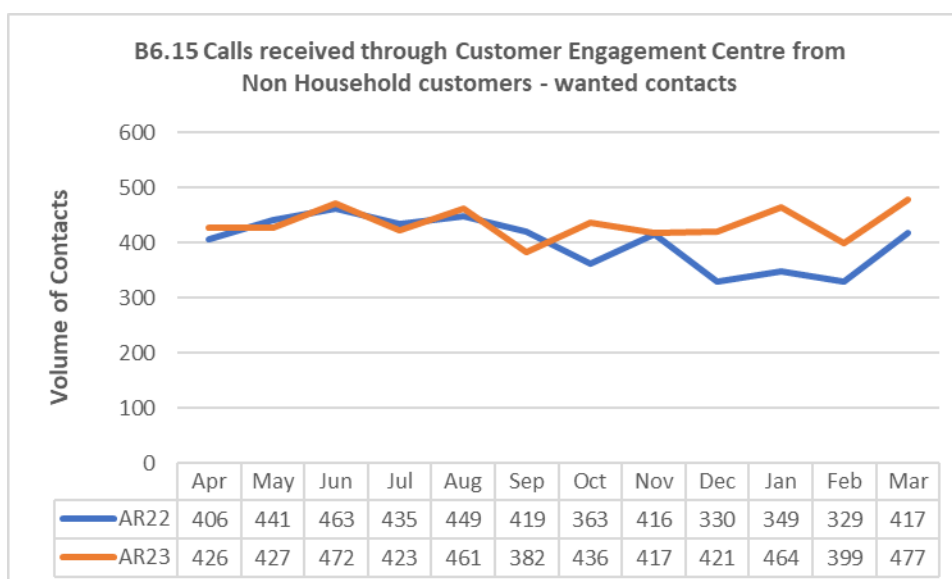
Figure 32: Volume of calls received through Customer Engagement Centre from non-household customers (all contacts) by month for AR22 and AR23.



B6.15 Calls received through Customer Engagement Centre from Non-household customers - wanted contacts

These contacts increased from 4,817 in AR22 to 5,205 in AR23, an increase of 388, or 8.05%. Contacts increased in the second 6 months AR23 compared to AR22, as per Figure 33 below.

Figure 33: Volume of calls received through Customer Engagement Centre from non-household customers (wanted contacts) by month for AR22 and AR23.



B6. 16 Calls received through Customer Engagement Centre from Non-household customers - contacts adjusted for permitted exclusions

These contacts decreased from 15,115 in AR22 to 14,711 in AR23, a decrease of 404, or 2.67%. (The reason for this is explained in the narrative to Lines B6.14 to B6.15 above).

B6.17 Non-household service issue contacts - Total unwanted contacts

This has been reported in Line B6.4, and the commentary on lines B6.8 to B6.16 above. The confidence grade for this line is A3.

11.2.3 Lines B6.18-B6.26 - Non-Household Customer experience

B6.18 Escalations

This has been reported in Line B6.6

B6.19 Formal complaints (Form G)

This has been reported in Line B6.5.

B6.20 Regulator upheld complaints

This has been reported in Line B6.7.

B6.21 LP Experience survey – total

This total decreased from 1,478 in AR22 to 1,255 in AR23, a decrease of 223, or 15.09%. This has been reported in line B6.2 above.

B6.22 LP Experience survey – satisfied

This response decreased from 1,426 in AR22 to 1,235 in AR23, a decrease of 191, or 13.39%. This has been reported in line B6.2 above.

B6.23 Ease of service indicator line 1

Like last year, ease of service is not part of the nhCEM measure.

B6.24 Ease of service indicator line 2

Like last year, ease of service is not part of the nhCEM measure.

B6.25 Business End-User Experience Survey – total

The total survey returns increased from 927 in AR22 to 1,004 in AR23, an increase of 77, or 8.31%.

This has been reported in line B6.3 above.

B6.26 Business End-User Experience Survey – satisfied

(As Line B6.25). This increased from 840 in AR22 to 883 in AR23, an increase of 43, or 5.12%.

This has been reported in line B6.3 above.

11.2.4 Lines B6.27-B6.38 - Developer CEM

In AR22 the Developer CEM (dCEM) had a sole focus on the development community and was in a shadow year. The methodology was reviewed throughout AR23 and changed to a more robust

method with Emails and Portal Contacts added to Service Issue Contacts, and a change in the calibration measure. It continued to be shadow reported in AR23.

B6.27 Contacts from developers about water and wastewater connections – total

There were 128,132 Contacts from development customers about water and wastewater connections reported in AR23 under the new methodology. Contacts in AR23 have remained relatively consistent from month to month with a seasonal drop in December due to the holiday period as per the Figure 34 below.

Figure 34: Volume of contacts from developers about water and wastewater connections (total) by month for AR23.

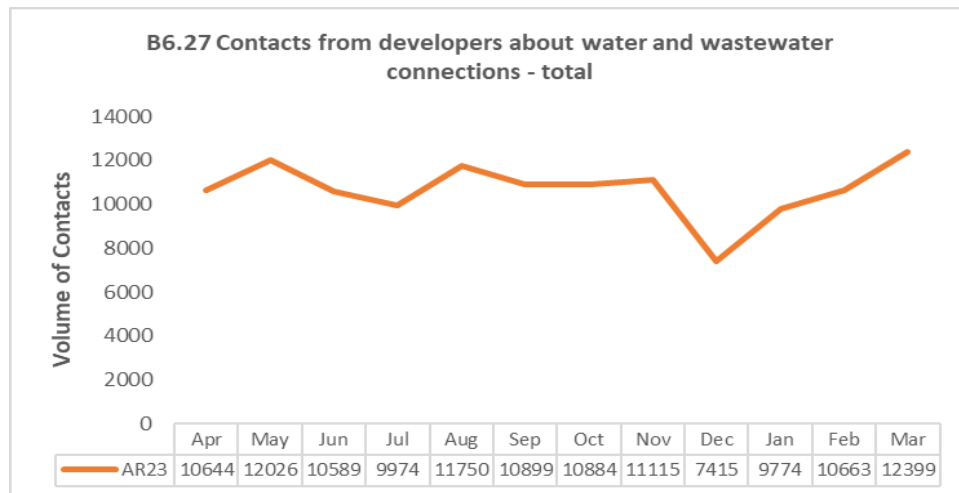
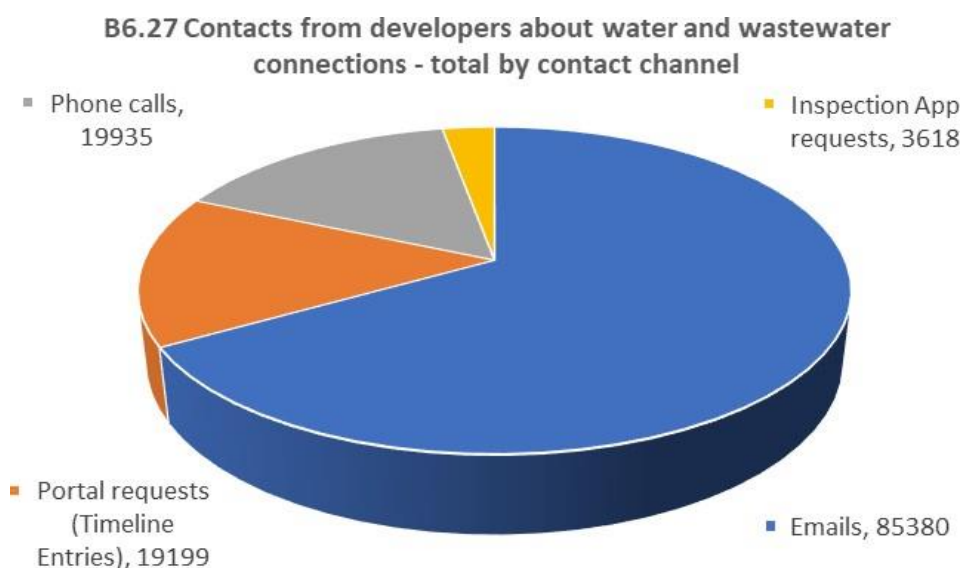


Figure 35 below looks at the split of total contacts by input channel with the majority of customer contacts via email.

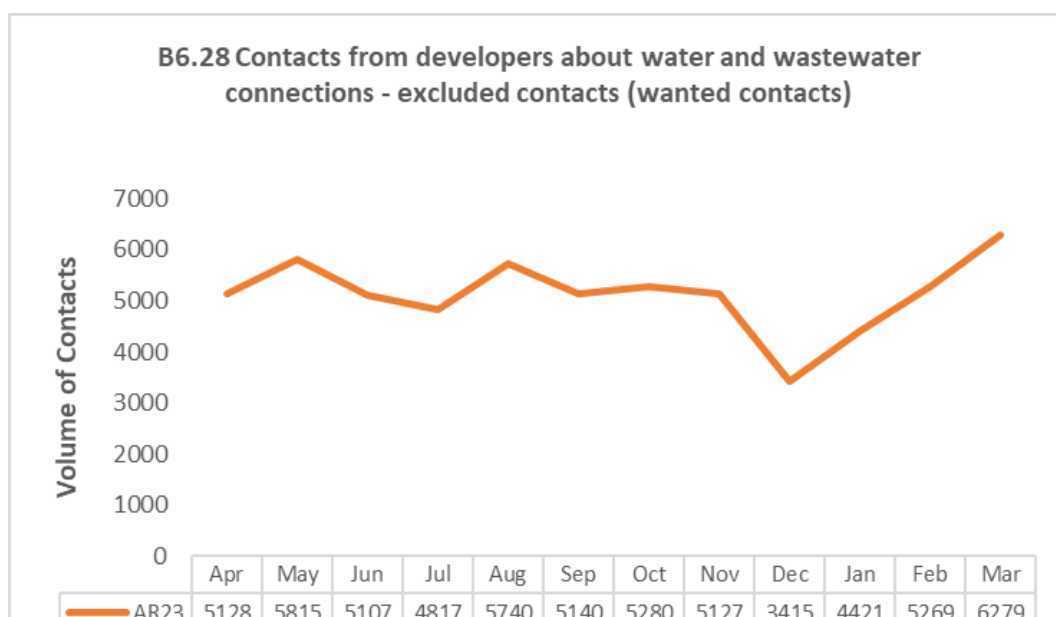
Figure 35: Channel breakdown of total contacts from developers about water and wastewater connections for AR23.



B6.28 Contacts from developers about water and wastewater connections - excluded contacts (wanted contacts)

There were 61,538 wanted contacts reported in AR23 under the new methodology. Wanted contacts this year have approximately followed the pattern of Line **B6.27** above, with a seasonal drop in December due to the holiday period, as shown in Figure 36 below.

Figure 36: Volume of contacts from developers about water and wastewater connections – excluded contacts (wanted contacts) by month for AR23.



B6.29 Contacts from developers about water and wastewater connections - contacts adjusted for permitted exclusions

There were 66,594 unwanted contacts reported in AR23 under the new methodology. This total is derived from the total contacts (Line **B6.27**) less the wanted contacts (Line **B6.28**) above, to arrive at a net unwanted total.

B6.30 Development Services escalations

In AR23 we had a total of 22 escalations, down from 24 in AR22. The main drivers of escalations were issues with current process, timescales and communication.

B6.31 Development Services Formal complaints

In AR23 we had six formal complaints, up from 2 in AR22. Table 62 below shows the spread of complaints through the year. Reason for complaints vary with 'delays in connection' and 'site still to be vested' featuring.

Table 62: Spread of development services formal complaints throughout AR23.

	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Total
Connection	1	0	0	1	0	2	0	0	0	0	0	0	4
Developer Connection	0	0	0	0	0	0	0	0	1	0	0	1	2
Total:	1	0	0	1	0	2	0	0	1	0	0	1	6

B6.32 Development Services Regulator upheld complaints

In AR23 we had 0 Regulator upheld complaints, the same number as in AR22.

B6.33 Single house connection experience survey – total

In AR23 we had 347 survey returns, down from 510 in AR22 – a reduction of 31.96% (see table below).

B6.34 Single house connection experience survey – satisfied

In AR23 we had 283 satisfied returns, down from 410 in AR22, with just under 62% giving top score. The satisfaction score (scores of 5-7) increased from 80.39% in AR22 to 81.56% in AR23, an increase of 1.16% (see Table 63 below).

Table 63: Single house connection experience survey satisfied scores for AR22 and AR23.

	1	2	3	4	4-2	3-1	3-1 (as %)
Developer Service Surveys - Single House	AR22	% of Total	AR23	% of Total	% Movement in Proportion AR23 v AR22	Volume Movement AR23 v AR22	% Move in Volume
Score 1-4	100	19.61%	64	18.44%	-1.16%	-36	-36.00%
Score 5-7	410	80.39%	283	81.56%	1.16%	-127	-30.98%
Total Returns	510	100.00%	347	100.00%		-163	-31.96%

B6.35 (developer) Ease of service indicator line 1

In AR23 we had 571 survey returns, marginally down from 586 in AR22, a reduction of 15 returns, or 2.56% - see B6 Table 10 below.

B6.36 (developer) Ease of service indicator line 2

In AR23 we had 458 satisfied survey returns, up from 449 in AR22. This satisfaction score (scores of 5-7) increased from 76.62% last year to 80.21%, an increase of 3.59%, see

Table 64 below.

This increase in satisfaction resulted in a reduction of points lost – see B6.62 below.

The confidence grade for this line is B2, to reflect the confidence grades in B6.62.

Table 64: Ease of Service survey satisfied scores for AR22 and AR23.

	1	2	3	4	4-2	3-1	3-1 (as %)
Developer Ease of Doing Business Surveys	AR22	% of Total	AR23	% of Total	% Movement in Proportion AR23 v AR22	Volume Movement AR23 v AR22	% Move in Volume
Score 1-4	137	23.38%	113	19.79%	-3.59%	-24	-17.52%
Score 5-7	449	76.62%	458	80.21%	3.59%	9	2.00%
Total Returns	586	100.00%	571	100.00%		-15	-2.56%

B6.37 Developer/Connections Experience survey- total

In AR23 we had 367 survey returns, up from 283 in AR22, an increase of 84 returns, or 29.68% - see table below.

B6.38 Developer/Connections Experience survey- satisfied

In AR23 we had 286 satisfied survey scores, up from 219 in AR22. This satisfaction score (scores of 5-7) increased from 77.39% last year to 77.93%, an increase of 0.54%, see Table 65 below.

The confidence grade for this line is B2, to reflect the confidence grades in B6.62.

Table 65: Developer / Connections survey satisfied scores for AR22 and AR23.

	1	2	3	4	4-2	3-1	3-1 (as %)
Developer/ Connections Experience Survey	AR22	% of Total	AR23	% of Total	% Movement in Proportion AR23 v AR22	Volume Movement AR23 v AR22	% Move in Volume
Score 1-4	64	22.61%	81	22.07%	-0.54%	17	26.56%
Score 5-7	219	77.39%	286	77.93%	0.54%	67	30.59%
Total Returns	283	100.00%	367	100.00%		84	29.68%

11.2.5 Lines B6.39-B6.50 - Non-household customer experience measure score

B6.39 Non-household customer experience target

In AR22 this would was a fixed-target score of 85.4-88.66. This remained the target range in AR23. For the purposes of the WIC S information request we have established a baseline figure of 85.4, which is the low point of the target range.

B6.40 Non-household customer experience - total score

This has been reported under Line B6.1.

B6.41 Connected non-household properties

The number of such properties in AR23 is 159,219. This has increased from the 154,822 reported. In AR22. The increase is 4,397, or 2.84%.

B6.42 nhCEM quantitative score

The nhCEM quantitative score has increased in AR23 to 45.21 from 45.07 reported in AR22. This is an increase of 0.14 points, or 0.30%.

B6.43 Service issue contacts (points lost)

Points lost has decreased to 2.00 in AR23 from 2.13 reported in AR22. This represents a decrease of 0.13 points lost, or 6.06%. This reflects the small decrease in Service Issue Contacts as outlined in Line B6.4 above.

B6.44 Escalations from Licensed Providers (points lost)

The escalations points lost has decreased in AR23 to 0.66 from 0.88 reported in AR22. This is a reduction of 0.22 points lost, or 24.89%. This reflects the reduction in escalations as outlined in Line B6.6 above.

B6.45 Formal non-household customer complaints (points lost)

This has increased to 2.13 in AR23 from 1.92 reported in AR22 and represents an increase of 0.21 points lost, or 11.09%. This reflects the increase in formal complains as outlined in B6.5 above.

B6.46 Regulator upheld complaints (points lost)

The number of points lost in AR23 was 0.00, which mirrored AR22's performance. There were no regulatory upheld complaints in AR23 as outlined in **B6.7** above.

B6.47 LP experience survey 12-month score weighted

This is a new line in AR23. The AR23 figure is 6.81.

B6.48 Business end-user experience 12-month score weighted

This is a new line in AR23. The AR23 figure is 5.15.

B6.49 nhCEM qualitative score

This has decreased in AR23 to 41.52 from the 42.20 reported in AR22, a decrease of 0.67, or 1.60%. The reported score in this line is calculated by deducting the values reported in Lines B6.50 and B6.51 from 50.00 (the points allocated to the Qualitative Measure).

The decrease is due to the number of Business end-user Experience points lost increasing, which was offset by improved performance in the LP Experience Survey, as per Lines **B6.50** and **B6.51** below.

It should be noted that for AR23, the formulae under Reporting Year -1 (2021-22) have been replaced with a manual entry to account for no data existing for the new metrics B6.47 and B6.48 in prior years and therefore an error result being returned. Therefore, we have corrected formulae accordingly as noted in "AR23 Template Change Log Final" file, reference AR23-215.

B6.50 LP Experience survey (points lost)

This decreased to 0.78 in AR23 from 1.68 reported in AR22. This is a reduction of *1 (rounded from 0.90) point, or approximately 53.57%.

For more detail on this refer to Line **B6.2**.

B6.51 Business end-user experience (points lost)

This has increased in AR23 to 7.70 from 6.12 in AR22 and represents an increase of *2 (rounded from 1.58) points, or approximately 25.82%.

For more detail on this refer to Line **B6.3**.

11.2.6 Lines B6.52-B6.63 - Developer customer experience measure score

The purpose of the Developer Customer Experience measure (dCEM) is to inform and drive improvements in service and satisfaction to all those in the Development Community (which includes customers who are making connections to the network for both household and non-household properties) in Scotland. Performance against a number of quantitative and qualitative indicators are combined to produce an Annual dCEM Score out of 100.

There was a change in methodology in AR23 with Emails and Portal Contacts added to Service Issue Contacts, and a change in the calibration measure. These changes altered the Service Issue Contacts element and also the points calculation for all the quantitative elements. As such no direct comparison can be made with the points lost for AR23 compared to AR22.

Developer CEM is a new measure currently being trialled and is due to go live in AR24.

B6.52 Developer customer experience target

This measure is being trialled this year and no range was set. However, in AR23 a target was set for AR24 of 76.5 – 78.7.

B6.53 Developer customer experience - total score

AR23 saw a change in methodology to AR22. See 1. Overview - Customer Service - Introduction for more details.

In AR23 the score was 77.1. Looking at the split between the (Line B6.55) Quantitative score at 39.04 and (Line B6.60) Qualitative score 38.07, there is slightly stronger performance in the Quantitative score. Within the Quantitative elements is the highest points lost element (Line B6.56) Development Services Service issue contacts (points lost) at 10.43.

On the Qualitative side both elements have improved from AR22. (Line B6.62) Ease of service indicator (points lost) improving from 6.34 in AR22 to 6.04 in AR23 and (Line B6.63) Development experience survey (points lost) improving from 5.99 in AR22 to 5.89 in AR23.

The confidence grade for this line is B2, reflecting the fact that this line is calculated using the scores reported in Line B6.55 (dCEM Quantitative Score) and B6.60 (dCEM Qualitative Score).

B6.54 Developer Connected properties

The number of Developer Connected properties for AR23 was 44,355, a reduction of 957 (2.11%) on the 45,312 reported in AR22.

B6.55 Developer CEM quantitative score

In AR23 the developer CEM quantitative score was 39.04.

This was driven mainly by performance in Service Issue Contacts accounting for the majority of points lost.

B6.56 Development services service issue contacts (points lost)

In AR23 the points lost for Development Services – Service Issue Contacts was 10.43.

B6.57 Development Services escalations (points lost)

In AR23 the points lost for Development Services – escalations were 0.34.

B6.58 Development Services formal complaints (points lost)

In AR23 the points lost for Development Services – formal complaints were 0.19.

B6.59 Development Services Regulator upheld complaints (points lost)

In AR23 the points lost for Development Services – formal complaints were zero.

B6.60 Developer CEM qualitative score

In AR23 the developer CEM qualitative score was 38.07. The Developer Service Survey element scored 19.11 CEM points and the Developer Ease of Doing Business Survey element scored 18.96 CEM points.

B6.61 Single house connection experience survey

The single house connection experience survey is combined with the development experience survey and a combined score is calculated.

Line B6.62 contains this combined score with no entry against B6.61.

B6.62 Ease of service indicator

In AR23 the points lost for ease of service indicator were 6.04.

B6.63 Development experience survey

In AR23 the points for development experience survey were 5.89.

11.3 Data

11.3.1 Data sources and confidence grades

Data for this table is derived from Scottish Water's corporate systems, the details can be found in the nhCEM Reporter's Report. However, for clarity Phone call volumes come from Puzzel our telephony management system, emails, portal contacts, Wanted contacts, escalations, formal complaints and regulatory upheld complaints is taken from our Customer Record Management MS Dynamics. LP Experience Survey, Ease of service indicator and Business end-user experience survey data is provided by Rant and Rave.

dCEM data for phone call volumes comes from Puzzel our telephony management system, emails, portal contacts, Wanted contacts, escalations, formal complaints and regulatory upheld complaints is taken from our Customer Record Management MS Dynamics. Single house connection experience Survey and part of Ease of service indicator is provided by Rant and Rave. Developer/connections experience survey and the other part of Ease of service indicator is provided by Trinity McQueen.

Line B6.25 Business end-user experience survey – total

This line had its confidence rating changed from A2 to B2.

Line B6.26 Business end-user experience survey – satisfied

This line has had its confidence rating changed from A2 to B2.

Both lines have been changed to match the lines they feed into B6.51 Business end user (points lost), B6.48 Business end-user experience 12-month score weighted and B6.3 Business end user.

Line B6.42 nhCEM qualitative score has been changed from A1 to A3. This is due to one of its input lines having this grading which is the lowest of its input lines. (Line B6.43)

Line B6.53 Developer customer experience – total score has had its confidence grading changed from B3 to B2. This is to reflect the two input lines B6.55 grading A1 and B6.60 grading B2.

Line B6.62 Ease of service indicator (point lost) and B6.63 Development experience survey (points lost)

The lines have both had their confidence grading changed to B2. To match their input lines B6.33-38.

No further confidence gradings have changed.

11.3.2 Data improvement programmes

The service issue element of dCEM was improved to include email and portal contacts. This increased the service issue contacts and altered the balance of the measure. This resulted in a change to the calibration from 2400 to 3600 to bring a more appropriate impact on the score.

For AR24 an improvement plan has been created. These include changes to the Portal to make tracking applications more intuitive and enhancements to the Remote Inspections App.

11.3.3 Assumptions used for forecast data

In our forecasting for AR24, we have selected a mid-point from our predicted range for each of the individual nhCEM and dCEM components. However, for forecasting the Overall nhCEM and dCEM Score we have calculated that score using the individual mid-point values forecast for each component.

12 Table B6A Stakeholders & Community Customer service

12.1 Overview

The stakeholder and Communities Experience Measure (sCEM) tracks and measures performance in perception, trust, and satisfaction as we engage in a wide range of activities in support of Scottish Water priorities and objectives. Figure 37 shows our stakeholders covered by sCEM.

It captures sentiment from those who have had direct contact with Scottish Water – and those with a perception of us and our services formed not having direct experience. SCEM combines quantitative data with qualitative elements.

AR23 was the second year of sCEM reporting. The score achieved last year was 74.48, compared to 76.77 recorded during AR22. This year's score was out with the target range predicted.

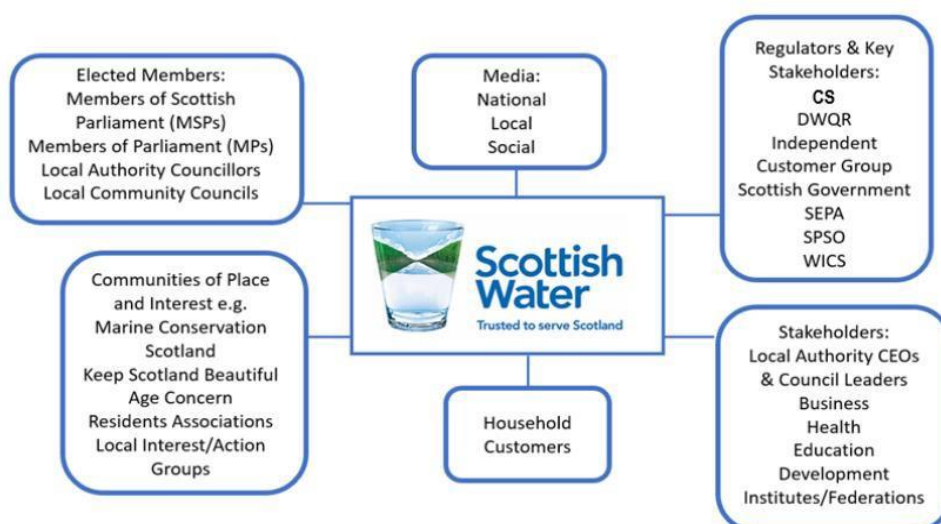
The reduction in points in the last year was driven by several factors; an increase in stakeholder contacts; lower satisfaction scores of local authority leadership; lower perception responses to surveys amongst other stakeholders.

Proactive work is ongoing to improve processes, achieve stronger service outcomes for stakeholders, communities and ultimately customers. We are working to gain better business-wide understanding of the links between operational activity and decision-making with stakeholder experiences and perceptions.

Regular monthly analysis has shown a rise in stakeholder contacts relating to the impact of severe weather events on services, including loss of supply, flooding, and sewage. Work to streamline our handling of enquiries received by stakeholders acting on behalf of customers is underway to ensure the organisation handles such contacts with improved customer-focused outcomes as a driver. Increased survey response levels have reduced volatility related to small sample sizes but has increased the number of respondents expressing dissatisfaction.

While the sCEM measure is owned by Corporate Affairs it reflects upon the whole organisation. Proactive work on engaging with communities, stakeholders including elected members nationally and locally has increased significantly over recent years.

Figure 37: Stakeholders included in sCEM.



12.2 Performance Trends

sCEM score AR23 74.48
SCEM score AR22 76.77

The target range for sCEM in AR23 was 77.5-87.5 There has been a month-on-month gradual decline in scoring over the past year, due to:

Contact numbers recorded are significantly higher than originally forecast in AR22 1,338 versus 1,598 actual (AR22 forecast based on 3-year average).

Survey response numbers dropped to single figures in November. Lower survey responses mean that one response can skew the score. As part of our ongoing improvement, we introduced e-mail surveys during 2022/23 to increase responses. As the year closed out, we reached 30+ responses per month. Higher survey responses introduce greater scope for wider ranges of expressions of satisfaction, perception, and trust, but give a truer insight into our engagement.

It is assessed that weather-related impacts on service have driven stakeholder contacts – specifically relating to flooding impacts and response, sewage, and pollution. An increase in capital investment spending led to a significant number of contacts throughout the year.

It is also assessed external factors such as cost-of-living crisis and increased customer expectations generally may have an impact on perception more widely which in turn informs how people respond to organisational service surveys.

B6A.1 sCEM overall score

The sCEM overall score was 74.49. The quantitative score comprised 39.25 (Line B6A.13), or 52.69%, of the points; and the qualitative score comprised 35.24 (Line B6A.18), or 47.31%. This is brought forward from Line B6A.12.

B6A.2 Stakeholder contacts Received

In AR23 we received 1,598 stakeholder contacts this is an increase of 57 from the 1,541 reported in AR22.

B6A.3 Stakeholder enquiries not responded to / Deadline not met

In AR23 we received three stakeholder enquiries not responded to/deadline not met contacts. This is a reduction of 5 from the previous year.

B6A.4 Stakeholder escalated / Formal Complaints

In AR23 we received two stakeholder escalated/formal complaints.

These escalated complaints were in relation to the time to complete a capital investment project and a lack of investment in the water supply in an island community.

B6A.5 Scottish Government/ Regulator Upheld Stakeholder complaints

In AR23 we received 0 Scottish Government/Regulator Upheld Stakeholder complaints for the second year.

B6A.6 Monthly perception survey – Contact

In AR23 contact was reported as 0.728 and lower than the previous year's 0.806

See introduction to this Performance Trends section for more information on what has impacted this score and the improvements being made.

B6A.7 Monthly perception survey - No Contact

In AR23 no contact was reported as 79.87%. This also saw a decrease from 88.97% in AR22.

B6A.8 Monthly customer perception survey - No Experience No Contact (hCEM)

This is also reported in **Line B5.3**. No experience no contact decreased from 93.46% last year to 91.70% this year, a decrease of 1.70%. (more information can be found in the hCEM commentary).

B6A.9 MSP Survey (Annual Perception Survey)

In AR23 the MSP Survey (Annual Perception Survey) increased to 57.00% an improvement on the reported 50.00% in AR22.

B6A.10 Local Government Leadership Survey (Annual Perception Survey)

In AR23 the Local Government Leadership Survey (Annual Perception Survey) was 33.00% and lower than the previous year's 49.00%. A review of the research and its recommendations have provided more insight into the preferred channel of face-to-face engagement with these stakeholders, and this had been built into our sCEM improvement plan.

12.2.1 Lines B6A.11-B6A.23 - Stakeholder customer experience measure score

B6A.11 Stakeholder customer experience target

The target range for AR23 was 77.5 - 87.5.

B6A.12 Stakeholder customer experience - total score

This is reported in Line B6A.1.

The score reported in this line is calculated using the values reported in lines B6A.18 (Stakeholder CEM qualitative score - B2) and B6A.13 (Stakeholder CEM quantitative score - A1). The confidence grade for this line is B2 reflecting the confidence grades for the lines used in the calculations.

B6A.13 Stakeholder CEM quantitative score

In AR23 the score was 39.25. This was driven mainly by performance in the Stakeholder Contacts Received category which lost 10.69 points.

The confidence grade for this line is A1.

B6A.14 Stakeholder contacts received

In AR23 points lost were 10.69 (AR22 10.31.)

B6A.15 Stakeholder contacts not responded to/deadline not met

In AR23 points lost were 0.03. (AR22 0.08)

B6A.16 Stakeholder escalated/formal complaints

In AR23 the points lost were 0.03 (AR22 0)

B6A.17 Regulator upheld stakeholder complaints

In AR23 the points lost were zero. (AR22 0)

B6A.18 Stakeholder CEM qualitative score (points lost)

In AR23 the score was thirty-five compared with 37 for AR22. This decrease was driven mainly by performance across all the elements. With the exception of the annual MSP survey which had an improvement in points in AR23.

The confidence grade for this line is B2.

B6A.19 Monthly perception survey - 'contact' (points lost)

In AR23 contact points lost were 3.32 (AR22 2.75)

The confidence grade for this line is B2.

B6A.20 Monthly perception survey - 'no contact' (points lost)

In AR23 points lost were 3.34 (AR22 2.84)

The confidence grade for this line is B2.

B6A.21 Monthly You Gov survey - 'no experience, no contact' household customers (points lost)

In AR23 points lost were 1.69 (AR22 1.35)

The confidence grade for this line is B2.

B6A.22 MSP annual perception survey (points lost)

In AR23 points lost were 2.51 (AR22 2.92)

The confidence grade for this line is B2.

B6A.23 Local Government Leadership annual perception survey (points lost)

In AR23 points lost were 3.91 (AR22 2.98)

The confidence grade for this line is B2.

12.3 Data

12.3.1 Data sources and confidence grades

Quantitative data is taken from Scottish Water's corporate systems including Microsoft and the Vuelio platform for logging and tracking enquiries and contacts from stakeholders. These have a confidence grade of A1.

Qualitative data is provided by external research companies for monthly perception surveys with stakeholders and annual surveys with MSPs and local authority leaders. These have a confidence grade of B2.

Data improvement programmes - work has been undertaken in a number of areas of improvement: Internal audit improvements on process and data management / security; this increases the integrity of the data and increases our confidence in analysis. Improved survey processes including

introduction of online capability; this increases the sample sizes and provides respondents with a better experience in taking part.

Review of contact types – Corporate Affairs stakeholder v Customer Service; this will help deliver better outcomes for both stakeholders and customers including additional support.

Clearer alignment with other CEMs; this will increase awareness and understanding across the organisation of the purpose of sCEM and its connectivity with activities / decision-making beyond Corporate Affairs.

12.3.2 Assumptions used for forecast data

sCEM - With 4 years' experience we have reviewed historic performance and reset the target zone for sCEM and this was approved by the Board in February 2023.

The reason for resetting this relates to sCEM Service Issue Contact (SIC) numbers over the last 2 years being higher than we anticipated when setting the original target in February 2021. AR21 was impacted by COVID-19, and we experienced significantly lower numbers of service issue contacts during that year than we have seen since. Given the more normalised position of c1,400 to 1,500 contacts a year we have reviewed and revised the sCEM target range to give a low end that is still challenging but achievable and a top end that is aspirational.

sCEM Target

Our AR24 target range is 76.5 – 83.5.

Target range was based on the exit figures from a shadow reporting year, (AR21).

13 Table B7: Customer care - Service Standards performance

13.1 Overview

From 1 April 2015 Guaranteed Service Standards (GSS) and Price Promise merged to a single set of standards called “Our Service Standards”.

If Scottish Water fails to comply with Our Service Standards set out in the Code of Practice, the customer is entitled to a payment. Most of the payments are automatically paid when Scottish Water identifies non-compliance and a small number require our customers to make a claim for payment.

Details relating to appointments have experienced system (Dynamics and Salesforce) integration issues from January 2022 to March 2023. This has prevented Scottish Water from being able to identify where appointments may have been missed. This issue has been rectified going into the AR24 period, whereby the coming annual period will be reportable.

13.2 Performance Trends

13.2.1 Lines B7.1-B7.4 Planned Interruptions

Planned interruptions warn customers 48 hours in advance and supply is restored within time given. Payment is made if Scottish Water fails to warn customers or supply is not restored by the time given.

B7.1 Number of Service Standards failure payments paid automatically (planned interruptions)

This was zero in AR23, which mirrored the performance in AR22.

B7.2 Number of Service Standards failure payments claimed (planned interruptions)

Compared to AR22 there was a decrease in the number of claims made against Scottish Water in relation to Interruption to Supply i.e. six claims compared to 12 in the AR22. This is a payment which customers claim so will vary depending on the number of customers claiming.

B7.3 Total number of Service Standards failure payments made (planned interruptions)

In AR23 this was 6 which represents a decrease of 6 from the 12 reported in AR22.

B7.4 Total amount paid out for Service Standards failure (planned interruptions)

The total amount paid out in AR23 was £180.00. This is a decrease of £210 on the £390.00 paid in AR22. Table 66 below shows the average payment from AR22 to AR23 which has reduced from £32.50 in AR22 to £30.00 in AR23. This was due to a single payment in AR22 of £60.00 with the rest at £30.

Table 66: Average payment for service standard failure.

	AR22	AR23
Amount Paid	£390.00	£180.00
Payments	12	6
Average Payment	£32.50	£30.00

13.2.2 Lines B7.5- B7.12 - Unplanned Interruptions - (burst main and so on) restore within 12 hours (48 hours for a large main supplying a large area)

B7.5 Number of Service Standards failure payments paid automatically (unplanned interruptions)

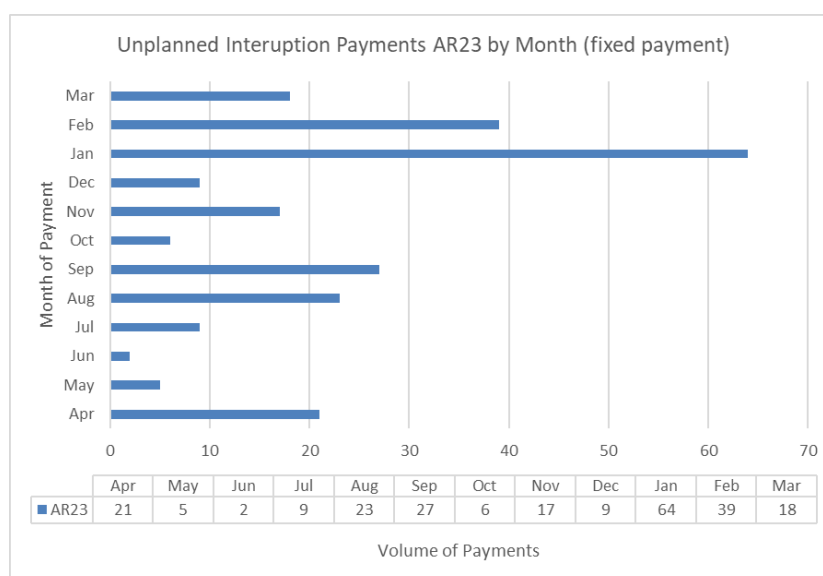
The number of payments paid automatically was zero in AR23, which mirrored the performance of AR22.

B7.6 Number of Service Standards failure payments claimed (unplanned interruptions)

The number of payments claimed was 1,872 in AR23, an increase of 1,814 from the 58 reported in AR22. For AR23 this includes the payments related to repeat interruptions of which there are 1632, in AR24 these payments will be split across lines B7.7 to B7.10. These payments were not included in the AR22 figures or the annual returns previously.

This line includes all failures for interruption to supply where “you can claim £30, then £15 for every 12-hour period after this that you are without water”. This accounts for 240 of the payments and Figure 38 below shows how these are split across AR23. Similar to Line B4.6 where we saw a spike in customer contacts in December and January these payments also spiked in the month’s following once customers had contacted to claim on the back of the winter weather.

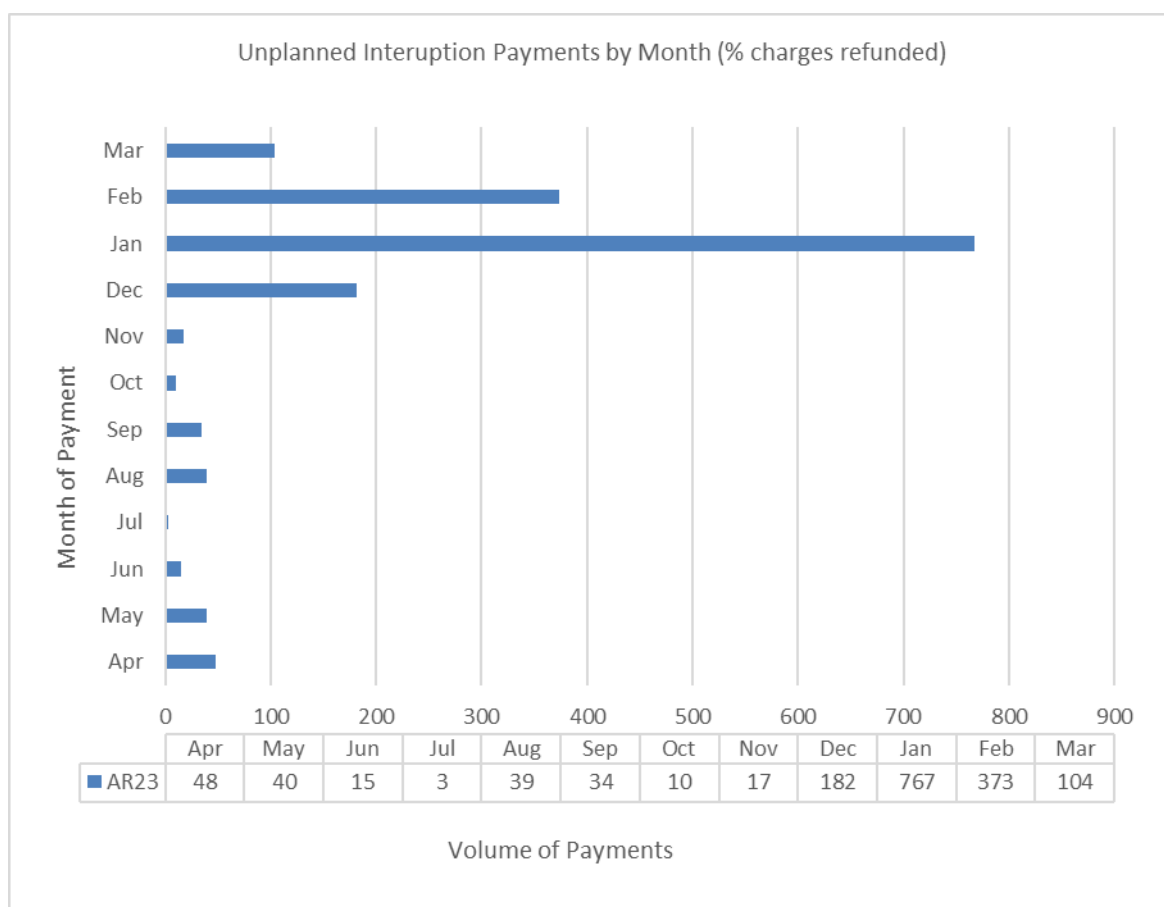
Figure 38: Volume of unplanned interruption payments (fixed payments) by month for AR23.



The second split of payments are for, “If you report two interruptions in the same financial year, caused by a failure in the network that is not related to work we are carrying out, you can apply to claim a payment of 25% of your annual water charges. If you experience and report subsequent interruptions within the same financial year, you can claim a further 25% for each of those subsequent interruptions, to a maximum of 100% of your water charges”.

There were 1,632 payments made in total and Figure 39 below shows the split of these across AR23. Similar to the fixed payments, this increased over the winter. In particular, we made 1,373 payments in the Kerse area which suffered repeat outages. With regard to the interruptions in the Kerse area, the first burst was on the 29 October 2022 in the inlet main to the water supply zone, where a hole was identified as a likely consequence of the pipe’s age and condition, along with a change of pressure and operation.

Figure 39: Volume of unplanned interruption payments (% charges refunded) by month for AR23.



On Saturday 5 November damage was caused to one of our large-diameter 15-inch trunk mains and a subsequent burst occurred on a 10-inch main on Sunday 6 November. The supply issues on the 6 and 7 November were due to an instable Pressure Reducing Valve (PRV) that manages the pressure to the village. Whilst we carried out the complex repair, unfortunately, some of our distribution mains experienced leaks which also required repair. We tankered water into the network to minimise the number of customers impacted, and bottled water was also made available including a bottled water station.

During the period of the 20 October to 20 December when the service reservoir that supplies Drongan was taken out of service, a number of interventions and improvements were completed on this asset to improve its structural integrity and operation. In addition to this, the pipework dimensions of the by-pass that was used to remove the service reservoir from service was upsized as soon as the asset was returned to service. These interventions have improved our operational resilience and stabilised the network. In addition to this, capital intervention work is currently underway to construct a new service reservoir which will improve our ability to complete routine maintenance without the risk of comprising supply to the recently affected area.

In AR24 these payments will be split across lines B7.7 to B7.10. These payments were not included in the AR22 figures.

B7.7 Number of Service Standards failure payments claimed for two interruptions per year

Automated reporting of this line has been developed and implemented in April 2023. This will allow reporting to commence in AR24.

B7.8 Number of Service Standards failure payments claimed for three interruptions per year

Automated reporting of this line has been developed and implemented in April 2023. This will allow reporting to commence in AR24.

B7.9 Number of Service Standards failure payments claimed for four interruptions per year

Automated reporting of this line has been developed and implemented in April 2023. This will allow reporting to commence in AR24.

B7.10 Number of Service Standards failure payments claimed for five interruptions per year

Automated reporting of this line has been developed and implemented in April 2023. This will allow reporting to commence in AR24.

B7.11 Total number of Service Standards failure payments made (unplanned interruptions)

The number of payments claimed was 1872 in AR23, an increase of 1814 from the 58 reported in AR22. In AR23 as was the case in AR22 we are unable to report the split of lines B7.7 to B7.10 due to system changes to allow us to report on this, we are able to report these payments an additional 1632 in AR23 as such these payments are in added into line B7.6 which details the breakdown of these payments.

B7.12 Total amount paid out for Service Standards failure (unplanned interruptions)

The total amount paid in AR23 was £324,479.24, which is an increase of £322,204.24 on the £2,275.00 paid in AR22. Table 67 below shows the split of the payments by reason for payment, this shows the increase is mainly due to 1632 payments totalling £311,074.24 for repeat interruptions to supply which are being added in AR23 having not been in the annual returns previously. Of those 1632 payments, 1373 totalling £261,341.25 are due to repeat interruptions in the Kerse area further details are in Line B7.6.

Table 67: Split of payments by reason for line B7.12 for AR22 and AR23.

	AR22	AR23	Difference AR23 - AR22
Payments for Interruption to supply	58	240	182
Amount paid	£2,275.00	£13,405.00	£11,130.00
Payments for between 2-5 Interruptions to supply	N/A	1632	N/A
Amount paid	N/A	£311,074.24	N/A
Total Payments	58	1872	1814
Total Amount paid	£2,275.00	£324,479.24	£322,204.24

Table 68 below details the Average Payment which has increased from £39.22 in AR22 to £173.33 in AR23. As mentioned in Line B7.6 the majority of payments are due to repeat interruption to supply which is a refund of part of the customers water charges these are higher payments and have increased the average payment in AR23.

Table 68: Average payment for Service Standard failure (unplanned interruptions) for AR22 and AR23.

	AR22	AR23
Amount Paid	£2,275.00	£324,479.24
Payments	58	1872
Average Payment	£39.22	£173.33

13.2.3 Lines B7.13-B7.20 - Internal wastewater flooding– caused by wastewater from our sewers

B7.13 Number of payments to domestic properties for internal flooding from sewers due to being on the register

The number of payments made in AR23 is 171, compared to 124 in AR22, an increase 47. This has increased due to the number of eligible properties increasing and the number of customers accepting the payment also increasing. Table 69 below shows the volume of payments offered, paid and % paid.

Table 69: Volume of payments offered, paid and % paid for AR22 and AR23 for line B7.13.

	Offered Payment	Paid	% Paid
AR22	232	124	53%
AR23	261	171	66%

B7.14 Number of payments to domestic properties for internal flooding from sewers due to not being on the register

The number of payments was 163 in AR23, compared to 111 in AR22, an increase of fifty-two.

B7.15 Total amount paid to domestic properties for internal flooding from sewers due to being on the register

Total amount paid to domestic properties in AR23 is £51,465.94 compared to £36,000.30 in AR22 an increase of £15,465.64. Table 70 below shows the average payment which has increased from £290.33 in AR22 to £300.97 in AR23. This payment is based on the wastewater charges for the property and will have increased based on increases in the charges, Table 71 below shows the changes in charges between AR22 and AR23. It can also be affected by the charges at the property for example a property with higher charges is removed from the register but a property with lower charges is added.

Table 70: Average payment amount for line B7.15 for AR22 and AR23.

	AR22	AR23
Amount Paid	£36,000.30	£51,465.94
Payments	124	171
Average Payment	£290.33	£300.97

Table 71: Unmetered Wastewater Supply Collection Charges.

Unmetered Wastewater Collection Charges		
Council Tax Band	AR22	AR23
Band A	£164.46	£171.36
Band B	£191.87	£199.92
Band C	£219.28	£228.48
Band D	£246.69	£257.04
Band E	£301.51	£314.16
Band F	£356.33	£371.28
Band G	£411.15	£428.40
Band H	£493.38	£514.08

B7.16 Total amount paid to domestic properties for internal flooding from sewers due to not being on the register

The total amount paid was £45,536.62 in AR23, compared to £30,138.26 in AR22, an increase of £15,398.36, shown in Table 72 below. As with Line B7.15 these payments are based on the wastewater charges of the property flooded as such the average payment can alter depending on the property.

Table 72: The amount paid, number of payments and average payment for line B7.16 for AR22 and AR23.

	AR22	AR23
Amount Paid	£30,138.26	£45,536.62
Payments	111	163
Average Payment	£271.52	£279.37

B7.17 Number of payments to non-domestic properties for internal flooding from sewers due to being on the register

These payments are not applicable to non-domestic customers and is therefore reported as – with a confidence grading of N.

B7.18 Number of payments to non-domestic properties for internal flooding from sewers due to not being on the register

The number of payments to non-domestic properties for internal flooding from sewers due to not being on the register is 107 in AR23, compared to 110 in AR22, a decrease of 3.

B7.19 Total amount paid to non- domestic properties for internal flooding from sewers due to being on the register

These payments are not applicable to non-domestic customers and is therefore reported as – with a confidence grading of N.

B7.20 Total amount paid to non-domestic properties for internal flooding from sewers due to not being on the register

The total amount paid was £69,314.33 in AR23, compared to £78,016.26 in AR22, a decrease of £8,701.93. The average payment has also decreased from £709.24 in AR22 to £647.80 in AR23, shown in Table 73 below. The payment is based on the Wastewater charges up to a maximum payment of £1,000, as such the average payment can alter depending on the properties flooded.

Table 73: The amount paid, number of payments and average payment for line B7.20 for AR22 and AR23.

	AR22	AR23
Amount Paid	£78,016.26	£69,314.33
Payments	110	107
Average Payment	£709.24	£647.80

13.2.4 Lines B7.21-B7.24 - External wastewater flooding - Caused by wastewater from our sewers

B7.21 Number of payments to domestic properties for external flooding from sewers

In AR23 we made ten payments to domestic properties for external flooding from sewers, this is an increase of two from the eight payments in AR22.

B7.22 Total amount paid to domestic properties for external flooding from sewers

In AR23 we paid £1,922.6 in payments to domestic properties for external flooding from sewers, compared to £1,284.30 in AR22, this has increased by £638.30. The average payment has also increased from £160.54 in AR22 to £192.26 in AR23, as shown in Table 74 below. The payments for these vary depended on the level of charges at the property hence why we see a change in the average payment.

Table 74: The amount paid, number of payments and average payment for line B7.22 for AR22 and AR23.

	AR22	AR23
Amount Paid	£1,284.30	£1,922.6
Payments	8	10
Average Payment	£160.54	£192.26

B7.23 Number of payments to non-domestic properties for external flooding from sewers

These payments are not applicable to non-domestic customers and is therefore reported as – with a confidence grading of N.

B7.24 Total amount paid to non-domestic properties for external flooding from sewers

These payments are not applicable to non-domestic customers and is therefore reported as – with a confidence grading of N.

13.2.5 Lines B7.25-B7.29 - Respond to questions about your bill and changing your payment methods - respond within 5 working days

There were no failures reported against this standard.

13.2.6 Lines B7.30-B7.34 - Written response to a formal complaint - respond within 5 working days

There were no failures reported against this standard.

13.2.7 Lines B7.35-B7.42 - Appointments - keeping appointments made more than 24 hours in advance

As per our response in AR22 we have now completed the work to resolve the issues in reporting and will be able to report these figures in AR24.

B7.35 Number of appointments

The number of appointments was 4,226 in AR23 this has increased on the partial figure of 2,487 reported in AR22 for April to December only. Due to the improvements in the process the confidence grade for this line is now A1 from B3.

B7.36 % of appointments made which are kept

As per our response in AR22 we are on track to report these figures in AR24. This line is being reported with a confidence grade of M for AR23.

B7.37 Number of two-hour time banded appointments made

The number of appointments was 4,226 in AR23 this has increased on the partial figure of 2,487 reported in AR22 for April to December only. Due to the improvements in the process the confidence grade for this line is now A1 from B3.

B7.38 % of two-hour time banded appointments made which are kept

As per our response in AR22 we are on track to report these figures in AR24. This line is being reported with a confidence grade of M for AR23.

B7.39 Number of Service Standards failure payments paid automatically (keeping appointments)

The number of payments paid automatically in AR23 was zero, a decrease of 32 from 32 in AR22. As per our response in AR22 we will be able to start paying these in 23/24.

B7.40 Number of payments made from claims for failure (keeping appointments)

The number of payments made in AR23 for failing to keep appointments was 15, an increase of 5 on the 10 failures to keep appointments in AR22.

The 15 failures to keep appointments in AR23 represents 0.35% of the total number of appointments made (B7.35 – number of appointments 4226), compared to the 10 failures in AR22, which represents 0.40% of the total number of appointments made (B7.35 – number of appointments 2487) – a marginal change in comparison between of AR23 and AR22

The confidence grading for this line has changed from AX to A1.

B7.41 Total number of Service Standards failure payments made (keeping appointments)

The total number of service standards failure payments made in AR23 was 15. This has decreased from 42 in AR22, a decrease of 28. The decrease is due to the reporting issues in AR22 which have been resolved and will allow automatic payments to be processed in AR24 as mentioned in Line B7.39.

B7.42 Total amount paid out for Service Standards failure (keeping appointments)

The total amount paid out for service standards failure in AR23 was £450. This has decreased from £1,250.00 in AR22, a decrease of £800. As mentioned in Line B7.41 this is due to zero automatic payments in AR23 as a consequence of technical issues. Table 75 below shows the average payment has increased from £29.76 in AR22 to £30.00 in AR23.

Table 75: The amount paid, number of payments and average payment for line B7.42 for AR22 and AR23.

	AR22	AR23
Amount Paid	£1,250.00	£450.00
Payments	42	15
Average Payment	£29.76	£30.00

13.2.8 Lines B7.43-B7.47 - Water in gas pipes - give you a call within 2 hours of reporting the fault to give details of what happens next

There were no failures reported against this standard.

13.2.9 Lines B7.48-B7.52 - Water meters - applications. We will let you know the outcome within 10 working days of your application

There were no failures reported against this standard.

13.2.10 Lines B7.53-B7.58 - Water pressure - we will tell you the outcome of our investigations within 5 working days

B7.53 Number of payments made within Service Standards period due to being on the register

The number of payments for AR23 is 30 compared to 48 in AR22. This is due to the number eligible properties and the number of properties taking up the payment decreasing. Table 76 below shows the numbers of properties eligible for a payment and the percentage who have accepted the payment both of which have dropped since AR22.

Table 76: Volume of payments offered, paid and % paid for AR22 and AR23 for line B7.53.

	Offered Payment	Paid	% Paid
AR22	64	48	75.00%
AR23	46	30	65.22%

B7.54 Number not dealt with within Service Standards period

The number not dealt with within Service Standards period was zero in AR23, this mirrored the performance from AR22.

B7.55 Number of payments for failure to respond (automatic)

The number of payments for failure to respond (automatic) was zero in AR23, this mirrored the performance in AR22.

B7.56 Number of payments made from claims for failure to respond

The number of payments made from claims for failure to respond was one in AR23, this increased from zero in AR22.

B7.57 Total number of payments for failure to respond

The total number of payments for failure to respond was one in AR23, this increased from zero in AR22.

B7.58 Total amount paid for Service Standards failure

The total amount paid for Service Standards failure was £8,702.56 in AR23, compared to £12,517.45 in AR22, a decrease of £3,814.89. Table 77 below shows the average payment which has increased from £260.78 in AR22 to £280.73 in AR23. This is made up of all the payments made in lines B7.53 to B7.57, line B7.53 is a payment of the water charges you have paid for the year, while lines B7.54 to B7.57 is a £30 payment. Only one payment of £30 was made in AR23 making the average payment being driven by water charges which can vary depending on the property.

Table 77: The amount paid, number of payments and average payment for line B7.58 for AR22 and AR23.

	AR22	AR23
Amount Paid	£12,517.45	£8,702.56
Payments	48	31
Average Payment	£260.78	£280.73

13.2.11 Lines B7.59-B7.62 - Water quality - affecting the water quality where a 'boil water' or do not use notice' is in place for more than 3 months

There were no failures reported against this standard.

B7.59 Number of restrictions (e.g., boil notices, do not use notices)

The number of restrictions (e.g., boil notices, do not use notices) was zero in AR23, this mirrors the performance in AR22.

B7.60 Number of restrictions (e.g., boil notices, do not use notices) in place for more than 3 months

The number of restrictions (e.g., boil notices, do not use notices) in place for more than 3 months was zero in AR23, this mirrors the performance in AR22.

B7.61 Number of Service Standards failure payments made from claims (water quality)

The number of service standards failure payments made from claims (water quality) was zero in AR23, this mirrors the performance in AR22.

B7.62 Total amount paid out for failure (water quality)

The total amount paid out for failure (water quality) was £0.00 in AR23, this mirrors the performance in AR22.

13.2.12 Lines B7.63-B7.68 - Connection Services - where evidence confirms that we have caused a delay

There were no failures reported against this standard.

B7.63 Number not dealt within the Service Standards period (≤32mm outside diameter pipe)

The number not dealt within the Service Standards period (≤32mm outside diameter pipe) was 0 in AR23, this mirrors the performance in AR22.

B7.64 Number not dealt within the Service Standards period (>32mm outside diameter pipe)

The number not dealt within the Service Standards period (>32mm outside diameter pipe) was 0 in AR23, this mirrors the performance in AR22.

B7.65 Number of payments made from claims for failure to respond (≤32mm outside diameter pipe)

The number of payments made from claims for failure to respond (≤32mm outside diameter pipe) was 0 in AR23, this mirrors the performance in AR22.

B7.66 Number of payments made from claims for failure to respond (>32mm outside diameter pipe)

The number of payments made from claims for failure to respond (>32mm outside diameter pipe) was 0 in AR23, this mirrors the performance in AR22.

B7.67 Total number of payments made from claims for failure to respond

The total number of payments made from claims for failure to respond was zero in AR23, this mirrors the performance in AR22.

B7.68 Total amount paid for Service Standards failure

The total amount paid for Service Standards failure was zero in AR23, this mirrors the performance in AR22.

13.2.13 Lines B7.69-B7.70 - Ex Gratia Payments Made

On receipt of a claim, Scottish Water fully investigates the details of the claim with the assistance of the relevant parties. If we establish that a failure has occurred, an offer of ex-gratia may be made to the customer. This payment is not considered as an admission of liability by Scottish Water, and this does not affect the claimant's legal rights.

B7.69 Total number of ex-gratia payments made

The total number of ex-gratia payments made in AR23 was 389 which is a decrease of 2,016 from AR22's total of 2,405.

The total number of payments for AR22 was 2405, which included 2,020 payments offered to customers following the impacts on service of Storms Arwen, Malick and Corrie during AR22. Removing these payments from the total equates to 385 (2405 - 2020). Comparing this to AR23 results in an increase of four payments, or 1%.

B7.70 Total amount paid out in ex-gratia payments

The total amount paid out in ex-gratia payments in AR23 was £81,442.11. This has decreased from the £228,122.77 in AR22, a decrease of £146,680.66. This decrease was mainly due to impact of the severe weather payments made in AR22.

13.2.14 Lines B7.71-B7.75 - Major Incidents - A) Failure to provide information

There were no failures reported against this standard.

13.2.15 Lines B7.76-B7.80 - Major Incidents - B) Failure to provide alternative supplies

There were no failures against this standard.

13.3 Data

13.3.1 Data sources and confidence grades

Processes and procedures are in place which allow the Service Standards team to strictly monitor performance on all Scottish Water's Service Standards. Information is accurately captured, and reports are produced that identify potential non-compliance with our standards. Each notified failure is fully investigated with the assistance of the relevant parties within the business and, if it is established that a failure has occurred, a payment will be issued to the customer.

This team also has responsibility for processing all ex-gratia claims received via a public liability claim against Scottish Water.

The Service Standards team are fully accredited and operate to ISO9001 standard.

Line B7.35 has had its confidence grading changed from B3 in AR22 to A1 in AR23 due to the improvements in the process over AR23. Reference section 1.2 for further details.

Line B7.36 % of appointments made which are kept, has had its confidence grade changed from B3 to N. We are unable to report any figures this year. However, as per our response in AR22 we are on track to report these figures in AR24.

Line B7.37 Number of two-hour time banded appointments made, due to the improvements in the process the confidence grade for this line is now A1 from B3.

Line B7.38 % of two-hour time banded appointments made which are kept, has had its confidence grade changed from B3 to N. Due to the fact that we are unable to report any figures this year, as per our response in AR22 we are on track to report these figures in AR24.

Line B7.40 Number of payments made from claims for failure (keeping appointments), the confidence grading for this line has changed from AX to A1 due to the increased volume of payments.

There have been no further changes to the confidence grading of any other lines.

13.3.2 Data improvement programmes

There were no significant data improvement in AR23 2022-23.

13.3.3 Assumptions used for forecast data

There are no forecasts in Table B7.

14 Table B8: Water infrastructure and sewerage service

14.1 Overview

The majority of lines reported in this table are repeated from other tables. The data derivations, observations and grades are discussed in their relevant table comments sections and referenced in this section, with limited summaries below.

The Distribution Input and Leakage components of this table, reported in Lines B8.9 to B8.13, are from Table A2 Lines A2.6 to A2.21 and Lines A2.23 to A2.26.

14.2 Performance Trends

Line B8.1 - Water service – distribution

B8.1 Mains bursts per 1000 km

Reported performance of 162 bursts per 1,000km was calculated from water mains bursts (7,959), and the total mains length of 49,110.37km. The increase is due to comparatively colder weather and thaws in December and January during AR23 than during AR22. Frost can penetrate through the ground to the mains which when thawed the ground moves which can cause mains to burst.

A new field system, Salesforce, was rolled out in stages in the latter half of AR22. This has provided field staff with a better means to record the activities they are conducting. However, after review of the data quality it has been identified that some activities have not been getting back to the works management system, used to calculate the number of bursts. Therefore, a correction has been put in place where data is used from both the field system and the works management system to provide the assessment of bursts, while we correct this system issue. This correction also results in the number of bursts per 1,000km reported in AR22 should have been 141 not 137.

14.2.1 Lines B8.2-B8.8 - Sewerage service

The numbers reported for this section are derived from the approach outlined in the commentary for Table E7. For reporting purposes, we include all cases where the pipe is damaged, and a repair has been necessary and rising mains are included in the reported numbers.

B8.2 Total number of sewer collapses

In this category Scottish Water reports as a “collapse” all cases where a sewer is damaged, and a repair has been necessary. The WICS definition for this line states ‘All third-party damage should be excluded where costs are potentially (rather than actually) recovered from a third party.’

The number of reported collapses increased from 1,434 in AR22 to 1,618 in AR23 (1,611 gravity sewer failures and 7 rising main failures); a 12.83% increase.

Sewer Collapses (Line Ref B8.2) - there have been a number of changes which have resulted in increased numbers of Work Orders being generated to investigate and repair these collapses. These include the Alternative Resolution Management process (repeat visit reduction), increased CCTV surveys by Sewer Response and ease of Work Order creation through the roll out of Salesforce.

B8.3 Sewer collapses per 1000 km

The reported performance of 29.8 sewer collapses/1,000km was calculated from the number of sewer collapses (1,618) divided by the total length of sewer (54220 km/1000). This is an increase of 11.4% from the AR22 figure of 26.75.

B8.4 Number of unsatisfactory intermittent discharges

The number of UIDs increased from 681 in AR22 to 776 in AR23 which is an increase of 95 as a result of better information from the SR15 and SR21 study programmes which have recently concluded.

B8.5 Number of intermittent discharges

This line reports the total number of Scottish Water's Intermittent Discharges (IDs). It is intended to include IDs in the network (Combined Sewer Overflows (CSO), Settled Storm Sewage Overflows (SSSO), Surface Water Overflows (SWO) and Emergency Overflows (EO) and IDs at WwTWs (Inlet CSOs, SSSOs and EOs).

The number of IDs was reported as 3,574 in AR22 and 3,591 in AR23, an increase of 17. However, in preparation for moving to a new inventory system and in reviewing priority locations for the installation of new overflow Event Duration Monitors, discrepancies in overflow numbers have been identified and a robust data cleansing activity is underway and will be completed ahead of the annual return next year.

B8.6 Percentage of unsatisfactory intermittent discharges

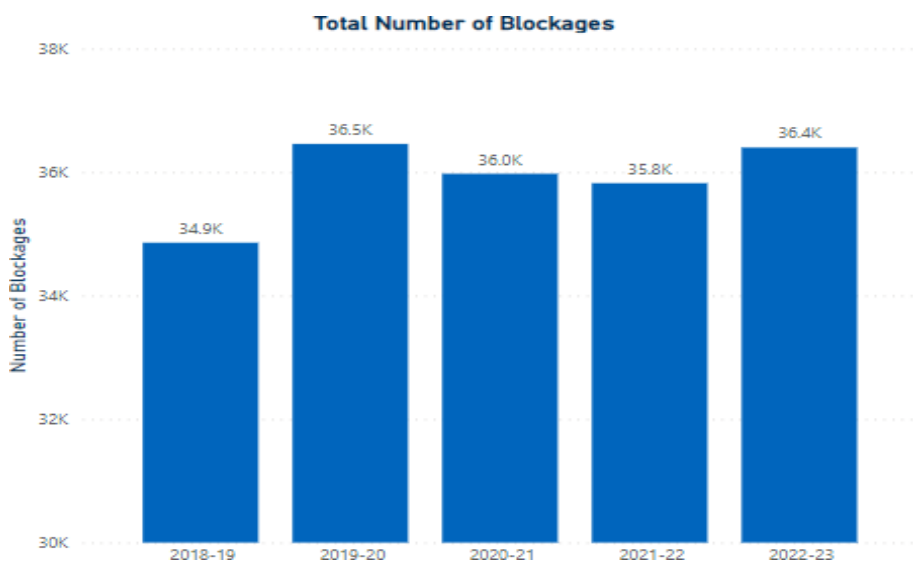
Line B8.6 is a calculated percentage line; the Number of Unsatisfactory Intermittent Discharges (**Line B8.4**) divided by Number of Intermittent Discharges (**Line B8.5**).

The confidence grade for this line is B2.

14.2.2 Lines B8.7 & B.8.8 Sewer Blockages

The number of blockages (chokes) for AR23 is 36,399, compared to 35,822 in AR22 (see Figure 40 below).

Figure 40: Total number of blockages per year since 2018.



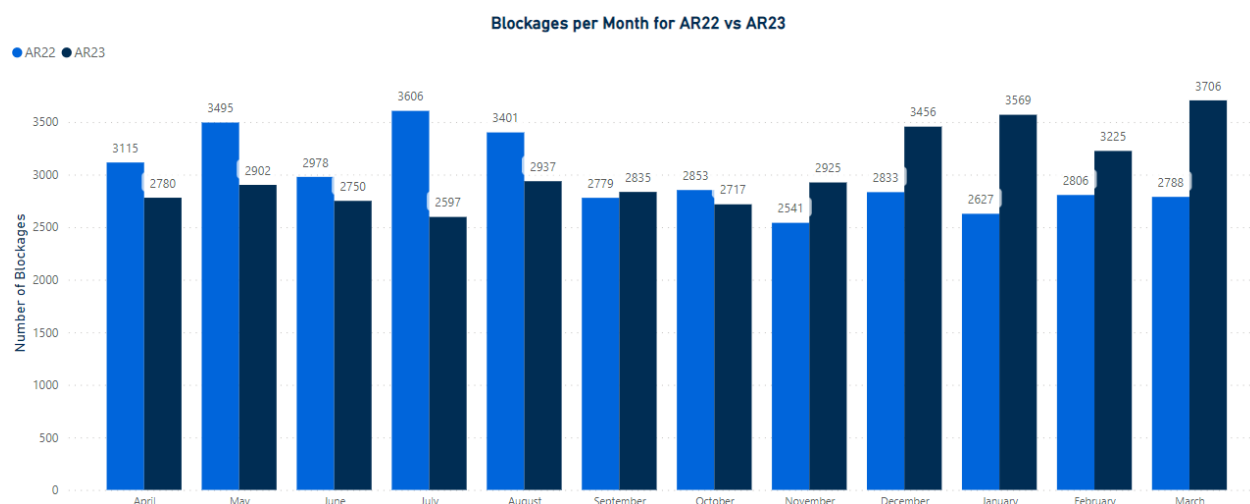
Both Main Sewer and Lateral Sewer lengths should be used when assessing chokes per 1,000km, as this better reflects the pipes which we are responsible for. This gives a rate of 671.3 chokes per 1,000km.

AR23 saw an initial decrease in the number of blockages, particularly during the summer months. This was followed by an increase in blockages later in the year in comparison to AR22.

This initial decline and subsequent spike in blockage volumes could be attributed to differing weather patterns in AR23 compared to AR22. During the summer of AR22, several short duration high intensity storms were experienced following long periods of dry weather. In comparison, in AR23 there was steady rainfall followed by short periods of dry weather.

Additionally, we were hit with a severe rainfall event on 30 December 2022, and constant rainfall during late winter which caused a significant increase in volumes through to year end. Figure 41 below illustrates the number of blockages per month for the AR22 period compared to the AR23 period.

Figure 41: The number of blockages per month for AR22 vs AR23.



14.2.3 Lines B8.9-B.13 – Leakage

B8.9 Leakage

Total leakage MLE (post adjustment) as a percentage of Distribution Input (DI) is at 25% and was also at 25% the previous year.

B8.10 Total Leakage (post-MLE Adjustment)

Scottish Water reports MLE leakage of 453.71 MI/d for AR23 (rounded to 454 in the WICS information request). The AR23 leakage value is 4.68 MI/d lower than the 458.39 MI/d at AR22 on a like-for-like basis (Table 78).

Table 78: Total leakage post MLE comparison.

Report Year	Top-Down Leakage (MI/d)	Bottom-Up Leakage (MI/d)	MLE Leakage (MI/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

Report Year	Top-Down Leakage (MI/d)	Bottom-Up Leakage (MI/d)	MLE Leakage (MI/d)
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

B8.11 Net Distribution input (DI) treated water (water put into supply)

AR23 saw a slight decrease in Distribution Input of -1.43MLD (to 1835.52 MLD) from 1836.95 MLD in AR22. The summer of 2022 saw record breaking temperatures across all areas of the UK. Scotland reported a record temperature of 34.8c on the 19th of July and slightly less intense heat in the second week of August. The temperatures caused a significant increase in domestic and non-domestic water use. The distribution input rose by c150 MI/d (8%) during this period. In contrast the winter brought a period of extremely cold temperatures from mid to late December. Temperatures rose quickly and the resulting thaw brought a large increase in bursts on both the public and private network. The Distribution Input increased by over 300ML/d during this time due to the increase in leakage.

For AR23 2.72% of the data was estimated or constant which is down from 3.73% at AR22. This has remained within a range of 1-5% over the past 14 years and is slightly above the fourteen-year average of 2.13%. Manually read data accounts for 0.73% of DI (down from 1.72% at AR22 and 3.63% from AR21) with 96.55% based on telemetry data (AR22 94.55%).

There have been four replacement meters installed during AR23 which is down from the six replacements in AR22.

There have been no large diameter meter changes during AR23.

B8.12 Leakage target

The target range is 443 to 458 MI/d. Scottish Water uses a spot target of 456 MI/d for AR23 to allow the calculation of **Line B8.13**.

B8.13 Leakage performance against the target

Scottish Water reports MLE leakage of 453.71 MI/d for AR23 (rounded to 454 MI/d for the WICS Information request), which is 2.33 MI/d (-0.50%) below the OPA target of 456 MI/d for AR23. This year there was another reduction in leakage, which contributed to the year-on-year reduction delivered since 2006.

14.3 Investment

The allocation to MA005 for UIs is £146m. The allocation is divided out within two need codes - Water Quality (£64.5m) and Aesthetic (£80.1m). As per discussions with SEPA, WQ will be prioritised.

The allocation of MA005 at the start of SR21 was £207m however following agreement of IPS23, the allocation was reduced from £207m to £146m.

As of April 2023, Live spend is at £47m with a current committed spend of £7.4m for 2023 – 2027 but action has been taken which will significantly accelerate the pace of investment against this MA as follows:

- Scottish Water will deliver interventions of all High Priority (HP) UIDs for 2027 and develop solutions for additional Glasgow HP UIDs which have been identified from the SR21 Aesthetic Catchment Studies for Daldowie, Dalmuir, Shieldhall and Laighpark catchment areas. In order to maintain consistency, the outputs of the studies have gone through the same verification/categorisation process (and SEPA agreement) as the previous HP UIDs, as well as develop solutions for all medium priority CSOs, subject to IPPG approval.
- By way of meeting the Dec 2027 commitments and as projects mature, it is expected that Scottish Water will invest the remainder of the.
- Scottish Water routinely review UID needs with SEPA and their prioritisation along with any change in scope which may come from ongoing development projects. This, with the agreement of SEPA, might see the UID needs being confirmed as 'no needs' and a slight reduction in number of needs however this is minimal.
- Develop solutions for all medium priority CSOs and agree delivery timetables for these. We will promote these as a priority investment for the period after 2027 and, subject to these being approved, we will plan to deliver improvements to these CSOs by December 2031.

The outcomes of the success delivery of MA005 intervention will be:

1. Deliver Solutions for high priority Water Quality CSOs by December 2027
2. Developed solutions for confirmed high priority CSOs that have significant Sewage Related Debris impacts on rivers.
3. Agreed delivery timetables for the high priority CSOs and promoting to IPPG for approval.
4. Subject to funding being available, we will plan to deliver these CSO improvements by December 2027.
5. Develop solutions for medium priority CSOs. We will promote these as a priority investment in the Ministerial Objectives for the period after 2027 and, subject to these being approved, we will plan to deliver improvements to these CSOs by December 2031.

14.4 Data

B8.1 - Mains bursts per 1000 km

The methodology for identifying and reporting burst data was revised and improved during AR22. The numbers reported for this return are derived from the approach in the methodology documentation dated February 2022 and is outlined in the commentary for Table E6, Line E6.16: Total Length of Mains, and Line E6.19: Water Mains Bursts; the base numbers used to derive the number for this line.

It is not feasible to forecast data for this line as burst data is impacted by weather.

14.4.1 Lines B8.2 & B8.3 - Sewer Collapses

Since the introduction of Salesforce, Network Analysts are only required to use Ellipse for assignment of fault codes. The reporting methodology has now been revised to report from Salesforce rather than by fault code from Ellipse. Reporting from Salesforce addresses the risk that a fault code has not been assigned. Ellipse Work Order numbers link the data contained within Salesforce and Ellipse. This change in reporting methodology has avoided any reduction in confidence grade which may have otherwise resulted from the new processes implemented when Salesforce was introduced.

14.4.2 Lines B8.4 - B8.6 Discharges

The main data source that informs additions/removals of overflows from the UID Register over the last year have come from the outputs of the SR15 and SR21 Catchment Study Programmes. Sixty-five SR15 catchment studies have now completed, along with four Glasgow SR21 catchment studies. Each of these outputs (UIDs) have been discussed and agreed with SEPA with a prioritisation category for each assigned.

The number of Unsatisfactory Intermittent Discharges is now shown, and managed, using a Power BI front end that is to be shared Business-wide and also with select Stakeholders i.e. SEPA. This Power BI tool has been developed over the last year and is called the Intermittent Discharge Register - the 'ID Register.'

The ID Register is a Flow Insights, Power BI tool that operates using links to various corporate data sources and in some cases live links to corporate data. If WICS would like access and a demonstration of this Power BI report Scottish Water is happy to accommodate.

The Intermittent Discharge Register (ID Register) has been built to enable quicker access to commonly requested data relating to ID performance, such as 'live' Asset Inventory, CAR Licence data, Hydraulic Modelling outputs, and Unsatisfactory/Satisfactory classifications. It also makes it quicker and easier for Scottish Water employees to respond to FOI Requests, share data with SEPA for example. It also provides a standard template for managing and tracking additions/removals from the UID Register.

It is not feasible to forecast these lines as the data is impacted by customer behaviour, operational issues in the network and weather.

14.4.3 Lines B8.7 & B8.8 - Sewer Blockages

The data for this line is sourced from Scottish Water Customer Relationship Management Software (CRM), Microsoft Dynamics. This data has been collected since 2010, ongoing data cleansing and reporting methodology changes had seen a steep decline in volumes over the earlier years through to circa 2015. Since this time the data source, methodology and recording has been static. It is not feasible to forecast this data as it is impacted by customer behaviour and weather.

15 Table B9 – Security of supply index

15.1 Overview

AR23 is the second year of reporting Security of Supply Index (SoSI) and associated Water Resources data from the Supply Demand Balance (SDB) in the SR21 Investment Period, and second year of consecutive reporting to WICS of these metrics for the intended use as an international comparator.

The format of B9 tables has remained consistent with last year, although for AR23 the additional 'daughter' tables B9e and B9f have been completed, allowing an additional representation of the data at an alternative customer service level interval of 1 in 150-year drought severity. These new table completions complement the existing Level of Service (LoS) intervals of 1 in 40 years, and 1 in 100 years, each calculated against two demand scenarios (Dry Year Annual Average – DYAA, and Dry Year Critical – DYC):

- Table B9: Summary overview of SoSI data and results
- Table B9a: SoSI - 1 in 40 Level of Service - Dry Year Annual Average
- Table B9b: SoSI - 1 in 40 Level of Service – Dry Year Critical
- Table B9c: SoSI - 1 in 100 Level of Service - Dry Year Annual Average.
- Table B9d: SoSI - 1 in 100 Level of Service - Dry Year Critical
- Table B9e: SoSI - 1 in 150 Level of Service - Dry Year Annual Average
- Table B9f: SoSI - 1 in 150 Level of Service - Dry Year Critical

For each LoS interval reported, the only variation of input data to the SDB model is the hydrological yield, which is modelled at the differing service levels of increasing drought severity (represented using return periods). Demand, population, and all other areas of supply data are consistent between the reported tables, and reflective of directly measured data from AR23, or the best understanding of the current configuration and capability of supply assets.

Unless otherwise stated, this B9 tables commentary will focus results as reported in the B9a table: a 1 in 40-year drought return period LoS, using Dry Year Annual Average Demands. This maintains perspective and comparison from previous year's commentary and reflects the main focus of the internal assurance audit. No methodology, calculations or data differences exist between the different table outputs except for alternative hydrological yield values, and the use of either Dry Year Annual Average demand or Dry Year Critical demand as appropriate.

For AR23 the reported SoSI score for 1 in 40-year DYAA (Table B9a) is 54 points (summarised in table row B9.4). This is a reduction of -15 points overall from the AR22 position of 69 points. The worsening SoSI is principally driven by data revision to supply side data components in the SDB. Demand data measured over the AR23 period has remained relatively static: the total being 1,835.519 Ml/d Annual Average, which is minus 1.435 Ml/d from AR22 (<-0.1% difference). Population is up slightly to 5,339,457, an increase of 11,386 (0.21%).

The SoSI scores were calculated for a total of 189 Water Resource Zones (row B9.1), which is 2 fewer than last year due to the closure of Fort Augustus WRZ (now included in Invermoriston WRZ), and Back Tolsta WRZ (now included in North Lochs WRZ).

At WTW level, there are slightly more changes to the supplies that do not affect the zonal configuration, as listed in more detail in below in the data summary section.

Of the 189 WRZ, 48 are in calculated supply deficit using the 1 in 40 LoS (row B9.2), and it is these zonal deficits that contribute to the overall SoSI position of 54, reduced from a perfect score of 100. The score of 54 is categorised as SoSI band 'C' (row B9.5), being in the range of 50 to 89 points, and described as 'Significant deficit against target headroom'.

The OPA scores presented (rows B9.7 to B9.12) are for reference only, using a planned SoSI score target of 91 that was originally set and attained during the SR10 period, and which aligned with the Water Resource Plans for that investment cycle. Since then, significant revision to the supply data and zonal structure have been introduced that effectively make this planned score outmoded. The revisions have all been undertaken as data and understanding of water supply assets has improved, thus increasing the understanding of supply risks to customers. These improvements directly support the primary function of the SDB as an evidence base for Water Resource related investment appraisals.

Purely for comparative purposes, OPA contribution from SoSI (rows B9.12) is 12.5 weighted points. This is 1.25 points less than reported in AR22. Only the Performance Against Target element (row B9.10) is different this year in the OPA conversion, as SoSI Absolute Performance (row B9.11) remains within the range assigned for SoSI Band C (row 9.5).

The Water Available for Supply Index (WASI) is based on the percentage population in surplus WRZs for two different service levels, 1 in 40-years and 1 in 100-years, using the Dry Year Critical (DYC) demand scenario. Although the new layout enables Yield Levels of Service intervals of 1 in 40, 100, and 150 years to be reported, only the 1 in 40 and 1 in 100 intervals have historically been used for WASI. Table 79 below shows the history of reported values and includes the latest position for AR23 at the 1 in 40 and 1 in 100 intervals.

Table 79: History of reported values for 1 in 40 and 1 in 100 intervals.

Year	1 in 40	1 in 100
AR14	96.50%	77.60%
AR15	88.90%	71.50%
AR16	87.30%	77.30%
AR17	86.80%	82.20%
AR18	86.70%	70.10%
AR19	86.70%	71.40%
AR20	86.60%	75.90%
AR21	79.80%	61.40%
AR22	76.75%	55.19%
AR23	63.96%	56.85%
% Change (AR22 to AR23)	-12.79%	1.66%

WASI is directly the equivalent of Tables Row B9.6 (Percentage in Population in Surplus Zones). The values in the above table are taken from the Dry Year Critical demand scenarios: B9b and B9d. An equivalent score for 1 in 150-year severity could be taken from the same reporting row, but for table B9f, which results in a value of 34.2%.

The large reduction in this year's WASI for 1 in 40-year LoS is principally due to three large population zones moving into slight reported deficit positions for AR23. These zones are:

- Fife WRZ (% Population 6.98%)
- Carron Valley (% Population 3.01%)
- Muirdykes & Camphill (% Population 2.24%)

Any metric or categorisation (such as WASI) that uses the distinction of zones being in either reported surplus or deficit is sensitive to zones that may move across this defining boundary despite small or modest changes in the actual supply risk.

Whilst SoSI gives a composite score across all WRZ, examining the breakdown of deficit banding into different categories of percentage deficit severity can give a more detailed and helpful picture.

Table 80 below shows, for AR23, the proportions of population and count of WRZ in each deficit band for the 1 in 40-year tables. Here the overwhelming majority of population and zones are either in surplus or the least severe band of deficit, which is indicative of deficits that are similar in scale to headroom uncertainty.

Table 80: Count of WRZ and population proportion in each deficit band for 1 in 40-year table for AR23.

Category	DYAA % Population	DYAA Count of WRZ	DYC % Population	DYC Count of WRZ
Band 1 ($\geq 0\%$ Surplus)	71.01%	141	63.96%	107
Band 2 ($< 0\%$ to $> -10\%$ Deficit)	22.80%	26	26.57%	26
Band 3 ($\leq -10\%$ to $> -25\%$ Deficit)	3.80%	13	7.02%	37
Band 4 ($\leq -25\%$ to $> -50\%$ Deficit)	2.25%	4	2.31%	11
Band 5 ($\leq -50\%$ Deficit)	0.13%	5	0.14%	8

15.2 Performance Trends

Table 81 shows the top 5 WRZ where SoSI has improved between last year's AR22 position and the new AR23 outputs. The term WAFU is 'Water Available for Use' and is the zonally calculated supply capability, directly representing the supply side of the SDB. This is primarily constrained by asset capability (WTW capacity or Hydrological Yield of the Water Source) or Controlled Activities Regulations (CAR) environmental abstraction licences from SEPA.

Table 81: Top 5 WRZ where SoSI has improved between AR22 and AR23.

WRZ Name	AR22 SoSI Points Lost	AR23 SoSI Points Lost	SoSI Difference	WAFU Change (Ml/d)	WAFU Change Comment	DI Change %	Population Change %
Turriff & Badentinan & Glenlatterach	4.47	2.07	-2.40	1.95	WTW Capacity	-0.7%	0.2%
Inverness	12.28	10.38	-1.91	0.02	WTW Losses DI	-3.1%	0.7%
Turret	7.86	6.80	-1.06	1.18	Zonal Transfers	0.4%	3.3%
Aviemore	0.10	0.00	-0.10	0.00		-8.7%	-0.5%
Lochcarron	0.08	0.01	-0.07	0.10	WTW % Losses	4.3%	-0.1%

Changes in only the demand and transfer volumes data from the Water Balance is directly or indirectly (via the calculation of WTW losses) responsible for 3 of the 5 entries: Inverness, Turret, and Aviemore WRZs. Turriff & Badentinan & Glenlatterach WRZ has seen the greatest improvement overall, due to correction to the WTW capacity at Turriff WTW. The formatting of the table displays green where the change in value has contributed to an improvement in SoSI, and red where the change in value has contributed to a loss in SoSI. For the example of Turret WRZ, The SoSI score has improved slightly despite increases in both DI and Population.

The top five list of WRZ where SoSI points have been lost are principally driven by two causes: hydrological yield updates and WTW Percentage Losses updates. The yield improvements are hydrological data and model improvements that have led to a revision in the yield values, which although lower, are a better representation of the supply yield in droughts of the stated return period severity.

WTW Percentage Losses relate to the process losses within the WTW, being the difference between inlet and outlet flow volumes. During AR23 a study comparing abstraction data (WTW Inlet) with Distribution Input (DI) data (WTW outlet) has led to 60 updates in the SDB values used to calculate the volumes lost. In three of the top 5 WRZ in Table 82 below, this was the primary cause of the loss of SoSI, although compounded by an actual increase in DI as well.

Table 82: Top 5 list of WRZ where SoSI points have been lost between AR22 and AR23.

WRZ Name	AR22 SoSI Points Lost	AR23 SoSI Points Lost	SoSI Difference	WAFU Change (MI/d)	WAFU Change Comment	DI Change %	Population Change %
Assynt	0.01	7.13	7.12	-5.00	Yield	2.3%	0.3%
Herricks	0.00	5.12	5.12	-2.16	Yield	2.1%	0.2%
Clatto & Lintrathen & Whitehillocks	1.59	5.07	3.47	-3.41	WTW % Losses	1.1%	-0.7%
Fife	0.00	3.40	3.40	-7.79	WTW % Losses	2.7%	0.1%
Muirdykes & Camphill	0.00	0.39	0.39	-4.72	WTW % Losses	1.7%	12.7%

To give further explanation to the hydrological yield changes at Assynt and Herricks: Assynt yield reduced by 30% (at 1 in 40) following the adoption of improved modelling for inflow estimates. Herricks yield has reduced by 69% (at 1 in 40) following an AR15 flow gauging study and the inclusion of an environmental Hands Off Flow arrangement.

Annual Average Distribution Input varied between AR22 and AR23 by only -1.4 MI/d, however, individual zonal differences are responsible for a difference of 2.4 SoSI points i.e., calculating the SDB using AR23 Supply Side data using AR22 Demand Data (corrected for the current asset configuration) results in an improvement of 2.4 SoSI points, therefore the AR23 demand data is the cause of the loss of these points this year.

Correspondingly, performing the same substitution exercise with zonal population data between AR23 and AR22 reveals only a 0.26 SoSI point swing, indicating that the AR23 data has had a very slight negative impact.

When examining the alternate Dry Year Critical demand scenario detail in Table B9b, the corresponding SoSI change between AR22 and AR23 is a loss of 13.9 points (having changed from 51.7 to 37.8 points). The principal drivers for this difference are similar to the examples stated above; the same supply data changes and underlying trends to population and demand apply equally to this scenario. In previous years numerous updates have also been applied to zonal and WTW Peak Demand uplift factors, which would be an obvious point of differentiation for this demand scenario (where peak demands are used in the SDB for zones with a peak Critical Period). However, for AR23, only one Peak Factor update has been applied, and this is for a zone which is still in reported surplus and is therefore not contributing towards SoSI.

15.3 Data

Updates to the SDB have continued during AR23 with a mix of planned and opportunistic improvements to the supply side data. Firstly, the base configuration of WTW has had several updates:

- External rationalisation of WTW000285 Back Tolsta from WTW000281 North Lochs (WRZ000199 North Lochs)
- Internal replacement of WTW000648 Bonnycraig with works WTW000833 Bonnycraig (WRZ000313 Edinburgh & Lothian)
- External rationalisation of WTW000741 Fort Augustus from WTW000824 Invermoriston (WRZ000053 Invermoriston)
- Internal replacement of WTW000759 Invermoriston with works WTW000824 Invermoriston (WRZ000053 Invermoriston)

The zonal SoSI scores are largely unchanged as a result of these updates, with the minor exception of Invermoriston where a new, larger WTW has removed a minor WTW constraint that previously caused a loss of 0.006 SoSI points in AR22.

Changes to the WTW capacity values have occurred in four other WRZ, with the most notable difference being at Lintrathen WTW, where a de-rating of the design capacity has led to a reduction in capability from 42 Ml/d to 32.83 Ml/d. Although the reduction is significant, it does not impact on SoSI directly as the zonal constraint to supply remains hydrological yield. The zone (Clatto & Lintrathen & Whitehillocks WRZ) is in the above table of top five SoSI point reductions, but the impact there is primarily driven by updates to the rates of WTW % Losses, which are a relevant part of the calculations where the constraint to Deployable Output (and therefore WAFU) is either Yield or CAR. In this particular zone, Clatto WTW % losses increased from 2% to 8%, based on analysis on measured abstraction and DI data, and Whitehillocks WTW increased from 2% to 3%.

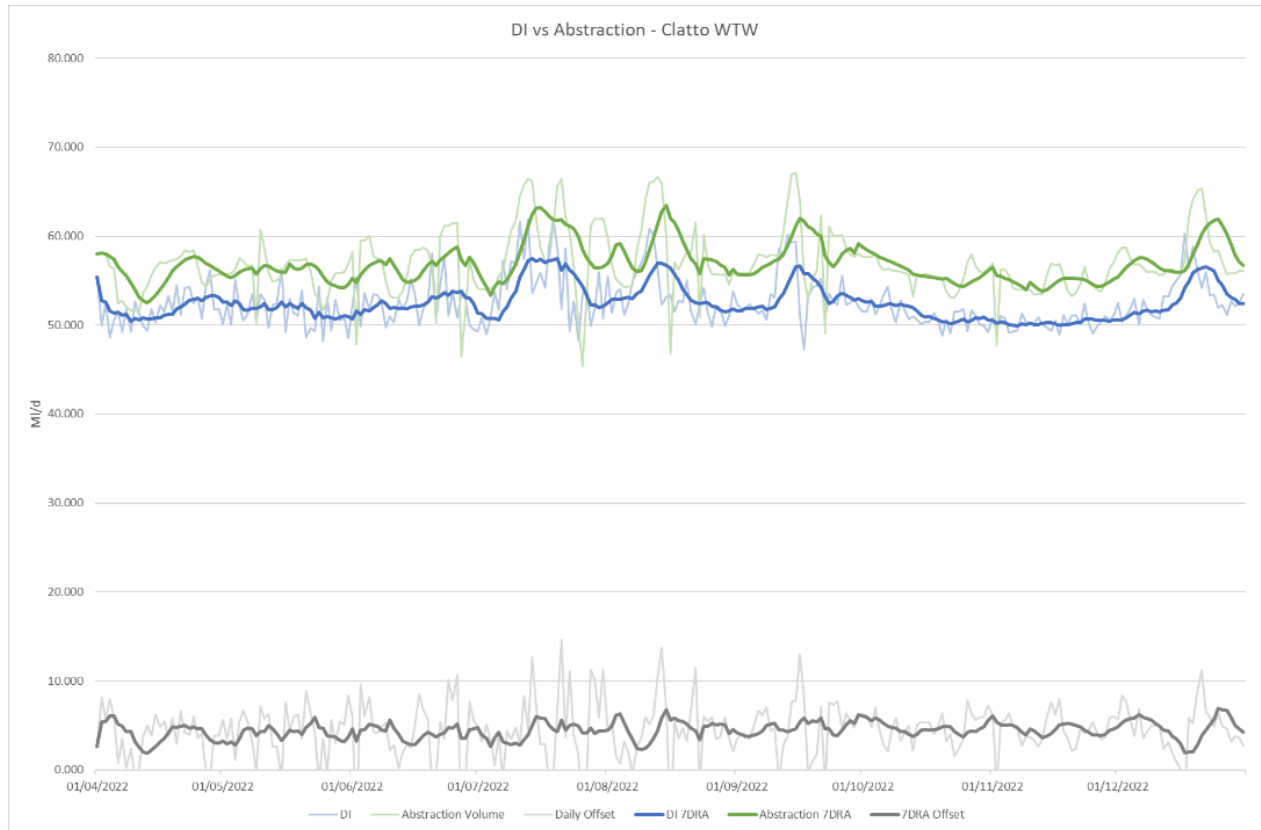
Changes to hydrological yield have occurred in 8 WRZ, but only four of these have the result of the yield change being the primary driver of WAFU changes (other cases are where yield is not the constraint on Deployable output, or where another factor of WAFU is more significant). Of these four, only two cause any impact on SoSI:

- Herricks WRZ, where a yield update from 3.187 to 0.974 has caused a new zonal deficit with a contributing loss of 5.125 SoSI points
- Assynt WRZ, where a yield update from 16.734 to 11.628 has worsened an existing zonal deficit with a contributing loss of 7.126 SoSI points (compared to 0.003 points in AR22)

A planned programme of analysis has been performed during AR23 seeking specifically to improve the dataset of WTW specific % loss factors. These values are used to derive volumes of treatment losses using DI data and have historically largely been based on industry estimates of process losses for different treatment types. The newer analysis is based on direct comparisons of measured data, and where a good correlation exists (a measured co-variance score of <0.25 has been used as an indicative guide) the average difference in volume is used to derive a revised percentage losses value. This body of work starts to address a long-standing recommendation from our Reporter's Assurance Report to make the most possible benefit from abstraction compliance monitoring equipment for this additional purpose.

Figure 42 below shows an example of the analytical data with abstraction, DI, and the difference plotted, with the emphasised traces being rolling 7-day averages for improved correlation. This particular example is Clatto WTW, where the overall co-variance score (standard deviation divided by the mean) was 0.2, and the measured volumetric difference equated to 8% of raw water losses through the overall treatment processes. This analytical approach will expand in future years to cover more sites, and also continue to re-examine WTW for consistency and continuous improvement.

Figure 42: Analytical data example - DI vs Abstraction for Clatto WTW.

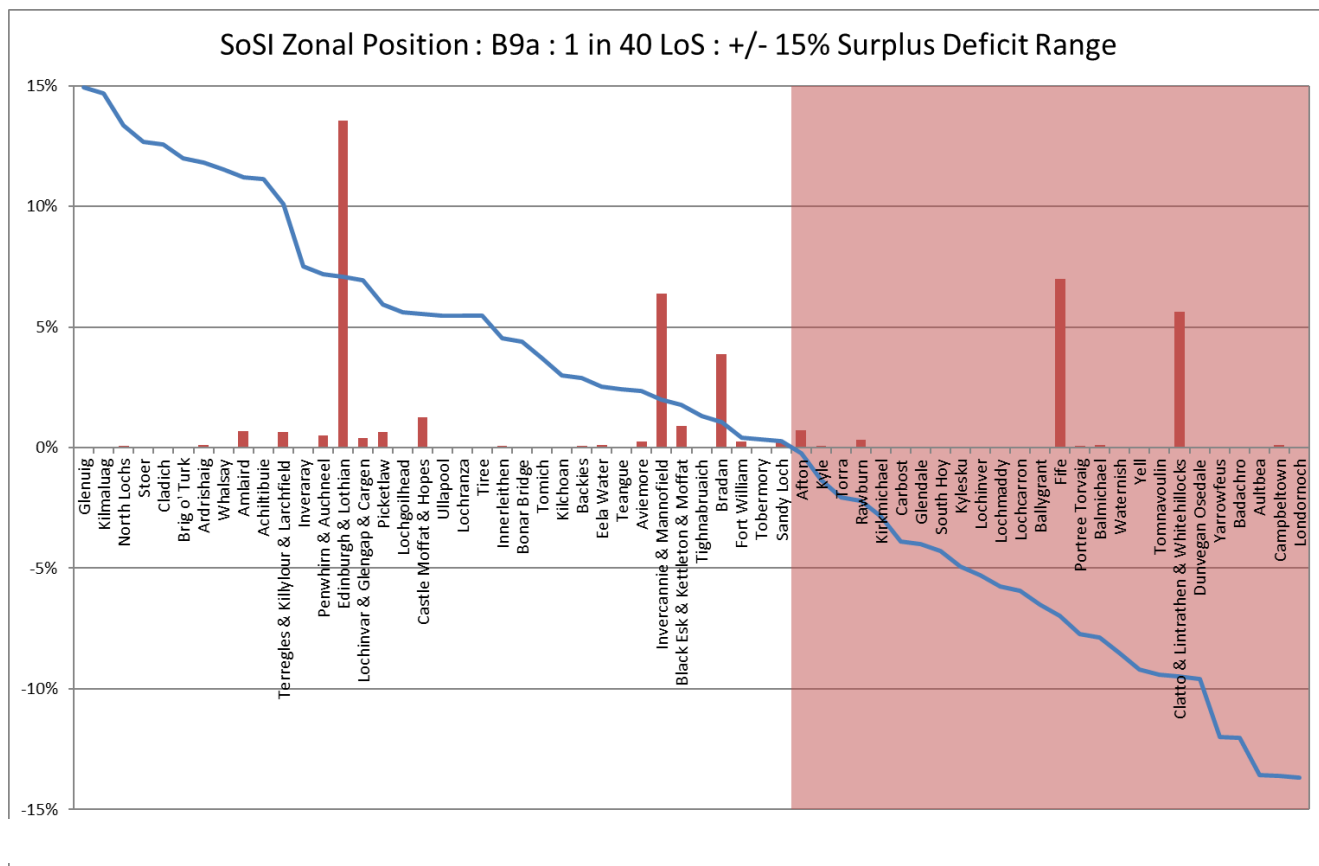


For AR23, 60 new WTW % Losses values were updated in to the SDB model, resulting in changes in 58 WRZ. Of these, 26 updates were the primary driver in an updated WAFU value, with four of these improving SoSI, and 12 worsening SoSI. The total difference in SoSI resulting from these updates is a loss of 7.83 points.

As an expansion of the analysis around SoSI, it is often useful to have visibility of the WRZ that are near to the tipping point of being in either SDB surplus or deficit. Figure 43 below shows the zones that fall within the range of +/- 15% surplus or deficit, and also displays the % proportion of total population that is reported for each zone. Zones with large populations drive larger contributing SoSI scores, so this approach is useful for easily observing which zones may be at risk of going into deficit, or where the opposite condition applies.

The red shading to the right-hand side of the chart is to indicate the deficit zones displayed, i.e. all the zones that have a deficit in the range of <0 to -15%. The blue plotted line of % Surplus / Deficit crosses zero on the x axis at the point where surplus zones transition to deficit zones. The full extent of all deficit zones extends beyond -15% and is not displayed. The usefulness of this chart lies in recognising which zones that are close to surplus / deficit boundary and are perhaps prone to crossing this boundary in future years, influencing metrics such as WASI.

Figure 43: SoSI Zonal Position. Zones that fall within the +/- 15% surplus deficit range and the percent of the total population that is reported for each zone.



16 Table B10: Scottish Water compliance with Water Quality Regulations

16.1 Overview

16.2 Introduction

This is a calendar year submission for 2022. The Drinking Water Quality Regulator (DWQR) regulates the quality of water supplied by Scottish Water, ensuring that drinking water supplies meet the requirements of the Public Water Supplies (Scotland) Regulations 2014 (as amended). It is important to note that for AR22 the data was submitted by Scottish Water as Table B10, and it details Scottish Water's compliance with the regulations. The AR22 submission happened after DWQR's Annual Water Quality Report 2021 was published and so DWQR provided a letter confirming their agreement with the dataset. For AR23, Table B10 has been populated before the publication of DWQR's Annual Water Quality Report for 2022, which usually happens around August of each year.

For this reason, DWQR's approval of Table B10 has not yet been requested this year as their 2022 dataset it is still being processed.

DWQR's report is used to confirm incident (Line B10.18) and escalated complaint numbers (Line B10.23) for the year and so the confidence grades for these data have been amended from A1 reported last year, to B2 and BX, respectively. Potential changes to these figures are noted in the incident and complaints sections.

Table 83 summarises water quality performance for 2022 on key metrics compared to the previous three years. Our overall water quality compliance remains high. Our teams continue to focus on complying with our drinking water quality duties, operating our assets against challenging weather impacts, replacing assets at the end of their lives, and targeting improvements in the capability of our assets.

COVID-19 restrictions affected zonal program samples during 2020, 2021 and January 2022, and customer's taps samples were substituted for Service Reservoirs (SR) and Water Treatment Works (WTW) instead. In 2022 the zonal program was affected by COVID-19 restrictions between 1 and 23 January 2022. Following discussion with the DWQR, those samples were rescheduled after 24 January 2022 and were retaken from customer properties.

The date to return to normal sampling post COVID-19 was queried by WIC in AR22 (Query Ref. B-27) and date of 24 January 2022 provided.

Table 83: Overview of water quality performance 2019-22 including COVID-19 impact.

Metric	2019	2020	2021	2022
Water treatment works (WTW)	43	24	24	25
Cryptosporidium no. viable oocysts	8	6	10	19
Storage points (SR)	78	60	46	52
Customer taps (Zonal)	114	73	110	116
Total fails	243	163	190	212
Total compliance	99.921%	99.946%	99.937%	99.929%
Customer tap compliance	99.917%	99.946%	99.920%	99.914%

Metric	2019	2020	2021	2022
COVID-19 impact	None	Zonal samples taken from substitute SR and WTW	Zonal samples taken from substitute SR and WTW	Zonal samples rescheduled to 24/01/22-31/12/22 all taken from customer's taps

16.3 Performance Trends

16.3.1 Lines B10.1-B10.14 - Parametric Compliance – Parameter Name

Customer tap performance was 99.914% (Line B10.14) and is comparable with 2019 (99.917%) with comparable results for microbiological, disinfection by-product, discolouration, and internal plumbing parameters. However, taste and odour (included in Line B10.13 'All other parameters') has seen a deterioration with 12 failures in comparison to 7 in 2019. Ten of the taste and odour failures have occurred since the start of July 2022 to the end of October 2022 reflecting the peak Methyl-Isoborneol (MIB) & Geosmin periods. These compounds are related to algae in our reservoirs, where the increase has been driven by climate change, increases in source water temperature and our asset capability to remove taste and odour precursors (Assessing climate change impacts on the water quality of Scottish standing waters. Aberdeen, Scotland's Centre of Expertise for Waters (CREW), 52pp. (CRW2020_01)). Two Letters of Commitment (Line B10.17a) for Glenfarg WTW and Rosebery WTW relate directly to taste and odour issues and a third Letter of Commitment at Carron Valley WTW relates to taste and odour precursors, THMs and Organics.

WTW performance (Line B10.14) has been sustained at a high level for 2022 at 99.96%. B10 Table 2 shows the improvements in microbiological performance between 2019 and 2020 have been maintained. Five of the seven turbidity failures in 2022 were measured at Turriff WTW and an Enforcement Notice (Line B10.16 & B10.16a) was issued in 2022 in relation to water quality improvements at Turriff WTW.

Table 84: Summary of WTW performance 2019-22.

Parameter	2019	2020	2021	2022
Coliform Bacteria	32	18	16	18
E. coli	3	1	2	0
Turbidity	8	5	6	7
Total	43	24	24	25

Service Reservoirs (SR) performance (99.946%) would have been equivalent to 2021 (99.951%) if it had not been for the Darvel SR in Ayrshire with five failures. Darvel SR was taken out of service, refurbished and returned to service end of May 2023. The two other sites with multiple failures (Kerse SR and Oyne Westhall SR) were taken out for cleaning and temporary repairs and further investment is underway or planned to address integrity issues. SR performance underpins the need for continued capital investment in these assets. Scottish Water's current portfolio identifies £217m to improve the ability to take tanks out of service for cleaning and inspection, to repair and reinstate the integrity of tanks that have been inspected and replace tanks that are beyond repair.

B10.15 - Cryptosporidium at Water Treatment Works

19 samples contained detections of viable Cryptosporidium oocysts, 9 more than in 2021.

A total of 9 positive detections were in October and November 2022 following exceptionally heavy rain across much of the country reflecting the high raw water load from the first flush after a dry summer period impacting on some WTWs with capability issues. Mannofield WTW, which has had

7 of the 9 detections in 2022, struggled to cope with the raw water loading after the heavy November rain (MET Office data measured 50mm of rainfall in 24 hours from 17th-18th November) - despite initial improvements made within the plant. Mannofield WTW is subject to an Enforcement Notice for *Cryptosporidium* with significant capital investment planned to inlet mixing and chemical dosing, filter performance and the installation of UV treatment.

Ultraviolet (UV) treatment at Bonnycraig, Turriff and Portree Torvaig WTWs successfully rendered harmless 38 positive *Cryptosporidium* detections.

Bonnycraig WTW was replaced by a new membrane works in December 2022, as required by the Enforcement Notice (B10.16a); no *Cryptosporidium* detections have been measured since the new works came into supply. Improvement works relating to *Cryptosporidium* detections at Turriff WTW are on-going to reduce the risk until a replacement membrane filtration plant is built in line with an existing enforcement notice (B10.16a).

Line B10.15a - Total compliance including Cryptosporidium compliance (for OPA)

Total compliance for 2022 is 99.929% (rounded from 99.9289518%). This was calculated from the sum of all failures at WTWs, service reservoirs, consumer taps and detections of viable *Cryptosporidium* oocysts, at WTWs against the sum of all tests analysed at all these site types. This is comparable with pre-COVID-19 2019 (99.921%) total compliance.

Table 85: Overview of water quality performance 2022.

Asset Type	Failures	Tests	Percentage compliance
Water treatment works (WTW)	25	60,670	99.959%
Cryptosporidium no. viable oocysts	19	6,277	99.697%
Storage points (SR)	52	96,642	99.946%
Customer taps (Zonal)	116	134,800	99.914%
Total fails/tests/compliance	212	298,389	99.929%

There are differences between the calculations used to produce the two figures ('Total compliance including Cryptosporidium compliance (for OPA)' (Line B10.15a) and 'OPA Calculator – Total Drinking Water') these were explained in Scottish Water's response to AR22 by WICS (Query Ref. B-29). It is recommended that Line B10.15a is renamed 'Total compliance including Cryptosporidium.' Therefore, we have corrected formulae accordingly as noted in "AR23 Template Change Log Final" file, reference AR23-216.

16.3.2 Lines B10.16-B10.18 – Enforcement and Incidents

The nine Enforcement Notices (EN) in place during 2022 are listed in Table 86 below. ENs at Bonnycraig WTW and Turriff WTW have been discussed in the previous Parametric Compliance section. Inellan Drinking Water Distribution Network Management Improvements is a new EN added in 2022 and relates to a 2021 water quality incident in Inellan DMA (within Loch Eck RSZ). Bonnycraig WTW and Inellan EN have since been signed off as complete by DWQR in 2023 and March 2023, respectively. Actions required by Afton WTW EN were completed at the end of 2022 and has since been signed-off as complete by DWQR.

Our Delivery Plan 2021-2023 sets out the key activities that we will progress over the year towards the strategic plan. Key here is the revised Water Supplies Regulations that require us to carry out

risk assessments for each of our supply systems to understand the water quality and continuity risks they face. The Delivery Plan sets out our commitment to accredit our management system for these water supply risks to BS EN 15975-2:2013 [the Standard] in 2023. This is in line with an improvement strategy agreed with the DWQR in December 2020 in response to their Enforcement Notice. The initial release of the Water Risk Assessment Platform (WRAP) went live in November 2022 with the planned "low resolution" risk assessment content. We have begun to operate a review process to drive its development over time. As a result, we have frozen updates to the legacy DWSP products that the WRAP replaces and will archive them in early 2023. Following a positive Stage 2 Implementation Audit by Lloyds Register, and attended by DWQR representatives, in May 2023 it was confirmed our risk management system and assessment processes meets the requirements of the standard. However, the current risk analysis is not aligning sufficiently with observed performance to command full confidence in the early results. This was expected following the introduction of the new system with further maturing and calibration a key part of our continual improvement plan. These initial improvements are planned to be complete by November 2023 and the DWQR support this work being completed before final approval. Accordingly, they propose to extend the enforcement end date from September 2023 to December 2023.

Table 86: Sites where Enforcement Notices were in place during 2022.

Site	Reason	Status
Inellan	Drinking Water Distribution Network Management Improvements	Issued & Active 2022
Turriff WTW	Water Quality Management Improvements	Closed in 2022
Afton WTW	Water quality management improvements	Closed in 2022
Bonnycraig WTW	Cryptosporidium	Issued Pre-2022 active
Pan-Scottish Water	Contravention of Risk Assessment Requirements	Issued Pre-2022 active
Turriff WTW	Cryptosporidium	Issued & Active 2022

There were 9 Letters of Commitment (LOC) active during 2022 of which one was issued in 2022 and are reported in Line B10.17 and Line B10.17a and relate to the sites shown in Table 87 below. Afton EN was closed during 2022.

Table 87: Sites where Letters of Commitment were active during 2022.

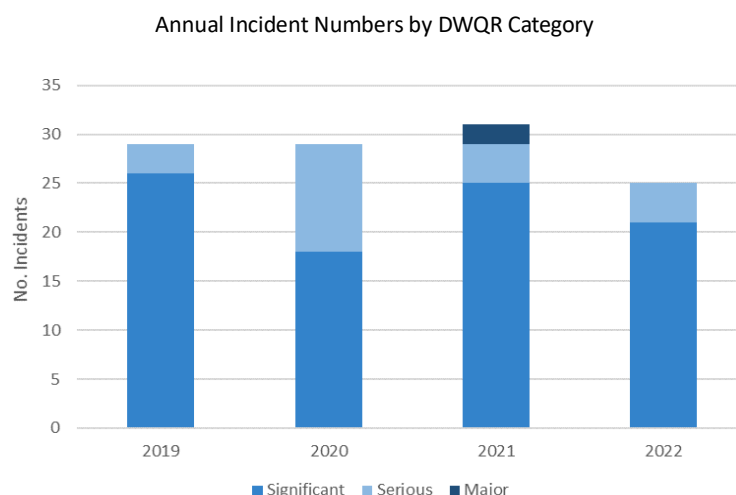
Site	Reason	Status
Bradán WTW	Microbiological Risk	Issued & Active 2022
Black Esk WTW	Manganese	Issued Pre-2022 Active
Carron Valley WTW	THM/Organics	Issued Pre-2022 Active
Daer WTW	Manganese	Issued Pre-2022 Active
Glenfarg WTW	Taste & Odour	Issued Pre-2022 Active
Herricks WTW	Cryptosporidium	Issued Pre-2022 Active
Pan-Scottish Water	Manganese strategy	Issued Pre-2022 Active
Rosebery WTW	Taste & Odour	Issued Pre-2022 Active
Turriff WTW	pH Adjustment	Issued Pre-2022 Active

No LOCs were closed during 2022.

There are currently 26 DWQR declared Incidents reported for 2022 (line B10.18), six less than 2021. When audited by the Reporter we presented 24, however since the Audit the DWQR have declared one further 2022 incident and event (Arnisdale WTW) taking the now reported number up to 25. The annual incident numbers for 2019-2022 by DWQR incident category are shown in Figure 44 below.

One further 2022 water quality event could be classed as an incident in DWQR's annual report. The confidence grade for Line B10.18 has been changed from A1 to B2 to reflect this uncertainty. Four incidents were classed as Serious and the remainder as Significant.

Figure 44: Annual incident numbers for 2019-2022 by DWQR category.



16.3.3 Lines B10.19-B10.22 - Consumer Contacts to Scottish Water

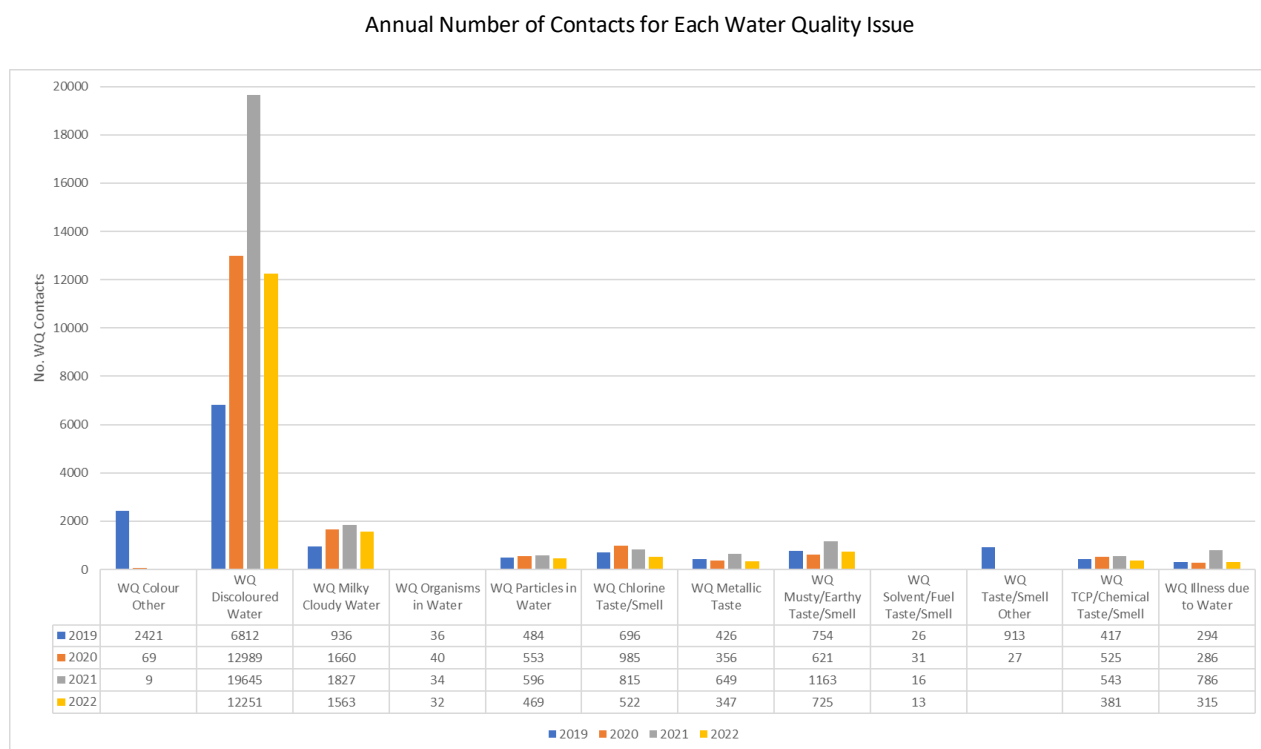
The number of consumer contacts received by Scottish Water is categorised as recorded by telephone, social media or by other means. These numbers are submitted to DWQR on a quarterly basis and are split over various Water Quality issues.

WQ Discoloured contacts decreased from 19,645 in 2021 to 12,251 in 2022. The 2021 peak in WQ Discoloured contacts were related to low rainfall which led to many reservoirs in the south and west draw down to exceptionally low levels, resulting in high dissolved manganese which passed into the supply network causing discoloured water and led to two Letters of Commitment (**Line B10.17**) being agreed with DWQR relating to improvement works at Daer WTW and the development of a Scottish Water Wide Manganese Management Strategy. WQ Discoloured contacts in 2022 (12,251) returned to similar numbers record in 2020 (12,989) as reservoir levels recovered.

In their annual water quality report, DWQR routinely report on numbers of consumer contacts assigned to Regulatory Supply Zones (RSZ). In 2022, 15,690 (94%) contacts were assigned to an RSZ. Of the 928 contacts without an RSZ reference, the majority were contacts made through the Scottish Water website with no address provided. The difference between total numbers of contacts and contacts reported in DWQR's Annual Report (i.e. those assigned to an RSZ) was queried by WIC in AR22 (Query Ref. B-30) and the above explanation provided.

The annual numbers of contacts between 2019-22 for each Water Quality issue are set out in Figure 45 below.

Figure 45: Annual number of contacts for each Water Quality Issue for 2019-2022.



B10.23 - Complaints to DWQR

DWQR investigated one second tier complaint relating to water quality in 2022, but this complaint was not upheld (<https://dwqr.scot/regulator-activity/consumer-complaint-investigations/consumer-complaint-determinations/>). This compares with no second-tier complaints about Water Quality received/upheld by DWQR in 2021. There is the potential for DWQR to report on additional escalated complaints in their 2022 annual water quality report that will be published later this year. The confidence grade has been amended from A1 to BX to reflect this uncertainty and the numbers of escalated complaints are so low an accuracy of X was chosen.

16.4 Investment

Bonnycraig WTW Enforcement Notice Cryptosporidium - the new Bonnycraig WTW went into supply on 20 December 2022, DWQR visited site on 24 January as part of the EN sign-off letter, the visit went well and the EN signed off by DWQR in letter on 17 Feb, following a site visit.

Other water quality projects

- Invercannie WTW new dissolved air floatation process and CWT construction has continued and due to go into supply in summer 2023, increasing reliable capacity to 66 MLD providing capacity to meet increased demand from the Aberdeen Harbour Development and improving operational headroom to enable refurbishment at Mannofield WTW
- Inlet mixing work improvements have started on site at Mannofield WTW with UV installation on the filters and filter refurbishment will commencing once Invercannie improvement are completed to reduce the risk from Cryptosporidium, Further investment in chemical dosing system is planned next year to further reduce the Cryptosporidium risk. It is likely a more robust

treatment process will be required to adequately reduce the risk from *Cryptosporidium* and a project appraisal is underway to assess this

- The new Herricks WTW one of the first scheme to go through our new project investment appraisal process started on-site in November 2022 and is forecast for completion by the end of 2025. Invercarnie WTW new DAF and new CWT construction has continued and due to go into supply in Summer 2023
- In accordance with our letter of commitment to the DWQR work has started at Carron Valley WTW to manage the naturally occurring raw water compound Geosmin, which causes taste and odour issues for our customers. The project is now on-site to install new PAC dosing, a new lime plant and RGF refurbishment
- At Turriff WTW, the previous Enforcement Notice to manage the risks from *Cryptosporidium* with essential capital maintenance including SCADA replacement was completed in June 2022., However, asset capability limitations resulted in further final water *Cryptosporidium* detections over the Winter and a new Enforcement Notice requiring further significant investment has been implement
- The management of discolouration risks in our networks has continued with cleaning and rehabilitation activities
- We have continued to invest in treated water storage points (Service Reservoirs and Clear Water tanks) carrying out maintenance identified through current inspection and cleaning programme as well as the known backlog of essential maintenance requirements which will take 2 to 3 years to reduce. The TWS bypass programme is also being progressed. New needs identified following the Darvel and Kerse SR incidents in 2022 has also highlighted the significant risks from SR structures repurposed from open raw water tanks into metal roof covered tanks when regional water supplies were rolled out between 1950 and 1980. The structures are not designed for holding treated water and need significant modification or replacement to reduce the risks to water quality. We will be developing a programme of tank replacement or improvements to remove these higher risk tanks.
- We continue with our customer driven, failure and opportunistic Lead communication pipe replacement programmes, but note that changes to the statutory guidance for private landlords requiring compliance with the Lead standard by March 2024 is driving an increase in enquiries.

16.5 Data

Table 88 provides a summary of each data type's source, confidence, and accuracy grade. Most confidence and accuracy grades remain at A1 as reported in AR22 but have reduced for Incidents and Complaints to reflect that these data have been provided before DWQR has published its annual water quality report on 2022 data.

Table 88: Summary of data sources, confidence, and accuracy grades.

Data type	Source	Confidence and accuracy grade
Parametric compliance	Combination of 12 x monthly csv data files. Sample data is extracted from the 'Analytics Model – LIMS' dataset located in the Power Bi Flow Insights App.	A1 - SW confidence definition: A-Data in a corporate system, where data input follows an auditable process. 1 - Accuracy less than +/- 1%
Enforcement	Details of Enforcement Notices and Letters of Commitment are published on DWQR's website, links below: https://dwqr.scot/regulator-activity/enforcement/ https://dwqr.scot/regulator-activity/letters-of-commitment/	A1 - SW confidence definition – A-Data in a corporate system, where data input follows an auditable process. 1 - Accuracy less than +/- 1%
Incidents	Incidents are declared to Scottish Water by DWQR via e-mail. These are entered onto a SharePoint list, web address below: https://scottishwater365.sharepoint.com/sites/WQ/WQ/Lists/WQ%20Incident%20Master%20List/Allitemsg.aspx	B2 - WIC confidence definition: B- as A, but with minor shortcomings. Examples include old assessment, some missing documentation, some reliance on unconfirmed reports , some use of extrapolation. 2 - Accuracy +/- 5% to +/- 1%
Consumer contacts to SW	Combination of 4 x quarterly csv data files of consumer contact data submitted to DWQR. Sample data is extracted from the 'Analytics Model – Ascend Dynamics' dataset located in the Power Bi Flow Insights App.	A1 – SW confidence definition: A-Data in a corporate system, where data input follows an auditable process. 1 - Accuracy less than +/- 1%
Complaints to DWQR	https://dwqr.scot/regulator-activity/consumer-complaint-investigations/consumer-complaint-determinations/	BX - WIC confidence definition: B- as A, but with minor shortcomings. Examples include old assessment, some missing documentation, some reliance on unconfirmed reports , some use of extrapolation. X - Accuracy outside +/- 100%, zero or small numbers or otherwise incompatible.

16.5.1 Future changes in sampling and compliance assessment related to the revised Drinking Water Directive

Amendments to the Public Water Supply (Scotland) Regulations 2014, were introduced to transpose the EU Revised Drinking Water Directive into Scots Law, in line with the UK Withdrawal from the European Union (Continuity) (Scotland) Act 2021. The amended Regulations became law on the 22 December 2022, effective from 1 January 2023. The Regulations introduced new regulatory parameters:

- Disinfection by-products - chlorate, chlorite and Haloacetic acids
- Source water contaminants - PFAS, Uranium, Microcystin and Bisphenol A

We are seeing an increase in failures linked to chlorate which is released from disinfectant chemicals as they degrade. Key factors driving this are the age, the temperature (particularly above 20 degrees) and concentration (higher concentration faster degradation). We are putting in place new operational processes to reduce this risk, aimed at limiting the age of the chemicals, the temperatures they are stored at and in some cases changing the concentration. This all requires to be done in a way that does not increase the risks of continuous disinfection.

The new regulations also change the regulatory sampling regime at customers taps to better align it with the underlying principles of risk management set out in the Directions. Key changes include:

- The frequency of sampling changing from population based to distribution input volume based
- 35 of the 53 parameters moving to risk bases sampling (Group B parameters), meaning those at higher risk will be sampled more frequently and those a lower risk less frequently

The changes have resulted in a reduction of circa 15,000 tests planned for 2023, which will make maintaining % compliance more challenging as while we take less samples, every failure has a larger impact.

The switch to risk-based sampling means we are now focussing on higher risk areas and as a result we will no longer be able to undertake year on year comparisons as the sampling frequencies and locations will no longer be statistically comparable. Similarly with no changes to the E&W regulations we will no longer be able to undertake like for like comparisons with E&W companies. Even if E&W had changes, we would still not be able to undertake meaningful comparisons for the Group B parameters as every company would have a statistically different sampling profile linked to its specific risk profile. Comparison of WTW, SR and Group A samples may allow some comparative assessments which we are currently exploring.

17 Table B11a – Pollution Incidents

17.1 Overview

Table B11a contains data for calendar year to end December 2022 and Financial Year 2022/23. The explanatory text below is in relation to the Financial Year.

AR22 saw an isolated increase in numbers of Cat 1-3 incidents with a return to more normal levels in AR23. It is suspected that this could have resulted from various impacts associated with the COVID-19 pandemic at that time.

There has been a substantial number of events which have been agreed as third party/private/compliant with licence and were therefore discounted from our numbers. As we move through SR21 our focus will be on reducing the significant proportion of incidents which occur on our wastewater network through increased intelligence and targeted planned maintenance.

The confidence grade for all lines on Table 11a is A1. All events reported in Table B11a have been agreed with SEPA and finalised by 19 April (as per SEPA e-mail dated 19/04/23).

In AR23 there were a total of 206 environmental pollution incidents (EPIs), 76 less than reported in the AR22 period. In AR23 there were 11 more serious Category 1&2 events (8 Wastewater and 3 Water) compared to 10 in AR22 (8 Wastewater and 2 Water).

17.2 Performance Trends

17.2.1 Lines B11a.1-B11a.8 Sewage Related Premises

Financial Year

During the AR23 reporting financial year 193 EPIs were recorded at sewage related premises, where 61% of these incidents were reported on the foul sewer network. 8 of the reported EPIs fell into Category 1 and 2 and are listed in Table 89 below.

Table 89: Location of Sewage related EPIs

Sewer Related Premises	Site or Area	Total EPI
Foul Sewer	Bo'Ness DOA	2
Foul Sewer	Whitecross DOA	1
Foul Sewer	Iron Mill Bay DOA	1
Foul Sewer	Eyemouth DOA	1
Foul Sewer	Kirkcaldy DOA	1
Sewage Treatment Works	Saline WwTW	1
Sewage Treatment Works	Ellon WwTW	1

For AR23 22/23 there were 13 EPIs compliant with licence within Wastewater.

Calendar Year

During the AR23 calendar reporting year 210 EPIs were recorded at sewage related premises, where 62% of these incidents were reported on the foul sewer network. 7 of the reported EPIs fell into Category 1 and 2 and are listed in Table 90 below.

Table 90: Location of Sewage related EPIs

Sewer Related Premises	Site or Area	Total EPI
Foul Sewer	Bo'Ness DOA	2
Foul Sewer	Whitecross DOA	1
Foul Sewer	Iron Mill Bay DOA	1
Foul Sewer	Eyemouth DOA	1
Sewage Treatment Works	Saline WwTW	1
Sewage Treatment Works	Ellon WwTW	1

For AR23 there were 12 EPIs compliant with licence within Wastewater.

17.2.2 Lines B11a.9-B11a.12 Water and Surface Water Related Premises

Financial Year

During the AR23 reporting financial year there were 13 EPIs recorded at water and surface water related premises, three of which were reported as Category 1 and 2 and are listed in Table 91 below.

Table 91: Site of Water related EPIs

Water and Surface Water Related Premises	Site or Area	Total EPI
Water Treatment Works	Ardishaig WTW	1
Water Supply Zone	Roseberry WSZ	1
Water Operational Area	Ardishaig WOA	1

For AR23 there were 0 EPIs that were compliant with the discharge consent within Water assets.

Calendar Year

During the AR23 calendar reporting year there were 11 EPIs recorded at water and surface water related premises, three of which were reported as Category 1 and 2 and are listed in Table 92 below.

Table 92: Site of Water related EPIs

Water and Surface Water Related Premises	Site or Area	Total EPI
Water Treatment Works	Ardishaig WTW	1
Water Supply Zone	Roseberry WSZ	1
Water Operational Area	Ardishaig WOA	1

For AR23 calendar year there were 0 EPIs that was compliant with the discharge consent for the related site.

B11a.17 Total Number of Water Company self-reported incidents

During the AR23 period the Total number of self-reported incidents made by Scottish Water was 56, which is equal to the number of self-reported incidents captured in AR22.

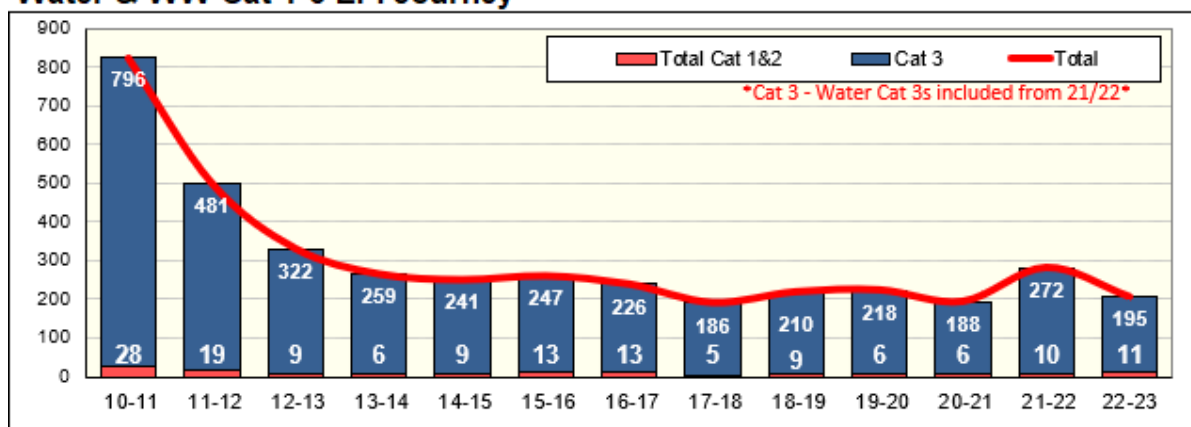
B11a.17 Total Number of Water Company self-reported incidents

During the AR23 calendar period the Total number of self-reported incidents made by Scottish Water was 55.

17.2.3 Pollution Trend Graphs

Figure 46: Water and wastewater category 1-3 EPI journey.

Water & WW Cat 1-3 EPI Journey



The long-term trend in Figure 46 shows significant reductions in numbers of EPIs followed by a levelling off of performance in subsequent years. AR22 saw an isolated increase in numbers of both measures with a return to more normal levels in AR23. It is suspected that this could have resulted from an increase in SEPA and customer reporting during COVID-19 pandemic when more people were working from home and more likely to exercise in the outdoors.

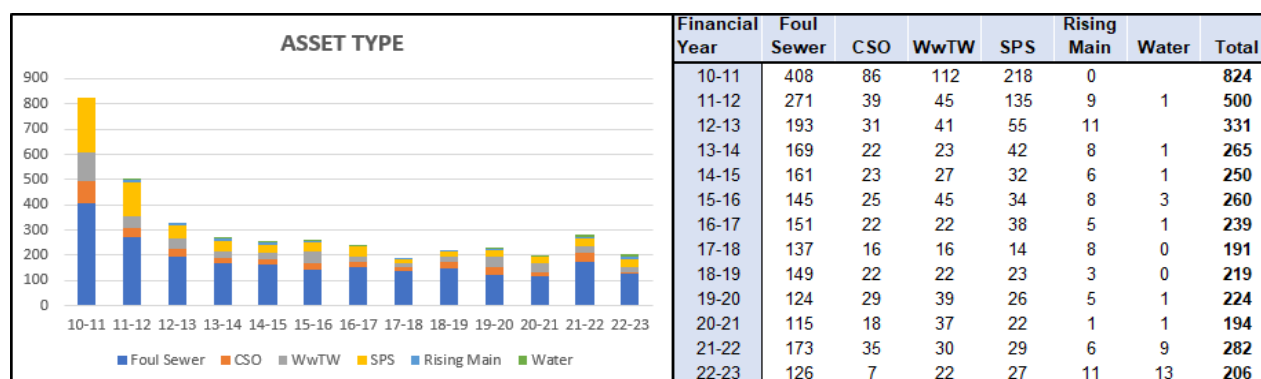
During AR22 there were a total of 226 other reports compared to 150 for AR23.

17.2.4 Root Cause Analysis

The types of assets associated with historic EPIs are summarised in Figure 47 below. This shows that although there has been a marginal increase in the number of incidents associated with water assets, the vast majority of EPIs (typically 94% or above) are associated with wastewater assets.

When EPI reporting first commenced issues related to wastewater non-infrastructure assets (wastewater treatment works and sewage pumping stations) accounted for up to 40% of incidents. Through subsequent focus on the performance of these assets and supporting investment this has fallen to around half this level (21% in AR22). This highlights that the key area of improvement in reducing EPI numbers relates to incidents associated with our wastewater infrastructure assets.

Figure 47: Asset types associated with historic EPIs.



17.3 Investment

B11a - Pollution Incidents

The Wastewater Intelligent Networks (WWIN) initiative forms part of the Intelligent Asset Base programme of transformation projects currently being progressed. This initiative is based on using information from depth monitors installed within the wastewater network, together with rainfall data, to identify blockages and other issues before they impact on our customers or the environment.

Four Drainage Operational Areas were chosen for Phase 1 of the initiative based on a variety of wastewater network performance indicators such as blockages, EPIs, “other cause” flooding and bathing water quality incidents. The data generated from the monitors installed in these areas has led to 25 successful interventions and has prevented 1 actual and 5 potential EPIs to date.

The Investment Appraisal for Phase 2 has now been approved and initial work has now commenced on this. Phase 2 will see the delivery of the WWIN monitors combined with the installation of 1000 new event duration monitors (EDMs) on combined sewer overflows (CSOs) as part of the Improving Urban Waters programme of work and is expected to take around 18 months to complete.

17.4 Data

There has been no change to the data sources, confidence grades and methodology from previous year.

Incidents reported by staff members, members of the public and SEPA and action taken to resolve them are recorded in Microsoft Dynamics. The EPI Co-ordinator then updates the Trackers from Microsoft Dynamics and populates the shared Scottish Water/SEPA spreadsheet. Since the SEPA cyber-attack SEPA do not have a system to record pollution events reported to them.

Scottish Water continues to carry out an internal agreement process for all Cat 4 Ops. Events, Cat 3 events where SEPA have not reported and Cat 3 events where both Scottish Water and SEPA agree Cat 3. Agreement calls for the remainder of the events are held monthly with Scottish Water and SEPA and any events where Scottish Water has found third party/land impacts these are discussed and agreed.

Calls are scheduled in between the monthly calls if required to discuss more serious events. Following any calls an up-to-date copy of the agreement tracker is e-mailed to the SEPA personnel involved. If agreement cannot be made, then the escalation process is followed.

Scottish Water provides a monthly data tracker download to the nine SEPA teams for review this includes a summary of the event the Scottish Water and SEPA initial category, the agreed category if agreed. All events reported for AR23 have been agreed with SEPA and finalised on 19 April (as per SEPA e-mail dated 19/04/23).

17.4.1 Data Improvements

Incident calls are held for all Cat 1 & 2 pollution incidents.

The SEPA licence number is now starting to be added to the EPI notification via Microsoft Dynamics with a link set up to the licence database.

Category matrix example list being created with both Scottish Water and SEPA input and will be distributed across Scottish Water and SEPA as part of the SEPA “build back better” discussions.

EPI Tool Box Talk (training) has been created on learning system cornerstone for WW Ops to complete.

18 Tables B11b and B11c: SEPA Annual Report to the Water Industry Commission for Scotland: Scottish Water Compliance & Discharges confirmed as failing

18.1 B11b/c Overview

This information was previously submitted by SEPA as an Annual Return to WICS.

Scottish Water has taken over reporting of the data for the AR22 and AR23. This data was previously sourced from SEPA's Corporate Licencing database. SEPA has advised that this number remained static over the years. Since the cyber-attack on the SEPA Systems, this database is no longer available.

As per AR22 queries process we have provided the data from Scottish Water's Operator Self-Monitoring (OSM) Annual Monitoring Plan (AMP) for commentary purposes. There are some lines that Scottish Water cannot report on due to Scottish Water not collecting the data, as detailed in the lines affected.

Scottish Water proposes a tripartite meeting with SEPA and WICS to agree the data to measure performance and the owner in the population of Tables B11b and B11c for AR24.

Wastewater compliance (for the purpose of tables B11b and B11c) is assessed against the CAR (Controlled Activity Regulations), UWWTD (Urban Wastewater Treatment Directive) and OPA for both calendar and financial years.

Wastewater Compliance Definitions

Wastewater compliance (for the purpose of tables B11b and B11c) is assessed against the CAR (Controlled Activity Regulations), UWWTD (Urban Wastewater Treatment Directive) and OPA for both calendar and financial years.

Regulatory sampling is undertaken by Scottish Water Scientific Services through Operator Self-Monitoring (OSM). Wastewater Treatment Works (WwTWs) are scheduled to be sampled from a pre-determined annual programme from SEPA, otherwise referred to as the Annual Monitoring Programme (AMP).

The exception to this is for bacteriological samples. SEPA undertake this sampling and send results to Scottish Water for inclusion in the compliance calculation.

A sample result remains on the compliance record for twelve months.

There are five ways a WwTW can be classed as failing. B11b/c Table 93 below summarises each:

Table 93: Failing classifications for WwTWs (i.e. reason for failure).

Failing Category	Definition
Look Up Table (LUT)	Exceeds a permitted number of parameter Lower Tier (LT) breaches, as per the LUT (standard appendix in all SEPA licences).
Upper Tier (UT) or pH	Breaches an Upper Tier (UT) parameter limit. pH is also included under this category (measured as a banding).
Annual Mean Concentration (AMC)	Average calculated from a set of samples taken throughout the calendar and financial year. A

Failing Category	Definition
	WwTW will be deemed failing if it fails the AMC limit on 31 December or 31 March.
75% Rule	Applies to a small set of WwTWs with single tier licences. A WwTW will be deemed failing if it does not achieve 75% compliance or more on 31 December or 31 March.
Log 10 Mean*	Applies to a small set of WwTWs sampled for Phosphorus as spot samples. Average calculated as Log10. A WwTW will be deemed failing if it fails the AMC limit on 31 December or 31 March.

* In the absence of guidance from SEPA, SEPA confirmed that EA guidance could be used to calculate compliance for the five sites that have this consented parameter.

Exclusion requests may be submitted to SEPA where there is sufficient evidence to appeal fails against specific clauses contained within the licence (Table 94 below). If SEPA accept an exclusion request, the sample result will be removed from the compliance record.

Table 94: Criteria for Exclusion Request submissions.

Low ambient temperatures (evidenced by effluent temperatures of 5°C or less or freezing of mechanical equipment)
Snow deposits sufficient to affect normal operation of the STW
Tidal or fluvial flooding
Weather conditions causing unforeseen loss of power supply to the treatment plant which could not be ameliorated by the reasonable provision and operation of standby facilities
CAS Section 4.3 (Agreed Improvement Plan for bringing discharge back into compliance)
Statutory defence (CAR Reg 48) - unforeseen accidents, force majeure or serious harm prevention

The performance measure for reporting failing wastewater treatment works changed in SR21, moving to Total Compliance which assesses compliance against all quality parameters contained within a SEPA licence. The reason for the change was to ensure that Scottish Water continued to focus on protecting the environment from all licensed quality parameters. Additionally, it aligned with SEPA's Compliance Assessment (CAS) criteria.

Prior to this only a proportion of final effluent sanitary parameters impacted on SR15 OPA compliance. Table 95 below lists and compares the parameters used to assess compliance in each of the investment periods.

Table 95: Parameters used to assess compliance with the Overall Performance Assessment (OPA) measure in each of the investment periods (SR15 and SR21).

SR15 OPA	SR21 OPA
BOD (CAR) – LUT	BOD (CAR) – LUT/UT
Suspended Solids (CAR) – LUT	Suspended Solids (CAR) – LUT/UT
Ammonia (CAR) – LUT	Ammonia (CAR) – LUT/UT
Phosphorus (CAR) – LUT	Phosphorus, Nitrogen (CAR) – LUT/UT/AMC
Bacti with UV Disinfection (CAR) – LUT	pH, Bacti, Metals, Organics (CAR) – LUT/UT/AMC
BOD (UWWTD) – LUT	BOD, COD (UWWTD) – LUT/UT
Phosphorus (UWWTD) – AMC	Phosphorus, Nitrogen (UWWTD) – AMC

Please note that for FAILING PE (OPA) measures under financial year 2022-23 (refer to range X170:X173) the SUM formula has been corrected to ensure it picks up line 14 in the calculations. The B11c WICS Template currently omits line 14 from the formula in these cells which was also the case for AR22. We have corrected formulae accordingly as noted in “AR23 Template Change Log Final” file, reference AR23-217.

18.2 Performance Trends

18.2.1 Lines B11b.1-B11b.4 - (A) Sewage Treatment Works: Total number

B11b.1 No. of discharges on register during calendar and financial years (in force)

The value of 1,202 is taken from the last confirmed SEPA calculation in 2020. Scottish Water is carrying out a data cleansing exercise on our licence database to align with the Improving Urban Waters Network, this is expected to be completed by AR24. Scottish Water recommends that the line definition is changed in consultation with SEPA and WICS for AR24.

B11b.2 No. of discharges assessed for compliance

For AR23 there were 580 reported which corresponds with the number of assets listed on the Operator Self-Monitoring (OSM) Annual Monitoring Plan (AMP). It also includes PFI sites.

B11b.3 No. of discharges confirmed failing in calendar and financial years

For the 2022 calendar year there were 22 WwTWs and, for the AR23 reporting year, 18 WwTWs Discharges Confirmed Failing under CAR compliance.

B11b.4 Percentage of discharges compliant with consent in the calendar and financial years

For the 2022 calendar year the percentage of CAR Discharges Compliant with Consent was 98.17%, and for AR23 98.50% was reported.

18.2.2 Lines B11b.5-B11b.8 - (B) Look-up Table Lower Tier Consents

B11b.5 No. of discharges on register during calendar and financial years (in force)

This is referenced under commentary **Line B11b.1**.

B11b.6 No. of discharges assessed for compliance

This is referenced under commentary **Line B11b.2**.

B11b.7 No. of discharges confirmed failing in calendar and financial years

For the 2022 calendar year there were 4 WwTWs, and for the AR23 reporting year there were 2 WwTWs confirmed as failing under the CAR compliance Discharge Look-up Table Lower Tier Consents criteria.

B11b.8 Percentage of discharges compliant with consent in the calendar and financial years

For the 2022 calendar year the percentage CAR Discharge Compliance with Consent was 99.67%, and for AR23 there was 99.83% reported.

18.2.3 Lines B11b.9-B11b.12 - (C) Upper Tier Consents

B11b.9 No. of discharges on register during calendar and financial years (in force)

This is referenced under commentary **Line B11b.1**.

B11b.10 No. of discharges assessed for compliance

This is referenced under commentary **Line B11b.2**.

B11b.11 No. of discharges confirmed failing in calendar and financial years

For the 2022 calendar year there were 20 WwTWs, and for the AR23 reporting year there were 16 WwTWs confirmed as failing under CAR compliance Discharge Upper Tier criteria.

B11b.12 Percentage of discharges compliant with consent in the calendar and financial years

For the 2022 calendar year the percentage CAR Discharge Compliance with Consent was 98.34%, and for AR23 there was 98.67% reported.

18.2.4 Lines B11b.13-B11b.16 - (D) Single Tier Consents

B11b.13 No. of discharges on register during year (in force)

For previous years this was sourced from SEPA's compliance system which, due to a cyber-attack, cannot be accessed for this reporting year.

In accordance with our 2022 Annual Monitoring Plan (AMP) there are 454 licences/assets with single tier limits. These were all assessed for compliance under the Operator Self-Monitoring (OSM) programme.

In accordance with the strict definition of this line we have left this blank, Scottish Water recommends that this line definition is changed in consultation with SEPA and WICS for AR24.

B11b.14 No. of discharges assessed for compliance

For previous years this was sourced from SEPA's compliance system which, due to a cyber-attack, cannot be accessed for this reporting year.

In accordance with our 2022 Annual Monitoring Plan (AMP) there are 454 licences/assets with single tier limits. These were all assessed for compliance under the Operator Self-Monitoring (OSM) programme.

In accordance with the strict definition of this line we have left this blank, Scottish Water recommends that this line definition is changed in consultation with SEPA and WICS for AR24.

B11b.15 No. of discharges confirmed failing in calendar year

For both the 2022 calendar year and the AR23 reporting year, there was 1 WwTW confirmed as failing under the metric CAR compliance Discharge Single Tier criteria.

B11b.16 %. of discharges compliant with consent in the year

For previous years this was sourced from SEPA's compliance system which, due to a cyber-attack, cannot be accessed for this reporting year.

In accordance with the strict definition of this line we have left this blank, Scottish Water recommends that this line definition is changed in consultation with SEPA and WICS for AR24.

Based on lines B11b.13 and B11b.15 it could be construed that the percentage of Single Tier discharges compliant with consent in the year is 99.997% $[(1 - 1/454) * 100.]$

18.2.5 Lines B11b.17-B11b.20 - (E) Absolute non-Sanitary Consents

SEPA has advised that these lines have never been completed as they do not categorise or separate licences in this way, hence these lines are not populated.

18.2.6 Lines B11b.21-B11b.24 - (F) Discharges confirmed as failing (CAR)**B11b.21 Number of discharges confirmed as failing (CAR)**

For the 2022 calendar year there were 22 WwTWs, and for the AR23 reporting year there were 18 WwTWs confirmed as failing under CAR compliance Discharge as Failing criteria.

B11b.22 Total population equivalent confirmed as failing

For the failing WwTWs reported in **Line B11b.22** the Total Population Equivalent affected for the 2022 calendar year there was 850,058, whereas for AR23 reporting year was 810,397.

B11b.23 Total population equivalent served by WwTWs (resident) (numeric consents)

The Total Population Equivalent served by WwTWs listed on the AMP is 6,529,556.

B11b.24 Percentage population equivalent confirmed as failing

For the 2022 calendar year the percentage Population Equivalent confirmed as failing under CAR was 15.56%, and for AR23 there was 12.41% reported.

18.2.7 Lines B11b.25-B11b.28 - (G) UWWTD

The numbers reported in these lines are based on the 2022 calendar year only.

B11b.25 No. of discharges on register during calendar year (in force)

For the 2022 period there were 197 discharges reported.

B11b.26 No. of discharges assessed for compliance

For the 2022 period there were 197 discharges Assessed for Compliance.

B11b.27 No. of discharges confirmed failing in calendar year

For the 2022 period there were 7 WwTWs confirmed as failing UWWTD.

B11b.28 Percentage population equivalent confirmed as compliant

96.45% percentage Population Equivalent were Compliant with Consent during the year.

18.2.8 Lines B11b.29-B11b.32 - (H) Discharges confirmed as failing (OPA criteria only)

OPA is a financial year measure, although calendar year is also reported for information.

The OPA performance measure for failing treatment works changed from 1 April 2021, moving to Total Compliance which assesses compliance against all quality parameters contained within a SEPA licence. Prior to this only a proportion of final effluent parameters impacted on OPA compliance.

B11b.29 Number of discharges confirmed as failing (OPA)

For the 2022 calendar year there were 28 WwTWs, and for the AR23 reporting year there were 22 WwTWs confirmed as failing the Total Compliance (SR21) measure, an increase of 2 from AR22.

This equates to a 96.2% compliance rate from the 580 assets listed on the Annual Monitoring Plan (AMP) and sampled under Operator Self-Monitoring (OSM).

Figure 48: Number of WwTWs confirmed as failing the Total Compliance (SR21) measure for AR23 vs AR22.

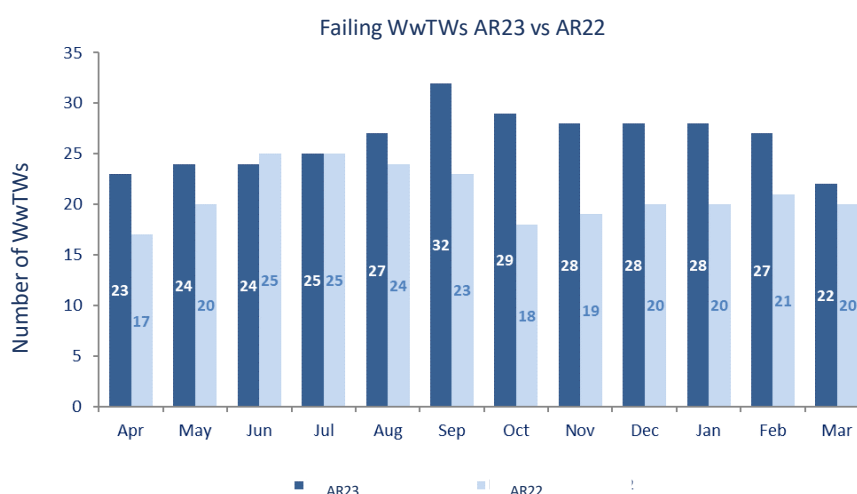


Table 96 below lists the failing WwTWs and parameters for both AR22 and AR23.

Table 96: Failing WwTWs and Parameters for AR22 and AR23.

Total Compliance SR21 Comparison			
AR23		AR22	
WwTW	Failing Parameter(s)	WwTW	Failing Parameter(s)
Aboyne	SS (UT)	Alloa	BOD (UT)
Alyth	NH3 (UT)	Bathgate	COD (UT)
Ashgill	SS (UT)	Daldowie	Total P (AMC)

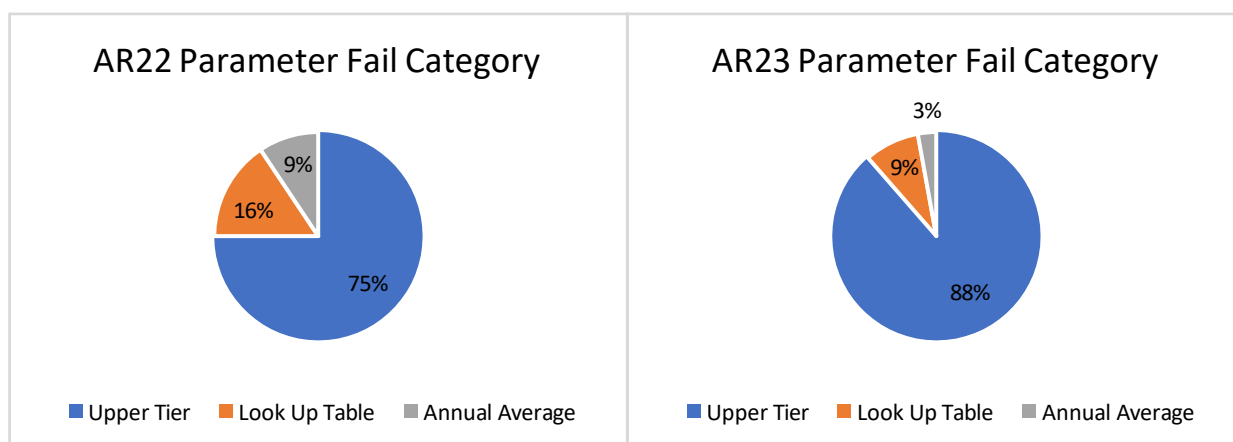
Total Compliance SR21 Comparison			
AR23		AR22	
WwTW	Failing Parameter(s)	WwTW	Failing Parameter(s)
Bothwellbank	NH3 (LUT), BOD (LUT)	Montrose	BOD (UT)
Coupar Angus	BOD (UT)	Bothwellbank	NH3 (LUT), BOD (UT), SS (UT)
Cupar	BOD (UT)	Hamilton	NH3 (UT), BOD (UT), SS (UT)
East Linton	BOD (UT), SS (UT)	Harthill	Total P (AMC)
Evanton	BOD (UT)	Hawick	BOD (UT), SS (UT), Iron (AMC)
Gorebridge	pH	Johnstone Park (Amisfield)	BOD (LUT)
Haddington	BOD (UT), SS (UT)	Kirkconnel	BOD (LUT & UT), SS UT
Hawick	SS (UT), Iron (AMC)	Kirknewton (Ritchie Camp)	NH3 (LUT)
Kemnay	BOD (UT), COD (UT), SS (UT)	Orphir Primary School	NH3 (UT), BOD (UT), SS (UT)
Lauder	BOD (UT), SS (UT)	Philipshill	SS (UT)
Lochwinnoch	SS (UT)	Rockcliffe	E.coli (UT)
Luss	E.coli (UT)	Salsburgh	SS (UT)
Orphir Primary School	NH3 (UT), BOD (UT), SS (UT)	Shieldhall	BOD (UT), SS (UT)
Penicuik	BOD (UT), SS (UT)	Stewarton	pH
Philipshill	NH3 (UT), BOD (UT)	Stonehouse	NH3 (UT)
Rigside	BOD (LUT)	Torthorwald	SS (UT)
Shieldhall	BOD (UT), SS (UT)	Woodlands of Durris	BOD (LUT & UT)
South Queensferry	BOD (UT), COD (UT)		
Stevenston	Dichloromethane (UT)		

For AR23, 88% of the parameters impacting the number of failing WwTWs are upper tier fails. This compares with 75% for AR22. Look Up Table and Annual Average percentages have improved for AR23 due to increased levels of mitigation and action taken to prevent further fails at an asset. Upper tier fails categorise a WwTW as failing immediately and will do so for the following twelve months.

For parameter type fails, BOD, Suspended Solids and Ammonia contribute the most towards failing WwTWs. AR23 is 40%, 31% and 11% respectively compared with 34%, 37% and 13% for AR22.

Figure 49 below show these comparisons.

Figure 49: Parameter Fail Category for AR22 and AR23.

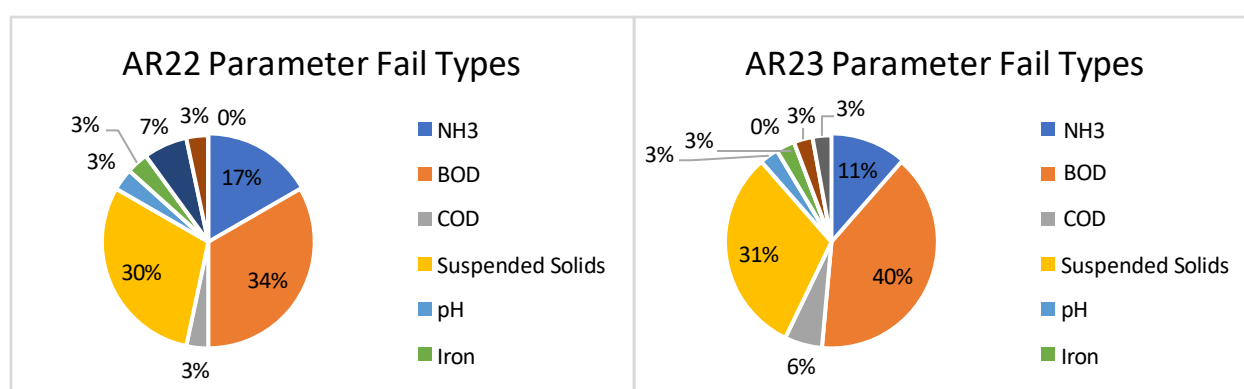


From the 22 WwTWs reported as failing AR23, five of these failed AR22. These sites are:

- Bothwellbank
- Hawick
- Orphir Primary School
- Philipshill
- Shieldhall

Figure 50 shows the parameter fail types for failing WwTWs reported in AR23 and AR22. External Influence and Ineffective Existing Asset (IEA) are comparable, but Customer Service Delivery Practice increased in 2022-23. A deep dive to understand the cause of this increase was undertaken and activities under the Compliance Mission (more detail in the Investment section of Tables B11b/c).

Figure 50: Parameter Fail Types for AR22 and AR23



B11b.30 Total population equivalent confirmed as failing

For the failing WwTWs reported in B11b.29 the Total Population Equivalent affected for the 2022 calendar year there was 1,079,754. The Total Population Equivalent affected for AR23 reporting year was 851,013.

B11b.31 Total population equivalent served by WwTWs (resident) (numeric consents)

The Total Population Equivalent served by WwTWs listed on the AMP is 6,529,556.

B11b.32 Percentage population equivalent confirmed as failing

For the 2022 calendar year the percentage Population Equivalent confirmed as failing under OPA criteria was 16.54%, and for AR23 13.03% was reported.

B11b.33 - Number of discharges confirmed as failing (OPA) (SR15 equivalent)

Wastewater compliance under the SR15 metric reported 2 failing WwTWs in AR23 compared with 7 in AR22. For the 2022 calendar year there were 6 WwTWs failing as defined for SR15 OPA Purposes. Table 97 below contains the list of failing works and failing parameters. Please note that a direct comparison between parameters that failed under the SR15 and SR21 versions of the OPA cannot be made due to the change in assessed parameters (see our response to AR22 query B-36).

Table 97: List of Failing Works and Failing Parameters

SR15 OPA Comparison			
AR23		AR22	
WwTW	Failing Parameter(s)	WwTW	Failing Parameter(s)
Bothwellbank	BOD (LT / LUT)	Bothwellbank	Ammonia (LT / LUT)
Rigside	BOD (LT / LUT)	Johnstone Park (Amisfield)	BOD (LT / LUT)
		Kirkconnel	BOD (LT / LUT)
		Kirknewton (Ritchie Camp)	Ammonia (LT / LUT)
		Woodlands of Durriss	BOD (LT / LUT)
		Daldowie	Total P (AMC)
		Harthill	Total P (AMC)

B11b.34 - Total population equivalent confirmed as failing (SR15 equivalent)

For the 2022 calendar year there were 242,371 affected by failing WwTWs (SR15 equivalent) and for AR23 there was 25,154 reported.

B11b.35 - Total population equivalent served by WwTWs (resident) (numeric consents) (SR15 equivalent)

For the 2022 calendar year there were 6,529,556 for all WwTWs with numeric consents (SR15 equivalent) which also reflects the AR23 figure reported.

B11b.36 - Percentage population equivalent confirmed as failing (SR15 OPA equivalent)

For the 2022 calendar year 3.71% of the population equivalent were affected by failing WwTWs (SR15 equivalent) and for AR23 0.39% was reported.

B11b.37 - Total number of non-compliant wastewater treatment plants failing to comply with any of the specified parameters in the licence

For the 2022 calendar year there were 28 WwTWs confirmed as failing and for AR23 22 were reported.

B11b.38 - Total number of non-compliant wastewater treatment plants failing to comply with any of the specified parameters in the licence (SR15 OPA equivalent)

For the 2022 calendar year there were 6 WwTWs confirmed as failing and for AR23 2 were reported.

18.3 Investment

The allocation (IPS 2023) to MA084 for WwTW Improvements is £125.4m.

The allocation of MA084 in 2022 was £174.1m. However this was reduced in IPS 2023 due to the reduced funding received by Scottish Water as a whole (£500m).

Live projects currently in development have a latest best estimate of £158.2m with a current committed spend of £13.6m. It is anticipated that the remaining investment will be fully committed within the investment period to meet the 2027 regulatory deadline.

There is uncertainty around the early high-level estimating. It is anticipated that these costs will increase as risks are realised.

The current cost range reported to the Scottish Government is £150-250m to deliver RBMP3 interventions alone, which makes up 86% of MA084.

Actual spend on RBMP3 has had a slower start due to further development including best available programme technology review, developing delivery approaches, desktop-based process assessments and solution development. LBEs are subject to change and more robust figures will be possible as we move into design and build phases and general assumptions such as land and compliance position can be verified.

Measures are in place to continually review the LBEs. However this is subject to external market influence and a strong expectancy that the final costs will be disproportionately high. Proactively, Scottish Water has engaged three partners for competitive best pricing which will support more positive procurement. In addition, the project team is currently seeking the agreement of the Investment Group (IG) to progress with a project delivery approach that does not align with current SW methodology, this will allow for a more streamlined process and progress at pace.

30/31 Sites within the programme are addressing a reactive phosphorus (RP) quality parameter that through a best available technology sweep and study has identified a likely standard product for deployment. The LBEs are reflective of this technology.

Four sites have differing consent standards that will require a more detailed optioneering exercise prior to handing over to DV (Delivery Vehicle).

Three of the sites within the programme are PFI sites, returning to Scottish Water post December 2027. Where any changes to consents or operating regimes are required there is a risk that they will need a lengthy contract re-negotiation. In addition, it may be problematic to introduce new standards and require enhancement of assets within the last few years of PFI operation. This will require discussion with PFI operators, Scottish Water Legal and with SEPA.

SEPA is aware of the threat that PFI sites may be unlikely to meet December 2027.

The outcomes of the success delivery of MA084 interventions will result in WwTW Improvements such as improve Bathing Water at Ayr South, reduced risk of malodour at Seafield WwTW and improved water quality to address all remaining WwTW pressures identified within RBMP3 which will be delivered by 2027.

18.4 Data

There has been no change to the data sources and methodology from AR22.

Regulatory samples results are sourced from Scientific Services LIMS. Using these, a consents reference set and a calculation spreadsheet, the compliance status is calculated for each WwTW sampled under OSM. Compliance reports are created weekly using Power BI and shared within Scottish Water and SEPA.

A Confidence Grade of A1 has been given to the data contained in each line in this table. The data is sourced from Scottish Water systems.

Section C – Carbon Emissions and Net Zero

Table C0 – Summary

18.5 Overview

Scottish Water has been reporting its annual operational carbon footprint (CFP) within its annual reports and sustainability reports since 2006-07, and to the Scottish Government since 2014 in line with obligations on public bodies under Scotland's Climate Change Act. It has been included in the Annual Return since AR22.

The operational CFP reports the greenhouse gas emissions associated with the day-to-day delivery of water and wastewater services. It also includes the regulated services delivered on Scottish Water's behalf through the PFI concessions.

Carbon is expressed as tonnes Carbon Dioxide equivalents (tCO₂e), which includes non-CO₂ emissions (e.g. methane and nitrous oxide from wastewater treatment). The information in the tables provides a detailed breakdown of our operational carbon emission data and renewable energy generation.

With respect to emissions on Scottish Water's landholdings, AR22 reported the breakdown of the types of landholdings owned by Scottish Water and noted that work was ongoing to assess the carbon. At that time, it was anticipated that we would report the carbon associated with the landholdings in AR24, but we have brought this forward to AR23 with the completion of initial baseline work during this period. There is significant uncertainty in this area as it is an emerging science, and we will continue to work to improve our understanding to increase the confidence in the figures reported.

Emissions Embodied in the Asset Base is a new area of carbon assessment and AR23 is the second year of reporting. It is noted that as a newer area there continues to be a big focus on improving the data and tools used to assess and report carbon.

Tables C2, C3 and C4 have been audited by Binnies. Table C1 was audited by Achilles, as described in the commentary for the C1 Table.

18.6 Performance Trends

18.6.1 Lines C0.1-C0.4 – Operational Emissions

These lines refer to information detailed in C1 tables.

C0.1 Net operational emissions in previous year (opening)

Reported as 230,902 tCO₂e, taken from AR22 tables C1.29.

C0.2 Change in Scope 1 to 3 emissions in the report year

Reported as -13,962 tCO₂e. All elements associated with operational emissions are detailed in Lines C1.1-C1.29. Changes for each scope are detailed in the memo Lines C1.37-C1.39.

C0.3 Change in renewable electricity generated and exported in the year

Reported as - 100 tCO₂e, as detailed in in Lines C1.41-C1.43.

C0.4 Net operational emissions in reporting year (closing)

Reported as 216,840 tCO₂e, as presented in **Line C1.29** This is a 6% reduction on the previous year. As in previous years, this is influenced by the reduction in emissions associated with grid electricity - which is seen in the reduction in scope 2 emissions and scope 3 emissions from PFIs. Further trends are detailed in C1 tables commentary.

Net operational emissions refer to emissions arising from the day-to-day operation of Scottish Water and includes emissions from the regulated water and wastewater operations (including PFIs), but not from the wider Scottish Water Group. Emissions sources include direct emissions from burning of fossil fuels on sites and in vehicles (scope 1), direct emissions in the form of nitrous oxide and methane from wastewater and sludge treatment (scope 1), indirect emissions from consumption of grid electricity (scope 2), indirect emissions from outsourced activities and business travel (scope 3). The term 'net' emissions refers to the netting off of emissions from exports of renewable electricity to the grid. Emissions are calculated and reported using the Carbon Accounting Workbook (CAW) version 17, a standard tool for the UK Water Industry.

18.6.2 Lines C0.5-C0.7 Emissions from landholdings

These lines refer to information detailed in C4 tables.

This information was not originally provided in AR22 as, at that time, the carbon inventory work on Scottish Water landholdings had not been completed (we committed to report in AR24). Instead, we reported only the breakdown of landholdings by area within the detailed sections of the C4 tables.

The conclusion of the initial baseline carbon inventory by the James Hutton Institute, using national data sets and methods as outlined in section 5 below has enabled us to populate this earlier than anticipated. As it was centred on the landholding data reported in AR22, we have retrospectively populated the AR22 lines in AR23.

It is important to note that the numbers reported in the AR are the mid-point of a broad range for land-based carbon capture/emissions. The range reflects the level of uncertainty in this first inventory which is primarily due to data on Scottish Water's peatlands and woodlands.

The retrospective AR22 position is that Scottish Water's landholdings may be emitting 9,200 tonnes CO₂e per annum within a range of -19,800 tonnes carbon capture per annum and 38,000 tonnes emitted per annum.

An AR23 figure of 2,517 tonnes CO₂e emitted from landholdings is reported in C0.7. This reflects extensive peatland survey work in the Katrine and Daer catchments that has confirmed peatland in these areas is both less extensive and in better condition than estimated from national data sets, which means we are able to show this as a reduction in land-based emissions.

We expect significant movement in these figures over the next 3 years as field data is generated to confirm site condition, and uncertainty is reduced. Longer term we expect these figures to begin to reflect the benefits of land improvements. A full assessment of the inventory to reflect all changes is due in AR25.

18.6.3 Lines C0.8-C0.9 Net operational emissions net of insetting and offsetting (opening & closing)

These lines are calculated from other data within the table and AR23 is the first year of reporting these figures. Net operational emissions (net of insetting and offsetting from the landbank) in AR22 is therefore increased by 9,200 tonnes to 240,102tCO₂e as our landholdings were assessed to be losing more carbon than they are capturing. More detail is provided in section 5 – Land and Carbon Inventory.

The outturn position in AR23 is that the net operational emissions (net of insetting and offsetting from the landbank) is 219,356tCO₂e reflecting both the decrease in the operational footprint and the improvement in the position of the landbank as a consequence of the extensive survey work at Daer and Katrine.

18.6.4 Lines C0.10-C0.13 Emissions embodied in the asset base

Scottish Water has developed tools that enable it to understand and account for carbon within its investment programme. These tools draw from UK water industry guidance and adopt known carbon factors for materials from standard sources such as the Bath University/Institution of Civil Engineers embodied carbon database.

Scottish Water has a significant asset base that represents decades of investment and associated emissions. Historical embodied emissions are likely to be higher than they would be if the same investment had been carried out today, owing to the greater carbon intensity of production and the reliance on coal and other fossil fuels in the power sector.

The tools that have been developed have enabled Scottish Water to begin to understand the carbon intensity of investment, and to identify the major sources of emissions within the capital programme. These tools have been adopted by our supply chain and enabled the identification of opportunities to reduce carbon intensity.

This remains a developing area and we continue to improve the tools we use and their coverage within the programme, but we have already seen positive moves towards adopting lower carbon solutions such as low carbon concrete and steel, offsite fabrication, the adoption of sustainable fuels and nature-based solutions.

It may be desirable to consider this as a “carbon MEAV” (Modern Equivalent Asset Valuation) to assess the carbon efficiency of asset replacement, which would seek to apply the latest investment carbon intensity factors across the asset base.

We would welcome WICS’ involvement in a wider discussion on how it sees this measure being used in the future.

In terms of performance, embodied carbon C0.11 has increased by a similar value to the previous year as expected. This is due to our adjustment to the carbon intensity value to reflect the impact of inflation, this decrease has been offset by the investment programme increasing by a similar percentage.

The overall embodied carbon figures have increased in line with the additional embodied carbon emitted by Scottish Water.

C0.10 Embodied carbon in overall asset base (previous year)

This is estimated as a Low and High range of 13,827,244 to 21,278,489 tonnes CO₂e and is detailed in Lines C2.10 and C2.11.

C0.11 Increase in embodied carbon in the year (e.g. due to capital investment)

This is estimated as a Low and High range of 159,635 to 238,996 CO_{2e} and is detailed in Lines C2.4 and C2.5

C0.12 Other changes in the year

No changes in period covered by AR23.

C0.13 Embodied carbon in overall asset base (closing)

This is estimated as a Low and High range of 13,986,879 to 21,517,485 tCO_{2e} and is detailed in Lines C2.10 and C2.11

18.7 Investment

Emissions management is supported by a range of activities delivered across the business. Much is not directly connected to management approaches or specific investment needs for carbon but is delivered through changes in operational or investment delivery practices. For example, investment in data and systems such as the development of reporting for electric vehicles or creating embodied emissions functionality within costing systems. Similarly, promoting greener measures within capital investment projects (adoption of low emission fuels or use of low emission materials) would be integrated within projects.

18.8 Data

Greenhouse gas emission and energy data is reported for operational activities, capital investment and land-based emissions. Of these, electricity use and generation have the greatest level of confidence at A2, reflecting corporate energy data and billing systems. Operational emissions is C4 reflecting the wider range of data sources and methods of calculation, along with uncertainty in areas such as modelled process emissions.

Capital Investment emissions is C5, and carbon embodied in the asset base is D5/6 reflecting the lower maturity of this and the assumptions made to generate an overall carbon embodied in the asset base figure.

Land based emissions are assigned C5 which reflects that the landholding area data is based on corporate GIS and national data sets, but that within this there are a number of assumptions and models used to assess greenhouse gas emissions/capture.

A full overview of the data sources, methodology, assumptions, and confidence grades are covered in the commentary for Tables C1 to C4.

See the corresponding table commentary for details of data improvement programmes.

19 Table C1 – Operational emissions

19.1 Overview

All figures within this table refer to the measurement of the annual operational Greenhouse Gas (GHG) emissions of the regulated business (Scottish Water operated sites, and PFI sites). Emissions are reported in line with Global, UK and Scottish reporting protocols and guidance and calculated using UK Water Industry Research's Carbon Accounting Workbook (CAWv17), used by all UK water companies. This is updated annually to reflect the latest UK Government's Department for Business, Energy & Industrial Strategy (BEIS) carbon conversion factors, boundaries, guidance, and methods. Prior to publication, Scottish Water's operational carbon footprint is audited externally by Achilles, carbon specialists, in line with ISO 14064-1.

Emissions are recorded in tonnes of carbon dioxide equivalent (tCO₂e) to account for the different potential each GHG has for global warming. Line C1.5 to C1.8 split out the tCO₂e into each of the main GHGs: carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O). The table is split according to "emissions scopes" in line with Global GHG reporting protocols (see descriptions in 2.2 below).

The major change in reporting since AR22 is the conclusion of two PFI concessions – Highland PFI (Allanfearn and Fort William WwTWs) in May 2022 and Grampian PFI (Nigg, Fraserburgh, Persley and Peterhead WwTWs, along with associated sewer pumping stations) in October 2022.

This does not impact the total emissions, but it does mean that the scope breakdown of the emissions is changed. In line with the global Greenhouse Gas Protocol, PFI emissions are considered third party "supply chain" emissions and reported as Scope 3. When they revert to Scottish Water control the emissions are classed as either Scope 1 (direct emissions - e.g. on-site fuel, process emissions) or Scope 2 (indirect emissions e.g. electricity). We attach a copy of the C1 tables showing the emissions associated with ex-PFI sites once they had returned to SW operation and this is referenced in commentary for relevant table lines below. Unless otherwise stated it does not include emissions from the wider (non-regulated) Scottish Water Group.

The net operational carbon footprint (CFP) reported by Scottish Water for water and wastewater services in AR23 is reported in C1.29 as 216,840 tCO₂e, a 6% fall from the AR22 figure. Within the Annual Performance and Prospects report the CFP is rounded to 217,000 tCO₂e.

19.2 Performance Trends

19.2.1 Lines C1.1-C1.8 Scope 1 Emissions

Scope 1 refers to emissions arising directly from the burning of fossil fuels or other direct release of GHGs such as CH₄ or N₂O.

C1.1 Direct emissions from burning fossil fuels (including CHP generated on site)

Reported as 3,236 tCO₂e for AR23, decreasing from 3,734 tCO₂e in AR22. This covers all activities that release emissions from fossil fuels in the course of delivering water and wastewater services, including natural gas used in heating and diesel and other fuels used in generators on site.

This includes an additional 680 tCO₂e from ex-PFI sites that came into Scottish Water operation part way through the 2022-23 financial year, which would have been classed as Scope 3 emissions in previous years.

For the first time this year we have used HVOs (Hydrogenated Vegetable Oils) in a generator at one of our sites, which emit up to 90% less CO₂e than diesel. We are investigating opportunities

to use HVOs across more sites and we anticipate this will support a reduction in emissions in the future.

These emissions can vary depending on operational practices and in year demands (e.g. standby generator use). The modest 13% fall is within the variability we have seen in the last 5 years, but we anticipate that the adoption of measures such as HVO will support a continued fall in the future. We are working with operational and finance teams to improve the granularity of reporting that will help us to better track the penetration of fuels such as HVO in the future.

C1.2 Process and fugitive emissions

Reported as 25,004 tCO₂e for AR23, increasing from 21,610 tCO₂e in AR22. This consists of direct release of GHGs such as CH₄ and N₂O from the natural processes of wastewater and sludge management. It also includes fugitive emissions (unintended release of) refrigerant gases from air conditioning units.

Process emissions are estimated based on the quantity of sludge processed and the population equivalent of WwTWs using the agreed methodology set in the UK Water Sector's Carbon Accounting Workbook. The 16% increase from the previous year is largely due to the inclusion of former PFI sites (previously reported in Scope 3) that came back into the business part way through the year, which accounts for 2,857tCO₂e or a 13% increase.

C1.3 Transport: company owned and leased vehicles

Reported as 11,276 tCO₂e for AR23, consistent with 11,244 tCO₂e in AR22. This includes emissions from Scottish Water-owned fleet and long-term leased vehicles. It does not include emissions from business travel in private vehicles, which is included under scope 3. This year's number includes additional transport associated with operation of the ex-PFI sites, acquired by Scottish Water in the reporting year. There is little other change from the previous year as Scottish Water continues to transition to a hybrid work model.

C1.4 Total scope 1 emissions

Reported as 39,517 tCO₂e for AR23, increasing from 36,589 tCO₂e in AR22. This presents the total Scope 1 emissions (a sum of Lines C1.1, C1.2 and C1.3), which comprises all emissions released directly from Scottish Water assets (including vehicles). 3,546tCO₂e of the increase is attributed to the additional emissions for the returning PFIs being reallocated from Scope 3 to Scope 1, which masks the modest fall in fuels. Please refer to items C1.1 – C1.3 for detailed explanations.

Lines C1.5-C1.8 break down Scope 1 emissions into their constituent GHGs – carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O) and other GHGs – generally trace refrigerant gases. Nitrous oxide (N₂O) from wastewater treatment is the largest contributor to scope 1 emissions.

There is a discrepancy between C1.4 Total scope 1 emissions 39,517 and the sum of the constituent GHGs in C1.5-C1.8 39,506 as detailed in Table 98 below. This difference is mainly due to the UK Government BEIS 2022 conversion factors (which are used in the CAWv17) not having a breakdown of emissions by GHG for Hydrogenated Vegetable Oils (HVOs), and so these emissions are only available in tCO₂e.

There is also a small amount of discrepancy attributed to other BEIS conversion factors - specifically, the factors for the different GHGs broken down by type (methane, nitrous oxide, carbon dioxide etc) have slight discrepancies in how they add up to the CO₂ equivalent. It is not currently possible to fully reconcile the figures. This impacts all UK Water companies that use the CAW to report their figures. We will work with rest of the sector to understand how this discrepancy can be addressed.

Table 98: Total Scope 1 Emissions – Discrepancy attributed to BEIS conversion factors.

	tCO ₂ e
C1.4 Total scope 1 emissions	39,516.82
Scope 1 emissions - CO ₂	14,307.44
Scope 1 emissions - CH ₄	3,955.35
Scope 1 emissions - N ₂ O	21,223.46
Scope 1 emissions - other GHGs	20.04
Sum of C1.5-C1.8	39,506.29
Difference	10.53

Table 99: Items not included in constituent GHG breakdown.

Items not included in constituent GHG breakdown (C1.5-C1.8)	tCO ₂ e	Comments
HVO fuel consumption	10.51	The 2022 UK government BEIS emission factor does not provide a breakdown for constituent GHGs.
Other	0.03	Discrepancies arising when BEIS 2022 conversion factors for individual GHGs are summed to CO ₂ equivalent

C 1.5 Scope 1 emissions – CO₂

Reported as 14,307 tCO₂e for AR23, decreasing from 14,782 tCO₂e for AR22.

This has been largely unaffected by the inclusion of ex-PFI sites (an additional 676tCO₂e previously reported in Scope 3) that came back into the business part way through the year as they use little additional CO₂ producing fuels. Two of the ex-PFI sludge treatment centres have biogas CHPs which generate heat and electricity for the site. The larger increases seen in CH₄ and N₂O emissions are due to wastewater treatment process emissions.

C1.6 Scope 1 emissions – CH₄

Reported as 3,955 tCO₂e for AR23, increasing from 2,353 tCO₂e for AR22.

This is largely made up of methane emissions from the wastewater and sludge treatment process.

A 1,306tCO₂e increase from the previous year is directly attributable to the inclusion of ex-PFI wastewater treatment works (previously reported as Scope 3 in line C1.24) that came back into the business part way through the year. This is a combination of additional sludge digestion, wastewater treatment and biogas venting. Other increases come from composting of grit and screenings - a new alternative to landfill that was explored for the first time this year. A detailed breakdown of the changes is shown below in Table 100. Note this table summarises overall changes from previous year which will be impacted both by changes in consumption and re-allocation of ex-PFI emissions.

Table 100: Detailed breakdown of Scope 1 emissions – CH₄.

Scope 1 methane emissions	AR23 (tCO ₂ e)	AR22 (tCO ₂ e)	Difference (tCO ₂ e)	Comments
Sludge digestion	1,650.70	1,011.00	639.70	Emissions are calculated by the CAW from volumes of digested sludge. The increase in emissions is due to a 63% increase in volumes of sludge digested as a result of two ex-PFI sites that came back into the business part way through the year. Previously these emissions would have been reported in Scope 3.

Scope 1 methane emissions	AR23 (tCO ₂ e)	AR22 (tCO ₂ e)	Difference (tCO ₂ e)	Comments
Wastewater treatment (includes methane from mechanical treatment and short-term storage of sludge)	1,551.03	1,330.56	220.47	Emissions are calculated by the CAW based on the population treated by at least secondary sewage treatment. This population has increased as a result of two ex-PFI sites that came back into the business part way through the year. Previously these emissions would have been reported in Scope 3.
Composting of grit and screenings (Scope 1 CH ₄ emissions in tCO ₂ e)	683.00	0	683.00	Composting of grit and screenings was a new alternative to landfill, that was made possible this year due to improved technology on site to sort and clean material. Composting has a higher CH ₄ emissions factor than disposal to landfill and is included in scope 1 emissions, whereas CH ₄ from landfill is in Scope 3 emissions.
Biogas venting	62.67	0	62.67	This year some biogas was vented at Allanfeearn, one of the ex-PFI sites, due to maintenance on the CHP engine, which usually enables combustion of biogas to generate electricity.
Other (methane from fuel combustion on site and in scope 1 transport)	7.95	11.43	-3.48	
TOTAL	3,955	2,353	1,602	

C1.7 Scope 1 emissions – N₂O

Reported as 21,223 tCO₂e for AR23, increasing from 19,432 tCO₂e for AR22. This is nitrous oxide emissions from the wastewater treatment process. A 1,563 tCO₂e increase from the previous year is due to the inclusion of ex-PFI sites (previously reported in Scope 3) that came back into the business part way through the year.

C1.8 Scope 1 emissions - other GHGs

Reported as 20 tCO₂e for AR23, similar to the 22 tCO₂e reported for AR22. This is refrigerant gases used to service air conditioning units.

19.2.2 Lines C1.9-C1.16 Scope 2 emissions

Scope 2 refers to emissions associated with the purchase of electricity and specifically the generation of electricity within the national grid. It is important to note that this does not include the carbon impact from transmission and distribution of electricity across the grid – which is accounted for as a Scope 3 emission.

Note that in line with guidance from the Scottish Government, Scottish Water uses the location-based method for accounting, where emissions are associated with where the electricity is generated and consumed. Some water companies in the rest of the UK may report their emissions using the market-based method, which allows grid electricity purchase to be reported as zero emissions when green tariffs are in place.

C1.9 Purchased Electricity

Reported as 88,822 tCO₂e for AR23, decreasing from 94,663 tCO₂e for AR22.

These emissions are associated with purchased electricity from the national grid and are calculated from the annual electricity purchased and the BEIS grid emissions factor. At present grid electricity use comprises the major element of Scottish Water's carbon footprint. Line C1.9 only covers Scottish Water electricity use, which represents 41% of the carbon footprint. This line excludes both Scope 3 transmission and distribution losses and PFI electricity, which come within Scope 3 Lines C1.20 and in part of C1.18a, respectively. With these two elements included, electricity emissions represent 54% of the carbon footprint. In the Annual Report all electricity is reported together regardless of whether Scottish Water or PFI use.

Scope 2 electricity consumption has increased by 1,712 tCO₂e from last year due to the inclusion of ex-PFI sites (previously reported in Scope 3) that came back into the business part way through the year. Despite this we report an overall decrease in emissions from last year as a result of lower emissions associated with each kWh (i.e. the grid emissions factor), as a larger portion of grid electricity is generated from renewable sources. Scottish Water energy efficiency and renewable programmes will also impact consumption.

C1.10 Electric vehicles

Reported as 16 tCO₂e for AR23. This is the first year we have reported this number.

This covers emissions from all electricity used to charge electric vehicles (EVs) from our leased fleet and in private vehicles, regardless of where the vehicle was charged.

C1.11 Removal of electricity to charge electric vehicles at site

This line refers to the amount of electricity used to charge EVs at Scottish Water sites.

As stated in AR22 commentary and queries, at present this data is unavailable due to the need to establish a new reporting framework and platform for the developing charging infrastructure. A digital project is currently taking place within Scottish Water to improve and streamline reporting from these different sources. We expect to be able to report this data for AR25.

We have taken the decision to report emissions from EV's in C1.10, accepting that there will be a small amount of double counting as we are currently unable to remove the proportion associated with charging on Scottish Water sites – consumption which will already be accounted for under line C1.9 Purchased Electricity.

C1.12 Total Scope 2 emissions

Reported as 88,839 tCO₂e for AR23, decreasing from 94,663 tCO₂e for AR22. The total emissions associated with Scope 2 electricity use fell, but electricity remains the major element of the operational footprint. The fall was attributed to a reduction in the carbon intensity of grid electricity per the explanation in **line C1.9**.

19.2.3 Lines C1.13-C1.16 Breakdown of Scope 2 emissions into their constituent GHGs

C1.13 Scope 2 emissions – CO₂

Reported as 86,941 tCO₂e for AR23, decreasing from 93,183 tCO₂e for AR22. CO₂ is the main constituent of scope 2 emissions (See explanation for decrease in C1.9).

C1.14 Scope 2 emissions – CH₄

Reported as 1,275 tCO₂e for AR23, an increase from 355 tCO₂e for AR22.

This is largely from electricity Scottish Water purchases from Scottish Water Horizons natural gas CHPs at Stirling and Dalmarnock. This was previously reported under C1.16 Scope 2 emissions – other GHGs but has now been reassigned to C1.14 Scope 2 emissions – CH₄ because GHGs from natural gas can be assumed to be methane. The increase is from both re-assignment and increase in electricity generated and purchased at Dalmarnock, which was only in operation for part of AR22 but is included for the full year in AR23.

C1.15 Scope 2 emissions – N₂O

Reported as 623 tCO₂e for AR23, a slight increase from 607 tCO₂e for AR22.

C1.16 Scope 2 emissions - other GHGs

Reported as zero tCO₂e for AR23, compared to 518 tCO₂e AR22. This is due to re-assignment of emissions from electricity Scottish Water purchases from a Scottish Water Horizons natural gas CHP at Stirling and Dalmarnock. This was previously reported in this category but has now been reassigned to C1.14 Scope 2 emissions – CH₄.

19.2.4 Lines C1.17-C1.26 Scope 3 emissions

Scope 3 emissions refer to our indirect emissions from activities that do not fit with Scope 1 or 2 or are emitted by others on our behalf (e.g. public transport, outsourced activities).

C1.17 Business travel by public transport and private vehicles used for company business

Reported as 359 tCO₂e for AR23, an increase from 264 tCO₂e for AR22. This has continued to increase post-pandemic as the business moved to a hybrid working pattern, with a further return to office working and face-to-face meetings.

C1.18-C1.18a Outsourced activities – PFI within & outside the Scottish Water group

Reported as 81,817 tCO₂e for AR23, decreasing from 92,716 tCO₂e for AR22.

As in AR22, these have all been reported under C1.18a as we are not able to split this between PFIs both within and out with the Scottish Water Group (Scottish Water Grampian). C1.18 will no longer be relevant as Scottish Water Grampian PFI returned to Scottish Water operation in October 2022, and so there are no PFIs within the Scottish Water Group.

The decrease from last year is mainly due to the conclusion of two PFI concessions – Highland PFI in May 2022 and Grampian PFI in October 2022. These emissions are reported under PFI Scope 3 (third party/supply chain) up to the point where they revert to Scottish Water control, after which emissions are classed as either Scope 1 (direct emissions) or Scope 2 (indirect emissions i.e. electricity). Other changes reflect expected year to year variation in consumption at PFI sites.

C1.19 Outsourced activities – other

Reported as 1,525 tCO₂e for AR23, increasing from 1,237 tCO₂e for AR22. This consists of sludge tankering carried out by third parties on our behalf.

C1.20 Purchased electricity - transmission and distribution

Reported as 8,042 tCO₂e for AR23, decreasing from 8,331 tCO₂e for AR22. These are emissions associated with electricity lost in the electrical transmission and distribution system. The trend follows scope 2 electricity emissions and has decreased due to a reduction in the carbon intensity of grid electricity and a change in PFI arrangements.

C1.21 Disposal of water and wastewater treatment waste to landfill

Reported as 864 tCO₂e for AR23, decreasing from 1,123 tCO₂e in AR22. This is within the variation expected from previous years (as shown in Table 101) and reflects quantity of waste to landfill on several islands where no recycling outlets are available.

Table 101: Disposal of water and wastewater treatment waste to landfill.

	AR23	AR22	AR21	AR20	AR19
Disposal of water and wastewater treatment waste to landfill (tCO ₂ e)	864	1,123	1,214	923	898

Note that this is not a required part of Ofwat reporting by water companies in England & Wales but has been included in Scottish Water's operational carbon footprint for more than a decade.

C1.22 Total scope 3 emissions.

Reported as 92,606 tCO₂e for AR23, decreasing from 103,672 tCO₂e in AR22.

This is the total of scope 3 emissions (sum of **Lines C1.17-C1.21**). The decrease from last year is mainly due to the conclusion of 2 PFI concessions – Highland PFI in May 2022 and Scottish Water Grampian PFI in October 2022. These emissions are reported under PFI Scope 3 (third party/supply chain) up to the point where they revert to Scottish Water control, after which emissions are classed as either Scope 1 (direct emissions) or Scope 2 (indirect emissions i.e. electricity). Other changes reflect expected year to year variation in consumption across PFI sites and changes in the grid factor. Please refer to **lines C1.2 & C1.18a** for further detail.

Note that scope 3 emissions reported by Scottish Water include PFI operators acting on Scottish Water's behalf.

19.2.5 Lines C1.23-C1.26 break down Scope 3 emissions into their constituent GHGs

C1.23 Scope 3 emissions – CO₂

Reported as 58,515 tCO₂e for AR23, decreasing from 65,520 tCO₂e for AR22.

C1.24 Scope 3 emissions – CH₄

Reported as 11,684 tCO₂e for AR23, decreasing from 13,744 tCO₂e for AR22. GHG emissions from landfill are assumed to be methane. The decrease from the previous year is partly due to the removal of ex-PFI wastewater treatment works that came back into the business part way through the year (previously reported in this line, but now included as scope 1 in line C1.6).

C1.25 Scope 3 emissions – N₂O

Reported as 22,407 tCO₂e for AR23, decreasing from 24,410 tCO₂e for AR22.

C1.26 Scope 3 emissions - other GHGs

Reported as 0 tCO₂e. All GHG emissions are in the form of CO₂, CH₄ or N₂O, as reported in Lines C1.23-1.25.

C1.27 Gross operational emissions (scope 1, 2 and 3)

Reported as 220,962 tCO₂e for AR23, decreasing from 234,924 tCO₂e for AR22.

This is a sum of scope 1, 2 and 3 emissions. Please refer to previous line items for further detail.

C1.28 Renewable Electricity Generated and Exported

Reported as -4,122 tCO₂e for AR23, increasing slightly from -4,022 tCO₂e in AR22.

Electricity that is generated on site but not used on site is exported to the grid where suitable connections are available. Where the generation meets the Renewable Energy Guarantee of Origin (REGO) criteria, this is converted to carbon credit and netted off against the overall operational carbon footprint. Whilst the grid transmission factor has reduced, the amount of electricity exported has increased.

C1.29 Total net operational emissions

Reported as 216,840 tCO₂e for AR23, decreasing from 230,902 tCO₂e in AR22.

Net operational emissions are the total of Scopes 1, 2 and 3 (C1.27 gross operational emissions) minus the carbon credit associated with exported renewable electricity (C1.28).

Net operational emissions are reported to the nearest kiloton (217,000) tCO₂e in the Performance and Prospects report – due to the inherent uncertainty in reporting these figures. The rounding formula is not included in the revised WICS template and therefore the figures held within the table will not exactly match the figures quoted in other publications containing these data.

19.2.6 Lines C1.30-C1.31 Ratio values

The carbon intensity of water and wastewater services are figures we have calculated and published since 2006-07 to provide information to customers on the carbon intensity of their service, and to enable interested organisations to calculate emissions embodied in the water they use. Intensity is expressed in tCO₂e per megalitre of water or wastewater service provided.

C1.30 Carbon Intensity, water (operational emissions)

Reported as 0.08 tCO₂e/MI of treated drinking water for AR23, a slight decrease from 0.09 tCO₂e/MI in AR22.

C1.31 Carbon Intensity, wastewater (operational emissions)

Reported as 0.17 tCO₂e/MI of wastewater for AR23, a slight decrease from 0.20 tCO₂e/MI in AR22.

19.2.7 Lines C1.32-C1.35 Comparison to 2006-07 baseline

In AR23 we report that our net operational carbon footprint has fallen by 53% to 216,840 tCO₂e compared with our 2006-07 baseline of 462,000 tCO₂e.

19.2.8 Lines C1.36-C1.43 Memo lines

These are for comparison with the previous year and commentary on key differences is contained in relevant lines above. These lines can be considered duplication now that a previous year column has been added to the AR23 template.

19.2.9 Lines C1.44-C1.45 Scottish Water Group

These lines refer to emissions from Scottish Water Group subsidiaries that are not included in the regulated operational footprint above.

C1.44 Scottish Water Horizons net operational emissions in report year

Reported as 2,931 tCO₂e for AR23, increasing from 1,435 tCO₂e for AR22.

The increase is largely due to increased natural gas use for a new CHP and district heating system at Dalmarnock as this only became operational part way through the AR22 year; and also due to increased fuel and electricity use at Deerdykes (a food waste anaerobic digestion site) while the biogas CHP was out of service. Table 102 below shows the breakdown:

Table 102: Change in Scottish Water Horizons net emissions (tCO₂e) from AR22 to AR23.

SW Horizons net emissions (tCO ₂ e)	AR23	AR22	Difference
Deerdykes*	-434	-894	+460
Dalmarnock	1,637	304	+1,333
Other**	1,728	2,025	-297
Total	2,931	1,435	+1,496

*Due to REGO accredited exports of grid electricity Deerdikes net emissions are negative

**'Other' line reflects changes in Scottish Water Horizons emissions not at Deerdikes or Dalmarnock. As per text above these two sites cover the major operational changes in the last year. Other, smaller changes are due to expected variation in consumption and changes in emission factors - notably the reduction in the electricity grid emissions factor.

C1.45 Scottish Water Business Stream net operational emissions in report year

Reported as 166 tCO₂e for AR23, compared with 417 tCO₂e for AR22.

The AR22 figure was unusually high due to release of refrigerant gases from use of fire extinguishing material in a substation. This shows the volatility of emissions reporting, particularly where novel gases are concerned – 1kg of HFC227a used in fire extinguisher is equivalent to 3,500kg CO₂e.

19.3 Investment

It is difficult to set out the impacts of investment on emission reduction as in many cases the emissions benefits may arise from adoption of more efficient processes or equipment, or materials within capital projects. For example, during AR23 some 5.87GWh annual equivalent energy efficiency was delivered in wastewater through adoption of lower energy equipment and by the Exemplar Wastewater Treatment (further detail is contained in section 4.3, investment related to table C3 – Energy).

19.4 Data

19.4.1 Data sources and confidence grades

There are two main types of data involved in calculating the operational carbon footprint – consumption data from Scottish Water and emission conversion factors from the CAW. There are inherent uncertainties in both, that must be considered in assigning confidence grades.

Consumption data is gathered from teams across the business from a variety of sources including meter readings, invoices, internal and regulatory reporting. Much of this is held in corporate systems and input follows an auditable process that is set out within Scottish Water's management system so can be assigned a high confidence grade. For example, electricity consumption (which is the largest single contributor to our footprint – 54%) is taken from verified meter readings, and fleet fuel usage is based on purchase information from vehicle fuel cards.

Some consumption data is not available in the correct units to allow a direct conversion into associated emissions and so some estimation is involved. For example, on site fuel consumption and travel on public transport are gathered in £ sterling. However, in order to be entered into the CAW, these need to be converted into litres of fuel and kilometres travelled respectively based on Scottish Water reference sites (on site fuel use), Department for Transport etc. Such entries will therefore be assigned a lower confidence grade.

Emission factors in the CAW are updated annually in line with latest UK government's BEIS carbon conversion factors, boundaries, guidance and methods. The main uncertainty recognised by the water industry is with regards to process emissions from wastewater and sludge treatment. Emissions are based on fixed factors applied to the population equivalent served and tonnes sludge treated. This does not take into account the varying nitrogen load of sewage entering the works, or the method of treatment or operation of the works. The water industry in the UK is collectively reviewing its methods around this and we expect the methodology to change in the next few years. This is reflected in the assigned confidence grade – i.e. we are confident in the figure we are reporting but expect this will change when the methodology changes.

Going forward, due to the greening of the grid, we expect electricity to make up a smaller proportion of our carbon footprint. As other components become more or less significant the confidence grade of our overall footprint may change.

19.4.2 Data improvement programmes

Annually, the operational carbon footprint of the regulated business is verified externally in line with ISO 14064-1 and informs continual improvement actions.

We are working with the wider water sector and through on-site monitoring programmes to better understand our process emissions and how they may be accounted for in the future.

The water industry in the UK works collaboratively each year to review and improve the CAW, including footprint boundaries, emissions factors and methods of calculation.

19.4.3 Assumptions used for forecast data

The C1 Table does not include forecasts.

20 Table C2 – Investment emissions

20.1 Overview

The following section explains Scottish Water's approach to investment carbon, detailing the progress we have made to date, some of the challenges we face and the areas we see for future development.

Scottish Water has developed a series of tools to allow it to make evidence led decisions around investment carbon.

1. Estimation of whole life carbon for future developments, this incorporates the investment carbon (embodied) and the impact on operational carbon.
2. Tools to allow option appraisal, where carbon is combined with cost information and other external factors such as risk or environmental concerns to provide a holistic view of the options.

The approach above is integrated across all carbon tools and covers the entire investment process. Scottish Water is the first in the UK water industry to have an integrated approach across the whole programme. We are now working hard to improve the early versions of these tools. As an early adopter of such tools, we will continue to develop and update them as Scottish Water identifies areas for improvement. For example, during AR23 we began to transition from the first carbon tool we developed (CCAT – see below) to a new system that integrates cost and carbon (BES – see below). We expect this to be an area of continuous improvement over the next two to three years.

The tools being used by Scottish Water operate at a project level across the entire investment programme. The information from these tools is combined to provide a management view of current Scottish Water carbon performance and this is reported in the Annual Return.

20.1.1 Carbon Tools

The following section will trace carbon data for a project from carbon estimates through to the tools where the carbon is reported and the decision making associated with that.

Estimating the carbon impact of a project

Scottish Water now has three tools which allow us to estimate the impact of investment or embodied carbon.

Capital carbon assessment tool (CCAT) - is an Excel based tool that was developed by Scottish Water in 2018-19. Improvements over the last two years have made this tool suitable for estimating the full carbon impact of an investment project for both embodied carbon-associated with construction of the project and the operational impacts of that project. The tool provides an output of embodied carbon, whole life carbon cost and net operational carbon impact.

The CCAT tool uses three key data sources to provide the carbon values:

- The Institution of Civil Engineers Civil Engineering Standard Method of Measurement (CESMM4) provides civil carbon estimates, built up using the standard civil estimating system, this data was developed in 2013 and has not been updated since.
- Bath University developed a series of basic material carbon estimated values such as steel, copper, concrete.
- Working with our technical delivery partners we have developed carbon curves for mechanical and electrical items such as pumps and control panels. This has allowed Scottish Water to improve its coverage of such items within CCAT and our other tools.

The first two data sources are recognised as industry standards and provide a consistent approach, although it should be noted that these tools are aging and have not been updated for a number of years and may not reflect current carbon values. This builds in an uncertainty impact to carbon estimates- they are likely to be over estimating carbon from the use of outdated emission factors. Scottish Water is working to develop updated carbon values to incorporate within its tools, although this is complex due to the nature of the data. Our aim over time is to use supply chain derived data within our systems and Scottish Water Procurement is currently working with parts of our supply chain to identify carbon values. This will take time as supply chains begin to understand the carbon associated with their products, and the focus will be on ensuring there is consistency of approach.

We are also aware that CCAT may underestimate embodied carbon values by not representing the full scope of projects and has the potential for input errors as it is a manual system. Whilst this does not impact options appraisal as all items are measured consistently, it does mean that the reporting of embodied carbon may be under-estimated by 20 to 30%. We do not make an adjustment in reported figures for this under-estimation.

CCAT is a tool designed to capture the key elements of a project such as pipes, tanks, roads etc. It was created as a stand-alone tool to work alongside the capital costing systems.

CCAT was designed to be used as a comparison tool for comparing options at appraisal and then monitoring progress of the project. As such it was not originally intended as a tool for measuring and reporting absolute carbon values.

The types of items that CCAT does not represent are demonstrated by considering the laying of a pipeline. In this example, CCAT will include the carbon related to excavating the trench, laying the pipe, the associated aggregates within the trench and the reinstatement. It will help support decisions on the approach to take. When we look in detail at the site, there may be rock in the trench, additional soft ground to be removed with additional aggregate to fill the voids left, additional water in the trench which needs to be pumped out, the trench may require additional supports to prevent collapse or bad weather may extend the time taken to complete the work. All these items are known within estimating teams as additional items, and each would increase the carbon of the pipe laying exercise.

However, the items which CCAT is unaware of are similar across all types of construction, therefore if CCAT were to compare an option to lay a pipe with an option to build a concrete tank, the items described above would be missed from both and it is unlikely that their omission would impact which option would be preferred.

Scottish Water is moving to use the Benchmark Estimating System (BES), part of the reason for this is to provide full carbon coverage of work with a reduction of workload on staff. BES can provide enhanced coverage as from a costing perspective all items which are expected to impact on cost will be identified and BES assigns a carbon value to every item identified.

The plan is to retire CCAT and rely on the corporate systems (BES/NCSD – see below) to produce carbon values, however this change is unlikely to take place for a number of years, as several programme areas are currently priced outside of BES. We will continue to review CCAT and its usefulness.

Benchmark estimating system (BES) - BES is Scottish Water's costing tool for capital projects. In the last year we have incorporated carbon into this tool. This allowed projects which are costed within the BES system to produce carbon values alongside a cost without any additional input from the user. The impact of using BES is improved coverage of carbon as no items are missed and through the removal of the double handling of data which was required with CCAT. BES uses the same source data sets as CCAT.

The carbon module in BES has been live since September 2022 and a review of outputs is showing a tendency to overestimate carbon. This is coming from the way in which a project is entered into BES. When BES was developed, we did not have carbon coverage for all items listed within BES. To avoid carbon data gaps within the tool, we fill gaps with a carbon value based on the cost of the items multiplied by a standard construction intensity value. The estimation error in BES only relates to the carbon estimating approach and does not impact on the cost estimates.

We have identified that certain items in particular temporary items such as traffic lights and the installation of temporary pumping is using an infill value which results in a carbon estimation much higher than would be expected.

The number of items listed within BES is too great for us to develop a carbon estimate for every item, so we have taken a pragmatic view to correct common items as they arise within projects. A process has been developed to identify projects which have a high carbon infill through the costing QA process and work to identify if any of the items appear to have high carbon estimates. When items are identified we develop the correct carbon value and update BES so that future projects will use a carbon rate rather than an infill value. To avoid slowing the investment programme when a project with incorrect carbon values is identified it will be allowed to continue whilst we develop the correct carbon values.

Non-complex service delivery application (NCSD) - the NCSD app has been developed to allow the users to procure lower value items and streamline the procurement process. This tool is used for items such as pump and valve replacements where the replacement item is the same as the existing item. Carbon is built into the tool in a similar style to BES. This approach covers common items such as pumps, valves and screens. Where an item does not have a carbon value the same infill approach as BES is used. The carbon module for this tool is being switched on during June 2023.

Appraisal tools - where options are being considered, the net present cost and carbon calculator (NPCC) is used. This tool combines cost and carbon data for differing options and develops a whole life cost and a whole life carbon estimate for each option. Within Scottish Water we focus on the whole life carbon as a key measure when considering option appraisals.

The NPCC tool is an NPV cost calculator. We take a similar approach with carbon but rather than discount carbon, we forecast the impact of the greening of the grid and the expected impacts of greening of industry within the tool. The implication being that an item bought in the future, for example, a pump purchased in 10 years' time will have lower carbon than a pump that is bought today. This allows us to incorporate time into our decision-making process.

Storing investment carbon data - Scottish Water stores carbon investment data within the P3M/Unifier tool alongside the existing capital information such as costs and milestone dates. The three carbon data fields stored in P3M at each of the Gate approval stages are:

1. Embodied carbon - this is the total construction carbon related to the project.
2. Whole life carbon - as described in the NPCC tool.
3. First year operational carbon - is to provide guidance on the likely impact on the operational carbon in the future.

Finally, carbon intensity, the t/£M, is calculated for the project, using the embodied carbon and expected cost held within the system. Carbon intensity being the key metric that Scottish Water uses to assess performance for capital carbon.

Work is currently being undertaken to provide a direct feed from BES to P3M. This will allow the data transfer to be made automatically removing manual entry error. There will also be an automated link from the NCSD app to P3M.

Reporting - we are developing a PowerBI report which is linked to the P3M system which will provide management information on the current position of carbon intensity of projects. It is expected that this tool will be used for reporting annual return data for table C2 in future years.

During AR23 Scottish Water has focused on improving systems and processes around Investment carbon to allow improved reporting, and at the same time we have developed our understanding of Investment carbon analysis. This has provided a challenge to reporting this year's annual return as we are currently changing both the systems that report carbon, and the processes for reporting Investment carbon. At this point in time, we have two immature systems, and it has led to data sitting across systems at the time of reporting. However, the systems that are being implemented will allow Scottish Water to be in a strong position of improved automated reporting for AR24.

20.1.2 Key developments during the year

This section sets out some of the developments during AR23.

Investment carbon reporting from BES (Costing system)

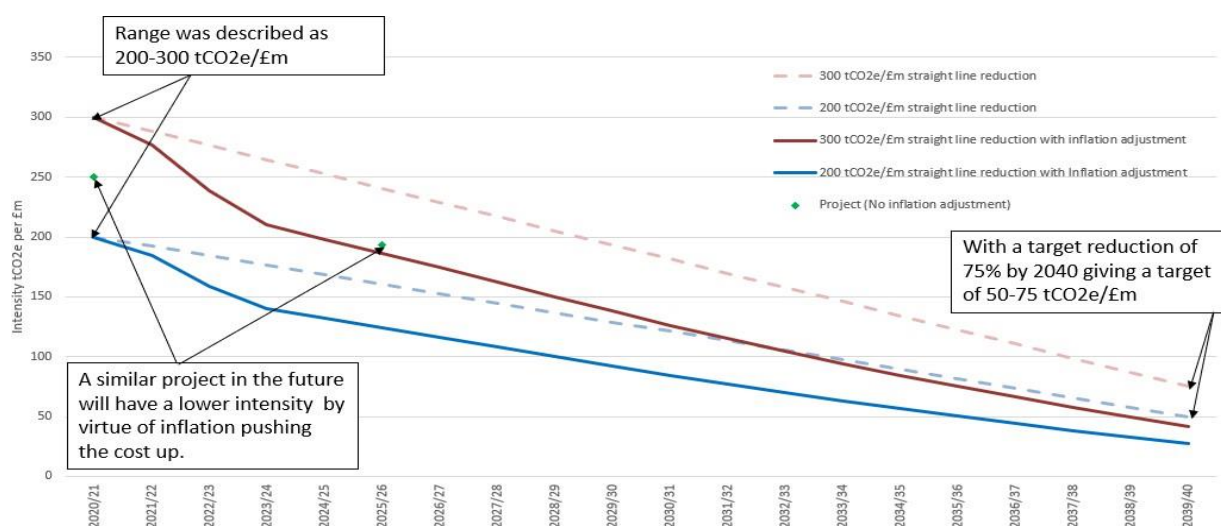
During September 2022 Scottish Water started to report carbon on some projects from the Benchmark Estimating System (BES), our investment costing system. This tool will now run alongside the existing Capital Carbon Accounting Tool (CCAT) as not all projects use BES at present. The carbon element of this system uses the same data feeds as the existing CCAT tool. For information, going forward all five step and three step governance projects will generate their carbon values from BES. Two-step governance projects above £250k will also generate their carbon values from BES, but two-step governance projects below £250k will continue to use the CCAT system. One-step governance projects will use system-generated values from the Non-Complex Service Delivery (NCSD) tool. This is going live in June 2023. There will be a period of transition as projects move to this approach and as a result of the system change, some projects have reported in CCAT and BES.

Inclusion of inflation adjustment within reporting

An area of development to improve the quality of reporting is the inclusion of inflation in carbon reporting. The approach we have taken is to adjust the carbon intensity target each year for the impact of inflation. This is because we recognised that due to inflationary pressures an identical project in future years will have a lower intensity figure simply due to the cost having increased due to inflation. We use 2020 as the baseline for carbon intensity, the year we first measured this, and the inflation adjustment values are the same as are used across the rest of Scottish Water.

Figure 51 below sets out the approach we have taken. Within the diagram we can see the impact on a project if no adjustment is made for inflation. The dotted lines show a straight-line reduction to the 2040 target of 75% reduction. The solid lines show this adjusted for inflation. This is set out in the discussion paper “Carbon intensity and inflation” in Appendix A.

Figure 51: Inflation adjustment – profile target lines account for inflation to date and future inflation forecast



Development of PowerBI carbon dashboard

One of the significant developments during the year has been the new investment carbon dashboard. This tool has two key reporting areas, project reporting compliance which has been in place for several months and Investment carbon performance.

The compliance section is used to track Scottish Water's performance at completing the new carbon reporting within the P3M/Unifier system, which is manual at the moment. This reporting allows the tracking of performance through the management structure to allow timely intervention to ensure that compliance is met. Currently the process for updating carbon in the P3M system is manual- this will change to automatic for BES and NCSD projects on completion of system upgrades in AR24.

The performance section will report the carbon intensity values used in this section of the Annual Return and will provide a live report of the current intensity value for Scottish Water. This will be available to all Scottish Water staff and Delivery Partners. This will be reported monthly to Capital Investment Leadership Team (CILT). This report is currently being run in a trial environment in the background but is forecast to be augmented to the main report during the summer of 2023.

Improved coverage of Investment carbon

As at the close of March 2023, Scottish Water now has carbon reporting tools covering all aspects of Investment delivery throughout the lifecycle of a project:

- CCAT and BES are the detailed tools that are used for detailed carbon assessment of projects. Project that are developed through the procurement route delivery 1 (DV1) will primarily use BES, although projects that have passed gate 90 will complete the project using CCAT to ensure data consistency. Procurement route DV2 will continue using CCAT for the time being but will move to BES once BES is used for costing.
- The high-level costing tool allows the assessment of carbon in the early stage of a project's life before the detail has been developed.
- During June 2023, the NCSD tool will have the carbon reporting element switched on to allow these projects to estimate carbon impact for the first time.

We expect that it will take time to reach full reporting coverage across all projects due in part to the time taken for project to move through approval gateways, and also due to the assessment and reporting of carbon being a significant change to existing approaches.

Data Quality Issues

When we were using a single tool, CCAT, to generate carbon values we were aware that as a manual system there was potential for error. This was a result of individuals not entering all aspects of the project into the tool. This led to under reporting. Improvements have been made to the CCAT tool and we will continue to monitor performance.

The BES system was expected to address this issue as everything that was being priced in a project would have a carbon value. BES values were expected to be higher. However, what we are finding is that whilst we are getting better coverage, the way in which projects are being entered into BES is impacting the carbon output as explained earlier.

Carbon emissions factors that are used in both CCAT and BES need to be updated as new low carbon materials emerge and the electricity grid decarbonises. This is a construction sector issue, and we are engaging with the BES system vendor to see how best to address this.

Impact of Improved Coverage of Carbon Reporting

Previously, carbon values were generated for all projects with an LBE of >£1m. This has led to a data set which has focussed on construction projects which has been extrapolated to give a carbon range for the entire investment programme.

As we are expanding carbon reporting to all projects this is bringing in projects with less construction aspects as well as studies which have very low carbon.

This can be expected to reduce the total carbon in the programme. Projects are making progress in reducing carbon, but in parallel we are gaining a clearer picture of the data quality issues that we need to address. To address these issues will take some time and as a result we will continue to report investment emissions as a broad range.

Auditing

The C2 tables were this year audited externally by Binnies for the first time.

3.2 Performance Trends

20.1.3 Lines C2.1-C2.2 Carbon intensity of investment, low and high estimates

We are building intelligence around investment carbon, but there remains more work to improve accuracy and systems for carbon data capture and reporting.

We continue to report a broad range of carbon intensity due to the relatively small data set, maturity of the process and complex data interactions leading to a degree of uncertainty.

A review of projects and a top-down assessment across different programme areas suggested an initial carbon intensity of investment for Scottish Water to be in the range of 200-300 tCO₂e per £m in 2020 price base. This was reported in our net zero emissions route map and in AR22.

Adjusting for inflation in AR23 we report a range of 170-254 tCO₂e per £m.

The Report Year -1 figures have been retrospectively adjusted for inflation as requested to provide consistency, and we report a range of 189-283tCO₂e per £m for 2021/22.

During AR23 we have been transitioning from CCAT towards using BES as our main reporting tool. This work is highlighting that the range may be larger, particularly for the lower end as more project types are captured and reported. Further work is underway to evaluate the tools and confirm the updated range that we will report in AR24.

This, along with further work to ensure the tools reflect the growing intelligence on low carbon materials and improve reporting, will also help us to better report the benefits arising from adopting lower carbon option within projects and programmes.

C2.3 Capital expenditure (figure brought forwards from capital tables)

Total figure provided is taken from Line G1.82. The water/waste split is based on the water/waste split described in Lines G1.67-G1.69 and Lines G1.80-G1.81 of Section G. General expenditure is pro-rata on the water/waste split.

20.1.4 Lines C2.4-C2.5 Carbon emissions from the capital investment programme

This is the estimated range for the total carbon footprint resulting from Investment activities and is calculated from intensity multiplied by the cost of the capital programme. We have adjusted the AR23 carbon intensity for inflation but are not reporting any reduction in carbon intensity. Note that the AR22 carbon intensity values were not adjusted for inflation.

20.1.5 Lines C2.6-C2.9 Quadrant intensity figures

We have been unable to produce updated quadrant values for AR23 due to the data transition described elsewhere in the document. The figures in AR23 reflect the AR22 quadrant values adjusted for inflation as per **line C2.1**. We will look to address the data quality issues to allow quadrant reporting in AR24.

C2.10 Embodied carbon in overall asset base - low estimate

The figure is the carbon MEAV from AR22 plus the low carbon emissions from the Investment programme for AR23. It could be considered that if Scottish Water were to rebuild the full asset stock today, the resultant carbon would be approximately this value.

C2.11 Embodied carbon in overall asset base - high estimate

This is an estimate of the total carbon produced by Scottish Water to build its asset stock over time. We have taken the high carbon emissions from AR22 and added the high carbon emissions from the Investment programme for AR23. There is an implicit assumption that the carbon intensity figure will have been higher in historic years – as explained in the Overview above.

20.2 Data

20.2.1 Data sources and confidence grades

Lines C2.1-C2.2 Carbon intensity of investment – Data based on original assumption of 200-300 range set out the net zero route map. We have applied the impact of inflation to these figures.

The embodied carbon in the overall asset base is expressed as a range reflecting the early maturity of work to establish the emissions intensity of investment, the relatively small data set, and the complex data interactions. Confidence in this data is low, although it should be noted that this range is felt to reflect Scottish Water's current carbon performance. A confidence grade of C5 has been assigned.

C2.3 Capital Expenditure

Data supplied by capital investment team; data grade applied (A1) is the same as line G1.67.

20.2.2 Lines C2.4-C2.5 Carbon emissions from the capital investment programme

This is a calculation based on the data above, the confidence grade (C5) reflects the confidence in line C2.1-C2.2.

20.2.3 Lines C2.6-C2.9 Emissions by water/waste/infra/non-infra

This data is based on a limited dataset from multiple data sources. There is known to be high volatility in the data, due to the data feeding this data. Once we start reporting from the capital carbon dashboard, we will move to reporting from a single data source and the data confidence in this area will improve. Current confidence rating D6.

20.2.4 Lines C2.10-C2.11 Embodied carbon in overall asset base

Data from multiple data sources using the data from lines C2.6-C2.9 as the base. Line C2.11 has additional extrapolation.

20.2.5 Data improvement programmes

20.2.6 Lines C2.1-C2.2 Carbon intensity of investment

During AR24 Scottish Water will move to reporting directly from the capital carbon dashboard. This will provide a full audit trail from the carbon intensity figure through to the source project data in BES/CCAT. It will also allow Scottish Water to analyse the data to provide a breakdown of lines C2.6-C2.9 Emissions by water/wastewater/infra/non-infra. There is a long-term data improvement activity to ensure we both record carbon accurately on projects and also to ensure carbon emission factors reflect the latest intelligence.

20.2.7 Assumptions used for forecast data

The C2 Table does not include forecasts.

21 Table C3 - Energy

21.1 Overview

Table C3 provides information on electricity consumption, generation and export with their associated financial information as well as other fossil fuels consumption. Scottish Water's operational electricity consumption comes from different sources. The predominant source is the grid, but we also use electricity generated by our own schemes and a small proportion comes from a CHP in a farm adjacent to one of our treatment works via a private wire. In the period wastewater PFI assets (Grampian and Highland) were returned to Scottish Water ownership.

21.2 Performance Trends

Electricity consumption, generation, and exports.

We have changed formats in many of the lines in table C3 so that all figures are displayed as numbers with an appropriate number of decimal places. This is to create consistency, and to make the displayed values appropriate for the units specified. Lines C3.1a - C3.3 are changed to three decimal places, please see "AR23 Template Change Log Final.xlsx" file, reference AR23-219. Lines C3.5 - C3.9 are changed to three decimal places, please see "AR23 Template Change Log Final.xlsx" file, reference AR23-220. Line C3.10 is changes to zero decimal places, please see "AR23 Template Change Log Final.xlsx" file, reference AR23-221. Lines C3.11 - C3.23 are changed to three decimal places, please see "AR23 Template Change Log Final.xlsx" file, reference AR23-222.

21.2.1 Lines C3.1a-C3.1c Electricity Consumption

Scottish Water Regulated - Total consumption for regulated operations (485.099GWh from the grid and self-supplied) increased by 19.654GWh mainly because of returning PFI assets. (The 455GWh of electricity used shown on page 46 of Scottish Water's Annual Report and Accounts 2022-23 is from the grid only and is reported in line C3.1b below)

The predominant source of electricity consumed is the grid (454.684GWh) which was 12.635GWh higher than the year before. Approximately 9GWh are attributed to former PFI wastewater assets coming back into the regulated business and approximately 4GWh were an increase in water operations (primarily the pumping of raw and treated water).

The electricity we self-supply is mainly renewable with the exception of Stirling and Dalmarnock CHPs (included in Line C3.1c). The higher volume supplied via Line C3.1c (+1.928GWh) is due to Dalmarnock CHP operating for the full financial year.

PFI's (Excluding those in Scottish Water Group) - Total electricity consumption for PFI's has decreased from last year. This is due to the conclusion of PFI Highland contract in May 2022. These sites moved to Scottish Water operation and their consumption for the remainder of the year is included under 'Scottish Water regulated.'

Scottish Water Grampian - Total electricity consumption for Scottish Water Grampian has decreased from last year. This is due to the conclusion of Scottish Water Grampian PFI contract in October 2022. These sites moved to Scottish Water operation and their consumption for the remainder of the year is included under 'Scottish Water regulated.'

Scottish Water Horizons - Total electricity consumption (C3.1a) for Scottish Water Horizons reduced by 0.195GWh (-10%) given that the Deerdykes Centre was not operational for several weeks during the year due to an operational outage.

21.2.2 Lines C3.2a-C3.2c On-site renewable electricity generated, used and exported

C3.2a – On site renewable electricity generated

This is presented disaggregated by the owners of the schemes: Scottish Water Regulated, PFIs, Scottish Water Grampian and Scottish Water Horizons. The PFI and Grampian schemes benefit only their own assets whereas the Horizons schemes are mostly embedded in Scottish Water Regulated assets contributing to displace grid consumption. Hence, Line C3.2b - On-site renewable electricity used reflects the usage of renewable power by the Scottish Water Regulated assets regardless of ownership of the renewable scheme.

Scottish Water Regulated - The volume of renewable electricity self-supplied (line C3.2b) for the use of regulated assets grew by 5.092GWh as a result of the ex PFI CHPs joining the core business. This also explains the increase in generation seen in line C3.2a.

The Scottish Water regulated business uses renewable electricity generated by itself, Scottish Water Grampian and Scottish Water Horizons. For the sum of these three columns, it is logical to expect that total generation (line C3.2a) minus exports (line C3.2c) would equal the electricity self-supplied (line C3.2b). In reality there is a small difference corresponding to our hydro turbine at Daer WTW where, due to export connection constraints, 0.581GWh of the generation had to be sent into heat dumps.

In the Annual Report 2022-23 it is stated that 46GWh of renewable power was generated on site. This figure is made up of 38GWh from Scottish Water Regulated own schemes plus 8GWh of schemes owned by Scottish Water Horizons and embedded in Scottish Water Regulated assets.

Line ref.	Description	Located on SW regulated assets	Located on SW Horizons assets	Total
C3.2a	On site renewable electricity generated –Scottish Water regulated	38.428	0.000	38.428
C3.2a	On site renewable electricity generated – Scottish Water Horizons	8.027	4.705	12.732
Totals		46.455	4.705	51.160

PFIs (excluding those in Scottish Water Group) - Overall renewable generation from biogas CHPs at PFIs has increased by 0.127GWh, despite CHP at ex-PFI Highland site Allanfean returning to Scottish Water Regulated category in year.

Scottish Water Grampian - The reduction in the generation figures is due to the conclusion of the PFI contract in October 2022 when the assets came back into the Scottish Water Regulated business and are reported under the Scottish Water Regulated section.

Scottish Water Horizons - The main generation asset owned by Scottish Water Horizons is the Deerdykes CHP which supplies the Deerdykes Centre and the reduction in the volume generated, exported and self-supplied was as consequence of the CHP being offline for several weeks.

C3.3 Renewable Electricity Capacity at end of year

Line C3.3 represents how much the existing renewable schemes could generate in a year as per the design output. It is not intended to express the capacity of the assets (usually expressed in MW) or the actual output in a given year, but rather how much the scheme is expected to generate in GWh based on its design and assumptions on operational conditions.

The source of this information varies. For older schemes it is based on historical output. For newer schemes it is based on the Acceptance Certificate (an internal document that shows the expected benefits of the project when delivered). For schemes owned by PFIs or third party-hosted on Scottish Water land, we rely on the information provided by these companies.

With the expiry of the Highland and Grampian PFIs, the capacity of the Nigg and Allanfearn CHPs is now reported under the Regulated section which is why there is an increase of 12.330GWh.

There is a net increase of 7.140GWh from ten new PV schemes delivered by Scottish Water Horizons during AR23 which will benefit Scottish Water regulated assets. Most of these were commissioned towards the end of the financial year so we will see the benefits of reducing reliance from the grid in the coming months.

C3.4 Percentage of 2030 Renewable Target Reached

Line C3.4 is a calculated figure that tracks progress against our 1320GWh target. It compares line C3.3 in GWh to the 1320GWh objective.

21.2.3 Lines C3.5-C3.9 Renewable technologies

This section shows the volume of renewable electricity generated, split by technology and ownership.

Scottish Water Regulated - The largest contribution (76%) to on-site renewable generation in lines C3.5 to C3.9 comes from hydro turbines (line C3.5) and the total generation across lines C3.5-C3.9 increased by 5.784GWh in AR23. This is predominantly because the generation from bioresources (line C3.8) increased by 5.860GWh as it now includes the CHPs from the former Highland and Grampian PFIs."

There was little variance in the other technologies.

PFIs (Excluding those in Scottish Water Group) - The total generation shows a decrease because of the transfer of the Allanfearn CHP into the Scottish Water Regulated business.

Scottish Water Grampian - The total generation shows a decrease because of the transfer of the Nigg CHP into the Scottish Water Regulated business.

Scottish Water Horizons - Overall, there was no variance in the generation of schemes owned by Scottish Water Horizons; however, there was a reduction in the output of Deerdrykes CHP (bioresource) due to an outage for several weeks. This was offset by an increased PV generation from newly commissioned schemes.

C3.10 Diesel consumption by Scottish Water fleet (transport by Scottish Water owned and leased fleet i.e. scope 1)

Note that this line represents diesel consumption from owned and leased fleet according to the boundaries outlined in the table and as below. 'Scottish Water fleet' is only relevant for the Scottish Water regulated number.

Scottish Water Regulated - Reported as 4,382,520 litres diesel for AR23, decreasing from 4,424,352 litres for AR22. This includes diesel used for by Scottish Water fleet (Scottish Water owned and leased vehicles i.e. scope 1).

PFIs (Excluding those in Scottish Water Group) - Reported as 260,527 litres diesel for AR23.

This is the first time we have reported this number. As stated in AR22 commentary and queries, we had not previously collected this information from the PFI companies. This is the first year we have asked for this data and represents data available at the time. We expect this number to increase as more complete records become available.

Scottish Water Grampian - Reported as 22,124.000 litres diesel for AR23, coincidentally the same as 22,124 litres reported for AR22.

This includes diesel used by Scottish Water Grampian PFI only for the part-year April-Sep 2022 in AR23, whereas Scottish Water Grampian PFI was included for the full year in AR22. This therefore represents an increase in consumption on site compared with AR22. Subsequently, Scottish Water Grampian PFI became a part of Scottish Water and so associated diesel for the remainder of the financial year is accounted for under Scottish Water Regulated category.

Scottish Water Horizons - Reported as 6,233.000 litres diesel for AR23, an increase from 4,338 litres for AR22. The increase is due to increased travel by Scottish Water Horizons. We do not have previous year's data for further trend analysis.

C3.11 Other fuels (non-transport)

This includes fuels not used for transport, including natural gas for heating and on-site fuel use in generators. This is the equivalent of C1.1 but expressed in GWh rather than tCO₂e. It is noted that in AR22 Scottish Water inadvertently did not include biogas that is generated from sludge digested on site.

Scottish Water Regulated - Reported as 33.457GWh for AR23, increasing from 17.040GWh in AR22.

This has increased due to the inclusion of biogas (approx. 18GWh) which was omitted in AR22 calculations. The remaining small change is due to variation in actual fuel consumption.

PFI (Excluding those in Scottish Water Group) - Reported as 215.155GWh for AR23, increasing from 156.830GWh in AR22. This has increased due to the inclusion of biogas (approx. 62GWh) which was omitted in AR22 calculations. The remaining small change is due to variation in actual fuel consumption.

Scottish Water Grampian - Reported as 11.058GWh for AR23, increasing from 2.150GWh in AR22. This has increased due to the inclusion of biogas (approx. 11GWh) which was omitted in AR22 calculations. The remaining small change is due to variation in actual fuel consumption.

Scottish Water Horizons - Reported as 31.238GWh for AR23, increasing from 11.550GWh in AR22.

This has increased due to the inclusion of biogas (approx. 13GWh) which was omitted in AR22 calculations. The remaining change is due to an increase in natural gas usage at Dalmarnock CHP, which was only operational for part of AR22, whereas AR23 includes the full year of operation.

21.2.4 Lines C3.12-14 Income received from energy exports and decarbonisation payments

All values presented have been extracted from our general ledger which captures costs at an account level. With the exception of Scottish Water Horizons, Line C3.12 is derived from amounts recorded as exported to grid. Line C3.13 is derived from amounts recorded as Renewable Obligation Certificates (ROC) and Feed in Tariffs (FIT) income.

Scottish Water Horizons, Line C3.12 has been populated using income recorded as sale of electricity and does not include the sale of electricity to the core business as this is included in line 3.17 detailed below.

Income from renewable electricity exported (line C3.12) in Scottish Water regulated increased £1.551m or 142% to £2.646m (2022: £1.095m). This has been driven partly from an increase in electricity generated and exported (as reported in lines C3.21 – C3.23) with the main driver being price increases as a result of the war in Ukraine.

Income from ROC and FITs (Line 3.13) in Scottish Water regulated increased by £0.651m or 17% to £4.392m (2022: £3.741m). The main driver for the increase has been the additional generation in the year as reported in lines C3.5 to C3.9. The balance of the increase has been driven by price increases of 4% for ROC (£49.71 per MWh in 2022/23 v £47.75 per MWh in 2021/22) and FIT increases in line with inflation.

Income from renewable electricity exported (line 3.12) in Scottish Water Horizons increased £0.268m or 19% to £1.657m (2022: £1.389m). The increase in the year has been mainly driven by increased solar and wind generation and price increases in the year. The increases have been partly offset by a decrease in generation at the Deerdykes facility as a consequence of engines being offline for maintenance/replacement during the year.

Income from ROC and FITs within Scottish Water Grampian decreased by £0.259m or 51% to £0.250m (2022: £0.509m). From 1 October 2022 the activities of the North-East PFI scheme were absorbed into the regulated activities of Scottish Water. This resulted in a transfer of generation and income to Scottish Water regulated in 2022/23. This has been reported in more detail within the M and N table commentary and also publicised within the Performance and Prospects report for 2022/23.

Electricity costs, recharges and hosting and export income have been extracted from our general ledger which captures costs at an account level. This data for PFIs is not available to us due to its commercially sensitive nature.

C3.15 Income from Hosting Renewable Electricity

There was a financial outperformance at Clyde Wind Farm given the high market prices of electricity during AR23 which resulted in additional income from hosting renewables (+£2.388m).

21.2.5 Lines C3.16-20 Electricity expenditure

All values presented have been extracted from our general ledger which captures costs at an account level. Line 3.16 is derived from charges from Optima and also includes Power Purchase Agreements charges and other non-optima charges. The value reported for gross expenditure is net of offset benefits.

Recharges of electricity expenditure represents the sale of renewable electricity from Scottish Water Horizons to the core business. This is also reported within the N Tables.

Total electricity expenditure (line C3.16) for Scottish Water regulated has increased £8.518m or 16% to £63.098m. The increase in the year has been mainly driven by price increases which equate to approximately £6.5m with the balance of the increase due to increased consumption. Scottish Waters energy procurement strategy of entering a new financial year fully covered, enabled the forward purchase of electricity for 2022/23 during 2021/22, thus protecting the business from the cost shocks experienced during 2022/23 caused by the war in Ukraine. Likewise, for 2021/22 electricity was forward purchased in 2020/21 at the height of the pandemic, thus securing a lower price than experienced in 2022/23. We estimate that our purchasing strategy

protected the regulated business from an energy cost shock of approximately £64m from the value reported.

Given the market premiums being experienced in late 2022/23 we adopted a new purchasing strategy for 2023/24 moving to a blended approach of day/month ahead procurement. This modification allows Scottish Water to purchase on a more frequent basis to reduce the risk premium in pricing that was built in after the price shocks in 2022/23 and allowing a flexible approach in a potentially volatile marketplace.

Recharges of electricity expenditure in Scottish Water regulated have increased £0.880m or 76% to £2.036m. The increase reflects an increase in the volumes being generated at newly developed solar PV projects which include the Dalmarnock PPA which came online from September 2022 and inflationary increases in price at other PPA's. At a group level the offset is shown on line C3.17 in the Scottish Water Horizons column.

Total electricity expenditure in Scottish Water Grampian decreased by £0.568m or 47% to £0.649m (2022: £1.217m). From 1 October 2022 the activities of the North-East PFI scheme were absorbed into the regulated activities of Scottish Water. This resulted in a transfer of expenditure to Scottish Water regulated in 2022/23. This has been reported in more detail within the M and N table commentary and also publicised within the Performance and Prospects report for 2022/23.

During the year there has been no movement of income between companies in the Scottish Water group (line C3.19).

Electricity costs, recharges and hosting and export income have been extracted from our general ledger which captures costs at an account level. This data for PFIs is not available to us due to its commercially sensitive nature.

21.2.6 Memo Lines C3.21-23

These are for comparison with the previous year and commentary on key differences is contained in relevant lines above. These lines can be considered duplication now that a previous year column has been added to the AR23 template.

21.3 Investment

To reduce emissions from electricity, Scottish Water is investing to improve energy efficiency and to increase renewable generation on its assets. Under MA027 - Energy efficiency, Scottish Water expect to replace electrical equipment with more modern energy efficient equipment including pump variable speed drives, blowers, aerators, lighting and will continue to introduce real time control technology. The criteria used is as follows:

- Energy efficiency projects which have positive NPV should be progressed in both water and wastewater service areas
- Positive NPV energy efficiency projects will be prioritised on the basis of quickest payback period first
- Projects with a payback period of <10 years can be progressed within the Investment Planning Scenario allocation
- Projects with payback periods of >10 years but which generate a return in the life of the asset (typically 20 years) can be progressed subject to additional governance checks

Under MA101 – Renewable Energy Enhancement, Scottish Water has adopted a strategic approach with a hierarchy of options and over the strategic review period 2021-2027 is selecting options for investment at each site. Projects include:

- Using renewables to displace power consumed from the grid

- Exploring the potential for including renewable generation in the scope of creating new assets if shown to be the lowest whole life cost
- Using renewables to displace power consumed from the grid and excess power generated stored using battery technology and consumed on site
- Purchasing renewable power via the grid generated by others on Scottish Water land along with Carbon Credits (e.g. hosted wind farms)
- Using renewables to displace onsite power use and export to private wire
- Using renewables to displace onsite power use and export to grid
- Using renewables, no onsite consumption and export to the grid/private wire
- Purchase renewable power generated by others on non-Scottish Water land via private wire

In addition to investment of Tier 2 funds on renewables, Scottish Water Horizons are making investments on renewables. The renewables investment hierarchy provides guidance on what investment should be Tier 2 or Horizons funded.

21.4 Data

The data for electricity consumption, generation and export comes from meter recordings and invoices from our electricity supplier.

The vast majority of our electricity import supplies, and renewable assets are fitted with smart meters that record and transmit data automatically. We have access to this data via a portal run by Scottish Power Dataserve (our meter operator).

The consumption and export data are also sent directly by Dataserve to our electricity supplier nPower for billing purposes and is subject to industry standard validation processes.

A small proportion of our import supplies are billed on estimated data when actuals are not available due to comms issues or lack of a manual meter reading and the estimation is done by our supplier following industry rules.

The meter data and the supplier's invoices feed our energy management system Optima from where we can obtain reports. Hence the degree of confidence in this data, as per WICS definitions, would be A2 (to allow for estimates).

The data relating to the "installed capacity at the end of year" comes from a mix of sources: historical records, internal documents and spreadsheets and information received from third parties; therefore, it has been graded B3.

The PFI consumption and generation data is gathered directly from each PFI company.

Electricity costs, recharges and hosting and export income have been extracted from our general ledger which captures costs at an account level. This data for PFIs is not available to us due to its commercially sensitive nature.

The data presented on Table 3 was audited by Binnies, with the exception of lines C.3.10 and C3.11 which were audited by Achilles. Achilles also audited the source data behind lines C3.1a to C3.9.

21.4.1 Data improvement programmes

We continue to identify electricity supplies with analogue meters so that these can be replaced with smart meters capable of transmitting data automatically avoiding reliance on manual readings or estimates.

21.4.2 Assumptions used for forecast data

The C3 Table does not include forecasts.

22 Table C4 – Land and carbon inventory

22.1 Overview

Land is a key part of the Scottish Water asset base in supporting Net Zero. We need to understand, manage and enhance our landholdings as an asset for carbon sequestration and greenhouse gas emissions reductions; and to report credible data on our landholdings' carbon balance.

In AR22, Scottish Water reported the initial inventory of landholdings in terms of the hectareage of key land classes, input to lines C4.1 – C4.5 (hectareage of each land type). We undertook to report the carbon inventory in AR24 but will bring this forward to AR23 to reflect the conclusion of initial baseline work and key learning from extensive peatland studies this year.

Scottish Water has worked with the James Hutton Institute (JHI) to develop an 'inventory approach' to quantifying a baseline of the carbon stocks and flows (annual losses or gains of carbon) of its landholdings. This has enabled Scottish Water to report land-based carbon in the balance of net zero emissions. The Scottish Water greenhouse gas baseline inventory for its landholdings is based on spatially explicit national land cover data sets, robust and referenced modelling approaches and published emission factors. The methodology aligns with global and national principles for greenhouse gas accounting, and was strengthened by engagement with external stakeholders, including Scottish Government and NatureScot. The method considers land cover, soil type, peatland condition, climate, topography, and land management, and was finalised in AR23.

As the inventory adopts a "top down" approach using national data sets it reports carbon status as a range, indicating the expected sequestration for each land type. This reflects the uncertainty around the actual site condition compared with the top-down national data sets. For the purposes of the Annual Return, a mid-range figure is reported in the data tables, with the range given in the commentary.

Sources of uncertainty include factors such as the actual extent and condition of peatland, the age and species composition of woodland, and the management practices on moorland and grassland. The inventory is intended to be reproduced every 3 years to reflect land use change, improved site intelligence and the resultant impact on carbon performances. Scottish Water will focus on site level data improvement to decrease uncertainty and help target activities for land improvement.

Scottish Water baseline inventory, based on the report by the James Hutton Institute, is shown in the Table 103 below:

Table 103: Scottish Water baseline inventory based on the James Hutton Institute report.

Land type	Area (ha)	Min. net emissions (tCO ₂ e/yr)	Max. net emissions (tCO ₂ e/yr)	Mid-Point	Range* (+/-)	Confidence grade
Peatland	4,614	28,000	52,000	40,000	30%	C5
Moorland	7,348	7,900	8,700	8,300	5%	C3
Montane	959	600	600	600	0%	C1
Arable	592	5,500	5,600	5,550	1%	C2
Grassland	5,898	-7,800	-4,700	-6,250	-25%	C5
Forestry	3,808	-54,000	-24,000	-39,000	-38%	C5

Land type	Area (ha)	Min. net emissions (tCO ₂ e/yr)	Max. net emissions (tCO ₂ e/yr)	Mid-Point	Range* (+/-)	Confidence grade
Total Emissions	23,219	-19,800	38,000	9,200		C5

*The % range is calculated as the upper and lower ranges from the mid-point of the minimum and maximum emissions. (i.e. for Peatland, difference between mid-point and min/max (12,000tCO₂e/yr) divided by mid-point value (40,000tCO₂e/yr) equals 30%)

The table shows the upper and lower emissions/capture range for each of the land types estimated by the James Hutton Institute reflecting uncertainty in the method of assessment through using strategic national data sets and carbon assessment methodologies. It suggests potentially significant carbon capture in woodland is exceeded by losses from peatland. The large ranges highlight the importance of data improvement as well as the areas of focus for prioritising interventions (peatland restoration and woodland creation).

The full inventory will be updated on a 3-yearly basis by external experts (e.g. JHI) to fully reflect land use changes and improvements in data, and to provide an independent assessment of the carbon performance of the landholding. On an annual basis, the inventory will be updated to reflect survey work carried out in the year which validates the actual conditions on the ground.

Now the baseline work has been finalised, we have retrospectively filled the AR22 column C4.6 – C4.10 with mid-points based on the above table, as required by the AR Table format.

For AR23 we report the mid-point of the ranges of carbon performance for each land type, adjusted to reflect the outcome of work undertaken in AR23 to improve data within the peatland category (C4.6).

The full update to the baseline will be published in AR25, and will need to identify all changes from the original baseline, for example:

- Changes because of improved intelligence (e.g. better land classification)
- Changes in land cover (e.g. grassland to woodland)
- Improvements (e.g. peatland restoration)
- Losses (e.g. wildfires)

It is important to reflect this as, unlike market-based schemes such as the Woodland Carbon Code where the risk of loss is built into the cost of the credit, the impact of the loss of carbon assets will need to be accounted for in Scottish Water's land inventory.

Alongside the baseline study undertaken by JHI, a parallel form of land assessment exercise was undertaken by Natural Capital Research Ltd to establish a baseline of biodiversity and natural capital across our landholdings, including carbon stocks and flows. The values from this study align with the outcome from the JHI project and will form the basis of Scottish Water's 3-yearly statutory biodiversity report to be published in late 2023.

22.2 Performance Trends

We have changed formats in all lines C4.1 to C4.27 so that all figures are displayed as numbers with zero decimal places. Please see "AR23 Template Change Log Final.xlsx" file, reference AR23-218. This is to create consistency, and to make the displayed values appropriate for the units specified.

C4.1 Total area of peatland

The reported value of 4,614 ha is based on our major landholdings, mostly those under agricultural tenancies or grazing lets, and excludes small areas of land associated with, for example,

operational sites and assets, which were not part of our initial carbon assessment. As explained above the full baseline re-assessment will be repeated by external experts on a 3-yearly basis.

Detailed survey work was completed within two major land parcels (south Loch Katrine and Daer) that identified significant differences in the field compared with the national data set/inventory. Extensive field sampling identified that for the southern part of Katrine the peatland is in much better condition and is less extensive than expected – the surveyor has indicated that parts of the site may not be regarded as peatland but instead is a mix of good condition acid grassland and low-density woodland.

As no quantified alternative land cover has yet been assigned (further habitat survey is required), by agreement with the surveyor and field ecologist, land formerly thought to be peat has been classed as “near natural” peatland. This classification reflects land that is losing much smaller amounts of greenhouse gases. (In reality, some of the land may actually be capturing carbon, but this depends on land cover, which will be known once further habitat survey has taken place.)

Similar conditions were found in large areas of Daer, but the survey also identified extensive areas of peatland still requiring restoration. This means that whilst the site is much better in terms of carbon than reported in the baseline, it still has significant emissions.

As an alternative land type has not yet been assigned to the areas found not to be peatland the number of hectares is unchanged from the number reported last year, although the emissions figure has been adjusted in line C4.6. Further habitat surveys will help us understand how best to categorise the land that is no longer considered peatland, and we aim to report this in AR24.

C4.2 Total area of woodland

The reported value of 3,808 ha is based on our major landholdings, mostly those under agricultural tenancies or grazing lets, and excludes small areas of land associated with, for example, operational sites and assets, which were not part of our initial carbon assessment.

A key principle we have adopted within the method for assessing land and the impact of land use change is that we will not re-assign land to woodland until 5 years post-creation. This aligns with the Woodland Carbon Code and allows sufficient time to enable the planting to become established and for us to confidently report the new land cover type.

The baseline assessment will be repeated on a 3-yearly basis and at this stage the number is unchanged from the number reported last year.

C4.3 Total area of grassland

The reported value of 5,898 ha is based on our major landholdings, mostly those under agricultural tenancies or grazing lets, and excludes those small areas of land associated with, for example, operational sites and assets, which were not part of our initial carbon assessment.

Some areas of grassland have been planted as woodland in AR22 and AR23 but, as noted above, we will wait 5 years before representing this as an established land use change. Therefore, the number is unchanged from the number reported last year. This will be adjusted for each area planted once we are confident the new woodland has been established.

C4.4 Total area of other land cover types

The reported value of 8,899 ha is based on major landholdings, mostly those under agricultural tenancies or grazing lets, and excludes those small areas of land associated with, for example, operational sites and assets, which were not part of our initial carbon assessment.

This category includes montane and moorland areas, as well as Scottish Water’s only arable farm. Aside from updating a policy position to prevent muirburn on tenanted moorland (which will come

into force at the conclusion of an existing tenancy), Scottish Water has not yet sought to proactively intervene and change land types in this category. Further study work is being scoped to help understand the steps we can take to improve the carbon status of these areas. Therefore, the number of hectares is unchanged from that reported last year.

C4.5 Total area of landholdings

The reported value of 23,219 ha is the sum of Lines C4.1-C4.4.

C4.6 CO₂e emissions from peatland in year

Whilst we originally indicated we would report this figure in AR24, the conclusion of the baseline work and studies completed in the year mean we are able to report an initial baseline now.

The inventory suggests we are losing significant amounts of greenhouse gases from peatland in poor condition. The opening value for the inventory was 40,000 tCO₂e which is the mid-point of a large range (28,000 – 52,000 tCO₂e) given in the JHI report and is being reported retrospectively for AR22.

As a result of surveys undertaken, the inventory has fallen to 33,317 tCO₂e losses per annum. The fall is attributed to the extensive studies of the actual condition and extent of peatland in the Daer and South Loch Katrine catchments, as explained in the commentary for C4.1 above. The confidence grade, however, remains low because alternative land types have not yet been assigned to the areas found not to be peatland, so the associated emissions are based on assumption.

We have shared the findings of our survey work with the JHI along with the method by which we have updated the inventory and they are supportive of the approach that we have used. We are also discussing the wider use of this approach with NatureScot.

The condition of peatland is the most important factor in determining associated emissions. For sites not yet surveyed, the condition was estimated for each 50m grid square within the JHI report based on the latest available Scottish national peatland surveys and not yet backed by site survey. The range of potential emissions is very wide to reflect this uncertainty and we have therefore assigned a low confidence grade to these data pending further study.

Further data improvement will continue year on year both through the peatland surveys for drinking water quality and peatland surveys specifically for carbon purposes. Ecological specialists have been engaged in reviewing the methods to ensure we focus on the peatland condition, and a major survey programme is underway over the next 18 months to support an updated inventory in AR25.

C4.7 CO₂e emissions from woodland in year

Whilst we originally indicated we would report this figure in AR24, the conclusion of the baseline work means we are able to report an initial baseline.

The inventory suggests we are capturing significant amounts of carbon in our woodland, making a strong contribution to net zero. The reported number of -39,000 tCO₂e per annum is the mid-point of a large range (-24,000 to -54,000 tCO₂e) given in the JHI report. We are also reporting this number retrospectively for AR22. The number is unchanged because, as stated in the commentary at C4.2, newly created woodland will not be reflected in the inventory until 5 years after the trees have been planted.

There are several sources of uncertainty in the data that contribute to the range: tree age and species being the main unknown factors in our current dataset.

We have begun a programme of assessment of our woodlands to determine an accurate age range and species composition. As these are progressed, the data will be added to the land inventory,

replacing current assumptions. The first stage of this is a desktop exercise and selected field survey and we anticipate being able to report with improved accuracy in AR24.

C4.8 CO₂e emissions from grassland in year

Despite previously stating we would not report this figure until AR24, the reported number of -6,250 tCO₂e is the mid-point of the range (-7,800 - -4,700 tCO₂e) given in the JHI report. As with peatland and woodland, the confidence grade for grassland is low due to the nature of the source data. It includes both improved grassland (where there is carbon capture) and upland unimproved grazing land where carbon is being lost. It excludes the operational emissions of any land operator which are beyond the control of Scottish Water, and we will work with agricultural experts to better understand and manage these emissions in future years.

C4.9 CO₂e emissions from other land cover types in year

The reported number of 14,450 tCO₂e is the sum of other land types within the JHI report and is likewise the mid-point of the range given (14,000 - 14,900 tCO₂e).

C4.10 Total CO₂e emissions from landholdings in year

The reported value of 2,517 tCO₂e is the sum of Lines C4.6-C4.9. This has fallen from the initial inventory baseline emissions of 9,200 tCO₂e which is retrospectively reported for AR22. The fall is attributed to the extensive studies of the actual condition and extent of peatland in the Daer and South Loch Katrine catchments, as explained in C4.6.

22.2.1 Lines C4.11-C4.19 Carbon sequestration – progress

C4.11 Peatland restored in year

The reported value in line C4.11 of 21 ha (rounded from 20.56 ha) was confirmed by the Catchment Liaison Officer as the area restored at one site – Loch Fasgro. During AR23 we did not manage to restore as much peatland as targeted owing to challenges in accessing sites in some locations. For AR24 we are working to complete surveys and agree land entry with tenants by mid-year to maximise the time window for restoration.

C4.12 Woodland created in year

The reported value in line C4.12 of 30 ha (rounded from 29.97 ha) consists of planting completed within the reporting year at three sites: Middle Coul (the remainder of the previous year's project that was planted in April 2022), Rosebery (partial planting, the remainder planted in 2023 will be reported in AR24), and Turdees (complete site of woodland pasture).

This remains a relatively new area for Scottish Water, and the total delivered is less than originally planned as we encountered challenges around activities required to deliver land use change. We have taken this learning and revised processes to support a longer-term programme of surveys, site design, regulatory permissions and planning delivering within the planting season. We expect to see increased delivery in future years.

As outlined in C4.2, new woodland will be added to the inventory figures after 5 years. Therefore, woodland created in AR22 is expected to be added to the C4.2 Total area of woodland figure in 2027, and woodland created in AR23 is expected to be added to C4.2 Total area of woodland in 2028.

As with peatland restoration, for AR24 sites we aim to complete surveys, scheme development, land entry agreement and submissions to Scottish Forestry by mid-year to maximise the time available to obtain Scottish Forestry approval (needed to obtain grant funding) and complete planting in year.

C4.13 Grassland restored and created in year

No grassland projects took place within the reporting year.

C4.14 Other land cover changes in year

No other land cover change projects took place within the reporting year.

C4.15 Total land area changed in year

During AR23, 51 ha (rounded from 50.53 ha) of land use change occurred (sum of Lines C4.11-C4.14).

C4.16 Peatland restored in year (forecast benefit in future years)

The reported figure of -397 tCO₂e (rounded from -396.81 tCO₂e) is an annual figure, which is calculated based on the difference in emissions factor between actively eroding peat (the original condition at the site) and drained peat, multiplied by the number of hectares restored. We do not use the lower emissions factor for the category of near natural peat, as it is thought that drained peatland is unlikely to return to near natural condition. However, findings at south Loch Katrine (as described above) where sheep were removed from the catchment suggest this might be possible. Monitoring in future years will provide more data.

C4.17 Woodland created in year (forecast benefit in future years)

The reported figure of -262 tCO₂e (rounded from -262.23 tCO₂e) is an annual figure, which is calculated by multiplying by the number of hectares planted by the sequestration rate for the type of woodland created (based on species, yield class and planting density. (This is captured in the appraisal document for each new area of woodland). Sequestration from new woodland is not counted for the first five years. As described in C4.2, this aligns with the Woodland Carbon Code and allows sufficient time to enable the planting to become established and for us to confidently report the sequestration associated with the new land cover type.

C4.18 Grassland restored and created in year (forecast benefit in future years)

There has been no activity focussed on grassland during AR23.

C4.19 Other land cover (forecast benefit in future years)

There has been no activity focussed on other land use this year.

22.2.2 Lines C4.20-C4.24 Expenditure

C4.20 Expenditure on peatland restoration in year

The expenditure figure of £217k (rounded from £216.8k) consists of contractor costs for physical restoration, all overheads, surveys etc.

As with the AR22 figure, this should not be used to calculate £/ha or £/tCO₂e avoided. Costs in year are not all directly related to work in year. The figure covers work at sites not yet restored (e.g. Daer) or not requiring restoration (e.g. south Loch Katrine) as well as the restored site at Loch Fasgro. These metrics can be calculated from actual costs on completed projects.

C4.21 Expenditure on forestry creation in year

Expenditure of £800k (rounded from £799.8k) consists of all costs associated with screening, surveys, site preparation (e.g. road construction, fencing, ground preparation), planting and all overheads.

As with the AR22 figure, this should not be used to calculate £/ha or £/tCO₂e abated. Costs in year are not all directly related to work in year. For example, they include invoices for work completed

at the end of the previous year, as well as some project uplifts that were applied after the 31 March (whereas others were applied prior). They also include screening work for all potential woodland sites in the process, whether or not they prove suitable for planting (the majority of them do not); surveys and third-party time for sites that were planned for delivery in AR23 (whether or not they were planted in year); and some early surveys for future sites that are planned for delivery in AR24. These metrics can be calculated from actual costs on completed projects.

Approximately £300k of this figure relates to the Land Management Plan for Loch Katrine. Much of the reforestation there is being managed through natural regeneration. Carbon benefits will be forecast from AR24 onwards following approval of the Land Management Plan by Scottish Forestry.

C4.22 Expenditure on grassland restoration and creation in year

No grassland projects took place within the reporting year.

C4.23 Other land cover

No other land cover change projects took place within the reporting year.

C4.24 Expenditure on land managed for sequestration in year

The reported figure of £1017k is the sum of **Lines C4.20-4.23**

22.2.3 Lines C4.25-C4.27 Memo Lines

C4.25 Total area of landholdings in previous year

The total area of landholdings of 23,219 ha is the same as that given for AR23, as explained earlier in the commentary. This number will change as data improves and as more of our operational sites can be included in the assessment. Changes will be reported on a three-yearly basis when the baseline work is repeated.

C4.26 Total CO₂e emissions from landholdings in previous year

As noted above, whilst we did not report this in AR22, the completion of the inventory, and the fact that it is based wholly on the landholdings in AR22 means we are able to retrospectively report the baseline emissions (the sum of the mid-point of the ranges for all land types) as 9,200 tCO₂e per annum.

C4.27 Expenditure on land managed for sequestration in previous year

£428k (rounded from £428,332) was invested in projects during AR22, mainly associated with a large woodland project in Angus.

22.3 Investment

Related to Management Approach MA077, a response to the Scottish Government's recognition of the global climate emergency, Scottish Water is baselining annual carbon capture and carbon stocks in landholdings, identifying opportunities for improvement, establishing credible and transparent mechanisms for carbon accounting and working towards delivering increases in annual carbon capture of our landholdings. We are developing partnerships with key stakeholders, such as Forestry and Land Scotland, and developing an engagement approach to work with tenant farmers, neighbours and others to facilitate the delivery of carbon capture.

In AR23, we invested £217k in Peatland restoration covering physical restoration, surveys and overheads predominantly at Daer, Loch Katrine and Loch Fasgro. In the coming two years we expect to invest a further £1M in these projects. Also in AR23, circa £800k was invested in Forestry creation projects covering screening work for all potential woodland sites, surveys and third-party

time for sites planned for delivery in AR23 and some early surveys for future sites that are planned for delivery in AR24.

22.4 Data

22.4.1 Data sources and confidence grades

Data for C4.1-C4.5 are taken from the Scottish Water greenhouse gas baseline inventory described above. This consists of the extent of landholdings covered by Scottish Water's GIS system used to assess carbon status. This excludes those small areas of land associated with, for example, operational sites and assets, which were not part of this initial carbon assessment. The division of landholdings between the land types is based on national data sets and will be updated over time with Scottish Water site data.

Land Cover - The land inventory is based on Scottish Water's corporate GIS shapefiles for its landholdings (excluding small operational sites). The work was commissioned through the James Hutton Institute (JHI) who compiled nationally available data sets (soils, land cover, habitats, national peatland assessments) on a 50x50 m grid to create an inventory for each of Scottish Water's land holdings. It is based on eight land cover classes: Peatland, Forestry-Broadleaved, Forestry-Coniferous, Arable land, Improved grassland, rough grassland, Moorland, Montane habitats, which for the purposes of reporting consolidates the forestry and grassland categories per the table in 5.1 Overview section.

The base land cover map was the freely available Land Cover of Scotland 1988, which represents upland landcover well. Forestry planting is the biggest land cover change since this data was derived. The cover map was corrected for forestry planting using both Scottish Water forestry data and the Forestry Commission's Forest Inventory (2019).

As noted in the commentary for line C4.6 - peatland emissions, the national data sets will be superseded by ground-truthed field survey. A programme of surveys to both validate the inventory and establish improvement programmes is underway for all land types.

Carbon inventory - It is important to note that carbon performance of landholdings is a relatively new and developing area, particularly for top-down national assessments. The carbon inventory is assessed using international and national principles and methods for carbon assessment coupled with expertise from the JHI that adopted the latest academic methodologies for assessing the carbon stocks and flows in land types.

As this is a developing area, a key element of the 3-yearly inventory update is a commitment to review methodologies against the latest guidance, academic literature and carbon factors to ensure that they are robust. Where field surveys are completed, the inventory will be updated with the relevant ground-truthed data. Any changes in input data or method in light of new developments and field work will be explained.

Confidence grades for area lines have been assigned based on the use of GIS polygons provided by our land agents, and national data sets of land cover provided and analysed by JHI.

Confidence grades for emissions/sequestration lines have been assigned based on the above land use, plus peatland condition, and assumptions on tree age and use of proxy tree species for sequestration rates, all provided and analysed by JHI.

As some land cover types have positive values (emitting) whilst others have negative (sequestering) values the possible range for total landholdings is a much larger range, hence it does not simply replicate the confidence grade of the contributing lines.

Where work has been done to improve the inventory numbers the confidence grade remains the same until this is fully integrated into the next iteration of the baseline (AR25).

22.4.2 Data improvement programmes

The requirement to consider uncertainty in the Scottish Water baseline emissions, informs Scottish Water priorities for acquiring new input data for improving the baseline estimates. Land use and condition is expected to change over time and the strategic and field data sets used to inform it will continually be reviewed and update. Data improvement work is currently prioritising:

Land cover - Field surveys at two peatland sites have shown that the extent of peatland may be much less than assumed from national data sets. Further information is required to assign alternative land cover/habitat types, but the work has led to a re-scoping of the survey approach with a goal to assess all key peatlands to inform AR25.

Peatland condition - As well as peatland extent survey work is showing that there are differences between the assumed condition (which informs a broad range of carbon performance) and the confirmed field condition. Our objective is to survey the majority of peatland to inform a full inventory update in AR25. This will enable us to set a much narrower range of emissions from peatland.

Woodland age and species - Improvements will be made by verifying the age and species composition of woodlands on our landholdings. A programme of desk-based record searches and field survey will be used to inform an updated inventory in AR25. As for peatland this will lead to a significant narrowing of the range currently assigned to the amount of carbon captured.

Assumptions used for forecast data - The annual figure for projected emissions savings from restored peatland is calculated based on the difference in emissions factor between actively eroding peat (the original condition at the site) and drained peat, multiplied by the number of hectares restored. We do not use the lower emissions factor for the category of near natural peat, as it is thought that drained peatland is unlikely to return to near natural condition. However, findings at south Loch Katrine (as described above) where sheep were removed from the catchment suggest this might be possible. Monitoring in future years will provide more data.

The annual figure for projected carbon sequestration from newly created woodland is calculated by multiplying by the number of hectares planted by the sequestration rate for the type of woodland created (based on species, yield class and planting density). Sequestration from new woodland is not counted for the first five years. As described in C4.2, this aligns with the Woodland Carbon Code and allows sufficient time to enable the planting to become established and for us to confidently report the sequestration associated with the new land cover type.

Carbon intensity and inflation

Purpose

This paper highlights:

- The need to control for inflation when considering carbon intensity of future projects
- Two of the possible options for controlling for inflation including:
 - Adjusting the cost of projects to remove the effect of inflation when calculating carbon intensity.
 - Lowering the target investment emission's carbon intensity to reflect inflation rates.

Background

$$\text{Carbon intensity} = \frac{\text{Embodied carbon (tCO}_2\text{e)}}{\text{Project cost (m£)}}$$

Without accounting for cost increase due to inflation, carbon intensity values will falsely decrease over time.

If we were to compare identical projects built 5 years apart, a project constructed in 2021 with an intensity of 250t CO₂e per £m, the identical project in 2026 the intensity would be 195t Co₂e per £m, purely due to the impact of inflation on the denominator. The later project appears to be a lower carbon project even though both projects have produced exactly the same amount of carbon.

Table 104: Example project impacted by inflation.

	Year	Project value (£m)	Embodied carbon (t CO ₂ e)	Intensity (t CO ₂ e per £m)
Project A	2020/21	3.00	750	250
Project B	2025/26	3.85	750	195

Therefore, we need to adjust for the impact of inflation to allow progress in capital carbon efficiency to be demonstrated.

We have two options with regards to reporting/targeting carbon intensity:

1. Adjust investment back to a set point 2020/21 in this case, so that all reporting is in line with the 200-300 to 50-75 range.
2. Adjust the target each year to reflect the inflation that has been observed.

Option 1 is the traditional financial approach to dealing with the issue of inflation, by converting the costs back to a common year using published inflation indices. Below we consider the projects described in CA Table 1 above.

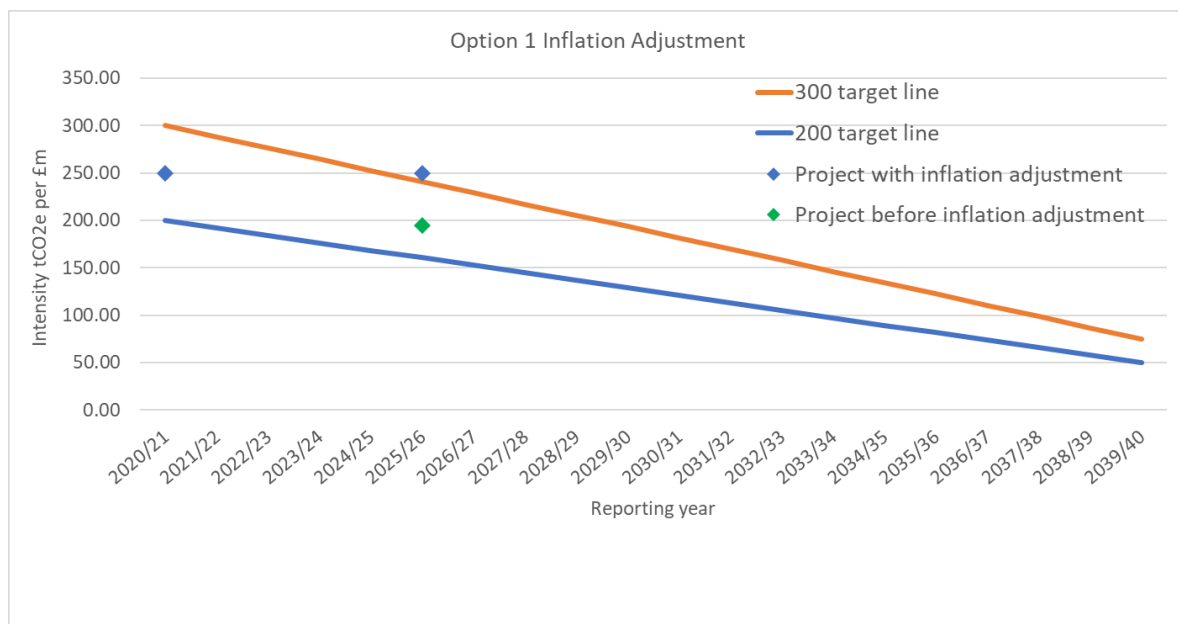
Project A is already in 2020/21 prices and has an intensity value of 250t CO₂e per £m. Project B was developed in 2025/26 and the costs is £3.85 m which gives an intensity value before adjusting for inflation of $\frac{750}{3.85} = 194.6\text{t CO}_2\text{e per £m}$. If we convert this cost back to 2020/21 prices using the inflation index set out in CA Table 4 in Annex A.

$$\frac{£3.85}{378} * 294.2 = £3.00\text{m}$$

Once this conversion is complete, we calculate the intensity ratio, which is $\frac{750}{3.00} = 250\text{t CO}_2\text{e per £m}$.

The target ranges are a straight line from 200-300 in 2021 to 50-75 in 2040. The range for 2025/26 is 161-241, therefore whilst the project in 2020/21 was within the expected range, the same project in 2025/26 is now above the range.

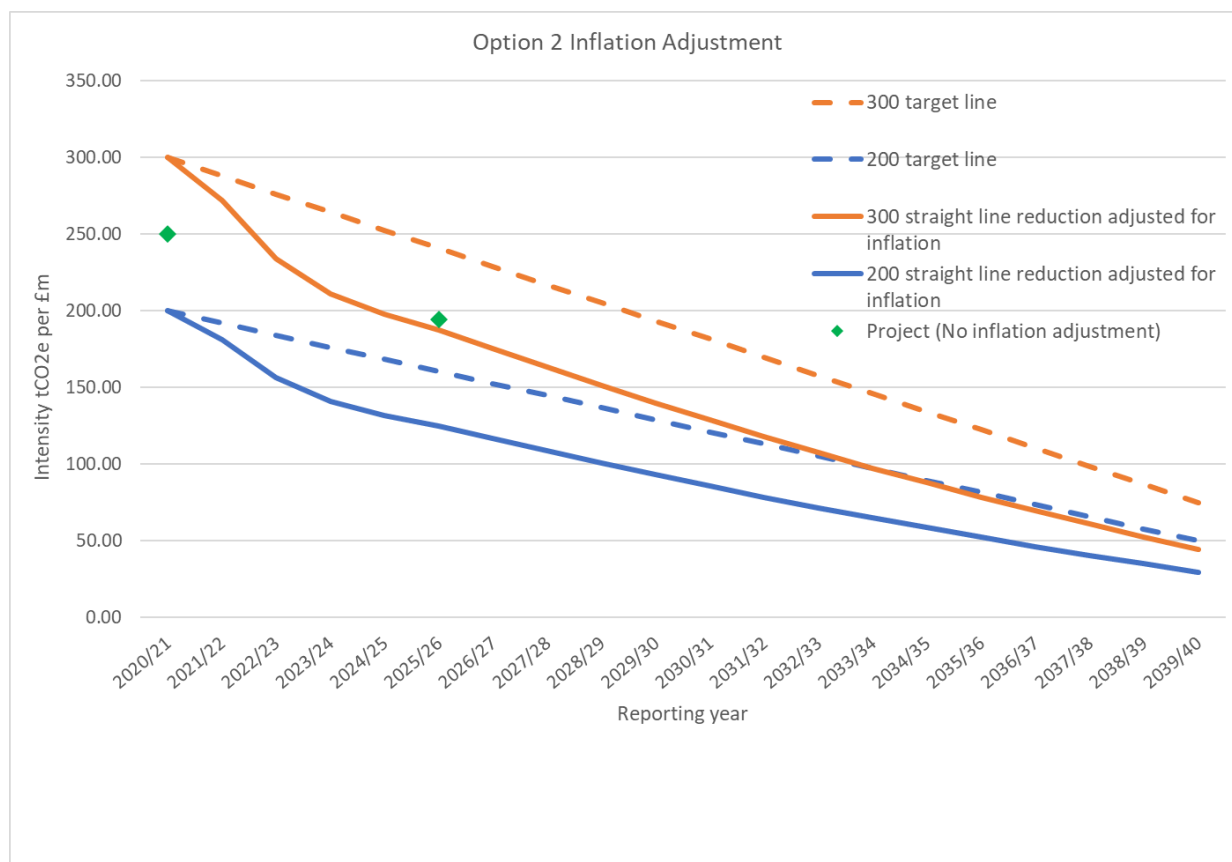
Figure 52: Option 1 methodology of inflation adjustment.



Option 2 Involves adjusting the target range for inflation and allowing the projects to report at a cash price. With this approach projects do not need to be recalculated to adjust for inflation, but the target range would need to be adjusted each year as actual inflation figures were confirmed, and forecasts for futures years would have to be applied.

Figure 53 below shows how the targets lines would be adjusted for inflation show as the solid line. Projects A&B have been included and show as seen for option 1 project B is above the target line

Figure 53: Option 2 methodology of inflation adjustment.



We can see that both options give the same result, however the optic is different in each case, option 1 generally makes it easier to compare projects over time, whereas option 2 allows for simpler calculation of intensity by the project at the time of the project estimate is being made.

Benefits/Issues of each approach

Option 1 – Adjust projects for inflation

This approach is the classical approach to dealing with inflation, in that all costs are converted back to a single price year. All analysis is then conducted in the price year.

Table 105: Benefits and issues of Option 1.

Benefit	Issues
Process is currently understood and is consistent with the approach take in other areas of Scottish Water.	When a project calculates an intensity, they will need to factor inflation to identify how they will be perceived against target.
The data is always backward looking and does not require forecast of inflation.	Possible confusion with projects has a current and adjusted intensity figure.
Targets can be clearly stated in advance and will not change due to inflationary pressures.	

Option 2 – Adjust targets for inflation

This approach adjusts the targets for inflation, whilst allowing the projects to calculate the intensity using cash costs.

Table 106: Benefits and issues of Option 2.

Benefit	Issues
Calculation of intensity for a project is intuitive for the project team.	Inflation requires to be forecast forwards to allow forecasting of impact of future measures.
Avoids the need to identify a “base” year.	As current inflation changes future targets will move.
	The definition of the 2040 target position is more complex to explain, as it will move each year due to change in current inflation.

Recommendation

This report has set out how inflation impacts on the carbon intensity figures, how it will impact on projects, and sets out how the target s could be set, but either adjusting the projects or the targets lines.

It is recommended that Scottish Water continues with the approach described in option 2, as this is simplest for the project teams, with the teams being able to calculate carbon intensity without the need to adjust for inflation.

Appendix B – Inflation factors

Table 107: Capital Price Inflation factors.

Year	Inflation factors
2020/21	294.2
2021/22	311.8
2022/23	346.9
2023/24	368.4
2024/25	375.8
2025/26	378.0
2026/27	383.7
2027/28	391.4
2028/29	399.2
2029/30	407.2
2030/31	415.3
2031/32	423.6
2032/33	432.1
2033/34	440.8
2034/35	449.6
2035/36	458.6
2036/37	467.7
2037/38	477.1
2038/39	486.6
2039/40	496.4

Section D – Water Mains and Sewers

23 Table D5 – Activities – Water service

23.1 Overview

The D Tables provide information on activities relating to water mains and sewers during the report year. Table D5 covers the water mains activities.

The total length of water mains has increased from 48,945km at AR22 to 49,110km for AR23, largely due to the addition of new mains. This increase is primarily due to new housing and commercial developments.

There has been an increase in the number of communication pipes replaced this year as reported in lines D5.9-5.11. The total number of pipes replaced is 3,036, which is an increase of 258% from AR22 and significantly greater than the recent yearly average of 1,183. There has been no major increase in activity on communication pipes when compared to a normal year, e.g. AR19 and AR20. The primary reason for the increase is the embedding of Scottish Water's new Salesforce Task Scheduling system, which uses specific categories for recording the type of activity undertaken on communication pipes. The system has ensured that all replacements involving lead can be clearly identified and included in Table D. The increase is also due, to a lesser extent, to the number of jobs performed returning to levels before COVID-19 lockdowns. There were approximately 1,500 pipe replacements in AR20, but an average of approximately 1,000 in AR21 and AR22, which were both periods of lockdown related restrictions.

23.2 Performance Trends

D5.1 Total length of mains (opening balance)

The opening balance for water mains on Line D5.1 is 48,945.39km, which is the Table H3.4 Mains Potable value from AR22.

The confidence grade of A1 remains the same as last year.

D5.2 Mains renewed

This has increased by 14.16km from 37.29km in AR22 to 51.45km, over the next 5-10 years we anticipate renewal rates to be between 200km and 250km per year, primarily focused on replacing asbestos cement pipes which are approaching the end of their serviceable lives. Renewed pipes have been formed by open cut direct replacement, pipe bursting or certain methods of slip lining of existing mains during the reporting year. Identification of the affected pipes is based on GIS (Geospatial Information Systems) analysis. An increase in the completion of the forming method in GIS is the main reason for the increase in this line. There is further explanation provided in the related line D5.3 - Mains relined.

Methods included in this category are listed in Table 108.

Table 108: The categories associated with renewing a water main.

ID	Forming Method
30	OCR - Open Cut (Direct Replacement)
35	ACB - Pipe Bursting Of AC Pipe
40	CCB - Pipe Bursting Of Concrete Pipe

ID	Forming Method
45	FPB - Pipe Bursting Of Ferrous Pipe
55	VCB - Pipe Bursting Clay-ware Pipe
60	PBU - Pipe Bursting (Unknown Pipe)
65	CSS - Chemical Soil Stabilisation (Sewers)
70	CIPP - Cured In Place Resin Sleeve Liner (Sewers)
75	GRP - Lined With GRP Panels
80	GRC - Resin Concrete Lining Panels
90	PRP - Ripped PE or PVC Pipe
95	RSP - Ripped Steel Pipe
100	RLP - Ripped Lead Pipe
105	ACT - Thermo Plastic Liner In AC Host
110	TPL - Thermo Plastic Liner Non AC Host
115	ACH - Slip Lining In AC Host Pipe
120	FCH - Slip Lining In Ferrous Host (Close Fit)
125	FLH - Slip Lining In Ferrous Host (Loose Fit)
130	PLL - Service Lining To Lead (Service) Pipe
135	VTH - Slip Lining Clay Pipe (Tight Fit)
140	OCH - Sliplining in Other Host

The confidence grade of B3 remains the same as last year given the method of data collection has not been subject to any improvement plans.

D5.3 Mains relined

Mains identified as having been relined during the reporting year have reduced from 14.33km to 1.02km in AR23. Mains that have been lined since the previous year but whose forming method is “RIM – Resin Injection Methods” or unknown are included in line D5.3. The decrease is attributed to an improvement in the completion of the forming method in GIS which describes the technique used to reline the pipe so less pipes have been identified with an unknown forming method. This has resulted in more pipes being included in line D5.2 instead.

The four lengths that make up D5.3 this year are recorded in GIS with a “Not Known” forming method as shown in Table 109 below:

Table 109: Lengths of mains relined from GIS.

D5_Line	facility_id	Length (m)	formed_by_desc	lining_material_water_desc
D5.3 Relined	26632232	706.63	Not Known	HPPE SDR17
D5.3 Relined	942177697	2.73	Not Known	SL - Slip Lined
D5.3 Relined	97496113	66.74	Not Known	SL - Slip Lined
D5.3 Relined	97548909	246.85	Not Known	MDPE SDR17
		1,022.96		

The confidence grade of B3 remains the same as the method of data collection has not been subject to any improvement plans.

D5.4 Mains cleaned (Total)

The total length of mains cleaned has increased by 12.7%, from 1,310.43km in AR22 to 1,476.6km which is consistent with year-on-year variation. D5.4, which reports the total length of mains cleaned and D5.5, which reports the length of mains cleaned for quality reasons, report the same length in AR23 as all pipes cleaned are selected for water quality improvement reasons, as stated below.

Scottish Water has built on the learning gained in delivering the SR15 OMG06 Mains Cleaning programme, which adopted a one-off “source to tap” zonal cleaning approach and have enhanced this by improving our understanding of how biofilms and metals accumulate and are then mobilised within water networks. A range of field investigations applying the learning gained from the University of Sheffield PODDS (Prevention of Discolouration in Distribution Systems) project are undertaken to build this understanding.

These activities are recorded as “Investigations” rather than “cleaning” even where mains flushing activities are carried out as part of the investigative work. This ensures that Scottish Water targets our interventions at locations and at a frequency to manage the rate of material regeneration within the water network. To support this new approach, Scottish Water suggests that a different set of metrics is discussed with the Commission for consideration for application to future ARs.

The confidence grade of B3 remains the same as last year as the change in the approach to identifying which mains to target did not affect the accuracy of the lengths reported.

D5.5 Distribution mains cleaned for quality

Line D5.5 this has increased by 61%, from 916.09km to 1476.6km - the same length as reported in D5.4. The method for identifying quality-based cleaning is described in the commentary for D5.4.

The confidence grade of B3 remains the same as last year as the main focus was on changing the approach so that the necessary mains could be targeted more effectively.

D5.6 New mains

Mains lengths adopted for new developments and lengths delivered as part of our capital programme are reported in D5.6. The length reported in AR22 was 103.99km. In AR23, 167.91km have been identified in GIS as being commissioned or been adopted during the year. As in recent years, the GIS analysis employs methods to exclude any historical mains records that have been added during the year. This ensures only newly laid or adopted mains are included.

The confidence grade of B2 remains the same as last year, as the data quality level has been sustained but not improved.

D5.7 Mains abandoned

35.71km more mains were abandoned in AR23 than in AR22 with 119.71km being reported, which is an increase of 42%. The lengths of mains abandoned each year does not follow a particular trend but averages at 128km based on the last four Annual Returns.

These pipes are identified as being Scottish Water owned and having their status changed from Operational to Abandoned during the year.

The confidence grade of B2 remains the same as last year, as the data quality level has been sustained but not improved.

D5.7a Other Changes

The length reported is the balancing value to bring the total changes in the year in line with the closing balance reported in Line D5.8. The length in this reporting year is –65.33km, which is a similar length to AR22. This length accounts for the necessary updating of networks in GIS during the year that do not reflect physical changes to water mains, but rather the untraceable network amendments in GIS. For example, a comparison activity for each pipe takes place on an annual basis, where some of these pipes can be split or indeed loose IDs.

The confidence grade of B3 remains the same as last year, as the data quality level has been sustained but not improved.

D5.8 Total length of mains (closing balance)

This line is a summation of Lines D5.1, D5.2 and D5.6 minus Lines D5.7 and D5.7a. The total length reported for AR23 is 49,110.37 km (consistent with Line H3.4), compared with 48,945.39 km in AR22.

The confidence grade of A1 remains the same as last year. The total length value is extracted from our GIS corporate system and therefore we consider A1 to be the appropriate confidence grade. Confidence grades for the input lines (D5.2 - D5.7a) are lower (B2 or B3) as there is a level of uncertainty on the individual length of mains that have been subject to the different interventions, but this uncertainty does not affect the confidence in the total length given activity relates to less than one percent of change to our network.

D5.9-D5.11 Communication pipes replaced

These lines report the number of communication pipes replaced which have varied over the last five years (see Figure 54). Excluding AR21 and AR22, given COVID-19 restrictions were in place, the total number of replacements of communication pipes has doubled over the last five years. The amount of activity on communication pipes has not increased however the procedure for recording activity on communication pipes has improved during AR23 as there are specific categories now available in the Scottish Water's new Salesforce Task Scheduling system to identify the nature of the work undertaken. This has also resulted in a change to the proportional split of lead communication pipe replacement where in the past these replacements were for quality reasons however in AR23 the vast majority are due to maintenance and other reasons. Given the source data has improved the confidence grades for these lines have been improved to reflect this.

Figure 54: Comparison of Communication Pipe Replacements from AR19 to AR23



D5.9 Lead communication pipes replaced - quality

The total number in AR23 is 320, which is a decrease of 362 from AR22. The procedure for recording lead replacement work has improved during AR23 as there are specific categories now available in the Scottish Water's new Salesforce Task Scheduling system to identify the nature of the work undertaken.

Due to this improvement the confidence grade has changed from B2 to A2 due to an improved data recording solution.

D5.10 Lead communication pipes replaced – maintenance or other

The total number in AR23 is 2,431, which has increased significantly from the six replacements reported in AR22. This increase again reflects the improvement in the data recording of communication pipe replacement work which now more accurately quantifies the number and material of pipes affected.

Due to this improvement the confidence grade has changed from B2 to A2 due to an improved data recording solution.

D5.11 Communication pipes replaced - other

The total number replaced in AR23 is 285. This is an 79% increase from the 159 reported in AR22. The D5.11 number was affected by Scottish Water's new Salesforce Task Scheduling system and the improved methodology used for identifying types of mains replacement.

Due to this improvement the confidence grade has changed from B2 to A2 due to an improved data recording solution.

23.3 Data

23.3.1 Data sources and confidence grades

The lengths reported in Table D5 are taken, unless otherwise stated, directly from digitised infrastructure in Scottish Water's GIS system.

Mains Renewed and Mains Relined are reported from interventions carried out during reactive operations, capital maintenance and capital project interventions; Mains Cleaned is reported from work done as part of the capital programme carried out by our water infrastructure alliance partner.

The number of Pipes Replaced is taken from Scottish Water's lead replacement programme records which now processes through the Salesforce Task Scheduling system.

Further detailed information on how individual lines are calculated, including the components of the calculation, is contained in the assurance report for the D tables.

Confidence grades have improved for lines D5.9, D5.10 and D5.11 due to the introduction of Scottish Water's new Salesforce Task Scheduling system which allows better accuracy in the recording of activity conducted by people maintaining our communication pipes.

23.3.2 Data improvement programmes

The embedding of Scottish Water's new Salesforce Task Scheduling system with PowerBI reporting, which uses specific categories for recording the type of replacement activity undertaken on communication pipes, has improved the data by enabling all replacements involving lead to be clearly identified and included in Table D.

23.3.3 Assumptions used for forecast data

There is no forecast data for the D5 table.

24 Table D6 – Activities – Wastewater service

24.1 Overview

The D Tables provide information on activities relating to water mains and sewers during the report year. Table D6 covers the activities on sewers. The overall increase in activity across the reported lines when compared to AR22 is largely due to new housing and commercial developments being connected.

The total length of sewers has increased from 53,601.91km at AR22 to 54,220.21km for AR23, largely due to the addition of new sewers. Of the total length of sewers, 19,800km relate to sewer laterals, which are either new wastewater house connections added, or 'virtual' connections created in GIS being replaced with more accurate, digitized lateral lengths.

The greatest change in wastewater service activities is a 147.71km (44.2%) increase from 333.91km to 481.62km reported in D6.3 New sewers added during the year. This increase is mainly (68%) due to 100km of sewer laterals being added to the network.

24.2 Performance Trends

D6.1 Total length of sewers – opening balance

The opening balance for sewers on Line D6.1 is 53,601.91km, which is the Table H4.1 Sewers value from AR22.

The confidence grade of B2 remains the same as last year.

D6.3 New sewers added during the year

The length reported has increased by 44%, from 333.9km in AR22 to 481.6km in AR23.

Of the 481.62km of new sewers, 242.0km were due to the increase in the number of connected properties this year, as shown in Table 110 below:

Table 110: Change in the number of connected properties from AR22 to AR23.

	AR22	AR23	Difference
Connected Properties (nr)	2,630,111	2,651,105	20,994

The lengths of connections are taken from digitized laterals in GIS or based on average lateral lengths representative of the different property types in Scotland.

The remaining 239.6km of new sewers is due to newly laid sewers and changes in the existing wastewater network.

The confidence grade of B2 remains the same as last year, as the data quality level has been sustained but not improved.

D6.4 Sewers inspected by CCTV or man entry during the year

In AR23 there was 81.22km of sewers inspected which is an increase of 4.99km from AR22. The increase is due primarily to two large projects - Paisley and Glasgow (approx. 42.5km) and Edinburgh (approx. 20.0km) CCTV phases of performed under the Critical Sewers (MA002) and Non-Critical Sewers (MA014) Management Approaches this year.

The confidence grade of B3 remains the same as last year, as the data quality level has been sustained but not improved.

D6.5 Sewers – renovated

In AR23 a similar length of sewers was renovated as AR22 at 0.59km. Sewers were renovated as part of the sewer rehabilitation programme.

The confidence grade of B2 remains the same as last year, as the data quality level has been sustained but not improved.

D6.6 Sewers - replaced

The sewers were replaced as part of the infrastructure programme in this reporting year has increased from 0.09km in AR22 to 0.75km.

The confidence grade of B2 remains the same as last year, as the data quality level has been sustained but not improved.

D6.7 Abandoned sewers

In AR22 we reported 18.20km of sewers as abandoned. This has increased by 21% (3.8km) in AR23 to 21.94km.

The confidence grade of B2 remains the same as last year, as the data quality level has been sustained but not improved.

D6.7a Other changes to sewers

The length reported is the balancing value to bring the total changes in the year in line with the closing balance reported in Line D6.8. For AR23 the balancing figure has reduced from +182.22km to -158.63km. This length accounts for the necessary updating of networks in GIS during the year that do not reflect physical changes to sewers and the change due to statistically generated laterals being replaced with GIS digitized laterals, which have a more accurate length.

The confidence grade of B2 remains the same as last year, as the data quality level has been sustained but not improved.

D6.8 Total length of sewer - closing balance

This line is a summation of Lines D6.1, D6.3 minus Lines D6.7 and D6.7a. The closing balance for sewers on Line D6.8 is 54,220.22km, compared to 53,601.91km reported in AR22 and is consistent with Line H4.1. Sewer laterals contribute 19,800km to the closing balance.

The confidence grade of B2 remains the same as last year, as the data quality level has been sustained but not improved.

24.3 Data

24.3.1 Data sources and confidence grades

The lengths reported in Table D6 are taken directly from digitised infrastructure in Scottish Water's GIS system unless otherwise stated.

The length reported in 'Other Changes to Sewers' is the balancing value to bring the total changes in the year to the current total length of sewers as reported in **Line H4.1**.

All confidence grades remain as per AR22.

24.3.2 Data improvement programmes

Data is constantly updated in GIS by digitising new development plans and the opportunistic recording of information gathered during operational activities.

24.3.3 Assumptions used for forecast data

There is no forecast data for Table D6.

Section E – Operating Costs and Efficiency

25 Table E3 – PPP project analysis

25.1 Overview

Table E3 and E3a provide details of the 21 Public-Private Partnership (PPP) wastewater treatment works that are managed under nine separate PPP concession agreements. Although listed in E3 Table 1, the assets comprising the Highland and Aberdeen schemes reverted to full Scottish Water ownership and control during 2022.

The assets that form part of each scheme are detailed in Table 111 below.

Table 111: PPP schemes.

PPP Scheme	Wastewater Treatment Works
Highland ⁽¹⁾	Fort William, Inverness
Tay	Hatton
Aberdeen ⁽²⁾	Nigg, Persley, Peterhead, Fraserburgh
Moray Coast	Lossiemouth, Buckie, Banff/Macduff
AVSE	Seafield, Newbridge, East Calder, Blackburn, Whitburn
Levenmouth	Levenmouth
Dalmuir	Dalmuir
Daldowie ⁽³⁾	Daldowie sludge treatment centre
MSI (Ayrshire)	Meadowhead, Stevenston, Inverclyde

Explanatory notes:

(1) Highland PPP expired on 28/05/22 in accordance with the terms of the Concession Agreement.

(2) Aberdeen PPP within the ownership of Scottish Water Horizons Holdings Ltd from December 2018. Original contractual, operational and reporting protocols remained in place up to the Concession Agreement termination on 30/09/22.

(3) Daldowie is a sludge treatment centre only.

25.2 Performance Trends

E3.1 Annual average resident connected population

The resident connected population has remained largely unchanged from the previous year with an increase of 5.22k (0.23%) to 2,247.92k.

Properties connected to the wastewater network are identified in the Geospatial Information system (GIS) and associated to their catchments. Population figures are then calculated from census data. This method is unchanged from last year.

E3.2 Annual average non-resident connected population

Line E3.2 is calculated from tourist property occupation statistics published by Visit Scotland as reported in Lines A2.1 and A2.2.

The total population of 11.80k is similar to last year's population as there were again travel restrictions during the year due to COVID-19 lockdown measures. For comparison, the non-resident connected population prior to lockdown measures in AR21 was 27.1k.

E3.3 Population equivalent of total load received

The Population Equivalent (PE) of total load has increased by 0.89%, which has been mainly driven by increases of 78% in the WwTW Sludge load PE (9.7k) and 4% in the non-household load PE (13.8k). The WwTW sludge increase resulted from a review of the Gemini Sludge Management system reporting process and subsequent data improvements that identified 20 additional WwTWs receiving sludge from septic tanks - these were included in the total load this year. The non-household load PE has increased following the previous two years which were affected by COVID-19 lockdown, but the total PE of 372.7k remains lower than the AR20 PE of 405.4k. For AR23, loads for the Highland and Aberdeen PPP contract PPP areas have been included in both the E3 PPP table and the other E Tables due to the expiration of the PPP agreement during the year.

25.2.1 Lines E3.4-E3.8 - Scope of Works

A breakdown of the scope of the PPP works is detailed in Table 112 below.

Table 112: Sewerage Information (E3.4).

PPP Works	Scope of works
Fort William ⁽¹⁾	Includes 4 pumping stations and associated pumping mains.
Inverness ⁽¹⁾	Includes 4 pumping stations and associated pumping mains/gravity sewers.
Hatton	Includes 16 pumping stations and associated pumping mains/gravity sewers.
Nigg ⁽¹⁾	Includes 14 pumping stations and associated pumping mains/gravity sewers.
Persley ⁽¹⁾	Includes a short section of gravity sewer.
Peterhead ⁽¹⁾	Includes a short section of gravity sewer.
Fraserburgh ⁽¹⁾	Includes 1 pumping station and a section of gravity sewer.
Lossiemouth	Includes 7 pumping stations and extensive pumping mains.
Buckie	Includes 12 pumping stations and extensive pumping mains.
Banff/Macduff	Includes 10 pumping stations and extensive pumping mains.
Seafeld	Includes 7 pumping stations, the Esk Valley trunk sewerage network with associated pumping and a number of storm water works with overflows.
Newbridge	Includes 2 pumping stations, a section of gravity sewer and a storm water works with overflow.
Whitburn	Includes 1 pumping station located within the site boundary.
Levenmouth	Includes 8 pumping stations and associated pumping mains and gravity sewers.
Daldowie	Includes 1 pumping station and a pumping main.
Inverclyde	Includes a short section of gravity sewer.

(1) Contracts expired/terminated during AR23; these sites will be removed in subsequent annual returns

E3.5 - Sewage Treatment

Daldowie does not include sewage treatment as it is exclusively a Sludge Treatment Centre (STC). Permanent sludge treatment facilities are detailed in Table 113 below.

Table 113: Permanent sludge treatment facilities (E3.6).

PPP Permanent Sludge treatment facilities	Details
Inverness ⁽¹⁾	Indigenous sludge, imports from Fort William, plus Scottish Water imports.
Hatton	Indigenous sludge plus Scottish Water imports.
Nigg ⁽¹⁾	Indigenous sludge, imports from Persley, Peterhead and Fraserburgh plus Scottish Water imports.
Lossiemouth	Indigenous sludge, imports from Buckie and Banff/Macduff plus Scottish Water imports.
Seafield	Indigenous sludge, imports from Newbridge, East Calder, Blackburn and Whitburn, plus Scottish Water imports.
Newbridge	Occasional treatment of indigenous sludge, occasional imports from East Calder, Blackburn and Whitburn depending on operational status of Seafield WwTW. Occasional treatment of indigenous sludge, occasional imports from East Calder, Blackburn and Whitburn.
Levenmouth	Indigenous sludge plus Scottish Water imports.
Dalmuir	A permanent sludge treatment facility centrifuges some of the indigenous sludge in order to limit the pass forward of Dalmuir sludge to Daldowie STC to a maximum ferric content of 2 tonnes/day.
Daldowie	Receives sludge from Dalmuir and Scottish Water wastewater treatment works (Daldowie, Shieldhall, Paisley, Dalmarnock and Erskine) by sludge pipeline and from Scottish Water tankered imports.
Meadowhead	Indigenous sludge plus imports from Stevenston and Inverclyde.

(1) Contracts expired/terminated during AR23 these sites will be removed in subsequent annual returns

E3.7 - Terminal Pumping Station

Terminal Pumping Stations are a pumping station that is the final point on the forward flow path from a sewerage network into a wastewater treatment works and may include both pumping of all/partial Flow to Full Treatment (FFT) flows or stormwater flows to storm tanks and/or storm outfalls. The Terminal Pumping Station may form part of the sewerage network (i.e. be remote from the WwTW) or may be associated with a wastewater treatment works depending on actual location and power supply source. It is not a Combined Pumping Station or a Stormwater Pumping Station.

The works detailed in Table 114 below include incoming terminal pumping stations as part of the PPP scheme. Maximum capacity (l/s) of these terminal pumping stations, excluding standby capacity, is given in brackets.

Table 114: Works with terminal pumping stations (E3.7).

PPP Works	Details
Fort William ⁽¹⁾	Caol Transfer (118 l/s), Fort William WwTW (590 l/s).
Inverness ⁽¹⁾	Allanfearn WwTW (50 l/s) This pumping station receives flows from a small part of the catchment.
Hatton	South Balmossie (1,563 l/s), West Haven (110 l/s), Inchcape Park (241 l/s).
Fraserburgh ⁽¹⁾	Fraserburgh Inlet (195 l/s).
Lossiemouth	Duffus Junction (33 l/s), Moycroft (300 l/s).

PPP Works	Details
Buckie	Nook (84 l/s), Shipyard (70l/s), Buckie WwTW (13 l/s).
Banff/Macduff	Craigfauld (552l/s), Banff/Macduff WwTW (222 l/s).
Seafield	A proportion of total flow is delivered via Marine Esplanade Terminal PS (1420 l/s).
Newbridge	A proportion of total flow is delivered via the Ratho Sewer Terminal PS (196 l/s).
Whitburn	A proportion of total flow is delivered via the Harrison Sewer Terminal PS (45 l/s).
Levenmouth	All flow delivered via terminal pumping stations; Methil M2 (125 l/s), Leven (212 l/s), Buckhaven (133 l/s), Levenmouth WwTW inlet FFT flows (1,650 l/s), Levenmouth WwTW inlet storm flows (2,347 l/s).

(1) Contracts expired/terminated during AR23 these sites will be removed in subsequent annual returns

E3.8 – Other

There are no works in the category 'Other.'

25.2.2 Lines E3.9–E3.14 - Effluent consent standards

Where an effluent consent standard (Lines E3.9-3.13) includes both Controlled Activities Regulations (CAR) and Urban Wastewater Treatment Directive (UWWTD) elements the stricter standard is given in the Annual Return. The effluent consent standards, based on data from the current SEPA licences, are summarised as:

- Suspended solids consent (E3.9) – All CAR
- BOD consent (E3.10) – All UWWTD, except Newbridge, East Calder, Blackburn and Whitburn which are CAR parameters
- COD consent (E3.11) – All UWWTD
- Ammonia consent (E3.12) – All CAR
- Phosphate consent (E3.13) – All CAR

At Newbridge, East Calder, Blackburn and Whitburn the CAR consent is expressed as 'mean concentration of total phosphorus of any series of instantaneous samples taken at regular but randomised intervals in any period of 12 months'.

Please note: The AR22 submission for lines E3.9 (Meadowhead) and E3.10 and 11 (all sites) was not correct and did not match the AR21 submission. This has now been corrected and is realigned with the AR21 submission.

E3.14 - Compliance with effluent consent standards

BOD, COD, SS, ammonia, and phosphate are reported for each works, based on the total number of sample results and exceedances (upper and lower tier) for sanitary determinands (to the exclusion of other parameters that may be included in the SEPA consent). Where an effluent consent standard includes both CAR and UWWTD standards both sets of samples are used for the calculation of compliance.

Percentage compliance is calculated as:

$$(1 - (\text{total number of failures} / \text{total number of samples})) \times 100$$

The Operator Self-Monitoring (OSM) results for the period ending 31 December 2022, downloaded from Power BI, have been taken as the definitive data source and, as such, it has been assigned a confidence grade of A1.

Failures and exceedances at Scottish Water PPP sites are listed in E3 Table 5 below. A comparison of these is shown in the following two tables (Table 115 and Table 116) which show a decrease in the number of exceedances from 3 to 1 and no failures in either year.

The SEPA Licences generally contain two tiers of numerical standards. A 'Failure' can be considered as a gross breach of Licence (the Upper Tier) which would result in a Failing classification for the year ahead. An 'Exceedance' is a lower grade breach, a sample result that sits between Lower and Upper Tier boundaries. The Licence permits a small number of these breaches without affecting regulatory compliance. Any result below the Lower Tier limit is a compliant sample.

Table 115: Exceedances and Failures 2022.

Site	CAR/UWWTD standards	Parameter	Exceedance (E) / Failure (F)	
Blackburn	CAR	BOD	E	02/02/2022

Table 116: Exceedances 2022 vs 2021.

Site	CAR/UWWTD standards	Parameter	2022	2021
Nigg	UWWTD	COD		1
Lossiemouth	UWWTD	BOD		1
Lossiemouth	UWWTD	COD		1
Blackburn	CAR	BOD	1	

Table 117: Failures 2022 vs 2021.

	CAR/UWWTD standards	Parameter	2022	2021
*			-	-

* No Failures recorded in 2021 or 2022, therefore table intentionally blank

Blackburn WwTW

The Blackburn exceedance (BOD) on 2 February 2022 was linked to issues with the motor drive gearbox on biofilter 7 (EPI reference EPI-015028-Q1Y0V6). The failure of the gearbox caused the biofilter arm to stop rotating and, until the biofilter was isolated, resulted in settled wastewater flushing through the media bed without distributed irrigation across the bed. This resulted in a BOD final effluent result of 19mg/l versus a Lower Tier limit of 10mg/l, Upper Tier limit 40mg/l.

25.2.3 Lines E3.15-E3.21 Treatment works category

Information contained in the lines on treatment works category (Lines E3.15-E3.21) is extracted from the project agreements and is given a confidence grade of A1.

- Primary (E3.15) – all plants except Persley, Lossiemouth, Buckie, Banff/Macduff, Levenmouth and Meadowhead
- Secondary activated sludge (E3.16) - includes all plants except Blackburn
- Secondary biological (E3.17) - Blackburn
- Tertiary A1 (E3.18) – summarised in Table 118
- Tertiary A2 (E3.19) – summarised in Table 119
- Tertiary B1 (E3.20) - no plants sit in this category
- Tertiary B2 (E3.21) – summarised in the Table 120

Table 118: Tertiary A1 – Activated sludge process (E3.18).

Site	Treatment Process Details
East Calder	Nitrifying filters
Whitburn	Nitrifying filters
Dalmuir	Nitrifying filters

Table 119: Tertiary A2 – Activated sludge process (E3.19).

Site	Treatment Process Details
Persley ⁽¹⁾	UV disinfection
Fraserburgh ⁽¹⁾	UV disinfection
Levenmouth	Densadeg lamella settlement tanks
Newbridge	Low head loss sand filters
East Calder	Disc filters
Whitburn	Low head loss sand filters.
Meadowhead	Biofors tertiary filter.

(1) Contracts expired/terminated during AR23, these sites will be removed in subsequent annual returns

Table 120: Tertiary B2 – biological sludge process (E3.21).

Site	Treatment Process Details
Blackburn	Disc filters.

25.2.4 Lines E3.22 to E3.32 - Sewerage data

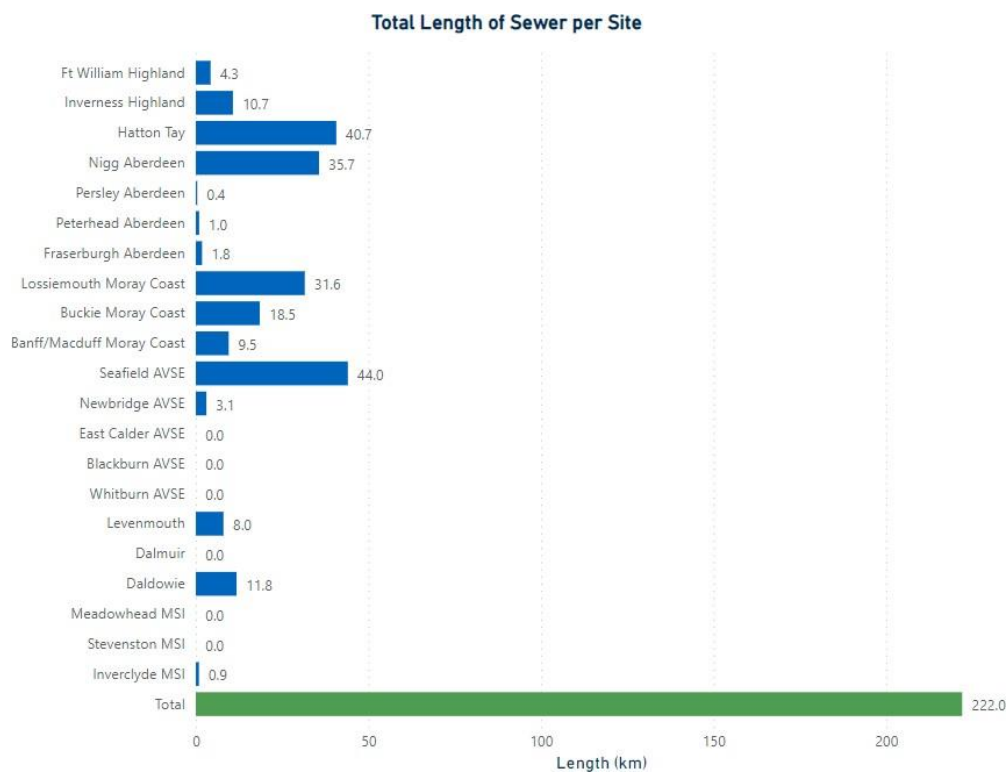
The sewerage data includes all sewerage (sewers, pumping stations, rising mains, outfalls and long sea outfalls).

Data sources include - Concession Agreements, Operator O&M manuals, Operator asset inventories, Scottish Water Geospatial Information system (GIS), as built drawings and SEPA consents. Pump capacity (kW) has been obtained from motor drive rating, not the pump duty point.

E3.22 Total length of sewer

The total length of outfalls, unless noted otherwise, is included in the overall length of sewers/pipelines. Where terminal pumping stations are located remote from a wastewater treatment works, the length of rising main connecting the terminal pumping station and wastewater treatment works is included. Further detail capturing the Total length of sewer per site has been included within the below chart, Figure 55.

Figure 55: Total length of sewer per site for AR23.



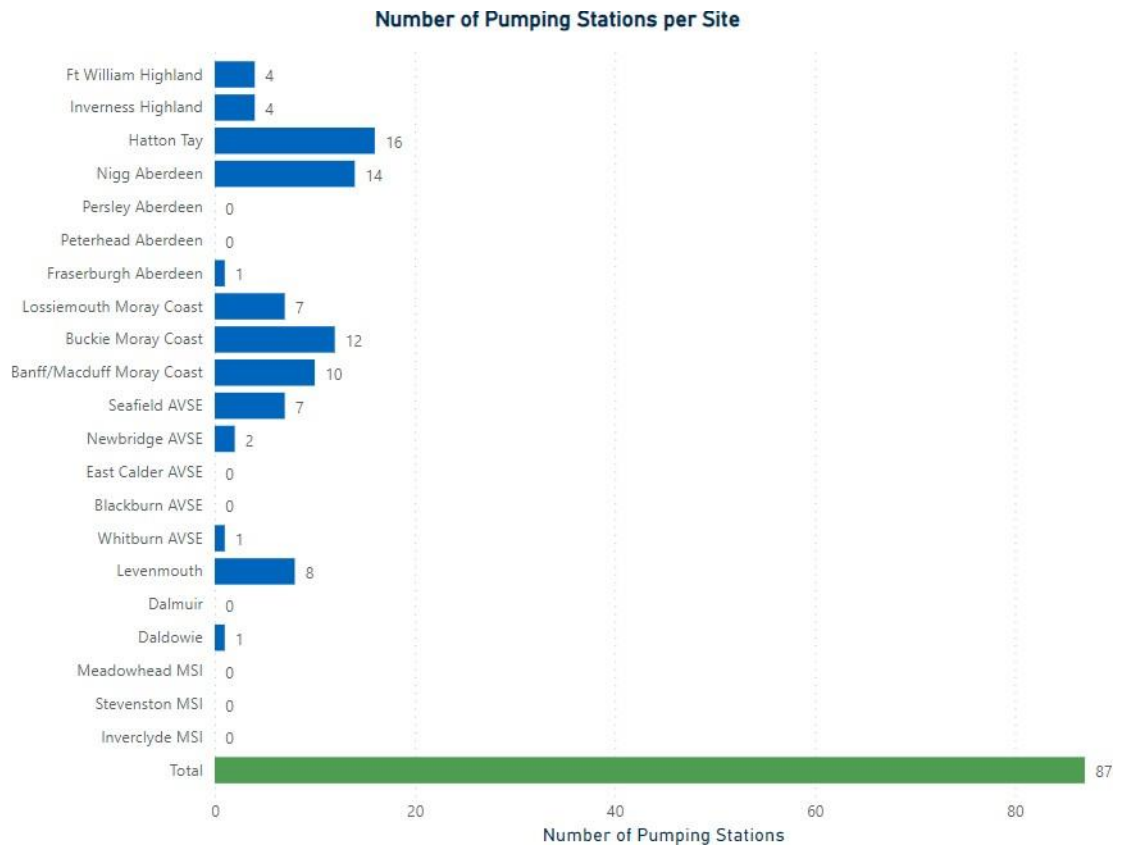
E3.23 Total length of critical sewer

All PPP sewers (including relief sewers, rising mains and CSO outfalls) are deemed to be critical.

E3.24 Number of pumping stations

Includes stormwater, combined and terminal pumping stations. Interstage and final effluent pumping stations forming part of a wastewater treatment plant are not included. Further information capturing the Number of pumping stations per site has been included within Figure 56 below.

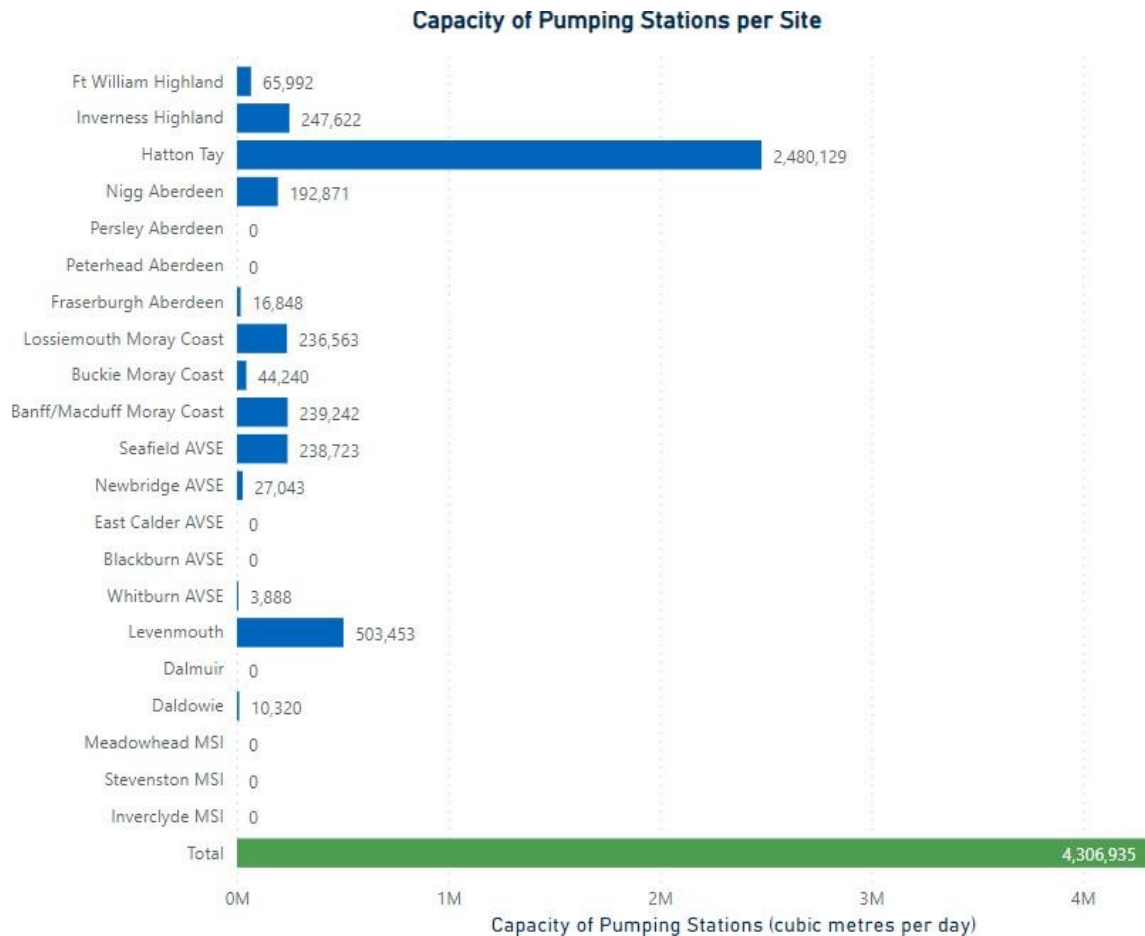
Figure 56: Number of pumping stations per site for AR23.



E3.25 Capacity of pumping stations (m³/d)

Includes stormwater, combined and terminal pumping stations. Maximum flow pumped forward per day. This excludes capacity of standby pumps. Further information capturing the Capacity of pumping stations per site has been included within Figure 57 below.

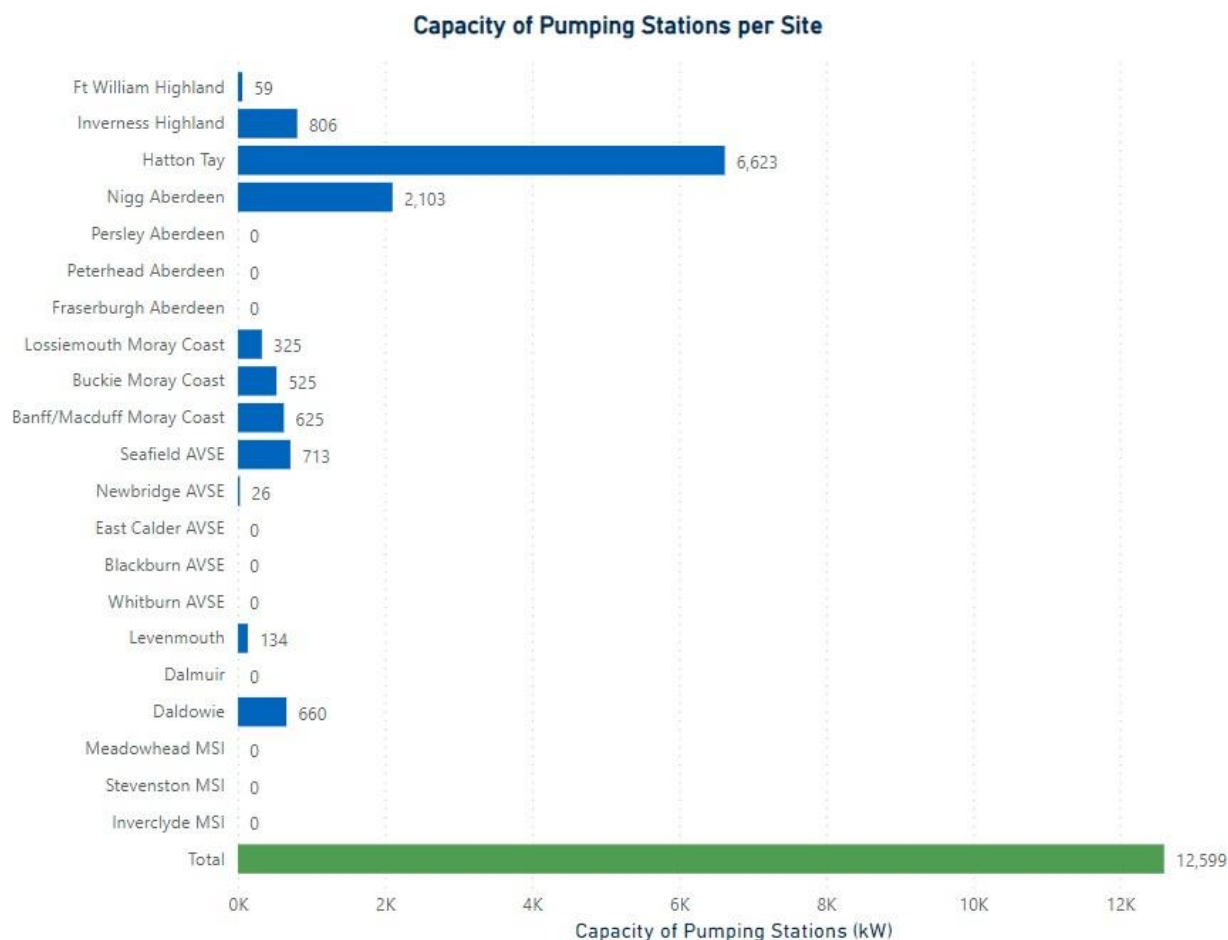
Figure 57: Capacity (m³/d) of pumping stations per site for AR23.



E3.26 Capacity of pumping stations (kW)

Includes stormwater and combined pumping stations, but not terminal pumping stations. Includes capacity of standby pumps. Further information capturing the Capacity of pumping stations per site has been included within Figure 58 below.

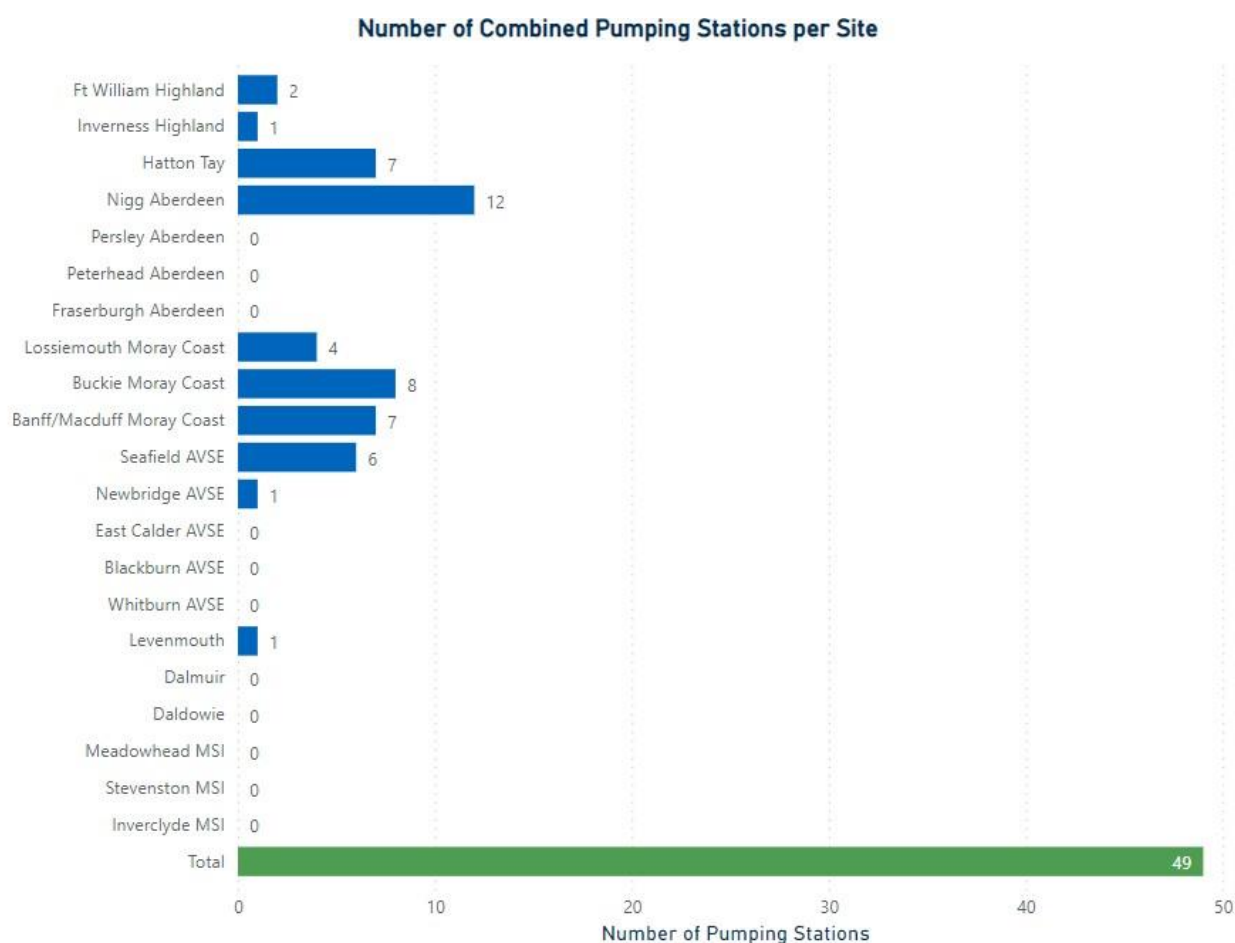
Figure 58: Capacity (kW) of pumping stations per site for AR23.



E3.27 Number of combined pumping stations

Combined pumping station means a network wastewater pumping station containing a pump or pumps transferring wastewater and surface drainage within the downstream sewerage network. The transferred wastewater flow rate from the combined pumping station is known as the FFT rate, the generally accepted term used in design and SEPA consents. For the sake of clarity, where storm water storage tank returns are pumped back into the sewerage system for onward flow, this shall be classed as a combined pumping station (as such flows become part of FFT). Terminal pumping stations are not included. Further information capturing the Number of combined pumping stations per site has been included within Figure 59 below.

Figure 59: Number of combined pumping stations per site for AR23.



The combined pumping stations listed in Table 121 below are included.

Table 121: Combined pumping stations (E3.27).

Site	Description
Fort William ⁽¹⁾	Blar Mhor, Caol No1
Inverness ⁽¹⁾	Longman
Hatton	Riverside, KGV, Stannergate, West Ferry, Broughty Castle, Fort Street, Gray Street
Nigg ⁽¹⁾	Downies, Portlethen Village, Newtonhill Clifftop, Portlethen South, Backies, Cowie (3), Slughead, Bridge of Muchalls, Cammachmore, Portlethen North
Lossiemouth	Burghead, Cummingston, Hopeman, Moycroft
Buckie	Portgordon West, Portgordon East, Seatown, Cluny, Cullen East, Portknockie, Findochty, Portessie
Banff/Macduff	Whitehills, Whitehills Harbour, Inverboyndie, Scotstown, Castlehill Park, Union Road, Bankhead
Seafeld	Wallyford Transfer, Wallyford SWW, Portobello SWW, Harelaw SWW, Dalkeith SWW, Mayshade SWW*
Newbridge	Broxburn SWW
Levenmouth	Methil M1

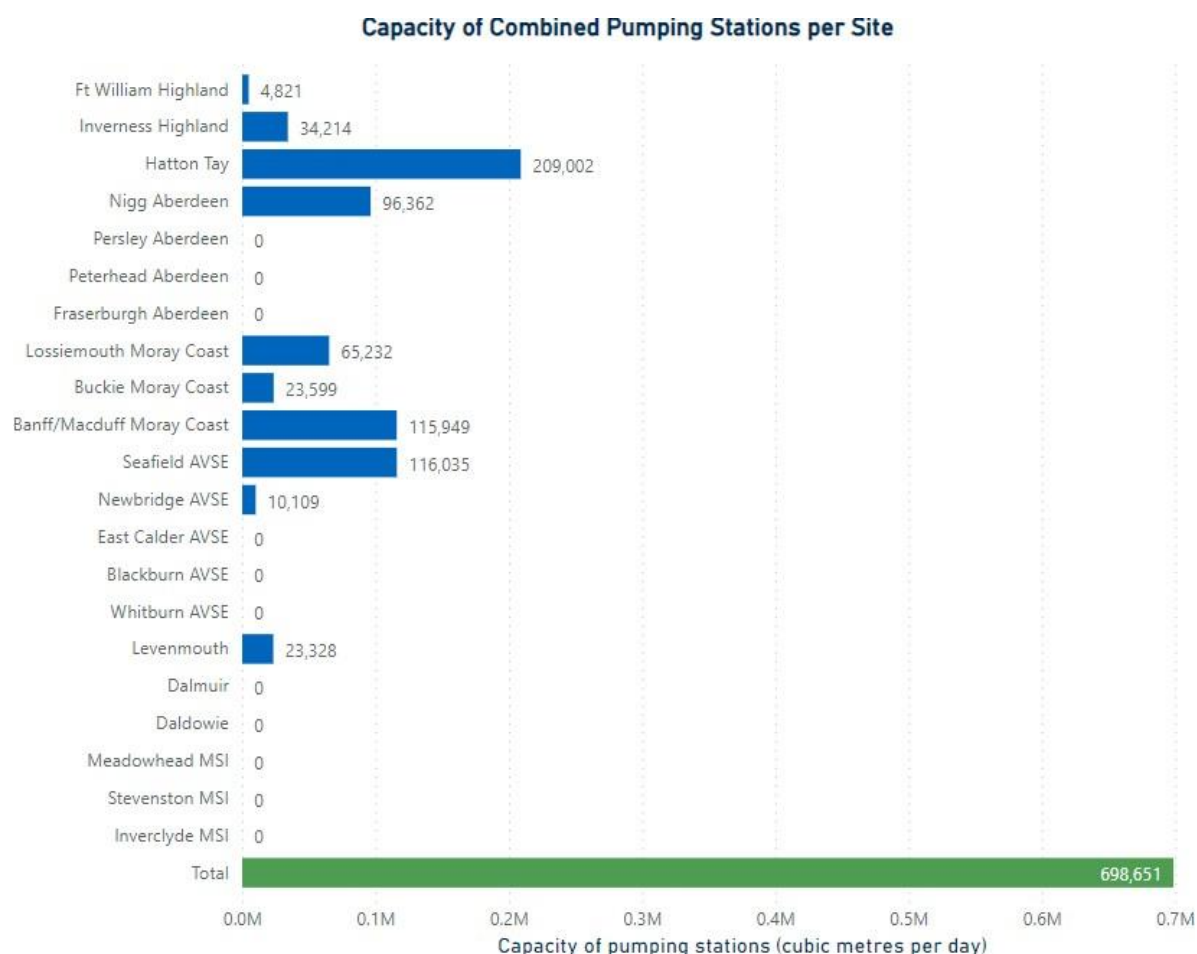
(1) Contracts expired/terminated during AR23 these sites will be removed in subsequent annual returns

*Mayshade SWW: pumping station comprises a separate duty/standby pump set in two separate storm tanks. As only one duty pump operates at any one time (ie storm tank 1 emptied before commencing emptying of storm tank 2) these four pumps have been entered as a single combined pumping station on a 1 duty/3 standby basis.

E3.28 Capacity of combined pumping stations (m³/d)

Maximum flow pumped forward per day. This excludes capacity of standby pumps. Further information capturing the Capacity of combined pumping stations per site has been included within Figure 60 below.

Figure 60: Capacity (m³/d) of combined pumping stations per site for AR23.



E3.29 Number of stormwater pumping stations

Stormwater pumping station means a network wastewater pumping station containing a pump or pumps transferring wastewater, containing stormwater, to a stormwater storage tank or storm overflow. The stormwater pumping station transfers wastewater in excess of FFT, the generally accepted term used in design and SEPA consents. For the sake of clarity, the function of the stormwater pumping station is to prevent and/or limit surcharging of the upstream sewerage system. Further information capturing the Number of storm water pumping stations per site has been included within Figure 61 below.

The stormwater pumping stations in Table 122 below are included.

Figure 61: Number of storm water pumping stations per site for AR23.

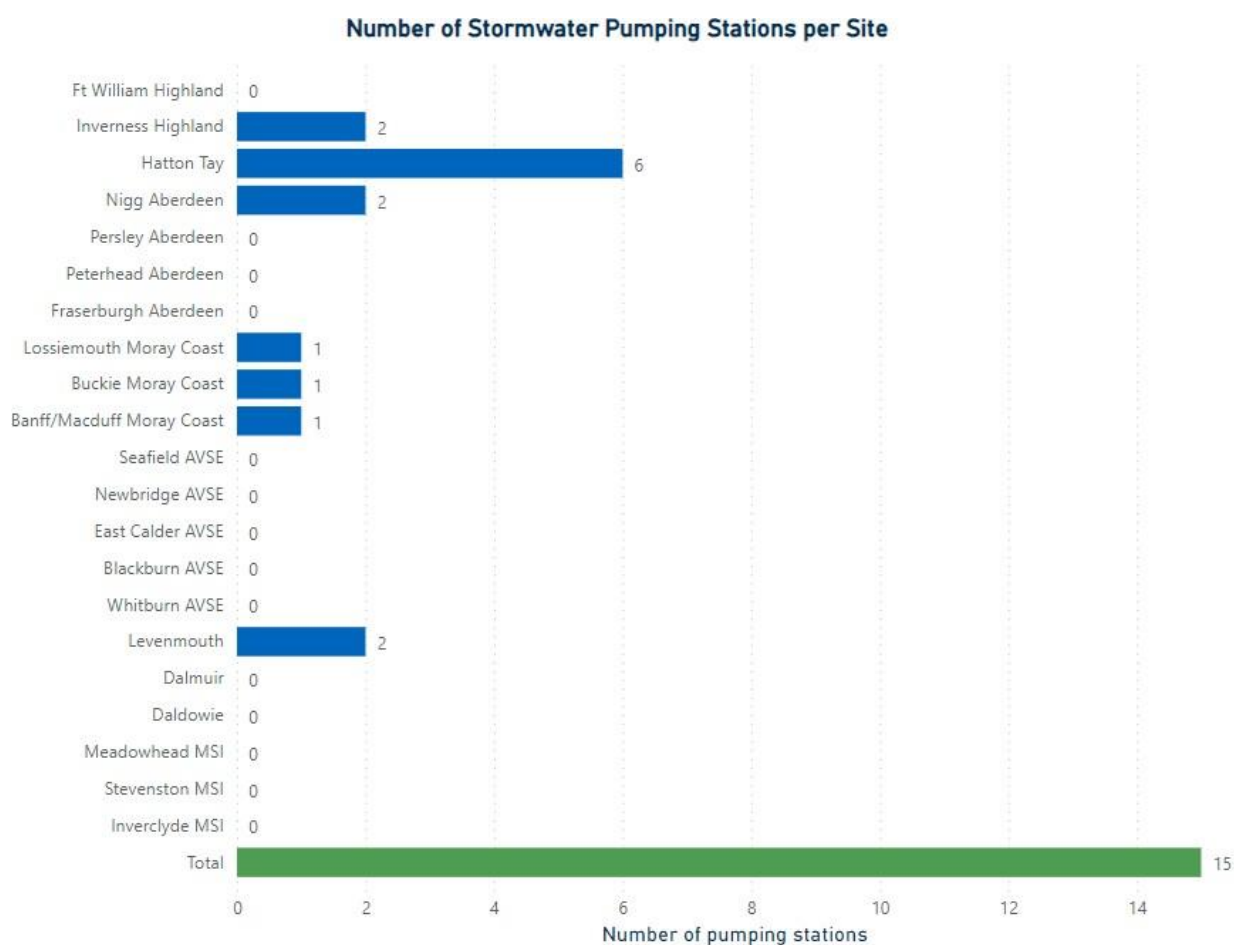


Table 122: Stormwater pumping stations (E3.29).

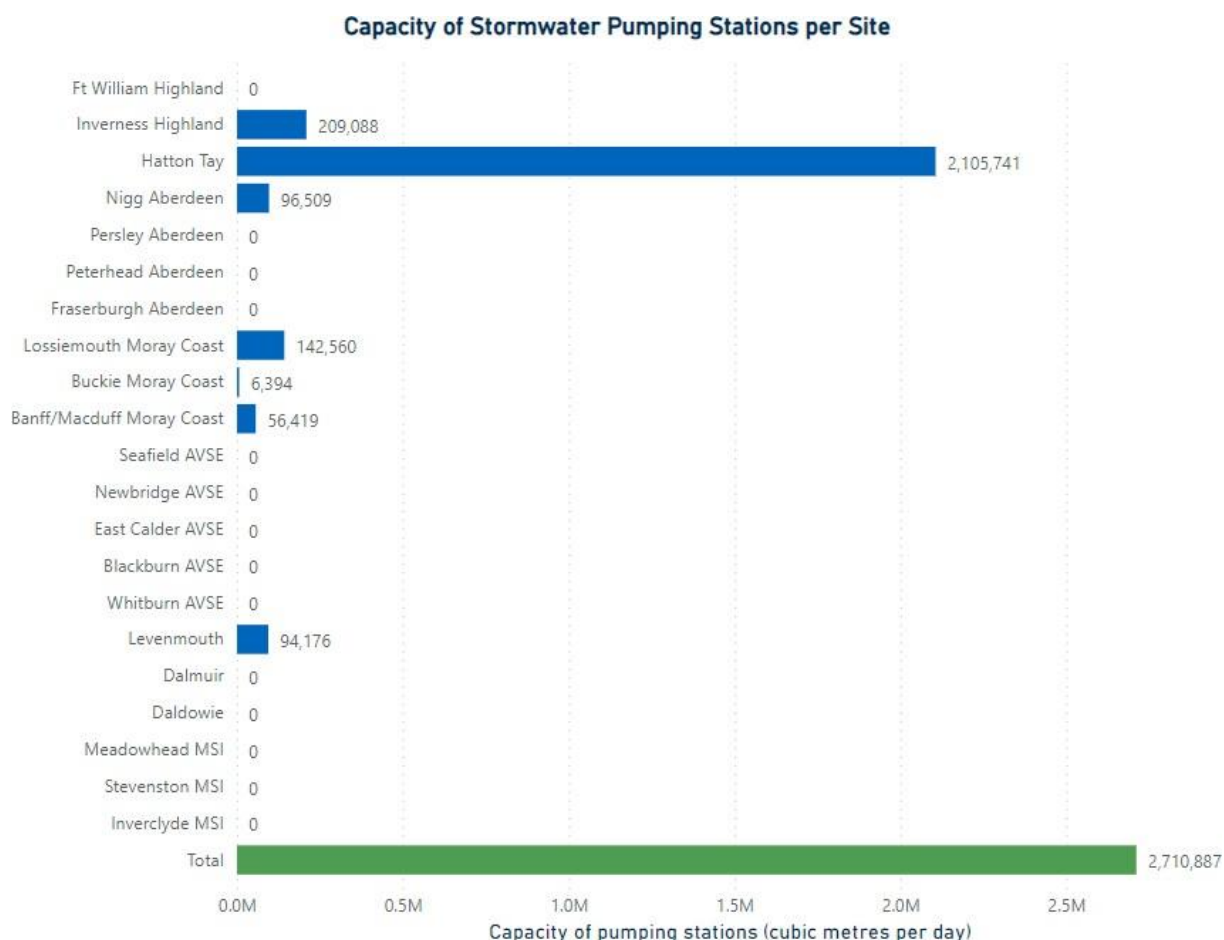
Site	Description
Inverness ⁽¹⁾	Longman (2)
Hatton	Riverside, KGV, Stannergate, Westhaven, Broughty Castle, Inchcape Park
Nigg ⁽¹⁾	Backies (2)
Lossiemouth	Moycroft
Buckie	Portessie
Banff/Macduff	Bankhead
Levenmouth	Leven, Roundall

(1) Contracts expired/terminated during AR23, these sites will be removed in subsequent annual returns

E3.30 Capacity of stormwater pumping stations (m³/d)

Maximum flow pumped forward per day. This excludes capacity of standby pumps. Further information capturing the Capacity of stormwater pumping stations per site has been included within Figure 62 below.

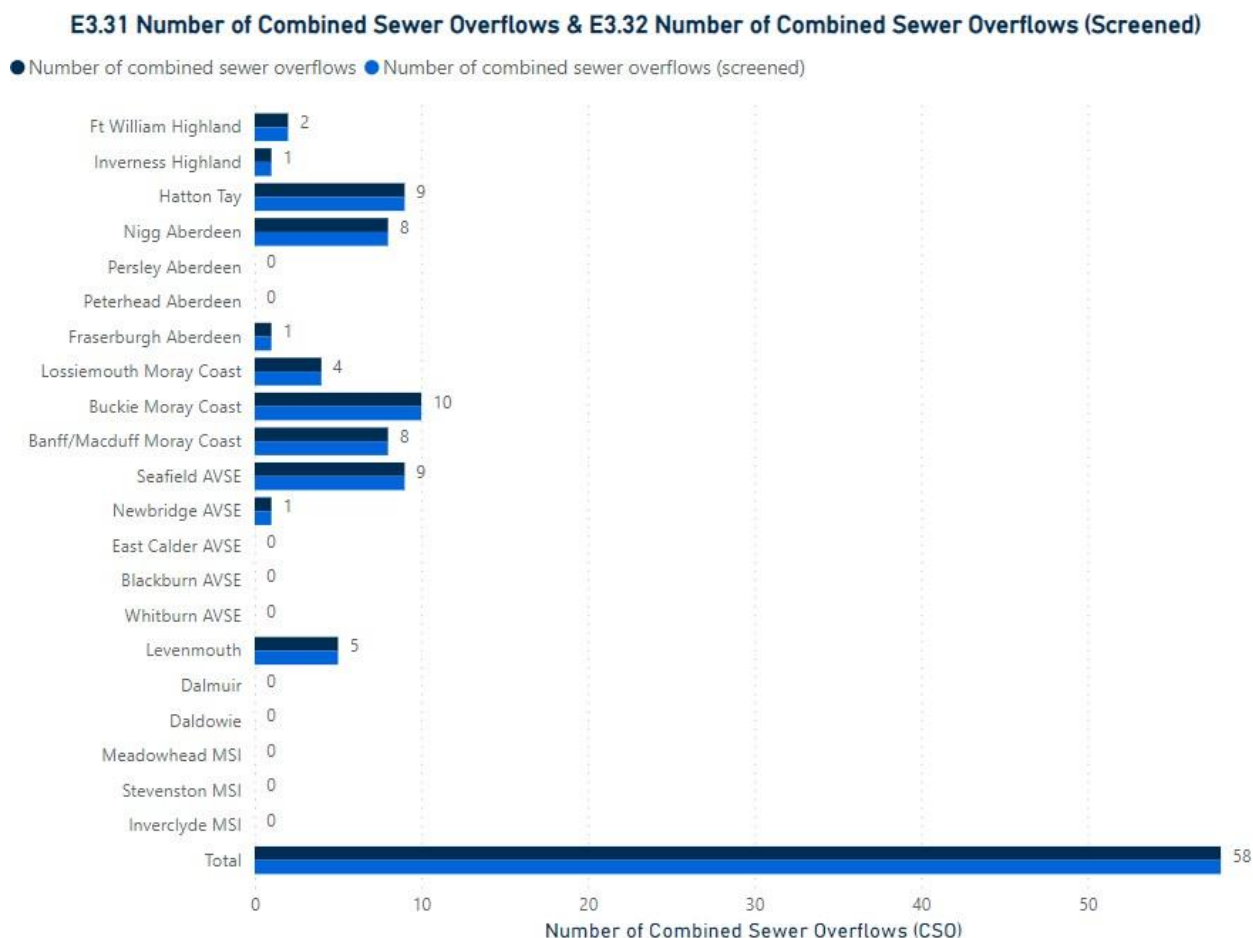
Figure 62: Capacity (m³/d) of stormwater pumping stations per site for AR23.



25.2.5 Lines E3.31 - Number of combined sewer overflows & E3.32 - Number of combined sewer overflows (CSO) (screened)

CSOs that overflow within the sewerage system rather than to an outfall discharging direct to the environment are not included. Further information capturing the Number of combined sewer overflows and the Number of combined sewer overflows (CSO) screened per site has been included within the chart below.

Figure 63: Number of combined sewer overflows and combined sewer overflows screened per site for AR23



The CSOs in Table 123 are included.

Table 123: List of CSOs (E3.31).

Site	Description
Fort William ⁽¹⁾	Caol No1, Caol Transfer
Inverness ⁽¹⁾	Longman
Hatton	Riverside, KGV, Stannergate, South Balmossie, Westhaven, Broughty Castle, Inchcape Park, Panmurefield/Balmossie Mill (2)
Nigg ⁽¹⁾	Downies, Portlethen Village, Newtonhill Clifftop, Backies (2), Cowie, Portlethen North, Nigg
Fraserburgh ⁽¹⁾	Fraserburgh Inlet (Watermill)
Lossiemouth	Burghead, Cummingston, Hopeman, Moycroft
Buckie	Portgordon West, Portgordon East, Seatown, Cluny, Nook, Cullen East, Portknockie, Findochty, Portessie, Shipyard
Banff/Macduff	Whitehills, Whitehills Harbour, Inverboyndie, Scotstown, Castlehill Park, Union Road, Bankhead, Craigfauld
Seafeld	Wallyford, Dalkeith*, Hardengreen, Harelaw, Haverall Wood, Middlemills, Newbattle, Newtongrange, Suttieslea*
Newbridge	Broxburn
Levenmouth	Buckhaven, Methil M2 CSO2**, Methil CSO1**, Leven, Roundall

(1) Contracts expired/terminated during AR23 these sites will be removed in subsequent annual returns

*Seafield - Dalkeith SWW consists of two separate screen overflows on two separate legs of the sewer which combine at the SWW. As each screened overflow is located on the same site and feeds one common storm water tank and outfall, this overflow has been recorded as a single CSO. Suttieslea: 'Copa Sac,' (equivalent to 6 mm screen), provided on outfall from storm tank.

**Levenmouth - Methil CSO1 and Methil M2 CSO2 discharge into a common outfall.

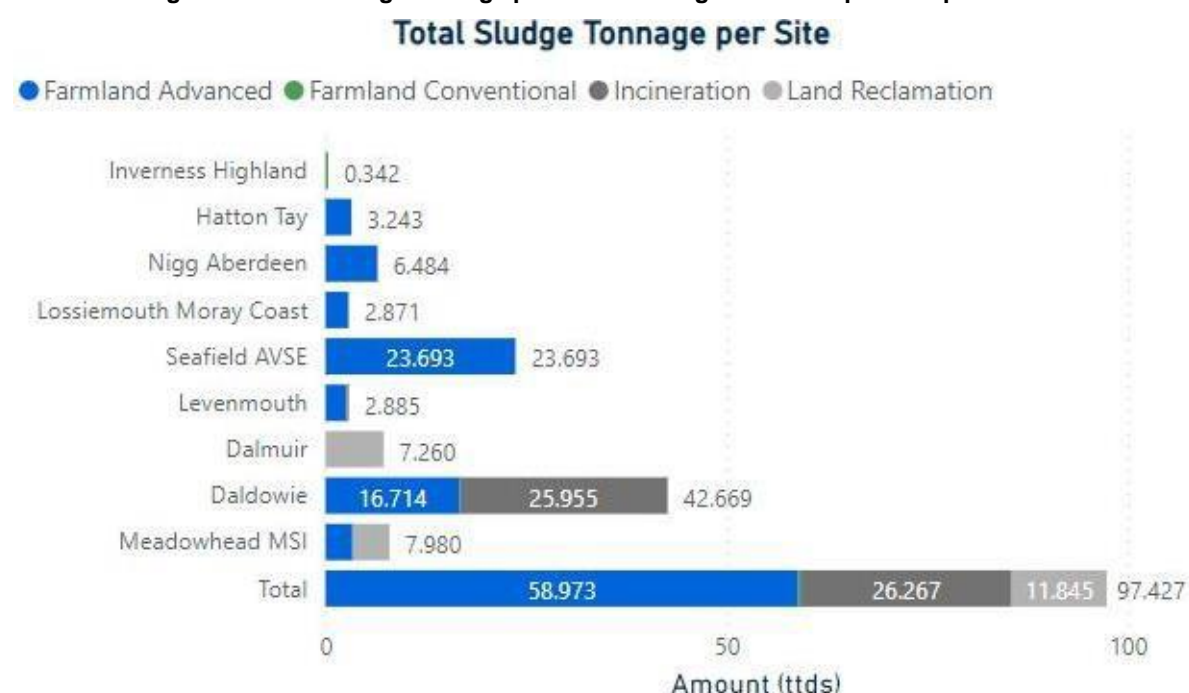
25.2.6 Lines E3.33-E3.40 Sludge Treatment and Disposal Data

The quantities reported are the total sludge tonnages prior to the sludge treatment process. This is in accordance with the methodology used in England & Wales. The information is based on PPP Company records of sludge disposed to the appropriate route.

To be consistent with other PPP works, Allanfearn sludge quantities disposed of by Scottish Water are included in Table E3 and the corresponding costs are included in Table E3a.

Further information capturing the total sludge tonnages prior to the sludge treatment process per site has been included within Figure 64 below, and captures data concerning Advanced Farmlands, Conventional Farmlands, Incinerations, and Land Reclamations as the Sludge treatment and disposal input is zero for the remaining lines.

Figure 64: Total sludge tonnage prior to the sludge treatment process per site for AR23.



For Daldowie the data comes from the PFI operator and is used for contract payment purposes and therefore is validated so a confidence grade of B3 is given. The confidence grade allocated to the other sludge disposal data is B4 as this is not associated with payment and therefore not subject to the same level of contractual validation.

E3.36 Incineration

99% of sludge to incineration came from Daldowie PFI. This data has been allocated a confidence grade of B3 given that:

- The data comes from the PFI operator and is used for contractual payment purposes and therefore is validated in accordance with Scottish Water procedures

- The data provided by the PFI operator is in the form of tonnes of wet sludge and some back calculation is required in order to translate this to tonnes of dry solids as requested in the AR table.

The confidence grade allocated to the data relative to Levenmouth is B4 as this is not associated to payment and therefore not validated, however this is only applicable to 1% of the overall submission (see Table 124 below). We therefore consider the overall confidence grade of B3 to be appropriate and consistent with previous Annual Returns.

Table 124: Sludge treatment and disposal data E3.36 Incineration.

Scheme	CG	ttds	% of total
Levenmouth	B4	0.312	1%
Daldowie	B3	25.955	99%
Total	B3	26.267	

25.3 Data

25.3.1 Date Sources

Data sources and confidence grades for Table E3 remain the same as AR22.

25.3.2 Date Improvement Programmes

There have been no notable data improvement programmes in AR23.

25.3.3 Forecast Data

There is no forecast data for the E3 Table.

26 Table E3a – PPP cost analysis

26.1 Overview

Table E3a provides operating costs for each scheme. As actual data is not available, all costs have been extracted from the relevant contractual financial models. Where the financial models do not split costs into specific categories the following has been assumed:

Works with a Sludge Centre: 72% Wastewater Treatment Costs, 28% Sludge Costs.

All other works: 80% Wastewater Treatment Costs, 20% Sludge Costs. These sludge costs have been allocated to the sludge treatment centre where the sludge is treated, e.g. Stevenston sludge costs appear against Meadowhead sludge centre.

The cost split was reviewed in detail and agreed with WICS' auditor in May 2007 and has not been subject to further discussion since that date.

26.2 Performance Trends

The changes between AR23 and AR22 for Scottish Water cost and for annual charges are summarised below.

E3a.24 Total Scottish Water cost

- The sum of Scottish Water general and support expenditure, and Scottish Water SEPA Charges (Lines E3a.5-E3a.6, E3a.12-E3a.13, and E3a.20-E3a.21)
- Confidence grade for total charges is A1 (see Table 125 below), but because Scottish Water PPP department costs and internal recharges must be split across all sites a confidence grade of C4 has been allocated.

Table 125: Summary of changes in Scottish Water cost from AR22 to AR23.

Site	AR23 £m	AR22 £m	Variance £m	Costs lower than previous year	Costs higher than previous year
Ft William	0.017	0.008	0.009		AR23 includes higher legal/consultants costs £0.005m, higher other Scottish Water operating costs £0.003m, higher Activity Based Management (ABM) support costs £0.001m,
Inverness	0.410	0.984	-0.574	AR23 includes lower legal/consultants fees £0.096m, lower other Scottish Water operating costs £0.046m, lower sludge tankering and disposal costs £0.427m, and lower ABM support costs £0.006m,	AR23 includes higher terminal pumping costs £0.001m,
Hatton	0.475	0.399	0.076	AR22 included terminal pumping costs £0.009m,	AR23 includes higher other Scottish Water operating costs £0.012m, higher sludge tankering costs £0.068m, and higher ABM support costs £0.005m,
Nigg	0.711	1.414	-0.703	AR23 includes lower other Scottish Water operating costs £0.209m, lower sludge tankering costs £0.478m, and lower	

Site	AR23 £m	AR22 £m	Variance £m	Costs lower than previous year	Costs higher than previous year
				ABM support costs £0.016m,	
Persley	0.006	0.011	-0.005	AR23 includes lower other Scottish Water operating costs £0.005m,	
Peterhead	0.003	0.009	-0.006	AR23 includes lower other Scottish Water operating costs £0.005m, and lower ABM support costs £0.001m,	
Fraserburgh	0.004	0.009	-0.005	AR23 includes lower other Scottish Water operating costs £0.004m, and lower ABM support costs £0.001m,	
Lossiemouth	0.405	0.259	0.146		AR23 includes higher legal/consultants fees £0.005m, higher other Scottish Water operating costs £0.052m, higher sludge tankering costs £0.081m, and higher ABM support costs £0.008m,
Buckie	0.013	0.016	-0.003	AR23 includes lower other Scottish Water operating costs £0.003m,	
Banff/Macduff	0.021	0.021	-		
Seafield	-0.031	0.187	-0.218	AR23 includes lower legal/consultants fees £0.181m, lower other Scottish Water operating costs £0.018m, lower ABM support costs £0.019m,	
Newbridge	0.025	0.024	0.001		AR23 includes higher ABM support costs £0.001m,
East Calder	0.011	0.010	0.001		AR23 includes higher other Scottish Water operating costs £0.001m,
Blackburn	0.004	0.005	-0.001	AR23 includes lower other Scottish Water operating costs £0.001m,	
Whitburn	0.006	0.007	-0.001	AR23 includes lower other Scottish Water operating costs £0.001m,	
Levenmouth	0.349	0.360	-0.011	AR23 includes lower legal/consultants fees £0.011m, higher other Scottish Water operating costs £0.007m,	AR23 includes higher ABM support costs £0.007m,
Dalmuir	2.023	2.074	-0.051	AR23 includes lower other Scottish Water operating costs £0.143m, lower Scottish Water sludge disposal costs £0.101m,	AR23 includes higher legal/consultants fees £0.147m, and higher ABM support costs £0.046m,
Daldowie	4.135	3.500	0.635	AR23 includes lower other Scottish Water operating costs £0.238m,	AR23 includes higher legal/consultants fees £0.150m, higher Shieldhall centrifuging costs £0.057m, higher sludge

Site	AR23 £m	AR22 £m	Variance £m	Costs lower than previous year	Costs higher than previous year
					tankering costs £0.661m, and higher ABM support costs £0.005m,
Meadowhead	0.735	0.788	-0.053	AR23 includes lower legal/consultants fees £0.007m, lower other Scottish Water operating costs £0.125m,	AR23 includes higher terminal pumping and inlet headworks costs £0.077m, and higher ABM support costs £0.002m,
Stevenston	0.513	0.361	0.152		AR23 includes higher other Scottish Water operating costs £0.024m, higher inlet headworks costs £0.126m, and higher ABM support costs £0.002m,
Inverclyde	0.561	0.466	0.095		AR23 includes higher other Scottish Water operating costs £0.024m, higher terminal pumping and inlet headworks costs £0.070m, and higher ABM support costs £0.001m,
TOTAL	10.396	10.912	-0.516		

E3a.26 Annual charge

This data is based on the service fees for the year, provisions and business rates (including rebates). Expenditure is taken from the Scottish Water P&L.

The data relative to the annual charges for each of the PPP schemes has been allocated a confidence grade of A1, with the exception of the data relative to annual charges for the individual sites included in the AVSE PPP scheme (Seafeld, Newbridge, East Calder, Blackburn and Whitburn). These have been allocated a confidence grade of B3 as the AVSE operator annual charges are based on the total flows from the AVSE PFI rather than for each of the individual sites. The data therefore has to be disaggregated for AR reporting purposes and the allocation of charges to each site is not validated.

The data relative to the total annual charge for the AVSE PPP in its entirety has been allocated a confidence grade of A1 as it is validated, therefore we consider the overall confidence grade of A1 for the line to be appropriate.

The changes in Annual Charge from AR22 to AR23 are summarised in Table 126, including the details shown in Figure 65 below.

Figure 65: Change in annual charge (£M) per site from AR22 to AR23.

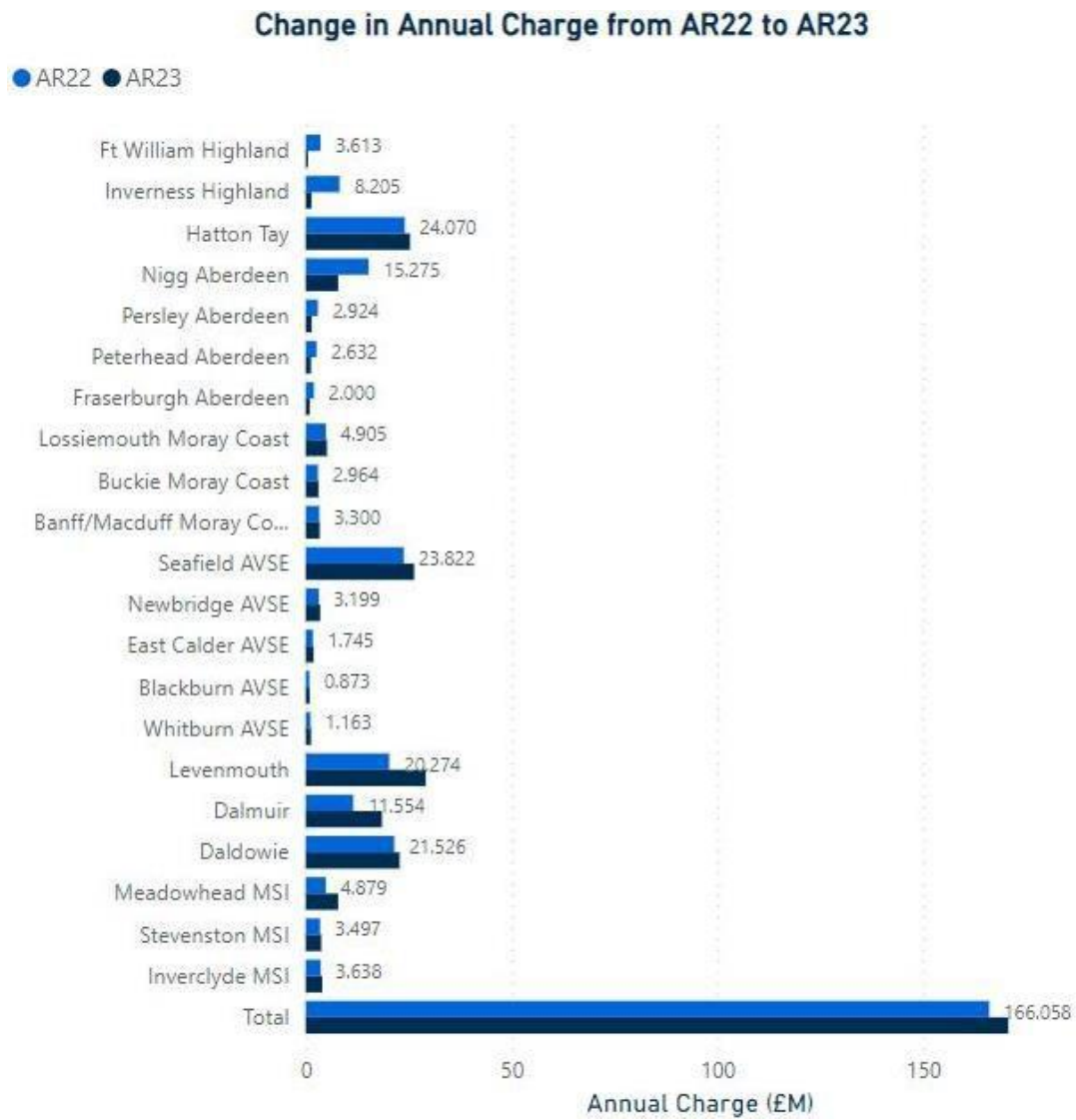


Table 126: Summary of changes in Annual Charge from AR22 to AR23.

Site	AR23 £m	AR22 £m	Variance £m	Costs lower than previous year	Costs higher than previous year
Ft William	0.545	3.613	-3.068	AR23 lower fees due to contract ending 28/05/22 £3.128m	AR23 inflation £0.042m, lower penalties £0.012m, lower release of accruals £0.006m
Inverness	1.402	8.205	-6.803	AR23 lower fees due to contract ending 28/05/22 £7.066m	AR23 inflation £0.1m, lower penalties £0.068m, lower release of accruals £0.095m
Hatton	25.346	24.070	1.276	AR23 lower flows £0.079m, higher release of accruals £0.030m	AR23 inflation £1.329m, AR23 higher additional works £0.056m
Nigg	7.883	15.275	-7.392	AR23 lower fees £8.972m and lower electricity costs £0.028m due to contract ending 30/09/22	AR23 inflation £0.51m, lower penalties £0.148m, lower business rates rebate £0.92m, lower release of accruals £0.030m
Persley	1.450	2.924	-1.474	AR23 lower fees £1.645m due to contract ending 30/09/22	AR23 inflation £0.119m, lower penalties £0.02m, lower business rates rebate £0.029m, lower release of accruals £0.003m
Peterhead	1.264	2.632	-1.368	AR23 lower fees £1.474m due to contract ending 30/09/22	AR23 inflation £0.099m, lower business rates rebate £0.006m, lower release of accruals £0.001m
Fraserburgh	0.978	2.000	-1.022	AR23 lower fees £1.15m due to contract ending 30/09/22	AR23 inflation £0.079m, lower penalties £0.017m, lower business rates rebate £0.029m, lower release of accruals £0.003m
Lossiemouth	5.151	4.905	0.246	AR23 higher release of accruals £0.060m	AR23 inflation £0.275m, higher sludge imports £0.009m, lower penalties £0.022m
Buckie	3.100	2.964	0.136	AR23 higher release of accruals £0.042m	AR23 inflation £0.171m, lower penalties £0.007m
Banff/Macduff	3.400	3.300	0.100	AR23 higher penalties £0.018m, higher release of accruals £0.051m	AR23 inflation £0.169m
Seafeld	26.355	23.822	2.533	AR23 lower business rates £0.064m, higher release of accruals £0.059m	AR23 based on 100% compliance with the contract plus inflation £1.972m, higher Seafeld Odour Improvement project costs £0.310m, Potential claim: NC Landfill tax to March 2023 £1.075m
Newbridge	3.521	3.199	0.322		
East Calder	1.920	1.745	0.175		
Blackburn	0.960	0.873	0.087		
Whitburn	1.280	1.163	0.117		
Levenmouth	29.163	20.274	8.889	AR23 higher release of accruals £0.175m	AR23 inflation, driven by UK Natural Gas Index, £8.424m*, higher flows £0.593m, higher Odour Project costs £0.031m, higher uninsurability Cost £0.016m
Dalmuir	18.508	11.554	6.954	AR23 lower insurance £0.033m, 21/22 included Fine Screen Renewal Sum £0.445m	AR23 base tariff change and inflation £1.880m, lower flows £0.114m, higher Annual Operations Compensation £0.621m, higher Capital Project opex £1.340m, higher additional works £0.027m, higher New Capital Investment costs £0.040m, higher business rates £0.010m, lower release of accruals £3.4m
Daldowie	22.800	21.526	1.274	AR23 lower additional works £0.025m, lower excess ragging £0.1m, higher release of accruals £1.292m	AR23 higher sludge volumes £0.484m, inflation £2.149m, higher necessary change costs £0.053m, business rates £0.005m
Meadowhead	7.888	4.879	3.009	AR23 higher UPM change rebate £0.2m	AR23 inflation £0.427m, higher gas cost £0.730m, higher business rates £5k, lower release of accruals £2.047m
Stevenston	3.775	3.497	0.278	AR23 lower release of accruals £0.041m	AR23 inflation £0.181m, higher flows/fees £0.134m, higher business rates £0.004m
Inverclyde	4.022	3.638	0.384		AR23 inflation £0.208m, higher flows/fees £0.051m, higher business rates £0.002m, lower release of accruals £0.123m
TOTAL	170.711	166.058	4.653		

* The Levenmouth PFI project tariff is subject to an annual increment linked to a basket of indices comprising the Average Earnings Index, UK Natural Gas Index and the Retail Price Index (all items).

26.3 Data

26.3.1 Lines E3a.1, E3a.8 and E3a.16 Estimated annual direct operating costs

These are based on the Concessionaire's financial model adjusted for actual inflation:

- The Highland PPP Contract expired 28 May 2022. The Concessionaire's financial model does not include any operating costs for AR23. As such, no costs are included in the table.
- The Aberdeen PPP Contract was terminated 30 September 2022. The table includes costs for this period.

Where the model specifically identified sums for rates and SEPA charges these have been deducted from that figure, otherwise the actual amount charged was deducted.

No adjustments were made at AVSE (for Rates), Daldowie (for Rates), and MSI (SEPA and Rates) as charges are paid by Scottish Water and are not included in the financial model. At Dalmuir, Scottish Water pays these charges, but amounts are also included in the financial model therefore an adjustment to the model costs is made (Rates and SEPA charges included in the model are refunded to Scottish Water).

An adjustment has been made to include the direct operational expenditure of the Dalmuir NTF and sludge treatment costs. 76% of the total fee is considered direct operational expenditure. This is further broken down to account for the ammonia treatment which is 84% of the ammonia fee and is allocated to wastewater treatment (Line E3a.8). The remainder is allocated to sludge treatment (Line E3a.16).

Additional cost for the operation of the Seafield Odour Project is also included, from AR18, with wastewater treatment (Line E3a.8).

During AR20 one of the traders discharging trade effluent through Scottish Water's inlet reached agreement with the Meadowhead PPP operator to discharge directly into the WwTW which resulted in reduced costs to Scottish Water. This reduction of cost for the operation of the Meadowhead WwTW is included, from AR21 onwards, with wastewater treatment (Line E3a.8) and sludge treatment (Line E3a.16).

Actual costs are not known and could vary considerably from the contractual financial model. A confidence grade of D6 has therefore been used. A confidence grade of A3 was allocated to the Dalmuir sludge treatment costs as there is some visibility of these costs.

26.3.2 Lines E3a.2, E3a.9 and E3a.17 Rates paid by the PPP Contractor

These are based on the rateable value and poundage published on the government website (www.saa.gov.uk). Rates paid by two-step.

also included and are based on actual charges for the year (Dalmuir, Daldowie, MSI, AVSE).

Confidence grade for total rates paid for each site is A2, but because rates must be split to take account of the sewerage, treatment and sludge elements, a lower confidence grade has been applied (see Table 127).

Table 127: Confidence grades for total rates paid.

	E3a.2	E3a.9	E3a.17	
Site	Sewerage	Sewage Treatment	Sludge Treatment	Comment on confidence grade
Fort William	N	B3	N	No sludge centre at works, sludge cost moved to Inverness
Inverness	N	B3	B3	Cost distribution is estimated
Hatton	N	B3	B3	Cost distribution is estimated, based on the Financial Model
Nigg	N	B3	B3	Cost distribution is estimated, based on the Financial Model
Persley	N	B3	N	No sludge centre at works, sludge cost moved to Nigg
Peterhead	N	B3	N	No sludge centre at works, sludge cost moved to Nigg
Fraserburgh	N	B3	N	No sludge centre at works, sludge cost moved to Nigg
Lossiemouth	N	B3	B3	Cost distribution is estimated, based on the Financial Model
Buckie	N	B3	N	No sludge centre at works, sludge cost moved to Lossiemouth
Banff/Macduff	N	B3	N	No sludge centre at works, sludge cost moved to Lossiemouth
Seafield	N	B3	B3	Cost distribution is estimated, based on the Financial Model
Newbridge	N	B3	B3	Cost distribution is estimated, based on the Financial Model
East Calder	N	B3	N	No sewerage and no sludge centre at works, sludge cost moved to Newbridge
Blackburn	N	B3	N	No sewerage and no sludge centre at works, sludge cost moved to Newbridge
Whitburn	N	B3	N	No sludge centre at works, sludge cost moved to Newbridge
Levenmouth	N	B3	B3	Cost distribution is estimated
Dalmuir	N	B3	N	No sludge treatment centre in the conventional sense – intermittent sludge thickening as operational need, no imports
Daldowie	N	N	A2	No sewage treatment at works
Meadowhead	N	B3	B3	Cost distribution is estimated
Stevenston	N	B3	N	No sewerage and no sludge centre at works, sludge cost moved to Meadowhead
Inverclyde	N	B3	N	No sludge centre at works, sludge cost moved to Meadowhead

26.3.3 Lines E3a.3, E3a.10 and E3a.18 SEPA charges paid by the PPP Contractor

Cost allocation is as per the relevant SEPA invoices for AR23.

The confidence grades have been assigned as per Table 128 below.

Table 128: CGs for PPP Contractor SEPA charges.

	E3a.3	E3a.10	E3a.18	
Site	Sewerage	Sewage Treatment	Sludge Treatment	Comment on confidence grade
Fort William	AX	A2	N	No sludge centre at works
Inverness	N	A2	A2	No separate cost for sewerage
Hatton	A2	A2	A2	
Nigg	N	A2	A2	No separate cost for sewerage
Persley	N	A2	N	No separate cost for sewerage, no sludge centre at works
Peterhead	N	A2	N	No separate cost for sewerage, no sludge centre at works
Fraserburgh	N	A2	N	No separate cost for sewerage, no sludge centre at works
Lossiemouth	A2	A2	N	No subsistence charge included in invoices
Buckie	A2	A2	N	No sludge centre at works
Banff/Macduff	A2	A2	N	No sludge centre at works
Seafield	A2	A2	A2	
Newbridge	A2	A2	N	No WML charge included in invoice
East Calder	N	A2	N	No sewerage and no sludge centre at works
Blackburn	N	A2	N	No sewerage and no sludge centre at works
Whitburn	N	A2	N	No sewerage and no sludge centre at works
Levenmouth	A2	A2	A2	
Dalmuir	N	N	A2	Only WML fees paid by the PFI Co
Daldowie	N	N	A2	Sludge treatment only
Meadowhead	N	N	A2	Only WML fees paid by the PFI Co

26.3.4 Lines E3a.4, E3a.11, E3a.19 and E3.23 Total Direct Costs - Total of E3a.1-E3a.3, E3a.8-E3a.11 and E3a.16-E3a.18.

Confidence grade for Total direct cost is D6 as per E3a.1, E3a.8 and E3a.16 (Estimated direct operating cost) as this is the most significant element of Total Direct Cost. A confidence grade of A3 was allocated to the Dalmuir sludge treatment costs as there is some visibility of these costs.

26.3.5 Lines E3a.5, E3a.12 and E3a.20 Scottish Water general and support expenditure

This includes:

- Costs such as advisors and legal costs, power, rent and insurance and the cost of the Scottish Water PPP department which administers PPP projects. Costs have been allocated to projects, relative to the operational costs at each site. Costs are as per the Profit & Loss (P&L).

- Scottish Water's costs of sludge disposal from Inverness, inter-site sludge tankering and terminal pumping costs (where tankering or pumping has taken place between a Scottish Water works and a PFI site) and additional support costs.

The confidence grade for total charges is A1, but because Scottish Water PPP department costs must be split across all sites, and all charges have to be split to take account of the sewerage, treatment and sludge elements, the following confidence grades have been assigned (see Table 129 below).

Table 129: Confidence grades for total charges.

	E3a.5	E3a.12	E3a.20	Comment
Site	Sewerage	Sewage Treatment	Sludge Treatment	Comment on confidence grade
Fort William	CX	C4	N	Network cost very small, no sludge centre at works
Inverness	C4	C4	C4	
Hatton	C4	C4	C4	
Nigg	C4	C4	C4	
Persley	CX	C4	N	Network cost very small, no sludge centre at works
Peterhead	CX	C4	N	Network cost very small, no sludge centre at works
Fraserburgh	CX	C4	N	Network cost very small, no sludge centre at works
Lossiemouth	C4	C4	C4	
Buckie	C4	C4	N	No sludge centre at works
Banff/Macduff	C4	C4	N	No sludge centre at works
Seafeld	C4	C4	C4	
Newbridge	CX	C4	C4	Network cost very small
East Calder	N	C4	N	No sewerage and no sludge centre at works
Blackburn	N	C4	N	No sewerage and no sludge centre at works
Whitburn	CX	C4	N	Network cost very small, no sludge centre at works
Levenmouth	C4	C4	C4	
Dalmuir	N	C4	A3	No sewerage
Daldowie	C4	N	C4	No sewage treatment at works
Meadowhead	N	C4	C4	No sewerage
Stevenston	N	C4	N	No sewerage and no sludge centre at works
Inverclyde	CX	C4	N	Network cost very small, no sludge centre at works

A confidence grade of A3 was allocated to the Dalmuir sludge treatment costs as there is some visibility of these costs.

26.3.6 Lines E3a.6, E3a.13 and E3a.21 Scottish Water SEPA Charges

With the exception of Dalmuir and MSI, all CAR License SEPA charges are paid for by the PPP Company and are included in the tariff rates (see Table 130 below)

Costs are as per the P&L and reflect charges as invoiced by SEPA.

Table 130: Confidence grades for Scottish Water SEPA charges.

	E3a.6	E3a.13	E3a.21	Comment
Site	Sewerage	Sewage Treatment	Sludge Treatment	Comment on confidence grade
Dalmuir	N	A2	N	Treatment cost only, sludge (WML) costs are paid by the PFI Co
Meadowhead	N	A2	N	Treatment cost only, sludge (WML) costs are paid by the PFI Co
Stevenston	N	A2	N	No sewerage and no sludge centre at works
Inverclyde	BX	A2	N	No sludge centre at works

Table 130, above, only includes sites where SEPA fees are paid by Scottish Water.

26.3.7 Lines E3a.7, E3a.14 and E3a.22 Total sewerage cost, total sewage treatment cost, total sludge treatment costs and disposal costs

- Confidence grade is D6 as per Lines E3a.1, E3a.8 and E3a.16 (estimated direct operating cost) as this is the most significant element of the cost.
- A confidence grade of A3 was allocated to the Dalmuir sludge treatment and disposal costs as there is some visibility of these costs.

E3a.15 Estimated terminal pumping cost

- Reported costs are as per the costs incurred for the Scottish Water operated terminal pumping stations.
- Where the terminal pumping station is part of the PPP scheme the costs are met by the Concessionaire and are included in the tariff rates and not reported as part of Line E3a.15.

E3a.25 Total operating cost

Confidence grade for total operating cost is D6 as per Line E3a.23 Total direct cost, as this is the most significant element of total operating cost.

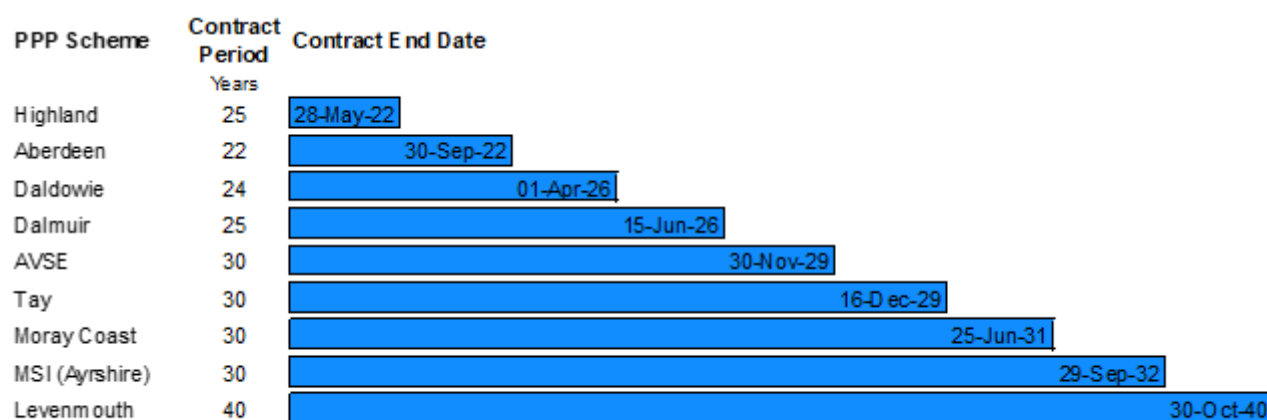
E3a.27 Public sector capital equivalent values

Values were derived from the base model incorporated in a report to the Transport and Environment Committee on 21 June 2001, adjusted for inflation. At Daldowie the PPP cost was used in the absence of a Public Sector Capital Equivalent (PSCE) value; similarly, for Levenmouth and AVSE the values have been taken from AR02.

E3a.28 Contract period and E3a.29 Contract end date

The period quoted and the contract end date are as defined in the Contract. Aberdeen has been updated to reflect contract termination 30 September 2022. Further details highlighting the contract period and the contract end dates per site have been captured within the below visual, Figure 66.

Figure 66: PPP scheme contract period and contract end dates.



Data Improvement Programmes

There have been no notable data improvement programmes in AR23.

26.3.8 Forecast Data

There is no forecast data for Table E3a.

27 Table E4 – Water resources and treatment

27.1 Overview

Table E4 provides information on operating costs and efficiencies relating to water resources and treatment. It covers:

- Source types
- Peak demand and pumping head
- Resources and treatment costs
- Water treatment works by process type
- Water treatment works by size band

There is a difference in the sites reported in the E and H tables. The sources in E4 are only included if they are direct sources, as per the definition document, as the lines report the distribution input from each source in columns 110-140. Table E only reports assets that are operational (including emergency) during the year.

Table H3 reports all assets that are operational, emergency, out of service or work in progress (as classified in the Works & Asset Management system (Ellipse)), at the end of the year. Line H3.3 raw water aqueducts are infrastructure assets that are sourced from Scottish Water's Geospatial Information system (GIS) and have no equivalent asset in the E4 table.

27.2 Performance Trends

27.2.1 Lines E4.1-E4.7 - Source Types

Source Type and **Operational Status** are derived from the Works & Asset Management system (Ellipse), with additional manipulation and classification to determine which sources feed direct to WTWs as well as to check status of a small number of emergency sources each year.

Number of Sources: As per original WICS guidance for Table E, a source is defined as an independent raw water supply to a treatment works. Only sources which feed directly to the treatment works are counted, so any indirect sources are not included. Standby or mothballed sources from which no water has been obtained in the year should not be included in the number of sources. As a result of this particular definition of sources counted for Table E4, the number of sources should not be expected to match any other source counts included elsewhere in the Annual Return (e.g. Table H3 which reports all direct and indirect source assets that are operational, emergency, out of service or work in progress at the end of the year.)

Average Daily Output data is exported from the corporate Distribution input (DI) reporting system (Z-One) - refer to Table A2 commentary for more detail on this data as required.

As in previous years, we have completed columns 110–140 by assuming that, where multiple sources feed a WTW, the total average daily output comes only from the primary source. The primary source is therefore allocated 100% of the DI and all other sources are allocated 0%.

There are 8 WTWs where the primary source is already assigned as the primary source to another WTW (conjunctive use sources). In order to ensure all WTW DI totals are included, the DI volume for these WTWs is manually re-assigned to the appropriate 'duplicate' conjunctive source entry for the WTW. For example, Megget Reservoir primarily feeds to Glencorse WTW but is also assigned as the primary source for Marchbank and Bonnycraig WTWs.

Generally, raw water supply sources catchments and the WTWs they supply are located within the same region. However, the following four WTWs are supplied from outside their region:

- Daer WTW: Source and WTW are in South Region, but a small proportion of the Daer WOA crosses over into West Region.
- Balmore WTW: Sources and WTW are in West Region, but there are four different WOAs supplied from Balmore; 3 of which are in the South Region (Balmore & Carron Valley WOA, Balmore South Region Nith WOA, Balmore South Region Tweed WOA).
- Afton WTW: Source and WTW are in West Region, but it supplies a small area in South Region (Afton South Region WOA).
- Turret WTW: Source and WTW are in East Region, but it also supplies areas in West Region (Turret West Region WOA).

Since Average Daily Outputs are derived from WTW's DI, the cross-boundary flow is accounted for and assigned to the region within its treatment rather than abstraction. This is consistent with the historic methodology.

The confidence grade for the number of sources (columns 10-40) is assessed as B1:

- Reliability band is B; changes to source and WTW status are based on data from the corporate Works & Asset Management system (Ellipse) but requires some additional manipulation / interpretation to arrive at final data, e.g., classification of Direct vs Indirect status.
- Accuracy band for number of sources is 1 (accuracy range less than +/- 1%).

The confidence grade for the average daily output of these sources (columns 110-140) is assessed as B2 (in line with reported confidence grade for Table A2, unchanged from previous year).

The overall confidence grade assigned for Table E4 lines 1-5 is therefore B2 as this is the lower of the two confidence grades described above.

The confidence grade for Table E4 lines 6-7 (Bulk water exports and imports) is AX as Scottish Water does not have any raw water exports or imports to other water companies.

The overall number of direct sources has reduced by two, from 269 to 267. As shown below in Table 131, the reduction in source count is due to two sources which are no longer in use but due to availability of other sources feeding their respective WTWs, the abandoned status of these sources was not previously identified clearly. These issues were identified through data cleansing checks. The two sources are Stein Burn (Waternish WTW) and Crathie Riverside (Crathie WTW).

Table 131: Change in number of sources from AR22 to AR23.

	AR22 No. of sources	269
Additions	N/A	0
Reductions	Data cleansing (sources abandoned before AR23)	2
	AR23 No. of sources	267

Compared to last year, Distribution Input has decreased by 1.435 MI/d to 1835.519 MI/d. AR23 saw notably high DI during the winter freeze period in December 2022. However, summer 2022 weather-driven DI peaks were lower overall compared to the July 2021 heatwave period. Changes to DI this year are detailed in Table 132 below:

Table 132: Change in distribution input from AR22 to AR23.

Source Type	AR22	AR23	Net Change
	Ml/d		
Impounding reservoirs	1351.717	1357.015	5.298
Lochs	21.380	21.500	0.120
River and burn abstractions	390.866	384.003	-6.863
Boreholes	72.991	73.001	0.010
Total	1836.954	1835.519	-1.435

27.2.2 Lines E4.13-E4.14 Peak Demand and Pumping Head

The Peak Demand in E4.13 for the AR23 period was 2019.15Ml/d with a Peak to Average ratio of 1.100, which is higher than AR22 (1.078). The peak week was recorded during the winter freeze period in the week ending 25/12/2022, as mentioned in the commentary for E4.1-7. The confidence grade of C3 remains the same as last year.

The Average Pumping head reported in **Line E4.14** is correspondingly marginally higher this year at 27.534m (compared to 27.512m in AR22). The figure reported in AR22 was 27.5 as it was required to be reported to 1dp. The confidence grade of C4 remains the same as last year.

27.2.3 Lines E4.15-E4.39 Functional costs by operational area, process and size band

E4.19 Water Resources & Treatment

	Total
Functional expenditure:	£m
2022/23	77.958
2021/22	63.795
Variance	<u>(14.163)</u>

Water resources and treatment costs increased by £14.2m (22%) from 2021/22 reflecting the following key movements:

- £2.9m increase in employment costs primarily driven by pay inflation of c. 6%, increased overtime to maintain supplies during periods of more extreme dry weather and higher levels of resources utilised on water resource and treatment activities.
- £8.8m increase in materials and consumables costs primarily due to chemical price inflation.
- £1.2m increase in other direct costs primarily due to increased transport costs arising from fuel price inflation, higher vehicle repair & maintenance costs and high levels of tankering to maintain water supplies during periods of more extreme dry weather; and
- £1.2m increase across general and support costs impacted mainly by general price inflation, for example on digital contracts.

Analysis of water resources and treatment costs by region:

	North	East	South	West	Direct	General and Support	Total
Functional expenditure:	£m	£m	£m	£m	£m	£m	£m
2022/23	13.385	18.225	13.611	22.014	67.235	10.723	77.958
2021/22	12.050	15.486	10.670	16.026	54.232	9.563	63.795
Variance	(1.335)	(2.739)	(2.941)	(5.988)	(13.003)	(1.160)	(14.163)

Minor changes to the numbers of WTW by process type and size band have arisen as a result of operational changes and process re-classifications in WTW during 2022/23. Re-stating 2021/22 figures on like-for-like basis shows the following variations:

Analysis of water resources and treatment costs by process type:

	2022/23	2021/22	Variance
Process Type	£m	£m	£m
SD : Simple Disinfection	1.553	1.287	(0.266)
W1 : SD plus simple physical or chemical treatment	0.317	0.206	(0.111)
W2 : Single stage complex physical or chemical treatment	12.536	9.706	(2.830)
W3 : Multiple stage complex treatment, excluding W4	47.169	37.885	(9.284)
W4 : Very high cost treatment Process	5.660	5.149	(0.511)
Direct	67.235	54.233	(13.002)
General and Support	10.723	9.562	(1.161)
Total	77.958	63.795	(14.163)

Analysis of water resources and treatment costs by size band:

	2022/23	2021/22	Variance
Size band	£m	£m	£m
<=1 MI/d	8.231	7.147	(1.084)
>1 to <=2.5 MI/d	3.493	2.877	(0.616)
>2.5 to <=5 MI/d	4.478	4.135	(0.343)
>5 to <=10 MI/d	5.766	4.664	(1.102)
>10 to <=25 MI/d	11.660	8.764	(2.896)
>25 to <=50 MI/d	11.442	10.238	(1.204)
>50 to <=100 MI/d	10.041	7.597	(2.444)
>100 to <=175 MI/d	7.659	5.527	(2.132)
>175 MI/d	4.465	3.284	(1.181)
Direct	67.235	54.233	(13.002)
General and Support	10.723	9.562	(1.161)
Total	77.958	63.795	(14.163)

The allocation of costs by size band has remained broadly consistent with 2021/22.

Costs which are directly attributable to abstraction and treatment are charged to the specific asset cost code in the General Ledger, either via direct charging, Ellipse timesheets or work orders. Of the £67.2m total direct resource and treatment costs, £53.0m of costs or 78.9% have been directly charged to assets in our corporate costing system.

Other costs have been allocated to Water Resources and Treatment through ABM support activity allocation, e.g. stores based on number of issues, IT applications based on number of users, etc. Therefore, support costs are allocated on a resource consumed basis. However, many of these costs are not specific to an asset; they are generally attributable to an employee. Consequently, the majority of these support costs have been allocated to the activities the employees have been completing.

Confidence grades on Table E4 are consistent with grades in the general E table commentary and remain consistent with 2021/22.

27.2.4 Lines E4.20-27 Water Treatment Works by Process Type

There are 229 Water Treatment Works reported for AR23 which is a net reduction of two from AR22. One site was added, and three removed as shown in Table 133 below.

Table 133: Water Treatment Works Additions and Removals.

Plant No	Site Description	Added/Removed	Process Type
WTW000020	BARCLYE WTW 1972 NX395696	Removed	SD
WTW000457	TOMATIN WTW 1987 NH803276	Removed	SD
WTW000501	GALLOWHILL WTW 1993 NJ678637	Removed	W3
WTW000833	BONNYCRAIG WTW 2022 NT251389	Added	W3

Three Water Treatment Works had significant changes to treatment processes during the AR23 reporting period. The WIC E Grade at Tarbert Argyll WTW was changed to W4 to reflect the inclusion of the newly installed MIEX Ion Exchange Process. Bunessan WTW had its E Grade changed from W4 to W3 due to the removal of final carbon filtration in the treatment process and improved membrane treatment. Laggan Bridge WTW changed from W1 to W4 due to UV installation for Cryptosporidium deactivation.

The corresponding categories of process type were amended to reflect these changes in treatment process this year. These changes are detailed in Table 134 below.

Table 134: Changes in treatment process.

Plant No	Site Description	AR22 Process Type	AR23 Process Type
WTW000032	BUNESSAN WTW 1996 NM404212	W4	W3
WTW000240	TARBERT ARG WTW 1993 NR840681	W3	W4
WTW000748	LAGGAN BRIDGE WTW 2006 NN611943	W1	W4

From the above status and process changes the subsequent changes to each process type are as presented in Table 135 below. The confidence grade of A2 remains the same as last year.

Table 135: Changes in process type.

Line Ref	Process Type	AR22 WTWs	AR23 WTWs	Change
E4.20	SD	21	19	-2
E4.21	W1	6	5	-1
E4.22	W2	24	24	0
E4.23	W3	156	156	0
E4.24	W4	24	25	1
E4.25	Total	231	229	-2

The Total distribution input (1835.518MI/d) reported in Line E4.26 is the same as that reported in Line E4.5 (1835.519MI/d) with the slight difference due to rounding.

The confidence grade for this line E4.26 is B3.

27.2.5 Lines E4.28-E4.39 Water Treatment Works by Size Band

Of the 229 Water Treatment Works reported in Line E4.25 the changes in size bands between AR22 and AR23 are shown in Table 136 below.

Table 136: Changes in size band and DI.

Line Ref	Size Band	AR22		AR23		Net Change	
		No.	% DI	No.	% DI	No.	% DI
E4.28	<= 1 MI/d	127	1.2	126	1.2	-1	0
E4.29	>1, <= 2.5 MI/d	22	1.3	21	1.3	-1	0
E4.30	>2.5, <= 5 MI/d	22	2.8	22	2.9	0	0.1
E4.31	>5, <= 10 MI/d	15	4.3	15	4.3	0	0
E4.32	>10, <= 25 MI/d	18	10.8	18	10.7	0	-0.1
E4.33	>25, <= 50 MI/d	12	15.8	12	15.8	0	0
E4.34	>50, <= 100 MI/d	9	22.5	9	22.3	0	-0.2
E4.35	>100, <= 175 MI/d	4	20.3	4	20.8	0	0.5
E4.36	>175 MI/d	2	21.0	2	20.6	0	-0.4
E4.37 & E4.38	Total	231	100	229	100	-2	0

The confidence grade of A2 remains the same as last year for Line E4.28-E4.37, as does the confidence grade of B3 for Line E4.38.

27.3 Data

27.3.1 Data sources and confidence grades

Data sources and confidence grades are detailed in the commentary section where relevant.

27.3.2 Data improvement programmes

No improvement work was carried out on data affecting Table E4.

For Average Daily Output: Refer to Table A2 commentary.

27.3.3 Assumptions used for forecast data

There are no forecast data in Table E4.

28 Table E6 – Water distribution

28.1 Overview

Table E6 provides information on operating costs and efficiencies relating to water distribution. It covers:

- Area data
- Distribution costs
- Water mains data
- Pumping stations
- Service reservoirs
- Water towers

28.2 Performance Trends

28.2.1 Lines E6.0-E6.6 Area Data

The methodology used to allocate properties and population to the four operational regions remains unchanged from the previous year throughout this table.

The figure reported in Line E6.1 reports the annual average resident connected population in thousands (5,219.11) and is consistent with the figure reported in A2.5. The confidence grade for AR23 is B2.

The total number of connected properties reported in Line E6.2 (2,785,921.00) is consistent with the figure reported in Line A1.10. The confidence grade of B4 remains the same as last year.

Volumes delivered to households and non-households (Lines E6.3 and E6.4) are allocated to water operational areas and summed to regional level; the method remains unchanged from last year. Values used to calculate this section of the E Table reflect those in the A2 Tables. The confidence grade of B2 and B4 respectively remains the same as last year.

The operational regions reported in Line E6.5 remained the same at 79,816.36km². The confidence grade at A1 reflects the fact that the operational region boundaries are taken directly from the corporate Geospatial Information system (GIS).

The number of supply zones reported in Line E6.6 has decreased by one to 278.00 overall with two removed and one added (Table 137 below).

Table 137: Change in number of supply zones (E6.6).

New for AR23

SiteRef	Site name	Region	Reason for Addition
Z005001016037	Baltimore Legbrannock	SOUTH	New Regulatory Supply Zone (RSZ) for 2023 due to Water Supply Zone (WSZ) movement and Population > 100,000

Removed for AR23

SiteRef	Site name		Reason for Removal
Z005000263429	Tolsta Western Isles	NORTH	Zone incorporated into North Lochs RSZ, due to Tolsta WTW mainout for 2023
Z005000972795	Daer D	SOUTH	Zone merged due to WSZ movement for 2023

The number of supply zones were calculated using the same methodology as last year, and matches the number reported to the Drinking Water Quality Regulator. Changes in zone topology are tracked and recorded by the Water Quality Regulation Zone procedure and a full audit trail is available.

28.2.2 Lines E6.7-E6.11 Functional Costs

E6.11 Water Distribution

	Total
Functional expenditure:	£m
2022/23	81.570
2021/22	<u>77.561</u>
Variance	<u>(4.009)</u>

Water distribution costs have increased by £4.0m (5%) from 2021/22 reflecting the following key movements:

- £2.1m increase in hire and contracted costs due in particular to the period of rapid freeze and thaw that resulted in high volumes of burst pipe repairs, price inflation added to partner contracts, additional levels of tank cleaning and new operating costs linked to investment choices
- £2.3m increase in other direct costs due primarily to increased transport costs related to tankering water to maintain supplies through freeze periods and impacted by higher fuel costs, and higher levels of insurance claims during the year

Analysis of water distribution costs by region:

	North	East	South	West	Total	General and Support	Total
	£m	£m	£m	£m	£m	£m	£m
Functional expenditure:							
2022/23	11.909	17.680	13.360	22.424	65.373	16.197	81.570
2021/22	<u>10.239</u>	<u>16.837</u>	<u>12.973</u>	<u>19.996</u>	<u>60.045</u>	<u>17.516</u>	<u>77.561</u>
Variance	<u>(1.670)</u>	<u>(0.843)</u>	<u>(0.387)</u>	<u>(2.428)</u>	<u>(5.328)</u>	<u>+1.319</u>	<u>(4.009)</u>

Confidence grades on Table E6 are consistent with grades in the general E table commentary and remain consistent with 2021/22.

Scottish Water has slightly lower confidence levels on Network cost analysis than treatment cost analysis. This is due to lower levels of direct labour capture on Networks.

28.2.3 Lines E6.12-E6.21 Water Mains Data

Lines E6.12 - E6.16 Potable Mains

There was an increase in total length of mains (Line E6.16) to 49,110.37km, which is 164.98km more than AR22. The size banding is based on the mains diameters, 99.7% of which are based on Geospatial Information system (GIS) data. The remainder are infilled based on an average diameter for the pipe based on its material.

Potable mains are recorded in Scottish Water's Geospatial Information system (GIS). It is necessary to infill the diameter to determine the correct E6 line for a small number of pipes (see Table 138 below).

Table 138: Water Mains Infill.

Actual/Infill Method	Length (m)	% Actual/Infill
Actual GIS Values	48,963,439	99.70
Default Infill Values	2006	0.00
Material based Infill Values	144,925	0.30

Material based infill is the median diameter for the pipe's material type, where the infill value is ascertained after assessment of the total length and actual diameter, of all pipes based on material type. Where there are pipes that have no material type or diameter assigned, a default value is populated as per the current methodology.

The confidence grades remain as A2 for the lines for specific pipe diameters. The confidence grade for the total Line E6.16 remains A1, as no infilling is required.

E6.17 Total length of unlined iron mains

The total length of unlined iron mains as held in our corporate Geospatial Information system (GIS) has decreased by 11.77km (0.08%) to 14,410.88km, in this reporting year.

The confidence grade of A2 remains the same as last year.

E6.18 Total length of mains >320mm diameter

The total length of mains greater than 320mm diameter has increased by 37.73km to 4,030.12km, in this reporting year, which is a 0.94% increase on AR22.

The confidence grade of A2 remains the same as last year.

E6.19 Mains Bursts

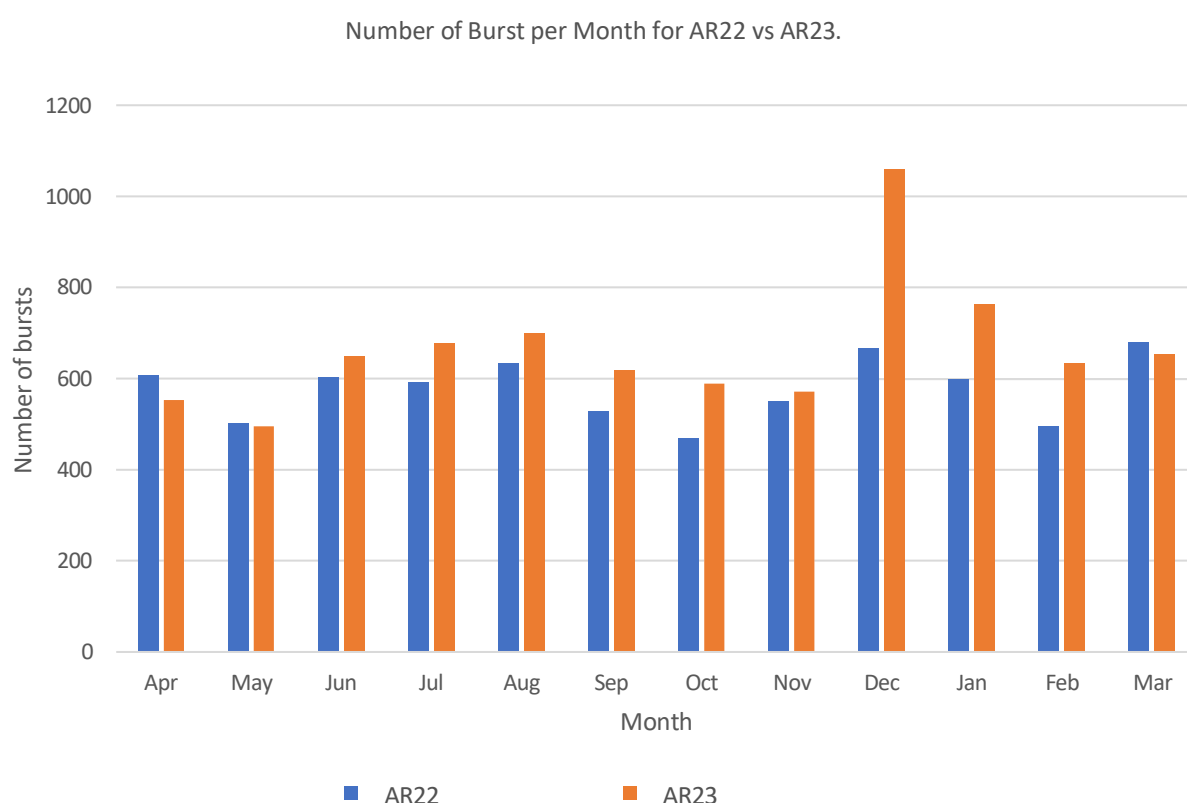
The reported number of water mains bursts on Line E6.19 is derived from both the number of customer and non-customer reported bursts for the reporting year. For AR23 the total number of mains bursts reported is 7,959.00, a 15% increase from last year.

The majority of water mains burst are on cast iron (CI) and asbestos cement (AC) pipes. CI pipes are our oldest material type and are subject to deterioration through corrosion, while AC is a 1950-60's material which is deteriorating due to our soft waters (and ground waters) dissolving the cement matrix which holds them together resulting in loss of strength. We see a cyclical pattern of failures over the months with a larger proportion of CI fails in the winter months which switches to AC in the summer months.

The causes of pipe failure are complex and not fully understood, however the larger proportion of AC failures in the summer are linked to changes in soil moisture leading to pipe movement and fracture of pipes weakened through loss of the cement matrix. We are seeing an increase in average burst rate for AC pipes above all other materials due to the continual loss of strength as they deteriorate. Our current assessment is all AC pipe materials will need replaced in the next 20-30 years and our replacement programmes are mainly focused on AC pipe replacement.

In the winter months the water temperature drops, reducing the temperature of the pipes, this can result in contraction of pipes (weakening joints), reduction in ductility of metal pipes (reducing ability to resist pressure), an increase in water density (increasing loadings on pipe bends) and frost heave resulting in pipe movement. These factors have a larger impact on cast iron pipes due to the nature of the material. The winter of 2022-23 had a long duration cold spell which increased the stress on the network (compared to AR22, see Figure 67) and resulted in an increase in the burst rate making a significant contribution to the 15% increase this year.

Figure 67: Comparison of monthly bursts for AR22 and AR23.



A new field system, Salesforce, was rolled out in stages in the latter half of AR22. This has provided field staff with a better means to record the activities they are conducting. However, after review of the data quality it has been identified that some activities have not been getting back to the works management system, used to calculate the number of bursts. Therefore, a correction has been put in place where data is used from both the field system and the works management system to provide the assessment of bursts, while we correct this system issue. As a result, the number of bursts reported in AR22 should have been 6,920 instead of 6,695 as originally reported.

The confidence grade remains at B2 for this year.

E6.20 Leakage Level

The reported top-down leakage level shown on **Line E6.20** is aligned with the figures on Tables A2 and B8, where we report leakage in terms of Maximum Likelihood Estimation (MLE) leakage.

Top-down leakage has increased from 430.93 MI/d in AR22 to 449.36 MI/d in AR23.

The confidence grade of B3 remains the same as last year.

E6.21 Low Pressure

The overall number of low-pressure properties has increased from 222.00 to 224.00 for, of which four properties were added due to better information (3) and asset deterioration (1), whilst two properties removed due to asset improvements.

The confidence grade of B2 remains the same as last year.

28.2.4 Lines E6.22-E6.25 Pumping Stations

E6.22 Total number of pumping stations

The number of Pumping stations reported in Line E6.22 is 625 for AR23. An overall increase of two sites as compared with AR22.

The confidence grade of A2 remains the same as last year.

E6.23 Total capacity of pumping stations

The total capacity of pumping stations reported in Line E6.23 is 2,460,481m³/d. An overall increase of 30,425m³/d as compared with AR22.

As the methodology is unchanged the confidence grade of C4 remains the same as last year.

E6.24 Total capacity of booster pumping stations

The total capacity of booster pumping stations reported in **Line E6.24** is 43,566.0kW. An overall increase of 580kW as compared with AR22, due to changes in pumping stations (see table below). The confidence grade of A3 remains the same as last year.

Details of the removals and additions with the corresponding capacities (Line E6.23 - m³/day and Line E6.24 – kW) are tabulated in Table 139.

Table 139: Added and removed capacities.

Plant No	Site	Added / Removed	Region	E6.23 (m³/d)	E6.24 (kW)
TWP001186	GALLHILLS TWP NY275756	Removed	SOUTH	56.116	1
TWP000708	KINLOCHBERVIE TWP	Removed	NORTH	0	0
TWP000019	BENNANE TWP 1986 NX093858	Removed	WEST	388.8	1.5
TWP001370	RHU STATION RD TWP 2019 NS273843	Added	WEST	897.856	16
TWP001410	ROBERTON TWP NT428149	Added	SOUTH	561.16	10
TWP001411	KIRKCOLM CAIRNBOWIE TWP NW992696	Added	SOUTH	617.276	11
TWP001413	NEWMARKET BLACKWATER TWP NB419339	Added	NORTH	370.3656	6.6
TWP001415	LOCH ECK HIGH LIFT TWP 1979 NS139872	Added	WEST	21660.776	386

In addition, capacity values in Line E6.23 at 8 pumping stations were updated for AR23 due to inclusion of more accurate m³ capacity values (see Table 140) and in Line E6.24 10 pumping stations had actual kW values populated which replaced infill values (see Table 141). The m³ values at Uig and Sanday were known from recorded values rather than converted from the kW capacities, so these have not changed.

Table 140: Changes in capacity between AR22 and AR23 (m³/d).

Plant No	Site	Region	AR22 m ³ /d	AR23 m ³ /d
TWP001155	MARYBANK TWP NB415341	NORTH	0	841.74
TWP001319	FETLAR TWP 2013 HU627913	EAST	0	28.058

Plant No	Site	Region	AR22 m ³ /d	AR23 m ³ /d
TWP001235	KILDRUMMY BOOSTER TWP 2009 NJ465174	EAST	0	448.928
TWP001248	ORAMS FANCY TWP 2009 HY653280	EAST	0	617.276
TWP001252	MID YELL TWP 2010 HU507901	EAST	0	2469.104
TWP001253	CULLIVOE TWP 2010 HU511992	EAST	0	925.914
TWP001274	KILLEARN IBERT RD TWP 2011 NS526858	WEST	0	84.174
TWP001283	HERIOT WTW BOOSTER TWP 2011 NT434600	SOUTH	0	841.74

Table 141: Changes in capacity between AR22 and AR23 (kW).

Plant No	Site	Region	AR22 kW	AR23 kW
TWP001155	MARYBANK TWP NB415341	NORTH	1	15
TWP000720	SANDAY TWP HY653402	EAST	1	37
TWP001319	FETLAR TWP 2013 HU627913	EAST	1	0.5
TWP001207	UIG (WESTERN ISLES) TWP NB060308	NORTH	1	15
TWP001235	KILDRUMMY BOOSTER TWP 2009 NJ465174	EAST	1	8
TWP001248	ORAMS FANCY TWP 2009 HY653280	EAST	1	11
TWP001252	MID YELL TWP 2010 HU507901	EAST	1	44
TWP001253	CULLIVOE TWP 2010 HU511992	EAST	1	16.5
TWP001274	KILLEARN IBERT RD TWP 2011 NS526858	WEST	1	1.5
TWP001283	HERIOT WTW BOOSTER TWP 2011 NT434600	SOUTH	1	15

E6.25 Average Pumping Head

The total average pumping head for distribution pumping stations has remained the same this year at 29.65m. As the methodology has remained the same from last year the confidence grade remains as C4.

28.2.5 Lines E6.26-29 Service Reservoirs & Water Towers

The number of service reservoirs reported in Line E6.26 is 1,286 for AR23, an overall decrease of seven sites as compared with AR22. The total capacity of the service reservoirs reported in Line E6.27 is 3,947.733MI, which is a decrease of 1.144MI as compared with AR22.

The number of water towers reported in Line E6.28 has reduced by one to 17 for AR23. The total capacity of the water towers reported in Line E6.29 has reduced to 27.446MI.

The confidence grade of A2 remains the same as last year for Lines E6.26 to E6.29.

Details of changes to Service Reservoir and Water Tower numbers with corresponding capacities are tabulated below (Table 142):

Table 142: Service Reservoir and Water Tower Additions and Removals.

Plant No	Site	Added / Removed	Region	Capacity (MI)
TWS003646	OBAN NORTH TWS NM863311	Added	NORTH	0.4
TWS003741	WHITEHALL TWS 2020 HY651282	Added	EAST	0.294
TWS000003	ACHNAGOUL DSR NN059055	Removed	NORTH	0.01
TWS000264*	DRUMCHAPEL DSR 1955 NS511718	Removed	WEST	1.82
TWS000776	BREACLETE DSR NB154374	Removed	NORTH	0.015
TWS000865	EAST LANGWELL DSR 01/01/50 NC720072	Removed	NORTH	0.023
TWS000970	BORVE SKYE DSR 1950 NG456478	Removed	NORTH	0.136
TWS001302	BRAEMORLICH DSR 1951 NJ434141	Removed	EAST	0.009
TWS001465	PENNAN DSR 1960 NJ820646	Removed	EAST	0.007
TWS001466	PENNAN DSR 1972 NJ832654	Removed	EAST	0.002
TWS001694	CAIRNHALL DSR 1952 NO276536	Removed	EAST	1.591
TWS001790	FOREBANK DSR 1962 NO698650	Removed	EAST	0.045
	Total Removed	-8		-2.964

* Water Tower

There is no change this year in the capacity of existing Service Reservoirs and Water Tower data

28.3 Data

28.3.1 Data sources and confidence grades

Data sources and confidence grades are detailed in the commentary section where relevant.

28.3.2 Data improvement programmes

There have been no notable data improvement programmes in AR23.

28.3.3 Assumptions used for forecast data

There is no forecast data for the E6 Table.

29 Table E7 – Wastewater explanatory factors - sewerage & sewage treatment by area

29.1 Overview

Table E7 provides information on operating costs and efficiencies relating to wastewater explanatory factors – sewerage and sewage treatment. It covers:

- Area data
- Sewerage data
- Sewerage costs
- Sustainable Urban Drainage Systems (SUDS)
- SUDS costs
- Pumping stations
- Sewage treatment works
- Sewage treatment costs

In terms of Wastewater Operating Costs, during AR23, six wastewater treatment works, all previously owned and operated under Private Finance Initiative (PFI) schemes, transferred into Scottish Water regulated. A list of the sites, associated PFI scheme and transfer date are noted below, and are applicable to the E7, E8, E9, and E10 tables:

Works	PFI Scheme	Transfer Date
Allanfearn	Highland	29 May 2022
Fort William	Highland	29 May 2022
Fraserburgh	Grampian	1 October 2022
Nigg	Grampian	1 October 2022
Persley	Grampian	1 October 2022
Peterhead	Grampian	1 October 2022

Year on year cost comparisons include the following impacts relating to the return of the Highland and Grampian PFI schemes:

	£m
Increase in SW operating costs included in E tables:	
Sewerage (E7)	0.8
Treatment (E7)	3.3
Sludge (E10)	<u>2.3</u>
	6.4
Local authority rates (not included in E tables)	0.7
Total increase in SW operating costs	7.1
Reduction in PFI costs	(22.4)

29.2 Performance Trends

29.2.1 Lines E7.1-E7.7 Area Data

E7.1 Annual average resident connected population

The total figure used for Scotland was correlated to the Scottish Water Region split obtained using GIS properties to ensure there was a consistent figure reported across the Annual Return tables. For AR23 the Annual average resident connected population in thousands is 5010.4 (5,010,350). This is marginally different from the number reported in A3.3 (5,010,355) due to rounding of figures when splitting across Scottish Water regions.

The confidence grade of B2 remains the same as last year.

E7.2 Annual average non-resident connected population

As with previous years, tourist population has been determined based on the average bed spaces multiplied by an average occupancy factor. Average occupancy rates are taken from Visit Scotland latest data for the year Jan-Dec 2021 available in the Tourism in Scotland report. For AR23 the Annual average non-resident connected population is 59.9k, compared to 38.5k in AR22. This increase is due to fewer COVID-19 lockdown periods.

The confidence grade of B3 remains the same as last year.

E7.3 Volume of sewage collected (daily average)

The daily average volume of sewage collected for the AR23 period is 3,495.7Ml/d, an increase of 449.1 Ml/d compared to AR22. Most of the increase was due to the storm flow component of the volume, as AR23 experienced considerably higher levels of precipitation than AR22, as described below.

The method used to calculate the volume of sewage data is based on the dry weather flows plus the storm flows within each catchment being summarized at Scottish Water Region level.

The average daily volume collected has been calculated as the flow which arrives in a public sewer (of any type) from any source e.g. rainfall, infiltration, domestic use, industrial use, tidal flows and connected watercourses. The approach used is the same as that in previous years and has been applied consistently across the country. It uses data sets for rainfall, connected properties and sewered areas consistent with the wastewater elements of the Annual Return. The flow has been calculated in two parts: dry weather flow and storm flow.

Dry Weather Flow: A factor has been established that relates the number of connected properties to the amount of sewer flow in periods without rainfall. To establish this figure a number of recordings of flows with a known connected population were analysed to establish a range of flow per connected population. These factors were averaged and applied to all sewered areas to establish a total dry weather flow contribution per sewered area.

Storm Flow: The storm flow element was calculated by using existing sewer models to establish a relationship between rainfall depth, area of the sewered area and the amount of run-off generated. A selection of models was used and an average value of run-off per millimetre rainfall per hectare of sewered area was established. This was then applied to each sewered area to establish a total storm flow contribution per sewered area. For AR23 the previous year's catchment-based rainfall was factored by the difference in Scotland's total rainfall for AR23 compared to AR22, as refreshed catchment rainfall was unavailable.

The total sewage collected was calculated (dry weather plus storm flows) for each sewered area and a total for each operational region calculated.

The confidence grade of C3 remains the same as last year.

E7.4 Total connected properties

This total is 2,651,106.0 and is based on the same data used for **Line A1.20** (2,651,106). The total property figure used for Scotland was correlated to the Scottish Water Region split obtained using GIS properties to ensure there was a consistent figure reported across the Annual Return tables.

The confidence grade of B3 remains the same as last year.

E7.5 Area of sewerage district

The area has remained the same at 79,816.4km².

The confidence grade of A1 remains the same as last year.

E7.6 Drained area

The reported value of the drained area is 2,006.6km² and is a slight increase of 32km² from AR22. This is a result of on-going verification of the sewered areas in our corporate Geospatial Information system (GIS).

The confidence grade of A1 remains the same as last year.

E7.7 Annual precipitation

For AR23 the previous year's Met Office radar rainfall data was factored by the difference in Scotland's total rainfall for AR23 compared to AR22, as an update on this catchment level rainfall data was unavailable for the year.

The total rainfall has increased from 1,133mm to 1,588mm for AR23.

The confidence grade for this has changed from A2 to C3 for AR23 to reflect the extrapolation of external web-based rainfall data.

29.2.2 Lines E7.8-E7.14 Sewerage Data

E7.8 Total length of sewer

This reflects values held in our corporate Geospatial Information system (GIS) and a partially statistical calculation of lateral sewer length using unit length connections by dwelling type. For AR23 the total length of sewer reported is 54,220.2km which is an increase of 1.15% from AR22.

The confidence grade of B2 remains the same as last year.

E7.9 Total length of lateral sewer

The statistical calculation of the length of lateral sewers is then used to populate **Line E7.9**. The calculation also uses the number of properties connected to the wastewater network (connected properties). This is the same methodology as used in previous returns. The reported length of lateral sewer is 19,800.8km, a 1.2% increase compared to AR22.

The confidence grade of B2 remains the same as last year.

E7.10 Length of combined sewer

The length of combined sewer held in our corporate Geospatial Information system (GIS) is reported as 17,640.3km for AR23, which is an increase of 44km from AR22. These figures are

reported to zero decimal places in the absence of specific guidance in the definitions document, and to be consistent with lines E7.8, E7.9 and E7.12.

The confidence grade of B2 remains the same as last year.

E7.11 Length of separate storm sewer

The length of separate storm sewer reported is 8,882.5km, which represents an increase of 2% (173km) from AR22, reflecting the adoption of separate storm sewers for new build developments. These figures are reported to zero decimal places in the absence of specific guidance in the definitions document, and to be consistent with lines E7.8, E7.9 and E7.12.

The confidence grade of B2 remains the same as last year.

E7.12 Length of sewer >1000mm diameter

The length of sewer greater than 1000mm diameter held in our corporate Geospatial Information system (GIS) is 799.6km. The reduction of 61km is mainly a result of a more accurate pipe equivalent diameter calculation being used to convert egg shaped sewers height and width to the circular pipe diameter equivalent necessary for reporting in the Annual Return tables.

The effect has been to reduce some diameters slightly, mostly in the larger sewers; therefore the reduction is most apparent in E7.12 as it reports sewers over 1000mm diameter.

The confidence grade of B2 remains the same as last year.

E7.14 Sewer collapses

Scottish Water reports a Sewer Collapse as all cases where a sewer was damaged, and a repair was necessary. The methodology is reported in Line B8.2. Collapses on laterals and rising mains are included in the reported numbers.

The number of sewer collapses over the report year is reported as 1,618.0 (1,611 gravity sewer failures and seven rising main failures) which is an increase of 184 in comparison with AR22.

There have been a number of changes which have resulted in increased numbers of Work Orders being generated. These include the ARM process (repeat visit reduction), increased CCTV surveys by Sewer Response and ease of Work Order creation with the integration of new Field Service Technology - Salesforce.

Alternative Resolution Management (ARM) has been set up to deal with weak spots in the network (premises and locations that have had more than 7 visits within the same 50m radius) this is a joint process which involves Sewer Response, Waste Water Network Analysts and the Flooding Investigation Team.

The increase in the number of Sewer Collapses has been driven by these process improvements, Whilst Scottish Water believes asset deterioration to be the main factor towards Sewer Collapses, there is insufficient data at this stage to confirm.

The confidence grade of B4 remains the same as last year.

29.2.3 Lines E7.15-E7.19 Sewerage Costs

E7.19 - Sewerage Costs

	Total
Functional expenditure:	£m
2022/23	55.218
2021/22	<u>47.522</u>
Variance	<u>(7.696)</u>

Sewerage costs have increased by £7.7m (16%) from 2021/22 including £0.8m of costs relating to the former Grampian and Highland PFI sites. Key changes include:

- £3.5m increase in hire and contracted costs (including £0.2m of costs relating to former PFI sites) driven primarily by (i) contractor price inflation of c.£0.9m and (ii) increased use of contractors for sewer repairs and to unblock choked sewer pipes (£2.0m) driven by higher volume of activity and internal vacant positions
- £1.9m increase in other direct costs as a result of higher levels of insurance claims (£1.1m) and higher transport costs associated with fuel price inflation and higher vehicle and plant repair and maintenance costs, partly due to price inflation and older vehicles
- £1.7m increase in power costs (including £0.5m of costs relating to former PFI sites) due to higher unit prices of c. 8% and higher energy consumption of 1% linked to higher average rainfall.

Analysis of sewerage costs by region:

	North	East	South	West	Direct	General and Support	Total
Functional expenditure:	£m	£m	£m	£m	£m	£m	£m
2022/23	4.094	9.783	13.448	15.606	42.931	12.287	55.218
2021/22	4.078	9.547	10.242	12.078	35.945	11.577	47.522
Variance	(0.016)	(0.236)	(3.206)	(3.528)	(6.986)	(0.710)	(7.696)

29.2.4 Lines E7.20-E7.25 - Sustainable Urban Drainage Systems (SUDS)

The number of Sustainable Urban Drainage (SUDS) assets as held corporately in the Works & Asset Management system (Ellipse), have been categorised and reported as shown in the sections below. 55 new assets have been reported this year – mainly SUDS Basins - due to the increasing implementation of surface water drainage system at new housing and commercial developments. One such system is the recently installed SUDS basin at Ardinn Road in Turriff, which has a capacity of 1,100m³ and was adopted in October 2022. Changes from AR22 for each line are shown in brackets and note that SUDS were first reporting in AR22 so longer-term trends are not available.

E7.20 SUDS Ponds

The total number of SUDS Ponds reported for AR23 was 39.0 (up 6 from AR22). The Confidence Grade for this new line has been allocated as A3.

E7.21 SUDS basins

The total number of SUDS Basins reported for AR23 was 161.0 (up 31 from AR22). The Confidence Grade for this new line has been allocated as A3.

E7.22 Filter trenches

The total number of Filter Trenches reported for AR23 was 102.0 (up 12 from AR22).
The Confidence Grade for this new line has been allocated as A3.

E7.23 Swales

The total number of Swales reported for AR23 was 19.0 (up 6 from AR22).
The Confidence Grade for this new line has been allocated as A3.

E7.24 Other (e.g. wetland)

The total number of Other SUDS types reported for AR23 was 3.0 (same as AR22).
The Confidence Grade for this new line has been allocated as A3.

E7.25 Total SUDS

The total number of SUDS reportable for AR23 was 324.0.
The Confidence Grade for this new line has been allocated as A3.

29.2.5 Lines E7.26-E7.30 SUDS Costs

Costs for maintaining SUDS sites are directly captured in our general ledger system against SUDS asset identifiers. For 2022/23, SUDS costs amounted to less than £0.1m, and as such have been omitted from table lines E7.26 to E7.30. Therefore, we have inserted a single value of £0.1m against line E7.28 and Area 1(North).

The Confidence Grade for these lines have been allocated as A4.

29.2.6 Lines E7.31-E7.40 Pumping Stations

A pumping station is defined as an individual site (i.e. not an individual pump). It includes foul, combined and stormwater pumping stations situated at treatment works but excludes interstage pumping. Changes since the last submission are reflective of asset data improvement, changes to pump units, and additions and removals of asset locations to reflect operational revisions.

As with previous years the data that supports the population of lines relating to pumping station capacity (m3/d) and pumping head is very limited. These values are extrapolations based on Table H5 size-banded kW ratings to infill any missing values per pumping station. There is an increase of 38 infilled pumping station capacities this year – the same as the number of additional pumping stations reported in E7.31. This has increased the infill percentage from 83.9% to 84.2%

The comparison with AR23 the pumping station capacity (m3/d) infilled sites are presented in Table 143.

Table 143: AR22-23 SPS Capacity Infill Comparison (number of pumping stations).

Region	AR22 Nr of PS with Infilled Capacity	AR23 Nr of PS with Infilled Capacity
EAST	557	580
NORTH	504	513
SOUTH	394	398
WEST	441	443
Total	1896	1934

E7.31 Total number of pumping stations

There was a net increase of 38 Pumping Stations in AR23, to 2,297.0. Removals and Additions are detailed in Table 144 below.

Table 144: Pumping Station Additions and Removals in AR23.

Plant No	Site	Add/Remove	Region	Sewer Use
SPS000666	LONGMAN WWPS NH665469	Added	NORTH	COMBINED
SPS000907	PERSLEY SLUDGE WWPS NJ908097	Added	EAST	COMBINED
SPS001036	CAOL TRANSFER WWPS NN108757	Added	NORTH	FOUL
SPS001037	CAOL WWPS NN106760	Added	NORTH	FOUL
SPS001041	INVERLOCHY WWPS NN111748	Added	NORTH	COMBINED
SPS001043	CAOL BLAR MHOR WWPS NN118760	Added	NORTH	FOUL
SPS001366	NEWTONHILL CLIFFTOP WWPS NO914934	Added	EAST	COMBINED
SPS001368	PORTLETHEN SOUTH WWPS NO921946	Added	EAST	COMBINED
SPS001369	DOWNIES WWPS NO926951	Added	EAST	COMBINED
SPS001370	PORTLETHEN NORTH WWPS NO927970	Added	EAST	COMBINED
SPS001371	PORTLETHEN VILL WWPS NO933963	Added	EAST	COMBINED
SPS002112	BALMUIR TARLAND WWPS NJ482045	Added	EAST	FOUL
SPS002312	COWIE WWPS NO880868	Added	EAST	COMBINED
SPS003047	ESKMILL ROAD WWPS NT243604	Added	SOUTH	FOUL
SPS003709	ALLOA SMITHFIELD LOAN WWPS NS872930	Added	WEST	COMBINED
SPS003719	COWIE DON SLUGHEAD WWPS NO883874	Added	EAST	COMBINED
SPS003720	STONEHAVEN BRIDGE OF MUCHALLS WWPS	Added	EAST	COMBINED
SPS003721	NEWTONHILL CAMMACHMORE WWPS	Added	EAST	COMBINED
SPS003772	SORN MAIN STREET WWPS 2007 NS558264	Added	WEST	FOUL
SPS003905	STONEHAVEN BACKIES WWPS NO878856	Added	EAST	COMBINED
SPS003961	ELLON CASTLE MEADOWS WWPS NJ957309	Added	EAST	FOUL
SPS004006	ARISAIG KEPPOCH FARM WWPS NM658866	Added	NORTH	FOUL
SPS004016	LONGMAN STORM WWPS 1 NH665469	Added	NORTH	COMBINED
SPS004017	LONGMAN STORM WWPS 2 NH665469	Added	NORTH	COMBINED
SPS004018	ALLANFEARN WWPS NH711475	Added	NORTH	COMBINED
SPS004038	FRASERBURGH WWPS 2001 NJ973669	Added	EAST	COMBINED
SPS004039	BACKIES STORM WWPS 1 2008 NO878856	Added	EAST	COMBINED
SPS004040	BACKIES STORM WWPS 2 2008 NO878856	Added	EAST	COMBINED

Plant No	Site	Add/Remove	Region	Sewer Use
SPS004095	POLBETH ALICE BANK WWPS 2008 NT033642	Added	SOUTH	FOUL
SPS004125	ABERDEEN DUBFORD WWPS 2013 NJ943123	Added	EAST	FOUL
SPS004212	RICC MAINS RD WWPS 2016 NT181684	Added	SOUTH	FOUL
SPS004356	KIRKTON HEIGHTS WWPS 2017 NJ990649	Added	EAST	FOUL
SPS004379	HADDINGTON DOVECOT FARM WWPS NT503729	Added	SOUTH	FOUL
SPS004455	FORFAR TURFBEG WWPS 2019 NO442516	Added	EAST	FOUL
SPS004503	WELLINGTON GDNS WWPS 2015 NJ942013	Added	EAST	FOUL
SPS004565	BLAIRYTHAN TERR FOVERAN SPS NJ973238	Added	EAST	FOUL
SPS004775	MT FLORIDA CARMUNNOCK RD WWPS NS588610	Added	WEST	COMBINED
SPS004821	IRON MILL BAY WwTW INLET WWPS NT061843	Added	EAST	COMBINED
SPS004843	WEST WEMYSS INLET WWPS NT327948	Added	EAST	COMBINED
SPS004844	WEST WEMYSS OUTLET WWPS NT327948	Added	EAST	COMBINED
SPS000430	STRAN LARG ROAD WWPS NX048623	Removed	SOUTH	FOUL
SPS000802	ELGIN, COVESEA ROAD SPS 1996 NJ214645	Removed	EAST	FOUL

In addition to the additions and removals in the table, there was a change in our Corporate Systems where Westburn Cambuslang WWPS (SPS0001459 NS647166) was moved from the West Region to the South Region for management purposes, although this asset sits geographically within both Regions.

The confidence grade of A3 remains the same as last year.

E7.32 Total capacity of pumping stations (m³/d)

For AR23 this is reported as 18,637,140.0 m³/d. This is a 17% increase on the value reported for AR22.

An exercise to improve the robustness of the source data and the calculations used to calculate m³ capacities and pumping head was undertaken in 2022. During the work, errors were identified in the method that had historically been used to perform the calculations. These were corrected and the pumping capacity results were recalculated with AR22 data using the revised method. The E7.32 capacity value once corrected for AR22 is 18,121,531 m³/d. Using this figure, the increase in AR23 is 2.8%

The data is now held in a database and all calculations are stored and can be re-calculated within the database. This avoids the inherent problems with updating, formatting and calculating large quantities of data in spreadsheets.

Any AR22 figures affected by the correction will be referenced in the Performance Trends section in comparisons with this year's figures.

The confidence grade of C4 remains the same as last year.

E7.33 Total capacity of pumping stations (kW)

For AR23 kW capacity is 102,530.4kW, which is an increase of 3,072.4kW from AR22. The confidence grade of A3 remains the same as last year.

E7.34 Average pumping head

This is reported as 29.2m for AR23. This represents a decrease of 2.8m from the figure reported in AR22. The corrected head for AR22 is 32.3, so this represents a decrease of 3.1 when compared to the corrected AR22 figure.

The confidence grade of C5 remains the same as last year.

E7.35 Total number of combined pumping stations

From the total number of pumping stations reported in **Line E7.31**, the total number of combined pumping stations has increased by 24 to 1,346.0 for AR23.

The confidence grade of A3 remains the same as last year.

E7.36 Total capacity of combined pumping stations

From the calculation used to populate **Line E7.32**, the Total Capacity of Combined Pumping Stations has increased to 13,553,472.2 m³/d. This is an increase of 15% on the AR22 reported figure. It is a 3.5% increase on the corrected AR22 capacity of 13,096,497 m³/d. These figures are provided to zero decimal places to be consistent with the requirement to show E7.32 to zero decimal places in the definitions document.

The confidence grade of C4 remains the same as last year.

E7.37 Total number of stormwater pumping stations

From the total number of pumping stations reported in **Line E7.31**, the Total Number of Stormwater Pumping Stations has remained the same at 46.0 for AR23. This figure is provided to zero decimal places to be consistent with the requirement to show E7.35 to zero decimal places in the definitions document.

The confidence grade of A3 remains the same as last year.

E7.38 Total capacity of stormwater pumping stations

The total capacity of stormwater pumping stations has increased by 8.9% to 753,652 m³/d. The corrected figure for AR22 is also 753,652.0 m³/d in line with the zero change in stormwater pumping station numbers. These figures are provided to zero decimal places to be consistent with the requirement to show E7.32 to zero decimal places in the definitions document.

The confidence grade of C4 remains the same as last year.

E7.39 Number of combined sewer overflows

This is reported as 3,241.0 for AR23, which is an increase of 65 since AR22. The majority of these assets are newly built assets that have become operational during the year or existing assets that have transferred to Scottish Water ownership at the end of PFI contracts.

The confidence grade of A3 remains the same as last year, however in preparation for moving to a new inventory system and in reviewing priority locations for the installation of new overflow Event Duration Monitors, discrepancies in overflow numbers have been identified and a robust data cleansing activity is underway and will be completed ahead of the annual return next year.

Data reported in these lines reflects the year-end position, rather than numbers in operation during the year. This introduces a small error due to UIDs abandoned in the report year. The Works & Asset Management system (Ellipse) extract used for the analysis shows all CSOs including those abandoned, shown never to have existed, and information on bifurcations. Reported numbers exclude CSOs at Wastewater Treatment Works (WwTW), dual manholes and emergency overflows operating less frequently than once in five years, although few of the latter have been modelled. Reported numbers include network CSOs and overflows at combined pumping stations which operate due to hydraulic overload, but not those which operate due to equipment failure.

E7.40 Number of combined sewer overflows (screened)

This is reported as 1,337.0 for AR23, which is a decrease of 75 since AR22. Using the improved methodology from **Line E7.39**, this also enables screens that serve the CSOs to be identified even if they are not recorded under the CSO asset. The methodology identified screened overflows which were at WwTW or foul (emergency overflow) pumping stations, which are excluded from line E7.40 in the WICS definitions, some of which had been included in AR22 in error.

The confidence grade of A3 remains the same as last year.

29.2.7 Lines E7.41-E7.42 Sewage Treatment Works

E7.41 Number of sewage treatment works

This has increased by 4 to 1,838.0 for AR23. Full details of the changes and size bands are included in the commentary for Table E8. This has been shown to zero decimal places as number of sewage treatment work will always be a whole number.

The confidence grade of A2 remains the same as last year.

E7.42 Total load

This has increased (14%) to 246,985.0 kgBOD/day. Full details of the changes to load values are included in the commentary for Table E8. The increase is primarily due to a review of the design capacities held in the Works & Asset Management system (Ellipse) in the North Scottish Water region.

The confidence grade of B3 remains the same as last year.

29.2.8 Lines E7.43-E7.47 Sewage Treatment Costs

E7.47 Functional Expenditure

	Total
Functional expenditure:	£m
2022/23	74.740
2021/22	63.552
Variance	(11.188)

Sewage treatment costs have increased by £11.2m (18%) from 2021/22 including £3.3m of costs relating to the former Grampian and Highland PFI sites. Key changes include:

- £2.3m increase in higher and contracted costs (including £0.6m of costs relating to former PFI sites) primarily due to price inflation of c£0.4m and compliance issues at wastewater assets resulting in additional contractor resources to transfer sludge costing £1.2m

- £2.2m increase in employment costs (including £1.3m of costs relating to former PFI sites) primarily driven by pay inflation and additional resources to support process improvement and energy efficiency projects
- £1.9m increase in power costs (including £0.6m of costs relating to former PFI sites) due mainly to higher unit prices of c. 8%
- £1.8m (31%) increase in materials and consumables costs (including £0.4m of costs relating to former PFI sites) as a result of chemical price inflation exacerbated by supply issues for some chemicals and increased dosing to maintain wastewater compliance
- £1.1m increase in other direct costs (including £0.2m of costs relating to former PFI sites) driven by higher transport costs associated with fuel price inflation and higher vehicle and plant repair and maintenance costs, partly due to price inflation and older vehicles
- £0.9m increase in SEPA charges (including £0.1m of costs relating to former PFI sites) mainly linked to inflation-based increases
- £1.0m increase in general and support costs driven by higher energy costs at office hubs, and additional agency staff, transport and WICS costs all including inflation related increases.

Analysis of sewage treatment costs by region:

	North	East	South	West	Direct	General and Support	Total
Functional expenditure:	£m	£m	£m	£m	£m	£m	£m
2022/23	9.866	17.643	19.821	16.473	63.803	10.937	74.740
2021/22	7.479	13.967	17.660	14.508	53.614	9.938	63.552
Variance	(2.387)	(3.676)	(2.161)	(1.965)	(10.189)	(0.999)	(11.188)

Confidence grades on Table E7 are consistent with grades in the general E table commentary and remain consistent with 2021/22.

Scottish Water has slightly lower confidence levels on Network cost analysis than treatment cost analysis. This is due to lower levels of direct labour capture on Networks.

29.3 Data

29.3.1 Data sources and confidence grades

Data sources and confidence grades are detailed in the Performance Trends section where relevant.

29.3.2 Data improvement programmes

Data improvement relevant to individual lines has been documented in the individual line comments.

29.3.3 Assumptions used for forecast data

There is no forecast data for the E7 Table.

30 Table E8 – Wastewater explanatory factors - sewage treatment works

30.1 Overview

Table E8 provides information on operating costs and efficiencies relating to wastewater explanatory factors – sewage treatment works. It covers:

- Numbers (of works)
- Loading (average daily load)
- Compliance
- Costs

The works reported in Table E8 are those in operation, excluding PFI works, at the end of the report year. The table includes unscreened sea outfalls which have no treatment assets.

30.2 Performance Trends

30.2.1 Lines E8.1-E8.10 Numbers

The numbers for small Sewage Treatment Works (WwTWs) with specific ammonia consents are sourced from Scottish Water's compliance database and are aligned with Lines E8.9 and E8.10, as per previous years.

The percentage compliance was calculated based on Operator Self-Monitoring Programme which are reported to SEPA. Scottish Water's methodology for calculating compliance is the same as last year and, in the case of two-tier consents, all failures were counted, not just upper-tier failures. WwTWs that are not sampled are not included in the averaging process for individual treatment categories and size bands.

30.2.2 Lines E8.1-E8.8 Sewage treatment works size bands

As reported in Table E7 the total number of WwTWs reported for AR23 is 1,838. The changes from AR22 with respect to size band and treatment category are shown in Table 145 below.

The following assets have changed in the Works & Asset Management system (Ellipse) from Ownership PFI to Scottish Water between AR22 and AR23:

STW001223 Allanfearn WwTW NH711475
 STW001527 Persley WwTW NJ906098
 STW001551 Fraserburgh WwTW 2001 NJ973669
 STW001543 Nigg WwTW NJ964046
 STW001569 Peterhead WwTW NK127442
 STW001638 Fort William WwTW NN108750

Table 145: Changes in sewage treatment works.

Plant No	Site	Region	Size Band	Treatment Category	Added / Removed
STW001223	ALLANFEARN WwTW NH711475	North	6	Tertiary A2	Added
STW001527	PERSLEY WwTW NJ906098	East	6	Tertiary A2	Added
STW001543	NIGG WwTW NJ964046	East	6	Secondary Activated Sludge	Added

Plant No	Site	Region	Size Band	Treatment Category	Added / Removed
STW001551	FRASERBURGH WwTW 2001 NJ973669	East	5	Tertiary A2	Added
STW001569	PETERHEAD WwTW NK127442	East	6	Secondary Activated Sludge	Added
STW001638	FORT WILLIAM WwTW NN108750	North	5	Secondary Activated Sludge	Added
STW003739	ARDERSIER WwTW 2009 NH771561	North	4	Tertiary B2	Added
STW001241	ARDERSIER WwTW 1995 NH776562	NORTH	4	Tertiary A1	Removed
STW001504	CLINTERTY WwTW 1965 NJ832110	EAST	0	Tertiary A2	Removed
STW003825	STORNOWAY MACKENZIE PK SEP 2015 NB452322	NORTH	0	Septic Tanks	Removed

A comparison of the AR22 and AR23 total number of WwTWs reported by Size Band are shown below (Table 146).

Table 146: Changes in sewage treatment works by Size Band.

Line Ref	Size Band	AR22 Reported	AR23 Reported	Change
E8.1	Size Band 0	1,114	1,103	-11
E8.2	Size Band 1	197	211	14
E8.3	Size Band 2	154	150	-4
E8.4	Size Band 3	187	180	-7
E8.5	Size Band 4	122	128	6
E8.6	Size Band 5	39	41	2
E8.7	Size Band 6 (Large Works)	21	25	4
E8.8	Total Sewage Treatment Works	1,834	1,838	4

Table 146b: Changes in sewage treatment works by Size Band including- band movement

Plant No	Function_Description	AR22 Band	AR23 Band
STW000063	BARRMILL WWTW NS368513	2	1
STW000066	BEESSWING WWTW NX891692	0	1
STW000075	BLACKWATERFOOT SEP NR894283	3	0
STW000154	CLACHAN WWTW NR762562	0	1
STW000157	CLARENCEFIELD WWTW 1999 NY089680	2	1
STW000172	COLMONELL MAIN STREET SEP NX146858	2	1
STW000190	CRAWFORD SEP NS957209	2	1
STW000205	CROSSHILL WWTW NS322068	3	2
STW000227	DALRY STW WWTW 1990 NX622804	3	2
STW000275	EASTRIGGS WWTW 1 NY244651	3	4
STW000348	GRETNA SERVICES WWTW 1964 NY307686	1	0
STW000432	KINLOCHSEP NR896280	0	1
STW000528	MONREITH SEP NX360409	0	1
STW000559	OBAN WWTW 2000 NM867314	5	4
STW000593	PORTNAHAVEN WWTW NR167519	2	1

Plant No	Function_Description	AR22 Band	AR23 Band
STW000611	RHU SEP NS265843	3	2
STW000689	SWINHILL SEP 1 NS775490	0	1
STW000714	TORTHORWALD WWTW NY030787	2	1
STW000757	WOOLFORDS SEP 2 NT005569	1	0
STW000772	CARLOWAY WWTW 1990 NB204426	2	1
STW000779	SHAWBOST SEP 1975 NB258478	2	3
STW000874	PITTENTRAIL WWTW NC727017	1	0
STW000880	BRORA WWTW 1997 NC905034	3	4
STW000957	JOHN O'GROATS SEP 1995 ND377734	1	2
STW000979	LINICLATE WWTW 2000 NF781498	0	1
STW001056	ARDVASAR VILLAGE SEP 1950 NG632032	0	1
STW001090	RERAIG SEP 2001 NG813271	0	1
STW001110	TORRIDON SEP 1960 NG897564	0	1
STW001168	DRUMNADROCHIT WWTW 1997 NH516295	4	3
STW001252	INSH WWTW 1996 NH809016	0	1
STW001330	TOMINTOUL WWTW 1993 NJ165193	2	3
STW001597	KILCHOAN NAM MARBH SEP 2004 NM494630	3	0
STW001664	FEARNAN SEP NN720444	2	1
STW001700	CAPUTH SEP NO088398	0	1
STW001754	AUCHTERHOUSE WWTW 1962 NO349377	2	1
STW001755	AIRPORT SEP 1976 NO376296	0	1
STW001780	MONIKIE WWTW 1965 NO501370	2	3
STW001815	BRECHIN WWTW 1972 NO619591	4	5
STW001816	LETHAM GRANGE WWTW 1980 NO623454	1	2
STW001818	INVERKEILOR WWTW 1970 NO664495	1	2
STW001900	SANDWICK SANDSAYRE SEP 1994 HU434250	0	1
STW001918	CEMETERY MID YELL SEP 1960 HU515909	0	4
STW002111	LETHAM FIFE WWTW NO311139	2	1
STW002132	NEWTOWN ST BOSWELLS WWTW NT582318	3	4
STW002193	ROMANNO BRIDGE SEP NT160480	0	1
STW002234	KINLOCHARD WWTW 1999 NN464023	3	2
STW002352	ULLAPOOL WWTW NH129953	3	4
STW002365	DURNESS SANGO WWTW NC408676	1	2
STW003530	SALTNESS SEP HU540628	1	2
STW003702	BURRAVOE YELL SEP HU519794	1	0
STW003714	UIG WWTW NG394640	1	0
STW003752	KINGUSSIE WWTW 2014 NH761006	3	4
STW005367	AIRDS POINT STW NX992663	0	4

The confidence grade of B3 remains the same as last year.

30.2.3 Lines E8.9-E8.10 Small sewage treatment works with ammonia consent

The number of small sewage treatment works with ammonia consent 5-10 mg/l has decreased by 4, to 43.

The number of small sewage treatment works with ammonia consent ≤ 5 mg/l has decreased by 5, to 65.

The confidence grade of A1 remains the same as last year.

30.2.4 Lines E8.11-E8.18 Average Daily Load

The total load received at each reported WwTW for AR23 was 240,069 BOD/day. This is an increase of 13.9% from AR22, which was mainly due to the large WwTW in the Works & Asset Management system (Ellipse) changing ownership from PFI to Scottish Water between AR22 and AR23 and being included for the first time this year. This is detailed in Table 147.

The change in size band 04 has been caused by the inclusion of trade effluent loads that are treated by sub-primary treatment processes, such as direct outfalls that do not receive primary settlement. In the past these were not included as the trade effluent flows reported in Table A1 only include loads going to secondary treatment, but under review this year it was deemed that, as Table E includes all treatment categories of works, that sub-primary loads should be included. The only works that is significantly affected is Airds Point WwTW with 373.4 kgBOD/day, making up nearly all of which has significantly increased the load reported in Sea Unscreened, Size Band 04.

Table 147: Changes in WwTW Average Daily Loads.

Line Ref	Size Band	AR22 Load (kgBOD/day)	AR23 Load (kgBOD/day)	Change
E8.11	Size Band 0	401	372	-29
E8.12	Size Band 1	945	970	25
E8.13	Size Band 2	2,000	1,845	-155
E8.14	Size Band 3	10,241	9,579	-662
E8.15	Size Band 4	34,353	35,143	790
E8.16	Size Band 5	34,318	37,316	2,998
E8.17	Size Band 6 (Large Works)	128,448	154,844	26,396
E8.18	Total Load Received	210,706	240,069	29,363

Loads are based on 300g BOD/cubic metre and PE is based on 60g BOD/head/day, as specified by WICS. Imported sludge liquor loads are calculated from the volume to each works and an average strength of 300g BOD/cubic metre.

The confidence grade of B3 remains the same as last year.

30.2.5 Lines E8.19 & E8.20 Small sewage treatment works with ammonia consent 5-10 mg/l and ≤ 5 mg/l

These lines report on the loads received at our small sewage treatment works with specific ammonia consents. The numbers are sourced from our compliance database and are aligned with Lines E8.9 and E8.10.

The total average daily load at small sewage treatment works with ammonia consent 5-10 mg/l marginally increased by 25kgBOD/day, to 7,157kgBOD/day.

The total average daily load at small sewage treatment works with ammonia consent ≤ 5 mg/l increased by 229kgBOD/day, to 48,664kgBOD/day.

The confidence grade of A1 remains the same as last year.

E8.21-30 Compliance

The percentage compliance was calculated based on SEPA results. Our methodology for calculating compliance is the same as last year and, in the case of two-tier consents, all failures have been counted, not only upper-tier failures. WwTWs that are not sampled are not included in the averaging process for individual treatment categories and size bands. The sampling period is the financial year AR23.

Compliance figures, which are reported in Lines E8.21-E8.30, show a decrease from the previous year, with 22 works reported as failing this year. These failing WwTWs are listed in Table 148 below.

Table 148: AR23 WwTWs Compliance Failing Sites.

Plant No	Site	WIC E Treatment
STW000039	ASHGILL WwTW 1997 NS789503	Secondary Activated Sludge
STW000085	BOTHWELLBANK WwTW 1947 NS698580	Secondary Activated Sludge
STW000483	LOCHWINNOCH WwTW 1971 NS356589	Secondary Activated Sludge
STW000488	LUSS WwTW NS360927	Secondary Activated Sludge
STW000576	PHILIPSHILL WwTW 1948 NS603560	Secondary Activated Sludge
STW000615	RIGSIDE WwTW 1950 NS872356	Tertiary B1
STW000642	SHIELDHALL WwTW NS533659	Secondary Activated Sludge
STW000670	STEVENSTON PFI WwTW NS275403	Secondary Activated Sludge
STW001197	EVANTON WwTW 1999 NH613659	Secondary Activated Sludge
STW001472	KEMNAY WwTW 1993 NJ732172	Secondary Activated Sludge
STW001731	COUPAR ANGUS WwTW 1985 NO214403	Secondary Activated Sludge
STW001737	ALYTH WwTW 1978 NO256484	Tertiary A1
STW001791	ABOYNE WwTW 1980 NO542982	Tertiary B1
STW001935	ORPHIR VILLAGE WwTW 1999 HY344058	Tertiary B1
STW001968	PENICUIK WwTW 2004 NT247609	Secondary Activated Sludge
STW001980	CUPAR WwTW 1962 NO388148	Secondary Activated Sludge
STW001990	HAWICK WwTW 1930 NT512155	Secondary Activated Sludge
STW002057	EAST LINTON WwTW NT597780	Secondary Activated Sludge
STW002080	GOREBRIDGE WwTW 1960 NT344612	Tertiary B1
STW002084	HADDINGTON WwTW 1960 NT532744	Tertiary A1
STW002109	LAUDER WwTW 1974 NT540471	Secondary Activated Sludge
STW002386	S QUEENSFERRY WwTW 2007 NT109777	Secondary Activated Sludge

From the 22 WwTWs reported as failing AR23, five of these failed AR22. These sites are:

- Bothwellbank
- Hawick
- Orphir Primary School
- Philipshill
- Shieldhall

Figure 68: Parameter fail types AR22 to AR23.

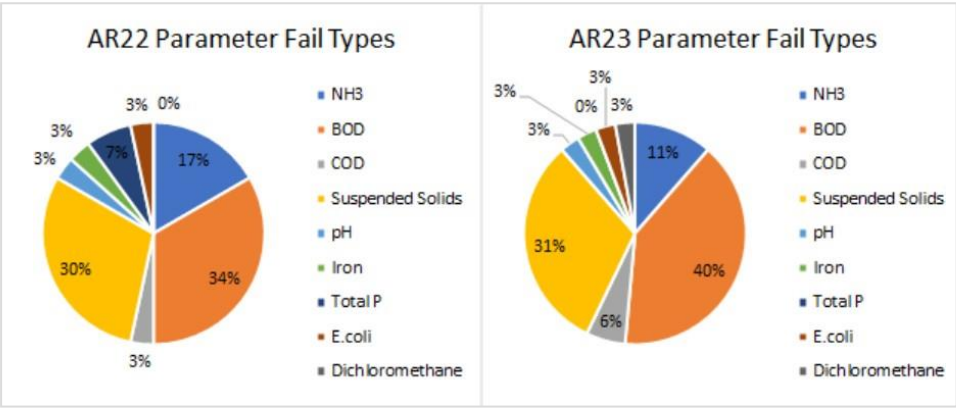
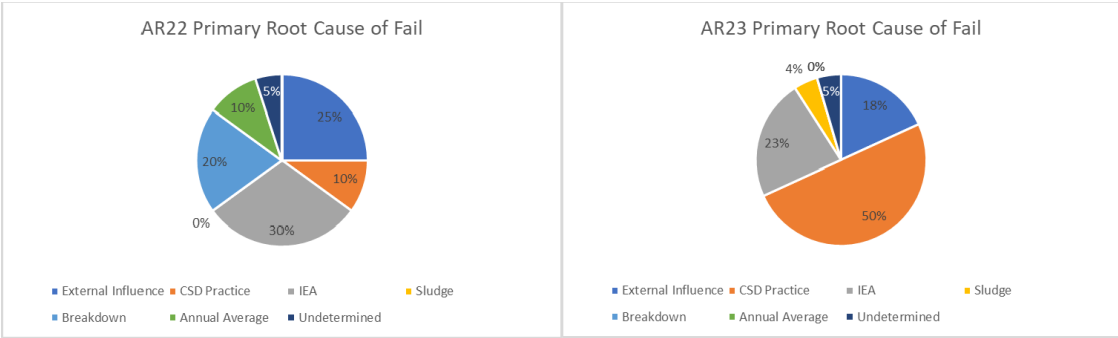


Figure 68 above shows the parameter fail types for WwTWs reported in AR23 and AR22. External Influence such as cold weather, power failures, illegal discharges and high strength influent can contribute to failures which are out with Scottish Water’s control and Ineffective Existing Asset (IEA) which encompasses issues that can occur at WwTWs such as asset deterioration, processes not performing adequately to meet the current standards or network infiltration (e.g. Saline) are comparable, also, but CSD Practice increased in 2022-23, which can have an effect on equipment calibration, operational practices or insufficient resources. A deep dive to understand the cause of this increase was undertaken and activities under the Compliance Mission (more detail in Investment Section for Tables B11b/c).

The portion of failures attributed to each cause for AR22 and AR23 are displayed in the charts below.



The Confidence Grade of B2 remains the same as last year.

30.2.6 E8.31-E8.42 Costs

Overall movements are explained in table Sewage Treatment E7.47 earlier in this commentary. The costs of treating and disposing of sludge are contained within Table E10 Sludge Treatment and Disposal.

Analysis of sewage treatment costs by process type:

Changes to the numbers of WwTW by process type have arisen as a result of operational changes and process re-classifications in WwTW during 2022/23. Re-stating 2021/22 figures on like-for-like basis shows the following variations:

	Septic tanks	Primary	Secondary	Tertiary	Sea Outfalls	Direct	General and Support	Total
Total treatment works	£m	£m	£m	£m	£m	£m	£m	£m
2022/23	3.571	1.384	44.760	13.707	0.382	63.804	10.936	74.740
2021/22	3.042	1.267	37.875	11.154	0.277	53.615	9.937	63.552
Variance	(0.529)	(0.117)	(6.885)	(2.553)	(0.105)	(10.189)	(0.999)	(11.188)

Costs which are directly attributable to treatment are charged to the specific asset cost code in the General Ledger, either via direct charging, Ellipse timesheets or work orders. Of the £63.8m total direct wastewater treatment costs, £44.1m of costs or 69.1% have been directly charged to assets in our corporate costing system.

Other costs have been allocated to Wastewater Treatment through ABM support activity allocation, e.g. stores based on number of issues, IT applications based on number of users, etc. Therefore, support costs are allocated on a resource consumed basis. However, many of these costs are not specific to an asset; they are generally attributable to an employee. Consequently, the majority of these support costs have been allocated to the activities the employees have been doing.

Confidence grades on Table E8 are consistent with grades in the general E table commentary and remain consistent with 2021/22.

30.3 Data

30.3.1 Data sources and confidence grades

Data sources and confidence grades are detailed in the Performance Trends section where relevant.

30.3.2 Data improvement programmes

There have been no notable data improvement programmes in AR23.

30.3.3 Assumptions used for forecast data

There is no forecast data for the E8 Table.

31 Table E9 – Large sewage treatment works information database

31.1 Overview

Table E9 provides information on operating costs and efficiencies relating to large sewage treatment works information database. It covers:

- Works size
- Compliance
- Treatment works category
- Sludge
- Works cost

Large works are defined as those which receive an average loading in excess of 1500kg BOD/day (including effluent from both domestic and trade sources but excluding any allowance for non-resident population). This is roughly equivalent to a population of 25,000.

This table excludes all sewage treatment works operated under PPP that meet the above load criteria.

The following works are included for the first time as they have come under Scottish Water ownership during the year and meet the criteria for table E9:

- STW001223 Allanfearn WwTW NH711475
- STW001527 Persley WwTW NJ906098
- STW001543 Nigg WwTW NJ964046
- STW001569 Peterhead WwTW NK127442

31.2 Performance Trends

31.2.1 Lines E9.0 & E9.0a - Name and Operational Area

These lines report the specific large non-PPP sewage treatment works for this reporting year with their operational area noted. Changes in the reported list of assets reflect the variation in both domestic, tanker, and trade effluent loads received at these works. The listed assets reported in Line E9.0 are aligned with those reported in Line E8.7.

The number and list of large non-PPP sewage treatment works has increased to 25 sites with the addition of Nigg, Persley and Peterhead WwTW that have changed in the Works & Asset Management system (Ellipse) from Ownership PFI to Scottish Water between AR22 and AR23

Large sewage treatment works are defined as those that receive an average loading in excess of 1,500 kg BOD/day which is approximately equivalent to a population of 25,000.

31.2.2 Lines E9.1 & E9.2 - Annual average resident connected population

These lines have been sourced from the same data that contributes to the measured household, unmeasured household and tourist population in Table A. The Confidence Grades for these lines are allocated as B2 and B3, respectively. The source data for line E9.2 has changed this year from the non-household (business) PE, which has been reported in previous Annual Returns, to the non-resident (tourist) population to follow the definition provided. The confidence grade of B3 remains appropriate.

31.2.3 Lines E9.3 & E9.4 - Trade effluent and Tanker loads received by works

Trade effluent load figures are shown solely in Line E9.3, therefore there is no overlap with Line E9.4. The Confidence Grades for these lines are allocated as B4 and B3, respectively.

E9.5 Population equivalent of total load received

The overall population equivalent of the total load received increased by 448k from 2,141k to 2,589k from AR22 with the addition of Nigg, Persley and Peterhead WwTW that have changed in the Works & Asset Management system (Ellipse) ownership from PFI to Scottish Water between AR22 and AR23.

Changes to the population equivalent in '000, as reported in the E9.5, of each large STW are detailed in the Table 149 below. The largest changes were due to the P.E. from WwTW Sludge imports at Dunfermline, Kinneil Kerse and Troqueer WwTW. Dalmarnock PE increased by 20.4k due to increases in household, non-household and trade effluent P.E.

Table 149: Change in Population Equivalent.

Plant No	Site	AR22 '000 PE	AR23 '000 PE	Change
STW001223	ALLANFEARN WWTW NH711475		79.09	79.09
STW000011	ALLERS WWTW 1964 NS662561	35.843	37.3	1.457
STW001979	ALLOA WWTW NS887918	44.586	42.85	-1.736
STW000033	ARDOCH WWTW 2002 NS374758	58.459	62.43	3.971
STW000125	CARBARNES WWTW 1973 NS773539	49.925	48.46	-1.465
STW001975	DALDERSE WWTW 1966 NS903822	95.584	91.87	-3.714
STW000218	DALDOWIE WWTW 1974 NS672622	288.767	277.4	-11.367
STW000222	DALMARNOCK WWTW NS611627	161.029	181.41	20.381
STW001984	DUNFERMLINE WWTW 1973 NT121817	83.123	93.65	10.527
STW000265	DUNNSWOOD WWTW NS782771	30.118	30.1	-0.018
STW000281	ERSKINE WWTW NS494691	83.58	84.81	1.23
STW001989	GALASHIELS WWTW NT513351	33.861	34.22	0.359
STW000355	HAMILTON WWTW NS712575	65.824	62.58	-3.244
STW001491	INVERURIE WWTW 2001 NJ781203	25.245	25.87	0.625
STW001977	KINNEIL KERSE WWTW 2001 NS960811	48.738	71.35	22.612
STW001982	KIRKCALDY WWTW 1987 NT287923	59.386	60.28	0.894
STW000455	LAIGHPARK PAISLEY WWTW NS485655	96.085	96.1	0.015
STW001543	NIGG WWTW NJ964046		290.61	290.61
STW001527	PERSLEY WWTW NJ906098		53.94	53.94
STW001712	PERTH CITY WWTW 1971 NO147221	107.252	95.72	-11.532
STW001569	PETERHEAD WWTW NK127442		35	35
STW000576	PHILIPSHILL WWTW 1948 NS603560	68.128	72.05	3.922
STW000642	SHIELDHALL WWTW NS533659	594.006	562.36	-31.646
STW002268	STIRLING WWTW 1968 NS808935	69.202	69.21	0.008
STW000719	TROQUEER WWTW 1950 NX971745	42.064	30.25	-11.814
		2140.805	2588.910	448.105

The confidence grade of B3 remains the same as last year.

31.2.4 Lines E9.6-E9.10 - Compliance

These lines report on regulatory compliance using consent data as taken from our corporate consents database. The most onerous of CAR or UWWT parameters was used to report.

The suspended solids consent is 100mg/l for most WwTW, which is equal to what was reported in AR22. Nigg and Peterhead, which have been added in AR23, have no suspended solids parameter and are therefore both reported as 0. There are also 6 WwTW whose BOD consent has changed from 75 in AR22 to 25mg/l this year – Alloa, Ardoch, Dunfermline, Erskine, Kinneil Kerse and Stirling. Kirkcaldy WwTW BOD consent has changed from 0 in AR22 to 25mg/l and Perth City from 30 to 25mg/l this year.

The Ammonia consent has changed from 40 to 19 mg/l at Erskine and 15 to 0 mg/l at Galashiels.

The Phosphate consent has changed from 0 to 2 mg/l at Allers, Carbars, Dunnswood, Galashiels, Hamilton, Inverurie and Philipshill and 0 to 1 mg/l at Daldowie and Dalmarnock WwTWs.

The Suspended Solids and BOD changes are a result of the suspended solids consent limit values that were missed in AR22 being identified and reported from Scottish Water's Power BI SEPA Licence report. In addition, some other consent limits have been identified that were recorded under the UWWTD standard, but previously not identified in the report. There has been a period of learning to fully understand the structure of the data in the licence report and develop the best methods to interrogate and extract data from it.

Confidence grades remain at A1, reflecting the fact that the data is obtained directly from our corporate consents database.

E9.11 Compliance with effluent consent standard

The compliance with consent percentage for Line E9.11 based on OSM regulatory samples from the SEPA system showed that 112 out of 25 works achieved 100% compliance, compared to AR22 where 7 out of 21 large WwTW achieved 100% compliance. The lowest compliance rate was found at Erskine WwTW which achieved 86% compliance.

The confidence grade of A1 remains the same as last year.

31.2.5 Lines E9.12-E9.18 - Treatment Works Category

These lines report the information held in the corporate asset inventory in relation to treatment type. We report 25 large sewage treatment works in Table E9; this corresponds with Line E8.7.

The Treatment Works Category identification remains unchanged from AR22 for the WwTW that were reported last year apart from Galashiels STW, which was incorrectly reported as having secondary activated sludge (E9.13) and not having secondary biological (E9.14) in AR22. In AR23 Galashiels is reported with 0 in line E9.13 and 1 in line E9.14.

The confidence grade of A1 remains the same as last year.

31.2.6 Lines E9.19-E9.22 - Sludge

The main areas of difficulty are inter-site sludge tankering and sludge treatment / conditioning. Therefore, lines E9.20 and E9.22 are completed based on a combination of: ABM analysis, direct cost capture by asset, and Scottish Water sludge model analysis. Confidence grades on lines E9.20 and E9.22 are lower (C3) than other E Table cost analysis due to these reasons.

As reported in Line E9.21, the following large sewage treatment works are designated as Sludge centres: Allanfean, Alloa, Dalderse, Daldowie, Dunfermline, Galashiels, Kinneil Kerse, Nigg, Perth

City, Shieldhall and Troqueer. The remainder of the large sewage treatment works, namely: Allers, Ardoch, Carbars, Dalmarnock, Dunnswood, Erskine, Hamilton, Inverurie, Kirkcaldy, Laighpark (Paisley), Persley, Peterhead, Philipshill and Stirling only treat their own sludge as reported in Line E9.19.

The Confidence Grades for E9.19 and E9.21 are A1.

31.2.7 Lines E9.23-E9.28 - Works cost

Analysis of functional costs for large sewage treatment works:

	2022/23	2021/22	Variance
	£m	£m	£m
Allanfearn	0.869	n/a	(0.869)
Daldowie	0.930	1.187	+0.257
Galashiels	0.337	0.187	(0.150)
Persley	0.227	n/a	(0.227)
Tertiary treatment	2.363	1.374	(0.989)
Allers	0.489	0.366	(0.123)
Alloa	0.489	0.458	(0.031)
Ardoch	0.395	0.375	(0.020)
Carbars	0.453	0.328	(0.125)
Dalderse	0.449	0.466	+0.017
Dalmarnock	1.932	2.356	+0.424
Dunfermline	0.358	0.326	(0.032)
Dunnswood	0.563	0.412	(0.151)
Erskine	0.690	0.685	(0.005)
Hamilton	1.030	0.792	(0.238)
Inverurie	0.670	0.463	(0.207)
Kinneil Kerse	0.479	0.505	+0.026
Kirkcaldy	0.798	0.723	(0.075)
Laighpark (Paisley)	0.886	0.848	(0.038)
Nigg	0.874	n/a	(0.874)
Perth	0.672	0.608	(0.064)
Peterhead	0.266	n/a	(0.266)
Philipshill	1.113	1.029	(0.084)
Shieldhall	2.801	2.489	(0.312)
Stirling	1.006	0.639	(0.367)
Troqueer	0.560	0.361	(0.199)
Secondary treatment	16.973	14.229	(2.744)
Direct large treatment works	19.336	15.603	(3.733)
General and Support	2.404	2.473	+0.069
Total large treatment works	21.740	18.076	(3.664)

The larger increases (>£0.2m) are explained as follows:

- The additions of Allanfearn
- Nigg WwTW, Peterhead WwTW and Persley WwTW
- Additional tank cleaning has been completed at Hamilton WwTW
- Higher energy costs due to higher unit prices at Shieldhall WwTW and Stirling WwTW
- New service agreements for the Nereda plant at Inverurie WwTW

The larger decreases (>£0.2m) are explained as follows:

- Optimisation of power usage at Daldowie WwTW
- The apparent lower SEPA costs at Dalmarnock WwTW are due to an invoice timing issue between AR22 and AR23. As such, the actual licence costs at Dalmarnock have not reduced; they have continued to rise year on year in line with SEPA's annual increases"

Confidence grades on Table E9, lines 23-28, are consistent with grades in the general E table commentary and remain consistent with 2021/22.

Confidence grades on lines E9.20 and E9.22 reflect the difficulty of separating costs relating solely to sludge activities at dual function works (sludge / wastewater treatment). The main areas of difficulty are inter-site sludge tankering and sludge treatment / conditioning. Therefore, lines E9.20 and E9.22 are completed based on a combination of: ABM analysis, direct cost capture by asset, and Scottish Water sludge model analysis. Confidence grades on lines E9.20 and E9.22 are lower (C3) than other E Table cost analysis due to these reasons.

31.3 Data

31.3.1 Data sources and confidence grades

Confidence grades in Table E9 are consistent with other grades in the Section E commentary and remain consistent with AR22. More detail is provided in the individual lines' descriptions.

31.3.2 Data improvement programmes

There were no notable data improvement programmes in AR23.

31.3.3 Assumptions used in forecast data

There are no forecast data for the Table E9.

32 Table E10 – Sludge treatment and disposal

32.1 Overview

The allocation of sludge treatment and disposal costs by disposal route relies on sludge movement data linked to financial data. The sludge movement data from the Gemini waste management system is linked to ABM costs to produce E10 cost analysis. Financial costs for this table are completed based on a combination of ABM analysis, direct cost capture by asset, and Scottish Water's sludge model analysis.

Sludge treatment and disposal is reported only for sludge treated and recycled or disposed of from Scottish Water's operational sites. Sludge disposal by PPP concessions is not reported in this table.

32.2 Performance Trends

E10.1 Resident population served

The resident population served by each sludge disposal route is reported on line **E10.1**.

The PE reported in line E10.1 has decreased from 2,492.0k to 1,317.642k. This change in the reporting method was made to bring E10.1 in line with E10.2, which reports sludge tonnages from Scottish Water's sludge treatment centres only, not PPP operated centres. Line 10.1 now only includes PE from Scottish Water's sludge treatment centres. This includes Nigg, Persley and Peterhead WWTW that have changed in the Works & Asset Management system (Ellipse) ownership from PFI to Scottish Water between AR22 and AR23. This has been reported to one decimal place in line with the rest of the E10 table and in the absence of any guidance in the definitions document.

To enable a comparison with last year, if the revised PE calculation method (only including population served by Scottish Water STCs) had been used in AR22, line E10.1 would have reported 833.0k instead of 2492.0k. This would have made the PE increase this year 484k (58%).

The confidence grade of C3 remains the same as last year.

E10.2 Amount of sewage sludge

This line reports the mass of sewage sludge across the noted disposal routes. The reported volume of 22.764ttds was derived from various internal data sources including our Gemini system. This is an increase of 67% from AR22.

For the Scottish Water sludge there was an increase of 4.48ttds in the volume of enhanced treated sludge produced. The reason for this is due to the Grampian PFI contract coming to an end and the volume from Nigg STC being incorporated into Scottish Water's reported figures.

Similarly, an increase in the volume of conventionally treated sludge produced from the previous year by 1.3ttds is due to the PFI Highland contract finishing and the material from Allanfearn being included in the Scottish Water reported figures.

It has been identified that the method Scottish Water used to calculate the ttds exported to land restoration last year excluded a small proportion of raw cake. This has been rectified and has resulted in an extra 3.4 ttds being included in this year's totals of material being recycled to land restoration.

A significant reliance is still placed on the use of land restoration outlets due to untreated/non-compliant sludge cakes at a number of Scottish Water operated sludge treatment centres.

0.4 ttds of untreated/raw sewage sludge cake continues to be landfilled in the Shetland Islands.

The confidence grade of B4 remains the same as last year.

32.2.1 Lines E10.3-E10.9 - Sludge Treatment and Disposal Costs

E10.9 - Sludge Treatment and disposal: Functional Expenditure

	Total
Functional expenditure:	£m
2022/23	21.111
2021/22	16.569
Variance	(4.542)

Sludge treatment costs have increased by £4.5m (27%) from 2021/22. Key variances include:

- The inclusion of former PFI works from the Highland and Grampian PFI schemes added £2.3m to Scottish Water's core sludge treatment and disposal costs
- £1.1m higher chemical costs, due primarily to price inflation
- £0.6m increase in fuel and vehicle maintenance costs
- £0.5m increase in general and support costs primarily driven by employment cost increases and general price inflation

Scottish Water incurs costs associated with the transportation of sludge from its own sewage treatment works to PPP sludge treatment centres. These costs have been reported within E3a.20 with the corresponding sludge loads reported in E3.

The allocation of sludge treatment and disposal costs by disposal route relies on sludge movement data linked to financial data. Scottish Water links sludge movement data from the Gemini waste management system to ABM costs to produce E10 cost analysis.

Analysis of sludge treatment costs by disposal route:

	2022/23	2021/22	Variance
	£m	£m	£m
Farmland:			
Untreated	0.000	0.000	+0.000
Conventional	2.086	0.652	(1.434)
Advanced	6.626	4.961	(1.665)
Incineration	0.000	0.000	+0.000
Landfill	1.084	0.758	(0.326)
Composted	0.000	0.000	+0.000
Land reclamation	11.315	10.198	(1.117)
Other	0.000	0.000	+0.000
Total	21.111	16.569	(4.542)

An increase in costs for disposals via Farmland conventional is primarily due to higher volumes through this route because of Allanfearn, previously Highland PFI, transferring into Scottish Water control during the year. Similarly, Farmland advanced incurred higher volumes during the year primarily because of Nigg, previously Grampian PFI, transferring into Scottish Water control on 1 October 2022.

There was also an increase in costs to Land reclamation in the year, resulting from higher volumes across several sites, including Cumnock Underwood, Laighpark Paisley and Girvan.

Confidence grades on Table E10 are consistent with grades in the general E table commentary and remain consistent with 2021/22.

Sludge cost analysis by ultimate disposal route requires analysis of all sludge treatment, tankering and disposal costs by works, linked to intermediate works (where applicable) and ultimate disposal route. Certain costs are clearly captured by works with identified disposal route. However, certain costs are not fully captured directly against sludge. The main areas of difficulty are inter-site sludge tankering and sludge treatment / conditioning at dual function works (sludge / wastewater treatment). Table E10 is completed on the basis of a combination of: ABM analysis, direct cost capture by asset, and Scottish Water sludge model analysis. Confidence grades on Table E10 are lower (B2) than other E Table cost analysis due to these reasons.

32.3 Data

32.3.1 Data sources and confidence grades

The resident population reported is the total resident population served by Scottish Water's treatment works, and excludes resident population served by PPP works. However, much of the sludge from the population served by Scottish Water treatment works is treated and disposed of through PPP concessions.

The quantity of sludge is taken from Scottish Water's Gemini tanker movement system (except one discharge to one PPP works via a metered pipeline) which records and tracks sludge from point of production to point of disposal. Sludge is moved by Scottish Water's contractors, and all tanker loading is metered. Sludge is moved by specialist transport for which weigh-bridging or tanker-metering is recorded.

Confidence grades are detailed in the Comments section where relevant.

32.3.2 Data improvement programmes

There have been no notable data improvement programmes in AR23.

32.3.3 Assumptions used in forecast data

There is no forecast data for Table E10.

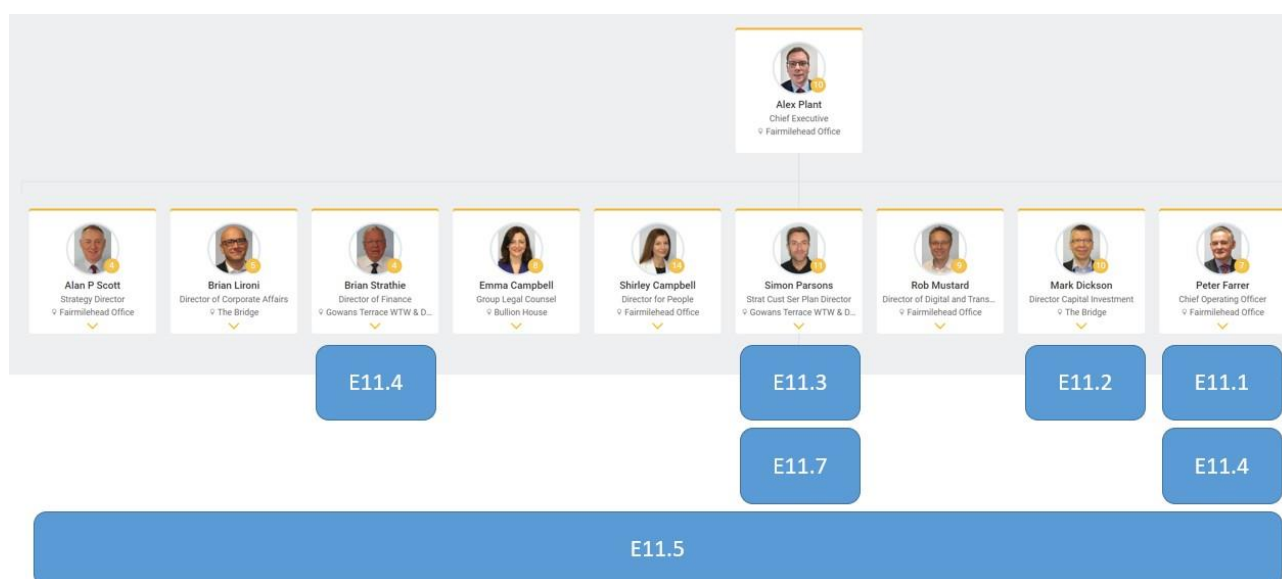
33 Table E11 – Employee numbers – Full-time equivalents

33.1 Overview

This table contains the number of full-time equivalent employees as of the end of March 2023; the split of data is explained in each line, as necessary.

The Row Headings in table E do not mirror the current organisation structure within Scottish Water therefore the total for each line is either a subset of a business area or is calculated by combining multiple business areas. These combinations are described in the narrative below (Figure 69).

Figure 69: Organisation structure and row ownership for Table E11.



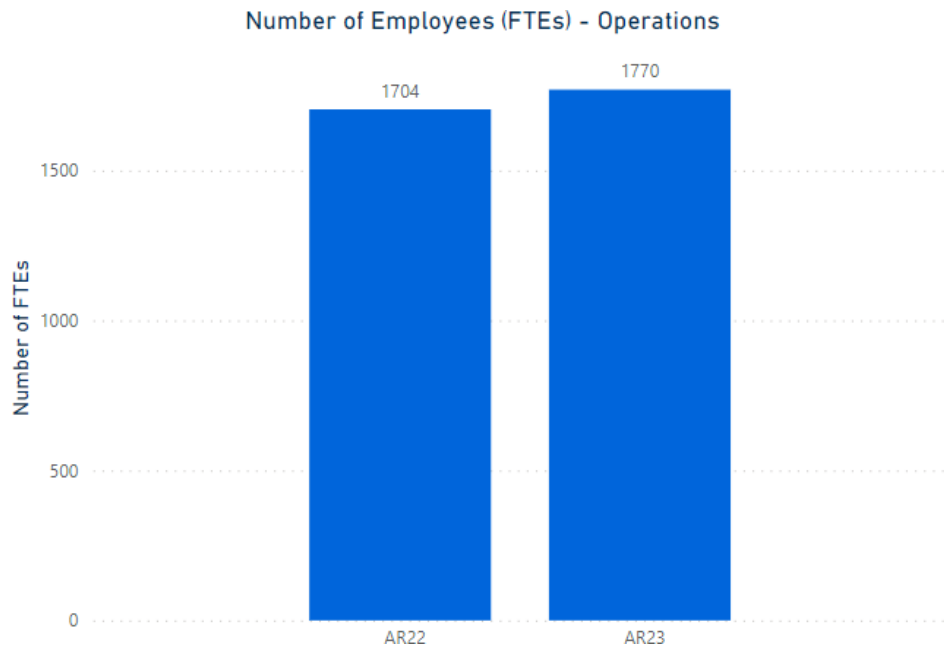
33.2 Performance Trends

33.2.1 Lines E11.1-E11.6 - Delivery of water and wastewater services

E11.1 – Operations

The FTE figures contained with Section 11.1 are for the main Water and Wastewater Operations function of Scottish Water. This excludes the focused Customer Service teams such as Contact Centre & Customer Experience and Field, Water and Sewer Response Teams which are captured in Section 11.4. These figures exclude Directors and Managers which are contained within Section 11.5 and include Grampian FTEs. The number of employees (FTE) in this category is 1770. Figure 70 below depicts the change in total number of employees (FTE) across AR22 and AR23.

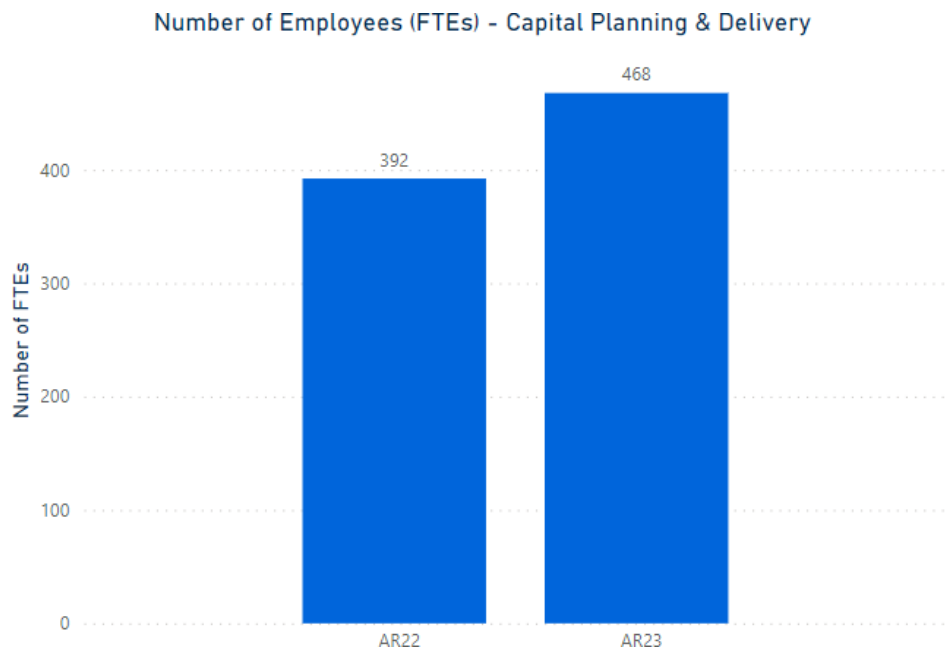
Figure 70: Change in number of employees (FTEs) in operations across AR22 and AR23.



E11.2 - Capital Planning and Delivery

This section contains the FTE for Scottish Water's Capital Investment Planning and delivery Teams. The focus areas include Capital Investment (Planning and Portfolio Management), Delivery, Commercial, Procurement and Specialist Services. These figures exclude Directors and Managers which are contained within Section 11.5. The number of employees (FTE) in this category is 468. Figure 71 below depicts the change in total number of employees (FTE) in Capital Investment only across AR22 and AR23.

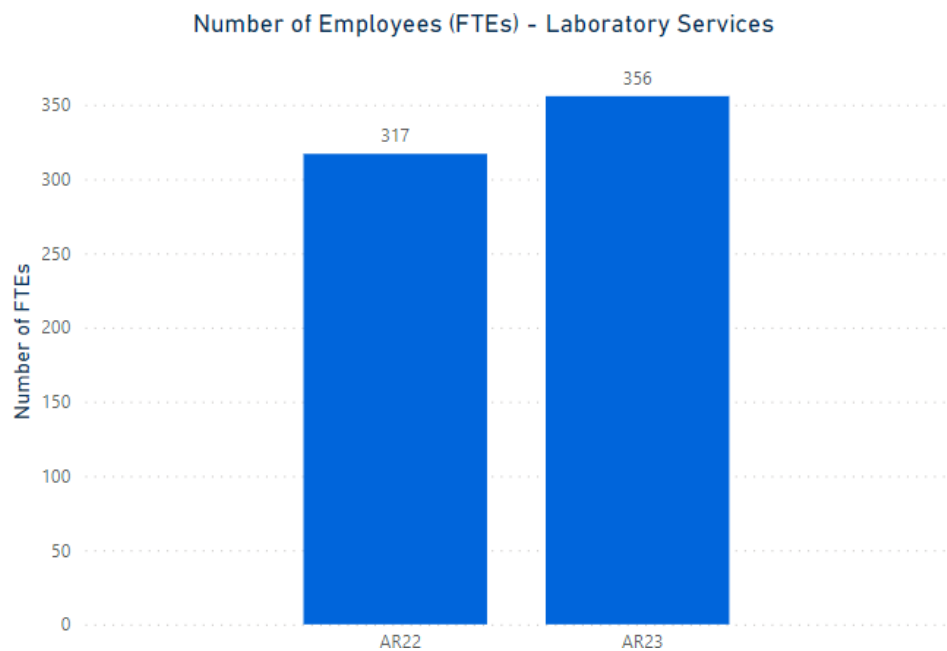
Figure 71: Change in number of employees (FTEs) in capital planning and delivery across AR22 and AR23.



E11.3 Laboratory Services

Section 11.3 captures the FTE for Scottish Water's Scientific Services Function. Within this Business area the focus is on Water and Wastewater Sampling and Quality Assessment (Laboratory Services). Research & Development and Lean Management Services are also part of this Business Area. These figures exclude Directors and Managers which are contained within Section 11.5. The number of employees (FTE) in this category is 356. Figure 72 below depicts the change in total number of employees (FTE) in Laboratory services across AR22 and AR23.

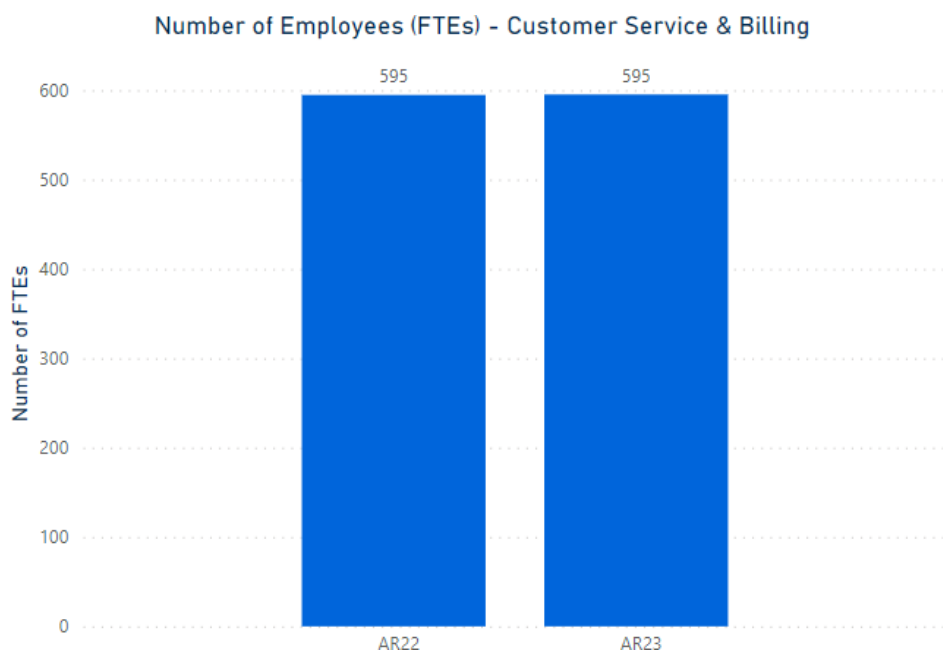
Figure 72: Change in number of employees (FTEs) in laboratory services across AR22 and AR23.



E11.4 Customer service and billing

This includes the FTE associated with the focused Customer Service teams such as Contact Centre & Customer Experience and Field, Water and Sewer Response Teams. The FTE captured under the category of Billing consist of Wholesale Services (Billing and Management). These figures exclude Directors and Managers which are contained within Section 11.5. The number of employees (FTE) in this category is 595. Figure 73 below depicts there has been no change in total number of employees (FTE) for Customer service and billing across AR22 and AR23.

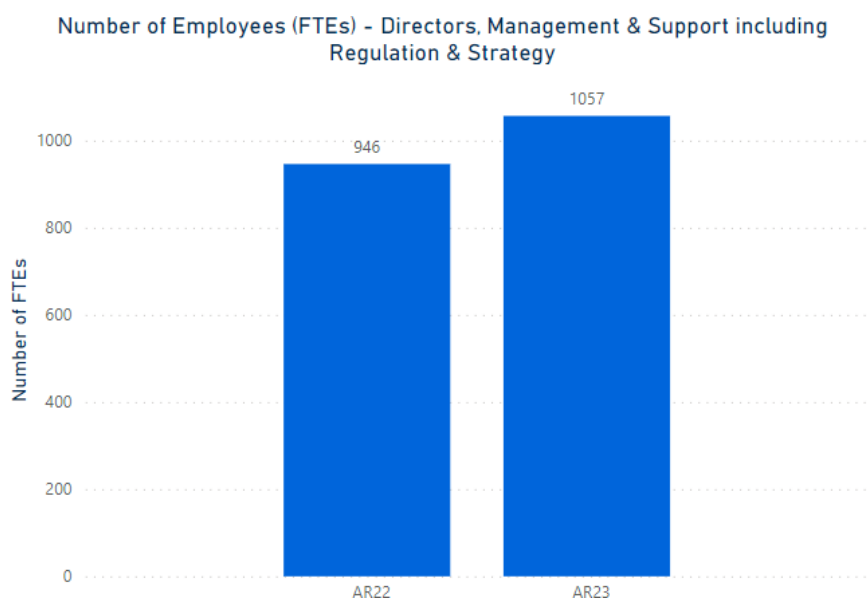
Figure 73: Change in number of employees (FTEs) in customer service and billing across AR22 and AR23.



E11.5- Directors, management and support including regulation and strategy

Under section 11.5 the FTE associated with Scottish Water's CEO, Executive Directors and Directors, General Managers and Business Managers (including Grampian) is recorded. Further to this support functions including Finance, People, Corporate Affairs Digital, Transformation, Strategic Customer Service Planning and Strategy & Commercial are also captured. Scottish Water Horizons (Non-core service) is excluded from these FTE figures. The number of employees (FTE) in this category is 1057. Figure 74 below depicts the change in the FTE associated with Scottish Water's Directors, management and support including regulation and strategy across AR22 and AR23. The increase in this area is due to the growth within the business which is mainly driven by Transformation.

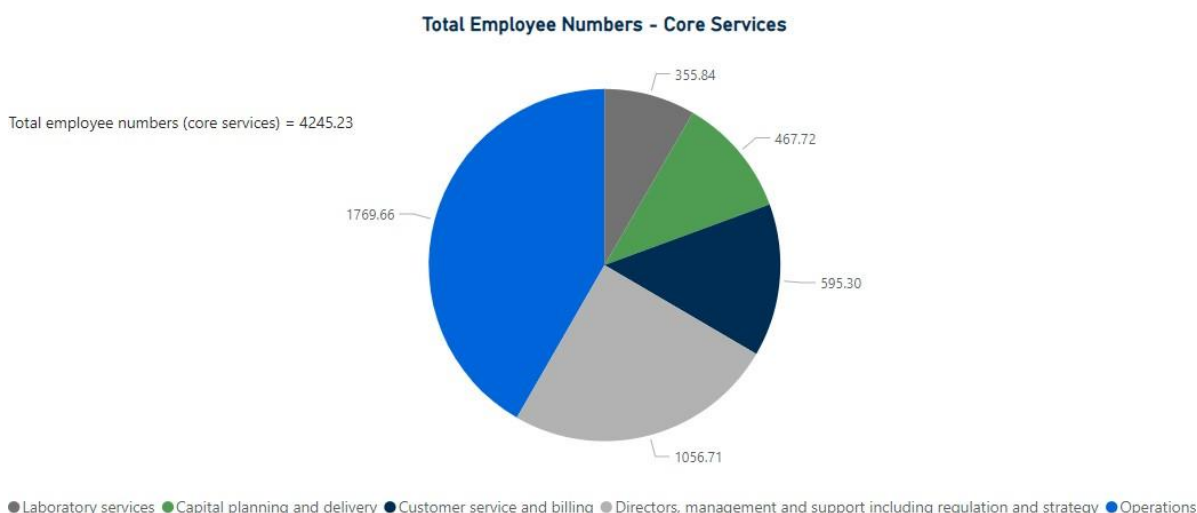
Figure 74: Change in number of employees (FTEs) in directors, management and support including regulation and strategy across AR22 and AR23.



E11.6 – Total employee number (core services)

The total FTE of employees working in water and wastewater services delivery, as contained within Sections 11.1 to 11.5 is 4245. The breakdown of this total number is shown in Figure 75 below.

Figure 75: Breakdown of employee numbers working in water and wastewater service delivery for AR23.



E11.7 – Total employee numbers (commercial and non-core services)

The total FTE including non-core service, Scottish Water Horizons (and Horizon Managers) and Capital Alliances (formerly Scottish Water Solutions) 67 FTE.

PLEASE NOTE: The above represents Scottish Water's FTE for Employees only and does not capture the FTE associated with Contingent Workers consisting of Agency and Consultants/Contractors. These are deployed across Scottish Water and total 317 FTE as of 31 March 2023.

33.3 Data

33.3.1 Data sources and confidence grades

All data has been sourced from Scottish Water's corporate HR system (Workday) as of March 2023, and has therefore been given a confidence grade of A1.

33.3.2 Data improvement programmes

There have been no notable data improvement programmes in AR23.

33.3.3 Assumptions used in forecast data

There is no forecast data for Table E11.

Section G – Investment

34 Table G1 – Summary: Investment

34.1 Overview

Scottish Water's investment programme is one of the largest infrastructure programmes in Scotland – delivering the vital assets that enable us to maintain and improve the water and wastewater services people depend on every day - and supporting growth and development to ensure that communities can flourish now and in the future.

The investment Planning and Prioritisation framework sets out how investment needs are prioritised and developed and how projects and programmes to meet the prioritised needs are identified and delivered ([Water industry: governance note 2021 to 2027 - gov.scot \(www.gov.scot\)](https://www.gov.scot/publications/water-industry-governance-note-2021-to-2027/pages/1-to-4.aspx)). Progress with the development and delivery of the Capital Investment programme is monitored quarterly by the Investment Planning and Prioritisation Group (IPPG), the Delivery Assurance Group (DAG) and associated Working Groups.

Over 2022-2023, three new needs were approved by Ministers for inclusion in the Development List (the list of needs and opportunities that have been prioritised for development – this can be found on the Scottish Government Objective Connect platform) following IPPG endorsement.

Each quarter we report to IPPG on our progress in developing interventions to address the needs on the Development List. Our The indicator of overall Progress towards the Committed List (PCL) is a high-level measure of the overall volume of intervention development relative to what is required for expected investment levels in future years. This measure assesses whether we are promoting sufficient volumes through the stages in each of its development pathways.

PCL was created using a top-down approach by splitting the investment profile between each development pathway. PCL tracks the impact of project forecasts on future investment levels.

PCL was set at 100% to achieve the required investment profile in future years. A score of less than 100% indicates that the rate of overall progress in developing interventions may not be sufficient. A score of more than 100% indicates that the rate of overall progress is more than sufficient to achieve planned investment. Changes may occur due to 'positive' or 'negative' attrition. 'Positive attrition' occurs if forecast costs for an intervention have reduced or if the required delivery timescales have been extended. 'Negative attrition' occurs if forecasts costs have increased, or additional evidence is required which extends the project appraisal process.

At the end of 21/22, PCL out turned at 117% indicating that we are developing sufficient volumes of investment across the programme to achieve planned investment in future years. Further detail on this measure can be found in Section 13 of this document.

Over the course of the year projects of a total value of £299m were committed for delivery and were added to the Committed List (the list of projects and programmes Scottish Water has committed to deliver - this can be found on Objective Connect and Table G6). In addition, programmes of work increased by £547m. The total value of the Committed List, at the end of March 2023 was £2,093m (Table G6).

Progress in delivering the Committed List for projects over £1m² is measured at high level by our Indicator of Progress of Overall Delivery (IPOD), which assesses the progress of investment projects monitored by DAG across 3 delivery milestones³ combining this information to give an overall score. At the end of March 2022 IPOD out turned at 609 points (Line G4b.40), within the target range of 564 to 683 points.

Table G1 summarises actual and forecast investment over the 6-year SR21 period. The table breaks down the investment into Repair & Refurbishment, Asset Replacement, Growth, Enhancement, Support and Completion.

It also provides actuals and forecasts for Grants and Contributions, Infrastructure Charge Contributions, Unallocated Investment and Annual OPEX impact.

Additional sections on the table break investment down by Risk/Overhead/Direct Costs, Primary Purpose, Repair and Refurbishment Summary, and the breakdown of Investment breakdown by Tiers 2 and 1a.

At the end of 2022/23 SW's Tier 2 planned investment was £687m⁴ up from £621m in 2021/22 (sum of Lines G1.76 and G1.77), and towards the top end of the range of £620m - £690m set out the Scottish Water Delivery Plan⁵.

When we include responsive repair and refurbishment expenditure it was £880m, up £105m on the AR22 (line G1.78). The equivalent total investment in 2017/18 prices is £718.1m.

We have successfully delivered year on year growth in investment which has only been possible by us putting in place the following:

- upskilling our people and working in collaboration with our supply chain partners to bring in new skills, greater capacity and capability into the construction sector
- embracing innovation and maximising on the benefits brought from digital construction rehearsals; off-site manufacture; new water and wastewater technology; and innovative construction techniques
- addressing the challenge of reducing embodied carbon with our partners trialling net zero construction sites
- Putting in place our, Transforming of Future Delivery' projects such as 'Get to Site in Half the Time'
- Scottish Water and its partners taking the opportunity to engage with communities before; during and after the delivery of projects - enhancing our reputation in communities and leaving them with knowledge of the importance of their local infrastructure

A significant proportion of our planned investment (£405m or £330m in 17/18 prices – the sum of lines G1.16 and G1.73) has been in the refurbishment and replacement of existing assets. We have also invested in enhancing our asset base to support, for example, water quality and improve environmental performance (£182m or £149m in 17/18 prices) (sum of Lines G1.55 and G1.57) and to facilitate growth (£75m or £61m in 17/18 prices) (Line G1.21)

Note: all figures are rounded to whole numbers.

² At the time of inclusion in the Committed List

³ These are start on site, gate 100 (acceptance) and gate 110 (financial close)

⁴ Value takes account of payment received from a contractor for defective work that occurred some years ago (£-6.7m)

⁵ Revised range contained in the [Interim Report and Accounts: Performance and Prospects for the six months to 30 September 2021](#)

34.2 Performance Trends

All values reported on G1 and in the commentary are in outturn prices unless explicitly stated.

Retrospective changes to previously reported actuals

As detailed below on a section-by-section basis, retrospective changes to the 2021-22 previously reported actuals have occurred. The G tables reflect our current best view of the 6-year investment period categories. While changes to project categorisation through the project lifecycle are expected to occur regularly, there have been changes due to the implementation of the SR21 programme (particularly classification of AR3 projects that were initiated in the SR15 period). Substantial changes as seen in this year's return are not expected to occur at the same level in future returns.

Project classification changes can be caused for the following reasons:

- Upgrade to Unifier functionality. This allowed SR21 project investment to be split across multiple needs / driver / purpose. This is an improvement in the accuracy of the programme and more accurately reflects larger projects contributing to the delivery of multiple needs within the programme
- Management Approach Reviews. Internally, regular Management Approach reviews are conducted with the Management Approach owners. These reviews highlight any data incorrectly assigned to a Management Approach and where necessary this has been changed. AR3 projects that started in SR15 (prior to the current system of Need and Management Approach mapping) and have been remapped to SR21 Needs have formed a substantial number of these changes
- Assessment of projects through the Capital Analysis Form process. As part of the Gate 90 and G110 approval process, projects are assessed in detail to determine how much of the work is refurbishment, replace or repair. This can lead to changes in the categorisation of projects between the AR3 categories and could potentially change the project from being Tier 1a or Tier 2
- Review and assessment of projects generated through the Non-Complex Service Delivery app. One of the improvements put in place over the previous years has been the introduction of an app to promote projects through the Non-Complex Service Delivery route. This enables projects to be raised quickly by the CSD teams and gives greater granularity of projects which would have previously been part of 'block lines' and not visible. Reviews have indicated that categorisation of some projects generated through this app needed to be changed and the app updated to improve the accuracy of the categories at project initiation
- Scope change. During the project lifecycle the scope of work may change to incorporate different refurbishment, replacement or repair activities. This is generally updated at gate review changes where scope changes are approved

34.2.1 Lines G1.01-G1.12

These lines break down Repair and Refurbishment investment into: Water, Wastewater and General (mainly property) and then further into Inspections and Testing, Repair and Refurbishment. The total in the report year in this category is £316.0m. The total for the SR21 period is £1,182.8m. Additional investment is expected in this category which is identified on G6 – Column 18 as Non-live.

There have been retrospective changes to 2021-22 values due to project recategorisation. This has reduced the 2021-22 investment across these lines from £246.3m to £237.7m. Comparing G6 and G1 from AR22 and AR23.

Projects having a significant impact are:

- 500573 – Tullich WOA Oban North and South TWS – reassessed as replacement G1.13 with a spend in year of £2.3m
- 501237 Knockfell SR – Outlet Trunk Main reassessed as replacement G1.13 with a spend in year of £1.6m
- 502067 Perth City WwTW HC Sewer reassessed as replacement G1.14 with a spend in year of £0.9m
- 515409 Swinstie WwTW Trunk Sewer reassessed as replacement G1.14 with a spend in the year of £0.8m

Within the categories 511695 Ironworks Capital Maintenance has been split across Water G1.02 and G1.06 having an impact of £5.5m – This change and other similar changes has been facilitated by Unifier upgrades to allow projects to be assigned and drawdown from multiple needs.

Compared to the forecast from the previous year for 2022-23, Repair and Refurbishment investment has increased from £258.3m to £316.0m. This is mainly due to new projects being added to the programme and where Repair and Refurbishment requirements have been identified during the year. An example of this is 521639 Daer Reservoir Core Drainage PPD with a spend in year of £9.4m where investment was required to make emergency repairs to the dam.

The forecast total for the Repair and Refurbishment programme has increased by £230.3m from £952.5m to £1,182.8m. This is due to new repair and refurbishment requirements being identified. This is expected to continue to increase throughout the SR21 programme as new repair and refurbishment requirements are identified through inspections and emerging issues.

34.2.2 Lines G1.13-G1.16

These lines break down Asset Replacement into Water, Wastewater and Business Services. The total in the report year in this category is £281.6m. The total for the SR21 period is £1,477.2m. Additional investment is expected in this category which is identified on G6 – Column 18 as Non-Live.

There have been retrospective changes to 2021-22 values due to project recategorization. This has increased the 2021-22 investment across these lines from £217.5m to £223.7m.

As above this is predominately due to projects moving from repair/refurbishment to replacement:

- 500573 – Tullich WOA Oban North and South TWS – reassessed as replacement G1.13 with a spend in year of £2.3m
- 501237 Knockfell SR – Outlet Trunk Main reassessed as replacement G1.13 with a spend in year of £1.6m
- 502067 Perth City WwTW HC Sewer reassessed as replacement G1.14 with a spend in year of £0.9m
- 515409 Swinstie WwTW Trunk Sewer reassessed as replacement G1.14 with a spend in the year of £0.8m
- 504505 TWS Asset Repair Mission has been reassessed as Asset Support G1.33 with a spend in the year of £1.4m

Compared to the forecast from the previous year, Replacement investment has increased from £263.1m to £281.6m. This is due to a combination of new projects +£47.5m, re-categorisation +£6.1m and variance in investment on existing projects -£35.2m.

Across the SR21 programme, an additional £407.1m of Replacement investment has been identified at project level taking the total from £1,070.1m to £1,477.2m.

34.2.3 Lines G1.17-G1.21

These lines break down Growth into Water and Wastewater Growth and Service Relocations Water and Wastewater. The total in the report year in this category is £75.2m. The total for the SR21 period is £583.5m. Additional investment is expected in this category which is identified on G6 – Column 18 as Non-Live.

There have been small retrospective changes in this programme area, with the spend in 2021-22 remaining at £57.0m.

Growth investment in 2022-23 out turned at £75.2m, £5.9m less than the £81.1m forecast in the previous year. Projects having a significant impact were:

- 502358 Black Esk and Winterhope -£3.4m less than forecast (in year reduction),
- 403658 Darnley Mains Development -£2.3m less than forecast (overall cost reduction),
- 506864 ICF Forres Strategic Water £1.5m less than forecast (project stopped and removed).

This has been offset by:

- 508752 Perth City WwTW additional £2.4m in year and
- 403967 Winchburgh WwTW with an addition £2.3m in the year.

34.2.4 Lines G1.22-G1.32

These lines break down Enhancement into the Ministerial Objective categories. The total in the report year in this category is £121.3m. The total for the SR21 period is £1,230.1m. Additional investment is expected in this category which is identified on G6 – Column 18 as Non Live.

The investment in 2021-22 has reduced from £113.4m to £112.1m. This is mainly due to the non-Completion element of 502132 Burncrooks WTW being assessed as Replacement rather than Enhancement with an impact of -£3.0m. This has been offset by:

- 513744 Hopes WTW – UV plant being assessed as Enhancement +£0.5m
- 521629 Stornoway WTW Drought Contingency being assessed as Enhancement +£0.4m
- 503061 Camphill Spillway Improvements being assessed as Enhancement +£0.4m and other minor changes

Enhancement investment in 2022-23 has reduced from £125.8m to £121.3m. Projects with a significant impact are:

- 518148 Highland PFI FMV payment £6.7m less than forecast
- 503755 Energy Efficiency Programme £1.7m less than forecast
- 502586 Turret WTW Legacy Sludge £1.6m less than forecast

This has been offset by: 5029502 Lead Comms Replacement a new project with a spend in year of £3.2m.

Across the SR21 Programme, forecast Enhancement investment has increased from £828.0m to £1,230.1m. This is primarily in the Drinking Water and Standards of Service Programme. In the Drinking Water programme with an increase of +£211.43m in total:

- 504549 Black Esk WTW +£50.1m
- 505409 Bradan WTW +£43.5m
- 505574 Rawburn WTW +£33.9m
- 511832 Glendevon WTW + £20.9m
- offset by 515849 Daer WTW - £22.2m

In the Standards of Service programme, with an increase +£130131.01m in total:

- 502327 Dolphin Road Glasgow +£9.3m
- 512555 Bertha Park Strategic Wastewater Infrastructure +£9.0m
- 503063 Assynt WOA Maryburgh Trunk Main +£8.0m
- other smaller increases

34.2.5 Lines G1.33-G1.36

These lines break down Support into the Direct, Indirect and Non-asset Support. The total in the report year in this category is £24.6m. The total for the SR21 period is £103.8m. Additional investment is expected in this category which is identified on G6 – Column 18 as Non-live.

The investment in 2021-22 has increased from £22.3m to £25.6m. This is primarily due to:

- 504505 TWS Asset Repair Mission moving from Replacement to Support +£1.4m
- 508494 Infrastructure Programme moving from Replacement to Support +£0.4m
- 510600 Digital Ad Hoc Repairs and Specials moving from Repairs to Support +£0.4m
- and other minor changes

Support investment in 2022-23 has increased from £21.4m forecast previously to £24.6m. Significant additional investment in the year has occurred with projects:

- 511541 CWA Integrated Wedge +£2.7m
- 503102 ESD Incentivisation +£2.5m
- 517435 LAD01 – Developer Connections +£2.3m
- 521642 I PPD Deploy – GTS Flooding & DV2ID +£1.9m
- and IPPD – Phase 1 (Understand & Incubate) +£1.8m
- This has been offset by 511527 SR21 Overhead Allocation is £7.7m lower than forecast (due to the large volume of projects passing through approval gates) and Supplier Rebates (a negative cost) have been higher than expected -£4.7m
- Other minor changes

Across the SR21 Programme, Forecast Support investment has increased from £80.4m to £103.8m. Projects having a significant impact are:

- 513880 NIS Regulation Compliance +£7.2
- 517435 LAD01 – Developer Connections +£3.5m
- and 510600 Digital Ad Hoc Repairs +£3.0m
- This has been offset by reductions for 050059 - Supplier Rebates 2022-23 -£4.7m
- and 503102 ESD Incentivisation -£4.0m

34.2.6 Lines G1.37-G1.41

These lines break down Completion into SR10 Completion, SR15 Completion Enhancement, SR15 Completion Growth and SR15 Completion Exceptional Asset Maintenance. The total Completion investment in the report year in this category is £60.9m. The total for the SR21 period is £284.3m. It does not include the £13m reduction for investment planned after 2020-21 in the SR15 Table K. If this is included this would total £271.3m. This compares with the baseline for Completion of £290.7m.

Minor changes have occurred in 2021-22. This is primarily due to allocations associated with Incentivisation Lines for the Alliance contracts 503100, 503101 and 503102. The split for these codes is based on the size and makeup of their respective programmes.

Completion investment in 2022-23 increased from £58.4m forecast previously to £60.9m. Significant additional investment in the year has occurred on :

- 500523 Ayrshire Strategic Resilience +£3.1m
- 502100 PV Project Vesting SUDS +£2.3m
- 404132 Picketlaw WTW Main Out +£2.3m
- This has been offset by 5022301 Barhale Insurance Pay out £6.7m

The cost of the Completion Programme has increased from £244.2m to £284.3m. This is due to increases for:

- 404132 Picketlaw WTW – Main Out +£15.7m
- 403951 Rockcliffe BW +£11.6m
- 500523 Ayrshire Strategic Resilience +£5.0m
- 529861 Londornoch Sludge Lagoons +£2.9m
- Dalmanock WwTW Improvements +£2.1m
- South Edinburgh Service Resilience +£1.8m
- other smaller changes

This has partly been offset by 522301 Barhale Insurance Pay out - £6.7m.

Line G1.42

This line gives the forecast and actual OPEX impact for the 6-year period. The OPEX impact for the report year was -£0.8m and the total over the SR21 period is £8.1m. The negative values in 2022-23 are primarily due to forecast savings generated by 507173 Oracle ULA Exit -£1.1m, 501898 Cost Investment Intelligence Project -£1.0m. The OPEX savings are partly offset by increases in OPEX elsewhere which include 503291 IR18 Security Operations Tools +£0.5m, WTW Performance Enhancement Plans +£0.3m and Blairlinnans PSC TM Monitoring +£0.1m

Line G1.48

This line shows Grants and Contributions. All income in this category is Contributions to Infrastructure assets and totals £3.4m in the report year and is forecast at £43.2m over the SR21 period. Future years are estimated based on the run-rate over the previous 5 years.

The current year income is lower than run-rate due to external factors generating less income for Service Relocations.

Line G1.49

This line shows the difference between the allowed for investment from the Final Determination and the investment already allocated to projects or programmes over the 2021-27 regulatory control period. This totals £1,081.2m.

34.2.7 Lines G1.50-G1.62

These lines are calculated cells and summarise in the rows above. The total gross investment in the year is £879.5m and is £4,861.7m over the SR21 period. This excludes RCC and Non-live investment.

34.2.8 Lines G1.63-G1.66

These lines break down the total gross investment into Direct Costs, Project Overheads and Risk Allowance. This is not profiled and is in the table as a total.

Project overheads reflect the incremental portfolio, programme and project support costs which are not project specific. The costs are primarily driven by the Capital Investment and Strategic Customer Service Planning teams where the activities are directly associated with planning and managing the investment portfolio and programmes of work. The activities of the teams are captured through time recording and activity-based analysis to provide robustness to the cost analysis and ensure that only those activities which are incremental to the investment activities are allocated to the investment portfolio.

A proportion of other incremental business costs required to support these teams such as digital, property, HR and finance are also included. These support costs are allocated to delivery projects at a rate of 7% of their LBE (Latest Best Estimate). These indirect support costs projects should be fully allocated to delivery projects by the end of the regulatory period and have an LBE £0m. This is a standard business practice and was implemented at the formation of Scottish Water.

Risk registers for appropriate projects are developed and used to appropriately hold contingent sums for events that are likely to happen as projects are delivered – based on best practice and detailed experience of delivering capital projects. This results in risk allowances of £105m captured by the project teams within Scottish Water's Unifier system. These costs are captured using project level risk registers, included within the project LBE, and are identified through Scottish Water's PMO Risk Management Process. These are maintained and updated by the project teams. Generally, these allowances are expended as part of the normal delivery of the programme and management of risk.

34.2.9 Lines G1.67-G1.70

These lines split the investment into Primary Purpose: Water, Wastewater and General. 49% of investment in the year was Water, 40% Wastewater and 11% General.

As part of the capturing of SR21 driver codes aligned with Management Approach and Need, a number of projects, predominately Digital and Fleet, have been reassigned from 50% Water / 50% Wastewater to General. Projects with a significant impact include 509894 SR21 CVT Vehicle Replacement Year 1 +£8.3m additional in General, 511344 Field Service Transformation Project +£6.7m in General, 511792 PSTN Replacement +£4.7m additional in General and 512776 Exemplar WW Programme +£3.2m additional in General.

34.2.10 Lines G1.71-G1.74

These lines split the Repair and Refurbishment investment into: Responsive repair and refurbishment investment previously expensed as operating expenditure ('Tier 1'), Remaining

responsive repair and refurbishment investment ('Tier 1') and Planned repair and refurbishment investment ('Tier 2'). This totals the same as Lines G1.04, G1.08 and G1.12, £316.0m in the report year and £1,182.8m in the SR21 period.

34.2.11 Lines G1.75-G1.77

These lines split the total investment into Tier 1a and Tier 2. They further split the Tier 2 investment into Committed List projects (Named and Programmes) and Pre-committed List.

Tier 1a investment in the year is £193.0m, this is £0.6m more than reported from a statutory perspective. The statutory Tier 1a is £192.4m with the difference reflecting transfer of £0.6m previous year repair costs to replacement identified at completion of the projects.

Line G1.79

This line is a calculation of net Tier 2 investment excluding Asset Replacement and Support.

34.2.12 Lines G1.80 and G1.81

These lines provide the profiles of Water and Wastewater RCC investment. The high investment in 2023-24 is due to 1 project, NGIWMS Agreement with Glasgow Council, which is forecast at £4.8m in the year and is funded from RCC.

Line G1.82

This line provides the total gross investment including RCC as a historical comparison with previous returns. This totals £912.2m for 2022-23.

Line G1.83

This line reflects the Infrastructure Charge contributions for infrastructure assets. The actual for the current year is £17.0m and future forecasts of £18.9m for remaining years is estimated based on the previous 5-year run-rate.

34.2.13 Lines G1.84 and G1.85

These lines are calculations. Line G1.84 is the Total Contributions excluding Infrastructure Charge and Line G1.85 is calculated to provide the total Net Capital Investment.

34.3 Data

34.3.1 Data sources and confidence grades

The majority of data in Table G1 is sourced from the Table G6 list using the Projected Expenditure profile in columns 79 to 86. This is multiplied by the appropriate columns in the Table G1 Percentages Section (columns 113 to 161).

Calculations have been left in Table G1 to allow easier reference back to Table G6.

Lines not sourced from G6 are:

G1.42 Additional Operating Expenditure from Investment: This line is sourced from *Unifier* for the latest OPEX Impact for each project and the year(s) the operational expenditure impacts is calculated based on the Gate 100 date.

Grants and Contributions actual data is sourced from the *Finance and Billing System (FAB)*.

The live project data is based on project level forecasts and data from Scottish Water's systems and are accorded a Confidence Grade of A1. Non-live data is significantly less certain and has a Confidence Grade of B1. Estimates for future contributions have also been allocated a Confidence Grade of B1 as it is estimated based on run-rates.

34.3.2 Data Improvement Programmes

We continue to undertake data improvement initiatives across the Capital Programme. As part of an assurance exercise, some projects were re-tagged relative to their previous Need code to Project code mapping. As projects progress through the governance gates, the repair, refurbish and replacement categories are also assessed. This regularly occurs when the Capital Analysis Forms (CAF) are assessed by Scottish Water's Tax team. In some instances, this will change categories on previously incurred investment.

As part of ongoing data cleansing activities, we continue to increase the overall integrity of information captured within our systems for the circa 24,000 projects detailed in the return.

We also continue to look to improve cost and date forecasting within the *Unifier* system through system improvements with point of entry data validation and through enhanced reporting made available to the Project Managers, Quantity Surveyors, P6 Planners and Programme Managers.

Categorisation of projects continues to improve, and data anomalies encountered during the production of the Section G Tables will be fed back into either system or process improvements.

34.3.3 Assumptions used for forecast data

The forecast and actual profiles are based on project forecasts and assumes that these are the best estimates of the forecast cost of the programme for projects that are live.

Non-live investment identified on G6 – Column 18 as Non-live reflects the best estimate of demand for each Primary Need (split into Tier 1a and Tier 2).

While the actual Grants and Contributions are taken from the *FAB* system, the forecasts are based on the run-rate of the previous 5 years and extended for the remainder of the investment period.

35 Table G2a – Summary: Outputs by Ministerial Objective

35.1 Overview

Table G2a tabulates the outputs contained in Table G6 giving detail of the cumulative number each quarter.

35.2 Performance Trends

Scottish Ministers set objectives for Scottish Water to deliver across the regulatory period. The objectives can be found at <https://www.gov.scot/publications/scottish-water-directions-2020/> and cover the following themes.

- Long term water sector vision
- Standards of service
- Asset maintenance
- Supporting Sustainable Economic Growth
- Drinking Water
- Environment
- Circular Economy
- Flooding and surface water management
- Security and resilience
- Climate change, adaption and mitigation
- Private finance initiative funded projects

35.2.1 Lines G2a.001-G2a.227

These sections show outputs split by Ministerial Objective. Where no outputs have been identified for Ministerial Objectives, a blank output line has been added. This applies to: Asset Maintenance, Circular Economy and Flooding and Surface Water Management.

The activities carried out to allow Scottish Water to meet all Ministerial Objectives in 2021-22 and those planned for 2022-23 were presented to IPPGWG in November 2022 (IPPGWG 14-02 Appendix 1 - MO update and look ahead- provided as part of this submission for ease of reference). This will be updated and presented at the IPPGWG meeting in November 2023.

35.3 Data

35.3.1 Data sources and confidence grades

This data is sourced from Table G6. It totals the number of outputs (or output value) in column 15 of Table G6 using the Forecast Gate 100 Date in column 59. This is summarised on the report using columns 13 - Ministerial Objective (primary purpose) - and 17 - Output code.

Outputs reported in this table are either for projects achieving G100 or where the project is on the Named Committed List. SR15 Completion outputs that previously formed part of the DAGWG Graphs for SR15 reporting are excluded from this table and are included in Table G2b.

Calculations have been left in Table G2a to allow easier reference back to Table G6.

There are no confidence grades associated with Table G2a.

35.3.2 Data improvement programmes

Work is continuing to improve the population of output data across the Capital Programme. Data quality continues to improve as we embed output data into our internal processes and reporting.

35.3.3 Assumptions used for forecast data

Outputs are actualised or forecast to be achieved based on the G100 date.

36 Table G2b – Summary: Completion Investment

36.1 Overview

Table G2b shows the forecast for the Planned and Delayed SR15 Completion programme broken down into the output descriptions used in SR15. The population of projects and outputs is based on the position reported at the end of March 2021.

36.2 Performance Trends

36.3 Lines G2b.1-G2b.18 2015-21 outputs remaining that were planned to complete in the 2021-27 period – Planned

These lines show the cumulative outputs forecast for Acceptance (MS4 or G100) for all projects in the Planned Completion programme. Projects achieving RSO (MS5) before 1 April 2021 are excluded from this table.

As the criteria for inclusion in the baseline was the RSO (MS5) milestone being outstanding, 8 outputs already have Acceptance as shown in the Pre-2021-22 column.

36.3.1 Lines G2b.19-G2b.36 2015-21 Completion outputs remaining – Delayed

These lines show the cumulative outputs forecast for Acceptance (MS4 or G100) for all projects in the Delayed Completion programme. Projects achieving RSO (MS5) before 1 April 2021 are excluded from this table.

As the criteria for inclusion in the baseline was the RSO (MS5) milestone being outstanding, 67 outputs already have Acceptance as shown in the Pre-2021-22 column.

36.3.2 Lines G2b.37-G2b.40 SR15 Completion projects

Line G2b.37 shows the SR10 Completion projects remaining

Line G2b.37 counts projects rather than outputs and the calculations exclude the additional completion outputs. The starting point is shown in Pre-2021-22 and shows the 19 SR10 projects within the 143 Completion projects in the programme. At the end of 2022-23 6 SR10 Completion projects are pre G100 (MS4).

Line G2b.38 shows the total number of projects remaining at the end of each quarter

Line G2b.38 counts projects rather than outputs and the calculations exclude the additional completion outputs. The starting point is shown in Pre-2021-22 and shows the 124 SR15 and IR18 projects within the 143 Completion projects in the programme. At the end of 2022-23 35 SR15 Completion projects are pre G100 (MS4).

Line G2b.39 counts the number of projects remaining at the end of each quarter in the Planned Completion programme

Line G2b.39 counts projects rather than outputs and the calculations exclude the additional completion outputs. The starting point is shown in Pre-2021-22 and shows the 57 total projects in the programme. At the end of 2022-23, 14 projects remain to be delivered in the Planned Completion Programme.

Line G2b.40 counts the number of projects remaining at the end of each quarter in the Delayed Completion programme

Line G2b.40 counts projects rather than outputs and the calculations exclude the additional completion outputs. The starting point is shown in Pre-2021-22 and shows the 86 total projects in the programme. At the end of 2022-23, 27 projects remain to be delivered in the Delayed Completion Programme.

36.4 Data

36.4.1 Data sources and confidence grades

The table is generated using data from Table G6 using columns: 63 – Planned or Delayed Completion Projects; 64 - SR15 Output Name; and 76 – Forecast MS4 date.

The data source for the above columns is the OMD Calculations file from the end of March 2021 combined with the latest actual and forecast MS4 (Gate100) date for the output.

Calculations have been left in Table G2b to allow easier reference back to Table G6.

There are no confidence grades associated with Table G2b.

36.4.2 Data improvement programmes

SR15 Completion Projects continue to be closely monitored internally. These projects are subject to the same data improvement initiatives as those in the SR21 Programme.

36.4.3 Assumptions used for forecast data

Forecast dates are provided by project teams.

37 Table G2c – Summary: Outputs by Milestone

37.1 Overview

Table G2c tabulates the outputs contained in Table G6 giving detail of the cumulative number each quarter for milestones G90, SOS, G100 and G110. It compares the baseline where available against the latest forecast.

Table G2c also shows the SR15 Completion programme split into Planned and Delayed, SR10 and SR15, forecast and baseline with the SR15 Milestones MS1 to MS5.

At the end of Q4 2022/23 we had planned to have 80 of the 86 delayed SR15 projects through acceptance. 21 have still to achieve Gate 100 acceptance. Four of these are now forecasting acceptance in Q1 with a further three in Q2. A further seven projects are forecasting completion in the remainder of 2023/24. Two projects (Mannofield WTW and Easdale Cottages) forecasting acceptance later in the period to align delivery with other planned work in the programme.

Of the planned projects Two achieved acceptance in Q4. 43 projects have now achieved Gate 100 acceptance against a target for Q4 2022/23 of 52. Ten projects have been impacted by delays. Two of these projects are forecasting completion in Q1 with a further three in Q2. The remaining projects, except for Edgehead ST, WATER OF LEITH UIDs - BATCH 7 - Longstone CSOs and Kirkmichael WTW, are forecasting to be complete during 2023/24.

37.2 Performance Trends

37.2.1 Lines G2c.001-G2c.18161808

These sections show outputs split by Ministerial Objective. Where no outputs have been identified for Ministerial Objectives a blank output line has been added. This applies to: Circular Economy and Flooding and Surface Water Management.

37.2.2 Lines G2c.18171809-G2c.21762168

These sections show SR15 outputs as summarised on G2b and profiled by the SR15 milestones, MS1-MS5. Outputs are split into SR10/SR15.

37.3 Data

37.3.1 Data sources and confidence grades

Data is sourced from Table G6 using the baseline dates from the Committed List Named and Programmes and the forecast dates.

It totals the number of outputs (or output value) in column 15 of Table G6 using the Baseline and Forecast Dates in columns 32-34 and 56-60. This is summarised in the report using columns 13 - Ministerial Objective (primary purpose) and column 17 Output code.

Calculations have been left in Table G2c to allow easier reference back to Table G6.

There are no confidence grades associated with Table G2c.

37.3.2 Data improvement programmes

Work is continuing to improve the population of output data across the Capital Programme. Data quality continues to improve as we embed output data into our internal processes and reporting.

37.3.3 Assumptions used for forecast data

There is no G90 baseline date for projects on the Committed List as this is always the same as the G90 actual date. For the table, this field has been aligned with the forecast. Only projects that are on the Committed List (Named and Programmes) have baseline dates. If projects are not on either Committed List (for example Tier 1a projects) then they will not have a baseline date, but the actuals are reported when they achieved each milestone.

38 Table G3 – Number of Needs or Projects by Milestone

38.1 Overview

Table G3 shows the number of milestones forecasting to be achieved in each quarter for Gates 30 to 110, baseline and forecast for projects confirmed on the Named Committed List, Non-named Committed List, and Pre-committed List.

It also shows the number of projects remaining in the SR15 Completion Programme for each milestone.

38.2 Performance Trends

There are no projects that are Needs from Gate 30 onwards put on hold. There are also no Needs from Gate 30 onwards that do not require an intervention.

For the Confirmed on the Committed List section, only projects that are on the Named Committed list are included. The Gate 90 baseline is the same as the Gate 90 forecast as all projects currently on the Committed List Named have been added after Gate 90. The table is cumulative and only includes milestones achieved in the period.

For the Non-named (Programme and projects within programmes), the baseline dates pre- Start On-site are the same as the forecast. There is currently no baseline for Non-named Committed projects before they are added to the Committed List. Due to the Governance Runways used, almost all projects in the Non-named list do not go through Gate 30 to 80 and start at G90. 4,106 Non-named projects achieved Gate 90 in the year.

For Pre-committed List Named, the baseline dates Pre-start on Site have been aligned with the forecast dates, we do not have baseline dates for these projects until they are confirmed additions to the Committed List.

“Security and Resilience” has been changed to “Security & Resilience” to align with the other tables.

There is no section for Long Term Water Sector Vision.

38.3 Data

38.3.1 Data sources and confidence grades

Data is sourced from Table G6 using the Baseline and Forecast Dates in columns 32-34 and 51-60. This is summarised on the report using columns 13 - Ministerial Objective (primary purpose) and column 18 Committed List/Pre-committed List.

Calculations have been left in G3 to allow easier reference back to Table G6.

There are no confidence grades associated with Table G3.

38.3.2 Data improvement programmes

We continue to seek to improve milestone forecasting within our *Unifier* system through reporting metrics and data assurance reports.

38.3.3 Assumptions used for forecast data

Forecast milestones are based on the latest best estimate from the project teams.

39 Table G4a – Summary IPOD by Ministerial Objective

39.1 Overview

Table G4a shows the IPOD points broken down by Ministerial Objective, forecast and actual, cumulatively by quarter.

39.2 Performance Trends

At the end of 2022-23 Scottish Water had achieved an IPOD score of 609 points against a baseline of 632 points. More information on IPOD achievement by portfolio can be found in the section below.

39.3 Data

39.3.1 Data sources and confidence grades

Data is sourced from Table G6. It uses column 18 Committed List/Pre-committed List to determine if a project is on the Named Committed List, columns 32-24 for the baseline dates and columns 57 to 60 for the forecast dates. Column 13 Ministerial objective (primary purpose) is used to establish the Ministerial Objective category.

Calculations have been left in Table G4a to allow easier reference back to Table G6.

There are no confidence grades associated with Table G4a.

39.3.2 Data improvement programmes

There have been no data improvement programmes during 2021/2022.

39.3.3 Assumptions used for forecast data

Forecast milestones are based on the latest best estimate from the project teams.

40 Table G4b – Summary IPOD by Portfolio

40.1 Overview

Table G4b shows the IPOD points broken down by Portfolio, forecast and actual, cumulatively by quarter. This aligns with the reported IPOD position as detailed in the DAGWG report for 2021-22 Q4.

40.2 Performance Trends

At the end of 2022-23 Scottish Water had achieved an IPOD score of 609 points against a baseline of 632 points.

40.3 Data

40.3.1 Data sources and confidence grades

Data is sourced from Table G6. It uses column 18 Committed List/Pre-committed List to determine if a project is on the Named Committed List, columns 32-24 for the baseline dates and columns 57 to 60 for the forecast dates. Column 20 Portfolio is used to establish the Portfolio category.

Calculations have been left in Table G4b to allow easier reference back to Table G6.

There are no confidence grades associated with Table G4b.

40.3.2 Data improvement programmes

There have been no data improvement programmes during 2022/2023.

40.3.3 Assumptions used for forecast data

Forecast milestones are based on the latest best estimate from the project teams.

41 Table G4c – Detail IPOD

41.1 Overview

The table shows the IPOD data aligning with G6, G4a and G4b. It shows one line per IPOD milestone and can be used for calculating IPOD.

The IPOD indicator provides a high-level measurement of Scottish Water's progress in delivering the Committed List for projects over £1m. It assesses the progress of these investment projects monitored across 3 delivery gates combining this information to give an overall score with the intention of gaining and implementing learning and monitoring delivery. The overall capital programme is considered 'on track' if IPOD is within the forecast range.

Having been outside the range at the end of Q3 the IPOD indicator has recovered to be at 609 points, against a range of 564 to 683 points. For the 3 delivery gates, progress is: -

- Start On Site – 145 points against forecast range of 108 to 151, Committed List Baseline 137
- Acceptance - 233 points against a forecast range of 247 to 272, Committed List Baseline 260
- Financial Completion - 231 points against forecast range of 209 to 260 points, Committed List Baseline 235

It is evident from this that the 'Acceptance' (Gate 100) milestone remains outside the range, albeit with an improved performance from Q3 (14 outside the range compared with 35 last quarter). 17 projects that have not yet had acceptance signed off are now substantially complete and are forecasting acceptance in Q1, with a further 8 forecasting acceptance in Q2.

For the Acceptance G100 milestone, CE&FS and Support Services are on, or marginally ahead, of the Committed List Baseline while Water and Wastewater are behind.

Reason For Delay	CE&FS	Support Services	Wastewater	Water	Total
Additional scope required to complete	0	0	1	2	3
Construction risks realised	0	0	3	17	20
Design issues	0	1	0	2	3
Third party issues	0	0	13	9	22
Total Behind	0	1	17	30	48
Total Ahead	0	2	4	15	21
Net Behind	0	-1	13	15	27
Total Committed List Baseline	0	15	121	124	260
Percentage of Projects Behind		6.7%	14.0%	24.2%	18.5%

Additional scope required to complete: Due to the complex nature and size of some of the projects on the Committed List, it is inevitable that there will be additional scope items on a number of projects that are required before the Acceptance can be achieved (3 projects). The scope required for a project should be fully understood at Gate 90, however the nature of complex construction projects is such that there will be some 'scope creep'.

Construction risks realised: We have seen a number of projects, particularly in the water programme, where previously identified risks have materialised. We continue to undertake a 'lessons learnt' approach to this, ensuring that we continue to feed back any knowledge gained.

Design issues: There are only 2 projects that have been delayed due to design issues. Design risks should be mitigated pre-Gate 90, however infrequently errors are found during the construction phase where design errors need to be rectified.

Third party issues: This is the most frequent reason for delay and can involve land owner, planning and power issues as well as others specific to the project site.

We continue to work to understand, and learn from, risks to improve the forecast and delivery of new projects. When committing to the delivery of a project we balance the likelihood of delay due to risks against setting an over cautious target with the potential to lose focus on the need to drive delivery.

Water Portfolio G100

The Water Portfolio is behind the Committed List Baseline of 124 by 15 milestones at with 109 projects through Acceptance. 15 projects are ahead of baseline and 30 projects are ahead.

Listed below are the projects behind the Committed List Baseline and a summary of the reason for delay.

PROJECT ID	DESCRIPTION	BASELINE QUARTER	FORECAST QUARTER	REASON FOR DELAY
403991	SR15 ES - Newmore WTW - WQ and Essential Related CM Upgrade	2022_23_Q4	2023_24_Q3	Construction risks realised
403994	SR15 ES - Uig WTW - SR15 WQ	2021_22_Q4	2023_24_Q1	Design issues
404135	Dalwhinnie WTW - TTU	2022_23_Q4	2024_25_Q1	Third party issues
500246	Ringford WTW	2021_22_Q3	2023_24_Q1	Construction risks realised
500509	South Edinburgh Service Resilience	2021_22_Q2	2024_25_Q1	Construction risks realised
500245	Galashiels Manse Street WTW	2022_23_Q2	2023_24_Q3	Construction risks realised
501001	SR15 TE CM Staney Hill North - Q Sandy Loch WTW	2022_23_Q4	2025_26_Q1	Design issues
500892	Cowsrieve Service Reservoir	2022_23_Q1	2023_24_Q2	Third party issues
501070	Kirkmichael WTW - CM	2021_22_Q3	2027_28_Q1	Construction risks realised
500896	Craighead WTW - CM	2022_23_Q3	2023_24_Q1	Construction risks realised
501390	WTW000627 - ROSEBERY WTW 1940 NT305570	2022_23_Q3	2023_24_Q3	Construction risks realised
501217	Glenlatterach WTW Manganese Removal	2021_22_Q2	2023_24_Q1	Construction risks realised
501232	Whitehillocks WTW - Quality and CM	2021_22_Q4	2023_24_Q3	Additional scope required to complete
501393	WTW000712 - HOWDEN WTW NT456275	2022_23_Q1	2023_24_Q2	Additional scope required to complete
501379	WTW000640 - MARCHBANK WTW NT165645	2022_23_Q2	2023_24_Q2	Construction risks realised
501243	Invercarnie WTW Pre-Treatment CWT and CM	2022_23_Q4	2023_24_Q2	Construction risks realised
501388	WTW000626 - PATESHILL WTW NS983595	2021_22_Q4	2023_24_Q1	Construction risks realised
501418	500122 - Ness WTW	2021_22_Q3	2023_24_Q1	Third party issues
502132	Burncrooks WTW Quality THM Compliance	2022_23_Q4	2023_24_Q4	Third party issues
502648	IR18 Allowance - Ardrishaig WTW	2022_23_Q1	2023_24_Q2	Construction risks realised
502651	Afton WTW_Ayrshire_THM Research and Investigation	2022_23_Q2	2023_24_Q3	Construction risks realised
502783	Balmore Pipebridge Repairs	2022_23_Q1	2024_25_Q1	Third party issues
502649	Dhu Loch_Argyll and Bute_THM Research and Investigation	2022_23_Q4	2023_24_Q2	Construction risks realised

PROJECT ID	DESCRIPTION	BASELINE QUARTER	FORECAST QUARTER	REASON FOR DELAY
502650	IR18 Allowance - Tarbert WTW	2022_23_Q1	2023_24_Q1	Third party issues
503235	Galashiels Manse Street Infra	2022_23_Q3	2023_24_Q2	Third party issues
503162	Auchneel WTW - Lime to Caustic	2022_23_Q2	2023_24_Q3	Construction risks realised
503336	Water Quality Improvement-Wick East DMA	2022_23_Q3	2023_24_Q3	Construction risks realised
503595	Yarrowfues WTW main-out 2019	2021_22_Q4	2023_24_Q1	Third party issues
506864	ICF - Forres Strategic Water upgrade	2022_23_Q4	2024_25_Q1	Third party issues
515505	SR21 Eela WTW Interim Measures	2022_23_Q3	2023_24_Q3	Construction risks realised

Wastewater Portfolio G100

17 projects achieved acceptance in Q4, delivering benefit to customers and bringing the total to 108 projects that have achieved acceptance against a forecast range of 117 to 124 at the time of commitment.

Listed below are the projects behind the Committed List Baseline and a summary of the reason for delay.

PROJECT ID	DESCRIPTION	BASELINE QUARTER	FORECAST QUARTER	REASON FOR DELAY
401705	S087 - UID - Scotwood Overflow North East of Lay-by Busby Road	2021_22_Q3	2023_24_Q3	Third party issues
401668	S043 - UID - Cambuslang Road Richmond Laundry - South East of Railway Rutherglen	2021_22_Q2	2023_24_Q2	Third party issues
403106	QS3b AR - P014 UID Westbank Quadrant at Eldon Street Bridge CSO NS273667	2022_23_Q4	2023_24_Q2	Third party issues
404026	SR15 ES - Main Street Newtonmore	2022_23_Q1	2024_25_Q2	Third party issues
403939	Stewarton WwTW - Growth	2022_23_Q1	2023_24_Q1	Additional scope required to complete
500052	Carstairs Village WwTW - Growth	2022_23_Q2	2023_24_Q1	Construction risks realised
500302	W462 - Coalburn Road Coalburn	2022_23_Q1	2023_24_Q1	Third party issues
500233	Burrelton WwTW - Growth	2021_22_Q4	2023_24_Q1	Third party issues
500681	SW843 Wellgate Lanark	2022_23_Q2	2023_24_Q2	Third party issues
500580	Forres WwTW 1973 NJ038595 - SR15 Capital Maintenance	2022_23_Q3	2023_24_Q2	Third party issues
501021	Banchory WwTW - Growth	2021_22_Q4	2023_24_Q1	Third party issues
501579	DALDERSE WwTW 1966 NS903822	2022_23_Q3	2023_24_Q2	Construction risks realised
501683	Shieldhall WwTW Grade 5 HC Sewer Ph1	2021_22_Q3	2023_24_Q1	Construction risks realised
502944	IR18 CAS Compliance Improvements - Networks East & North, Complex	2021_22_Q2	2023_24_Q3	Third party issues
502949	Dunfermline Wellwood Waste Water Infrastructure	2021_22_Q4	2023_24_Q4	Third party issues
503362	Infra-Kingdom Park	2021_22_Q2	2024_25_Q2	Third party issues
506865	ICF - Forres Strategic Wastewater upgrade	2022_23_Q4	2024_25_Q1	Third party issues

Support Services Portfolio G100

16 projects have achieved Gate 100 Acceptance, against a range of 15 to 16. 3 projects achieved acceptance in Q4.

Listed below is the project behind in this portfolio.

PROJECT ID	DESCRIPTION	BASELINE QUARTER	FORECAST QUARTER	REASON FOR DELAY
510727	Infrastructure Tactical Project	2022_23_Q3	2023_24_Q1	Design issues

42 Table G5 – Growth

42.1 Overview

Table G5 shows the expenditure Scottish Water has incurred or is forecast to incur on growth for the SR21 programme.

42.2 Commentary

At the start of SR21 new master projects were created to track all new Connections and RCC activity. There are currently 16 SR21 Master codes made up of 1 Domestic Water, 1 Domestic Waste, 1 Non-domestic Water and 1 Non-domestic Waste for each of the 4 regions North, South East & West.

The total Growth expenditure shown in Table G5 aligns with the total Growth on Table G1.

In Table G5, the total for Line G5.14 Total Gross Expenditure on Growth and Line G5.15 Service Relocations Water and Line G5.16 Service Relocations Wastewater totals £717.3m for the SR21 period and £107.9m for the current year. This aligns with Table G1 when combining expenditure in Line G1.21 Total Growth and the Total Expenditure for the RCC Lines G1.80 and G1.81.

In Annual Return 2022, growth for the current year was forecast at £99.3m, and has out-turned at £107.9m, an increase of £8.6m. RCC investment increased by £14.5m and Growth in the Wastewater Network increased by £7.0m. This was offset by a decrease in investment in Service Relocations and Growth in the Water Network. RCC and Service Relocations are demand driven programmes, Wastewater Network has seen more investment at Perth City WwTW and Winchburgh WwTW and Water Network has had reduced investment at Black Esk and Winterhope WOA and Forres Strategic Water upgrade.

42.3 Data

42.3.1 Data sources and confidence grades

All data has been sourced from the *FAB* financial system including the general ledger, projects, ledger, Accounts Payable records (payments to vendors) and the Water Utility Billing customer billing & management system.

The report has been produced using the same methodology as G1 with the projects actual expenditure taken from the financial systems and the forecast expenditure taken from Primavera. The percentage allocation assigned to each project has been taken from the systems which hold Scottish Water's CAPEX gateway approval forms. Most projects are assigned 100% to growth but there may be significant growth investment delivered as part of large quality schemes.

The above data from the multiple corporate systems, which feeds into Table G5, has a Confidence Grade of A1. The estimated Confidence Grade for the Contributions is B1 – future Contributions forecasts are based on run rate from the previous 5 years.

The Confidence Grade for the outputs in Lines G5.45 and G5.46 are also allocated as B1. Outputs data is being developed and will require future improvement to data quality and process.

42.3.2 Data improvement programmes

Further enhancements of the data captured in Astro to be developed.

42.3.3 Assumptions used for forecast data

Forecast connection numbers in Lines G5.27-G5.32 are based on a baseline of 22,000 connections in 21/22 with a growth rate of 0.9% in future years. These figures are also used Lines G5.39-G5.44.

The forecasted connection numbers are the basis for the total Infrastructure receipts in Lines G5.20-G5.24 at a rate of £437.6 per Connection which is the 22/23 standard connection charge.

Forecast number of properties receiving RCC in section Lines G5.33-G5.39 are based on the forecast RCC spend in Lines G5.1-G5.7 divided by the average cost per plot for RCC in 21/22 which were Water £352.51 and Waste £798.45.

43 Table G6 – Project Level Detail

43.1 Overview

Table G6 contains the full dataset of all projects that are either currently forecasting to spend in the SR21 period, deliver outputs or form part of the baselines for IPOD and SR15 Completion.

It is used as the primary data source for the calculations in tables 3,4,5,6,10,11,12 and 13.

43.2 Performance Trends

Column 1 Project Autocode. This gives the unique ID that is used by Scottish Water to track projects through our systems. As well as the standard project IDs, new IDs have been created for: Completion outputs where projects have more than one output, suffixed with a C.

Additional SR21 outputs where there is more than one output in a project are suffixed with a D and the Output code.

Non-live investment, prefixed NL then the Need code and T1 for Tier1a or T2 for Tier 2 component of the need

Column 2 Project Title. This is the name of the project in our systems.

Column 3 Water, Wastewater or Support Services (primary purpose). This indicates whether the project is primarily Water, Wastewater or General. General projects either span water and wastewater assets or are for support services element of the programme such as Digital and Transformation.

Column 4 Primary Investment Category (Enhancement, Growth, Replacement, Repair and Refurbishment Project Classification). This is a calculated field that shows the main component of the project. Categories used are:

- Completion - primarily SR10 and SR15 Completion
- Enhanced – primarily SR21 Enhancement
- Growth – primarily Growth
- RCC – primarily Reasonable Cost Contributions (RCC)
- Repair and Refurbishment – primarily repair and refurbishment maintenance
- Replacement – primarily replacement maintenance.
- Support – primarily support services

Column 5 Project location - Local Authority The local authority where the project is located. In some cases, the project will span multiple areas and be regional (East, West, North, South) or may be Scottish Water Wide. For operational reasons, some Unitary Authorities are split further depending on where the asset is managed from.

Column 6 Legislation / Directive / Enforcement / Letter of commitment This shows where a project has either a Letter of Commitment, Enforcement Notice or Management Interests of Safety (MIOS). There are 24 projects that fit into one of these categories.

Column 7 L/D/E/LOC Detail. This provides a short amount of detail on what the scope of work is for each project with a Letter of Commitment, Enforcement Notice or Management Interests of Safety (MIOS).

Column 8 Compliance date. This provides the Compliance Date for each project with a Letter of Commitment, Enforcement Notice or Management Interests of Safety (MIOS).

Column 9 Regulator responsible. Although DWQR and SEPA do not generally sign off projects, we have used this column to identify where the projects are appropriate to each quality regulator. Projects that are Completion and not signed off by SEPA or DWQR are flagged as “SW” if they are signed off internally.

Column 10 Asset Name. This shows the name of the asset where a project has either a Letter of Commitment, Enforcement Notice or Management Interests of Safety (MIOS). Where available the Asset Name has been populated, we will continue to improve the population of asset data for projects in our systems.

Column 11 Water Resource Zone. This shows the name of the water resource zone where a project has either a Letter of Commitment, Enforcement Notice or Management Interests of Safety (MIOS).

Column 12 Water body affected. This shows the name of the water body affected where a project has either a Letter of Commitment, Enforcement Notice or Management Interests of Safety (MIOS). Where available the Water Body affected has been populated, we will continue to improve the population of this data for projects in our systems.

Column 13 Ministerial objective (primary purpose). This provides the Ministerial Objective that the project is contributing towards. It is derived from the Need Ref. Projects without a Ministerial Objective are either Completion or RCC.

Column 14 Output Description. This gives the description of the output that the project delivers. We are currently working to improve the population of output data within our systems. The column currently only shows either outputs for projects completed in the year or forecast and actual outputs for projects on the Named Committed List. This does not include SR15 outputs that were previously tracked by the DAG Working Group through the SR15 graphs. SR15 outputs are shown in column 64 SR15 Output Name.

Where projects deliver more than 1 output, additional rows are added to G6.

Work is continuing to improve the population of output data across the Capital Programme. Data quality continues to improve as we embed output data into our internal processes and reporting.

Column 15 Number of outputs (or output value). This provides the quantity or number of outputs where project outputs have been identified.

Column 16 Output units. This provides the unit where project outputs have been identified. This is generally ‘Nr.’ for number but also includes population equivalent (PE), GWhr and meters.

Column 17 Output code. This provides the code where project outputs have been identified. This links to the drivers for the project and will be used within Scottish Water’s systems.

Column 18 Committed List / Pre-committed List. This column indicates whether a project is on the Committed List Named or Programmes however it also gives some additional information for the project status. The categories are:

- Committed Exclusions - This flag is for projects that are not on the Committed List Project/Programmes either because they are excluded due to being Tier1a/RCC or have no budget on the Committed List Programmes.

- **Committed List Named** – This identifies projects that are on the Named Committed List due to meeting the Committed List Criteria. Projects on the Named Committed list are used to generate the IPOD metrics. The information provided is from the Committed List 2021-22 Q4.
- **Committed List Programmes** – This identifies projects that form part of the Committed List Programmes sheet within the Committed List from 2021-22 Q4. Projects are entered onto the list when they achieve G90, are Tier 2 and have a G90 budget. It is primarily used to track the volume of committed investment for projects not fully meeting the criteria for being on the Named Committed list.
- **Completion Output Only** – This flag is for projects that are on the Itemised List table with more than one SR15 Completion output. This allows the relevant output to be counted in Table 4. Lines in this category have dates and OMD points. To avoid duplication, there are no costs associated.
- **Non-live** – This identifies the lines in G6 that summarise Non-live investment. This is calculated at Need and Investment Tier level.
- **Pre-committed** – This identifies projects that are pre gate 90.
- **Pre-committed Named** – This identifies projects that are expected to form part of the Named Committed List based on LBE being greater than £1m. Projects in this category will need to be further assessed at G90 to determine whether they fit other criteria.
- **SR21 Additional Outputs Only** – This identifies where a project has more than 1 type of output. This allows the relevant output to be counted in Tables 3 and 5. Lines in this category have dates but to avoid duplication, there are no costs associated. This excludes outputs that are on the Committed List.
- **SR21 Additional Outputs Only CL** - Like SR21 Additional Outputs Only, this identifies multiple outputs in the G6 data structure. This is only for projects that are on the Committed List and allows for calculations on Tables 3 and 5.

Column 19 Committed List project reference When the project is on the Named Committed list, this gives the project ID. This is the same as the project Autocode except when suffixed for additional outputs.

Column 20 Portfolio. This identifies the Portfolio a project is in and is based on the Need Reference.

Column 21 Sub Portfolio. This identifies the Sub Portfolio a project is in and is based on the Need Reference.

Column 22 Programme. This identifies the Programme a project is in and is based on the Need Reference.

Column 23 Sub Programme This identifies the Sub Programme a project is in and is based on the Need Reference.

Column 24 Management Approach Ref. This identifies the Management Approach a project is in and is based on the Need Reference.

Column 25 Management Approach Description. This gives the description associated with the Management Approach Ref.

Column 26 Primary Need Ref. The Primary Need Ref is the lowest level coding for a project and is used to determine the Management Approach, Sub Programme, Programme, Sub Portfolio, Portfolio and Ministerial Objective. This is identified on project setup and is monitored for accuracy. Where projects were created prior to SR21, a review has been undertaken to establish the correct coding.

Column 27 Primary Need Description. This gives the description of the Primary Need Ref.

Column 28 Project Appraisal Document Reference Where available this gives the hyperlink to the Appraisal Document. Further work is required to establish the mechanism for sharing the appraisal documents. An external SharePoint site is already established to share project investment appraisals with stakeholders: [Project Investment Appraisal - Stakeholder site \(sharepoint.com\)](#).

Project Investment Appraisals are shared at Gate 50 (Stage 3a) and Gate 80/90 (Project Appraisal for Commitment).

Column 29 Level of Project Investment Appraisal This gives the proportionate approach applied for appraising project investment. The Levels of project investment appraisal are:

- Level 1 relates to projects with the potential for early identification of placemaking and external partnership involvement. It is anticipated that Level 1 projects will have the highest degree of customer / community / stakeholder engagement
- Level 2 relates to substantive system and project investments which are greater than £3m, or novel/contentious
- Level 3 relates to less substantive system and project investments between £500k and £3m
- Level 4 will be guided by the Management Approach which lays out the investment trigger policies and rulesets.
- Level 5 relates to projects that have been assessed and a project level appraisal is not required.

Column 30 IPOD Value This indicates how many IPOD points a project is due to achieve. For projects added to the Committed List after March 2021, this should be 3:1 for Start On Site, 1 for G100 and 1 for G110.

When projects were added to the Committed List as part of the initial setup, only the future milestones were counted. This was done to avoid diluting the IPOD score with the previous investment period's milestones and to start IPOD at zero for SR21.

Column 31 G80 Date This is the gate 80 date established when the project was added to the Committed List.

Project are usually added to the Committed List at G90, however not always. A project is added to the Committed List once it is suitably mature in terms of scope, cost, risk and delivery timescale. There is flexibility as to which governance gateway this can occur at (i.e. between Gate 70 and Gate 90) and is dependent on the complexity and value of the project being committed to.

Column 32 Start On Site Date This is the start on site baseline date established when the project is added to the Committed List. It is used as part of the IPOD measure, will stay fixed and used for the IPOD baseline.

Column 33 Gate 100 Date This is the gate 100 baseline date established when the project is added to the Committed List. It is used as part of the IPOD measure, will stay fixed and used for the IPOD baseline.

Column 34 Gate 110 Date This is the gate 110 baseline date established when the project is added to the Committed List. It is used as part of the IPOD measure, will stay fixed and used for the IPOD baseline.

Column 35 RSO Date This is the currently blank for SR21 projects as we do not have a Regulatory Signoff Date associated with projects on the Committed List. Completion projects have an RSO date where appropriate.

Column 36 Date project removed from Committed List This is the currently blank as we have not removed any projects from the Committed List Post G110. This requires further discussion.

Column 37 Total Project Value £m This is the total budget for projects on the Committed List Named and comparable to the Total Project Value field. It is fixed when the project is added to the list.

For the Committed List Programmes this only includes spend after March 21 and aligns with the Project Value Post March 21 £m column.

Column 38 Project Value Post March 21 £m This is the budget for projects and excludes any spend incurred prior to April 21.

Columns 39-45 Budget. These columns give the profile of the Committed List Budgets Post March 21. Like the dates and the total, this is fixed when the project is added to the Committed List.

Column 46 Direct Costs. This gives the Committed List Budget without risks or overhead.

Column 47 Risk Site Specific. This gives the value of risk within the LBE when the project was added to the Committed List. Risk forms part of the project's cost breakdown structure within *Unifier*.

Column 48 Risk Programme/General. This gives the value of risk not within the LBE when the project was added to the Committed List. For new projects this is 12% based on previous experience of LBE increases post G90. For projects added when the Committed List was initiated, the risk added varied based on a line-by-line assessment through Scottish Water's Commercial Team.

Column 49 Overhead. This gives the value of Scottish Water's overhead when the project was added to the Committed List. It is applied to a project at its various governance stages and is actualised. If it has not been actualised, it will be forecast and forms part of the project's cost breakdown structure in *Unifier*.

Column 50 Runway. This is the Governance Runway used within *Unifier* and determines which gates a project should go through. These Runways are:

- Digital – Appropriate for Digital projects where G40 and G50 are not required
- Financial Management – Projects within this runway do not require design and start at G90
- OPD – Original Project Delivery – Projects start at G70, and this runway mainly covers legacy projects

- PPD – Plan Prepare Deliver – Projects go through all Governance gates listed on the table
- SVCD Planned – Small Value Capital Delivery Planned. Projects that are non-complex and have a combined plan and design stage. Start at G30 but skip G40, G50, G70, G80
- SVCD Responsive – Small Value Capital Delivery Responsive. Projects within this runway go straight to G90 are Non-Complex and have a low LBE. Most of the projects in this category have been created through the Non-Complex Service Delivery App. Due to volume, projects in this runway are substantially automated with *Unifier*. The Start on Site date is aligned with the Gate 90 date and the G110 date is aligned with the G110 date.

Columns 51 to 60b Forecast Dates This shows the forecast or actual dates associated with a project. If a date is pre-April 2022, then it is an actual otherwise it is a forecast date. The RSO date is blank except for the SR15 Completion Enhancement projects.

Column 61 Completion Investment. This shows the forecast cost of the SR15 Completion Programme post-March 21 and can be compared with column 67a Total Budgeted Expenditure for Completion Projects.

Column 62 Investment Period (SR15) This shows the investment period the Completion Project with which it is associated.

Column 63 Planned or Delayed Completion Projects This shows whether the project forms part of the SR15 Completion programme for remaining outputs as either 'Planned' (projects due to be delivered after the 31 March 21) and the 'Delayed' (projects due to be delivered before 1 April 21) completion projects. In some cases, projects are delivering more than 1 output, the additional output is flagged as 'Duplicate Delayed' or 'Duplicate Planned'. This associates the dates, outputs and OMD points with the project.

Column 64 SR15 Output Name This gives the output name used in the SR15 period and aligns with the OMD extract and DAGWG graphs from the end of 20-21 reporting. It is only populated for projects that were outstanding at the end of SR15.

Column 65 SR15 Output Quantity This gives the output quantity used in the SR15 period and aligns with the OMD extract and DAGWG graphs from the end of 20-21 reporting. It is only populated for projects that were outstanding at the end of SR15.

Column 66 Technical Expression Autocodes This gives the output reference code used in the SR15 period and aligns with the OMD extract and DAGWG graphs from the end of 20-21 reporting. It is only populated for projects that were outstanding at the end of SR15. [Needs populated]

Column 67 OMD Points This gives a breakdown of the remaining OMD points that were not delivered in the SR15 period.

Column 67a Total Budgeted Expenditure for Completion Projects This gives the baseline budget for the SR15 Programme. This aligns with the values provided in last year's return and outperformance assessment. It does not include the £13m reduction for investment planned after 20-21 in the SR15 Table K. If this is included the column would total £290.7m.

Columns 68 to 72. This gives the baseline for MS1 to MS5 dates for the SR15 Completion Programme. This was fixed and aligns with the OMD extract reported at the end of 20-21 reporting. Dates here may differ from the Committed List as when projects were added to the list, the forecast dates were re-assessed taking into account known delivery risks to provide a more robust view.

Columns 73 to 77. This gives the latest forecast and actual milestones for the SR15 Completion Programme.

Columns 78 to 86b. These give a forecast or actual profile of investment of the 6-year period with totals pre 2021-22, and totals post 26-27. Actual costs are extracted from Scottish Water's *FAB* system and the forecast profile is extracted from *Unifier* for all live projects.

The Pre-2021-22 column is completed to allow the Total Project value to be calculated.

Projects are included on the table based on having a financial transaction in the SR21 period or from having outputs. For more information and a complete view for Scottish Water's spend Pre-2021-22, previous Annual Returns would need to be reviewed.

Column 87 Direct Costs. This gives the Total Project Value over 2021-27 without risks or overhead. Non-live Investment is fully allocated to this category.

Column 88 Risk Site Specific. This gives the value of risk within the Total Project Value over 2021-27. Risk forms part of the project's cost breakdown structure within *Unifier*.

Column 89 Risk Programme/General. This gives the value of risk not within the LBE and held within Scottish Water's risk registers at either a project, programme or delivery vehicle level.

Column 90 Overhead. This gives the value of Scottish Water's overhead within the Total Project Value over 2021-27. It has been assumed that the overhead has been applied at a constant rate over the 6-year period. Overhead is applied at governance gateways and while this may change how much overhead is in the project during the any period, over 6 years this should average out.

Column 91 Grants and Contributions (excluding Infrastructure Charge contributions). As in previous year's returns the Grants and contributions are allocated to 1 line. [need to populate]

Column 92 Infrastructure Charge contributions for infrastructure assets. As in previous year's returns, the Infrastructure Charge contributions are allocated to 1 line. [need to populate]

Column 93 Project expenditure funded from Grants & Contributions (£m) This is the total of Infrastructure Charge Contributions and Grants and Contributions and is the sum of columns 91 and 92.

Column 94 Net project expenditure funded through customer revenue & financed through Borrowing (£m) This is a calculation of the Total Project Value over 2021-27 £m - Project expenditure funded from Grants & Contributions (£m).

Column 95 to 102 Carbon Impacts

The Carbon Impact data that Scottish Water collects is held in columns 95 and 96. Scottish Water do not currently collect data in a format that allows the population of columns 97 to 102.

Columns 103 to 112 Drivers These columns show the Driver and the allocation of the project's total investment to each driver. In some cases, the number of drivers exceed 5 and when this occurs the first 5 will be shown.

Drivers for the project are entered at project setup and reviewed at each approval gate. While new projects have been setup with the new SR21 codes, Completion Projects retain the SR15 drivers and Maintenance/Growth project that were initiated in the SR15 period will be changed to SR21 driver codes when the appropriate data is collected.

The driver codes are used in combination with the Tier categorisation and the Investment programme to establish the percentage allocations to columns 113 to 161.

Columns 113 to 161 G1 Percentages. These columns are added to the G tables and allow calculations of the investment split into the appropriate categories. The categorisation of investment for G1 is detailed in the G tables commentary.

Columns 162 to 171 G5 Percentages. These columns are added to the G tables to allow calculation of the growth investment split into the appropriate categories.

Column 24a Management Approach Group. This column has been added. It identifies the Management Approach Group that a project is in and is based on the Need Reference.

43.3 Data

43.3.1 Data sources and confidence grades

The data source for Table G6 is primarily Scottish Water's *Unifier* system. Actual costs are sourced from Scottish Water's *FAB* system. In some cases, data is not held in *Unifier* and has been sourced from other areas. The intention is to carry out system updates to allow relevant data to be held within *Unifier* in future.

Table G6 aligns with Table 2 and includes additional columns requested as part of the G tables review. The additional columns either provide more information or provide the backup data to the summary tables.

There are no confidence grades associated with Table G6.

43.3.2 Data improvement programmes

We continue to undertake data improvement initiatives across the Capital Programme. As part of an assurance exercise, some projects were re tagged relative to their previous Need code to Project code mapping. As projects progress through the governance gates, the repair, refurbish and replacement categories are also assessed. This regularly occurs when the Capital Analysis Forms (CAF) are assessed by Scottish Water's Tax team. In some instances, this will change categories on previously incurred investment.

As part of ongoing data cleansing activities, we continue to increase the overall integrity of information captured within our systems for the circa 24,000 projects detailed in the return.

We continue to look to improve cost and date forecasting within the *Unifier* system through system improvements with point of entry data validation and through enhanced reporting made available to the Project Managers, Quantity Surveyors, P6 Planners and Programme Managers.

Categorisation of projects continues to improve, and data anomalies encountered during the production of the Section G Tables will be fed back into either system or process improvements.

44 Table G7 – Repair, Refurbishment and Asset Replacement – Disaggregation by Management Approach

44.1 Introduction

Table G7 breaks down the Repair, Refurbishment and Asset Replacement into Management Approach groups. It gives the forecast for investment in year for each management approach broken down into Tier 1a responsive, Tier 2 planned repair and refurbishment and Tier 2 Replacement. By definition, there is no Tier 1a replacement.

For each Management Approach group, there is a Tier 1a and Tier 2 projected expenditure which is based on the AMS (Asset Managers Scenario – based on last refresh of August 22). Tier 2 cannot be split into Replacement and Repair/Refurbishment. The total in 17/18 prices has been profiled using the inflation index.

44.2 Performance Trends

44.2.1 Lines G7.001 & G7.002 - CPI inflation assumption.

The inflation profile for Cost inflation is aligned with G8.1.

44.2.2 Lines G7.003 to G7.128

These lines show the Repair, Refurbishment and Asset Replacement forecast and actual expenditure broken down into Management Approach group. The Management Approach groups have been introduced to aggregate Management Approaches.

Further discussion of the methodology used to calculate the inflation profile is detailed in the commentary for Line G8.1.

44.3 Data

44.3.1 Data sources and confidence grades

Data within G7 is a combination of projected and forecast expenditure from live projects, Non-live projects and the Asset Managers Scenario (AMS).

For each Management Approach group, the projected expenditure is derived from the Asset Managers Scenario (AMS). The forecast expenditure comes from project forecasts held in the live corporate systems and the current view of Non-live investment.

44.3.2 Data improvement programmes

We are currently working to improve the project forecast data within the corporate systems.

44.3.3 Assumptions used for forecast data

There is no section for Support in this table which is identified on G1 and totals £103.8m.

45 Table G8 – Investment and Capital Price Inflation

45.1 Overview

Table G8 shows the forecast and actual CPI and Capital Price Inflation used in the return. It also summarises the live investment.

45.2 Performance Trends

Line G8.5 shows the total investment excluding SR15 Completion in 17/18 prices. This is calculated from Table G1: Line G1.58 Gross Investment – Line G1.41 Total Completion Programme and deflated using the index in Line G8.2.

Line G8.6 is inflated to outturn prices using the index in Table G8.2.

In Line G8.7, there is no Efficiency applied to the programme.

Line G8.8 is identical to Line G8.6 as no Efficiency has been applied.

Line G8.9 is calculated based on CPI rather than Capital Price Inflation.

Line G8.10 gives the forecast cost of the SR15 Completion programme and aligns with Line G1.41 Total Completion Programme.

Line G8.11 is calculated and deflates the programme to 17/18 prices using CPI.

Line G8.12 gives the cost of the live programme totalling £880m in the current year and £4,862m across the SR21 Period.

Line G8.13 deflates the cost of the live programme to 17/18 prices. This totals £3,862m in 17/18 prices for the SR21 Period.

45.3 Data

45.3.1 Data sources and confidence grades

Data sources for inflation are detailed below. Investment summary data is taken from Table G1.

45.3.2 Data improvement programmes

There have been no data improvement programmes during 2022/2023.

45.3.3 Assumptions used for forecast data

Where CPI has been used in any calculations it is based on the following:

- FY 21/22 and FY 22/23 taken from ONS published data.
- FY 23/24 to 26/27 taken from BOE forecast February 2023.

This in turn generated the CPI profile show in **Table 150** below.

Table 150: Annual CPI Profile 2021/22 to 2026/27

Year	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27
Average CPI	4.0%	10.1%	5.5%	1.3%	0.6%	1.5%

45.3.4 Methodologies Employed

There continues to be volatile construction market conditions causing price fluctuations in certain materials, supplies and commodities. Scottish Water now undertakes a six-monthly review of this to understand the impact compared to CPI. Due to the dynamic nature of the fluctuations and the inherent complexities in assessing their impact accurately, we now undertake a six-monthly review of the impact using a top down and bottom-up assessment, and then combining these to estimate impact at a generic level. The two assessment methodologies are explained below:

Top-Down Approach

- Takes a high-level view of the capital programme and the main cost buckets of spend
- Utilises actual cost increases where appropriate
- Takes a wider industry view of future cost risks, building on our own experience, that of our supply chain and partners and also feedback from CECA Scotland
- Assumes non-construction elements of the Capital Programme inflate in line with CPI forecasts.

Bottom-Up Approach

- Looks at individual frameworks.
- Builds in actual cost increases to date during SR21.
- Takes into account contractual arrangements regarding inflation. For example, no increases during fixed price periods.
- Utilises a framework level view of future cost risks based on feedback from our Framework Managers.

Outcome

- It was agreed to use the average of the two above approaches.
- To allow for future changes to CPI the profile was also provided as a percentage above CPI.

Capital Price Inflation will next be updated in August 2023. The average profile is show in **Table 151** below.

Table 151: Average Inflation Forecast 2021/22 to 2026/27

Year	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27
Average Inflation Forecast	6.0%	11.3%	6.2%	2.0%	0.6%	1.5%

45.4 Indicator of overall Progress towards the Committed List (PCL)

The indicator of overall progress towards the Committed List (PCL) is a high-level measure of the overall volume of intervention development relative to what is required for expected investment levels in future years. It aims to determine whether Scottish Water has sufficient work to enable an annual planned level of investment over the 2021-27 period (and beyond). PCL measures the volume of work through the gateway stages in comparison with a baseline plan designed to achieve the annual investment expectations. The PCL measure is designed to ensure a sufficient volume

of investment is flowing through the project delivery runways and it is tracked between gates 30 and 90. PCL is a leading indicator designed to measure capacity in planned investment.

In addition to ensuring volume of investment, PCL is used internally to measure performance across the delivery teams for gates 30 through to 90. Regular performance reviews are held particularly with teams involved in early-stage project delivery where forecasts are reviewed, and any issues identified and escalated.

SR15 Completion projects are excluded from the measure as there is a fixed baseline programme with project level milestones - all other projects are included. Tier 1a projects are included for to provide a complete picture of investment going into construction. This would avoid a circumstance where PCL looked on-track, but the correct type of investment was not going to the appropriate delivery vehicle. Also, including all projects simplifies reporting and improves understanding of this relatively new measure in the delivery teams. The argument against including Tier 1a would be that Tier 1a projects do not go onto the Committed List and that Tier 1a projects are generally responsive in nature. On balance, we decided to keep Tier 1a projects in the measure.

1. The Baseline PCL value for 2022-23 was £823.7m. The cumulative PCL Baseline value as of 31 March 2023 was £799.5m (as of 31 March 2022) + £823.7m = £1,623.2m.
2. The Forecast PCL value for 2022-23 was £908.2m. The cumulative PCL Forecast value as of 31 March 2023 was £935.7m (as of 31 March 2022) + £908.2m = £1,843.9m.
3. The PCL Score at the 2022-23 year-end is 113.6%.

PCL Baseline vs Forecast by Tier	Baseline	Forecast	Variance	Percentage
Tier 1a	219.4	92.1	-127.3	42.0%
Tier 2	604.3	816.1	211.8	135.0%
Total 2022-23	823.7	908.2	84.5	110.3%
Cumulative to 2021-22-P12	799.5	935.7	136.2	117.0%
Cumulative Total	1,623.2	1,843.9	220.7	113.6%

When the PCL measure is split by Tier, it is evident that the Tier 1a volume of investment is less than set out in the baseline. As part of the Investment Planning Scenario 4 refresh, allocations to Tier 1a will be reviewed and, if appropriate, the Tier 1a allocation will be adjusted. Tier 2 investment has compensated for the reduction in Tier 1a promotion, and the PCL measure is above 110% both in the year and cumulatively. Internal focus on achieving early-stage milestones has improved the confidence Scottish Water has in achieving the planned levels on investment in future years. Over promotion by 10% allows for improved delivery vehicle performance and efficiency through programme optimisation.

PCL Baseline vs Forecast by Gate	Baseline	Forecast	Variance	Percentage
G30	64.7	130.7	66.0	202.1%
G40	55.2	81.0	25.7	146.6%
G50	62.0	124.8	62.8	201.3%
G70	173.8	137.0	-36.8	78.8%
G80	159.0	120.8	-38.2	76.0%
G90	309.0	313.9	4.9	101.6%
Total 2022-23	823.7	908.2	84.5	110.3%
Cumulative to 2021-22-P12	799.5	935.7	136.2	117.0%

	Baseline	Forecast	Variance	Percentage
PCL Baseline vs Forecast by Gate				
Cumulative Total	1,623.2	1,843.9	220.7	113.6%

The above table tracks the performance at each gate and identifies where there are any bottlenecks in getting projects into delivery which generates further investigation into any reasons for delays at certain gates (G50 to G70 showing as a problem in this year's data).

Section H – Asset Inventory

46 Table H1: Summary

46.1 Overview

The H Tables report the number of infrastructure and non-infrastructure assets in Scottish Water's inventories that were operational as of 24 March 2023, in essence the end of AR23. The data is extracted near the end of March rather than the last day in March to allow time to process and do relevant quality checks. In comparison, the most E table lines report the number of assets that were operational during AR23 so those assets that have been operational at any point throughout during the year. The exceptions to this are combined sewer overflows, sewers and water mains.

The H Tables also report the gross and net modern equivalent asset values (MEAV) for each site level asset class e.g. Water Treatment Works. The MEAV is calculated using an asset related cost algorithm matched to asset data at unit level. Units are a collection of equipment. The MEAV for each unit are summed to give the site MEAV. When the MEAV for a site is built up, all units present at that point in time (as at year end) are priced using cost curves. Then an allowance for inflation, using the Retail Price Index, is added and then on-costs, e.g. contractor overheads, are added. The relevant sites are summed to give the total Gross MEAV for the asset class. The Net MEAV is calculated for non-infrastructure assets by taking the multiplication of Gross MEAV with the proportion of the assets remaining life by its expected overall life.

$$\text{Net MEAV} = \text{Gross MEAV} \times \text{Asset remaining life} / \text{Expected overall asset life}.$$

The MEAV has been recalculated for all assets and is influenced by:

- Inflation indexing
- Changes in inventory between end of March 2022 to end of March 2023
- The assessment of on-costs
- The allocation of assets and units to cost curves

Together these have resulted in an increase in reported gross MEAV from £81.436 billion at AR22 to £92.530 billion for AR23, an increase of £11.094 billion (13.6%), largely due to inflation of approximately 12.9%.

Table H1 is a summary table of Tables H2 to H6. The gross valuation is dominated by the infrastructure (H3 & H4) valuation of £78.003 billion, comprising 84.3% of the total. The non-infrastructure (H2 & H5) valuation is £14.341 billion, which is 15.5% of the total valuation with the remaining £185.379 million (0.2%) allocated to Support Services (H6) such as vehicles and IT equipment.

The greatest changes relate to Lines H1.7 Sewer structures, H1.12 Sludge treatment facilities by disposal type and H1.8 Sea Outfalls:

- Sewer structures have a variance greater than 30%. The change is largely due to an error in the reported figure for combined sewer and emergency overflows in AR22. The reported figure was £354.4 million but should have been £450.8 million. An on-cost factor (overheads, management cost etc.) for sewer infrastructure was applied last year rather than the factor developed for intermittent discharges, which is approximately 27% higher. The remainder of the variance is due to an increase in inflation.
- Sludge treatment facilities have a variance greater than 30%. The change is largely due to the transfer of two large PFI sites: Allanfean and Persley, back to Scottish Water ownership which

are relatively larger than other sludge treatment facilities. These sites result in a significant increase the value of the MEAV as their combined design capacity is 92% of the capacity of the 19 sites that were reported as part of the previous Annual Return.

- Sea outfalls have decreased by approximately 20% due to an improvement in the method used to identify and classify sea outfalls in the sewer network (details can be found in Section 4.2). The number of long sea outfalls has reduced by approximately 10% and the number of short sea outfalls has reduced by approximately 32%.

The MEAV for all remaining asset types have increased due to inflation and minor changes in the asset base.

46.2 Performance Trends

46.2.1 Lines H1.1-H1.13 - Asset Inventory

Scottish Water's reported AR23 gross asset inventory valuation is £92.530 billion. The breakdown by asset type is provided in Table 152 below. The gross valuation is dominated by the infrastructure valuation of £78.003 billion, comprising 84.3% of the total. The non-infrastructure total valuation is £14.341 billion, which is 15.5% of the total valuation. Support services valuation is approximately £185.379 million representing 0.2% of the gross asset inventory valuation.

Table 152: Gross asset inventory valuation by asset type.

Asset Type	AR22 Gross MEAV (£m)	% of Total	AR23 Gross MEAV (£m)	% of Total
Water Infrastructure	19,800.5	24.31	22,347.9	24.15
Water Non-Infrastructure	5,918.7	7.27	6,727.9	7.27
Wastewater Infrastructure	48,864.0	60.00	55,655.4	60.15
Wastewater Non-Infrastructure	6,675.2	8.20	7,614.0	8.23
Support Services	178.3	0.22	185.4	0.20
Total	81,436.7	100	92,530.1	100

Table 153 below shows the change in the total gross asset valuation of Scottish Water's assets from AR22 to AR23 by asset category.

Table 153: Change in the total gross asset valuation of Scottish Water's assets from AR22 to AR23 by asset category.

Line Ref	Asset Category	AR22 Gross MEAV (£m)	% of Total	AR23 Gross MEAV (£m)	% of Total	Change (£m)	% Change
H1.1	Water treatment works	3,282.9	4.03	3,768.5	4.07	485.7	14.8
H1.2	Water storage	2,258.1	2.77	2,519.1	2.72	260.9	11.6
H1.3	Water pumping stations	377.7	0.46	440.3	0.48	62.6	16.6
H1.4	Water resources	3,811.2	4.68	4,190.7	4.53	379.5	10.0
H1.5	Water mains	15,989.3	19.63	18,157.2	19.62	2,167.8	13.6
H1.6	Sewers	47,532.1	58.37	54,264.6	58.65	6,732.5	14.2
H1.7	Sewer structures	641.1	0.79	837.7	0.91	196.6	30.7
H1.8	Sea outfalls	690.8	0.85	553.1	0.60	-137.7	-19.9
H1.09	Sustainable Urban Drainage Systems	n/a	n/a	n/a	n/a	n/a	n/a
H1.10	Sewage pumping stations	1,326.9	1.63	1,436.5	1.55	109.6	8.3
H1.11	Sewage treatment works	5,108.1	6.27	5,822.8	6.29	714.7	14.0
H1.12	Sludge treatment facilities by disposal type	240.1	0.29	354.4	0.38	114.3	47.6
H1.13	Support services	178.3	0.22	185.4	0.20	7.1	4.0

Line Ref	Asset Category	AR22 Gross MEAV (£m)	% of Total	AR23 Gross MEAV (£m)	% of Total	Change (£m)	% Change
	Total	81,436.7	100	92,530.3	100	11,093.6	13.6

A summary of the asset categories that had a variance greater than +/- £200m or +/- 30% in any one asset category is contained in Table 154 below.

Table 154: Summary of the changes incorporating a variance greater than +/- £200m or +/- 30% in any one asset category.

Asset Category	Change (£m)	% Change
Water treatment works	485.66	14.79
Water storage	260.93	11.56
Water resources	379.51	9.96
Water mains	2,167.85	13.56
Sewers	6,732.52	14.16
Sewer structures	196.56	30.66
Sewage treatment works	714.72	13.99
Sludge treatment facilities by disposal type	114.26	47.58
Total	11,052.02	

The total net value of Scottish Water's non-infrastructure asset inventory (including support services depreciable assets) is £3.598 billion. The changes to the net valuation by asset category between AR22 and AR23 are outlined in Table 155 below.

Table 155: Changes in net valuation by asset category.

Line Ref	Asset Category	AR22 Net MEAV (£m)	% of Total	AR23 Net MEAV (£m)	% of Total	Change (£m)	% Change
H1.1	Water treatment works	897.2	24.93	987.5	24.95	90.3	10.1
H1.2	Water storage	779.8	21.67	855.6	21.62	75.8	9.7
H1.3	Water pumping stations	122.2	3.40	134.5	3.40	12.2	10.0
H1.10	Sewage pumping stations	430.6	11.97	454.9	11.50	24.3	5.6
H1.11	Sewage treatment works	1,231.3	34.22	1,368.0	34.57	136.8	11.1
H1.12	Sludge treatment facilities by disposal type	50.7	1.41	60.2	1.52	9.5	18.6
H1.13	Support services	86.6	2.41	97.0	2.45	10.5	12.1
	Total	3,598.4	100	3,957.7	100	359.3	10.0

46.3 Data

The data for the non-infrastructure asset inventory is extracted from the Works & Asset Management system (Ellipse) whereas the infrastructure inventory is extracted from the Geospatial Information system (GIS). The cost models are provided by Scottish Water's internal costing team. Version 13 cost models (as applied for AR17) have been used for consistency and costs inflated using RPI, which equated to a 12.9% increase on AR22.

The residual life method used to estimate the life expectancy of the assets remains the same as previous years and therefore has had no impact on significant changes in the Gross or Net Value

of element categories. However, there have been some material changes to the element category values but these are in line with the overall changes, due to inflation or changes to the asset stock as described later against the relevant lines.

The confidence grades for the H1 Table are assessed individually considering the proportion of each asset as opposed to defaulting to the lowest value in the H2-H6 Tables. There are no changes to the confidence grades associated with this table.

Some figures within the commentary may be subject to rounding; this will account for minor variances. The reason for the variances is the level below the summary tables uses calculations to provide more detailed information.

The unit level cleansing work started in AR22 was completed on Sewage Pumping Stations in AR23. This cleansing work rationalised unit codes to simplify our asset inventory and associated cost models. This change aligns with the cleansing work completed on other asset types for the previous Annual Return.

47 Table H2: Water Non-Infrastructure

47.1 Overview

Table H2 provides information on the water non-infrastructure asset inventory. The gross asset valuation for AR23 has increased to £6.727 billion. This represents an increase of 13.7%, of which 12.9% is the direct result of inflation the remaining is due to minor changes in the asset base.

Table H2 has three subsections: water treatment works, water storage and water pumping stations. The greatest change within each subsection is:

- Water treatment works assets has a 15.3% increase in gross MEAV reported in H2.4 SW3 treatment works. This increase of 12.9% is due to inflation and the addition of the new site at Bonnycraig
- Water storage assets has a 11.6% increase in gross MEAV reported in H2.9 Service reservoirs. This increase is due to inflation but diminished by the net reduction of 16 service reservoirs (these are listed in Section 47.2.2 Table 157)
- Water pumping station assets is a 18.4% increase in gross MEAV reported in H2.13 Booster pumping stations. This increase is due to inflation and the addition of three booster pumping stations (these are listed in Section 47.2.3, Table 158)

47.2 Performance Trends

47.2.1 Lines H2.1-H2.8 Water Treatment Works

The number of Water Treatment Works reported for AR23 is 227. This is a net decrease of one from AR22. The details of the changes in Water Treatment Works due to sites being added or removed in AR23 are shown in Table 156 below.

Table 156: Changes in reported Water Treatment Works due to removals or additions.

Plant No	Site	AR23 Status	WIC H Grade	Band
WTW000833	BONNYCRAIG WTW 2022 NT251389	Added	4	3
WTW000648	BONNYCRAIG WTW 1962 NT251389	Removed	4	3
WTW000285	BACK TOLSTA WTW 1956 NB522456	Removed	3	2

There were no changes to the WIC H Grades for these assets. In addition, the following site change occurred due to improvements in data quality of the site design capacity:

- Bunessan WTW moved from H2.4 to H2.3 (Band 1).

The confidence grade for the Asset stock remains the same as last year, A2, as the data quality level has been sustained but not improved.

The gross asset valuation aligned to Water Treatment Works for AR22 has increased from £3.28 billion to £3.77 billion. The valuation has increased primarily to due to inflation but also due to the addition of the new site at Bonnycraig.

The confidence grade for the asset valuation remains the same as last year, C4, as a similar scale of data infilling is needed to complete the asset valuation.

47.2.2 Lines H2.9-H2.10 Water Storage

The number of Water Storage Assets reported for AR23 is 1,284. This is a net decrease of 17 assets from AR22 as a result of the removal of 18 service reservoirs and a single water tower, offset by the addition of two service reservoirs. These are listed in Table 157 below.

Table 157: Changes to reported Water Storage Assets due additions and removals.

Plant No	Site	AR22 Status	WIC H Grade
TWS003646	OBAN NORTH TWS NM863311	Added	9
TWS003741	WHITEHALL TWS 2020 HY651282	Added	9
TWS002087	OAKLEA TWS DSR NT026922	Removed	9
TWS000121	BURNCROOKS ROUND CWT 1960 NS501794	Removed	9
TWS000220	CRINAN DSR NR787941	Removed	9
TWS000281	DUNSELMA DSR NS192809	Removed	9
TWS000580	OBAN NORTH DSR NM864312	Removed	9
TWS000729	TULLOCHGORM DSR NR966953	Removed	9
TWS000781	CARLOWAY DSR 1980 NB218431	Removed	9
TWS000785	BRAGAR DSR NB287466	Removed	9
TWS000803	BACK DSR 1960 NB469428	Removed	9
TWS000804	SWORDALE DSR 1990 NB498305	Removed	9
TWS000809	TOLSTA CWT 1950 NB522456	Removed	9
TWS000813	TOLSTA VILLAGE DSR NB529473	Removed	9
TWS000817	SHESHADER DSR 1980 NB537350	Removed	9
TWS000917	NORTHBAY EOLIGARRY DSR 1980 NF706069	Removed	9
TWS001339	GARDENHEAD DSR 1970 NJ542647	Removed	9
TWS001688	FAIRYGREEN DSR NO216329	Removed	9
TWS001915	WHITEHALL DSR 1930 HY652283	Removed	9
TWS003509	ADABROCK DSR NB532625	Removed	9
TWS000798	LEURBOST RANISH DSR 1960 NB406248	Removed	10

The confidence grade for the Asset stock remains the same as last year, A2, as the data quality level has been sustained but not improved.

The gross asset valuation aligned to Water Storage for AR23 increased from £2.258 billion to £2.519 billion. The valuation has increased primarily to due to the RPI increase but diminished by the reduction in assets.

The confidence grade for the Asset valuation remains the same as AR22, C4, as a similar scale of data infilling is needed to complete the asset valuation.

47.2.3 Lines H2.11-H2.13 Water Pumping Station

The number of Water Pumping Station assets reported for AR23 is 787. This is a net decrease of one asset from AR22. These are made up of:

- Intake (RWP): Two (2) removed – net change of -2
- Source (GWS): One (1) added and three (3) removed – net change of -2
- Booster (TWP): Six (6) added and three (3) removed – net change of +3

The affected sites are listed below in Table 158.

Table 158: Changes to reported Water Pumping Stations due additions and removals.

Plant No	Site	AR22 Status	WIC H Grade
GWS000478	INVERURIE GWS 2018 NJ779204	Added	12
TWP001102	BUCKIEBURN TWP NS752851	Added	13
TWP001370	RHU STATION RD TWP 2019 NS273843	Added	13
TWP001410	ROBERTON TWP NT428149	Added	13
TWP001411	KIRKCOLM CAIRNBOWIE TWP NW992696	Added	13
TWP001413	NEWMARKET BLACKWATER TWP NB419339	Added	13
TWP001415	LOCH ECK HIGH LIFT TWP 1979 NS139872	Added	13
RWP000186	LOCH ECK HIGH LIFT RWP 1979 NS139872	Removed	11
RWP000187	LOCHGOILHEAD HIGH LIFT RWP NN204021	Removed	11
GWS000099	MOSS WELL GWS NJ209144	Removed	12
GWS000458	PERTH GWS	Removed	12
GWS000463	RIVER TRUIM WELL 3 1970 NN637846	Removed	12
TWP000087	DRUMCHAPEL TWP 1954 NS516717	Removed	13
TWP000197	RHU STATION ROAD TWP NS274843	Removed	13
TWP001363	SOUTH MOORHOUSE TWP 2018 NS524511	Removed	13

In addition, the following site changes occurred due to improvements in data quality of the site design capacity:

- Balmichael GWS moved from Band 0 to Band 2,
- Delgaty Borehole GWS moved from Band 0 to Band 2,
- Camisky Wellfield Borehole 8 GWS moved from Band 0 to Band 1,
- South Moorhouse Farm P.S. TWP moved from Band 0 to Band 1,
- Marybank TWP moved from Band 0 to Band 2,
- Fairyhills Wood TWP moved from Band 0 to Band 2,
- Sanday TWP moved from Band 0 to Band 3,
- Uig (Western Isles) TWP moved from Band 0 to Band 2,
- Auchinairn Gardens 2002 TWP moved from Band 0 to Band 2,
- Kildrummy Booster 2009 TWP moved from Band 0 to Band 2,
- Orams Fancy 2009 TWP moved from Band 0 to Band 2,
- Cullivoe 2010 TWP moved from Band 0 to Band 2,
- Mid Yell 2010 TWP moved from Band 0 to Band 3, and
- Heriot WTW Booster 2011 TWP moved from Band 0 to Band 2.

The confidence grade for the Asset stock remains the same as last year, A3, as the data quality level has been sustained but not improved (see Section 2.3 for details).

The asset valuation aligned to Water Pumping Stations for AR23 increased from £377.667 million to £440.257 million. The valuation has increased primarily to due to the RPI increase and the addition of booster pumping stations.

The confidence grade for the Asset valuation remains the same as last year, C4, as a similar scale of data infilling is needed to complete the asset valuation.

47.3 Data

Data sources and confidence grades are detailed in the Performance Trends section where relevant.

In AR22, 31 Water Pumping Stations required an infilled design capacity given this data was missing against our inventory. During 2022/23, a survey was conducted to improve this data resulting in over 60% of these sites now having an actual design capacity. This activity has sustained the level of confidence in the asset inventory for Water Pumping Stations.

There is no forecast data for the H2 table.

48 Table H3: Water Infrastructure

48.1 Overview

Table H3 provides information on the water infrastructure asset inventory. The gross asset valuation for AR23 has increased to £22.347 billion. This represents an increase of 12.9% which is the direct result of inflation.

Table H3 has two subsections: water resources and water mains. The greatest change within each subsection is:

- Water resources has a 10.9% increase in gross MEAV reported in H3.2 Raw water intake (lochs and burns). This increase is due to inflation but diminished by the reduction of six raw water intakes (these are listed in Section H3.2, Table 160).
- Water Mains has a 17.1% increase in gross MEAV reported in H3.8 Water meters. This increase is due to inflation and an increase in newly installed commercial meters only, as there has been a decrease of 24 domestic water meters.

There is a difference in which sites are reported between H and E tables. The sources in Table E4 are only included if they are direct sources, as per the definitions document, as the lines report the distribution input from each source in columns 110-140, therefore indirect sources are omitted. Table E also only reports assets that are operational (including emergency) during the year. Table H3 reports all assets that are operational, emergency, out of service or work in progress (as classified in the Works & Asset Management system (Ellipse)), at the end of the year. Note that Line H3.3 raw water aqueducts are infrastructure assets that are sourced from Scottish Water's Geospatial Information system (GIS) and have no equivalent asset in the E4 table.

48.2 Performance Trends

H3.1 Water Resources – Dams & Impounding Reservoirs

The number of Dams & Impounding Reservoirs reported for AR23 is 198. This is a net decrease of three assets from AR22. The affected sites are listed in Table 159 below.

Table 159: Changes to reported Dams & Impounding Reservoirs due additions and removals.

Plant No	Site	AR23 Status	WIC H Grade
DIR000231	LOCH IONADAGRO DIR NB513465	Removed	14
DIR000750	ROSS LOAN DIR NS421868	Removed	14
DIR000786	LOCH TARFF DIR 1963 NH422097	Removed	14

The confidence grade for the Asset stock remains the same as last year, C4, as there has been no change in the data analysis methods.

The asset valuation aligned to Dams & Impounding Reservoirs for AR23 increased from £1.70 billion to £1.86 billion. The valuation increased due to the increase in inflation.

The confidence grade for the Asset valuation remains the same as last year, C4, as there has been no change to the data or calculation method.

H3.2 Water Resources – Raw Water Intakes

The number of Raw Water Intakes reported for AR23 is 263. This is a net decrease of six assets from AR22. These are three raw water sources related to redundant Water Treatment Works, i.e. Muirhead, Black Tolsta and Castle Borge. These affected sites are listed in Table 160 below.

Table 160: Changes to reported Raw Water Intakes due additions and removals.

Plant No	Site	AR23 Status	WIC H Grade
RWI000655	MUIRHEAD RWI NS741860	Removed	15
RWI000656	MUIRHEAD RWI NS741862	Removed	15
RWI000657	MUIRHEAD RWI NS740868	Removed	15
RWI000827	LOCH IONADAGRO RWI NB513464	Removed	15
RWI000885	CASTLEBAY RWI 1960 NL663998	Removed	15
RWI001023	MUIRHEAD RWI NS741861	Removed	15

The confidence grade for the Asset stock remains the same as last year, C5, as there has been no change in the data analysis methods.

The asset valuation aligned to Raw Water Intakes for AR23 increased from £27.75 million to £30.76 million. The valuation increased due to the increase in RPI.

The confidence grade for the Asset valuation remains the same as last year, C5, as there has been no change to the data or calculation method.

H3.3 Water Resources – Raw Water Aqueducts

The total length of Raw Water Aqueducts in this reporting year is 1,662.97km. This is a decrease of 47.3 km from AR22. This reduction is mainly due to 29km of the Invercannie 1924 pipe, in the Scottish Water East area, being reclassified in the Geospatial Information system (GIS) from aqueducts to distribution mains (reported in line H3.4), during 2022. The length of network takes treated water from Invercannie WTW to a treated water storage (Mannofield W CWT) therefore is it complies with the WICS lines definitions for H3.4 - Distribution Mains as it is treated water.

The confidence grade for the Asset stock remains the same as last year, B2, as the data quality level has been sustained but not improved.

The asset valuation aligned to Raw Water Aqueducts for AR23 has increased from £2.09 billion to £2.30 billion. The valuation has mainly increased due the RPI increase as confirmed in H1.

Approximately 7.5% (127.2km) of the total length of Raw Water Aqueducts required the diameter to be infilled based on connected pipes' values where available (1.7%) or based on an average diameter for the pipe based on its material (5.8%). The diameter is required to produce an asset valuation. The confidence grade for the Asset valuation remains the same as last year, B2, as the data quality level has been sustained but not improved.

H3.4 Water Mains – Mains Potable

The total length of Potable Mains in this reporting year is 49,110.4km. This is an increase of 165.0km from AR22.

The confidence grade for the Asset stock remains the same as last year, A2, as the data quality level has been sustained but not improved.

The asset valuation for this reporting year has increased from £14.747 billion to £16.742 billion. The valuation has increased due to the length of new mains commissioned but primarily, as in recent years, due to the increase in inflation.

The diameter of a main is required to produce an asset valuation. Approximately 0.3% (146.9km) of the total length of Potable Mains required the diameter to be infilled based on connected pipes' values where available (0.3%) or based on an average diameter for the pipe based on its material

(0.0% equivalent to 2km). The confidence grade for the Asset valuation remains the same as last year, B4, as the data quality level has been sustained but not improved.

H3.5 Mains Other

The total length of Mains Other in this reporting year is 145.0km. This is an increase of 0.4km from AR22, which is similar to the 0.2% increase in length shown in previous years.

The confidence grade for the Asset stock remains the same as last year, A3, as the data quality level has been sustained but not improved.

The asset valuation for this reporting year has increased from £56.903 million to £63.300 million. This is mainly due to the increase in inflation.

The confidence grade for the Asset valuation remains the same as last year, B4, as the data quality level has been sustained but not improved.

H3.6 Communication Pipes (Lead)

The total number of Communication Pipes (Lead) in this reporting year is 51,970, equivalent to 2.83% of total communication pipes. This is a decrease of 2,751 from AR22 due to the planned and opportune removal of lead pipes from our network.

Scottish Water bases its understanding of the number of lead communication pipes in the network on a statistical survey which estimated the number at approximately 4% of total number of communication pipes, in 2010. Each subsequent year, this estimate is reduced from the activity on our network to remove lead communication pipes. We aim to refine the estimate by using a risk assessment approach to target water quality sampling in areas likely to have lead communication pipes. We are also undertaking pilot projects for the replacement of lead communication and supply pipes in Tighnabruaich, Kyle of Lochalsh and a DMA in Edinburgh which will help confirm or refine our estimates.

The confidence grade for the Asset stock remains the same as last year, B4, however the procedure for recording lead replacement work has improved as there are specific categories now available in the Scottish Water's new Salesforce Task Scheduling system.

The asset valuation for this reporting year has increased from £33.606 million to £36.042 million due to the increase in inflation which is diminished by the reduction in number of assets.

The confidence grade for the Asset valuation remains the same as last year, C4, despite the improved reporting system as the baseline number of lead communications remaining has a degree of uncertainty that merits this grade.

H3.7 Communication Pipes (Other)

The total number of Communication Pipes (Other) in this reporting year is 1,785,593. This is an increase of 18,130 from AR22 due to new housing and commercial developments being connected to our network.

The confidence grade for the Asset stock remains the same as last year, B4, as the data quality level has been sustained but not improved.

The asset valuation for this reporting year has increased from £1.085 billion to £1.238 billion. The valuation has increased due to the increase in the number of pipes reported and the increase in RPI.

The confidence grade for the Asset valuation remains the same as last year, C4, as the data quality level has been sustained but not improved.

H3.8 Water Meters

The total number of Water Meters in this reporting year is 138,535. This is an increase of 4,219 (3%) from AR22 and greater than previous recent years. The increase was due to the number of new commercial premises requiring meters returning to levels before COVID-19 lockdowns; 4% higher than AR20 but 4% lower than AR19.

The confidence grade for the Asset stock remains the same as last year, A3, as the data quality level has been sustained but not improved.

The asset valuation for this reporting year has increased from £66.152 million to £77.445 million. The valuation has increased due to the increase in the number of meters reported and the increase in RPI.

The confidence grade for the Asset valuation remains the same as last year, B4, as the data quality level has been sustained but not improved.

48.3 Data

Data sources and confidence grades are detailed in the Performance Trends section where relevant.

There have been no notable data improvement programmes in AR23.

There is no forecast data for the H3 Table.

49 Table H4: Wastewater Infrastructure

49.1 Overview

Table H4 provides information on the wastewater infrastructure asset inventory. The gross asset valuation for AR23 has increased to £55.655 billion. This represents an increase of 13.95%, of which 12.9% is the direct result of inflation the remaining is due to minor changes in the asset base.

Table H4 has four subsections: sewers, sewer structures, sea outfalls and sustainable drainage systems. The greatest change within each subsection is:

- Sewers has an 18.4% increase in gross MEAV reported in H4.2 Sewage and sludge pumping mains. This increase is due to inflation and the addition of 46.3km of sewage and sludge pumping mains
- Sewer structures has a 45% increase in gross MEAV reported in H4.3 Combined sewer and emergency overflows. This increase is due to inflation, the addition of 24 assets and a correction to the on-cost factor applied (see Section 4.2 for details)
- Sea outfalls has a 28.2% decrease in gross MEAV reported in H4.5 Short sea outfalls. This decrease is due to a reduction in the number of short sea outfalls as a result of improvements in the methods used to identify and calculate these assets (details can be found in Section 4.2).
- Sustainable urban drainage system assets have a 46.2% increase in number of assets reported in H4.10 Swales. This increase is due to new assets being installed throughout the year. Scottish Water does not currently have an appropriate cost model to calculate the MEAV for sustainable urban drainage systems so gross MEAV is excluded from this table submission. Note net MEAV would not be applied to this asset type because infrastructure assets are assumed not to depreciate in value.

49.2 Performance Trends

H4.1 Sewers

The total length of Sewers in this reporting year is 54,220.2km. This is an increase of 618.3km from AR22.

The confidence grade for the Asset stock remains the same as AR22, B2, as the data quality level has been sustained but not improved.

The asset valuation for this reporting year has increased from £46.960 billion to £53.588 billion. The valuation has increased due to the length of new sewers commissioned and the increase in the RPI.

The confidence grade for the Asset valuation remains the same as last year, C4, as the data quality level has been sustained but not improved.

H4.2 Sewers – Sewage and Sludge Pumping Mains

The total length of Sewage and Sludge Pumping Mains in this reporting year is 1,418.3km. This is an increase of 46.3km from AR22.

The confidence grade for the Asset stock remains the same as AR22 at A4, as the data quality level has been sustained but not improved.

The asset valuation for this reporting year has increased from £571.420 million to £676.510 million. The valuation has increased due to an increased length of assets and a change in RPI.

The confidence grade for the Asset valuation remains the same as AR22, B4, as the data quality level has been sustained but not improved.

H4.3 Combined sewer and emergency overflows.

The number of combined sewer and emergency overflows in the report year is 3,674, an increase of 24 from AR22.

The confidence grade for the Asset stock for CSOs remains the same as last year at A4, however in preparation for moving to a new inventory system (a replacement for Ellipse) and in reviewing priority locations for the installation of new overflow Event Duration Monitors, discrepancies in overflow numbers have been identified and a robust data cleansing activity will be completed ahead of the annual return next year.

The asset valuation for this reporting year increased from £354.409 million to £513.908 million. The main reason is a correction from AR22. An incorrect on-cost factor (overheads, management cost /) for sewer infrastructure was applied last year rather than the correct factor developed for intermittent discharges. The AR22 MEAV with the correct on-cost applied would have been £450.800 million, an increase of 27% from what was reported.

The increase for £450.800 million to £513.908 million is due to the increase in inflation and the small increase in the number of assets.

The confidence grade for the Asset valuation remains the same as AR22, C4, as the data quality level has been sustained but not improved.

H4.4 Other Sewer Structures

The number of Other Sewer Structures is 267, which is a decrease of 45 from AR22. This figure has been established from an improvement in the data of sewage storage structures (as defined in the WICS Guidance) recorded in the Works & Asset Management system (Ellipse), rather than the estimated figure of 312 used in previous years. The improvement in the source data has been reflected in the confidence grade for the asset stock with an increase from D5 to B3.

The asset valuation for this reporting year increased from £286.729 million to £323.791 million. The valuation was based on the estimated figure used in AR22 inflated by this year's RPI. Scottish Water aims to develop an improved cost model to calculate a MEAV based on the asset information held in the Works & Asset Management system (Ellipse) in future years.

The confidence grade for the Asset valuation remains the same as AR22, D5, as the data quality level has been sustained but not improved.

49.2.1 Lines H4.5 and H4.6 - Sea Outfalls: Short and Long Sea Outfalls

Both Sea Outfall categories reduced in number this year due to a review of the methods used to identify and classify them from the sewer network asset type as they are included with in the Geospatial Information system (GIS).

Two improvements were made to the identification method:

- Pipes that crossed into a marine area (used to identify sea outfalls) but were less than 5m long were excluded, as it was found that these were usually headwalls at the coastal land edge that were identified by automated spatial analysis. A tolerance of 5m, to allow for the approximation of marine boundary areas and the termination point of the digitized pipes that cross into them, was used to ensure only sea outfalls were identified. 410 outfalls that discharged to marine waters were excluded by this analysis.

- The point on the sewer network pipe that determined where an outfall started had previously been taken as the start of the entire pipe (as digitized in GIS) that crossed from land into the marine area. A review of GIS sample outfalls data showed, however, that the length on land could be over 100m, which meant an overestimation of the sea outfall length and associated value was being made. An improved method was therefore developed that split the pipe where it crossed from land to marine area and assigned the marine side to the sea outfall category and assigned the land side to the sewer category (H4.1).

The result of the new method was a decrease in the number of reported Short Sea Outfalls due to <5m long outfalls being excluded from line H4.5, and a decrease in the number of reported Long Sea Outfalls due to the length of pipe laid in land being excluded, thus shortening the outfall length, in some cases to <500m which put them into the Short Sea Outfall category.

The total number of Sea Outfalls in this reporting year is 1,242, which is a reduction of 558 in Short Sea Outfalls and a reduction of 6 in Long Sea Outfalls. The confidence grade for the Asset stock remains the same as AR22, B2, as the data quality level has been sustained but not improved. The confidence grade submitted last year of B4 was an error and should have been recorded as B2.

The asset valuation for this reporting year has decreased from £690.8 million to £553.1 million due to the reduction in the number of outfalls. The reduction was lessened by the increase in RPI this year. The pipes not identified as sea outfalls this year are included under the Sewers category in H4.1.

The confidence grade for the Asset valuation remains has previously been reported in error with a value of B4. This has been corrected to be reported this year with a value of C4 the same as AR22, as the data quality level has been sustained but not improved.

49.2.2 H4.7-H4.11 - Sustainable Drainage Systems (SUDS)

The total number of Sustainable Urban Drainage Systems in AR23 is 324 which is an increase of 55 from AR22. This increase is solely due to new assets being installed.

In AR23, volume (m³) data was sourced from the Ellipse Works & Asset Management system for SUDS sites to designate size bands to the asset stock. 26% of the 324 reported SUDS sites were populated with capacities from this source and the remainder were designated with the median of known volumes, 700m³, which put them into Size Band 2.

The confidence grade for the Asset stock has changed from A3 in AR22 to A4 in AR23 to reflect the number of infilled volumes as there is uncertainty in the correct banding of SUDS rather than the total number.

Scottish Water does not currently have an appropriate cost model to assess MEAV for SUDS assets.

49.3 Data

Improved data analysis has affected the asset number and MEAV for sea outfalls as detailed in the line by line 4.2 Performance Trends.

New sourcing of data has enabled size banding of SUDS asset reported in lines H4.7-11 and actual asset number reporting of Other Sewage Structures in line H4.4 for the first time this year.

There is no forecast data for the H4 Table.

50 Table H5: Wastewater Non-Infrastructure

50.1 Overview

Table H5 provides information on the wastewater non-infrastructure asset inventory. The gross asset valuation for AR23 has increased to £7.613 billion. This represents an increase of 14.1%, of which 12.9% is the direct result of inflation the remaining is due to minor changes in the asset base.

Table H5 has three subsections: sewage pumping stations, sewage treatment works and sludge treatment facilities by disposal type. The greatest change within each subsection is:

- Both asset type's gross MEAV for sewage pumping stations have increased by approximately 8%. This increase is due to inflation (12.9%) but reduced by the improved recording of site design capacities (i.e., kw) which resulted in assets having a smaller design capacity than the previously used infill value.
- Sewage treatment works has a 22.8% increase in gross MEAV reported in H5.7 Tertiary treatment only. This increase is due to inflation (12.9%) and the adoption of two PFI sites: Allanfearn and Persley.
- Sludge treatment facilities by disposal type has a 48.6% increase in gross MEAV reported in H5.9 Sludge treatment – cake disposal. This increase is due to inflation and the adoption of two PFI sites: Allanfearn and Nigg. These sites result in a significant increase the value of the MEAV as their combined design capacity is 92% of the capacity of the 19 sites that were reported as part of the previous Annual Return.

50.2 Performance Trends

50.2.1 Lines H5.1 and H5.2 - Sewage Pumping Stations

The total number of Sewage Pumping Stations in AR23 is 2,290. This is a net increase of 33 assets from AR22, mainly due to the transfer of sites from PFI to Scottish Water ownership. Table 161 below lists the affected sites.

Table 161: Changes to reported Sewage pumping stations due additions and removals.

Plant No	Site	AR23 Status	WIC H Grade
SPS000666	LONGMAN WWPS NH665469	Added	29
SPS001037	CAOL WWPS NN106760	Added	29
SPS001366	NEWTONHILL CLIFFTOP WWPS NO914934	Added	29
SPS001368	PORTLETHEN SOUTH WWPS NO921946	Added	29
SPS001369	DOWNIES WWPS NO926951	Added	29
SPS001370	PORTLETHEN NORTH WWPS NO927970	Added	29
SPS001371	PORTLETHEN VILL WWPS NO933963	Added	29
SPS002112	BALMUIR TARLAND WWPS NJ482045	Added	29
SPS003047	ESKMILL ROAD WWPS NT243604	Added	29
SPS003709	ALLOA SMITHFIELD LOAN WWPS NS872930	Added	29
SPS003719	COWIE DON SLUGHEAD WWPS NO883874	Added	29
SPS003720	STONEHAVEN BRIDGE OF MUCHALLS WWPS	Added	29
SPS003721	NEWTONHILL CAMMACHMORE WWPS	Added	29
SPS003772	SORN MAIN STREET WWPS 2007 NS558264	Added	29
SPS003905	STONEHAVEN BACKIES WWPS NO878856	Added	29
SPS003961	ELLON CASTLE MEADOWS WWPS NJ957309	Added	29

Plant No	Site	AR23 Status	WIC H Grade
SPS004006	ARISAIG KEPPOCH FARM WWPS NM658866	Added	29
SPS004016	LONGMAN STORM WWPS 1 NH665469	Added	29
SPS004017	LONGMAN STORM WWPS 2 NH665469	Added	29
SPS004039	BACKIES STORM WWPS 1 2008 NO878856	Added	29
SPS004040	BACKIES STORM WWPS 2 2008 NO878856	Added	29
SPS004095	POLBETH ALICE BANK WWPS 2008 NT033642	Added	29
SPS004125	ABERDEEN DUBFORD WWPS 2013 NJ943123	Added	29
SPS004212	RICC MAINS RD WWPS 2016 NT181684	Added	29
SPS004356	KIRKTON HEIGHTS WWPS 2017 NJ990649	Added	29
SPS004379	HADDINGTON DOVECOT FARM WWPS NT503729	Added	29
SPS004455	FORFAR TURFBEG WWPS 2019 NO442516	Added	29
SPS004503	WELLINGTON GDNS WWPS 2015 NJ942013	Added	29
SPS004565	BLAIRYTHAN TERR FOVERAN SPS NJ973238	Added	29
SPS004775	MT FLORIDA CARMUNNOCK RD WWPS NS588610	Added	29
SPS001036	CAOL TRANSFER WWPS NN108757	Added	30
SPS001041	INVERLOCHY WWPS NN111748	Added	30
SPS001043	CAOL BLAR MHOR WWPS NN118760	Added	30
SPS002312	COWIE WWPS NO880868	Added	30
SPS004018	ALLANFEARN WWPS NH711475	Added	30
SPS004038	FRASERBURGH WWPS 2001 NJ973669	Added	30
SPS004821	IRON MILL BAY WWTW INLET WWPS NT061843	Added	30
SPS004843	WEST WEMYSS INLET WWPS NT327948	Added	30
SPS004844	WEST WEMYSS OUTLET WWPS NT327948	Added	30
SPS001533	DUNBLANE HIGH WWPS NN772008	Removed	29
SPS001713	CRAIGFORTH WWPS NS774952	Removed	29
SPS003735	KILMARNOCK EAST SHAW ST WWPS NS429370	Removed	29
SPS004644	KIRKHILL NEWTON PARK WWPS NH560458	Removed	29
SPS000003	AIRDS POINT WWPS NX992663	Removed	30
SPS002315	FALLIN WWPS NS835923	Removed	30

The confidence grade for the Asset stock remains the same as last year, A3, as the data quality level has been sustained but not improved.

The asset valuation for this reporting year has increased from £1.326 billion to £1.436 billion. The valuation has increased primarily to due to inflation, however, this increase was partially offset by the unit cleansing work on sewage pumping station sites. This unit cleansing work simplified the capture of units and associated cost models. This change aligns with the cleansing work completed on other asset types for the previous Annual Return.

The confidence grade for the Asset valuation remains the same as last year, C4, as a similar scale of data infilling is needed to complete the asset valuation.

50.2.2 Lines H5.3 to H5.7 - Sewage Treatment Works

The total number of Sewage Treatment Works in this reporting year is 1,842. This is a net increase of 6 from AR22. The affected sites are listed in Table 162 below.

Table 162: Changes to reported Sewage Treatment Works due additions and removals.

Plant No	Site	AR23 Status	WIC H Grade
STW003836	BOLTON STEADING SEP WWTW NT507700	Added	31
STW001543	NIGG WWTW NJ964046	Added	34
STW001569	PETERHEAD WWTW NK127442	Added	34
STW001638	FORT WILLIAM WWTW NN108750	Added	34
STW001223	ALLANFEARN WWTW NH711475	Added	35
STW001527	PERSLEY WWTW NJ906098	Added	35
STW001551	FRASERBURGH WWTW 2001 NJ973669	Added	35
STW003739	ARDERSIER WWTW 2009 NH771561	Added	35
STW001241	ARDERSIER WWTW 1995 NH776562	Removed	35
STW001504	CLINTERTY WWTW 1965 NJ832110	Removed	35

The confidence grade for the Asset stock remains the same as last year, A2, as the data quality level has been sustained but not improved.

The asset valuation for the reporting year has increased from £5.108 billion to £5.822 billion. The valuation has increased primarily to due to the RPI increase.

The confidence grade for the Asset valuation remains the same as last year, C4, as a similar scale of data infilling is needed to complete the asset valuation.

50.2.3 Lines H5.8 and H5.9 Sludge Treatment Facilities

The total number of sludge treatment facilities in this reporting year is 21. This is a net increase of 2 from AR22 as a result of the re-adoption of two PFI assets.

Table 163: Changes to reported Sludge Treatment Facilities due additions and removals.

Plant No	Site	AR23Status	WIC H Grade
STC000121	ALLANFEARN STC NH711475	Added	37
STC000126	NIGG STC NJ964046	Added	37

The confidence grade for the Asset stock remains the same as last year, A2, as the data quality level has been sustained but not improved.

The asset valuation for the reporting year has increased from £240.150 million to £354.411 million. The valuation has increased due to the inflation increase (12.9%); however, the remaining increase was predominately a result of the adoption of the two PFI sites.

The confidence grade for the Asset valuation remains the same as AR22, C4, as a similar scale of data infilling is needed to complete the asset valuation.

50.3 Data

Data sources and confidence grades are detailed in the Performance Trends section where relevant.

There have been no notable data improvement programmes in 2022/23. However, there has been an impact due to standardising unit codes. here is no forecast data for the H5 Table.

51 Table H6: Support Services

51.1 Overview

Table H6 provides information on the support services asset inventory. The gross asset valuation for AR23 has increased to £185.379 million. This represents an increase of 4% which is the result of increases in the asset base. In comparison, AR22 reported a reduction in the Support Services gross valuation of 1%. Inflation is not applied to these asset types.

The greatest change in support services is a 7.4% increase in gross MEAV reported in H6.4 Vehicles & plant. This increase is due to the addition of 87 items of plant on the register.

51.2 Performance Trends

51.2.1 Lines H6.1 and H6.2 - Offices & laboratories, Depots & Workshops

H6.1 reports one additional office. Marchmont House Office in Dumfries has been added with a valuation of £1.6m and a floor area of 840m². Although closed this year, the Castle House Office is included in H6.1, as it remains a Scottish Water asset. The confidence grade for the Asset stock remains the same as last year, B2, as the data quality level has been sustained but not improved.

A correction to the depot area in H6.2 band 1 has increased the area from 28,695m² reported in AR22 to 33,830m². This was a data reporting error and there has been no actual change to the Depots and Workshops line.

The asset valuation for the reporting year has increased from £49.143 million to £50.743 million for Offices & Laboratories. Depots & Workshops is unchanged at £11.25 million.

The confidence grade for the Asset valuation remains the same as AR22, C4, as the data quality level has been sustained but not improved.

H6.4 Vehicle & Plant

The value of Plant reported in H6.4 Band 2 has increased from £58.974 million to £63.885 million due to an increase of 87 additional items of plant on the register.

The confidence grade remains the same as AR22, B3, as the data quality level has been sustained but not improved.

H6.5 Telemetry Systems

The number of Telemetry sites in AR23 is 5,161, an increase of 39 from AR22. The gross MEAV has increased to £23.689 million. This 0.8% increase is slightly less than the 2.2% increase in gross MEAV seen in AR22. The increase is due to the increase in telemetry units only as RPI is not applied to this category.

The confidence grade for the Asset stock remains the same as AR22, A2, as the data quality level has been sustained but not improved. The confidence grade for the Asset valuation remains the same as last year, B3, as the data quality level has been sustained but not improved.

H6.6 Information Systems

Laptops have increased from 3,932 to 4,151, desktops have decreased from 152 to 34 and servers remain unchanged at 249. The change is due to Hybrid working practices being adopted by Scottish Water.

The confidence grade for the Asset stock remains the same as AR22, A2, as the data quality level has been sustained but not improved.

The asset valuation for this reporting year has slightly increased from £4.483 million to £4.571 million.

The confidence grade for the Asset valuation remains the same as AR22, B2, as the data quality level has been sustained but not improved.

H6.7 Other Non-Operational Assets

Two houses have been demolished (Phingask Cottages No.1 and Campbeltown TW House), which accounts for the reduction from 30 to 28 in the asset stock reported in H6.7. This is reflected in a decrease in the MEAV from £15.825 million in AR22 to £15.617 million in AR23.

The confidence grade for the Asset stock remains the same as AR22, C4.

51.3 Data

Data sources and confidence grades are detailed in the commentary section where relevant.

There have been no notable data improvement programmes in AR23.

There is no forecast data for the H6 Table.