SCOTTISH WATER

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

Section E– Operating Costs and Efficiency

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1.1 Overview

Table E3 and E3a provide details of the fifteen Public-Private Partnership (PPP) major wastewater assets that are managed under seven separate PPP concession agreements.

Upon its creation in April 2002 Scottish Water inherited nine concession contracts which had been entered into with nine private sector consortia (PFI Companies) by its three predecessor authorities (i.e., East of Scotland Water Authority, North of Scotland Water Authority and West of Scotland Water Authority). During the year ending 31 March 2023 two PPP concessions, Highland and Aberdeen, and had been under Scottish Water control for the whole of 2023-24. There are six sites - Fort William, Inverness, Nigg, Persley, Peterhead and Fraserburgh. Scottish Water acts as the client body to the seven remaining private sector consortia that provide wastewater and sludge treatment and disposal services to Scottish Water.

The length of the remaining contracts varies between 25 and 40 years with the longest expiring in October 2040. Under the terms of these contracts the private sector has either upgraded or built new wastewater and sludge treatment assets, and, in certain circumstances, network assets (e.g. sewers and pumping stations) in order to meet Scottish Water's legal obligations in respect of the treatment and disposal of these products. These consortia are also responsible for the operation and maintenance of these assets over the lifetime of each contract.

Costs attributable to the assets that have come into Scottish Water's ownership have been excluded from Table E3a in AR24, but included in the other E Tables, as appropriate.

The assets that form part of each remaining scheme are detailed in Table 1 below.

Table 1: PPP schemes.

PPP Scheme	Wastewater Treatment Works
Tay	Hatton
Moray Coast	Lossiemouth, Buckie, Banff/Macduff
AVSE	Seafield, Newbridge, East Calder, Blackburn, Whitburn
Levenmouth	Levenmouth
Dalmuir	Dalmuir
Daldowie(1)	Daldowie sludge treatment centre
MSI (Ayrshire)	Meadowhead, Stevenston, Inverclyde

Explanatory notes:
(1) Daldowie is a sludge treatment centre only.

1.2 Performance Trends

E3.1 Annual average resident connected population

The resident population connected to Public/Private Partnership (PPP) assets has reduced from 2,247,915 in AR23 to 1,891,616 in AR24.

These reductions are shown by Wastewater Treatment Works (WwTW) in Table *2* below. Most of the change is due to WwTWs that are no longer reported as they came under Scottish Water operation during the AR23 reporting period. They were therefore included in AR23, but not in AR24. These WwTWs are shown as zero resident connected population in AR24 **Line E3.1** column (highlighted in blue in Table 2 below) and amount to a total reduction of 361,613. Further reductions are reported for Tay (Hatton), Moray Coast (Lossiemouth, Buckie, Banff/Macduff, AVSE (Newbridge Blackburn and Whitburn) and MSI (Meadowhead, Stevenston and Inverclyde) totalling 1,738. This overall decrease is compensated for by increases reported for Seafield, East Calder, Levenmouth and Dalmuir. The overall change in population, excluding the sites that are now in Scottish Water ownership, results in an increase of 5,314 population connected. The small variances within individual schemes are driven by changes in census data and are consistent with those seen in previous years.

Table 2: Resident connected population change AR23 to AR24

E3_Column	E3_Pfi_Area_Name	E3_Stw_Name	AR23 E3.1	AR24 E3.1	Difference
10	Highland	Ft William	8.264	0	-8.264
20	Highland	Inverness	62.341	0	-62.341
30	Tay	Hatton	193.041	192.931	-0.11
40	Aberdeen	Nigg	211.223	0	-211.223
50	Aberdeen	Persley	38.544	0	-38.544
60	Aberdeen	Peterhead	23.651	0	-23.651
70	Aberdeen	Fraserburgh	17.59	0	-17.59
80	Moray Coast	Lossiemouth	37.192	37.124	-0.068
90	Moray Coast	Buckie	13.448	13.395	-0.053
100	Moray Coast	Banff/Macduff	10.535	10.517	-0.018
110	AVSE	Seafield	617.805	622.31	4.505
120	AVSE	Newbridge	25.094	25.04	-0.054
130	AVSE	East Calder	74.96	76.484	1.524
140	AVSE	Blackburn	18.92	18.755	-0.165
150	AVSE	Whitburn	13.148	13.017	-0.131
160	Levenmouth	Levenmouth	114.698	114.708	0.01

E3_Column	E3_Pfi_Area_Name	E3_Stw_Name	AR23 E3.1	AR24 E3.1	Difference
170	Dalmuir	Dalmuir	436.957	437.97	1.013
180	Daldowie	Daldowie	0	0	0
190	MSI	Meadowhead	189.414	188.905	-0.509
200	MSI	Stevenston	68.059	67.839	-0.22
210	MSI	Inverclyde	73.031	72.621	-0.41
			2247.915	**1891.616**	**-356.299**

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 latest available National Records of Scotland (NRS) 2018 projections to 2043 using the same methodology as for tables A2 and A3. This method is unchanged from AR23 and, as in previous years, has been audited by our external auditor.

E3.2 Annual average non-resident connected population

The annual average non-resident connected population has been taken from the assessment and distribution of holiday populations described in the commentary for tables A2 and A3.

The total reported population is 16,292, which is an increase of 4,489 from AR23. The total non-resident connected population removed due to the PPPs coming into Scottish Water ownership (highlighted in blue in Table 3 below) is 4,269. The increase in population for the remaining sites is therefore 8,758.

The movement in the non-resident population is explained by:

- Recovery from periods of COVID-19 lockdown during AR23, which shows as a positive difference
- Works that are no longer reported as they came under Scottish Water operation during the AR23 reporting period, which show as a negative difference

The population of works no longer reported is shown as zero in the AR24 **E3.2** column.

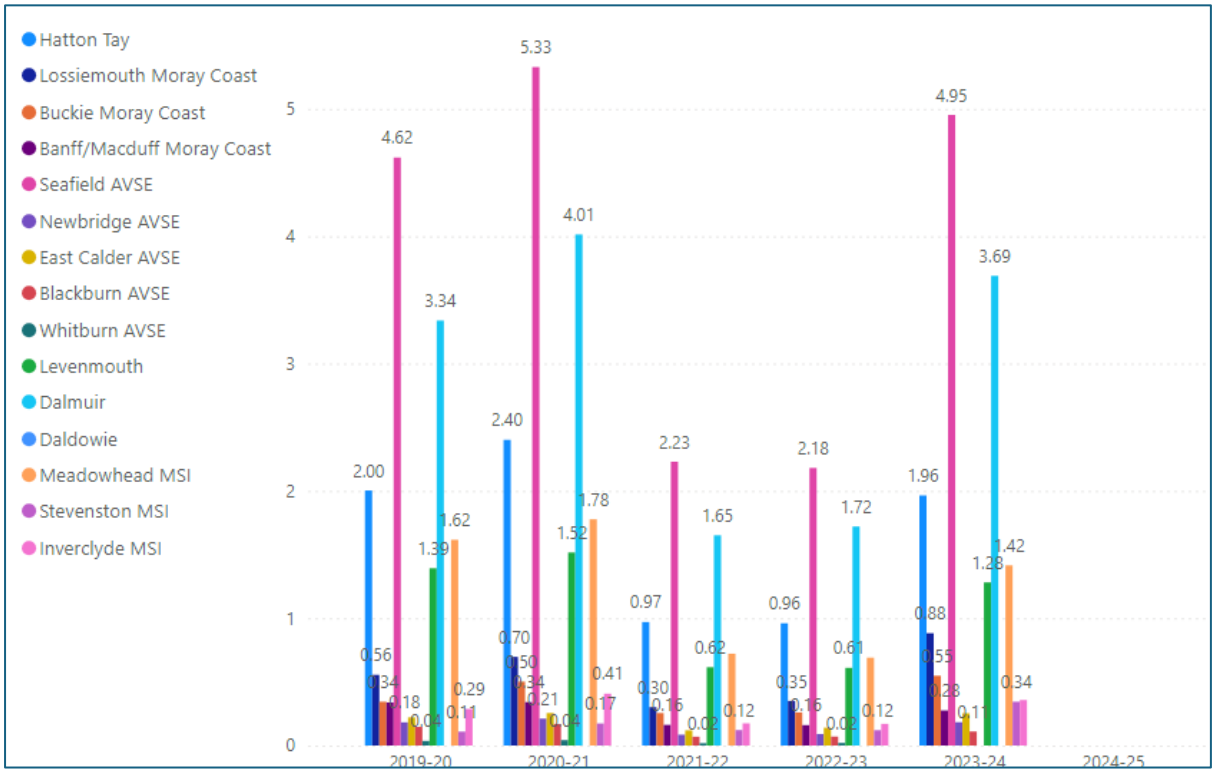
Table 3: Average Non-resident connected population change AR23 to AR24

E3_Column	E3_Pfi_Area_Name	E3_Stw_Name	AR23 E3.2	AR24 E3.2	Difference
10	Highland	Ft William	0.499	0	-0.499
20	Highland	Inverness	1.859	0	-1.859
30	Tay	Hatton	0.956	1.964	1.008
40	Aberdeen	Nigg	1.233	0	-1.233
50	Aberdeen	Persley	0.321	0	-0.321

E3_Column	E3_Pfi_Area_Name	E3_Stw_Name	AR23 E3.2	AR24 E3.2	Difference
60	Aberdeen	Peterhead	0.2	0	-0.2
70	Aberdeen	Fraserburgh	0.157	0	-0.157
80	Moray Coast	Lossiemouth	0.349	0.882	0.533
90	Moray Coast	Buckie	0.262	0.548	0.286
100	Moray Coast	Banff/Macduff	0.164	0.275	0.111
110	AVSE	Seafield	2.177	4.953	2.776
120	AVSE	Newbridge	0.085	0.183	0.098
130	AVSE	East Calder	0.136	0.253	0.117
140	AVSE	Blackburn	0.069	0.11	0.041
150	AVSE	Whitburn	0.018	0.038	0.02
160	Levenmouth	Levenmouth	0.614	1.281	0.667
170	Dalmuir	Dalmuir	1.722	3.689	1.967
180	Daldowie	Daldowie	0	0	0
190	MSI	Meadowhead	0.686	1.415	0.729
200	MSI	Stevenston	0.122	0.344	0.222
210	MSI	Inverclyde	0.174	0.357	0.183
			11.803	**16.292**	**4.489**

The average non- resident connected population for the remaining PPP sites reported in AR24 is comparable to pre COVID-19 values as shown in Figure 1 below.

Figure 1: Reported average Non-resident connected population for remaining PPP sites AR19 to AR24



E3.3 Population equivalent of total load received

The Population Equivalent (PE) of total load has decreased by 16% (-465.366k) (see Table 4 below), which has been mainly driven by works that are no longer reported as they came under Scottish Water operation during the AR23 reporting period (- 503.759k). They were therefore included in AR23, but not in AR24. These are shown as zero population equivalent and highlighted in blue in Table 4 below. This is compensated for by a net increase of 38.393k for the remaining works.

Table 4: Population equivalent of total load received change AR23 to AR24

E3_Column	E3_Pfi_Area_Name	E3_Stw_Name	AR23 E3.3	AR24 E3.3	Difference
10	Highland	Ft William	20.031	0	-20.031
20	Highland	Inverness	79.086	0	-79.086
30	Tay	Hatton	234.155	239.105	4.95
40	Aberdeen	Nigg	290.608	0	-290.608
50	Aberdeen	Persley	53.938	0	-53.938
60	Aberdeen	Peterhead	35.002	0	-35.002
70	Aberdeen	Fraserburgh	25.094	0	-25.094
80	Moray Coast	Lossiemouth	43.928	44.789	0.861
90	Moray Coast	Buckie	29.008	36.862	7.854
100	Moray Coast	Banff/Macduff	12.181	12.592	0.411

E3_Column	E3_Pfi_Area_Name	E3_Stw_Name	AR23 E3.3	AR24 E3.3	Difference
110	AVSE	Seafield	780.469	807.681	27.212
120	AVSE	Newbridge	30.972	30.243	-0.729
130	AVSE	East Calder	117.522	104.511	-13.011
140	AVSE	Blackburn	21.681	21.902	0.221
150	AVSE	Whitburn	14.22	14.293	0.073
160	Levenmouth	Levenmouth	183.957	193.524	9.567
170	Dalmuir	Dalmuir	546.347	546.697	0.35
180	Daldowie	Daldowie	0	0	0
190	MSI	Meadowhead	222.366	222.722	0.356
200	MSI	Stevenston	80.279	80.835	0.556
210	MSI	Inverclyde	85.286	85.008	-0.278
			2906.13	**2440.764**	**-465.366**

The movement in total load received for the remaining works is consistent with previous years except for:

- East Calder – despite the increase in resident and non-resident the decrease in population equivalent of total load received is driven by a reduction in trade effluent PE
- Moray Coast (Buckie) – the significant increase in population equivalent of total load received is due to an increase in trade effluent

1.2.1 Lines E3.4-E3.8 - Scope of Works

A breakdown of the scope of the remaining PPP works (i.e., those that have not been transferred into Scottish Water ownership) is detailed in Table 5 and has not changed from AR23.

Table 5: Sewerage Information (E3.4).

PPP Works	Scope of works
Hatton	Includes 16 pumping stations and associated pumping mains/gravity sewers.
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.
Seafield	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.

E3.5 - Sewage Treatment

All remaining PPP schemes have sewage treatment with the exception of Daldowie as it is exclusively a Sludge Treatment Centre (STC).

E3.6 – Sludge Treatment

Permanent sludge treatment facilities for the remaining PPP works are detailed in Table 6. These have not changed from AR23.

Table 6: Permanent sludge treatment facilities (E3.6).

PPP Permanent Sludge treatment facilities	Details
Hatton	Indigenous sludge 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.
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.

E3.7 - Terminal Pumping Station

Terminal Pumping Stations are pumping stations that are 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 WwTW 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 7 below include incoming terminal pumping stations as part of the remaining PPP scheme. Maximum capacity (l/s) of these terminal pumping stations, excluding standby capacity, is given in brackets. These have not changed from AR23.

Table 7: Works with terminal pumping stations (E3.7).

PPP Works	Details
Hatton	South Balmossie (1,563 l/s), West Haven (110 l/s), Inchcape Park (241 l/s).
Lossiemouth	Duffus Junction (33 l/s), Moycroft (300 l/s).
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).

E3.8 – Other

There are no works in the category 'Other.'

1.2.2 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 (**Line E3.9**) – All CAR
- BOD consent (**Line E3.10**) – All UWWTD, except Newbridge, East Calder, Blackburn and Whitburn which are CAR parameters
- COD consent (**Line E3.11**) – All UWWTD
- Ammonia consent (**Line E3.12**) – All CAR
- Phosphate consent (**Line 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'.

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-(total number of failures/total number of samples)) x 100

The Operator Self-Monitoring (OSM) results for the period ending 31 December 2023, 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's remaining PPP sites are listed in Table 8. A comparison of these is shown in the subsequent two tables (Table 9 and Table 10) which show an increase in the number of exceedances from 1 to 2 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 8: Exceedances and Failures 2023.

Site	CAR/UWWTD standards	Parameter	Exceedance (E) / Failure (F)	
Seafield	UWWTD	BOD	E	28/07/2023
Inverclyde	UWWTD	BOD	E	20/06/2023

Table 9: Exceedances 2023 vs 2022.

Site	CAR/UWWTD standards	Parameter	2023	2022
Seafield	UWWTD	BOD	1	
Inverclyde	UWWTD	BOD	1	
Blackburn	CAR	BOD		1

Table 10: Failures 2023 vs 2022.

	CAR/UWWTD standards	Parameter	2023	2022
*			-	-

* No Failures recorded in 2022 or 2023, therefore the table has been left intentionally blank

Seafield WwTW

The Seafield exceedance (BOD) on 28 July 2023 occurred during a period of stable operation as evidenced by accredited daily sampling and analysis before and after that day. The OSM exceedance was recorded as 41mg/l versus a SEPA Licence Lower Tier Limit of 25mg/l, Upper Tier limit of 50mg/l. The contemporary contractual sample result for that day was 13mg/l. It is therefore likely that the composite sample was not sufficiently mixed prior to splitting for regulatory and contractual purposes. All other parameters were compliant. No process or operational root cause was identified during investigations.

Inverclyde WwTW

The exceedance was in part due to heavy rain onsite resulting in an increase in flows and a blanket spill from the Secondary Settlement Tanks. Additionally, there was a fault with the Dissolved Oxygen (DO) probe in one of the aerations lanes that was reading artificially high (10mg/l). Several attempts were made to recalibrate the probe, but all were unsuccessful. The false 'high' reading raised the average DO reading in the blower control system. As a result, the blowers did not increase the DO levels when required. The fault was rectified later in the day and normal levels of oxygen input were restored.

1.2.3 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 (excluding the PPP sites which have transferred to Scottish Water ownership). These have not changed from AR23.

- Primary (**Line E3.15**) – all plants except Persley, Lossiemouth, Buckie, Banff/Macduff, Levenmouth and Meadowhead
- Secondary activated sludge (**Line E3.16**) - includes all plants except Blackburn
- Secondary biological (**Line E3.17**) - Blackburn
- Tertiary A1 (**Line E3.18**) – summarised in Table 11
- Tertiary A2 (**Line E3.19**) – summarised in Table 12
- Tertiary B1 (**Line E3.20**) - no plants in this category
- Tertiary B2 (**Line E3.21**) – summarised in the Table 13

Table 11: Tertiary A1 – Activated sludge process (E3.18).

Site	Treatment Process Details
East Calder	Nitrifying filters
Whitburn	Nitrifying filters
Dalmuir	Nitrifying filters

Table 12: Tertiary A2 – Activated sludge process (E3.19).

Site	Treatment Process Details
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.

Table 13: Tertiary B2 – biological sludge process (E3.21).

Site	Treatment Process Details
Blackburn	Disc filters.

1.2.4 Lines E3.22 to E3.32 - Sewerage data

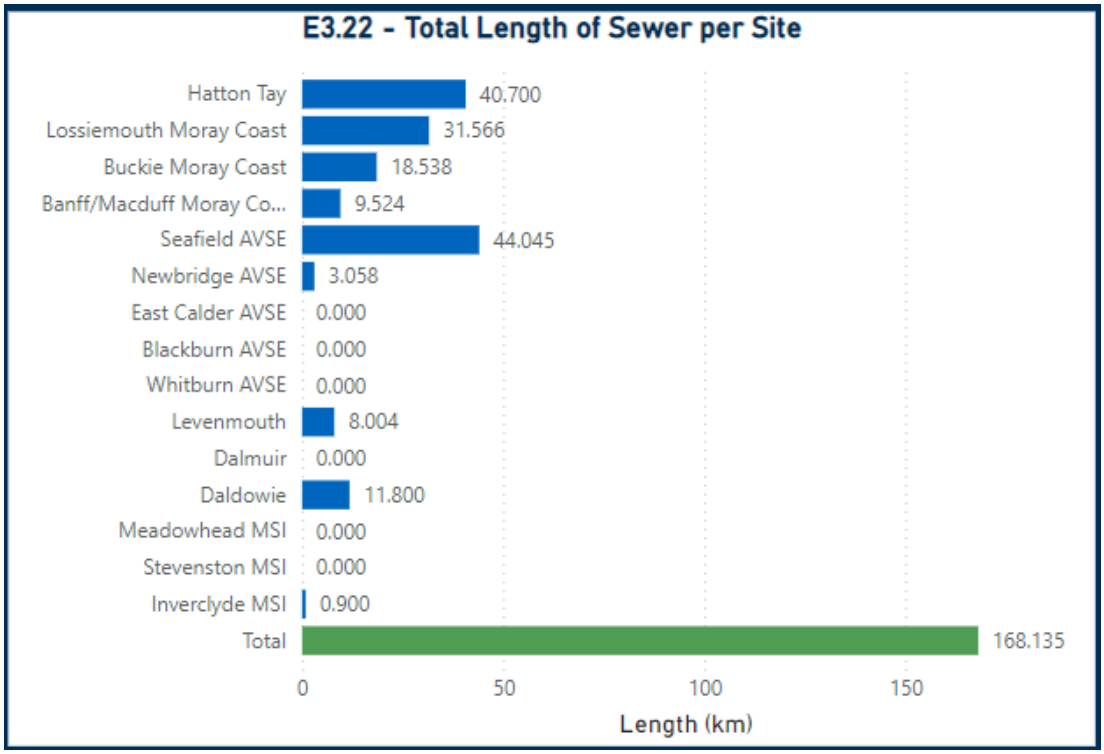
The sewerage data includes all sewerage (sewers, pumping stations, rising mains, outfalls and long sea outfalls) for the remaining PPP sites.

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 for the remaining PPP sites, unless noted otherwise, is included in the overall length of sewers/pipelines. Where terminal pumping stations are located remotely 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 in Figure 2 below.

Figure 2: Total length of sewer per site for AR24.



The reduction in total length of sewer from AR23 (53.89 Km) is the result of the transfer of the six PPP sites into Scottish Water ownership. All other values remain unchanged

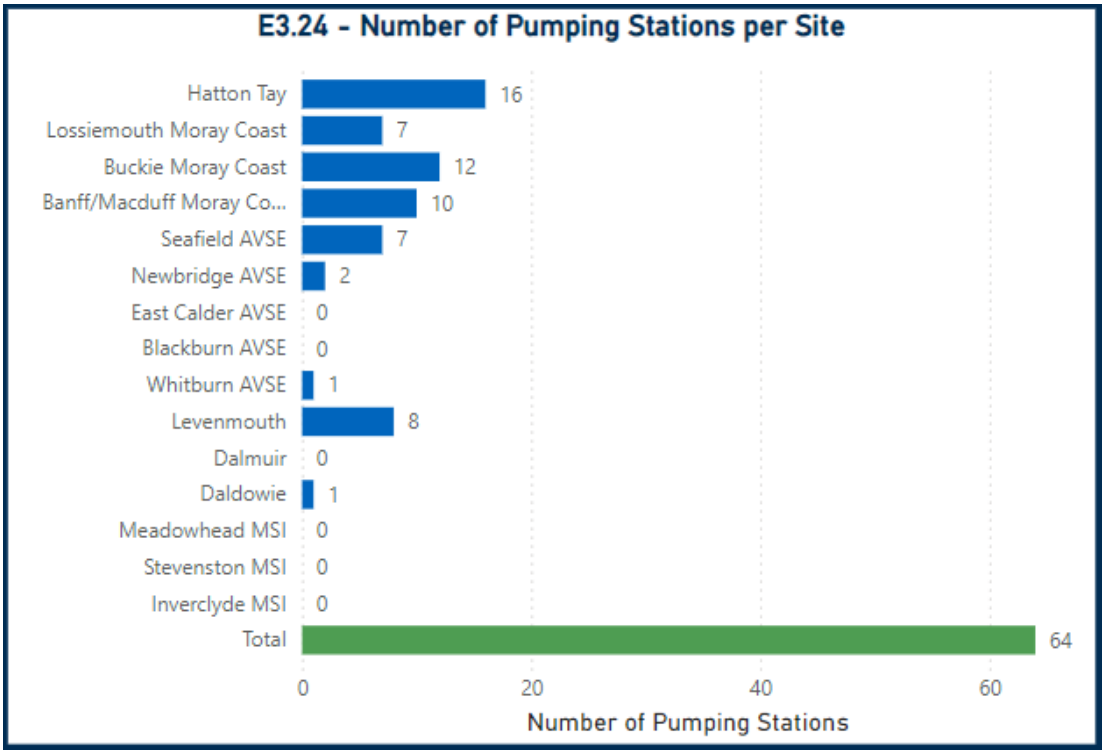
E3.23 Total length of critical sewer

All PPP sewers (including relief sewers, rising mains and CSO outfalls) are deemed to be critical therefore the commentary for **Line E3.22** also applies to this line.

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 3. The reduction on the total number of pumping station (-13) from AR23 is due to the transfer of the six PPP sites into Scottish Water ownership. The number of pumping stations for each individual remaining PPP site has remained the same as AR23.

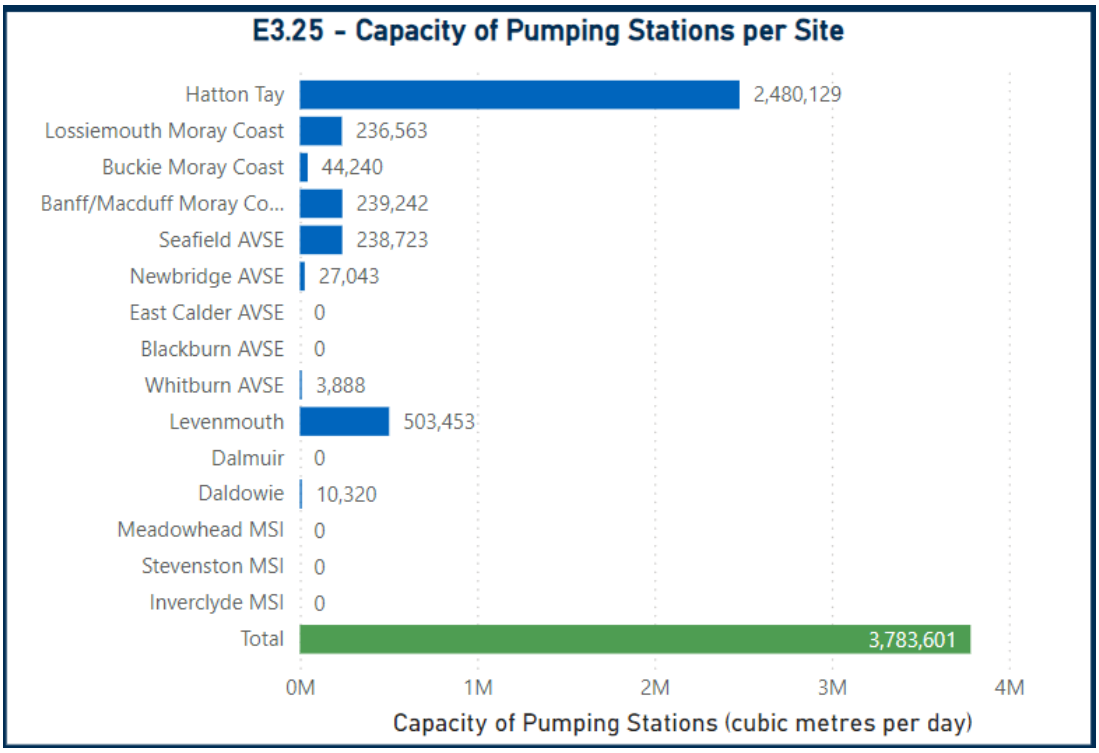
Figure 3: Number of pumping stations per site for AR24.



E3.25 Capacity of pumping stations (m^3/d)

Includes stormwater, combined and terminal pumping stations. Maximum flow pumped forward per day. This excludes the capacity of standby pumps. The reduction in total capacity of 0.53 m^3/d from AR23 is due to the transfer of the six PPP sites into Scottish Water ownership. The capacity of the remaining sites is the same as reported in AR23. Further information capturing the Capacity of pumping stations per site has been included within Figure 4 below.

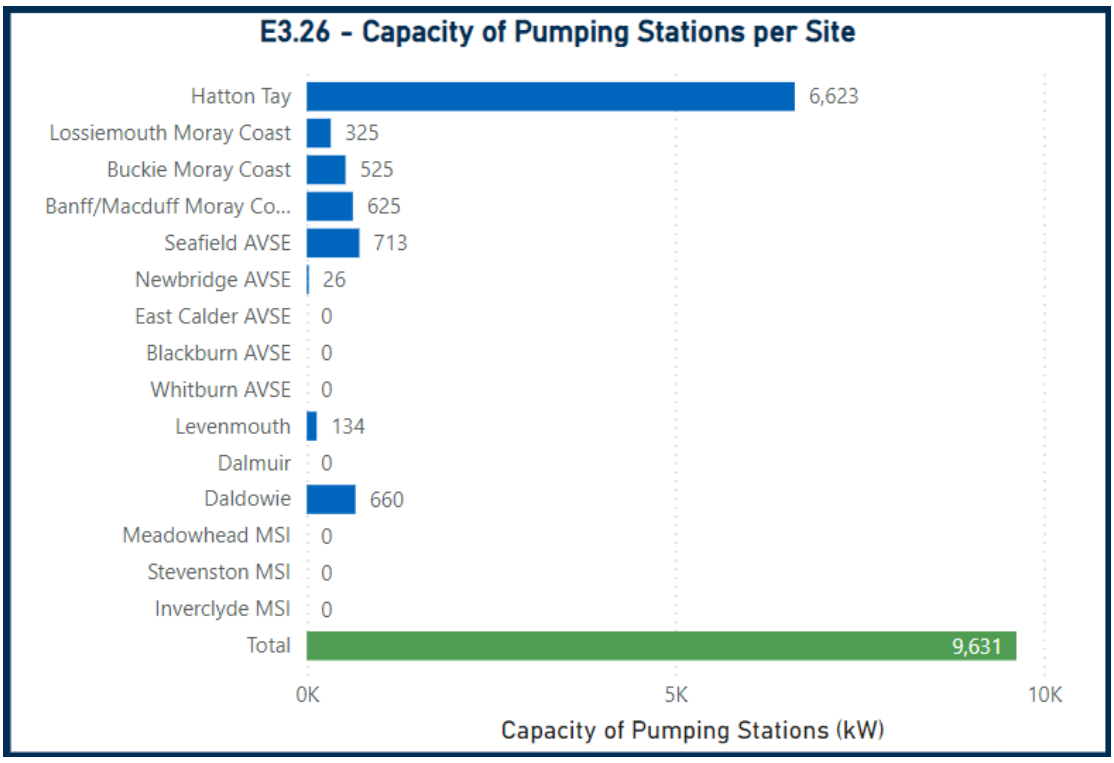
Figure 4: Capacity (m^3/d) of pumping stations per site for AR24.



E3.26 Capacity of pumping stations (kW)

Includes stormwater and combined pumping stations, but not terminal pumping stations. Includes capacity of standby pumps. The reduction in total capacity of 2.97 kW from AR23 is due to the transfer of the six PPP sites into Scottish Water ownership. The capacity of the remaining sites is the same as reported in AR23. Further information capturing the capacity of pumping stations per site has been included within Figure 5.

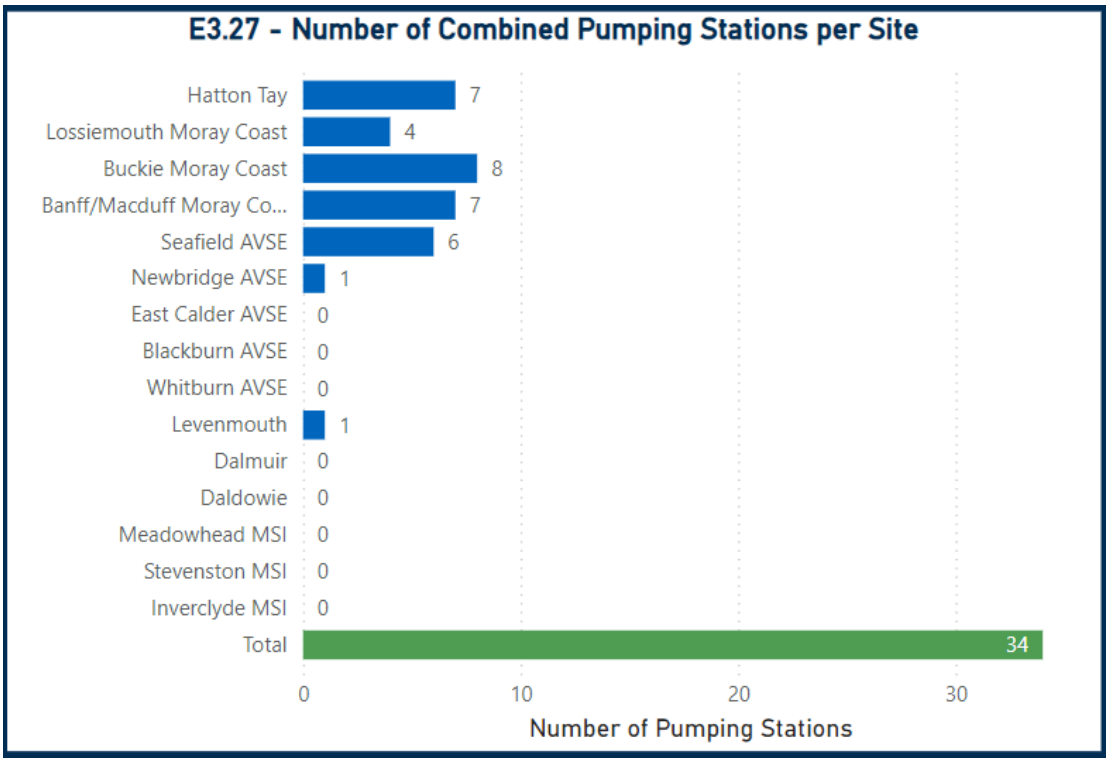
Figure 5: Capacity (kW) of pumping stations per site for AR24.



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. The reduction in the number of combined pumping stations from 15 in AR23 is due to the transfer of the six PPP sites into Scottish Water ownership. The number of combined pumping stations for the remaining sites is the same as reported in AR23. Further information capturing the number of combined pumping stations per site has been included within Figure 6 below.

Figure 6: Number of combined pumping stations per site for AR24.



The combined pumping stations listed in Table 14 are included.

Table 14: Combined pumping stations (E3.27).

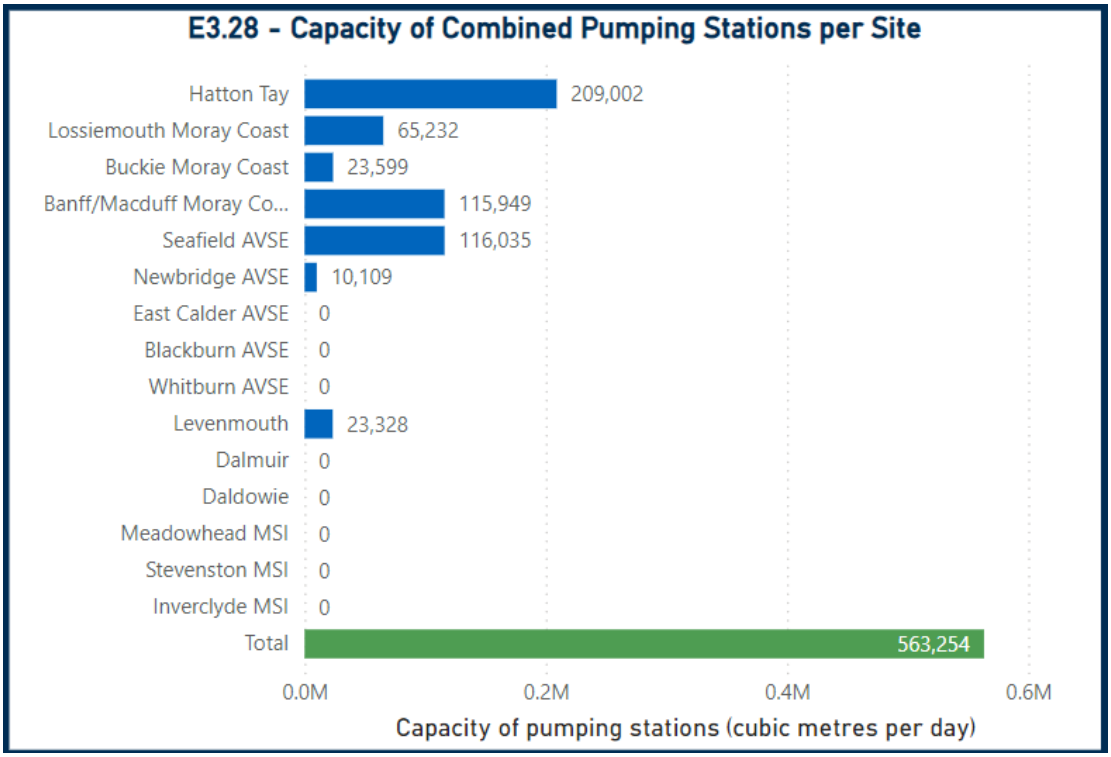
Site	Description
Hatton	Riverside, KGV, Stannergate, West Ferry, Broughty Castle, Fort Street, Gray Street
Lossiemouth	Burghead, Cummingston, Hopeman, Moycroft
Buckie	Portgordon West, Portgordon East, Seatown, Cluny, Cullen East, Portknockie, Findochty, Portessie
Banff/Macduff	Whitehills, Whitehills Harbour, Inverboyndie, Scotstown, Castlehill Park, Union Road, Bankhead
Seafield	Wallyford Transfer, Wallyford SWW, Portobello SWW, Harelaw SWW, Dalkeith SWW, Mayshade SWW*
Newbridge	Broxburn SWW
Levenmouth	Methil M1

*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 (m^3/d)

This is the maximum flow pumped forward per day and excludes capacity of standby pumps. The overall reduction in the capacity of the combined pumping stations of 0.22 m^3/d from AR23 is due to the transfer of the six PPP sites into Scottish Water ownership. The capacity of the combined pumping stations for the remaining sites is the same as reported in AR23. Further information capturing the Capacity of combined pumping stations per site has been included within Figure 7 below.

Figure 7: Capacity (m^3/d) of combined pumping stations per site for AR24.



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 clarity, the function of the stormwater pumping station is to prevent and/or limit surcharging of the upstream sewerage system. The overall reduction in the number of stormwater pumping stations of four from AR23 is due to the transfer of the six PPP sites into Scottish Water ownership. The number of stormwater pumping stations for the remaining sites is the same as reported in AR23. Further information capturing the number of storm water pumping stations per site has been included within Figure 8 below.

The stormwater pumping stations in Table 15 are included.

Figure 8: Number of storm water pumping stations per site for AR24.

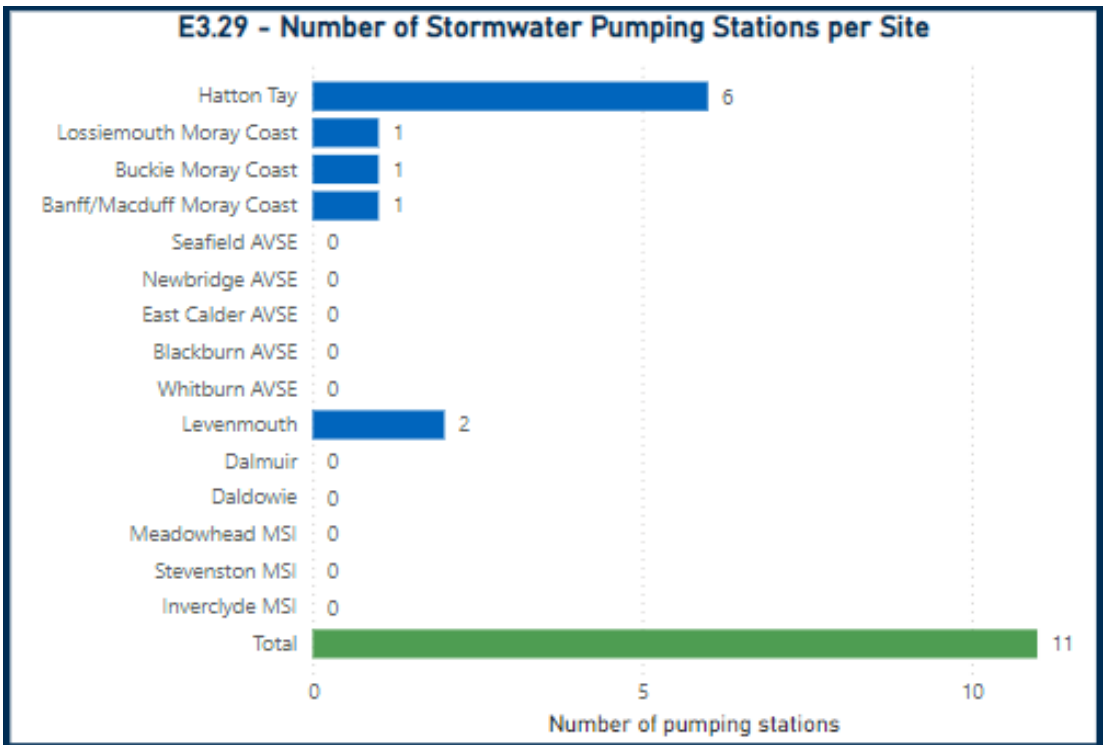


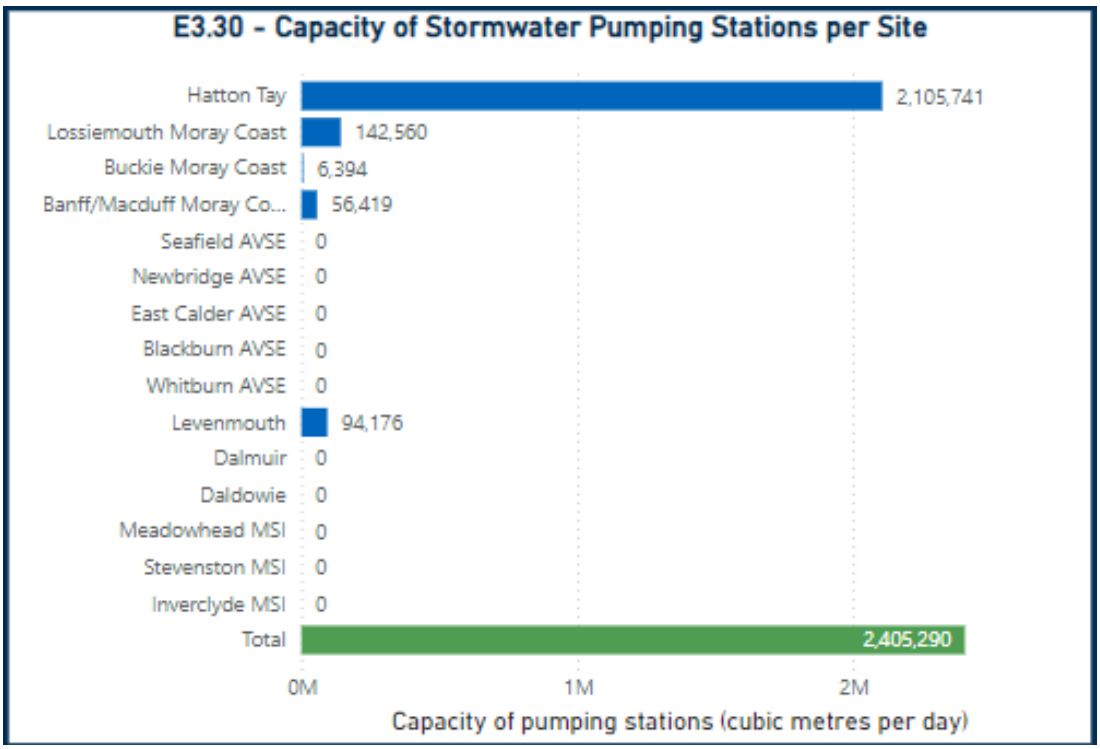
Table 15: Stormwater pumping stations (E3.29).

Site	Description
Hatton	Riverside, KGV, Stannergate, Westhaven, Broughty Castle, Inchcape Park
Lossiemouth	Moycroft
Buckie	Portessie
Banff/Macduff	Bankhead
Levenmouth	Leven, Roundall

E3.30 Capacity of stormwater pumping stations (m^3/d)

Maximum flow pumped forward per day. This excludes the capacity of standby pumps. The overall reduction in the capacity of stormwater pumping stations of 0.3 m^3/d from AR23 is due to the transfer of the six PPP sites into Scottish Water ownership. The capacity of stormwater pumping stations for the remaining sites is the same as reported in AR23. Further information capturing the capacity of stormwater pumping stations per site has been included within Figure 9 below.

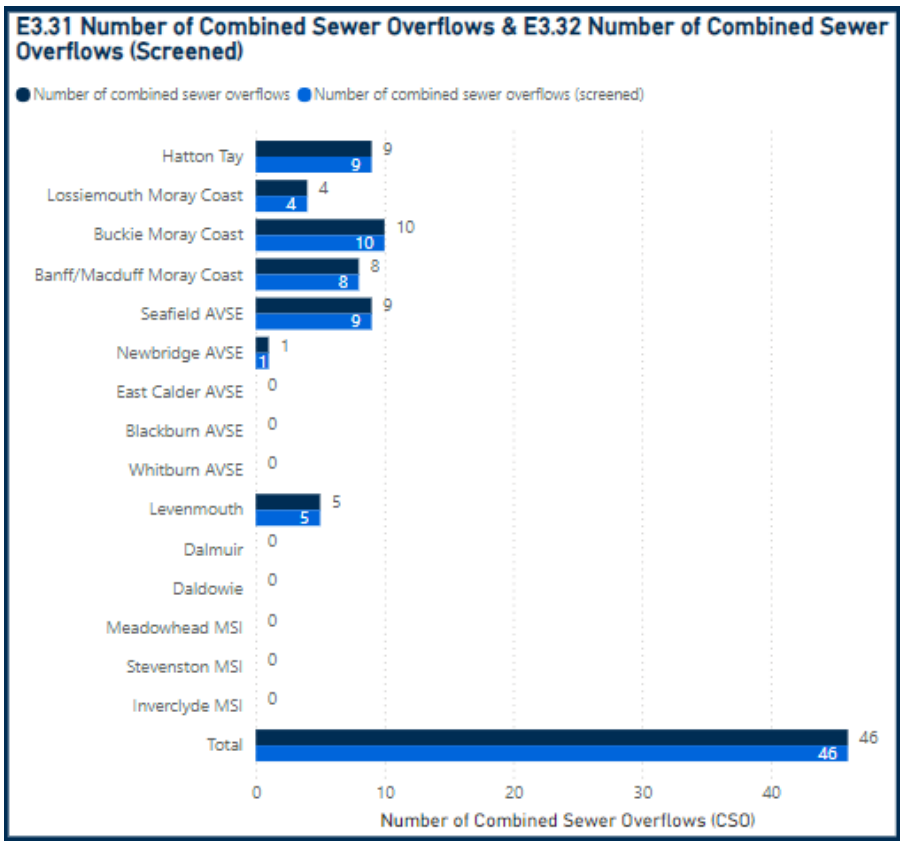
Figure 9: Capacity (m^3/d) of stormwater pumping stations per site for AR24.



1.2.5 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. The overall number of CSOs and the number of CSOs (screened) of 12 from AR23 is due to the transfer of the six PPP sites into Scottish Water ownership. The number of CSOs and the number of CSOs (screened) for the remaining sites is the same as reported in AR23. Further information capturing the number of CSOs and the number of CSOs screened per site is included in Figure 10 below.

Figure 10: Number of combined sewer overflows and combined sewer overflows screened per site for AR24



The CSOs in Table 16 are included.

Table 16: List of CSOs (E3.31).

Site	Description
Hatton	Riverside, KGV, Stannergate, South Balmossie, Westhaven, Broughty Castle, Inchcape Park, Panmurefield/Balmossie Mill (2)
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
Seafield	Wallyford, Dalkeith*, Hardengreen, Harelaw, Haveral Wood, Middlemills, Newbattle, Newtongrange, Suttieslea*
Newbridge	Broxburn
Levenmouth	Buckhaven, Methil M2 CSO2**, Methil CSO1**, Leven, Roundall

*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.

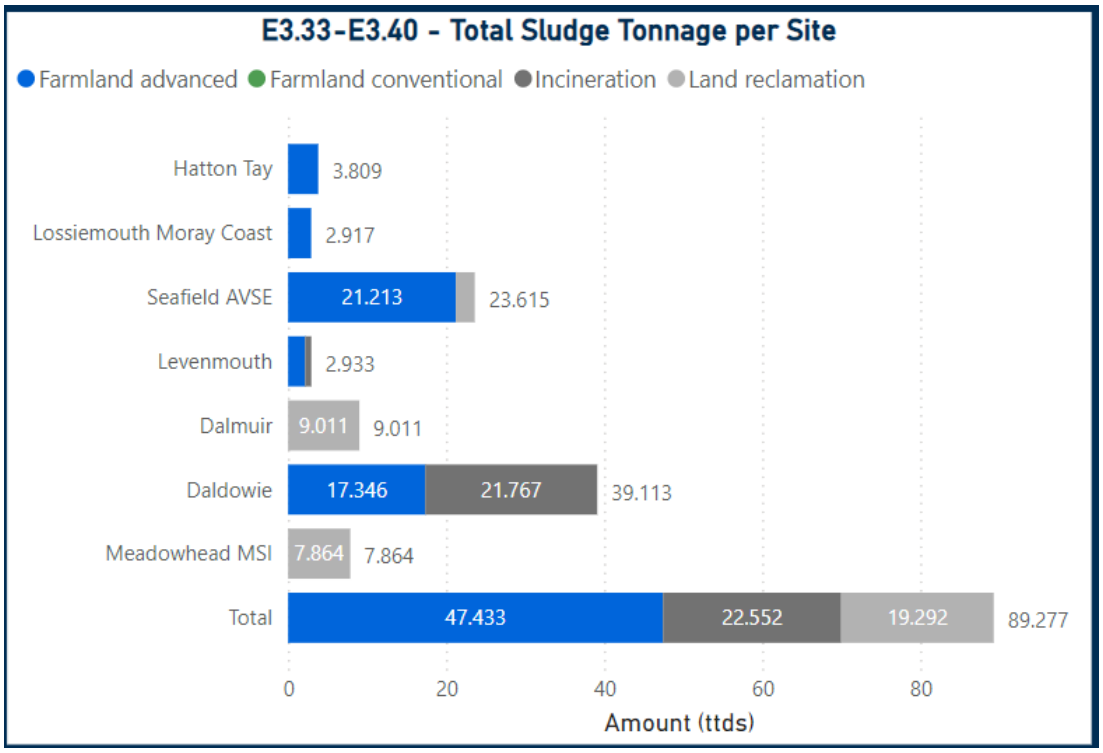
**Levenmouth - Methil CSO1 and Methil M2 CSO2 discharge into a common outfall.

1.2.6 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.

Further information capturing the total sludge tonnages prior to the sludge treatment process per site is included in Figure 11, 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 11: Total sludge tonnage prior to the sludge treatment process per site for AR24.



For Daldowie, the data comes from the PFI operator and is used for contract payment purposes and therefore is validated. Therefore, 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 is, therefore, not subject to the same level of contractual validation.

E3.36 Incineration

97% 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 with payment and, therefore, not validated. However, this is only applicable to 3%

of the overall submission (see Table 17). We therefore consider the overall confidence grade of B3 to be appropriate and consistent with previous years.

Table 17: Sludge treatment and disposal data E3.36 Incineration.

Scheme	CG	ttds	% of total
Levenmouth	B4	0.785	3%
Daldowie	B3	21.767	97%
Total	**B3**	**22.552**	

The overall reported ttds of sludge treatment and disposal (**Lines E3.33-E3.40**) will change year on year based on a number of factors including weather, sludge imports, operational incidents and operational decisions.

Key changes between AR23 and AR24 reported values can be outlined as follows:

- Hatton: the tonnage shows a +17% variance but when considered in the wider context of a five-year dataset, the AR24 tonnage was close to average expected for the catchment of indigenous sludge and imports from outlying Scottish Water assets.

- Dalmuir: The data shows a variance of +24% for sludge disposed from the site. This was an operational decision to use installed and contingency equipment as a result of reduced downstream asset capability. It is likely that the same level of increased production will continue and therefore the AR25 variance analysis is likely to be lower.

- Daldowie: The variance of -8% has largely been influenced by the Dalmuir operational decision and, again, the AR25 variance will likely be lower.

1.3 Data

1.3.1 Data Sources

Data sources and confidence grades for E3 remain the same as AR23.

1.3.2 Data Improvement Programmes

There have been no notable data improvement programmes in AR24.

1.3.3 Forecast Data

There are no forecast data for E3.

2 Table E3a – PPP cost analysis

2.1 Overview

Table E3a provides operating costs for each scheme. Actual data is not available, estimated direct operating costs have been calculated from the financial models prepared when the concession agreement was closed. The models do not take account of any additional plant constructed by the concessionaries at the site. 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 the Water Industry Commission for Scotland (WICS) auditor in May 2007 and has not been subject to further discussion since that date.

2.2 Performance Trends

The changes between AR24 and AR23 for Scottish Water cost and for annual charges are summarised below.

E3a.24 Total Scottish Water cost

- The Total Scottish Water cost is calculated as 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).**

- The confidence grade for total charges is A1 (see Table 18 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.

- Excluding the sites which have now moved to Scottish Water control (highlighted in blue in Table 18) the total costs variance is + £1.989m. A detailed explanation of the variance is contained in the table.

Table 18: Summary of changes in Scottish Water cost from AR23 to AR24.

Site	AR24 £m	AR23 £m	Variance £m	Costs lower than previous year	Costs higher than previous year
Ft William	-	0.017	-0.017	contract ended 28/05/22	
Inverness	-	0.410	-0.410	contract ended 28/05/22	
Hatton	0.629	0.475	0.154	23/24 includes lower legal/consultants fees £0.003m,	23/24 includes higher other Scottish Water operating costs £0.020m, higher sludge tankering costs £0.134m, higher ABM support costs £0.003m,
Nigg	-	0.711	-0.711	contract ended 30/09/22	

Site	AR24 £m	AR23 £m	Variance £m	Costs lower than previous year	Costs higher than previous year
Persley	-	0.006	-0.006	contract ended 30/09/22	
Peterhead	-	0.003	-0.003	contract ended 30/09/22	
Fraserburgh	-	0.004	-0.004	contract ended 30/09/22	
Lossiemouth	0.408	0.405	0.003	23/24 includes lower legal/consultants fees £0.023m, lower other Scottish Water operating costs £0.091m, lower ABM support costs £0.012m,	23/24 includes higher sludge tankering and terminal pumping costs £0.131m,
Buckie	0.016	0.013	0.003		23/24 includes higher other Scottish Water operating costs £0.003m,
Banff/Macduff	0.025	0.021	0.004		23/24 includes higher other Scottish Water operating costs £0.003m, higher ABM support costs £0.001m,
Seafield	0.461	-0.031	0.492		23/24 includes higher legal/consultants fees £0.403m, higher other Scottish Water operating costs £0.036m, higher ABM support costs £0.053m,
Newbridge	0.031	0.025	0.006		23/24 includes higher other Scottish Water operating costs £0.006m,
East Calder	0.012	0.011	0.001		23/24 includes higher other Scottish Water operating costs £0.001m,
Blackburn	0.007	0.004	0.003		23/24 includes higher other Scottish Water operating costs £0.002m, higher ABM support costs £0.001m,
Whitburn	0.007	0.006	0.001		23/24 includes higher other Scottish Water operating costs £0.001m,
Levenmouth	0.336	0.349	-0.013	23/24 includes lower legal/consultants fees £0.004m, lower other Scottish Water operating costs £0.009,	
Dalmuir	2.469	2.023	0.446	23/24 includes lower legal/consultants fees £0.169m,	23/24 includes higher other Scottish Water operating costs £0.119m, higher Scottish Water sludge disposal costs £0.448m, higher ABM support costs £0.048m,
Daldowie	4.555	4.135	0.420	23/24 includes lower legal/consultants fees £0.098m, lower Shieldhall centrifuging costs £0.037m,	23/24 includes higher other Scottish Water operating costs £0.257m, higher sludge tankering costs £0.281m, higher ABM support costs £0.017m,
Meadowhead	1.056	0.735	0.321		23/24 includes higher legal/consultants fees £0.006m, higher other Scottish Water operating costs £0.87m, higher terminal pumping and inlet headworks costs £0.226m, higher ABM support costs £0.002m,
Stevenston	0.503	0.513	-0.010	23/24 includes lower other Scottish Water operating costs £0.001m, lower inlet headworks costs £0.010m,	23/24 includes higher ABM support costs £0.001m,
Inverclyde	0.719	0.561	0.158		23/24 includes higher other Scottish Water operating costs £0.002m, higher terminal pumping and inlet headworks costs £0.155m, higher ABM support costs £0.001m,
TOTAL	**11.234**	**10.396**	**0.838**		

E3a.26 Annual charge

As per previous reporting years 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 (Seafield, 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 PPP rather than for each of the individual sites. The data therefore has to be disaggregated for annual return 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.

Excluding the sites which have now moved to Scottish Water's control (highlighted in blue in Table 19) the total costs variance is + £0.81m. A detailed explanation of the variance is contained in the table.

The changes in Annual Charge from AR23 to AR24 are summarised in Table 19, including the details shown inFigure 12: Change in annual charge (£M) per site from AR23 to AR24. Figure 12.

Figure 12: Change in annual charge (£M) per site from AR23 to AR24.

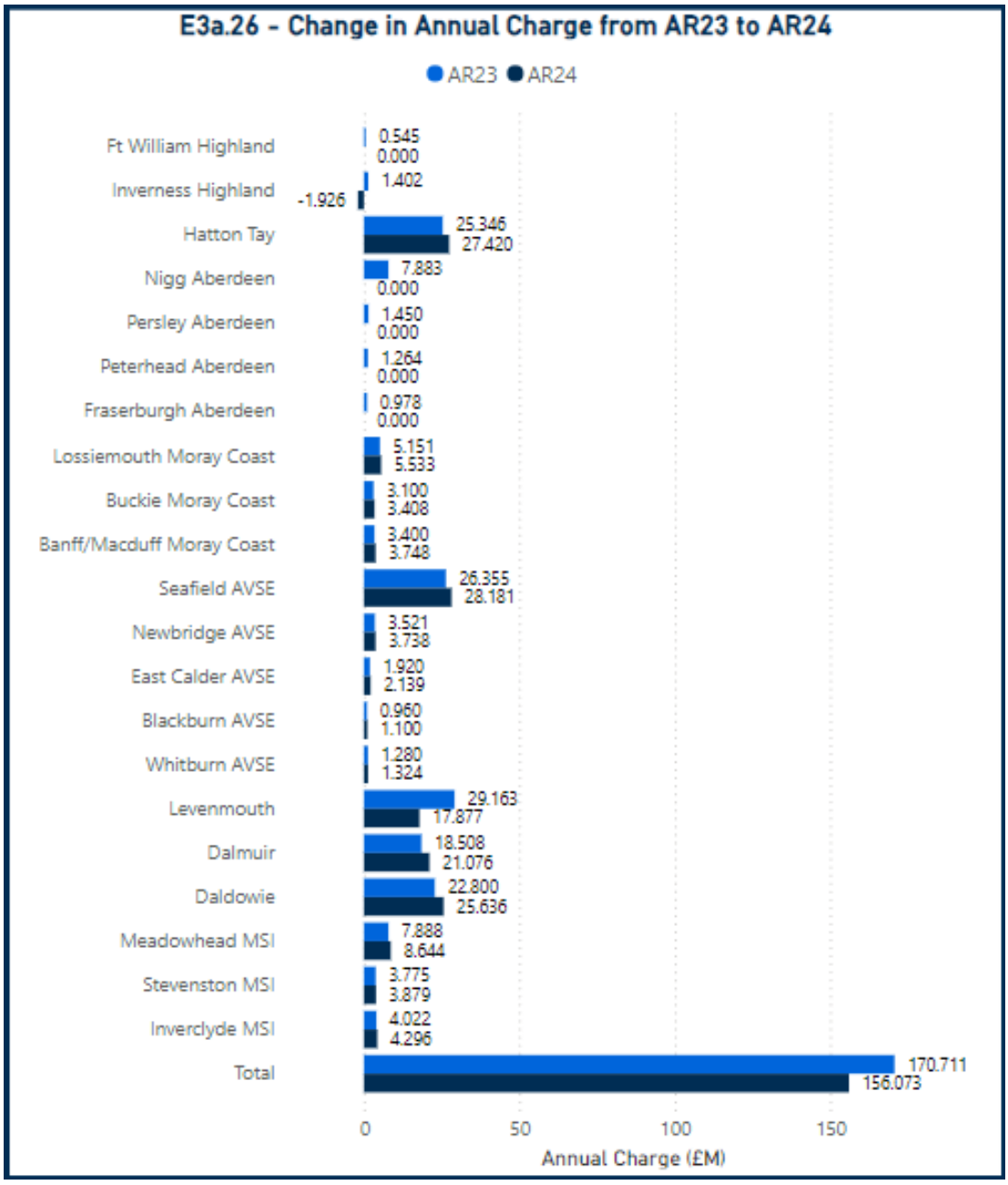


Table 19: Summary of changes in Annual Charge from AR23 to AR24.

Site	AR24 £m	AR23 £m	Variance £m	Costs lower than previous year	Costs higher than previous year
Ft William	-	0.545	-0.545	contract ended 28/05/22	
Inverness	-1.926	1.402	-3.328	contract ended 28/05/22 A 'full and final' settlement of all matters under the Highland PFI contract was reached between the parties in July 2023. Therefore, an accrual of £1.926m that had been retained in respect of the risk that Scottish Water will require to compensate the PFI Company for a series of performance related payment deductions accumulating between January 2019 and March 2022 was ultimately not required and has been released.	
Hatton	27.420	25.346	2.074	22/23 includes additional works £0.056m,	23/24 inflation and flows £2.067m, lower release of accruals £0.063m,
Nigg	-	7.883	-7.883	contract ended 30/09/22	
Persley	-	1.450	-1.450	contract ended 30/09/22	
Peterhead	-	1.264	-1.264	contract ended 30/09/22	
Fraserburgh	-	0.978	-0.978	contract ended 30/09/22	
Lossiemouth	5.533	5.151	0.382		23/24 inflation, penalties, sludge imports £0.314m, lower release of accruals £0.068m
Buckie	3.408	3.100	0.308		23/24 inflation £0.266m, lower release of accruals £0.042m
Banff/Macduff	3.748	3.400	0.348		23/24 inflation £0.287m, lower release of accruals £0.061m
Seafield	28.181	26.355	1.826	23/24 higher release of accruals £0.124m, 22/23 included NC Landfill tax to March 2022 £0.933m,	23/24 based on 100% compliance with the contract plus inflation £3.503m
Newbridge	3.738	3.521	0.217		
East Calder	2.139	1.920	0.219		
Blackburn	1.100	0.960	0.140		
Whitburn	1.324	1.280	0.044		
Levenmouth	17.877	29.163	-11.286	23/24 inflation, driven by UK Natural Gas Index and flow £10.581m*, higher release of accruals £0.504m, 22/23 included Uninsurability Cost £0.218m,	23/24 higher Odour Project costs £0.017m,
Dalmuir	21.076	18.508	2.568	23/24 lower Annual Operations Compensation £0.490m, lower additional works £0.038m,	23/24 base tariff change, inflation and flows £1.299m, higher Capital Project opex £1.138m, higher New Capital Investment costs £0.052m, lower release of accruals £0.607m
Daldowie	25.636	22.800	2.836		23/24 inflation and sludge volumes £1.401m, higher excess ragging £0.1m, lower release of accruals £1.335m
Meadowhead	8.644	7.888	0.756	23/24 lower gas cost £0.394,	23/24 inflation £0.704m, higher additional works £0.113m, lower release of accruals £0.333m
Stevenston	3.879	3.775	0.104	23/24 higher release of accruals £0.122m,	23/24 inflation and flows £0.222m, higher additional works £0.004m,
Inverclyde	4.296	4.022	0.274	23/24 higher release of accruals £0.014m,	23/24 inflation and flows £0.288m,
TOTAL	**156.073**	**170.711**	**-14.638**		

* 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).

2.3 Data

2.3.1 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.

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, in 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.

2.3.2 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 UK Government website (www.saa.gov.uk). Rates paid by Scottish Water are 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 20).

Table 20: Confidence grades for total rates paid.

	E3a.2	E3a.9	E3a.17	
Site	Sewerage	Sewage Treatment	Sludge Treatment	Comment on confidence grade
Hatton	N	B3	B3	Cost distribution is estimated, based on the Financial Model
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

2.3.3 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 AR24.

The confidence grades have been assigned as per Table 21.

Table 21: CGs for PPP Contractor SEPA charges.

	E3a.3	E3a.10	E3a.18	
Site	Sewerage	Sewage Treatment	Sludge Treatment	Comment on confidence grade
Hatton	A2	A2	N	
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

2.3.4 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.

Total direct costs are the sum of estimated Direct Operating costs (**Lines E3a.1, E3a.8 and E3a.16**), Rates paid by PPP contractors (**Lines E3a. 2, E3a.9, E3a.17**) and SEPA charges paid by the PPP contractor (**Lines E3a.3, E3a.10 and E3a.18**). The most significant element of this calculation is the estimated direct operating costs (**Lines E3a.1, E3a.8 and E3a.16**) which has a confidence grade of D6. Therefore the confidence grade for total direct cost has been allocated as D6. A confidence grade of A3 was allocated to the Dalmuir sludge treatment costs as there is some visibility of these costs.

2.3.5 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 costs for 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 22).

Table 22: Confidence grades for total charges.

	E3a.5	E3a.12	E3a.20	Comment
Site	Sewerage	Sewage Treatment	Sludge Treatment	Comment on confidence grade
Hatton	C4	C4	C4	
Lossiemouth	C4	C4	C4	
Buckie	C4	C4	N	No sludge centre at works
Banff/Macduff	C4	C4	N	No sludge centre at works
Seafield	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.

2.3.6 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 23 below).

Costs are as per the Profit & Loss account and reflect charges as invoiced by SEPA.

Table 23 only includes sites where SEPA fees are paid by Scottish Water.

Table 23: 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

2.3.7 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 these are the largest components of the total costs calculations and carry a confidence grade of D6.
- 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.

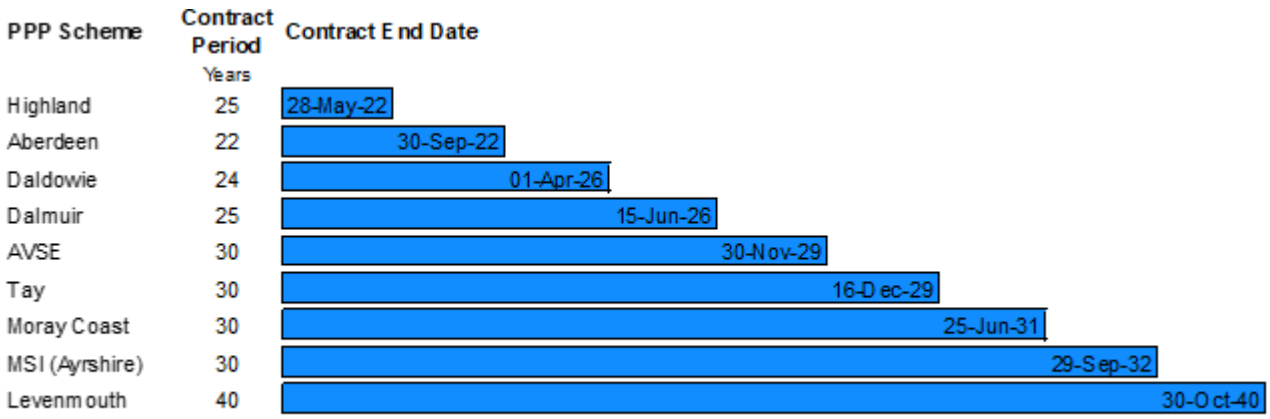
E3a.27 Public sector capital equivalent values

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. Further details highlighting the contract period and the contract end dates per site have been captured within the below visual, Figure 13.

Figure 13: PPP scheme contract period and contract end dates.



2.3.8 Data Improvement Programmes

There have been no notable data improvement programmes in AR24.

2.3.9 Forecast Data

There are no forecast data for Table E3a.

3 Table E4 – Water resources and treatment

3.1 Overview

Table E4 provides information on operating costs and efficiencies relating to water resources and treatment allocated to areas.

There is a difference in how source sites are reported in the E and H tables, so there is no direct read across between the two tables. In line with the table definitions, the sources in E4 are only included if they are direct sources, and 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.

3.2 Performance Trends

3.2.1 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 Water Treatment Works (WTW) as well as to check status of a small number of emergency sources each year.

Number of Sources: As per the AR24 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 are to 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 AR24 (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) - more detail on this data is provided in the Table A2 commentary.

As in previous years and in line with the reporting requirements, columns 110-140 have been completed by assuming that, where multiple sources feed a WTW, the total average daily output comes only from the primary and hardest to treat source. The primary source is therefore allocated 100% of the DI and all other sources are allocated 0%.

There are eight 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 WTW.

Generally, raw water supply sources, catchments, and the WTW they supply, are located within the same region. However, the following four WTW 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 DI, the cross-boundary flow is accounted for and assigned to the region within its treatment rather than abstraction. This approach is consistent with previous years.

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 E4.1- E4.5** is therefore B2 as this is the lower of the two confidence grades described above.

The confidence grade for Table E4 **Lines E4.6- E4.7** (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 one, from 267 to 266. As shown below in Table 24, the reduction in source count is due to a WTW closure i.e. Back Tolsta WTW was abandoned. The area previously served by it is now part of North Lochs Water Operational Area served by North Lochs WTW.

Table 24: Change in number of sources from AR23 to AR24.

	AR23 No. of sources	267
Additions	N/A	0
Reductions	WTW main-out	1
	AR24 No. of sources	**266**

Compared to AR23, DI increased very marginally by 2.215 Ml/d to 1837.734 Ml/d. AR24 saw higher summer peak DI compared to AR23, but this was mostly offset by less significant winter DI peaks in AR24 compared to AR23. Changes to DI in AR24 are detailed in Table 25 below:

Table 25: Changes to DI sources

Source Type	AR23	AR24	Net Change
	Ml/d		
Impounding reservoirs	1357.015	1522.026	165.011
Lochs	21.500	22.035	0.535
River and burn abstractions	384.003	217.494	-166.509
Boreholes	73.001	76.180	3.179
Total	1835.519	**1837.734**	**2.215**

3.2.2 Lines E4.13-E4.14 Peak Demand and Pumping Head

The Peak Demand used in **E4.13** for the AR24 period was 1974.99 Ml/d with a Peak to Average ratio of 1.075, which is lower than AR23 (Peak demand = 2019.15 Ml/d; Peak to average ratio 1.100). The peak week was recorded during the summer in the week ending 18/06/2023. The confidence grade of C3 remains the same as AR23.

The Average Pumping Head is extrapolated from historic data on work done at raw water pumping stations and proportioned based on the change in the total Distribution Input at Scottish Water Region level each year. This is due to Scottish Water not having the meters in the network required to measure and calculate Average Pumping Head. The Average Pumping Head reported in **Line E4.14** is correspondingly lower in AR24 at 26.919 m (compared to 27.534 m in AR23). All pumping stations where the work done (m4) is known were included in the calculations, which is 64% of the total number of pumping stations. The confidence grade of C4 remains the same as AR23.

3.2.3 Lines E4.15-E4.39 Functional costs by operational area, process and size band

E4.19 Water Resources & Treatment

	Total
Functional expenditure:	£m
2023/24	90.109
2022/23	77.958
Variance	(12.151)

Water resources and treatment costs increased by £12.2m (16%) from 2022/23 reflecting the following key movements:

- **Line E4.15**: £5.7m (42%) increase in power costs due to wholesale price increases:

- **Line E4.17**:
  - £1.9m (11%) increase in employment costs primarily driven by pay inflation

- £1.9m (52%) increase in material and consumable costs primarily related to chemical price inflation and bulk purchases to combat algal bloom across multiple sites

- **Line E4.18** £2.8m (26%) increase across general and support costs impacted mainly by pay inflation, additional unfunded pension cost accruals following further valuation work, CPI price inflation across digital contracts, and the progression of new digital projects.

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
2023/24	15.068	21.170	15.277	25.096	**76.611**	13.498	**90.109**
2022/23	13.385	18.225	13.611	22.014	**67.235**	10.723	**77.958**
Variance	**(1.683)**	**(2.945)**	**(1.666)**	**(3.082)**	**(9.376)**	**(2.775)**	**(12.151)**

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 2023/24 (see commentary to **Lines E4.20-27** Water Treatment Works by Process Type & **Lines E4.28-E4.39** Water Treatment Works by Size Band below). Re-stating 2022/23 figures on a like-for-like basis for comparison shows the following variations:

Analysis of water resources and treatment costs by process type (22/23 restated to align with 23/24 process type allocations):

	2023/24	2022/23	Variance
Process Type	£m	£m	£m
SD : Simple Disinfection	1.810	1.553	(0.257)
W1 : SD plus simple physical or chemical treatment	0.126	0.164	+0.038
W2 : Single stage complex physical or chemical treatment	14.916	12.536	(2.380)
W3 : Multiple stage complex treatment, excluding W4	53.056	47.224	(5.832)
W4 : Very high cost treatment Process	6.703	5.758	(0.945)
Direct	**76.611**	**67.235**	**(9.376)**
General and Support	13.498	10.723	(2.775)
Total	**90.109**	**77.958**	**(12.151)**

Analysis of water resources and treatment costs by size band (22/23 restated to align with 23/24 size allocations):

	2023/24	2022/23	Variance
Size band	£m	£m	£m
<=1 Ml/d	8.125	8.014	(0.111)
>1 to <=2.5 Ml/d	4.094	3.709	(0.385)
>2.5 to <=5 Ml/d	4.961	4.478	(0.483)
>5 to <=10 Ml/d	6.700	5.766	(0.934)
>10 to <=25 Ml/d	12.475	11.660	(0.815)
>25 to <=50 Ml/d	13.663	11.443	(2.220)
>50 to <=100 Ml/d	11.744	10.041	(1.703)
>100 to <=175 Ml/d	9.402	7.659	(1.743)
>175 Ml/d	5.447	4.465	(0.982)
Direct	**76.611**	**67.235**	**(9.376)**
General and Support	13.498	10.723	(2.775)
Total	**90.109**	**77.958**	**(12.151)**

The allocation of costs by size band has remained broadly consistent with the restated 2022/23 allocation.

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 £76.6m total direct resource and treatment costs, £61.0m of costs or 79.6% have been directly charged to assets in our corporate costing system.

Other costs have been allocated to Water Resources and Treatment through Activity Based Management (ABM) support activity allocation, e.g. - stores, based on number of issues; IT applications, based on number of users. 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 of employees. For 2023/24 support activity allocations from 2022/23 were used to allocate support costs to Water Resources and Treatment.

There are no changes to confidence grades for **Lines E4.15-E4.39** remain consistent with 2022/23 AR23.

3.2.4 Lines E4.20-27 Water Treatment Works by Process Type

There are 229 Water Treatment Works reported for AR24 which is the same as AR23. Two sites were added and two removed as shown in Table 26 below.

Table 26: Water Treatment Works Additions and Removals.

Plant No	Site Description	Added/Removed	Process Type
WTW000824	INVERMORISTON WTW 2019 NH423150 (replaced INVERMORISTON WTW 2007 NH422157, which has been abandoned)	Added	W3
WTW000828	DALWHINNIE WTW 2019 NN637847 (replaced DALWHINNIE WTW 1970 NN637848, which has been abandoned)	Added	W3
WTW000285	BACK TOLSTA WTW 1956 NB522456 (Abandoned. Area previously served now part of North Lochs Water Operational Area	Removed	W2

Plant No	Site Description	Added/Removed	Process Type
	served by NORTH LOCHS WTW 1994 NB395287)		
WTW000648	BONNYCRAIG WTW 1962 NT251389 (Mothballed and replaced by BONNYCRAIG WTW 2022 NT251389)	Removed	W4

Table 27 shows the four Water Treatment Works with treatment process changes during AR24 that caused a movement in the process category reported.

Table 27: Changes in treatment process.

Plant No	Site Name	Region	AR23 WIC E	AR24 WIC E	Reason
WTW000007	ARDRISHAIG WTW 1993 NR846864	NORTH	W3	W4	Inclusion of Magnetic Ion Exchanged (MIEX) plant for dissolved organic carbon removal to mitigate THM risk. Water Into Supply - June 2023
WTW000384	BADACHRO WTW 2000 NG782733	NORTH	W4	W3	Carbon Filtration no longer Operational. Enhanced Membrane treatment
WTW000753	YELL WTW HU511992	EAST	W4	W3	Carbon Filtration no longer Operational. Enhanced Membrane treatment
WTW000784	LOCHINVER WTW 2009 NC103223	NORTH	W4	W3	Carbon Filtration no longer Operational. Enhanced Membrane treatment

Combining the above status and process changes in Table 26 and Table 27 the resulting changes to the number of WTW in each process type are as presented in Table 28 below. The confidence grade of A2 remains the same as for AR23.

Table 28: Changes in process type.

Line Ref	Proces Type	AR23 WTWs	AR24 WTWs	Change
E4.20	SD	19	19	0
E4.21	W1	5	5	0
E4.22	W2	24	23	-1
E4.23	W3	156	160	4
E4.24	W4	25	22	-3
E4.25	Total	229	229	**0**

The total distribution input (1837.733 Ml/d) reported in **Line E4.26** is the same as that reported in **Line E4.5** (1837.734 Ml/d) with the slight difference due to rounding during allocation.

The confidence grade for **Line E4.26** is B3.

3.2.5 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 AR23 and AR24 are shown in Table 29 below.

Table 29: Changes in size band and DI.

Line Ref	Size Band	AR23		AR24		Net Change	
		No.	*%* DI	*No.*	*%* DI	*No.*	*%* DI
E4.28	<= 1 Ml/d	126	1.2	127	1.2	1	0.0
E4.29	>1, <= 2.5 Ml/d	21	1.3	21	1.3	0	0.0
E4.30	>2.5, <= 5 Ml/d	22	2.9	21	2.9	-1	0.0
E4.31	>5, <= 10 Ml/d	15	4.3	15	4.3	0	0.0
E4.32	>10, <= 25 Ml/d	18	10.7	18	10.2	0	-0.5
E4.33	>25, <= 50 Ml/d	12	15.8	12	16.3	0	0.5
E4.34	>50, <= 100 Ml/d	9	22.3	9	22.7	0	0.4
E4.35	>100, <= 175 Ml/d	4	20.8	4	20.6	0	-0.2
E4.36	>175 Ml/d	2	20.6	2	20.4	0	-0.2
E4.37 & E4.38	**Total**	229	100	229	100	0	0

The confidence grade of A2 remains the same as AR23 for **Line E4.28-E4.37**, as does the confidence grade of B3 for **Line E4.38**.

3.3 Data

3.3.1 Data sources and confidence grades

Data sources and confidence grades are detailed in the Commentary, where relevant.

3.3.2 Data improvement programmes

No improvement work was carried out on data affecting E4. For Average Daily Output refer to the Commentary for Table A2.

3.3.3 Assumptions used for forecast data

There are no forecast data in E4.

4 Table E6 – Water distribution

4.1 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

4.2 Performance Trends

4.2.1 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 Commentary for Table A2 describes the methodologies used to calculate populations for Section E and includes a discussion of the data for each line.

The figure reported in **Line E6.1** reports the annual average resident connected population in thousands (5,229.495) and is consistent with the figure reported in A2.5. The confidence grade for AR24 is B2.

The total number of connected properties reported in **Line E6.2** (2,809,283) is consistent with the figure reported in **Line A1.10**. The confidence grade of B4 remains the same as AR23.

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 AR23. Values used to calculate this section of Table E6 reflect those in the A2 Tables. The confidence grades, B2 and B4 respectively, remain the same as AR23.

The operational regional areas reported in **Line E6.5** remained the same at 79,816.36 km^2. The confidence grade at A1 reflects 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 277 as the Fort Augustus zone has been merged into Invermoriston as detailed in Table 30 below.

Table 30: Change in number of supply zones (E6.6).

SiteRef	Site name	Region	Reason for Addition
Z005000263326	Fort Augustus	NORTH	Zone merged into Invermoriston RSZ due to new WTW supply

The number of supply zones was calculated using the same methodology as AR23, 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.

4.2.2 Lines E6.7-E6.11 Functional Costs

E6.11 Water Distribution

	Total
Functional expenditure:	£m
2023/24	91.993
2022/23	81.570
Variance	**(10.423)**

Water distribution costs have increased by £10.4m (13%) from 2022/23 reflecting the following key movements:

- £5.5m (47%) increase in power costs due primarily to wholesale price increases
- £2.2m (8%) increase in employment costs relating primarily to pay inflation, and overtime costs incurred due to Storm Isha
- £0.8m (5%) increase in hired and contracted costs related to leakage recovery works and contractor price increases
- £4.0m (25%) increase in general and support costs impacted mainly by pay inflation, additional unfunded pension cost accruals following further valuation work, CPI price inflation across digital contracts, the progression of new digital projects and fuel costs incorrectly classified as other direct costs in 2022-23

This is partially offset by:

- £2.1m (36%) reduction in other direct costs due primarily to the misclassification of fuel costs as other direct costs in 2022-23, partially offset by an increase in property maintenance and rents.

Analysis of water distribution costs by region:

	North	East	South	West	Total	General and Support	Total
Functional expenditure:	£m	£m	£m	£m	£m	£m	£m
2023/24	13.186	19.200	14.852	24.547	**71.785**	20.208	**91.993**
2022/23	11.909	17.680	13.360	22.424	**65.373**	16.197	**81.570**
Variance	**(1.277)**	**(1.520)**	**(1.492)**	**(2.123)**	**(6.412)**	**(4.011)**	**(10.423)**

The confidence grade for **Lines E6.7-E11** is A2 which is consistent with 2022/23 (AR23)

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.

4.2.3 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 49,224.42 km, which is 114.06 km more than AR23. The size banding is based on the mains diameters, 99.7% of which are based on Geospatial Information system (GIS) data. The remainder is 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 31).

Table 31: Water Mains Infill.

Actual/Infill Method	Length (m)	% Actual/Infill
Actual GIS Values	49,078,579	99.70
Default Infill Values	2,026	0.00
Material based Infill Values	143,822	0.30

Material based infill is the median diameter for the material a pipe is made from, 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.

The confidence grade remains A2 for the lines for specific pipe diameters. The confidence grade for the total i.e., **Line E6.16**, remains A1 because 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 41.97 km (0.3%) to 14,368.90 km, due to mains replacement in this reporting year.

The confidence grade of A2 remains the same as AR23.

E6.18 Total length of mains >320mm diameter

The total length of mains greater than 320mm diameter has increased by 3.23km to 4,033.35 km, in this reporting year, which is a 0.08% increase on AR23.

The confidence grade of A2 remains the same as AR23.

E6.19 Mains Bursts

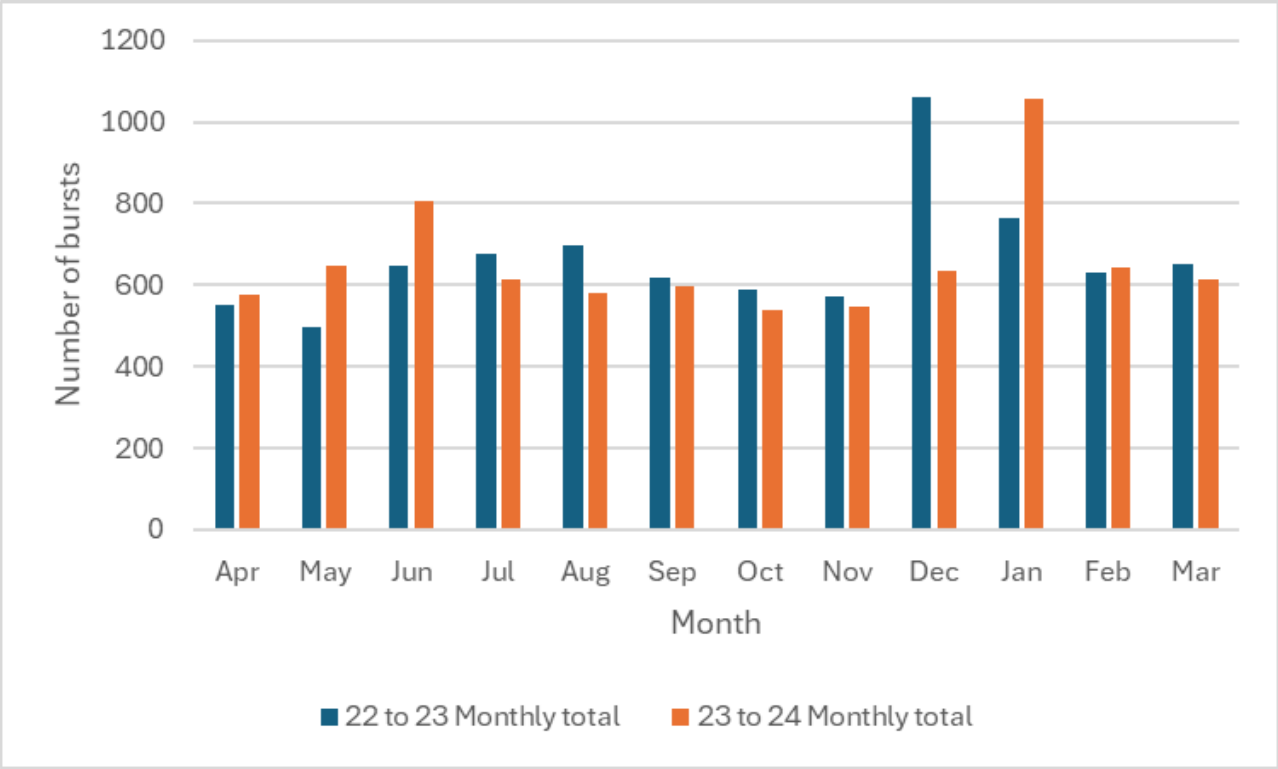
The reported number of water mains bursts for AR24 is 7,860, a 1% decrease from AR23.

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 1950-60s 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 the 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 to be 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 number of bursts during AR24 followed a similar pattern to AR23 (see Figure 14). The difference being that the highest bursts during AR24 occurred during January 2024 rather than December 2023 when the coldest weather was experienced. The highest bursts during warmer months occurred during May and June 2023 for AR24 as opposed to July and August 2022 for AR23. This corresponds with when the warmest weather occurred.

Figure 14: Comparison of monthly bursts for AR23 and AR24.



The confidence grade remains at B2 for AR24.

E6.20 Leakage Level

The reported top-down leakage level shown on **Line E6.20** is aligned with the figures in Tables A2 and B8, where we report leakage in terms of Maximum Likelihood Estimation (MLE) leakage.

Top-down leakage has increased from 449.36 Ml/d in AR23 to 473.28 Ml/d in AR24.

The confidence grade of B3 remains the same as AR23.

E6.21 Low Pressure

The overall number of low-pressure properties has decreased from 224 in AR23 to 219 in AR24. Further commentary can be found in Table B2.

The confidence grade of B2 remains the same as AR23.

4.2.4 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 636 for AR24. An overall increase of eleven sites from AR23.

The confidence grade of A2 remains the same as AR23.

E6.23 Total capacity of pumping stations

The total capacity of pumping stations reported in **Line E6.23** is 2,471,101 m^3/d. An overall increase of 10,620 m^3/d as compared with AR23.

As the methodology is unchanged the confidence grade of C4 remains the same as AR23.

E6.24 Total capacity of booster pumping stations

The total capacity of booster pumping stations reported in **Line E6.24** is 43,771 kW. An overall increase of 205 kW as compared with AR23, due to changes in pumping stations (see Table 32 below). The confidence grade of A3 remains the same as AR23.

Details of the removals and additions with the corresponding capacities (**Line E6.23** - m^3/day and **Line E6.24** – kW) are tabulated in Table 32.

Table 32: Added and removed capacities.

Plant No	Site	Added / Removed	Region	E6.23 (m3/d)	E6.24 (kW)
TWP001142	ACHMORE TWP NG852332	Added	NORTH	61.7	1.1
TWP001254	ABERDEEN CHARLESTOWN TWP NJ935003	Added	EAST	1066.2	19
TWP001315	ST RONANS TERRACE TWP 2007 NT328369	Added	SOUTH	224.5	4
TWP001354	F AUGUSTUS PRI TWP 2019 NH387083	Added	NORTH	484.8	8.64
TWP001355	F AUGUSTUS SEC TWP 2019 NH404090	Added	NORTH	71.3	1.27
TWP001356	INVERMORISTON TWP 2019 NH423150	Added	NORTH	3310.8	59
TWP001376	ASCOG MILLBANK TWP 2019 NS106639	Added	WEST	897.9	16
TWP001379	WEMYSS BAY KELLY TWP 2019 NS201684	Added	WEST	897.9	16
TWP001381	CAIRNDOW ST CATHERINES TWP 2019 NN133080	Added	WEST	897.9	16
TWP001390	BACK TWP NB485401	Added	NORTH	2805.8	50
TWP001397	YARROWFORD TWP NT409301	Added	SOUTH	1683.5	30
TWP001398	HATTON GREENHEADS TWP NK036390	Added	EAST	617.3	11
TWP001420	CAMBUSMORE STRAID TWP NN654058	Added	WEST	61.7	1.1
TWP000087	DRUMCHAPEL TWP 1954 NS516717	Removed	WEST	2592	30
TWP000197	RHU STATION ROAD TWP NS274843	Removed	WEST	0	8

There were no changes to the capacity values of existing pumping stations in **Line E6.23 for AR24**, therefore changes reported are solely due to the addition and removal of pumping stations.

There were three changes to the capacity values of existing pumping stations in **Line E6.24 for AR24** (see Table 33). These three sites had a default kW rating for AR23 but have actual kW ratings for AR24.

Table 33: Changes in capacity between AR23 and AR24 (kW).

Plant No	Site	Region	AR23 kW	AR24 kW
TWP001163	FAIRYHILLS WOOD TWP NJ024567	EAST	1	6
TWP001223	AUCHINAIRN GARDENS TWP 2002 NS625694	WEST	1	6
TWP001302	WHINHILL COTTAGE TWP NS282746	WEST	1	1.334

E6.25 Average Pumping Head

The total average pumping head for distribution pumping stations has reduced slightly in AR24 to 29.30m. As the methodology has remained the same as AR23 the confidence grade remains as C4.

4.2.5 Lines E6.26-29 Service Reservoirs & Water Towers

The number of service reservoirs reported in **Line E6.26** is 1,300 for AR24, an overall increase of fourteen sites from AR23. The total capacity of the service reservoirs reported in **Line E6.27** is 4,021.23 Ml, which is an increase of 73.5 Ml from AR23.

The number of water towers reported in **Line E6.28** has reduced by one to sixteen for AR24. The total capacity of the water towers reported in **Line E6.29** has reduced to 27.424 Ml. The confidence grade of A2 remains the same as AR23 for **Lines E6.26 to E6.29**.

Details of changes to Service Reservoir and Water Tower numbers with corresponding capacities are tabulated below (Table 34 and Table 35):

Table 34: Service Reservoir Additions and Removals.

Plant No	Site	Added / Removed	Region	Capacity
TWS000121	BURNCROOKS ROUND CWT 1960 NS501794	Removed	WEST	3.637
TWS000220	CRINAN DSR NR787941	Removed	NORTH	0.068
TWS000281	DUNSELMA DSR NS192809	Removed	WEST	0.227
TWS000580	OBAN NORTH DSR NM864312	Removed	NORTH	3.41
TWS000729	TULLOCHGORM DSR NR966953	Removed	NORTH	0.015
TWS000781	CARLOWAY DSR 1980 NB218431	Removed	NORTH	0.4
TWS000785	BRAGAR DSR NB287466	Removed	NORTH	0.1
TWS000803	BACK DSR 1960 NB469428	Removed	NORTH	0.182
TWS000804	SWORDALE DSR 1990 NB498305	Removed	NORTH	0.068
TWS000809	TOLSTA CWT 1950 NB522456	Removed	NORTH	0.182
TWS000813	TOLSTA VILLAGE DSR NB529473	Removed	NORTH	0.12
TWS000817	SHESHADER DSR 1980 NB537350	Removed	NORTH	0.06
TWS000917	NORTHBAY EOLIGARRY DSR 1980 NF706069	Removed	NORTH	0.054
TWS001339	GARDENHEAD DSR 1970 NJ542647	Removed	EAST	0.032
TWS001688	FAIRYGREEN DSR NO216329	Removed	EAST	0.061
TWS001915	WHITEHALL DSR 1930 HY652283	Removed	EAST	0.304
TWS002087	OAKLEA TWS DSR NT026922	Removed	EAST	0.227
TWS003509	ADABROCK DSR NB532625	Removed	NORTH	0.05
TWS000182	COCHNO NO.2 C.WT.	Added	WEST	1.136
TWS000183	COCHNO DIR NS496737	Added	WEST	2.272
TWS000184	COCHNO NO.4 TWS	Added	WEST	1.136
TWS000185	COCHNO NO.5 TWS	Added	WEST	1.136
TWS000186	COCHNO DIR NS496738	Added	WEST	2.272
TWS000199	CORRIEGILLS DSR NS029351	Added	WEST	0.257
TWS000275	DUNOON NO 3 DSR TWS	Added	WEST	0.5
TWS000276	DUNOON NO 4 DSR TWS	Added	WEST	0.5
TWS000278	DUNOON DIR NS165768	Added	WEST	1.89
TWS000308	FAULDRIBBON DSR NX197973	Added	WEST	0.959
TWS000388	HIGHLEES MID CWT 1960 NS368334	Added	WEST	22.725
TWS000389	HIGHLEES NORTH CWT 1960 NS367334	Added	WEST	22.72
TWS000412	JOCKSTOWN DSR 1 NY214714	Added	SOUTH	0.951
TWS000506	LOCH FERGUS DSR NX696518	Added	SOUTH	0.602

Plant No	Site	Added / Removed	Region	Capacity
TWS001413	KEMNAY PARKHILL DSR 1930 NJ740158	Added	EAST	0.233
TWS001512	SLOPEFIELD BPT 1950 NJ903041	Added	EAST	1.1
TWS001740	BALMOSSIE DSR 1938 NO479334	Added	EAST	7.64
TWS001839	FOULA SOUTH CWT 1981 HT969377	Added	EAST	0.02
TWS002273	GARYVARD DSR	Added	NORTH	0.4
TWS003398	LOCH LEACACH DSR NC688573	Added	NORTH	0.4
TWS003493	MANSE ST NEW CWT NT479366	Added	SOUTH	0.981
TWS003524	DHU LOCH CWT	Added	WEST	2
TWS003540	LIMEFIELD DSR 1 NS988691	Added	SOUTH	4.5
TWS003639	CARBOST WTW CWT 2006 NG342340	Added	NORTH	0.072
TWS003676	DRUMFEARN DSR 2011 NG672155	Added	NORTH	0.014
TWS003711	NEWCASTLETON TWS 1 1972 NY495882	Added	SOUTH	0.162
TWS003729	FORT AUGUSTUS DSR 2019 NH376101	Added	NORTH	0.75
TWS003730	INVERMORISTON TWS 2019 NH422157	Added	NORTH	0.08
TWS003731	INVERMORISTON TWS 2019 NH423150	Added	NORTH	0.29
TWS003749	TOLSTA VILLAGE DSR TWS NB529473	Added	NORTH	0.2
TWS003750	CRAIGHEAD CWT 1975 TWS NJ497405	Added	EAST	0.4
TWS003758	SILVERBURN DSR 2 NT204602	Added	SOUTH	0.4
		32	Added	
		18	Removed	
		14	Change	

Table 35: Water Tower Additions and Removals.

Plant No	Site	Added / Removed	Region	Capacity
TWS000798	LEURBOST RANISH DSR 1960 NB406248	Removed	NORTH	0.022

Two service reservoirs have had capacity corrections in AR24. The capacity of both Glenhove Distribution Service Reservoirs (DSRs) were listed against only one of the sites; and the other received an infill capacity (Table 36). This has been corrected in the Ellipse data source.

Table 36: Service Reservoir and Water Tower Capacity Change.

Plant No		Region	AR23 Capacity	AR24 Capacity
TWS002016	GLENHOVE DSR 1 NS767722	WEST	91	47.7
TWS003732	GLENHOVE DSR 2 NS766721	WEST	0.4	47.7

Service Reservoir and Water Tower Capacity Change.

Plant No		Region	AR23 Capacity	AR24 Capacity
TWS002020	GOWANBANK DSR NS911714	South	46	
TWS002020	GOWANBANK DSR NS911714	WEST		46

4.3 Data

4.3.1 Data sources and confidence grades

Data sources and confidence grades are detailed in the commentary, where relevant. The majority of data is sourced from Ellipse and GIS.

4.3.2 Data improvement programmes

There have been no notable data improvement programmes in AR24.

4.3.3 Assumptions used for forecast data

There are no forecast data for the E6.

5 Table E7 – Wastewater explanatory factors - sewerage & sewage treatment by area

5.1 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

5.2 Performance Trends

5.2.1 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 AR24 the Annual average resident connected population in thousands is 5019.3 (5,019,326). This is marginally different from the number reported in A3.3 (5,019,327) due to rounding of figures when splitting across Scottish Water regions.

The confidence grade of B2 remains the same as AR23.

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 2022 available in the Tourism in Scotland report. For AR24 the Annual average non-resident connected population is 81.8k, compared to 59.9k in AR23. There were no periods of restricted travel due to COVID-19 in AR24 non-resident figures, whereas there were restricted periods between January and April 2021 in the AR23 figures, which accounts for most of the increase.

The confidence grade of B3 remains the same as AR23.

E7.3 Volume of sewage collected (daily average)

The daily average volume of sewage collected for the AR24 period is 3,200.0 Ml/d, a decrease of

295.7 Ml/d compared to AR23. This is due to AR24 having less rainfall than AR23, so less sewage volume was collected.

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. Rainfall data was calculated by Scottish Water using Hyrad rainfall data in AR24. In AR23, AR22 catchment-based rainfall was factored by the difference in Scotland's total rainfall. This was taken from an external source and compared to AR22 because 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 for A24 remains the same as AR23, given the uncertainty in the dry weather flow element of the calculation.

E7.4 Total connected properties

This total is 2,672,411 and is based on the same data used for **Line A1.20** (2,672,411). 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 AR23.

E7.5 Area of sewerage district

The area has remained the same at 79,816.4km^2.

The confidence grade of A1 remains the same as AR23.

E7.6 Drained area

The reported value of the drained area is 2,011.0 km^2 and is a slight increase of 4.4km^2 from AR23. 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 AR23.

E7.7 Annual precipitation

Rainfall data was calculated by Scottish Water using Hyrad rainfall data this year. 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 decreased from 1,588 mm to 1,286 mm for AR24.

The confidence grade for this has changed from C3 to A2 for AR24, as rainfall was calculated internally by Scottish Water relating satellite data to wastewater catchments to establish a precise correlation between rainfall and Scottish Water's assets.

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 AR24 the total length of sewer reported is 54,689.6km which is an increase of 0.87% from AR23.

The confidence grade of B2 remains the same as AR23.

E7.9Total 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 20,028.07 km, a 1.15% increase compared to AR23.

The confidence grade of B2 remains the same as AR23.

E7.10 Length of combined sewer

The length of combined sewer held in our corporate Geospatial Information system (GIS) is reported as 17,646.1 km for AR24, which is an increase of 5.8 km from AR23.

The confidence grade has improved from B2 to A2 for AR24 given the data is extracted directly from GIS.

E7.11 Length of separate storm sewer

The length of separate storm sewer reported is 9,021.4 km, which represents an increase of 1.6% (139km) from AR23, reflecting the adoption of separate storm sewers for new build developments.

The confidence grade has improved from B2 to A2 for AR24 given the data is extracted directly from GIS.

E7.12 Length of sewer >1000mm diameter

The length of sewer greater than 1000mm diameter held in our corporate Geospatial Information system (GIS) is 803.1 km, which is an increase of 3.5km.

The confidence grade has improved from B2 to A2 for AR24, as the data is extracted directly from GIS.

E7.14 Sewer collapses

The numbers reported for this section are derived from Microsoft Dynamics. When a customer reports an incident to the Customer Contact Centre, sewer response field teams investigate. Any incidents which require further work due to sewer damage are passed to Network Analysts for further investigation and to arrange repair. The numbers reported in this section are the filtered incidents which have been deemed as sewer collapse after further investigation. 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.

The number of sewer collapses over the report year is reported as 2,501 which is an increase of 883 in comparison with AR23. This is an increase of 54.57% and a 10% increase over the last highest recorded number in AR15.

A number of improvements have resulted in the 54.57% increase in reported sewer collapses:

Increase in CCTV Surveys – an increase in the number of CCTV surveys carried out by Sewer Response after every repair has resulted in an increase in the number of sewer collapses. This has resulted in Scottish Water being able to address issues that may have gone undetected before, therefore preventing any future disturbance to customers.

Alternative Resolution Management – this process involves bringing departments together across functions and working in new ways to resolve complex customer problems. It is used to identify and address repeat appointments to customers. This is helping to identify weak spots in

the network and as a result we are finding more issues which are a contributing factor in driving the increase in sewer collapses.

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 AR23.

5.2.2 Lines E7.15-E7.19 Sewerage Costs

E7.19 - Sewerage Costs

	Total
Functional expenditure:	£m
2023/24	61.454
2022/23	55.218
Variance	**(6.236)**

Sewerage costs have increased by £6.2m (11%) from 2022/23, including £0.6m of costs relating to running ex SW Grampian and Highland PFI sites for a full year. Key changes include:

- £1.8m (12%) increase in employment costs primarily reflecting pay inflation
- £3.8m (39%) increase in power costs costs due to higher wholesale energy prices
- £2.7m (22%) increase in general and support costs driven by pay inflation, additional unfunded pension cost accruals following further valuation work, CPI price inflation across digital contracts, and the progression of new digital projects

Partially offset by:

- £2.3m (70%) decrease in other direct costs mainly resulting from a reduction in insurance claim costs during the year

Analysis of sewerage costs by region:

	North	East	South	West	Direct	General and Support	Total
Functional expenditure:	£m	£m	£m	£m	£m	£m	£m
2023/24	4.786	11.375	13.381	16.959	**46.501**	14.953	**61.454**
2022/23	4.094	9.783	13.448	15.606	**42.931**	12.287	**55.218**
Variance	**(0.692)**	**(1.592)**	**+0.067**	**(1.353)**	**(3.570)**	**(2.666)**	**(6.236)**

The reduction in sewerage costs in the south region relates primarily to a reduction in insurance claim costs during the year.

5.2.3 Lines E7.20-E7.25 - Sustainable Urban Drainage Systems (SUDS)

The number of Sustainable Urban Drainage (SUDS) assets held corporately in the Works & Asset Management system (Ellipse) are reported in **Lines E7.20-25**.

149 new assets have been reported this year - mainly SUDS Basins - due to the increased implementation of surface water drainage systems in new housing and commercial developments, which then come into Scottish Water ownership.

The movement in individual lines is summarized in Table 37.

Table 37: SUDS changed between AR23 and AR24

Line	AR23	AR24	Change
E7.20 - SUDS Pond	39	66	27
E7.21 - SUDS Basin	161	255	94
E7.22 - Filter Trenches	102	128	26
E7.23 - Swales	19	21	2
E7.24 - Suds Other Wetland	3	3	0
E7.25 - Total SUDS	**324**	**473**	**149**

The Confidence Grades for all the lines are A3 and are consistent with 2022/23 (AR23).

5.2.4 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 2023/24, SUDS costs amounted to less than £0.1m, and as such we have inserted a single value of £0.1m against **Line E7.28** and Area 1 (North).

The Confidence Grade for these lines is A4.

5.2.5 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 limited. These values are extrapolations based on Table H5 size-banded kW ratings to infill any missing values per pumping station. There is no new pumping station capacity data available this year.

E7.31 Total number of pumping stations

There was a net increase of 22 Pumping Stations in AR24 to 2,319 mainly due to the installation at new housing developments. Removals and Additions are detailed in Table 38 below.

Table 38: Pumping Station Additions and Removals in AR24.

Plant No	Site	Added / Removed	Region	Sewer Use
SPS000669	INVERNESS SLACKBUIE AVE WWPS NH671424	Added	NORTH	foul
SPS002210	LOANHEAD WWPS NT282650	Added	SOUTH	foul
SPS003055	KILMAURS MARSHALL GDNS WWPS NS404411	Added	WEST	foul
SPS003870	MUIR OF ORD CORRIE VIEW WWPS NH530488	Added	NORTH	foul
SPS003919	THE SIDINGS WWPS NS682649	Added	WEST	foul
SPS003920	7-17 MONTFORT PARK WWPS NS514594	Added	WEST	foul
SPS004079	GLASGOW LONDON ROAD WWPS 2011 NS635625	Added	WEST	foul
SPS004097	CANONBIE WWPS 2014 NY394765	Added	SOUTH	combined
SPS004122	NEWTON MEARNS BARRANCE WWPS NS560555	Added	WEST	foul
SPS004155	WEST CLERKHILL WWPS 2014 NK107451	Added	EAST	foul
SPS004156	WEST LINTON ALICE HAMILTON WAY WWPS	Added	SOUTH	foul
SPS004161	CRAIGHALL FARM WWPS 2014 NS444409	Added	WEST	foul
SPS004167	HIGHLAND GATE WWPS 2015 NS780953	Added	WEST	foul
SPS004195	SOUTH GYLE WYND WWPS 2015	Added	SOUTH	foul
SPS004348	STEPPS DUNLOP CLOSE WWPS 2011 NS675680	Added	WEST	foul
SPS004368	OLD CRAIGHALL WWPS 2017 NT336705	Added	SOUTH	foul
SPS004466	ARDERSIER BISHOPS HILL RD WWPS NH781504	Added	NORTH	foul
SPS004468	DUMFRIES COLLEGE RD WWPS 2019 NX967770	Added	SOUTH	foul
SPS004501	LINWOOD BRIDGE OF WEIR RD WWPS NS430638	Added	WEST	foul
SPS004540	BURRELTON WWPS 2021 NO207378	Added	EAST	combined
SPS004568	MORAY STYNIE ROAD WWPS NJ333604	Added	EAST	foul
SPS004603	KINROSS THE MUIRS WWPS NO118027	Added	EAST	foul
SPS004652	ELGIN FINDRASSIE WWPS NJ218651	Added	EAST	foul
SPS004656	DUMFRIES SUMMERPARK ROAD WWPS NX985769	Added	SOUTH	foul
SPS004660	ELIE ROAD WWPS NO520016	Added	EAST	foul
SPS004850	EDINBURGH GRANTON SQ WWPS NT236771	Added	SOUTH	combined
SPS004869	EDINBURGH 25 MAIN ST SUMP AND PUMP	Added	SOUTH	combined
SPS004878	JEMIMAVILLE WWTW FE WWPS NH722652	Added	NORTH	treated effluent
SPS000003	AIRDS POINT WWPS NX992663	Removed	SOUTH	TRADE EFFLUENT

Plant No	Site	Added / Removed	Region	Sewer Use
SPS001533	DUNBLANE HIGH WWPS NN772008	Removed	WEST	FOUL
SPS001713	CRAIGFORTH WWPS NS774952	Removed	WEST	COMBINED
SPS002315	FALLIN WWPS NS835923	Removed	WEST	COMBINED
SPS003735	KILMARNOCK EAST SHAW ST WWPS NS429370	Removed	WEST	COMBINED
SPS004644	KIRKHILL NEWTON PARK WWPS NH560458	Removed	NORTH	FOUL
		28	Added	
		6	Removed	
		22	Change	

Further to the additions and removals in the table above, there was a change in our Corporate Systems where the Scottish Water Region for Blackness WwPS (SPS002984) was corrected from West to South. Table 39 summarises the changes at region level.

Table 39: Pumping Station Region summary in AR24.

	North	East	South	West	Sum
AR23	537	829	456	475	2297
Added	4	6	9	9	28
Removed	-1	0	-1	-4	-6
Correction	0	0	1	-1	0
	540	**835**	**465**	**479**	**2319**

The confidence grade of A3 remains the same as AR23.

E7.32 Total capacity of pumping stations (m^3/d)

For AR24 this is reported as 18,701,980 m^3/d. This is a 0.35% increase on the value reported for AR23.

The confidence grade of C4 remains the same as AR23.

E7.33 Total capacity of pumping stations (kW)

For AR24 kW capacity is 102,773.4kW, which is an increase of 243kW from AR23.

The confidence grade of A3 remains the same as AR23.

E7.34 Average pumping head

This is reported as 31.9m for AR24. This represents an increase of 2.7m from the figure reported in AR23. Pumping head is largely influenced by the sewage volume, which itself changes based on the rainfall figures. There is an inverse relationship, therefore the lower rainfall reported in AR24 compared to AR23 results in an increase in the pumping head.

The confidence grade of C5 remains the same as AR23.

E7.35 Total number of combined pumping stations

The total number of combined pumping stations has increased by 1 to 1,347 for AR24.

The confidence grade of A3 remains the same as AR23.

E7.36 Total capacity of combined pumping stations

The total Capacity of Combined Pumping Stations has increased to 13,563,171.8 m^3/d. This is an increase of 0.07% on the AR23 reported figure.

The confidence grade of C4 remains the same as AR23.

E7.37 Total number of stormwater pumping stations

The total number of stormwater pumping stations has remained the same at 46 for AR24.

The confidence grade of A3 remains the same as AR23.

E7.38 Total capacity of stormwater pumping stations

The total capacity of stormwater pumping stations has remained the same at 753,652 m^3/d.

The confidence grade of C4 remains the same as AR23.

E7.39 Number of combined sewer overflows (CSOs)

The figure reported is 3,130 for AR24, which is a decrease of 111 from AR23. Data improvement activity has been undertaken during the year as part of the Improving Urban Waters plan to identify CSOs not previously recorded in Scottish Water's Ellipse system and to correctly match existing CSOs with their locations – either on the wastewater network, at a pumping station, or at a wastewater treatment works.

The reduction shown this year is mainly due to the correct association of CSOs to wastewater treatment works (WwTW). CSOs at WwTW are not included in the definition for **Line E7.39**. These would have been recorded as network CSOs previously. 143 CSOs were identified as being at a WwTW or a foul pumping station that were removed in AR23; and 32 newly reported CSOs were added.

The additional CSOs identified during data improvement are mainly located at WwTWs and, therefore, are not included in this line.

The confidence grade of A3 remains the same as AR23.

E7.40 Number of combined sewer overflows (screened)

This is reported as 1,414 for AR24, which is an increase of 77 since AR23. Table 40 provides the split of mechanical and powered screens present.

Table 40: Pumping Station Region summary in AR24.

Screen Type	Total	North	East	South	West
Mechanical Screen	895	174	201	239	281
Powered Screen	519	52	71	151	245

The confidence grade of A3 remains the same as AR23.

5.2.6 Lines E7.41-E7.42 Sewage Treatment Works

E7.41 Number of sewage treatment works

This number of sewage treatment works remains the same at 1,838 for AR24. Full details of the changes and size bands are included in the commentary for E8.

The confidence grade of A2 remains the same as AR23.

E7.42 Total load

This has decreased (1.75%) to 242,665 kg BOD/day. Full details of the changes to load values are included in the commentary for E8. The difference is primarily due to the reduction in the trade effluent and WwTW sludge loads reported in AR24.

The confidence grade of B3 remains the same as AR23.

5.2.7 Lines E7.43-E7.47 Sewage Treatment Costs

E7.47 Functional Expenditure

	Total
Functional expenditure:	£m
2023/24	90.455
2022/23	74.740
Variance	**(15.715)**

Sewage treatment costs have increased by £15.7m (21%) from 2022/23, including £3.2m of costs relating to running ex SW Grampian and Highland PFI sites for a full year. Key changes include:

- £3.4m (19%) increase in employment costs driven primarily by pay inflation
- £7.7m (38%) increase in power costs primarily driven by the higher wholesale energy prices
- £1.1m (15%) increase in materials and consumables costs as a result of chemical price inflation compliance issues at Galashiels WwTW lagoon
- £0.5m (7%) increase in SEPA charges linked to inflation-based increases
- £2.5m (22%) increase in general and support costs driven by pay inflation, additional unfunded pension cost accruals following further valuation work, CPI price inflation across digital contracts, and the progression of new digital projects.

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
2023/24	11.939	22.872	22.920	19.336	**77.067**	13.388	**90.455**
2022/23	9.866	17.643	19.821	16.473	**63.803**	10.937	**74.740**
Variance	**(2.073)**	**(5.229)**	**(3.099)**	**(2.863)**	**(13.264)**	**(2.451)**	**(15.715)**

Sewage treatment costs for the east region include a full year of costs relating to the ex North East PFI sites.

Confidence grades for **Lines E7.43-E7.47** are A2 and remain consistent with AR23.

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.

5.3 Data

5.3.1 Data sources and confidence grades

Data sources and confidence grades are detailed in the Performance Trends section 5.2, where relevant.

5.3.2 Data improvement programmes

Data improvement relevant to individual lines has been documented in the individual line comments.

5.3.3 Assumptions used for forecast data

There are no forecast data for E7.

6 Table E8 – Wastewater explanatory factors - sewage treatment works

6.1 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 the E8 table 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. There are no WwTWs where there is doubt over which band or treatment type applies.

6.2 Performance Trends

6.2.1 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.

6.2.2 Lines E8.1-E8.8 Sewage treatment works size bands

As reported in E7 the total number of WwTWs reported for AR24 is 1,838. The changes from AR23 with respect to size band and treatment category are shown in Table 41 and Table 42 below.

Table 41: Changes in sewage treatment works.

Plant No	Site	Region	Size Band	Tre	Added / Removed
STW002368	REARQUHAR WWTW NH745920 - PRIVATE	NORTH	0	Septic Tank	Removed
STW000511	MIDDLEBIE SEP NY215762	SOUTH	0	Septic Tank	Removed
STW000124	CANONBIE SEP NY395766	SOUTH	2	Septic Tank	Removed
STW001727	BURRELTON WWTW 1931 NO207378	EAST	3	Sec Biological	Removed
STW003839	MIDDLEBIE NEW 2006 SEP WWTW NY2155876154	SOUTH	0	Septic Tank	Added
STW003838	NETHERMAINS SEP WWTW NS310421	WEST	0	Septic Tank	Added
STW003836	BOLTON STEADING SEP WWTW NT507700	SOUTH	0	Septic Tank	Added
STW003782	CANONBIE WWTW 2014 NY394773	SOUTH	2	Sec Act Sludge	Added

Table 42: Changes in sewage treatment works Size Band by Treatment Category

Size Band	0 E8.1	1 E8.2	2 E8.3	3 E8.4	4 E8.5	5 E8.6	6 E8.7	Total E8.8
Septic Tanks	3	-1	-3	2	0	0	0	1
Primary	-1	1	0	-1	0	0	0	-1
Sec Activated Sludge	1	-1	1	1	-1	1	0	3
Sec biological	-1	0	2	-2	1	0	0	0
Tertiary A1	-3	0	0	0	0	0	0	-3
Tertiary A2	1	0	0	0	0	0	0	0
Tertiary B1	0	0	0	-1	1	1	-1	0
Tertiary B2	0	0	0	0	0	0	0	0
Sea Preliminary	0	0	0	0	0	0	0	0
Sea Screened	0	0	0	0	0	0	0	0
Sea Unscreened	0	0	0	0	0	0	0	0
Total	0	-1	0	-1	1	2	-1	0

A comparison of the AR23 and AR24 total number of WwTWs reported by Size Band are shown below in Table 43. The confidence grade of B3 remains the same as AR23.

Table 43: Changes in sewage treatment works by Size Band.

Line Ref	Size Band	AR23 Reported	AR24 Reported	Change
E8.1	Size Band 0	1,103	**1103**	0
E8.2	Size Band 1	211	**210**	-1
E8.3	Size Band 2	150	**150**	0

Line Ref	Size Band	AR23 Reported	AR24 Reported	Change
E8.4	Size Band 3	180	**179**	-1
E8.5	Size Band 4	128	**129**	1
E8.6	Size Band 5	41	**43**	2
E8.7	Size Band 6 (Large Works)	25	**24**	-1
E8.8	Total Sewage Treatment Works	**1,838**	**1838**	**0**

6.2.3 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 increased by five, to 48. The number of small sewage treatment works with ammonia consent <= 5 mg/l has remained at 65.

The confidence grade of A1 remains the same as AR23.

6.2.4 Lines E8.11-E8.18 Average Daily Load

The total load received at each reported WwTW for AR24 was 236,427 BOD/day (Table 444). This is a decrease of 1.5% from AR23, which was mainly due to the reduction in trade effluent and WwTW Sludge loads this year. However, the load values at smaller size band works are more susceptible to changes in household figures from which we have seen an increase causing an increase in average daily load in size bands 0-3, inclusive. The larger works, size bands 4-6 inclusive, which are more susceptible to changes in trade effluent and septic tank emptying (part of sludge loads) have had an overall reduction in load but the increase in size bands 4 and 5 are due to an increase in the number of works being reported against these size bands. The comparatively large decrease in size band 6 is due to one less WwTW being reported compared to AR23.

Table 44: Changes in WwTW Average Daily Loads.

Line Ref	Size Band	AR23 Load (kgBOD/day)	AR24 Load (kgBOD/day)	Change
E8.11	Size Band 0	372	382	10
E8.12	Size Band 1	970	1,041	71
E8.13	Size Band 2	1,845	2,086	241
E8.14	Size Band 3	9,579	9,826	247
E8.15	Size Band 4	35,143	36,280	1,137
E8.16	Size Band 5	37,316	38,134	818
E8.17	Size Band 6 (Large Works)	154,844	148,677	-6,167
E8.18	Total Load Received	**240,069**	**236,427**	**-3,642**

Loads are based on 300g BOD/cubic metre and the Population Equivalent (PE) is based on 60g BOD/head/day, as specified by the Water Industry Commission for Scotland. Imported sludge liquor loads are calculated from the volume to each WwTW and an average strength of 300g BOD/cubic metre.

The confidence grade of B3 remains the same as AR23.

6.2.5 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 increased by 82 kgBOD/day, to 7,239kgBOD/day.

The total average daily load at small sewage treatment works with ammonia consent <= 5 mg/l decreased by 32,076 kgBOD/day, to 16,588 kgBOD/day from the figures reported in AR23. Subsequently, errors were discovered in the AR23 **Line E8.20** figures where the figure of 48664 kgBOD/Day was reported. The corrected figures for AR23 and a comparison to AR24 are shown in Table 45 below. The error was only present in **Line E8.20** (<=5mg/l), but both the ammonia consent loading lines are summarized.

Table 455: Ammonia consent loading lines AR23 to AR24 summary

AR Year	Line_Size_Band	30	40	50	60	70	80	Total
AR23	8.19 : 5-10 mg/l	2,863	1,962	2,099		233		**7,157**
AR24	8.19 : 5-10 mg/l	2,858	2,025	2,120		236		**7,239**
Difference	8.19 : 5-10 mg/l	-5	63	21	0	3	0	82

AR23	8.20 : <=5 mg/l	6,636	2,220	1,653	2,563	2,514	1,452	**17,038**
AR24	8.20 : <=5 mg/l	6,533	2,232	1,710	2,144	2,512	1,457	**16,588**
Difference	8.20 : <=5 mg/l	-103	12	57	-419	-2	5	-450

The confidence grade of A1 remains the same as AR23.

E8.21-30 Compliance

The percentage compliance was calculated based on the Operator Self-Monitoring Programme which is reported to SEPA. Our methodology for calculating compliance is the same as AR23 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 AR24 period.

Compliance figures, which are reported in **Lines E8.21-E8.30**, show a decrease of one from the previous year, with 21 works reported as failing this year. These failing WwTWs are listed in Table 466 below.

Table 466: AR24 WwTWs Compliance Failing Sites

Plant No	Site	Treatment Category
STW000281	ERSKINE WWTW NS494691	Sec Act Sludge

Plant No	Site	Treatment Category
STW000538	NEILSTON WWTW NS479578	Sec Act Sludge
STW000646	SHOTTS WWTW 1938 NS866594	Ter A2
STW001176	MUIR OF ORD WWTW 2002 NH546487	Sec Act Sludge
STW001239	KILDARY WWTW 1970 NH769739	Sec Act Sludge
STW001242	TAIN WWTW 1977 NH778828	Ter A2
STW001249	CROY WWTW 1990 NH798499	Ter A1
STW001252	INSH WWTW 1996 NH809016	Sec Biological
STW001312	FORRES WWTW 1973 NJ038595	Sec Biological
STW001453	SAUCHEN WWTW 1994 NJ697113	Sec Act Sludge
STW001543	NIGG WWTW NJ964046	Sec Act Sludge
STW001559	LONGSIDE WWTW 1974 NK040476	Sec Biological
STW001708	STANLEY WWTW 1963 NO112329	Sec Biological
STW001832	BANCHORY WWTW 1963 NO711959	Sec Biological
STW001841	DRUMLITHIE WWTW 1950 NO793810	Sec Act Sludge
STW001977	KINNEIL KERSE WWTW 2001 NS960811	Sec Act Sludge
STW001989	GALASHIELS WWTW NT513351	Ter B1
STW002176	TYNDRUM WWTW NN330302	Sec Act Sludge
STW002296	GAIRLOCH WWTW 2004 NG772775	Ter A2
STW002386	S QUEENSFERRY WWTW 2007 NT109777	Sec Act Sludge
STW003751	FYVIE WWTW 2010 NJ765375	Sec Act Sludge

One of the 21 WwTWs reported as failing in AR24 also failed in AR23 - S QUEENSFERRY WWTW 2007 NT109777.

More details on compliance and parameter failure types can be found in Tables B11b&c.

The Confidence Grade of B2 remains the same as AR23.

6.2.6 Lines E8.31-E8.42 Costs

Overall movements are explained in **Line E7.47** Sewage Treatment earlier in this commentary. The costs of treating and disposing of sludge are contained within the E10 Sludge Treatment and Disposal.

Analysis of sewage treatment costs by process type:

	Septic tanks	Primary	Secondary	Tertiary	Sea Outfalls	Direct	General and Support	Total
Total treatment works	£m	£m	£m	£m	£m	£m	£m	£m
2023/24	3.733	1.586	54.611	16.754	0.383	**77.067**	13.388	**90.455**
2022/23	3.571	1.384	44.760	13.707	0.382	**63.804**	10.936	**74.740**
Variance	(0.162)	(0.202)	(9.851)	(3.047)	(0.001)	(13.263)	(2.452)	(15.715)

Changes to the numbers of WwTW by process type have arisen as a result of operational changes and process re-classifications in WwTW during 2023/24. Re-stating 2022/23 figures on a like-for-like basis shows the following variations:

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 £77.1m total direct wastewater treatment costs, £53.4m of costs or 69.3% 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. For 2023/24 support activity allocations from 2022/23 were used to allocate support costs to Wastewater Treatment.

Confidence grades in E8 are consistent with grades in the general E table commentary and remain consistent with 2022/23.

6.3 Data

6.3.1 Data sources and confidence grades

Data sources and confidence grades are detailed in the Performance Trends section 6.2 where relevant.

6.3.2 Data improvement programmes

There have been no notable data improvement programmes in AR24.

6.3.3 Assumptions used for forecast data

There are no forecast data for E8.

7 Table E9 – Large sewage treatment works information database

7.1 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 1500 kg 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. There were no works upgraded during the reporting year.

This table excludes all sewage treatment works operated under Public Private Partnership (PPP) that meet the above load criteria.

7.2 Performance Trends

7.2.1 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 decreased by one to 24 sites as Galashiels WwTW has fallen below the BOD threshold for a large Wastewater Treatment Works (WwTW). With a BOD Kg/day of 1,151, it is included under size band 5 in the E8 table and not included in E9. There are no other changes to the works included in the E9 table in AR24.

Large sewage treatment works are defined as those that receive an average loading over 1,500 kg BOD/day, about equivalent to a population of 25,000.

7.2.2 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.

7.2.3 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, these are the same as AR23.

E9.5 Population equivalent of total load received

The overall population equivalent of the total load received decreased by 111k from 2,589k to 2,478 from AR23 with the removal of Galashiels WwTW.

Changes to the population equivalent in '000, as reported in **Line E9.5**, of each large WwTW are detailed in the Table 477 below. In addition to the 34k PE reduction caused by the removal of Galashiels WwTW, the significant reductions at Dunfermline, Kinneil Kerse, Nigg and Perth City are caused by the exclusion of septic tank and treatment works sludge that receives sludge thickening, rather than being taken to the head of a WwTW. A portion of the Perth loads do go through the treatment works process and these are included. Improved analysis of the imported loads has enabled identification of which loads to include/exclude as contributing to the PE at each WwTW.

Table 477: Change in Population Equivalent.

Plant No	Site	AR23 '000 PE	AR24 '000 PE	Change
STW001223	ALLANFEARN WWTW NH711475	79.09	83.21	4.12
STW000011	ALLERS WWTW 1964 NS662561	37.3	35.96	-1.34
STW001979	ALLOA WWTW NS887918	42.85	43.04	0.19
STW000033	ARDOCH WWTW 2002 NS374758	62.43	62.11	-0.32
STW000125	CARBARNS WWTW 1973 NS773539	48.46	48.33	-0.13
STW001975	DALDERSE WWTW 1966 NS903822	91.87	87.66	-4.21
STW000218	DALDOWIE WWTW 1974 NS672622	277.4	283.23	5.83
STW000222	DALMARNOCK WWTW NS611627	181.41	176.62	-4.79
STW001984	DUNFERMLINE WWTW 1973 NT121817	93.65	84.26	-9.39
STW000265	DUNNSWOOD WWTW NS782771	30.1	30.21	0.11
STW000281	ERSKINE WWTW NS494691	84.81	85.55	0.74
STW001989	GALASHIELS WWTW NT513351	34.22	-	-34.22
STW000355	HAMILTON WWTW NS712575	62.58	61.75	-0.83
STW001491	INVERURIE WWTW 2001 NJ781203	25.87	26.84	0.97
STW001977	KINNEIL KERSE WWTW 2001 NS960811	71.35	46.23	-25.12
STW001982	KIRKCALDY WWTW 1987 NT287923	60.28	60.56	0.28
STW000455	LAIGHPARK PAISLEY WWTW NS485655	96.1	98.12	2.02
STW001543	NIGG WWTW NJ964046	290.61	270.37	-20.24

Plant No	Site	AR23 '000 PE	AR24 '000 PE	Change
STW001527	PERSLEY WWTW NJ906098	53.94	49.61	-4.33
STW001712	PERTH CITY WWTW 1971 NO147221	95.72	70.03	-25.69
STW001569	PETERHEAD WWTW NK127442	35	35.14	0.14
STW000576	PHILIPSHILL WWTW 1948 NS603560	72.05	67.59	-4.46
STW000642	SHIELDHALL WWTW NS533659	562.36	569.67	7.31
STW002268	STIRLING WWTW 1968 NS808935	69.21	69.64	0.43
STW000719	TROQUEER WWTW 1950 NX971745	30.25	32.22	1.97
		2588.91	**2477.95**	**-110.96**

The confidence grade of B3 remains the same as for AR23.

7.2.4 Lines E9.6-E9.10 – Compliance

These lines report on regulatory compliance using consent data as taken from our corporate consents database. CAR or UWWT parameters were used to report, depending on which was the most stringent.

The suspended solids (SS) consent is 100mg/l for most WwTW, which is the same as for AR23. Nigg and Peterhead have no SS consent, as in AR23. There are no changes to the BOD, Ammonia or Phosphate consent values from AR23.

Confidence grades remain at A1, reflecting the data being obtained directly from our corporate consents database.

E9.11 Compliance with effluent consent standard

Line E9.11 - compliance with consent percentage, based on OSM regulatory samples from the SEPA system showed that nine out of 24 works achieved 100% compliance, compared to AR23 where 12 out of 25 large WwTW achieved 100% compliance. The lowest compliance rate was found at Nigg WwTW which achieved 87% compliance. The remaining number of works had greater than or equal to 93% compliance, with 19 out of 24 works achieving greater than or equal to 97% compliance.

Line E9.11 reports full compliance for each site against each individual sample whereas table B11b reports compliance as a percentage of non-failing works across the year.

The confidence grade of A1 remains the same as for AR23.

7.2.5 Lines E9.12-E9.18 - Treatment Works Category

These lines report the information held in the corporate asset inventory in relation to treatment type. There are 24 large sewage treatment works in E9; this corresponds with **Line E8.7**.

The Treatment Works Category identification remains unchanged from AR23.

The confidence grade of A1 remains the same as AR23.

7.2.6 Lines E9.19-E9.22 – Sludge

The main areas of difficulty in populating **Lines E9.20 and E9.22** are in allocating inter-site sludge tankering costs to individual sites and identifying sludge treatment/conditioning costs at multi-functional sites. 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 for **Lines E9.20 and E9.22** are lower (C3) than other Section E cost analysis for these reasons.

As reported in **Line E9.21**, the following large sewage treatment works are designated as sludge centres: Allanfearn, Alloa, Dalderse, Daldowie, Dunfermline, Kinneil Kerse, Nigg, Perth City, Shieldhall and Troqueer. The remainder of the large sewage treatment works, namely: Allers, Ardoch, Carbans, 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 **Lines E9.19 and E9.21** are A1

7.2.7 Lines E9.23-E9.28 - Works cost

Analysis of functional costs for large sewage treatment works:

	2023/24	2022/23	Variance
	£m	£m	£m
Daldowie	1.530	0.930	(0.600)
Galashiels	n/a	0.337	+0.337
Persley	0.633	0.227	(0.406)
Tertiary treatment	**2.163**	**1.494**	**(0.669)**
Allanfearn	1.198	0.869	(0.329)
Allers	0.460	0.489	+0.029
Alloa	0.610	0.489	(0.121)
Ardoch	0.725	0.395	(0.330)
Carbarns	0.561	0.453	(0.108)
Dalderse	0.439	0.449	+0.010
Dalmarnock	2.342	1.932	(0.410)
Dunfermline	0.629	0.358	(0.271)
Dunnswood	0.505	0.563	+0.058
Erskine	0.888	0.690	(0.198)
Hamilton	0.956	1.030	+0.074
Inverurie	0.687	0.670	(0.017)
Kinneil Kerse	0.438	0.479	+0.041
Kirkcaldy	1.099	0.798	(0.301)
Laighpark (Paisley)	1.092	0.886	(0.206)
Nigg	1.802	0.874	(0.928)
Perth	0.949	0.672	(0.277)
Peterhead	0.608	0.266	(0.342)
Philipshill	1.434	1.113	(0.321)
Shieldhall	3.338	2.801	(0.537)
Stirling	0.948	1.006	+0.058
Troqueer	0.606	0.560	(0.046)
Secondary treatment	**22.314**	**17.842**	**(4.472)**
Direct large treatment works	**24.477**	**19.336**	**(5.141)**
General and Support	2.662	2.404	(0.258)
Total large treatment works	**27.139**	**21.740**	**(5.399)**

The larger increases (>£0.2m) are explained as follows:

Increased wholesale energy prices resulted in increased power costs across the majority of large WwTWs. Power costs were the primary driver of increased costs across several sites, including Allanfearn, Ardoch, Dalmarnock, Kirkcaldy, Laighpark, Perth, Peterhead, Philipshill and Shieldhall:

Persley and Nigg WwTWs transferred into Scottish Water control on 1 October 2022 and therefore 2023-24 represents a full year of costs for these sites.

Higher chemical costs at Daldowie and Dunfermline WwTWs, primarily due to a combination of price inflation and increased dosing to maintain compliance.

The larger decreases (>£0.2m) are explained as follows:
Galashiels WWTW fell below the threshold required to be classified as a large works (size band 6) during 2023-24 and therefore has no costs included in the E9 table for the current year.

Confidence grades for **Lines E9.23-9.28**, are consistent with grades in the Section E commentary and remain consistent with 2022/23.

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 Section E cost analysis for these reasons.

7.3 Data

7.3.1 Data sources and confidence grades

Confidence grades in E9 are consistent with other grades in the Section E commentary and remain consistent with AR23. More detail is provided in the individual lines' descriptions.

7.3.2 Data improvement programmes

There were no notable data improvement programmes in AR23.

7.3.3 Assumptions used in forecast data

There are no forecast data for E9.

8 Table E10 – Sludge treatment and disposal

8.1 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 the E10 table 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.

8.2 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 increased from 1,317.642k to 1,631.933k (+314.29k). The main reason for the increase is the recategorisation of the disposal route as detailed in Table 488 below

Table 488: Major changes in Resident Population from AR23

Plant Nr	Disposal Site	Disposal Method	Resident Population	Change
STC000067	PERSLEY STC	Land Reclamation	39.125	Categorised as Land Restoration in AR23 and excluded from the submission
STC000097	KIRKCALDY STC NT286923	Land Reclamation	51.179	Categorised as Land Restoration in AR23 and excluded from the submission
STC000098	ST ANDREWS STC	Land Reclamation	21.049	Categorised as Land Restoration in AR23 and excluded from the submission
STW000426	KILMORY WWTW 2006 NR864868	Land Reclamation	16.573	Categorised as Land Restoration in AR23 and excluded from the submission
STW000559	OBAN WWTW 2000 NM867314	Land Reclamation	20.461	Categorised as Land Restoration in AR23 and excluded from the submission
STW001569	PETERHEAD WWTW NK127442	Land Reclamation	0.244	Categorised as Land Restoration in AR23 and excluded from the submission

Plant Nr	Disposal Site	Disposal Method	Resident Population	Change
STW001980	CUPAR WWTW 1962 NO388148	Land Reclamation	23.119	Categorised as Land Restoration in AR23 and excluded from the submission
STC000088	DUNFERMLINE STC NT121817	Land Reclamation	131.561	New in AR24
Total			**303.310**	

The remaining change in PE - 10.981k - is due to population change and is within normal movement. This is re-calculated every year from the properties identified as household and wastewater connected in the catchment, and the average property occupancy,

The confidence grade of C3 remains the same as AR23.

E10.2 Amount of sewage sludge

This line reports the mass of sewage bioresource across the noted disposal routes. The total reported volume of 28.930ttds was derived from various internal data sources including our Gemini system. This is an increase of 27.09% from AR23 where the total reported volume was 22.764ttds.

For the Scottish Water sludge there was an increase of 2.56 ttds in the volume of enhanced treated material produced. The reason for this is due to Nigg STC being a part of core Scottish Water for the full 12 months of AR24 and Kinneil Kerse producing compliant material from January 2024.

There has been a decrease of 1.59 ttds in volume of conventionally treated material recycled to agriculture in AR24. This is primarily due to the digesters at Allanfearn being taken offline and a marginal decrease in compliance in Cumnock.

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. There has been an increase of 5.19 ttds of material that utilised land restoration as an outlet for non-compliant and raw cake, so as to maintain overall satisfactory sludge disposal compliance. This is due to issues with cake imports at Nigg STC (bottleneck at front end and equipment issues) which resulted in substantial diversions to land restorations from various sites.

0.4 ttds of untreated bioresource material continues to be landfilled in the Shetland Islands.

The confidence grade of B4 remains the same AR23.

8.2.1 Lines E10.3-E10.9 - Sludge Treatment and Disposal Costs

E10.9 - Sludge Treatment and disposal: Functional Expenditure

	Total
Functional expenditure:	£m
2023/24	24.851
2022/23	21.111
Variance	**(3.740)**

Sludge treatment costs have increased by £3.7m (18%) from 2022/23, including £2.0m of costs relating to running ex SW Grampian and Highland PFI sites for a full year. Key variances include:

- £0.8m (19%) higher employment costs linked primarily to pay inflation
- £0.9m (37%) increase in power costs driven by wholesale energy price increases
- £0.4m (16%) higher chemical costs, due primarily to price inflation
- £0.4m (6%) increase hire and contracted costs due to price inflation and increased tank cleaning
- £1.9m (24%) increase in other and general and support costs primarily driven by pay inflation, additional unfunded pension accruals due to new valuation work, the progression of new digital projects 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 **Line E3a.20** with the corresponding sludge loads reported in the E3 table.

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 table cost analysis.

Analysis of sludge treatment costs by disposal route:

	2023/24	2022/23	Variance
	£m	£m	£m
Farmland:			
Untreated	0.000	0.000	+0.000
Conventional	1.470	2.086	+0.616
Advanced	8.407	6.626	(1.781)
Incineration	0.000	0.000	+0.000
Landfill	1.140	1.084	(0.056)
Composted	0.000	0.000	+0.000
Land reclamation	13.834	11.315	(2.519)
Other	0.000	0.000	+0.000
Total	**24.851**	**21.111**	**(3.740)**

An increase in costs for disposals via Farmland advanced is primarily due to higher volumes through this route from Nigg, previously Aberdeen PFI, which represents a full year of disposal volumes compared to six months in 2022/23. There was also an increase in costs to land reclamation in the year, resulting mainly from higher volumes at Daldowie because of new sludge centrifuging capabilities, higher volumes from Dunfermline due to various closures at

Nigg and higher volumes from Allanfearn because of digester maintenance requirements. Consequently, there was a reduction in volumes disposed of via farmland conventional as a result.

Confidence grades in the E10 table are consistent with grades in the Section E commentary and remain consistent with 2022/23.

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). The E10 table is completed based on a combination of: ABM analysis, direct cost capture by asset, and Scottish Water sludge model analysis. Confidence grades in E10 are lower (B2) than other Section E cost analysis for these reasons.

8.3 Data

8.3.1 Data sources and confidence grades

The resident population reported is the total resident population served by Scottish Water treatment works, and excludes the 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 the Scottish Water Gemini tanker movement system (except one discharge to one PPP works which is moved 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 documented in the individual line comments where relevant.

8.3.2 Data improvement programmes

There have been no notable data improvement programmes in AR23.

8.3.3 Assumptions used in forecast data

There are no forecast data for E10.

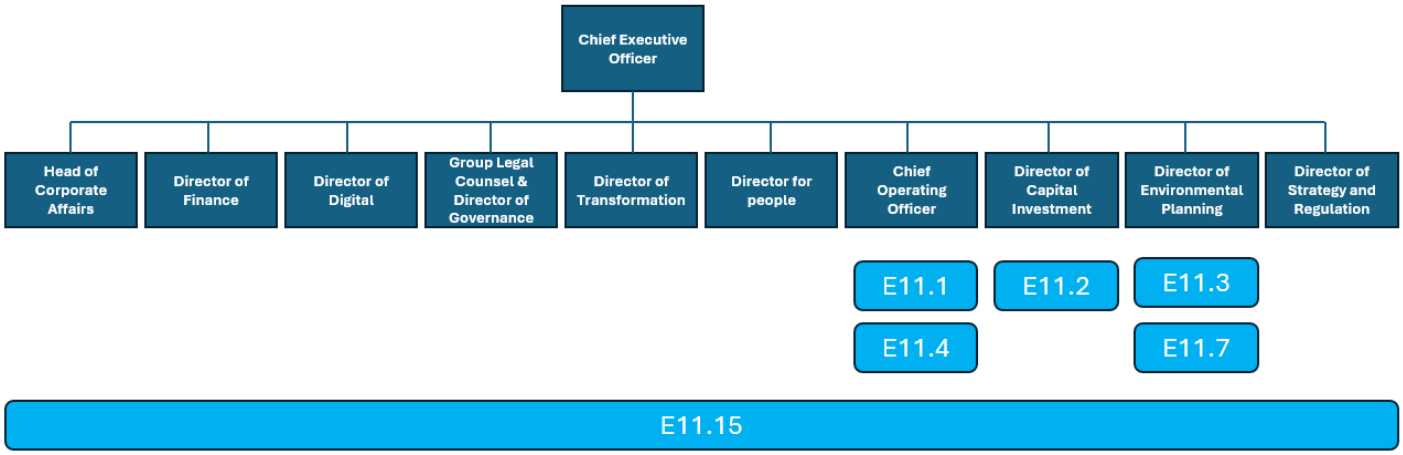
9 Table E11 – Employee numbers – Full-time equivalents

9.1 Overview

This table contains the number of full-time equivalent employees as of the end of March 2024; the split of data is explained in each line, as necessary.

The row headings in the E11 table 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 in Figure 15.

Figure 15: Organisation structure and row ownership for Table E11.



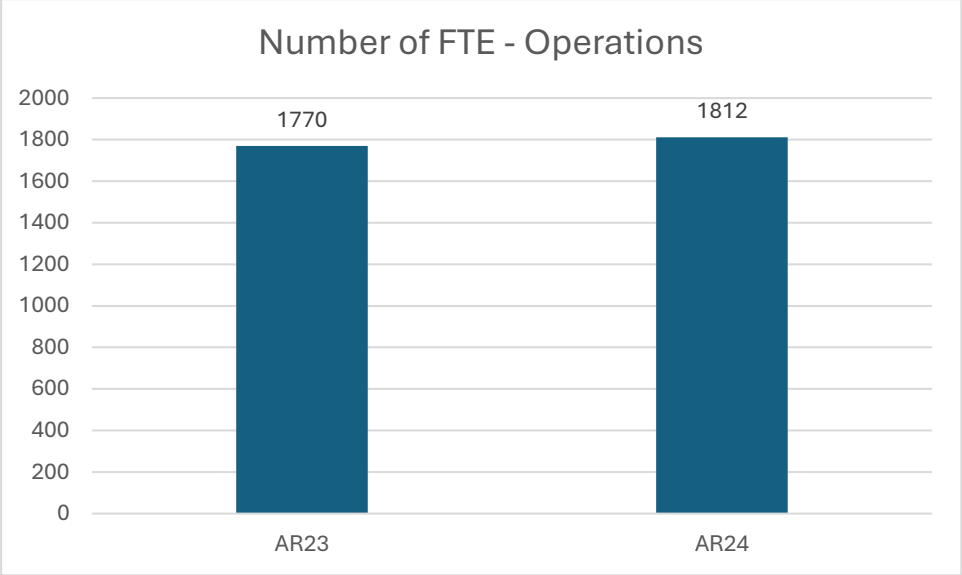
9.2 Performance Trends

9.2.1 Lines E11.1-E11.6 - Delivery of water and wastewater services

E11.1 – Operations

The Full Time Equivalent (FTE) figures contained with **Line E11.1** are for the main Water and Wastewater Operations function of Scottish Water, within the Customer Services Directorate which sits under the Chief Operating Officer. This excludes the focused Customer Service teams such as Contact Centre and Customer Experience and Field, Water and Sewer Response Teams which are captured in **Line E11.4**. These figures exclude directors and managers as these are included in **Line E11.5** but does include Grampian FTE. The number of employees (FTE) in this category is 1812. Figure 16 below depicts the change in total number of employees (FTE) across AR23 and AR24.

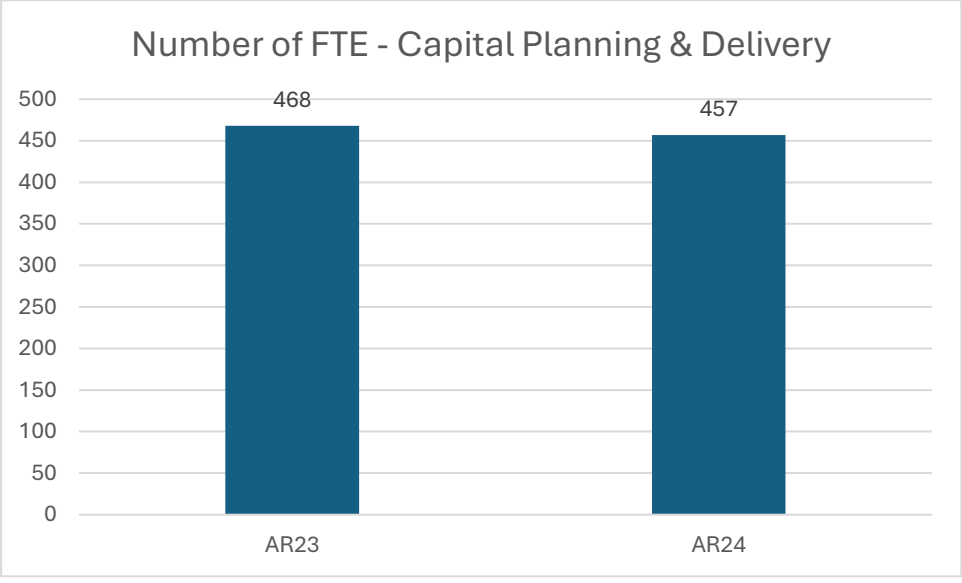
Figure 16: Change in number of employees (FTEs) in operations across AR23 and AR24.



E11.2 - Capital Planning and Delivery

This line contains the FTE for Scottish Water Capital Investment Planning and delivery Teams within the Capital Investment Directorate. 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 in **Line E11.5**. The number of employees (FTE) in this category is 457. Figure 17 below depicts the change in total number of employees (FTE) in Capital Investment only across AR23 and AR24.

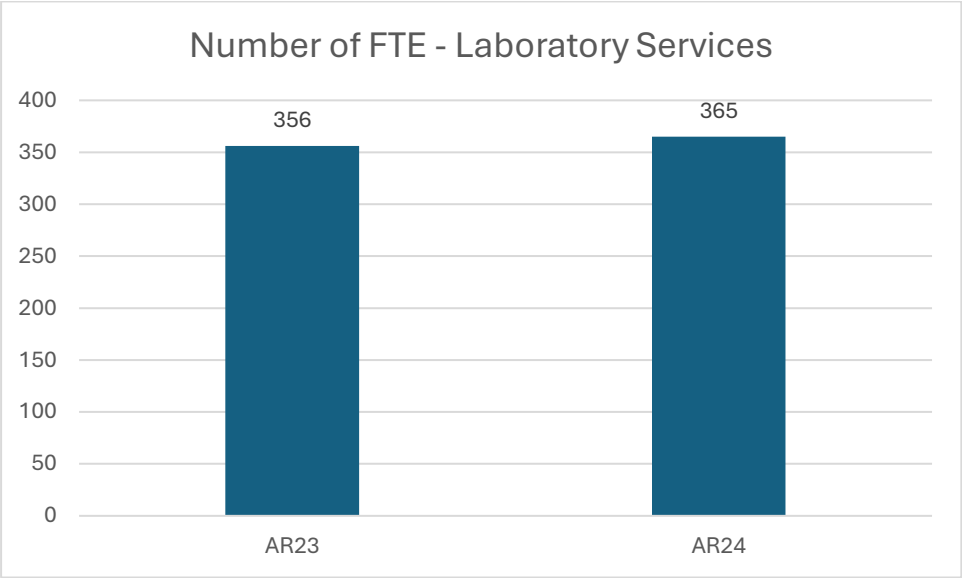
Figure 17: Change in number of employees (FTEs) in capital planning and delivery across AR23 and AR24.



E11.3 Laboratory Services

Line E11.3 captures the FTE for Scottish Water's Scientific Services Function which sits in the Environmental Planning Directorate. Within this Business area the focus is on Water and Wastewater Sampling and Quality Assessment (Laboratory Services). These figures exclude directors and managers which are included in **Line E11.5**. The number of employees (FTE) in this category is 365. Figure 18 below depicts the change in total number of employees (FTE) in Laboratory services across AR23 and AR24.

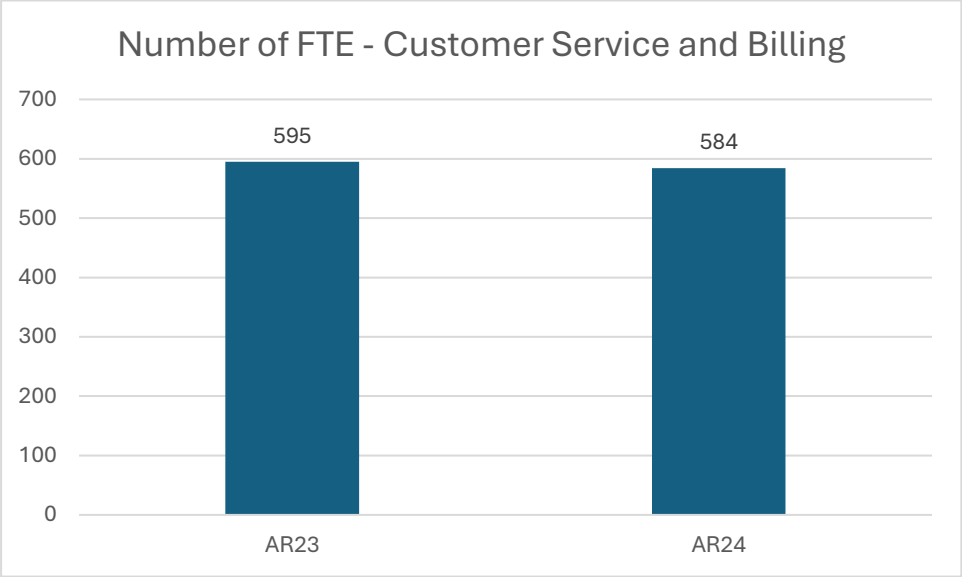
Figure 18: Change in number of employees (FTEs) in laboratory services across AR23 and AR24.



E11.4 Customer service and billing

This includes the FTE associated with the focused Customer Service teams such as Contact Centre and Customer Experience and Field, Water and Sewer Response Teams within the Customer Services Directorate. The FTE captured under the category of Billing consist of Wholesale Services (Billing and Management). These figures exclude directors and managers which are included in **Line E11.5**. The number of employees (FTE) in this category is 584. Figure 19 below depicts there has been no significant change in total number of employees (FTE) for Customer service and billing across AR23 and AR24.

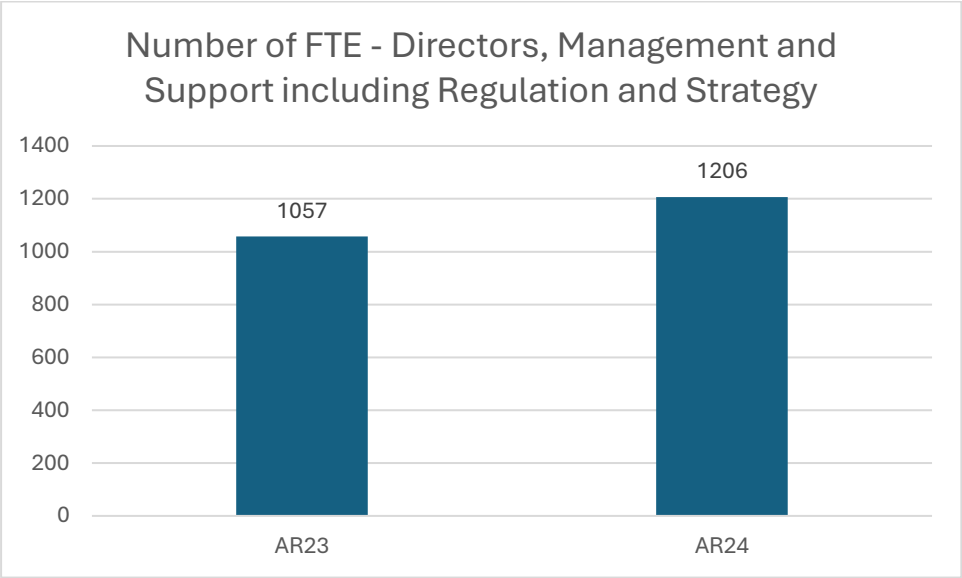
Figure 19: Change in number of employees (FTEs) in customer service and billing across AR23 and AR24.



E11.5- Directors, management and support including regulation and strategy

In **Line E11.5** the FTE associated with Scottish Water CEO, executive directors and directors, general managers and business managers (including SW Grampian) is recorded. Further to this support functions including Finance, People, Corporate Affairs, Digital, Transformation, Environmental 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 1206. Figure 20 below depicts the change in the FTE associated with Scottish Water directors, management and support including regulation and strategy across AR23 and AR24. The increase in this area is due to the growth within the business which is driven in part by Transformation.

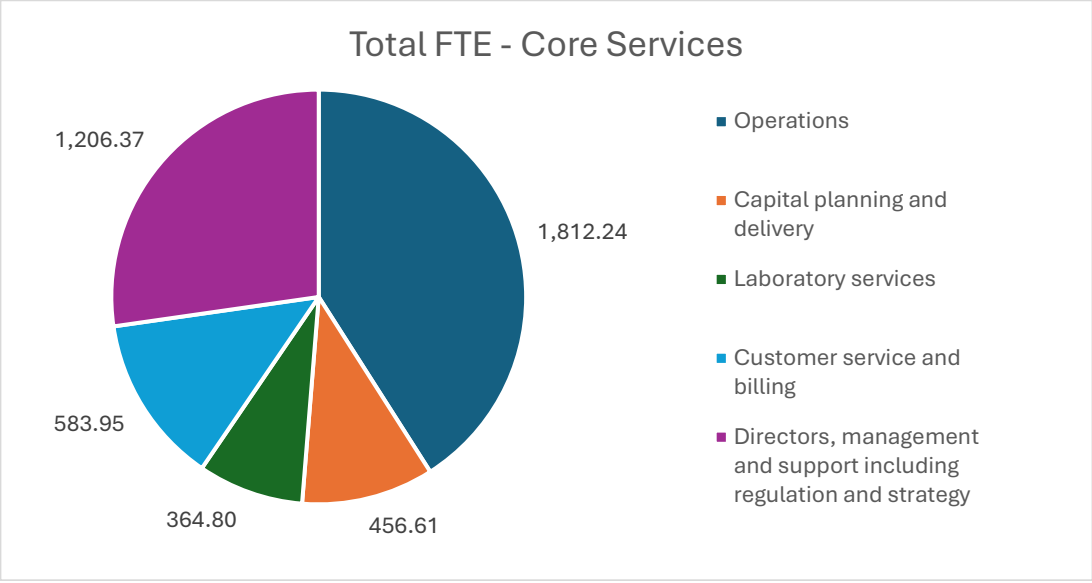
Figure 20: Change in number of employees (FTEs) in directors, management and support including regulation and strategy across AR23 and AR24.



E11.6 – Total employee number (core services)

The total FTE number of employees working in water and wastewater service delivery, **Lines E11.1-E11.5**, is 4424. The breakdown of this total number is shown in Figure 21 below.

Figure 21: Breakdown of employee numbers working in water and wastewater service delivery for AR24.



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) 99 FTE an 48.3% increase from AR23 reported value of 67.

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 285.74 FTE as of 31 March 2024.

9.3 Data

9.3.1 Data sources and confidence grades

All data has been sourced from Scottish Water's corporate HR system (Workday) as of March 2024, and has therefore been given a confidence grade of A1.

9.3.2 Data improvement programmes

There have been no notable data improvement programmes since AR23.

9.3.3 Assumptions used in forecast data

There are no forecast data for E11.