



SCOTTISH WATER

WIC ANNUAL RETURN

Commentary

June 2020

(Revised October 2020)

Table of Contents

1	Table A1 Connected and Billed Properties.....	6
1.1	Data sources and confidence grades	6
1.2	Data improvement programmes	6
1.3	Assumptions used for forecast data	8
1.4	Key changes from 2018/19	8
2	Table A2 Population, volumes and loads - Water	14
2.1	Data sources and confidence grades	14
2.2	Data improvement programmes	15
2.3	Assumptions used for forecast data	16
2.4	Key changes from 2018/19	16
3	Table A3 Population, volumes and loads - Wastewater.....	20
3.1	Data sources and confidence grades	20
3.2	Data improvement programmes	20
3.3	Assumptions used for forecast data	20
3.4	Key changes from 2018/19	20
4	Table D5 Activities – Water Service.....	23
4.1	Data sources and confidence grades	23
4.2	Data improvement programmes	23
4.3	Assumptions used for forecast data	23
4.4	Key changes from 2018/19	23
5	Table D6 Activities – Wastewater Service	24
5.1	Data sources and confidence grades	24
5.2	Data improvement programmes	24
5.3	Assumptions used for forecast data	24
5.4	Key changes from 2018/19	24
6	Table E3 PPP Project Analysis	25
6.1	Data sources and confidence grades	25
6.2	Data improvement programmes	31
6.3	Assumptions used for forecast data	31
6.4	Key changes from 2018/19	31
7	Table E3a PPP Cost Analysis	34
7.1	Data sources and confidence grades	34
7.2	Data improvement programmes	39
7.3	Assumptions used for forecast data	39

7.4	Key changes from 2018/19	39
8	Table E4 Water Resources and Treatment	45
8.1	Data sources and confidence grades	45
8.2	Data improvement programmes	46
8.3	Assumptions used for forecast data	46
8.4	Key changes from 2018/19	46
8.5	Functional costs	48
9	Table E6 Water Distribution	53
9.1	Data sources and confidence grades	53
9.2	Data improvement programmes	53
9.3	Assumptions used for forecast data	53
9.4	Key changes from 2018/19	53
9.5	Functional costs	55
10	Table E7 Wastewater Explanatory Factors – by Area	58
10.1	Data sources and confidence grades	58
10.2	Data improvement programmes	59
10.3	Assumptions used for forecast data	59
10.4	Key changes from 2018/19	59
10.5	Functional costs	60
11	Table E8 Wastewater Explanatory Factors – Sewage Treatment Works	63
11.1	Data sources and confidence grades	63
11.2	Data improvement programmes	63
11.3	Assumptions used for forecast data	63
11.4	Key changes from 2018/19	63
11.5	Functional costs	65
12	Table E9 Large Sewage Treatment Works Information Database	67
12.1	Data sources and confidence grades	67
12.2	Data improvement programmes	67
12.3	Assumptions used for forecast data	67
12.4	Key changes from 2018/19	67
12.5	Functional costs	68
13	Table E10 Sludge Treatment and Disposal.....	70
13.1	Data sources and confidence grades	70
13.2	Data improvement programmes	70
13.3	Assumptions used for forecast data	70
13.4	Key changes from 2018/19	70

13.5	Functional costs	70
14	Tables G1 & G2: Investment and Investment Monitoring	73
14.1	Data sources and confidence grades	73
14.2	Data improvement programmes	73
14.3	Assumptions used for forecast data	73
14.4	Key changes from 2018/19	74
15	Table G3 Monitoring Serviceability	78
15.1	Data sources and confidence grades	78
15.2	Data improvement programmes	79
15.3	Assumptions used for forecast data	79
15.4	Key changes from 2018/19	79
16	Table G4 OMD Inputs	85
17	Table G5 Growth	86
17.1	Data sources and confidence grade	86
17.2	Data improvement programmes	86
17.3	Assumptions used for forecast data	86
17.4	Key changes from 2018/19	86
18	Table G6 Project Analysis – Actuals & Forecast – Water & Wastewater	88
19	Table G7 Asset Maintenance.....	89
19.1	Data sources and confidence grade	89
19.2	Data improvement programmes	90
19.3	Assumptions used for forecast data	90
19.4	Key changes from 2018/19	92
20	Table H1 – Summary	94
20.1	Data sources and confidence grades	94
20.2	Data improvement programmes	94
20.3	Assumptions used for forecast data	94
20.4	Key changes from 2018/19	94
21	Table H2 Water Non-Infrastructure.....	98
21.1	Data sources and confidence grades	98
21.2	Data improvement programmes	98
21.3	Assumptions used for forecast data	98
21.4	Key changes from 2018/19	98
22	Table H3 Water Infrastructure.....	102
22.1	Data sources and confidence grades	102

22.2	Data improvement programmes	102
22.3	Assumptions used for forecast data	102
22.4	Key changes from 2018/19	102
23	Table H4 Wastewater Infrastructure	104
23.1	Data sources and confidence grades	104
23.2	Data improvement programmes	104
23.3	Assumptions used for forecast data	104
23.4	Key changes from 2018/19	104
24	Table H5 Waste Water Non-Infrastructure	106
24.1	Data sources and confidence grades	106
24.2	Data improvement programmes	106
24.3	Assumptions used for forecast data	106
24.4	Key changes from 2018/19	106
25	Table H6 Support Services	110
25.1	Data sources and confidence grades	110
25.2	Data improvement programmes	110
25.3	Assumptions used for forecast data	110
25.4	Key changes from 2018/19	110

Section A - Base Information

1 Table A1 Connected and Billed Properties

1.1 Data sources and confidence grades

Property numbers are, for this report year, as at 30 September 2019. Unmeasured household property numbers are taken from the 30 September 2019 data submitted by Councils. Measured Household numbers have been sourced from our Financials and Billing (FAB) system and give the numbers billed for Water, Wastewater and Drainage as at 30 September 2019.

The confidence grade for all values for household properties has changed from A2 to B2 for AR20 following a review of the consistency of confidence grades between the household and non-household lines. While the household data is sourced from the Local Councils Corporate Systems, once received by us it is held on spreadsheets with some minor derivation required due to reporting constraints with some councils' billing systems. These issues do not affect the accuracy of billed revenue but solely relate to the ability of a small minority of councils to report the data split into all of the categories required for Annual Return reporting (further details in section 1.2 below). For these reasons, the historic confidence grade of A2 is felt to have been potentially overstated, with B2 more appropriate for the data sources involved.

A confidence grade of B3 has been applied to the figures reported in Table A1 for all values for non-household properties, this remains consistent with last year's return.

The non-household figures have been sourced from settlement reports supplied by the Competition and Markets Authority (CMA), which are loaded into our reconciliation datamart. The vacancy status, used to determine whether the property is 'occupied' or 'vacant', has been sourced from the Market Data Set (MDS) files which are also published by the CMA. This is consistent with previous Annual Returns.

The September 2019 2nd reconciliation (R2), which was the latest available at the end of March 2020, along with the MDS file published at the same time, were used to populate the A Tables.

The data source and methodology for trade effluent remains broadly the same for AR20. The confidence grades for billed and connected properties, for the report period and the forecast, are A2 and A3, respectively. The confidence grades for total BOD and COD loads receiving secondary treatment are B2 and B4, respectively.

Note that the line for 'Discontinuation of Trade Effluent services' is intended to capture disconnections due to non-payment of TE charges. As the only way of achieving this would be to physically block the sewer, this is not a process undertaken by Scottish Water.

1.2 Data improvement programmes

In recent years there have been differences between council reports of dwellings and the total figures obtained from the Scottish Assessors (SAA). We identified that the reports from some councils did not include numbers for new council tax reduction schemes.

Since AR19, we have obtained an additional report from 2 of the impacted councils that has allowed us to extract the missing data and include it in the analysis. This has reduced the gap between the total households reported in data from the councils and the SAA figures from 6,749 at September 2018, to 2,143 at September 2019.

In agreement with the Water Industry Commission (WICS), some changes have been made to the A1 tables and definitions for non-household billed properties for this report year. Unmeasured billed water (A1.3) has been split into lines A1.3a and A1.3b to show the proportion of occupied and vacant properties. The same approach has been applied to line A1.4 for measured billed water; and lines A1.13 and lines A1.14, for unmeasured and measured billed foul sewerage.

Following a general movement of Supply Points from vacant to occupied immediately before and after the introduction of charging at vacant properties in 2017, the proportion of vacant Supply Points has been stable since late 2018, at just over 9%, until the start of the COVID-19 pandemic. The volume of occupancy changes by LPs in R1 settlement reports, as summarised in the table below, can fluctuate from month to month but the overall % of vacant Supply Points, including additions and removals from the base, was stable prior to COVID-19.

Table 1: Net occupancy changes by year since 2012

Occupancy status changes in 12 months prior to Annual Return data cut	Occupied to Vacant	Vacant to Occupied	Net change in occupied SPIDs
2012	33,938	27,896	-6,042
2013	23,334	30,722	7,388
2014	22,433	19,806	-2,627
2015	25,507	22,713	-2,794
2016	24,235	26,796	2,561
2017	21,855	25,241	3,386
2018	14,232	14,805	573
2019	13,336	16,670	-2,666

The billed surface drainage lines have been updated to ensure consistency and provide more explicit numbers. Lines A1.23 and A1.24 have been updated from property drainage to surface drainage; they now provide a count of properties with foul sewerage but neither roads nor property drainage. Line A1.26, billed for surface drainage only, has been split as above, to show occupied and vacant property counts. The calculated total (A1.27) has been amended to give the total number of properties billed for surface drainage; road or property drainage. Further clarification is provided in the definitions.

In recent years we have taken part in a number of market initiatives to improve the completeness of market data. Although now complete, the processing of changes to the market data continued into the current report year and is the reason for some movements in this year's A1 tables.

The multi-tenancy project matched c.35,000 'tenant' drainage supply points to their corresponding c.6,000 bulk metered 'landlord' supply points. Multi-tenancy properties, such as office blocks or retail parks, are often served by a single metered water supply, billed to

the landlord and represented by a 'landlord' supply point, with the tenant of each individually rated unit billed separately for surface drainage charges via a series of 'tenant' supply points. In this report year, c.1,400 multi-tenancy conversions and disaggregations were processed, resulting in c.800 new drainage-only supply points being added to the market by the project. Measures to enable us to pro-actively maintain the alignment of market data with external data sources have been implemented and brought into business as usual (BAU) processes.

One significant improvement has been made in the understanding of the data received from the CMA which has changed the way in which data is grouped and totalled for trade effluent. In AR19, the CMA X25 report grouped data by discharge point (DPID) and monthly charge period (MCP), with totals being calculated at that stage prior to grouping/totalling on DPID alone to produce the return.

Analysis of the report confirmed that it was better to group and total by DPID, MCP and 'effective from date' as these records contain the same charge parameters. Whilst we have not used this change of methodology for AR19, we do not believe this change has had an impact on the Table A or E data related to trade effluent, but have seen significant improvements in the agreement between calculations on the P tables.

1.3 Assumptions used for forecast data

The forecast of measured households is based on the average movement over the last 2 years with the following exceptions:

- a change in the definitions for lines A1.23 and A1.24 referred to in section 1.2 has resulted in a significant difference between the actual numbers for AR20 and the AR19 forecast.
- the addition of new lines and new processes last year for A1.41 and A1.42 means that 2 years' data isn't available resulting in the forecast for these two lines in AR19 being over-estimated.
- The new methodology used for grouping trade effluent has resulted in a decrease in AR20 values compared to that forecast in AR19.

The forecast growth for unmeasured households is based on the SR15 Final Determination. For 2020/21, the Determination states that it is assumed to be 0.9% on the current year billed properties for Water, giving an increase of 21,730 properties for 2020/21.

The SR15 Business Plan assumes zero growth in non-household revenue and with no further data or market projects planned which will have a material impact on property numbers, we are forecasting zero growth for 2020/21.

The forecast does not take into account any impact from Covid-19 as this is currently unknown. It is likely that the economic impact will result in an increased proportion of vacant properties for non-household, and growth in the number of properties qualifying for reliefs and exemptions for household in 2020/21 and beyond. However, at present there is not enough information to assess the likely extent of that impact.

1.4 Key changes from 2018/19

A summary of the variances between 2018/19 and 2019/20 for connected and billed properties can be found in the table at the end of this section – Table A1 comparison AR19 and AR20. The significant changes are detailed in this section.

Unmeasured connected household property numbers increased by more than forecast due to higher-than-expected levels of new housebuilding (water increased by 25,488, waste by 23,374). Unmeasured billed household properties increased by slightly more (water increased by 28,678, waste by 26,600) due to some previously vacant (void) properties becoming occupied and moving into charge.

Table 2: Changes to Unmeasured Connected Properties

Removed

	Total	Deregistered/ Permanently Disconnected	Remove Unmeasured Service Element	Unmeasured to Measured
Water	1835	1336	1	498
Sewerage	1696	783	439	474

Added

	Total	Gap Site/ New Connection/Change of Use	Unmeasured Service Element Added	Measured to Unmeasured
Water	996	886	3	107
Sewerage	756	648	20	88

Measured household billed property numbers continued to reduce as customers switch to council tax-based charges which they determine to be more economical for them.

Table 3: Changes to Measured Connected Properties

Removed

	Total	Deregistration/ Permanent Disconnection	Remove Metered Service Element	Measured to Unmeasured
Water	1835	1725	3	107
Sewerage	1476	1151	237	88

Added

	Total	Gap Site/ New Connection/Change of Use	Metered Service Element Added	Unmeasured to Measured
Water	3029	2526	5	498
Sewerage	2679	2106	99	474

Overall, there has been a very small increase of 0.2% in the number of non-household properties connected to water and foul sewerage. The only notable changes are to the unmeasured vacant counts; unmeasured non-household vacant billed properties – water (A1.3b) and unmeasured non-household vacant billed properties – foul sewerage (A1.13b) both decreased by 12.1%, a total of 1,013 properties. The decrease is mainly due to:

- the deregistration of properties found to be incorrectly in the market
- their status being changed by the SAA (for example domestic, merged and duplicate properties), and
- properties moving to measured due to a meter being installed at the premise.

There have been some significant movements in the surface water drainage numbers, particularly in properties not billed for surface water drainage:

- Unmeasured non-household billed properties (A1.23) not billed for surface drainage decreased by 19.6%, this only equates to 9 properties as the numbers are very low
- Measured non-household billed properties (A1.24) not billed for surface drainage increased by 60.9%, which is 2,686 properties.

This increase is predominantly due to the disaggregation of market data for multi-tenancy premises by the market project outlined above. This resulted in the removal of surface drainage services from supply points identified as 'landlord' supplies and the creation of separate 'tenant' supply points for the drainage charges at each individually rated unit, as detailed above. Mainly as a result of this work, there was a corresponding increase in properties billed for surface drainage only (A1.26a and A1.26b) by 10.4%; 4,466 properties in total. There was a corresponding increase in properties connected for surface drainage (A1.30).

Non-household permanent disconnections (A1.37) increased from 179 to 388; this is in part due to the identification of a number of historic disconnections which had been carried out, but the transactions had not been sent to update the market. In September 2018 a new Customer Relationship Management (CRM) solution was delivered fully systemising this process which had previously been managed manually and offline. The increase is also due to an increase in permanent disconnections for non-payment; a process was introduced to the market in April 2018.

Non-household water and wastewater properties (A1.38-A1.40) de-registered from the market has decreased by 3,101; this year's numbers are in line with expected BAU deregistration numbers. The previous year's figures were high due to de-registrations carried out by the SAA market project.

The breakdown of deregistration volume by reason, mirroring those in the operational code, is detailed in the table below. The total for wastewater includes supply points with foul sewerage and those with surface drainage only (i.e. the 'drainage only' column of the table below) is a subset of the 'wastewater' column.

Table 4: Breakdown of deregistration volume

De-registered Properties			
Categories	Water	Wastewater	Drainage Only
Bulk (landlord) Meter	329	19	
Demolished	161	502	331
Domestic	1012	793	55
Duplicate SPID	88	72	32
Merged Property	441	1155	727
No Drainage		230	219
No Sewerage Connection		140	
No Water Connection	225	0	
Other	417	422	206
Grand Total	2673	3333	1570

The number of non-household properties (A1.41-A1.43) temporarily transferred to Scottish Water successfully, has increased from 4 to 58 for water properties and to 61 for wastewater as this includes 3 drainage-only properties. The temporary transfer process was introduced to the market in April 2018, but the number of successful applications was low in the first year due in part to the length of the preceding legal processes. Numbers have increased in this report year as the licensed providers involved have established appropriate processes and further increases are expected in future.

The number of billed properties for trade effluent has decreased slightly, whereas the number of connected properties has increased slightly. The total BOD and COD loads receiving secondary treatment have decreased significantly and this is reflected in the commentary in section A3.

SCOTTISH WATER

ANNUAL RETURN INFORMATION REQUIREMENTS

SECTION A: BASE INFORMATION Table A1: Connected and billed properties

Line Ref.	Description	Units	Report Year		Report Year		Variance	% Change	Explanation provided in AR20 Commentary?
			2019-20	CG	2018-19	CG			

Billed Properties - Water

A1.1	Unmeasured household billed properties - potable water (including exempt)	Nr	2510569	B2	2481891	A2	28678	1.16	1.1 Data sources and confidence grades 1.4 Key changes
A1.2	Measured household billed properties - potable water	Nr	387	B2	399	A2	-12	-3.01	1.1 Data sources and confidence grades 1.4 Key changes
A1.3a	Unmeasured non-household occupied billed properties - potable water (including exempt)	Nr	19927	B3	24598	B3	-4671	-18.99	1.1 Data sources and confidence grades 1.2 Data improvement programmes 1.4 Key changes
A1.3b	Unmeasured non-household vacant billed properties - potable water (including exempt)	Nr	3832	B3	n/a	n/a	n/a	n/a	1.1 Data sources and confidence grades
A1.4a	Measured non-household occupied billed properties - potable water	Nr	120241	B3	127853	B3	-7612	-5.95	Occupied and vacant separate lines for AR20 (new lines)
A1.4b	Measured non-household vacant billed properties - potable water	Nr	8806	B3	n/a	n/a	n/a	n/a	
A1.5	Total number of billed properties - potable water	Nr	2663762	B3	2634741	B3	29021	1.10	

Connected Properties - Water

A1.6	Unmeasured household connected properties	Nr	2563192	B2	2537704	A2	25488	1.00	1.3 Assumptions used for forecast 1.4 Key changes
A1.7	Measured household connected properties	Nr	387	B2	399	A2	-12	-3.01	1.3 Assumptions used for forecast 1.4 Key changes
A1.8	Unmeasured non-household connected properties	Nr	23759	B3	24598	B3	-839	-3.41	1.4 Key changes
A1.9	Measured non-household connected properties	Nr	129047	B3	127853	B3	1194	0.93	1.4 Key changes
A1.10	Total number of connected properties	Nr	2716385	B3	2690554	B3	25831	0.96	

Billed Properties - Foul Sewerage

A1.11	Unmeasured household billed properties (including exempt)	Nr	2,409,383	B2	2382783	A2	26600	1.12	1.4 Key changes
A1.12	Measured household billed properties	Nr	94	B2	99	A2	-5	-5.05	1.4 Key changes
A1.13a	Unmeasured non-household occupied billed properties (including exempt)	Nr	17,173	B3	21645	B4	-4472	-20.66	1.4 Key changes
A1.13b	Unmeasured non-household vacant billed properties (including exempt)	Nr	3,532	B3	n/a	n/a	n/a	n/a	1.4 Key changes
A1.14a	Measured non-household occupied billed properties	Nr	96,890	B3	103545	B4	-6655	-6.43	1.4 Key changes
A1.14b	Measured non-household vacant billed properties	Nr	7,858	B3	n/a	n/a	n/a	n/a	1.4 Key changes
A1.15	Total number of billed properties	Nr	2534930	B3	2508072	B4	26858	1.07	

Connected Properties - Foul Sewerage

A1.16	Unmeasured household connected properties	Nr	2459942	B2	2436568	A2	23374	0.96	1.4 Key changes
A1.17	Measured household connected properties	Nr	94	B2	99	A2	-5	-5.05	1.4 Key changes
A1.18	Unmeasured non-household connected properties	Nr	20705	B3	21645	B3	-940	-4.34	1.4 Key changes
A1.19	Measured non-household connected properties	Nr	104748	B3	103545	B3	1203	1.16	1.4 Key changes
A1.20	Total number of connected properties	Nr	2585489	B3	2561857	B3	23632	0.92	

Billed Properties - Surface Drainage

A1.21	Unmeasured household billed properties (including exempt) not billed for property drainage	Nr	0	B2	0	A2	0	0	1.1 Data sources and confidence grades
A1.22	Measured household billed properties not billed for property drainage	Nr	18	B2	17	A2	1	5.88	1.1 Data sources and confidence grades
A1.23	Unmeasured non-household billed properties not billed for property drainage	Nr	37	B3	3019	B3	-2982	-98.77	1.2 Data improvement programmes 1.4 Key changes
A1.24	Measured non-household billed properties not billed for property drainage	Nr	7099	B3	2197	B3	4902	223.12	1.2 Data improvement programmes 1.4 Key changes
A1.25	Household properties billed for surface drainage only	Nr	0	B2	0	A2	0	0.00	1.1 Data sources and

									confidence grades
A1.26a	Non-household properties billed for surface drainage only	Nr	41342	B3	42891	B3	-1549	-3.61	1.2 Data improvement programmes
A1.26b	Non-household vacant properties billed for surface drainage only	Nr	6105	B3	n/a		n/a	n/a	1.2 Data improvement programmes
A1.27	Total number of billed properties	Nr	2575223	B3	2599515	B3	-24292	-0.93	

Connected Properties - Surface Drainage									
A1.28	Unmeasured household connected properties	Nr	2459942	B2	2436568	A2	23374	0.96	1.1 Data sources and confidence grades
A1.29	Measured household connected properties	Nr	518	B2	545	A2	-27	-4.95	1.1 Data sources and confidence grades
A1.30	Unmeasured non-household connected properties	Nr	71398	B3	67602	B3	3796	5.62	1.4 Key changes
A1.31	Measured non-household connected properties	Nr	95430	B3	96935	B3	-1505	-1.55	1.4 Key changes
A1.32	Total number of connected properties	Nr	2627288	B3	2601650	B3	25638	0.99	

Trade Effluent									
A1.33	Billed Properties	Nr	1,304	A2	1321	A2	-17	-1.29	1.1 Data sources and confidence grades
A1.34	Connected Properties	Nr	3,417	A2	3399	A2	18	0.53	1.1 Data sources and confidence grades
A1.35	Trade effluent load receiving secondary treatment (BOD/yr)	Nr	13,848	B3	16414	B2	-2566	-15.63	1.4 Key changes
A1.36	Trade effluent load receiving secondary treatment (COD/yr)	Nr	27,654	B3	34856	B2	-7202	-20.66	1.4 Key changes

Vacant Charging and Disconnections									
A1.37	Non-household permanent disconnections	Nr	388	B3	179	B3	209	116.76	1.4 Key changes
A1.38	Non-household water properties de-registered from the market	Nr	2,673	B3	4178	B3	-1505	-36.02	1.4 Key changes
A1.39	Non-household wastewater properties de-registered from the market	Nr	3,333	B3	4929	B3	-1596	-32.38	1.4 Key changes
A1.40	Non-household drainage only properties de-registered from the market	Nr	1,570	B3	1972	B3	-402	-20.39	1.4 Key changes
A1.41	Non-household water properties under successful temporary transfer to Scottish Water	Nr	58	B3	4	B3	54	1350.00	1.4 Key changes
A1.42	Non-household wastewater properties under successful temporary transfer to Scottish Water	Nr	61	B3	4	B3	57	1425.00	1.4 Key changes
A1.43	Non-household drainage only properties under successful temporary transfer to Scottish Water	Nr	3	B3	0	B3	3	100.00	1.4 Key changes
A1.44	Non-household water properties pending temporary transfer to Scottish Water	Nr	6	B3	0	B3	6	100.00	1.4 Key changes
A1.45	Non-household wastewater properties pending temporary transfer to Scottish Water	Nr	9	B3	0	B3	9	100.00	1.4 Key changes
A1.46	Non-household drainage only properties pending temporary transfer to Scottish Water	Nr	3	B3	0	B3	3	100.00	1.4 Key changes
A1.47	Discontinuation of Trade Effluent services	Nr	0	A1	0	A1	0	0.00	

2 Table A2 Population, volumes and loads - Water

2.1 Data sources and confidence grades

The base population data is sourced from the National Records for Scotland (NRS) using the latest published data including council breakdowns. For AR20 this is the 2016 based reports, as this is the most recent data split to Council area. Three reports are used:

- NRS population projections – projected total population by Scottish area
- NRS household projections – projected households by council area
- NRS household population projections – projected private household population by council area

In addition, data from the Councils' returns is used to determine the ratio of dwellings with water to total dwellings.

The winter tourist population uses data from Visit Scotland and business classifications from Address Based Premium (ABP). The lowest winter visitor month (January) according to Visit Scotland statistics was used.

The total population with water (A2.1) is the sum of the winter tourist population and the following 3 values, each derived as follows:

Population of unmeasured households with water (A2.3):

- The ratio of dwellings with water to total dwellings (from data supplied by councils) is applied to the NRS private household population to give the population in unmeasured households with water.

Population of measured households with water (A2.4):

- The average population per household is calculated from NRS private household populations and NRS total households. This average is applied to the number of measured properties for water to give population in measured households with Water.

Population not in households with water:

- Population not in households with water is taken to be the difference between NRS total population and NRS private household population. The ratio of dwellings with water to total dwellings is then applied to calculate the population not in households with water.

Due to the age of the source data (2016), the extrapolation of ratios from council data to the population data and the inclusion of the winter tourist population, the figures are given a confidence grading of B2.

There has been no change in data sources or confidence grades for the water balance or leakage. The sources of data are:

- Unmeasured households (HH) - local authorities' billing system
- Distribution Input (DI) - Z-one system
- Unmeasured HH volumes - in-house consumption monitoring zones & extrapolated to all properties

- Measured HH volumes - SW own measured volumes dataset
- Measured Non-household (NHH) volumes - Wholesale/CMA
- Unmeasured NHH volumes extrapolated using RV (rateable value) supplied by Wholesale/CMA

The confidence grade for the volume of non-potable water delivered remains at C4, reflecting the fact that some extrapolation is involved for Buckieburn Farm and Freshwater Research Unit.

The changes to the per household consumption (PHC) methodology introduced for AR19 were continued in AR20. Further information on leakage, PHC and Maximum Likelihood Estimation (MLE) can be found in the leakage report (Commentary by leakage assessor, 2020).

2.2 Data improvement programmes

In preparing the tourist population figures, we identified that "Touring" (camping and caravan sites) are sometimes listed in 'Address Base' at individual pitch level within the one site. Previously, each pitch was allocated the average bed space figure for a whole site. Addresses listed in this manner have been identified and 4 bed spaces allocated for each pitch to correct this.

In addition, the average bed space at "Touring" (camping and caravan sites) of 258, which has been used since 2005, was reviewed as it seemed high when checked against site samples. The "UK Caravan and Camping Alliance - 2019 Impact Report" was used as a source as it was referenced by Visit Scotland for providing reliable statistics. The report's 2018 figure for Scotland was 390 parks with 34,662 pitches, which averages out as 89 pitches per site. This figure (89) was therefore used as a replacement.

There have been changes to the District Metered Area (DMA) leakage calculation. As we moved into AR19 a change in reporting methodology was made in line with the UK consistency of measures (convergence) project. A comparison of the total leakage post MLE estimate pre and post the changes is shown in the table below.

Table 5: Total leakage post MLE comparison

	AR18	AR19	AR20
Pre methodology changes	492ML/d	485ML/d	465ML/d
Post methodology (convergence) changes	492ML/d	480ML/d	465ML/d *

* Note that the A Table post MLE total leakage number is always rounded up to the nearest whole number for summary reporting purposes.

An error was picked up during the 2019/20 reporting year around implementation of the UK convergence recommended leakage calculation in our leakage systems, PSP. After correcting the error, the AR19 value increased from 480ML/d to 492ML/d. This was explored during the AR20 audit with the WICS leakage specialist adviser (Stuart Trow).

A change has been made to the way customer supply pipe losses have been calculated for this year. In previous years, the estimate was based on a small area monitor of which the limited survey sample size has reduced and the estimate cannot be regarded as robust.

Therefore, for AR20, SW has reverted to a method used in AR14 to estimate the supply pipe leakage rate, as agreed by WICS. The method used to determine supply losses is based on the number of supply pipe bursts found and fixed by SW throughout the year and extrapolated over the rest of the number of supply pipes. This traditional model is known as a burst and background estimates (BABE).

2.3 Assumptions used for forecast data

Forecast populations are taken from the NRS projections and ratios applied to 'dwellings with water' to 'total dwellings' to calculate the forecast population as described above. The ratios are based on the forecast Dwellings as described in Table A1 commentary.

The forecast for leakage reduction for DI and MLE is 5 MI/d. This has been applied on a simple basis to the key out-turn leakage estimates. Forecast estimations have not been developed or applied to other lower component areas of the water balance.

2.4 Key changes from 2018/19

A summary of the variances between 2018/19 and 2019/20 for population, volumes and loads (Water) can be found at the end of this section – Table A2 comparison AR19 and AR20. The significant changes are detailed in this section.

Household population figures increased by 20,483 in the year in line with forecast from the NRS predictions. However, these underlying population increases are offset by a reduction of 14,598 in winter tourist numbers following the update to the figures as described above.

- The winter population (A2.1) is comprised of the resident population and 65,085 non-resident (tourist) occupancy.
- The summer population (A2.2) is comprised of the resident population and 138,034 non-resident (tourist) occupancy.

There have been changes in the water balance and leakage and the contributing factors are:

- Non household measured volume significantly reduced by c.20 MI/d (A2.1); this was primarily due to two large petrochemical plants reducing production throughout the year.
- MLE leakage significantly reduced by c.27 MI/d (see table below); this was due to a continued application of high find fix rates and no adverse weather conditions.
- DI significantly reduced as a result of the above
- Household properties increased c.29k (A1.1 and A1.2) as expected due to new builds.

Table 6: Total leakage post MLE comparison

Report Year	Top Down Leakage (MI/d)	Bottom Up Leakage (MI/d)	MLE Leakage (MI/d)
AR11	757	693	699
AR12	661	617	629
AR13	617	561	575

Report Year	Top Down Leakage (MI/d)	Bottom Up Leakage (MI/d)	MLE Leakage (MI/d)
AR14	608	553	566
AR15	590	531	544
AR16	531	492	500
AR17	559	480	495
AR18	543	480	492
AR19	472	482	492
AR20	454	467	465

Eleven non-household customers receive non-potable water supplies and ten of these have a separate potable supply to the premises. Several of these supply points are subject to Schedule 3 charging arrangements and all the non-potable supplies are now metered.

The total volume of non-potable water recorded was 12.151 ML/day for this report period, a decrease of 3.111. This decrease is mainly due to a drop in consumption at two customer sites; Buckieburn Farm and Freshwater Research Unit and Kerry Food Manufacturers in Menstrie.

SCOTTISH WATER

ANNUAL RETURN INFORMATION REQUIREMENTS

SECTION A: BASE INFORMATION

Table A2: Population, volumes and loads (Water)

Line Ref.	Description	Units	Report Year 2019-20		Report Year 2018-19		Variance	% Change	Explanation provided in AR20 Commentary?
			CG		CG				
Summary - Population - Water									
A2.1	Winter	000	5383.20	B2	5376.72	B2	6.47	0.12	2.1 Data sources and confidence grades 2.4 Key changes
A2.2	Summer	000	5456.14	B2	5548.54	A2	-92.39	-1.67	2.2 Data improvement programmes 2.4 Key changes
Household - Population - Water									
A2.3	Population of unmeasured household properties	000	5216.17	B2	5195.66	A2	20.51	0.39	2.1 Data sources and confidence grades
A2.4	Population of measured household properties	000	0.83	B2	0.86	A2	-0.03	-3.37	2.1 Data sources and confidence grades
A2.5	Household population connected to the water service	000	5217.00	B2	5196.52	A2	20.48	0.39	2.4 Key changes
Water Balance									
A2.6	Net Distribution input treated water (water put into supply)	MI/d	1769.71	B2	1806.16	B2	-36.45	-2.02	2.1 Data sources and confidence grades 2.4 Key changes
A2.7	Unmeasured household volume of water delivered (including losses)	MI/d	992.81	B2	986.11	B2	6.70	0.68	2.1 Data sources and confidence grades 2.4 Key changes
A2.8	Measured household volume of water delivered (including losses)	MI/d	0.29	B2	0.32	B2	-0.03	-10.49	2.1 Data sources and confidence grades 2.4 Key changes
A2.9	Unmeasured non-household volume of water delivered (including losses)	MI/d	15.00	C5	15.75	C5	-0.75	-4.75	2.1 Data sources and confidence grades 2.4 Key changes
A2.10	Measured non-household volume of water delivered (including losses)	MI/d	366.22	B3	386.76	B3	-20.54	-5.31	2.1 Data sources and confidence grades 2.4 Key changes
A2.11	Water taken unbilled - legally	MI/d	62.40	C4	62.18	C4	0.22	0.36	2.1 Data sources and confidence grades 2.4 Key changes
A2.12	Water taken unbilled - illegally	MI/d	1.71	C4	1.91	C4	-0.20	-10.38	2.1 Data sources and confidence grades 2.4 Key changes
A2.13	Water taken unbilled - Distribution System Operational Use (DSOU)	MI/d	5.77	C3	5.75	C3	0.02	0.31	2.1 Data sources and confidence grades 2.4 Key changes
A2.14	Net Consumption (including supply pipe losses)	MI/d	1444.20	B3	1458.77	B3	-14.57	-1.00	2.1 Data sources and confidence grades 2.4 Key changes
A2.15	Distribution losses (including trunk mains and reservoirs)	MI/d	325.51	B3	347.39	B3	-21.88	-6.30	2.1 Data sources and confidence grades 2.4 Key changes
A2.16	Customer supply pipe losses	MI/d	128.50	C3	124.18	C3	4.32	3.48	2.1 Data sources and confidence grades 2.4 Key changes
A2.17	Overall water balance	-		B3		B3			
Leakage									
A2.18	Total Leakage (pre-MLE Adjustment)	MI/d	466.66	B3	481.89	B3	-15.23	-3.16	2.1 Data sources and confidence grades 2.4 Key changes
A2.19	Water Balance Closing Error	%	-0.71	B3	-0.57	B3	-0.14	25.10	2.1 Data sources and confidence grades 2.4 Key changes
A2.20	MLE Adjustment	MI/d	-2.25	B3	-1.88	B3	-0.37	19.74	2.1 Data sources and confidence grades 2.4 Key changes
A2.21	Total Leakage (post-MLE Adjustment)	MI/d	464.41	B3	480.01	B3	-15.60	-3.25	2.1 Data sources and confidence grades 2.4 Key changes
Water delivered - non-potable									
A2.22	Volume of non-potable water delivered	MI/d	12.151	C4	15.262	C4	-3.11	-20.38	2.4 Key changes

Water delivered - components

A2.23	Per Household consumption (unmeas'd h'hold - excl s/pipe leakage) PHC	l/household/day	346.000	B2	348.730	B2	-2.730	-0.78	2.1 Data sources and confidence grades
A2.24	Per Household consumption (meas'd h'hold - excl s/pipe leakage) PHC	l/household/day	720.860	B3	793.056	B3	-72.196	-9.10	2.1 Data sources and confidence grades
A2.25	Meter under-registration (measured households) (included in water delivered)	MI/d	0.012	C3	0.013	C3	-0.001	-5.96	2.1 Data sources and confidence grades
A2.26	Meter under-registration (measured non-households) (included in water delivered)	MI/d	16.201	C3	17.226	C3	-1.025	-5.95	2.1 Data sources and confidence grades

3 Table A3 Population, volumes and loads - Wastewater

3.1 Data sources and confidence grades

The change in confidence grades associated with population values is explained in section A1. The winter and summer populations are derived from the resident and non-resident (tourist) occupancy.

The data source and methodology for sewage volumes remains broadly the same as for AR19.

As with previous Annual Return submissions for sewage sludge treatment and disposal (A3.26-A3.28) all the SW figures reported were taken direct from our Corporate Gemini system, recycling contractors invoice tracker data sheets and duty of care documentation. As in previous years we have retained the existing confidence grade.

3.2 Data improvement programmes

Information regarding the measured non-household foul volume (A3.12) is now taken directly from Wholesale, superseding the previous internal data source and recognised as a more robust source of information.

There has been an improvement in the recording of the volume of septic tank waste. Tanker drivers can now use an app as back up to record the volume collected, which enables data, that would previously have been missed, to be recorded.

3.3 Assumptions used for forecast data

The forecast data is based on those used for wholesale and customer populations. The forecast does not take into account any impact from Covid-19 as this is currently unknown.

3.4 Key changes from 2018/19

A summary of the variances between 2018/19 and 2019/20 for population, volumes and loads (Wastewater) can be found at the end of this section – Table A3 comparison AR19 and AR20. The significant changes are detailed in this section.

Sewage volumes are partly driven by population changes and have broadly remained stable, with the exception of those noted below.

The measured household volume (A3.5) reported this year is 0.054 ML/day lower than the value last year. This is due to over counting in AR19 with the inclusion of households on a water meter as well as those measured for wastewater. This has an impact on the measured household load (A3.12) resulting in a reduction of 6.35tonnes.

The recorded volume of trade effluent discharged (A3.8) has decreased by c.8%. This decrease is attributed mainly to the failure of the Licence Provider (LP) for Meadowhead Public Private Partnership (PPP) to submit meter readings during the period. The total BOD

load (A3.15) discharged to the network has also decreased significantly and as for line A3.8; most of this decrease can be attributed to the LP not submitting any meter readings.

The volume and loads of septic tank waste (A3.10, A3.17 & A3.18) has increased in AR20, due partly to the improved recording of septic tank load transfers through the use of the app. There is also an increase in private septic tank loads as these are collected more frequently at the customers' request and not just annually as previously.

The table below summarizes the Equivalent population served (A3.23 & A3.24) changes by category from AR19 to AR20.

Table 7: Changes in Equivalent population served between 2018/19 and 2019/20

	AR20	AR19	Difference
Unmeasured Household	5,007,927	4,990,033	17,894
Measured Household	202	426	-224
Measured Non-Household (Metered & Assessed)	780,730	814,254	-33,524
Trade Effluent Load, PE	632,350	773,439	-141,089
Imported Public Septic Tank, PE	6,295	4,575	1,720
Imported Private Septic Tank, PE	11,937	4,403	7,534
Imported WTW Sludge, PE	15,040	11,330	3,710
Imported WWTW Sludge, PE	157,516	64,989	92,527
Other Tanker Loads, PE	16,171	19,864	-3,693
Sludge Return Liquors, PE	12,454	9,126	3,328
PE for Table A (exc. Tourist)	6,640,622	6,692,439	-51,817

The reported mass of wastewater treatment sludge recycled (A3.26) was 123.838ttds in 2019/20 (compared to 122.61 in 2018/19), of which the majority came from the PPP/PFI works (107.028ttds) with the Scottish Water figure equating to only 16.810ttds. The reason for the increase in 2020 is that sludge was able to be spread to agriculture land instead of going to land reclamation.

For the Scottish Water sludge there was a slight increase in the volume of enhanced treated sludge produced due to Troqueer Sludge Treatment Centre (STC) coming back into operation. 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.

Due to COVID-19, the BAS audit was postponed in March and eventually carried out on the 12th -14th May (via Skype). One non-conformance was raised, and this was closed off at the start of this week (01/06/20). Details of this were submitted to the auditor to close off the audit. We received our BAS certificate on 09/06/2020.

SECTION A: BASE INFORMATION
Table A3: Population, volumes and loads
(Wastewater)

Line Ref.	Description	Units	Report Year 2019-20		Report Year 2018-19		Variance	% Change	Explanation provided in AR20 Commentary?
				CG		CG			

Summary - Population - Waste water

A3.1	Winter	000	5155.938	B2	5152.536	A2	3.402	0.07	2.1 Data sources and confidence grades 2.4 Key changes
A3.2	Summer	000	5206.792	B2	5240.506	B2	-33.714	-0.64	2.1 Data sources and confidence grades 2.4 Key changes
A3.3	Household Population connected to the wastewater service	000	5008.573	B2	4990.247	A2	18.326	0.37	2.1 Data sources and confidence grades

Sewage - Volumes

A3.4	Unmeasured household volume (including exempt)	MI/d	766.85	B3	767.88	B3	-1.023	-0.13	3.4 Key changes
A3.5	Measured household volume	MI/d	0.026	A2	0.080	A2	-0.054	-67.50	3.4 Key changes
A3.6	Unmeasured non-household foul volume (including exempt)	MI/d	12.724	B3	12.776	B3	-0.052	-0.41	3.4 Key changes
A3.7	Measured non-household foul volume	MI/d	143.457	B3	150.075	B3	-6.618	-4.41	3.2 Data improvement programmes 3.4 Key changes
A3.8	Trade effluent volume	MI/d	59.853	B2	64.860	B2	-5.007	-7.72	3.4 Key changes
A3.9	Total volume	MI/d	982.913	B3	995.667	B3	-12.754	-1.28	3.4 Key changes
A3.10	Volume septic tank waste	MI	61.023	B3	30.048	A3	30.975	103.09	3.4 Key changes

Sewage - Load (BOD/yr)

A3.11	Unmeasured household load (including exempt)	tonnes	109673.610	B3	109281.723	B3	391.887	0.36	3.4 Key changes
A3.12	Measured household load	tonnes	2.969	B4	9.323	B4	-6.354	-68.15	3.4 Key changes
A3.13	Unmeasured non-household foul load (including exempt)	tonnes	1393.252	B4	1398.997	B4	-5.745	-0.41	3.4 Key changes
A3.14	Measured non-household foul load	tonnes	15704.750	B3	16433.162	B3	-728.412	-4.43	3.4 Key changes
A3.15	Trade effluent load	tonnes	14269.517	B4	17132.347	B2	-2862.830	-16.71	3.4 Key changes
A3.16	Total load discharged from primary services	tonnes	141044.098	B3	144255.552	B3	-3211.455	-2.23	3.4 Key changes
A3.17	Private septic tank load	tonnes	261.409	B3	96.419	B3	164.990	171.12	3.4 Key changes
A3.18	Public septic tank load	tonnes	137.862	B3	100.186	B3	37.676	37.61	3.4 Key changes
A3.19	Other tanker load	tonnes	354.141	B3	396.189	B3	-42.048	-10.613	3.4 Key changes
A3.20	Total load entering sewerage system (BOD/yr)	tonnes	141797.510	B3	144848.346	B3	-3,050.836	-2.106	3.4 Key changes
A3.21	Average COD concentration	mg/l	350.00	A1	350.00	B2	0.000	0.00	3.4 Key changes
A3.22	Average suspended solids concentration	mg/l	250.00	A1	250.00	B2	0.000	0.00	3.4 Key changes
A3.23	Equivalent population served (resident)	000	6640.621	B3	6704.447	B3	-63.826	-0.95	3.4 Key changes
A3.24	Equivalent population served (resident) (numerical consents)	000	6185.013	B3	6300.900	B3	-115.887	-1.84	3.4 Key changes
A3.25	Total load receiving treatment through PPP treatment works	tonnes	64534.055	B3	66469.070	B3	-1935.015	-2.91	3.4 Key changes

Sewage Sludge Treatment and Disposal

A3.26	Total sewage sludge disposal	ttds	123.838	B4	122.605	B4	1.233	1.01	3.4 Key changes
A3.27	Total sewage sludge disposal by PPP treatment works	ttds	107.028	B4	107.405	B4	-0.377	-0.35	3.4 Key changes
A3.28	Percentage unsatisfactory sludge disposal	%	0.00	A1	0.00	A1	0.000	0.00	3.4 Key changes

Section D – Asset Information

4 Table D5 Activities – Water Service

4.1 Data sources and confidence grades

The lengths reported in table D5 are taken, unless otherwise stated, directly from digitized infrastructure in our GIS system.

The mains renewed and relined are reported from interventions carried out from reactive operations, capital maintenance and capital projects interventions, where the mains cleaned, are reported from work done as part of capital programme.

The number of pipes replaced is taken from the records of our lead replacement programme, which includes descriptions of the location address, work carried out and date completed. This level of detail provides sufficient assurance that the numbers and reasons for pipe replacements can be categorized correctly and quantified within 5% accuracy.

All confidence grades remain as per last year, with the exception of lead replacement which has been re-evaluated from B3 to B2 this year.

4.2 Data improvement programmes

Data is constantly updated in GIS from the digitising of new development plans and opportunistic recording of information gathered during operational activities. The accuracy of the source data has increased this year, with 99.75% of water mains having pipe diameter information available.

4.3 Assumptions used for forecast data

There is no forecast data for the D5 table.

4.4 Key changes from 2018/19

The length of mains renewed is less (36.8km) than last year. There has been an increase of 700km of mains cleaned compared to last year and the majority (97%) of this has been for quality purposes. This increase is due to our continued focus on preventative maintenance, and an additional 445.87km of new mains reported (an increase of 430.9km on last year), which is a combination of length adopted for new developments and lengths delivered as part of our capital programme

5 Table D6 Activities – Wastewater Service

5.1 Data sources and confidence grades

The lengths reported in table D6 are taken, unless otherwise stated, directly from digitized infrastructure in our GIS system. The accuracy of the source data has increased this year, with 96.55% of sewers having pipe diameter information available.

The figure reported for the inspection of sewers throughout the year is monitored by CCTV as part of the SR15 Capital Programme.

The length reported in 'Other Changes to sewers' is the balancing value to bring the total changes in the year to the current total length of sewers as reported in H4.1.

All confidence grades remain as per last year unless stated below.

5.2 Data improvement programmes

As a result of the continuous update of data in our GIS system as outlined in section 4.2 above, new sewers added during the year includes 790km of laterals identified from GIS digitized pipes and lengths estimated from address points and property classification data in GIS.

5.3 Assumptions used for forecast data

There is no forecast data for the D6 table.

5.4 Key changes from 2018/19

There was a significant increase in the length of new sewers (D6.3) with 1066.66km added in 2019/20 compared to 77.81km in 2018/19. This is due to the improvements in GIS data described above.

In line with the changes in Table H4, critical sewers have not been categorised separately and are not reported on an individual line but are included as part of the total sewers reported.

The improvements to the recording processes of infrastructure assets have resulted in the 'other changes to sewers' (D6.7a) being considerably lower than previous years at 0.37km.

Section E - Operating Costs and Efficiency

The E tables report the number of non-infrastructure assets in our inventory that were operational during 2019/20 as compared to the H tables which report the number of non-infrastructure assets in our inventory that were operational as of 31 March 2020.

6 Table E3 PPP Project Analysis

Table E3 and E3a provide details of the 21 PPP wastewater treatment works that are managed under 9 separate PPP Concession agreements.

The following table outlines the works that form part of each scheme.

Table 8: PPP schemes

PPP Scheme	Wastewater Treatment Works*
Highland	Fort William, Inverness
Tay	Hatton
Aberdeen*	Nigg, Persley, Peterhead, Fraserburgh
Moray Coast	Lossiemouth, Buckie, Banff/Macduff
AVSE	Seafield, Newbridge, East Calder, Blackburn, Whitburn
Levenmouth	Levenmouth
Dalmuir	Dalmuir
Daldowie**	Daldowie sludge treatment centre
MSI (Ayrshire)	Meadowhead, Stevenston, Inverclyde

* Aberdeen PFI within the ownership of Scottish Water Horizons Holdings Ltd from December 2018. Existing contract, operational and reporting protocols remain in place despite the change in ownership.

** Daldowie is a sludge treatment centre only.

6.1 Data sources and confidence grades

The methodology for establishing the PPP sites connected population and population equivalent is unchanged from previous years. The confidence grades also remain the same.

The annual average resident connected population in E3.1 has increased this year as the method used to calculate properties and occupancy rates has been aligned with Local Authority wastewater connected property numbers as used for household billing. This ensures consistency between Tables A and E and more robust population figures.

The increase in resident population and population equivalent has been partially offset by a decrease in the non-resident figures.

The following tables show a breakdown of the scope of the PPP works.

Table 9: Sewerage Information (E3.4)

PPP Works	Scope of works
Fort William	Includes 4 pumping stations and associated pumping mains.
Inverness	Includes 14 pumping stations and associated pumping mains/gravity sewers.
Hatton	Includes 16 pumping stations and associated pumping mains/gravity sewers.
Nigg	Includes 14 pumping stations and associated pumping mains/gravity sewers.

PPP Works	Scope of works
Persley	Includes a short section of gravity sewer.
Peterhead	Includes a short section of gravity sewer.
Fraserburgh	Includes 1 pumping station and a section of gravity sewer.
Lossiemouth	Includes 7 pumping stations and extensive pumping mains.
Buckie	Includes 12 pumping stations and extensive pumping mains.
Banff/Macduff	Includes 10 pumping stations and extensive pumping mains.
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.

Sewage Treatment (E3.5) - Only Daldowie does not include sewage treatment as it is exclusively a sludge treatment centre.

Table 10: Permanent sludge treatment facilities (E3.6)

PPP Permanent Sludge treatment facilities	Details
Inverness	Indigenous sludge, imports from Fort William, plus Scottish Water imports.
Hatton	Indigenous sludge plus Scottish Water imports.
Nigg	Indigenous sludge, imports from Persley, Peterhead and Fraserburgh plus Scottish Water imports.
Lossiemouth	Indigenous sludge, imports from Buckie and Banff/Macduff plus Scottish Water imports.
Seafield	Indigenous sludge, imports from Newbridge, East Calder, Blackburn and Whitburn, plus Scottish Water imports.
Newbridge	Occasional treatment of indigenous sludge, occasional imports from East Calder, Blackburn and Whitburn.
Levenmouth	Indigenous sludge plus Scottish Water imports.
Dalmuir	A new permanent sludge treatment facility has been commissioned, which 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 SW tankered imports.
Meadowhead	Indigenous sludge plus imports from Stevenston and Inverclyde.

Persley, Peterhead and Fraserburgh are not classed as sludge treatment centres as any indigenous or processed sludge is normally taken to Nigg for treatment. However, due to maintenance works, during April 2019 these three sites produced some thickened raw cake for onward disposal.

Terminal Pumping Station (E3.7) – This means a pumping station that is the final point on the forward flow path from a sewerage network into a wastewater treatment works and may include both pumping of all/partial 'FFT' flows or stormwater flows to storm tanks and/or storm outfalls. The Terminal Pumping Station may form part of the sewerage network (ie be remote from the WWTW) or may be associated with a wastewater treatment works

depending on actual location and power supply source. It is not a Combined Pumping Station or a Stormwater Pumping Station.

The following works include incoming terminal pumping stations as part of the PPP scheme. Maximum capacity (l/s) of these terminal pumping stations, excluding standby capacity, is given in brackets.

Table 11: Works with terminal pumping stations (E3.7)

PPP Works	Details
Fort William	Caol Transfer (118 l/s), Fort William WWTW (590 l/s).
Inverness	Allanfearn WWTW (50 l/s) This pumping station receives flows from a small part of the catchment.
Hatton	South Balmossie (1,563 l/s), West Haven (110 l/s), Inchcape Park (241 l/s).
Fraserburgh	Fraserburgh Inlet (195 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).

There are no plants in the category 'Other' (E3.8).

Where an effluent consent standard (E3.9–E3.13) includes both Controlled Activities Regulations (CAR) and Urban Wastewater Treatment Directive (UWWTD) elements the stricter standard is given in the Annual Return. The effluent consent standards, based on data from the current SEPA licences, are summarised as:

- Suspended solids consent (E3.9) – All CAR
- BOD consent (E3.10) – All UWWTD, except Newbridge, East Calder, Blackburn and Whitburn which are CAR parameters
- COD consent (E3.11) – All UWWTD
- Ammonia consent (E3.12) – All CAR
- Phosphate consent (E3.13) – All CAR

At Newbridge, East Calder, Blackburn and Whitburn the consent is expressed as 'Mean concentration of total phosphorus of any series of composite samples taken at regular but randomised intervals in any period of 12 months'.

Compliance with effluent consent standards (E3.14) for BOD, COD, SS, ammonia, and phosphate is reported for each works, based on the total number of sample results and exceedances (upper and lower tier) for sanitary determinands (to the exclusion of other parameters that may be included in the SEPA consent). Where an effluent consent standard includes both CAR and UWWTD standards both sets of samples are used for the calculation of compliance.

Percentage compliance is calculated as:

- $(1 - (\text{total number of failures} / \text{total number of samples})) \times 100$

The SEPA Annual Compliance Report for the period ending 31 December 2019 has been taken as the definitive data source, provided by SEPA, and as such it has been assigned a Confidence Grade of A1.

Information contained in the lines on treatment works category (E3.15-E3.21) is extracted from the project agreements and is given a confidence grade of A1.

- Primary (E3.15) – All plants
- Secondary activated sludge (E3.16) - includes all plants except Blackburn
- Secondary biological (E3.17) - Blackburn
- Tertiary A1 (E3.18) – summarised in the table below
- Tertiary A2 (E3.19) – summarised in the table below
- Tertiary B1 (E3.20) - No plants sit in this category
- Tertiary B2 (E3.21) – summarised in the table below

Table 12: Tertiary A1 – Activated sludge process (E3.18)

East Calder	Nitrifying filters.
Whitburn	Nitrifying filters.
Dalmuir	Nitrifying filters.

Table 13: Tertiary A2 – Activated sludge process (E3.19)

Persley	UV disinfection.
Fraserburgh	UV disinfection.
Levenmouth	Densadeg lamella settlement tanks.
Newbridge	Low head loss sand filters.
East Calder	Disc filters.
Whitburn	Low head loss sand filters.
Meadowhead	Biofors tertiary filter.

NB: UV disinfection at Levenmouth and Banff MacDuff was discontinued in 2019 following a change to the SEPA licence.

Table 14: Tertiary B2 - biological sludge process (E3.21)

Blackburn	Disc filters.
-----------	---------------

The sewerage data in lines E3.22 to E3.32 includes all sewerage (sewers, pumping stations, rising mains, outfalls and long sea outfalls).

Data sources include: Concession Agreements, Operator O&M manuals, Operator asset inventories, SW GIS system, as built drawings and SEPA consents.

Pump capacity (kW) has been obtained from motor drive rating, not the pump duty point.

Total length of sewer (E3.22) – Length of outfalls included in data unless noted otherwise in commentary. Where terminal pumping stations are located remote from a wastewater

treatment works, the length of rising main connecting the terminal pumping station and wastewater treatment works is included.

Total length of critical sewer (E3.23) – All PPP sewers (including relief sewers, rising mains and CSO outfalls) are deemed to be critical.

Number of pumping stations (E3.24) – Includes stormwater, combined and terminal pumping stations. Interstage and final effluent pumping stations forming part of a wastewater treatment plant are not included.

Capacity of pumping stations (m³/d) (E3.25) - Includes stormwater, combined and terminal pumping stations. Maximum flow pumped forward per day. This excludes capacity of standby pumps.

Capacity of pumping stations (kw) (E3.26) - Includes stormwater and combined pumping stations, but not terminal pumping stations. Includes capacity of standby pumps.

Number of combined pumping stations (E3.27) - 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 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 combined pumping stations listed in the table below are included.

Table 15: Combined pumping stations (E3.27)

Fort William	Blar Mhor, Caol No1
Inverness	Longman
Hatton	Riverside, KGV, Stannergate, West Ferry, Broughty Castle, Fort Street, Gray Street
Nigg	Downies, Portlethen Village, Newtonhill Clifftop, Portlethen South, Backies, Cowie (3), Slughead, Bridge of Muchalls, Cammachmore, Portlethen North
Lossiemouth	Burghead, Cummingston, Hopeman, Moycroft
Buckie	Portgordon West, Portgordon East, Seatown, Cluny, Cullen East, Portknockie, Findochty, Portessie
Banff/Macduff	Whitehills, Whitehills Harbour, Inverboyndie, Scotstown, Castlehill Park, Union Road, Bankhead
Seaford	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.

Capacity of combined pumping stations (m³/d) (E3.28) - Maximum flow pumped forward per day. This excludes capacity of standby pumps.

Number of stormwater pumping stations (E3.29) - Stormwater pumping station means a network wastewater pumping station containing a pump or pumps transferring wastewater, containing stormwater, to a stormwater storage tank or storm overflow. The stormwater pumping station transfers wastewater in excess of “FFT”, the generally accepted term used in design and SEPA consents. For the sake of clarity, the function of the stormwater pumping station is to prevent and/or limit surcharging of the upstream sewerage system.

The stormwater pumping stations in the table below are included.

Table 16: Stormwater pumping stations (E3.29)

Inverness	Longman (2)
Hatton	Riverside, KGV, Stannergate, Westhaven, Broughty Castle, Inchcape Park
Nigg	Backies (2)
Lossiemouth	Moycroft
Buckie	Portessie
Banff/Macduff	Bankhead
Levenmouth	Leven, Roundall

Capacity of stormwater pumping stations (m³/d) (E3.30) – Maximum flow pumped forward per day. This excludes capacity of standby pumps.

Number of combined sewer overflows (E3.31) & Number of combined sewer overflows (CSO) (screened) (E3.32) - CSOs that overflow within the sewerage system rather than to an outfall discharging direct to the environment are not included.

The CSOs in the following table are included.

Table 17: List of CSOs (E3.31)

Fort William	Caol No1, Caol Transfer
Inverness	Longman
Hatton	Riverside, KGV, Stannergate, South Balmossie, Westhaven, Broughty Castle, Inchcape Park, Panmurefield/Balmossie Mill (2)
Nigg	Downies, Portlethen Village, Newtonhill Clifftop, Backies (2), Cowie, Portlethen North, Nigg
Fraserburgh	Fraserburgh Inlet (Watermill)
Lossiemouth	Burghead, Cummingston, Hopeman, Moycroft
Buckie	Portgordon West, Portgordon East, Seatown, Cluny, Nook, Cullen East, Portknockie, Findochty, Portessie, Shipyard
Banff/Macduff	Whitehills, Whitehills Harbour, Inverboyndie, Scotstown, Castlehill Park, Union Road, Bankhead, Craigfauld
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.

Sludge Treatment and Disposal Data (E3.33-40) - 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.

Allanfearn sludge quantities disposed of by Scottish Water are included in Table E3 and the corresponding costs are included in Table E3a to be consistent with the rest of the PPP works.

6.2 Data improvement programmes

The method used to calculate the annual average non-resident connected population from the Address Base categories has been amended slightly (referenced in the commentary to Section A).

This improved analysis of the data is the main reason for the reduction in the non-resident component of population in E3.2 and PE in E3.3.

6.3 Assumptions used for forecast data

There is no forecast data for the E3 table.

6.4 Key changes from 2018/19

A summary of the variances between 2018/19 and 2019/20 for PPP Project Analysis can be found at the end of this section – Table E3 comparison AR19 and AR20. The significant changes are detailed in this section.

There has been a reduction in the PE of total reported load received (E3.3) at Meadowhead PPP in 2019/20 (228,318) compared to 2018/19 (332,371), associated with a reduction in the trade effluent volumes. During 2019/20 one of the traders, who had been discharging trade effluent through our inlet, reached agreement with the Meadowhead PPP operator to discharge directly into the WWTW, accounting for this decrease.

Failures and exceedances at our PPP sites are listed in the table below. A comparison of these is shown in the following two tables, which show only a minor change in the number of exceedances and no change in the number of failures, although the failures are at different works.

Table 18 Exceedances and Failures 2019/20

Site	CAR/UWWTD standards	Parameter	Exceedance (E) / Failure (F)	
Inverness	UWWTD	COD	E	15/05/19
Nigg	UWWTD	COD	E	20/02/19
Newbridge	CAR	Ammonia	E	26/07/19
East Calder	CAR	Ammonia	E	16/04/19
East Calder	CAR	Ammonia	E	16/05/19
East Calder	CAR	Ammonia	E	10/07/19
East Calder	CAR	Ammonia	E	13/11/19
Blackburn	CAR	Ammonia	E	07/07/19
Blackburn	CAR	Ammonia	E	20/11/19

Site	CAR/UWWTD standards	Parameter	Exceedance (E) / Failure (F)	
Whitburn	CAR	Ammonia	E	20/05/19
Meadowhead	UWWTD	BOD	F	11/07/19
Stevenston	UWWTD	BOD	E	11/03/19

Table 19: Exceedances 2019/20 vs 2018/19

Site	CAR/UWWTD standards	Parameter	2019/20	2018/19
Inverness	UWWTD	COD	1	1
Nigg	UWWTD	COD	1	1
Newbridge	CAR	Ammonia	1	
East Calder	UWWTD	BOD		1
East Calder	CAR	Ammonia	4	2
Blackburn	UWWTD	BOD		2
Blackburn	CAR	Ammonia	2	3
Whitburn	CAR	Ammonia	1	
Stevenston	UWWTD	BOD	1	
Lossiemouth	UWWTD	COD		2
Dalmuir	UWWTD	BOD		1
Dalmuir	CAR	Ammonia		1

Table 20: Failures 2019/20 vs 2018/19

Site	CAR/UWWTD standards	Parameter	2019/20	2018/19
East Calder	CAR	Ammonia		1
Meadowhead	UWWTD	BOD	1	

ANNUAL RETURN INFORMATION REQUIREMENT 2020

SECTION E : OPERATING COSTS AND EFFICIENCY
Table E3: PPP Project Analysis

Line Ref	Description	Units	AR19	CG	AR20	CG	Variance	% Change	Explanation provided in AR20 Commentary?
Project Data									
E3.1	Annual average resident connected population	000	2238.30	B3	2248.92	B2	10.616	0.47	6.1 Data sources and confidence grades
E3.2	Annual average non-resident connected population	000	31.48	B3	23.44	B3	-8.039	-25.54	6.2 Data improvement programmes
E3.3	Population equivalent of total load received	000	3035.10	B3	2946.84	B3	-88.259	-2.91	6.2 Data improvement programmes 6.4 Key changes from 2018/19
Sewerage Data									
E3.22	Total length of sewer	km	222.00	B3	222.00	B3	0	0.00	6.1 Data sources and confidence grades
E3.23	Length of critical sewer	km	222.00	B3	222.00	B3	0	0.00	6.1 Data sources and confidence grades
Sludge Treatment and Disposal Data									
E3.33	Farmland Untreated	ttds	0.00	B4	0.00	N	0	0.00	6.1 Data sources and confidence grades
E3.34	Farmland Conventional	ttds	2.24	B4	1.86	B4	-0.375	-16.76	6.1 Data sources and confidence grades
E3.35	Farmland Advanced	ttds	45.64	B4	60.28	B4	14.648	32.10	6.1 Data sources and confidence grades
E3.36	Incineration	ttds	40.68	B3	32.42	B3	-8.259	-20.30	6.1 Data sources and confidence grades
E3.37	Landfill	ttds	0.00	B4	0.00	N	0	0.00	6.1 Data sources and confidence grades
E3.38	Composted	ttds	0.00	B4	0.00	N	0	0.00	6.1 Data sources and confidence grades
E3.39	Land Reclamation	ttds	19.02	B4	12.04	B4	-6.981	-57.99	6.1 Data sources and confidence grades
E3.40	Other	ttds	0.47	B4	0.42	B4	-0.047	-11.14	6.1 Data sources and confidence grades

7 Table E3a PPP Cost Analysis

This table provides operating costs for each scheme. As actual data is not available, all costs have been extracted from the relevant contractual financial models. Where the financial models do not split costs into specific categories the following has been assumed:

- Works with a Sludge Centre: 72 % Wastewater Treatment Costs, 28% Sludge Costs.
- All other works: 80% Wastewater Treatment Costs, 20% Sludge Costs. These sludge costs have been allocated to the appropriate sludge treatment centre where the sludge is treated, e.g. Fort William sludge costs appear against Inverness sludge centre.

The cost split was reviewed in detail and agreed with WICS auditor John Mills in May 2007 and has not been subject to further discussion since that date.

7.1 Data sources and confidence grades

Estimated annual direct operating costs (E3a.1, E3a.8, E3a.16) 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 (E3a.8). The remainder is allocated to sludge treatment (E3a.16).

Additional cost for the operation of the Seafield Odour Project is also included, from 2017/18, with wastewater treatment (E3a.8).

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.

Rates paid by the PPP Contractor (E3a.2, E3a.9, E3a.17):

- These are based on the rateable value and poundage published on the 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 below).

Table 21: Confidence grades for total rates paid

Site	E3a.2 Sewerage	E3a.9 Sewage Treatment	E3a.17 Sludge Treatment	Comment on confidence grade
Fort William	N	B3	N	No sludge centre at works, sludge cost moved to Inverness
Inverness	N	B3	B3	Cost distribution is estimated
Hatton	N	B3	B3	Cost distribution is estimated, based on the Financial Model
Nigg	N	B3	B3	Cost distribution is estimated, based on the Financial Model
Persley	N	B3	N	No sludge centre at works, sludge cost moved to Nigg
Peterhead	N	B3	N	No sludge centre at works, sludge cost moved to Nigg
Fraserburgh	N	B3	N	No sludge centre at works, sludge cost moved to Nigg
Lossiemouth	N	B3	B3	Cost distribution is estimated, based on the Financial Model
Buckie	N	B3	N	No sludge centre at works, sludge cost moved to Lossiemouth
Banff/Macduff	N	B3	N	No sludge centre at works, sludge cost moved to Lossiemouth
Seafield	N	B3	B3	Cost distribution is estimated, based on the Financial Model
Newbridge	N	B3	B3	Cost distribution is estimated, based on the Financial Model
East Calder	N	B3	N	No sewerage and no sludge centre at works, sludge cost moved to Newbridge
Blackburn	N	B3	N	No sewerage and no sludge centre at works, sludge cost moved to Newbridge
Whitburn	N	B3	N	No sludge centre at works, sludge cost moved to Newbridge
Levenmouth	N	B3	B3	Cost distribution is estimated
Dalmuir	N	B3	N	No sludge treatment centre in the conventional sense – intermittent sludge thickening as operational need, no imports
Daldowie	N	N	A2	No sewage treatment at works
Meadowhead	N	B3	B3	Cost distribution is estimated
Stevenston	N	B3	N	No sewerage and no sludge centre at works, sludge cost moved to Meadowhead

	E3a.2	E3a.9	E3a.17	
Inverclyde	N	B3	N	No sludge centre at works, sludge cost moved to Meadowhead

SEPA charges paid by the PPP Contractor (E3a.3, 10, 18):

- Cost allocation is as per the relevant SEPA invoices for 2019/20.

The following confidence grades have been assigned (see table below).

Table 22: Confidence grades for SEPA charges

Site	E3a.3 Sewerage	E3a.10 Sewage Treatment	E3a.18 Sludge Treatment	Comment on confidence grade
Fort William	A2	A2	N	No sludge centre at works
Inverness	N	A2	A2	No separate cost for sewerage
Hatton	A2	A2	A2	
Nigg	N	A2	A2	Includes the cost recharged to Scottish Water for the additional SEPA charges associated with 2 parameters as detailed in the contract.
Persley	N	A2	N	No separate cost for sewerage, no sludge centre at works
Peterhead	N	A2	N	No separate cost for sewerage, no sludge centre at works
Fraserburgh	N	A2	N	No separate cost for sewerage, no sludge centre at works
Lossiemouth	A2	A2	N	No subsistence charge included in invoices
Buckie	A2	A2	N	No sludge centre at works
Banff/Macduff	A2	A2	N	No sludge centre at works
Seafield	A2	A2	A2	
Newbridge	A2	A2	N	No WML charge included in invoice
East Calder	N	A2	N	No sewerage and no sludge centre at works
Blackburn	N	A2	N	No sewerage and no sludge centre at works
Whitburn	N	A2	N	No sewerage and no sludge centre at works
Levenmouth	A2	A2	A2	
Dalmuir	N	N	A2	Only WML fees paid by the PFI Co
Daldowie	N	N	A2	Sludge treatment only
Meadowhead	N	N	A2	Only WML fees paid by the PFI Co
Stevenston	N	N	N	SEPA fees paid by SW
Inverclyde	N	N	N	SEPA fees paid by SW

Total Direct Costs (E3a.4, 11, 19, 23) - Total of E3a.1-E3a.3, E3a.8-E3a.11 and E3a.16-E3a.18. Confidence grade for Total direct cost is D6 as per E3a.1, E3a.8 and E3a.16 (Estimated direct operating cost) as this is the most significant element of Total Direct Cost. A confidence grade of A3 was allocated to the Dalmuir sludge treatment costs as there is some visibility of these costs.

Scottish Water general and support expenditure (E3a.5, E3a.12, E3a.20) includes:

- Costs such as advisors and legal costs, power, rent and insurance and the cost of the Scottish Water PPP department that administers the PPP projects which have

been allocated to projects relative to the operational costs at each site. Costs are as per the Profit & Loss (P&L).

- Scottish Water's costs of sludge disposal from Inverness, inter-site sludge tankering and terminal pumping costs (where tankering or pumping has taken place between a Scottish Water works and a PFI site) and additional support costs.

The confidence grade for total charges is A1, but because Scottish Water PPP department costs must be split across all sites, and all charges have to be split to take account of the sewerage, treatment and sludge elements, the following confidence grades have been assigned (see table below).

Table 23: Confidence grades for total charges

Site	E3a.5 Sewerage	E3a.12 Sewage Treatment	E3a.20 Sludge Treatment	Comment Comment on confidence grade
Fort William	CX	C4	N	Network cost very small, no sludge centre at works
Inverness	C4	C4	C4	
Hatton	C4	C4	C4	
Nigg	C4	C4	C4	
Persley	CX	C4	N	Network cost very small, no sludge centre at works
Peterhead	CX	C4	N	Network cost very small, no sludge centre at works
Fraserburgh	CX	C4	N	Network cost very small, no sludge centre at works
Lossiemouth	C4	C4	C4	
Buckie	C4	C4	N	No sludge centre at works
Banff/Macduff	C4	C4	N	No sludge centre at works
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.

Scottish Water SEPA Charges (E3a.6, E3a.13, E3a.21) - With the exception of Dalmuir and MSI, all CAR Licence SEPA charges are paid for by the PPP Company and are included in the tariff rates (see table below). At Nigg, Scottish Water meets the additional CAR Licence

SEPA charges associated with 2 parameters as detailed in the contract. Costs are as per the P&L and reflect charges as invoiced by SEPA.

Table 24: Confidence grades for tariff rates

	E3a.6	E3a.13	E3a.21	Comment
Site	Sewerage	Sewage Treatment	Sludge Treatment	Comment on confidence grade
Fort William	N	N	N	SEPA charges paid by PFI Co
Inverness	N	N	N	SEPA charges paid by PFI Co
Hatton	N	N	N	SEPA charges paid by PFI Co
Nigg	N	N	N	Treatment cost only (exotics), costs are included with E3a.26
Persley	N	N	N	SEPA charges paid by PFI Co
Peterhead	N	N	N	SEPA charges paid by PFI Co
Fraserburgh	N	N	N	SEPA charges paid by PFI Co
Lossiemouth	N	N	N	SEPA charges paid by PFI Co
Buckie	N	N	N	SEPA charges paid by PFI Co
Banff/Macduff	N	N	N	SEPA charges paid by PFI Co
Seafield	N	N	N	SEPA charges paid by PFI Co
Newbridge	N	N	N	SEPA charges paid by PFI Co
East Calder	N	N	N	SEPA charges paid by PFI Co
Blackburn	N	N	N	SEPA charges paid by PFI Co
Whitburn	N	N	N	SEPA charges paid by PFI Co
Levenmouth	N	N	N	SEPA charges paid by PFI Co
Dalmuir	N	A2	N	Treatment cost only, sludge (WML) costs are paid by the PFI Co
Daldowie	N	N	N	SEPA charges paid by 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

Total sewerage cost, total sewage treatment cost, total sludge treatment costs and disposal cost (E3a.7, E3a.14, E3a.22):

- Confidence grade is D6 as per E3a.1, E3a.8 and E3a.16 (estimated direct operating cost) as this is the most significant element of the cost.
- A confidence grade of A3 was allocated to the Dalmuir sludge treatment and disposal costs as there is some visibility of these costs.

Estimated terminal pumping cost E3a.15:

- Reported costs are as per the costs incurred for the SW 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 E3a.15.
- As a result of transition between information management systems as we prepare for 2020/21 and beyond, we were unable to allocate estimated terminal pumping costs in 2019/20.

Total operating cost (E3a.25) - Confidence grade for total operating cost is D6 as per E3a.23
Total direct cost, as this is the most significant element of total operating cost.

Public sector capital equivalent values (E3a.27) – 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 the 01/02 WIC return.

Contract period (E3a.28) - The period quoted is the contract period as defined in the Contract.

Contract end date (E3a.29):

- The Contract end date is as defined in the Contract.
- The Highland PPP (Fort William, Inverness) contract end date has been revised from 12 December 2021 to 28 May 2021.

All parties to the Highland PPP contract had been working on the basis that the contract would end on 11 December 2021, 25 years after the Concession Award Date which had been assumed to be 12 December 1996 ie when the original PFI contract was signed. However, new information has recently been received that shows that the parties to the original PFI contract had agreed that that Concession Award Date was actually achieved on 29 May 1997. This means that the Highland PPP contract will end c5 months later than originally envisaged on 28 May 2022.

7.2 Data improvement programmes

There have been no notable data improvement programmes in 2019/20.

7.3 Assumptions used for forecast data

There is no forecast data for the E3a table.

7.4 Key changes from 2018/19

A summary of the variances between 2018/19 and 2019/20 for PPP Cost Analysis can be found at the end of this section – Table E3a comparison AR19 and AR20. The significant changes are detailed in this section.

The changes between 2019/20 and 2018/19 for Scottish Water cost and for annual charges are summarised below.

The Total Scottish Water cost (E3a.24):

- the sum of Scottish Water general and support expenditure, and Scottish Water SEPA Charges (E3a.5-6, 12-13 and 20-21)
- Confidence grade for total charges is A1 (see table below), but because Scottish Water PPP department costs and internal recharges must be split across all sites a confidence grade of C4 has been allocated.

Table 25: Summary of changes in Scottish Water cost from 2018/2019 to 2019/20

Site	2019/20 £m	2018/19 £m	Variance £m	Costs lower than previous year	Costs higher than previous year
Ft William	0.029	0.024	0.005		
Inverness	0.696	0.560	0.136	2019/20 includes lower other Scottish Water operating costs £0.031m, no terminal pumping costs have been identified (2018/19 included £0.002m)	2019/20 includes higher legal/consultants costs £99k, higher sludge tankering and disposal costs £0.048m, and higher ABM support costs £0.022m
Hatton	0.358	0.318	0.040	2019/20 no terminal pumping costs have been identified (2018/19 included £0.008m)	2019/20 includes higher legal/consultants fees £0.004m, higher other Scottish Water operating costs £0.006m, higher sludge tankering costs £0.032m, and higher ABM support costs £0.006m
Nigg	1.037	0.870	0.167	2019/20 includes lower legal/consultants fees £0.001m	2019/20 includes higher other Scottish Water operating costs £0.041m, higher sludge tankering costs £0.109m, and higher ABM support costs £0.018m
Persley	0.026	0.029	- 0.003		
Peterhead	0.030	0.035	- 0.005		
Fraserburgh	0.025	0.033	- 0.008		
Lossiemouth	0.208	0.182	0.026	2019/20 includes lower other Scottish Water operating costs £0.002m,	2019/20 includes higher sludge tankering costs £0.028m,
Buckie	0.029	0.034	- 0.005		
Banff/Macduff	0.029	0.032	- 0.003		
Seafield	0.462	1.504	- 1.042	2019/20 includes lower legal/consultants fees £0.793m, lower other Scottish Water operating costs £0.031m, and lower ABM support costs £0.218m	
Newbridge	0.045	0.046	- 0.001		
East Calder	0.027	0.025	0.002		
Blackburn	0.021	0.019	0.002		
Whitburn	0.022	0.020	0.002		
Levenmouth	0.305	0.273	0.032	2019/20 includes lower legal/consultants fees £0.003m	2019/20 includes higher other Scottish Water operating costs £0.025m, and higher ABM support costs £0.010m
Dalmuir	2.061	2.450	- 0.389	2019/20 includes lower Scottish Water sludge	2019/20 includes higher legal/consultants fees

Site	2019/20 £m	2018/19 £m	Variance £m	Costs lower than previous year	Costs higher than previous year
				disposal costs £0.233m, lower other Scottish Water operating costs £0.209m, and lower ABM support costs £0.060m	£0.113m,
Daldowie	3.137	2.797	0.340	2019/20 includes lower Shieldhall centrifuging costs £0.088m, lower other Scottish Water operating costs £0.064m, and lower ABM support costs £0.027m	2019/20 includes higher legal/consultants fees £0.017m, and higher sludge tankering costs £0.502m,
Meadowhead	0.488	0.928	- 0.440	2019/20 includes lower other Scottish Water operating costs £0.071m, no terminal pumping costs have been identified (2018/19 included £0.391m)	2019/20 includes higher legal/consultants fees £0.008m, higher inlet headworks costs £0.013m, and higher ABM support costs £0.001m
Stevenston	0.464	0.366	0.098	2019/20 includes lower other Scottish Water operating costs £0.029m,	2019/20 includes higher inlet headworks costs £0.127m,
Inverclyde	0.445	0.473	- 0.028	2019/20 no terminal pumping costs have been identified (2018/19 included £0.053m)	2019/20 includes higher other Scottish Water operating costs £0.006m, and higher inlet headworks costs £0.019m,
TOTAL	9.944	11.018	-1.074		

The Annual charge (E3a.26) is based on the service fees for the year, provisions and business rates (including rebates). Expenditure is taken from the P&L.

Confidence grades for each of the schemes is A1, other than the AVSE scheme which is B3, as the charges are based on the total AVSE flows given that there is no separate tariff for each scheme.

Table 26: Summary of changes in Annual Charge from 2018/2019 to 2019/20

Site	2019/20 £m	2018/19 £m	Variance £m	Costs lower than previous year	Costs higher than previous year
Ft William	3.853	3.838	0.015	2019/20 lower flows/loads £0.023m, higher release of accruals £0.063m,	2019/20 inflation £0.096m, lower penalties £0.005m
Inverness	7.958	6.501	1.457	2019/20 higher penalties £0.189m, higher release of accruals £0.221m,	2019/20 inflation £0.212m, higher flows/loads £1.615m, additional works £0.040m

Site	2019/20 £m	2018/19 £m	Variance £m	Costs lower than previous year	Costs higher than previous year
Hatton	22.812	22.554	0.258	2019/20 higher release of accrual £0.690m	2019/20 inflation £0.355m, higher flows £0.593m,
Nigg	15.645	0.990	14.655	2019/20 higher penalties £0.045m, higher business rates rebate £0.011m, lower SEPA recharge from KWS £0.031m, higher release of accruals £0.051m	2019/20 inflation £0.290m, higher flows/loads £0.746m, higher electricity recharge from KWS £0.007m, 2018/19 included income from commercial claim £13.75m,
Persley	3.004	2.916	0.088	2019/20 higher penalties £0.006m, higher business rates rebate £0.003m,	2019/20 higher flows/loads £0.021m, inflation £0.066m, lower release of accruals £0.010m
Peterhead	2.446	2.302	0.144	2019/20 higher business rates rebate £0.002m,	2019/20 higher flows/loads £0.079m, inflation £0.055m, lower release of accruals £0.012m
Fraserburgh	2.034	1.852	0.182		2019/20 higher flows/loads £0.119m, inflation £0.045m, lower release of accruals £0.018m
Lossiemouth	4.419	4.816	-0.397	2019/20 higher release of accrual £0.446m, higher penalties £0.024m	2019/20 inflation £0.073m,
Buckie	2.785	2.878	-0.093	2019/20 higher release of accrual £0.136m	2019/20 inflation £0.035m, lower penalties £0.007m,
Banff/Macduff	3.200	3.199	0.001	2019/20 higher release of accrual £0.051m	2019/20 inflation £0.052m,
Seafeld	23.045	21.607	1.438		2019/20 based on 100% compliance with the contract plus inflation £0.650m, higher Seafeld Odour Improvement project costs £0.163m, higher business rates £0.034m, lower release of accruals £0.994m
Newbridge	3.090	2.905	0.185		
East Calder	1.685	1.585	0.100		
Blackburn	0.843	0.792	0.051		
Whitburn	1.123	1.056	0.067		
Levenmouth	12.082	13.324	-1.242	2019/20 lower inflation £1.730m, lower Odour Project costs £0.033m, higher release of accruals £0.785m	2019/20 higher flows £1.031m, higher Operator Self-Monitoring £0.031m, NC Catchment Boundary Extension £0.020m, Uninsurability Cost £0.224m
Dalmuir	14.322	13.724	0.598	2019/20 base tariff change and inflation £0.534m,	2019/20 higher flows £0.122m, higher Capital Project opex £0.106m, higher Annual Operations Compensation £0.493m, higher Operator Self-Monitoring £0.016m, higher business rates £0.013m,

Site	2019/20 £m	2018/19 £m	Variance £m	Costs lower than previous year	Costs higher than previous year
					higher New Capital Investment costs £0.021m, higher additional works £0.024m, higher release of accruals £0.337m
Daldowie	20.089	20.806	-0.717	2019/20 lower sludge volumes £0.677m, lower excess ragging £0.100m, higher release of accruals £1.004m	2019/20 inflation £0.549m, higher business rates £0.007m, higher necessary change costs £0.008m, higher additional works including plant life extension £0.500m
Meadowhead	6.654	7.189	-0.535	2019/20 UPM Change from April 2019 £0.800m, higher release of accruals £0.043m,	19/10 inflation £0.153m, higher Landfill Tax & Gas cost £0.010m, higher business rates £0.007m, higher additional works £0.118m, higher Operator Self-Monitoring £0.020m
Stevenston	3.616	3.364	0.252	2019/20, higher release of accruals £0.029m	2019/20 inflation £0.047m, higher flows/fees £0.228m, higher business rates £0.006m
Inverclyde	3.749	3.683	0.066	2019/20 lower business rates £0.018m, higher release of accruals £0.020m	2019/20 inflation £0.053m, higher flows/fees £0.051m,
TOTAL	158.454	141.881	16.573		

ANNUAL RETURN INFORMATION REQUIREMENT 2020

SECTION E : OPERATING COSTS AND EFFICIENCY

Table E3a: PPP Cost Analysis

Line Ref	Description	Units	AR19	CG	AR20	CG	Variance	% Change	Explanation provided in AR20 Commentary?
Sewerage Costs									
E3a.1	Estimated direct operating cost	£m	7.28	D6	7.32	D6	0.047	0.65	7.1 Data sources and confidence grades
E3a.2	Rates paid by the PPP contractor	£m	0.00	N	0.00	N	0	0.00	7.1 Data sources and confidence grades
E3a.3	SEPA charges paid by the PPP contractor	£m	0.05	A2	0.05	A2	0.002	4.00	7.1 Data sources and confidence grades
E3a.4	Total direct cost	£m	7.33	D6	7.37	D6	0.049	0.67	7.1 Data sources and confidence grades
E3a.5	Scottish Water general & support expenditure	£m	0.35	C4	0.34	C4	-0.018	-5.08	7.1 Data sources and confidence grades
E3a.6	Scottish Water SEPA charges	£m	0.00	BX	0.00	N	0	0.00	7.1 Data sources and confidence grades
E3a.7	Total sewerage cost	£m	7.68	D6	7.71	D6	0.031	0.40	7.1 Data sources and confidence grades
Sewage Treatment Costs									
E3a.8	Estimated direct operating cost	£m	35.36	D6	35.71	D6	0.346	0.98	7.1 Data sources and confidence grades
E3a.9	Rates paid by the PPP contractor	£m	4.14	B3	4.12	B3	-0.017	-0.41	7.1 Data sources and confidence grades
E3a.10	SEPA charges paid by the PPP contractor	£m	1.27	A2	1.19	A2	-0.074	-5.84	7.1 Data sources and confidence grades
E3a.11	Total direct cost	£m	40.77	D6	41.03	D6	0.255	0.63	7.1 Data sources and confidence grades
E3a.12	Scottish Water general & support expenditure	£m	3.26	C4	2.30	C4	-0.966	-29.60	7.1 Data sources and confidence grades
E3a.13	Scottish Water SEPA charges	£m	0.84	A2	0.73	A2	-0.11	-13.11	7.1 Data sources and confidence grades
E3a.14	Total sewage treatment cost	£m	44.87	D6	44.05	D6	-0.821	-1.83	7.1 Data sources and confidence grades
E3a.15	Estimated terminal pumping cost	£m	0.46	A3	0.00	M	-0.455	-100.00	7.1 Data sources and confidence grades
Sludge Treatment and Disposal Costs									
E3a.16	Estimated direct operating cost	£m	29.05	D6	29.65	D6	0.593	2.04	7.1 Data sources and confidence grades
E3a.17	Rates paid by the PPP contractor	£m	1.70	B3	1.73	B3	0.023	1.35	7.1 Data sources and confidence grades
E3a.18	SEPA charges paid by the PPP contractor	£m	0.15	A2	0.20	A2	0.052	35.86	7.1 Data sources and confidence grades
E3a.19	Total direct cost	£m	30.90	D6	31.57	D6	0.668	2.16	7.1 Data sources and confidence grades
E3a.20	Scottish Water general & support expenditure	£m	6.56	C4	6.58	C4	0.02	0.30	7.1 Data sources and confidence grades
E3a.21	Scottish Water SEPA charges	£m	0.00	N	0.00	N	0	0.00	7.1 Data sources and confidence grades
E3a.22	Total sludge treatment & disposal cost	£m	37.46	D6	38.15	D6	0.688	1.84	7.1 Data sources and confidence grades
Total Cost Analysis									
E3a.23	Total direct cost	£m	79.00	D6	79.97	D6	0.972	1.23	7.1 Data sources and confidence grades
E3a.24	Total Scottish Water cost	£m	11.02	C4	9.94	C4	-1.074	-9.75	7.4 Key changes from 2018/19
E3a.25	Total operating cost	£m	90.01	D6	89.91	D6	-0.102	-0.11	7.1 Data sources and confidence grades
E3a.26	Annual charge	£m	141.88	A1	158.45	A1	16.573	11.68	7.1 Data sources and confidence grades
E3a.27	Public sector capital equivalent value	£m	1124.39	B3	1151.56	B3	27.167	2.42	7.1 Data sources and confidence grades

8 Table E4 Water Resources and Treatment

8.1 Data sources and confidence grades

Source Type and Operational Status are derived from Ellipse, with additional manipulation and classification to determine which sources feed direct to WTWs as well as to check the status of a small number of emergency sources each year. A re-evaluation of confidence grades in section E, based on the WICS definitions and the source and quality of the source data was undertaken for AR20. This re-evaluation showed that a confidence grade of A1 was the correct grade to be applied to the total number of works (E4.25 and E4.37).

We assume that the volume that goes into our WTW from our sources (Average Daily Output) is the same as the volume that is distributed from our WTWs. The average daily output values are exported from the corporate Distribution input (DI) reporting system (Z-One).

As in previous years, we have completed lines E4.8 to E4.12 by assuming that, where multiple sources feed a WTW, the total average daily output comes only from the primary source. The primary source is therefore allocated 100% of the DI and all other sources are allocated 0%.

There are six WTWs where the primary source is already assigned to another WTW (conjunctive use sources). In order to ensure all WTW DI totals are included, the DI volume for these WTWs is manually re-assigned to the appropriate 'duplicate' conjunctive source entry for the WTW. For example, Megget Reservoir primarily feeds to Glencorse WTW but is also assigned as the primary source for Marchbank and Bonnycraig WTWs.

Generally, raw water supply source catchments and the WTWs they supply are located within the same region. However, the following four WTWs are supplied from outside their region:

- Daer WTW: Source and WTW are in South Region, but a small proportion of the Daer WOA crosses over into West Region.
- Balmore WTW: Sources and WTW are in West Region, but there are 4 different WOAs supplied from Balmore; 3 of which are in the South Region (Balmore & Carron Valley WOA, Balmore South Region Nith WOA, Balmore South Region Tweed WOA).
- Afton WTW: Source and WTW are in West Region, but it supplies a small area in South Region (Afton South Region WOA).
- Turret WTW: Source and WTW are in East Region, but it also supplies areas in West Region (Turret West Region WOA).

Since average daily outputs are derived from WTW's DI, the cross-boundary flow is accounted for and assigned to the region within its treatment rather than abstraction. This is consistent with the historic methodology.

The peak demand in E4.13 is calculated as before, by comparing the average daily volume into supply in the peak week with the average of the preceding year.

As limited flow and pressure data is available to calculate the average pumping head (line E4.14), the methodology used was to update last year’s figures by calculating the change to the “Work Done” (m³) at regional level based on the proportional (regional) change to DI. This figure was then divided by the Regional DI to obtain the Regional Pumping Head, which was then aggregated. The confidence grade has remained at C4 as pumping work done, which is necessary to calculate the pumping head, is extrapolated from a limited dataset to all pumps.

8.1.1 Financial Cost Data

Cost analysis in the E Tables (E4, E6, E7, E8, E9 and E10) was prepared using reports from our Activity Based Management (ABM) model on a historic cost basis excluding IFRS adjustments. Confidence grades of the operating cost lines on the E Tables remain consistent with 2018/19.

ABM provides analysis of the costs of key activities and processes and links these to the factors that cause or drive the level of cost. This allows us to develop an understanding of the full cost of providing services, either internally within Scottish Water or to our external customers. Consistent with prior years, costs are captured or allocated in line with Regulatory Accounting Rules. A more detailed commentary on ABM methodology and cost allocation is provided in support of Regulatory Accounts Tables M18 and is not repeated in this document.

Direct costs are predominantly captured in the core corporate financial system, with labour costing feeds from the core corporate works management system. A high proportion of direct costs are captured by asset or zone, hence the A2 confidence grade. A smaller proportion of costs – mainly general and support costs – remain to be allocated to asset/zone by means other than direct capture. We have slightly lower confidence levels on Network cost analysis than treatment cost analysis. This is due to lower levels of direct labour capture on Networks.

8.2 Data improvement programmes

There have been no notable data improvement programmes in 2019/20.

8.3 Assumptions used for forecast data

Not applicable

8.4 Key changes from 2018/19

A summary of the variances between 2018/19 and 2019/20 for Water resources and treatment can be found at the end of this section – Table E4 comparison AR19 and AR20. The significant changes are detailed in this section.

The overall number of direct sources has reduced by 7, from 282 to 275 (E4.5). Four sources were closed and a further 3 emergency drought sources, which were used in 2018 but not in 2019, are excluded from the 2019/20 source count.

Table 27: Changes in sources

	2018/19 No. of sources	282
--	-------------------------------	------------

Reductions	Closed sources	4
Reductions	Emergency sources not used	3
	2019/20 No. of sources	275

Distribution Input has reduced by 36.448 MI/d to 1769.710 MI/d. This change is largely due to reduced summer demand in 2019 compared to heatwave conditions experienced in summer 2018, which saw significant demand increases. Changes to DI this year are detailed in the table below.

Table 28: Summary of distribution input between 2018/29 and 2019/20

Source Type	2018/19	2019/20	Net Change
	MI/d		
Impounding reservoirs	1327.606	1291.896	-35.710
Lochs	20.835	20.933	0.098
River and burn abstractions	388.188	389.524	1.336
Boreholes	69.529	67.357	-2.172
Total	1806.158	1769.710	-36.448

The peak week average (the highest weekly DI value) was 1852.6 ML/day and this gave a peak to average ratio of 1.047, which is lower than AR19. The Average Pumping head reported in E4.14 is correspondingly lower this year at 27.9m.

Since 2018/19 there has been an overall increase of 4 WTWs in the W3 process type category and a reduction of 6 in the W4 category, resulting in a reduction of 2 WTWs in the total number. A summary of the changes is shown in the table below.

Table 29: Changes in WTWs by Process Type

Process Type	Change	Reason	WTWs
W3	-1	Abandoned	North Hoy*
	-2	Mothballed	Corsehouse South Moorhouse
	-2	Changed to W4 due to additional treatment	Turriff Yell
	+2	Brought into operation	Tullich** Lochmaddy
	+7	Improved nano-membrane filtration	Bracadale Broadford Mallaig Fair Isle Acharacle Dunvegan Osedale Teangue
W4	-1	Abandoned	Beasdale
	-7	Changed to W3 due to nano-membrane filtration (as above)	As above
	+1	UV reactors for Cryptosporidium	Turriff

Process Type	Change	Reason	WTWs
		Deactivation	
	+1	Carbon filtration added	Yell

*This relates to the old North Hoy WTW

** Tullich WTW000817 became operational in 2019/20

The 7 treatment works which now include improved nano-membrane filtration processes allowed the removal of high-cost granular activated carbon (GAC) treatment, reducing the number of works in category W4 and increasing the number in W3.

The total volume DI for W4 increased from 57ML/day in 2018/19 to 74.6ML/day in 2019/20. This increase was largely due to the addition of Turriff to the W4 list which has a DI of 25.8ML/day.

8.5 Functional costs

Functional expenditure for water resources and treatment costs (E4.15-39):

Functional expenditure:	Total
2019/20	£m
2018/19	61.878
	<u>64.742</u>
Variance	<u>+2.864</u>

Water resources and treatment costs decreased by £2.9m (4.4%) from 2018/19 due to:

- £2.4m (18.6%) reduction in general and support costs, largely due to the normalisation of IT costs after incurring £1.5m of transition costs in 2018-19. These were associated with the transfer to new Digital partners, an increase of £0.7m in energy renewables income and lower fuel costs of £0.1m;
- £0.6m (3.8%) reduction in power costs mainly incurred in the operation of water treatment works and raw water intakes. Higher energy tariffs have been offset by a reduction in energy consumption relative to 2018-19 (when usage was particularly high due to maintaining supplies through dry weather conditions);
- £0.3m (7.9%) reduction in hire and contracted services due to slightly lower overall contractor maintenance requirements at water treatment works; and
- £0.4m (2.0%) reduction across other cost lines, offset by £0.8m (5.8%) increase in materials and consumables costs, due primarily to an increase in the market price of treatment chemicals.

Analysis of water resources and treatment costs by region:

	North	East	South	West	Direct	General and Support	Total
	£m	£m	£m	£m	£m	£m	£m
Functional expenditure:							
2019/20	12.161	13.719	9.857	15.883	51.620	10.258	61.878
2018/19	11.928	14.382	10.012	15.811	52.133	12.609	64.742
Variance	(0.233)	+0.663	+0.155	(0.072)	+0.513	+2.351	+2.864

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 2019/20. Re-stating 2018/19 figures on a like-for-like basis shows the following variations:

Analysis of water resources and treatment costs by process type:

Process Type	2019/20 £m	2018/19 £m	Variance £m
SD : Simple Disinfection	1.451	1.457	+0.006
W1 : SD plus simple physical or chemical treatment	0.164	0.156	(0.008)
W2 : Single stage complex physical or chemical treatment	9.251	10.158	+0.907
W3 : Multiple stage complex treatment, excluding W4	35.660	35.209	(0.451)
W4 : Very high cost treatment Process	5.094	5.151	+0.057
Direct	51.620	52.131	+0.511
General and Support	10.258	12.610	+2.352
Total	61.878	64.742	+2.864

Direct costs by process type have moved broadly in line with the overall cost movement explained above, with the exception of process type W3 which has increased due to a new water treatment works at Tullich.

Analysis of water resources and treatment costs by size band:

Size band	2019/20 £m	2018/19 £m	Variance £m
<=1 MI/d	7.320	7.914	+0.594
>1 to <=2.5 MI/d	3.031	3.106	+0.075
>2.5 to <=5 MI/d	4.132	3.764	(0.368)
>5 to <=10 MI/d	5.072	4.819	(0.253)
>10 to <=25 MI/d	8.208	8.283	+0.075
>25 to <=50 MI/d	8.874	8.791	(0.083)
>50 to <=100 MI/d	6.355	6.980	+0.625
>100 to <=175 MI/d	5.635	5.038	(0.597)
>175 MI/d	2.993	3.437	+0.444
Direct	51.620	52.132	+0.512
General and Support	10.258	12.609	+2.351
Total	61.878	64.742	+2.864

The allocation of costs by size band remained broadly consistent with 2018/19 with the exception of:

- Size band > 100 to <= 175MI/d where increased costs are associated with the installation of powdered activated carbon chemical dosing at Carron Valley WTW.

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 £51.6m total direct resource and treatment costs, £47.7m of costs or 92.4% have been directly charged to assets in our corporate costing system.

Other costs have been allocated to water resources and treatment through ABM support activity allocation, e.g. stores based on number of issues, IT applications based on number of users, etc. Support costs are, therefore, 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 completed by employees.

SCOTTISH WATER

ANNUAL RETURN INFORMATION
REQUIREMENT 2020

SECTION E: OPERATING COSTS AND EFFICIENCY
Table E4: Water Resources and Treatment

Line Ref	Description	Units	Total Number of Sources AR19	CG	Total Number of Sources AR20	CG	Variance	% Change	Explanation provided in AR20 Commentary?
----------	-------------	-------	------------------------------	----	------------------------------	----	----------	----------	--

Source Types			Number						
E4.1	Impounding reservoirs	nr	102	B2	100	B2	-2	-1.96	8.4 Key changes from 2018/19
E4.2	Lochs	nr	38	B2	38	B2	0	0.00	8.4 Key changes from 2018/19
E4.3	River and burn abstractions	nr	78	B2	74	B2	-4	-5.13	8.4 Key changes from 2018/19
E4.4	Boreholes	nr	64	B2	63	B2	-1	-1.56	8.4 Key changes from 2018/19
E4.5	Total	nr	282	B2	275	B2	-7	-2.48	8.4 Key changes from 2018/19
E4.6	Bulk water exports	nr	0	AX	0	AX	0	0	8.4 Key changes from 2018/19
E4.7	Bulk water imports	nr	0	AX	0	AX	0	0	8.4 Key changes from 2018/19

Proportional Breakdown of Source output produced		
E4.8	Impounding reservoirs	nr
E4.9	Lochs	nr
E4.10	River and burn abstractions	nr
E4.11	Boreholes	nr
E4.12	Total	nr

Peak demand and Pumping Head			Total AR19	CG	Total AR20	CG	Variance	% Change	Explanation provided in AR20 Commentary?
E4.13	Peak	nr	1	C3	1	C3	-0.054	-4.92	8.1 Data sources

Units	Total Source Outputs AR19	CG	Total Source Outputs AR20	CG	Variance	% Change	Explanation provided in AR20 Commentary?
-------	---------------------------	----	---------------------------	----	----------	----------	--

Average daily output (MI/d)							
MI/d	1327.606	B2	1291.896	B2	-35.710	-2.69	8.4 Key changes from 2018/19
MI/d	20.835	B2	20.933	B2	0.098	0.47	8.4 Key changes from 2018/19
MI/d	388.188	B2	389.524	B2	1.336	0.34	8.4 Key changes from 2018/19
MI/d	69.529	B2	67.357	B2	-2.172	-3.12	8.4 Key changes from 2018/19
MI/d	1806.158	B2	1769.710	B2	-36.448	-2.02	8.4 Key changes from 2018/19
MI/d	0.000	AX	0.000	AX	0	0	8.4 Key changes from 2018/19
MI/d	0.000	AX	0.000	AX	0	0	8.4 Key changes from 2018/19

Proportion of Own Source Output							
nr	0.735	n/a	0.730	n/a	-0.005	-0.69	8.1 Data sources and confidence grades
nr	0.012	n/a	0.012	n/a	0.000	2.54	8.1 Data sources and confidence grades
nr	0.215	n/a	0.220	n/a	0.005	2.41	8.1 Data sources and confidence grades
nr	0.038	n/a	0.038	n/a	0.000	-1.13	8.1 Data sources and confidence grades
nr	1.000	n/a	1.000	n/a	0	0.00	8.1 Data sources and confidence grades

	demand - peak to average ratio								and confidence grades
E4.14	Average pumping head - resources and treatment	nr	28	C4	28	C4	-0.378	-1.34	8.1 Data sources and confidence grades

Water Treatment Works by Process Type			Total number of works AR19	CG	Total number of works AR20	CG	Variance	% Change	Explanation provided in AR20 Commentary?
E4.20	Simple Disinfection	nr	23	A2	23	A2	0	0.00	8.4 Key changes from 2018/19
E4.21	W1	nr	5	A2	5	A2	0	0.00	8.4 Key changes from 2018/19
E4.22	W2	nr	28	A2	28	A2	0	0.00	8.4 Key changes from 2018/19
E4.23	W3	nr	151	A2	155	A2	4	2.65	8.4 Key changes from 2018/19
E4.24	W4	nr	32	A2	26	A2	-6	-18.75	8.4 Key changes from 2018/19
E4.25	Total numbers of works	nr	239	A2	237	A1	-2	-0.84	8.1 Data sources and confidence grades 8.4 Key changes from 2018/19
E4.26	Total distribution input								

Water Treatment Works by Size Band			Total number of works AR19	CG	Total number of works AR20	CG	Variance	% Change	Explanation provided in AR20 Commentary?
E4.28	Size band <=1 MI/d	nr	130	A2	129	A2	-1	-0.77	Not in commentary*
E4.29	Size band >1 - <=2.5 MI/d	nr	23	A2	23	A2	0	0.00	Not in commentary*
E4.30	Size band >2.5 - <=5 MI/d	nr	22	A2	22	A2	0	0.00	Not in commentary*
E4.31	Size band >5 - <=10 MI/d	nr	19	A2	17	A2	-2	-10.53	Not in commentary*
E4.32	Size band >10 - <=25 MI/d	nr	18	A2	19	A2	1	5.56	Not in commentary*
E4.33	Size band >25 - <=50 MI/d	nr	12	A2	12	A2	0	0.00	Not in commentary*
E4.34	Size band >50 - <=100 MI/d	nr	9	A2	9	A2	0	0.00	Not in commentary*

Total volume Dist'n input				Variance	% Change	Explanation provided in AR20 Commentary?	
MI/d	22.821	B3	20.232	B3	-2.589	-11.35	8.1 Data sources and confidence grades
MI/d	0.188	B3	0.160	B3	-0.028	-14.99	8.1 Data sources and confidence grades
MI/d	645.027	B3	626.726	B3	-18.301	-2.84	8.1 Data sources and confidence grades
MI/d	1081.065	B3	1047.958	B3	-33.107	-3.06	8.1 Data sources and confidence grades
MI/d	57.056	B3	74.634	B3	17.578	30.81	8.1 Data sources and confidence grades

MI/d	1806.158	B3	1769.710	B3	-36.448	-2.02	8.1 Data sources and confidence grades 8.4 Key changes from 2018/19
------	----------	----	----------	----	---------	-------	--

	Proportion of DI AR19	CG	Proportion of DI AR20	CG	Variance	% Change	Explanation provided in AR20 Commentary?
nr	0.012	C3	0.012	B3	0.0003	2.50	8.1 Data sources and confidence grades
nr	0.013	C3	0.013	B3	0.0001	0.79	8.1 Data sources and confidence grades
nr	0.028	C3	0.027	B3	-0.0012	-4.26	8.1 Data sources and confidence grades
nr	0.046	C3	0.045	B3	-0.0008	-1.74	8.1 Data sources and confidence grades
nr	0.106	C3	0.105	B3	-0.0014	-1.32	8.1 Data sources and confidence grades
nr	0.154	C3	0.156	B3	0.0012	0.78	8.1 Data sources and confidence grades
nr	0.228	C3	0.229	B3	0.0014	0.61	8.1 Data sources and confidence grades

E4.35	Size band >100 - <=175 Ml/d	nr	4	A2	4	A2	0	0.00	Not in commentary*
E4.36	Size band >175 Ml/d	nr	2	A2	2	A2	0	0.00	Not in commentary*
E4.37	Total number of works	nr	239	A2	237	A1	-2	-0.84	8.1 Data sources and confidence grades*
E4.38	Proportion of distribution input - total								

nr	0.206	C3	0.214	B3	0.0076	3.68	8.1 Data sources and confidence grades
nr	0.206	C3	0.199	B3	-0.0072	-3.49	8.1 Data sources and confidence grades
nr	1.000	C3	1.000	B3	0	0.00	8.1 Data sources and confidence grades

* A series of tables were provided in the AR19 commentary which are now superseded by this single table

9 Table E6 Water Distribution

9.1 Data sources and confidence grades

The area was calculated using the same methodology as last year and matches the number reported to the Drinking Water Quality Regulator (DWQR). Changes in zone topology are tracked and recorded by the Water Quality Regulation Zone procedure and have a full audit trail.

Volumes delivered to households and non-households (E6.3 and E6.4) are allocated to water operational areas and summed to regional level; the method remains unchanged from last year. Values used to calculate this section of the E table reflect those in the A1 and A2 tables.

The vast majority of potable mains are recorded in our GIS, but 0.25% of the length of pipes are given a default diameter (the median diameter for their material type) where the diameter has not been populated in the corporate system. The quality of the data used to complete lines E6.12-16, has improved due to less data infilling and using the actual values recorded in GIS. The confidence grades have, therefore, been changed to A2.

A re-evaluation of confidence grades for section E, based on the WICS definitions and the source and quality of the source data, was undertaken for AR20. This re-evaluation showed that a confidence grade of A2 was the correct grade to be applied to the lines reporting the total number of assets (pumping stations (E6.22), service reservoirs (E6.26) and water towers (E6.28).

Pumping head is based on extrapolation from a limited number of pumping stations that has a work done value recorded, therefore the confidence grade for E6.25 remains at C4.

The confidence grade for the capacity of booster pumping stations has increased from B3 to A3 due to the high number of actual recorded values and low infill. Similarly, the capacity of service reservoirs and water towers has increased from B2 to A2, for the same reason.

9.1.1 Financial Cost Data

Refer to section 3.1.1 for information on sources and confidence grades for the E tables.

9.2 Data improvement programmes

Work has been undertaken during 2019/20 to improve the recording of pump Kw capacities at over 83 individual pumping stations. Individual pump ratings were identified and totalled to the Function (Site) level where Kw ratings for the Annual Return are sourced.

9.3 Assumptions used for forecast data

There is no forecast data for the E6 table.

9.4 Key changes from 2018/19

A summary of the variances between 2018/19 and 2019/20 for Water distribution can be found at the end of this section – Table E6 comparison AR19 and AR20. The significant changes are detailed in this section.

The area of the 4 Scottish Water regions has not changed and there are 3 fewer supply zones reported in the North region this year. The zones for Bayhead, Oykel Bridge and Beasdale were all removed in 2019/20 as they were amalgamated into larger regulatory supply zones. The 3 other regions all report the same number of zones as before.

Potable mains are reported by diameter and in total have increased by around 135km this year, which will be from a combination of new developments and mains relaying.

The total length of unlined iron mains (E6.17) has reduced by 239km in 2019/20.

The leakage level reported has reduced from 472 MI/d in 2018/19 to 454 MI/d in 2019/20.

The number of water mains bursts (E6.19) has decreased by 1062 to 7296 (almost 13%) since last year and is comparable to 2017/18. The higher levels in 2018/19 were due in part to more extreme weather conditions, but there has been a rise in bursts over the last few years partly as a result of a reduction in proactive mains management. Despite the reduction in bursts there has been an overall increase in the interruptions to supply, particularly those >6 hours (see section G3).

The overall number of low-pressure properties has decreased from 421 to 407. Targeted investment and operational changes have improved pressure to 17 properties during 2019-20. 3 properties have been recorded as being added to the register due to asset deterioration.

Table 30: Changes in number of low-pressure properties

20018/19 Properties reported for low pressure	421
Removed due to operational improvements	0
Removed due to asset improvements	-17
Removed due to better information	0
Added due to asset deterioration	+3
Added due to better information	0
Added due to operational changes	0
2019/20 Properties reported for low pressure	407

The number of pumping stations (E6.22) has increased by 3 this year, however the total capacity (E6.23: m3/d and E6.24: Kw) has decreased by around 2,800Kw, not only due to changes in stations but also due to the data improvements. The increased number of pumping stations is as a result of the changes detailed in the table below, which demonstrates that 5 stations were removed and 8 were added.

Table 31: Changes in pumping stations (E6.22)

Equipment Description	Removed or Added	KW
CARCO TWP NS783122	Removed	0.75
DALTON GREEN TWPNO NY122740	Removed	2.2
BRACADALE WTW TWP NG359392	Removed	0.74
ACHMELVICH BOOSTER TWP 2008 NC067252	Removed	0.74
LOCHALINE BOOSTER TWP NM676454	Removed	5
WHINPARK TWP 2017 NS448388	Added	1800
LOCHMADDY TWP 2018 NF892712	Added	50

Equipment Description	Removed or Added	KW
SOUTH MOORHOUSE TWP 2018 NS524511	Added	20
GREENOCK LUSS AVENUE TWP 2019 NS290743	Added	16
OVERTON HIGH TWP 2019 NS271749	Added	16
NEWMILNS WOODHEAD TWP 2019 NS522373	Added	1.5
CRAIGHEAD TWP NJ497404	Added	1
BEASDALE TWP 2017 NM701850	Added	0.75

There are 6 fewer service reservoirs (E6.26) and a subsequent increase of 95MI in the total capacity of these assets has been recorded this year. This is as a result of 16 reservoirs being removed and 10 reservoirs being added as per the changes detailed in the table below.

Table 32: Changes in service reservoirs (E6.26)

Equipment Description	Removed or Added
MULINDRY DSR 2 1997	Removed
CORSEHOUSE CWT 1974	Removed
STH MOORHOUSE DSR 1 1995	Removed
STH MOORHOUSE DSR 2 1995	Removed
STH MOORHOUSE DSR 3 1995	Removed
TOBERMORY CWT 1	Removed
TOBERMORY CWT 2	Removed
WISTON DSR	Removed
LARGIE DSR 1995	Removed
RAVIE HILL DSR 1950	Removed
LOCHALINE CWT	Removed
ACHMELVICH CWT	Removed
AMLAIRD EAST DSR TWS NS484443	Removed
AMLAIRD WEST TWS NS483443	Removed
KINGSHILL DSR 1990 NJ862057	Removed
CAIRNFIELD DSR 1952 NJ927105	Removed
MILLHALL RECTANGULAR SR	Added
ASSYNT CWT TWS 2020 NH588674	Added
KILMALUAG CWT TWS 2017 NG431730	Added
KILMUIR DSR TWS 2017 NG396687	Added
STAFFIN CWT TWS 2017 NG458682	Added
URCHANY SR TWS 2019 NH877505	Added
LOCHMADDY TWS 2018 NF892712	Added
LOCHALINE DSR TWS 2019 NM676457	Added
BEASDALE DSR TWS 2017 NM701850	Added
STRONTIAN CWT TWS 2006 NM821645	Added

9.5 Functional costs

Functional expenditure for water distribution (E6.11):

Functional expenditure:	Total
2019/20	£m
2018/19	72.353
	<u>81.259</u>
Variance	<u>+8.906</u>

Water distribution costs have decreased by £8.9m (11.0%) from 2018/19 analysed as follows:

- £4.8m (24.6%) reduction in hire and contracted services, which relates primarily to the reduction of contractor resources relative to the exceptionally high cost of maintaining water supplies and recovering leakage levels through the prolonged period of dry weather in 2018-19;
- £4.2m (20.5%) reduction in general and support costs, largely due to the normalisation of IT costs after incurring £1.8m transition costs in 2018-19 associated with the transfer to new Digital partners, a decrease of £1.6m in the hire of vehicles (2018-19 tanker hire costs were particularly high due to maintaining water supplies through dry weather conditions), lower levels of strategy and planning resources of £0.6m and lower fuel costs of £0.2m;
- £1.5m (36.2%) reduction in other direct costs due, primarily, to the lower cost of insurance claims;
- £0.2m (0.8%) net reduction across employment and materials and consumables costs, offset by;
- £1.8m (19.6%) increase in power costs, mainly due to an average 12.9% increase in tariffs and slightly higher consumption.

Analysis of water distribution costs by region:

	North	East	South	West	Total	General and Support	Total
	£m	£m	£m	£m	£m	£m	£m
Functional expenditure:							
2019/20	7.868	15.102	14.833	18.221	56.024	16.329	72.353
2018/19	8.040	14.952	16.362	21.358	60.712	20.547	81.259
Variance	+0.172	(0.150)	+1.529	+3.137	+4.688	+4.218	+8.906

SCOTTISH WATER

ANNUAL RETURN INFORMATION REQUIREMENT
2020

SECTION E: OPERATING COSTS AND EFFICIENCY
Table E6: Water Distribution

Line Ref	Description	Units	Total Report Year 2018-19	CG	Total Report Year 2019-20	CG	Variance	% Change	Explanation provided in AR20 Commentary?
Area Data									
E6.1	Annual average resident connected population	000	5377.35	A2	5217.00	A2	-160.34	-2.98	9.1 Data sources and confidence grades - reference to values in A1 and A2
E6.2	Total connected properties	000	2690.55	B4	2716.39	B4	25.84	0.96	9.1 Data sources and confidence grades - reference to values in A1 and A2
E6.3	Volume of water delivered to households	MI/d	986.47	B2	993.11	B2	6.64	0.67	9.1 Data sources and confidence grades - reference to values in A1 and A2
E6.4	Volume of water delivered to non-households	MI/d	402.51	B4	381.22	B4	-21.29	-5.29	9.1 Data sources and confidence grades - reference to values in A1 and A2
E6.5	Area	km2	79799.04	A1	79799.40	A1	0.37	0.00	9.1 Data sources and confidence grades
E6.6	Number of supply zones	nr	285.00	A1	282.00	A1	-3.00	-1.05	9.4 Key changes from 2018/19
Water mains data									
E6.12	Potable mains: Band 1 (<=165mm)	km	35880.50	B2	35964.37	A2	83.87	0.23	9.1 Data sources and confidence grades 9.4 Key changes from 2018/19
E6.13	Potable mains: Band 2 (166 - 320mm)	km	8783.19	B2	8807.43	A2	24.24	0.28	
E6.14	Potable mains: Band 3 (321 - 625mm)	km	3083.75	B2	3078.19	A2	-5.56	-0.18	
E6.15	Potable mains: Band 4 (>625mm)	km	858.76	B2	891.59	A2	32.83	3.82	
E6.16	Total length of mains	km	48606.19	B2	48741.58	A1	135.39	0.28	
E6.17	Total length of unlined iron mains	km	14815.80	B2	14576.38	A2	-239.42	-1.62	9.4 Key changes from 2018/19
E6.18	Total length of mains > 320mm diameter	km	3942.51	B2	3969.78	A2	27.27	0.69	Only a brief statement in AR19 Commentary to say the length has increased by 0.5km
E6.19	Water mains bursts	nr	8358	B3	7296	B3	-1062.00	-12.71	9.4 Key changes from 2018/19
E6.20	Leakage level	MI/d	471.57	B3	454.01	B3	-17.56	-3.72	9.4 Key changes from 2018/19
E6.21	Properties reported for low pressure	nr	421	B2	407	B2	-14.00	-3.33	9.4 Key changes from 2018/19
Pumping Stations									
E6.22	Total number of pumping stations	nr	613	B2	616	A2	3.00	0.49	9.4 Key changes from 2018/19
E6.23	Total capacity of pumping stations	m3/d	2604278.31	C4	2434417.81	C4	169860.50	-6.52	9.2 Data improvement programmes 9.4 Key changes from 2018/19
E6.24	Total capacity of booster pumping stations	Kw	45806.16	C3	42976.40	A3	-2829.76	-6.18	9.2 Data improvement programmes 9.4 Key changes from 2018/19
E6.25	Average pumping head	m	30.14	C4	29.87	C4	-0.27	-0.9	9.1 Data sources and confidence grades
Service Reservoirs									
E6.26	Total number of service reservoirs	nr	1311	B2	1305	A2	-6.00	-0.46	9.4 Key changes from 2018/19
E6.27	Total capacity of service reservoirs	MI	3853.28	B2	3948.77	A2	95.48	2.48	9.4 Key changes from 2018/19
Water Towers									
E6.28	Total number of water towers	nr	18	B2	18	A2	0	0.00	No change to report
E6.29	Total capacity of tower towers	MI	29.27	B2	29.27	A2	0	0.00	No change to report

10 Table E7 Wastewater Explanatory Factors – by Area

10.1 Data sources and confidence grades

The changes to resident and non-resident populations commented on for lines E3.1 and E3.2 also apply to E7.1 and E7.2. The confidence grade for line E7.2 has been changed to B3 to reflect improvements in the analysis of the source data, as discussed in table E3.

The method used to calculate the volume of sewage data (E7.3) is based on the dry weather flows plus the storm flows within each catchment being summarized at SW Region level.

The confidence grade for the total connected properties (E7.4) has been changed to align with the confidence grade applied in table A1. In addition, the re-evaluation of confidence grades for section E, based on the WICS definitions and the source and quality of the data, showed that a confidence grade of A1 was also the correct grade to be applied to the drained area (E7.6) and A2 should be applied to the number of sewage treatment works (E7.30).

Annual rainfall total for Scotland was obtained from Statista's website this year, as the usual catchment-based sources of information could not be obtained and analysed due to system access issues associated with Covid-19. The Scotland wide total was factored across the 4 SW regions in the same proportions as the AR19 rainfall. Due to the use of external data and extrapolation the confidence grade for E7.7 has reduced to C3 for 2019/20.

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; the dry weather flow and the 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 several 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.

The total sewage collected was calculated (dry weather plus storm flows) for each sewered area and a total for each operational region calculated.

There has been no significant change in methodology for the sewerage data (E7.8 to E7.14). Critical sewers have not been categorized separately in 2019/20, as agreed with WICS; consequently, line E7.13 remains blank in the E7 tables.

The average pumping head reported on line E7.23 has been calculated by additions, deletions and corrections to the pumping data contained in the historic annual return spreadsheets. We currently have a limited dataset from which we extrapolate an overall pumping head value across the whole of Scottish Water. Due to data limitations our confidence grade has remained at C5.

10.1.1 Financial Cost Data

Refer to section 3.1.1 for information on sources and confidence grades for the E tables.

10.2 Data improvement programmes

Work has been undertaken during 2019/20 to improve the recording of pump Kw capacities at over 1000 individual pumping stations, which has changed the confidence grade from C4 to A3.

A data cleansing exercise has been undertaken on combined sewer overflows which has removed incorrectly identified screens in legacy data sources. The recording of screening equipment is now fully held in our Ellipse system.

10.3 Assumptions used for forecast data

There is no forecast data for the E7 table.

10.4 Key changes from 2018/19

A summary of the variances between 2018/19 and 2019/20 for Wastewater explanatory factors (by area) can be found at the end of this section – Table E7 comparison AR19 and AR20. The significant changes are detailed in this section.

The resident connected population (E7.1) has increased by 17,669 and non-resident (E7.2) decreased by 30,646, since 2018/19.

The number of pumping stations (E7.20 and E7.24) across the different sewer use categories remains largely unchanged this year. The total capacities (E7.21 and E7.22), however, have increased for combined pumping stations and overall, with the exception of stormwater pumping station capacity (E7.27), which decreased. The capacity changes are as a result of the data improvements described above.

The number of screened CSOs (E7.29) has decreased from 1352 in 2018/19 to 1219 2019/20 due to the data cleansing exercise, despite several new screened CSOs being added during the year.

The total load (E7.31) has decreased by 367kg BOD/day; the change in constituent parts is summarised in the table below.

Table 33: Change in Total load by constituent

Constituent	AR19 (% total load)	AR19 (kg/BOD/day)	AR20 (% total load)	AR20 (kg/BOD/day)	Variance
Population	73	165,121.0	73.2	165,552.7	431.7
Tourist	2	4,531.4	1.4	3,173.8	-1,357.5
Non-domestic	10.4	23,611.5	10.0	22,517.1	-1,094.4
Trade effluent	11.4	25,834.3	10.1	22,895.6	-2,938.7
Imported private septic tanks	0.1	264.2	0.3	625.2	361.1
Imported public septic tanks	0.1	274.5	0.2	356.4	81.9
Imported other loads	0.8	1,912.3	0.4	970.2	-942.1
Imported WWTW sludge	1.7	3,899.3	3.8	8,603.4	4,704.0
Imported WTW sludge	0.3	679.8	0.4	902.4	222.6
Sludge return liquors	0.2	443.7	0.3	615.0	171.3

10.5 Functional costs

Functional expenditure for sewerage (E7.15-19):

	Total
	£m
Functional expenditure:	
2019/20	48.048
2018/19	<u>44.707</u>
Variance	<u>(3.341)</u>

Sewerage costs have increased by £3.3m (7.5%) from 2018/19. The increase is analysed as follows:

- £2.1m (27.1%) increase in power costs, due to average tariff increases of £0.9m (10.1%), a £0.9m (11.6%) increase in consumption driven by higher rainfall and £0.3m of prior year costs;
- £1.0m (6.8%) increase in employment costs relating to pay progression and changes in resources allocated to sewerage activities; and
- £0.2m (1.0%) net increase across other cost lines.

Analysis of sewerage costs by region:

	North	East	South	West	Direct	General and Support	Total
	£m	£m	£m	£m	£m	£m	£m
Functional expenditure:							
2019/20	4.260	8.479	9.319	13.223	35.281	12.767	48.048
2018/19	<u>3.864</u>	<u>8.282</u>	<u>9.205</u>	<u>10.380</u>	<u>31.731</u>	<u>12.976</u>	<u>44.707</u>
Variance	<u>(0.396)</u>	<u>(0.197)</u>	<u>(0.114)</u>	<u>(2.843)</u>	<u>(3.550)</u>	<u>+0.209</u>	<u>(3.341)</u>

Functional expenditure for sewage treatment (E7.32-36):

	Total
Functional expenditure:	£m
2019/20	66.350
2018/19	<u>63.599</u>
Variance	<u>(2.751)</u>

Sewage treatment costs have increased by £2.8m (4.3%) from 2018/19. The main movements are as follows:

- £2.5m (14.0%) increase in power costs primarily due to average tariff increases of £1.8m (10.1%) and a £0.7m (4.0%) increase in consumption;
- £1.4m (8.4%) increase in employment costs relating to pay progression and changes in resourcing; and
- £1.3m (45%) increase in hired and contracted services primarily due to costs incurred as a result of unauthorised discharges from traders at Dunbar and Alloa WWTWs, an increase in tank cleaning and new Opex associated with capital investment, offset by;
- £0.5m (3.8%) net reduction across other cost lines primarily due to lower volumes of chemical usage in treatment processes; and
- £1.9m (15%) reduction in general and support costs, largely due to the normalisation of IT costs after incurring £1.6m transition costs in 2018-19 associated with the transfer to new Digital partners and lower fuel costs of £0.2m.

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
2019/20	6.948	13.297	18.804	16.339	55.388	10.962	66.350
2018/19	7.364	12.329	16.779	14.217	50.689	12.910	63.599
Variance	+0.416	(0.968)	(2.025)	(2.122)	(4.699)	+1.948	(2.751)

ANNUAL RETURN INFORMATION REQUIREMENT 2020

SECTION E : OPERATING COSTS AND EFFICIENCY
Table E7: Wastewater Explanatory Factors - Sewerage & Sewage treatment by area

Line Ref	Description	Units	AR19	CG	AR20	CG	Variance	% Change	Explanation provided in AR20 Commentary?
Area Data									
E7.1	Annual average resident connected population	000	4990	B2	5008	B2	17.669	0.35	6.1 Data sources and confidence grades 10.1 Data sources and confidence grades 10.4 Key Changes from 2018/19
E7.2	Annual average non-resident connected population	000	107	C4	76	B3	-30.646	-28.65	6.1 Data sources and confidence grades 10.1 Data sources and confidence grades 10.4 Key Changes from 2018/19
E7.3	Volume of sewage collected (daily average)	MI/d	2914	C3	2921	C3	6.846	0.23	10.1 Data sources and confidence grades
E7.4	Total connected properties	nr	2561857	B4	2585489	B3	23,632.000	0.92	6.1 Data sources and confidence grades 10.1 Data sources and confidence grades
E7.5	Area of Sewerage District	km 2	79799	A1	79799	A1	0.367	0.00	No change to report
E7.6	Drained Area	km2	1937	B2	1957	A1	19.864	1.03	10.1 Data sources and confidence grades
E7.7	Annual Precipitation	mm	979	A2	1803	C3	824.128	84.19	10.1 Data sources and confidence grades
Sewerage Data									
E7.8	Total length of sewer	km	53203	B2	52810	B2	-392.70	-0.74	10.1 Data sources and confidence grades
E7.9	Total length of lateral sewer	km	18496	B2	19286	B2	790.25	4.27	10.1 Data sources and confidence grades
E7.10	Length of combined sewer	km	17506	B2	17534	B2	27.99	0.16	10.1 Data sources and confidence grades
E7.11	Length of separate stormwater sewer	km	8449	B2	8479	B2	29.79	0.35	10.1 Data sources and confidence grades
E7.12	Length of sewer > 1000 mm diameter	km	802	B2	854	B2	52.84	6.59	10.1 Data sources and confidence grades
E7.13	Length of Critical Sewer	km	10924	A2	n/a	n/a		n/a	Agreed with WICS to remove line for AR20
E7.14	Sewer Collapses	nr	1541	B4	1358	B4	-183.00	-11.88	10.1 Data sources and confidence grades
Pumping Stations									
E7.20	Total number of pumping stations	nr	2250	A3	2256	A3	6.00	0.27	10.4 Key changes from 2018/19
E7.21	Total capacity of pumping stations (m3/d)	m3/d	13889371	C4	14652750	C4	763378.89	5.50	10.2 Data improvement programmes 10.4 Key changes from 2018/19
E7.22	Total capacity of pumping stations (kw)	Kw	85646	C4	97594	A3	11948.20	13.95	10.2 Data improvement programmes 10.4 Key changes from 2018/19
E7.23	Average pumping head	m	34	C5	34	C5	0.14	0.42	10.2 Data improvement programmes
E7.24	Total number of combined pumping stations	nr	1331	A3	1328	A3	-3.00	-0.23	10.4 Key changes from 2018/19
E7.25	Total capacity of combined pumping stations	m3/d	10108065	C4	10741414	C4	633349.13	6.27	10.2 Data improvement programmes
E7.26	Total number of stormwater pumping stations	nr	49	A3	49	A3	0.00	0.00	10.4 Key changes from 2018/19
E7.27	Total capacity of stormwater pumping stations	m3/d	717712	C4	655363	C4	-62349.44	-8.69	10.2 Data improvement programmes 10.4 Key changes from 2018/19
E7.28	Number of combined sewer overflows	nr	3067	A3	3072	A3	5.00	0.16	10.2 Data improvement programmes
E7.29	Number of combined sewer overflows (screened)	nr	1352	A3	1219	A3	-133.00	-9.84	10.2 Data improvement programmes
Sewage Treatment works									
E7.30	Number of sewage treatment works	nr	1843	A3	1837	A2	-6.0	-0.3	10.1 Data sources and confidence grades
E7.31	Total Load	kg BOD/day	225858	B3	226212	B3	-354	-0.2	10.4 Key changes from 2018/19

11 Table E8 Wastewater Explanatory Factors – Sewage Treatment Works

11.1 Data sources and confidence grades

A re-evaluation of confidence grades based on, the WICS definitions and quality of the source data was undertaken for AR20 for asset data. This re-evaluation showed that a confidence grade of A2 was the correct grade to be applied to the line reporting the total number of sewage treatment works (E8.8).

The numbers for small sewage treatment works with specific ammonia consents are sourced from our compliance database and are aligned with lines E8.9 and E8.10, as per previous years. *The confidence grades were reviewed, and it was assessed that the completeness of the ammoniacal consent information in the STW licences and the lower number infilled load values merited an increase in the confidence grade to A1.*

The percentage compliance has been calculated on the basis of SEPA results. Our methodology for calculating compliance is the same as last year and, in the case of two-tier consents, all failures have been counted, not just upper-tier failures. STW that are not sampled are not included in the averaging process for individual treatment categories and size bands. There is no change in confidence grade.

11.1.1 Financial Cost Data

Refer to section 3.1.1 for information on sources and confidence grades for the E tables.

11.2 Data improvement programmes

There have been no notable data improvement programmes regarding sewage treatment works, with the exception of those that have been discussed in other sections.

11.3 Assumptions used for forecast data

There is no forecast data for the E8 table.

11.4 Key changes from 2018/19

A summary of the variances between 2018/19 and 2019/20 for Wastewater explanatory factors (sewage treatment works) can be found at the end of this section – Table E8 comparison AR19 and AR20. The significant changes are detailed in this section.

There are 6 fewer sewage treatment works (E8.8) reported this year as a result of 10 being removed and 4 new ones being added to the inventory (see table below). Those removed include 5 works abandoned in the sea unscreened category. The total load has increased by 377kg BOD/day (E8.18).

Table 34: Changes in sewage treatment works (E8.8)

Works Removed	Works Added
LOTH WWTW	KILMUN LAGGANBHUIE SEP WWTW
INVERURIE WWTW 1965	KILMUN ALDERBURN SEP WWTW
INVERURIE WWTW 2001	INVERURIE WWTW 2018
ORKNEY OUTFALLS WWTW	KENSALEYRE SEP WWTW

Works Removed		Works Added
KILMUN, LAGGANBHUIE UNS SO		
KILMUN, ALDERBURN PLACE UNS SO		
KILMUN, HILLRIG UNS SO		
DOUBLE HOUSES UNS SO		
STRONE, DUNSELMA LODGE UNS SO		
CRAIGNURE VILLAGE HALL SEP		

The tables below summarise the changes between treatment categories and bands between 2018/19 and 2019/20.

Table 35: Changes in WWTW Treatment Categories

Category	AR19	AR20	Difference
Septic Tanks	1178	1178	0
Primary	40	40	0
Sec Activated Sludge	177	176	-1
Sec biological	296	296	0
TertiaryA1	36	36	0
Tertiary A2	19	19	0
Tertiary B1	59	59	0
Tertiary B2	14	14	0
Sea Preliminary	8	8	0
Sea Screened	3	3	0
Sea Unscreened	13	8	-5
Total	1843	1837	-6

Table 36: Changes in WWTW Bands

Description	AR19	AR20	Difference
Size Band 0	1116	1115	-1
Size Band 1	211	209	-2
Size Band 2	148	150	2
Size Band 3	185	183	-2
Size Band 4	119	121	2
Size Band 5	42	36	-6
Size Band 6 (Large Works)	22	23	1

Table 37: Changes in load by treatment category

Treatment Category	2018/19	2019/20	Net Change
Primary	3550	3489	-61
Sec Activated Sludge	148666	152018	3352
Sec Biological	23382	23095	-287
Tertiary A1	26800	24832	-1968

Treatment Category	2018/19	2019/20	Net Change
Tertiary A2	4886	5002	116
Tertiary B1	8577	8265	-312
Tertiary B2	1618	1659	41
Sea Preliminary	1822	1819	-3
Sea Screened	284	227	-57
Sea Unscreened	469	24	-445
Total	220054	220430	376

Three sewage treatment works are reported as non-compliant with the discharge permit this year: Tomintoul in the Primary treatment category, Inchmarlo in Secondary treatment and Kinneff in Tertiary treatment. In total, 99.5% of the wastewater assets that are sampled in the Annual Monitoring Programme were assessed as meeting regulatory quality standards for discharge.

11.5 Functional costs

Overall movements are explained in the commentary for table E7 and the costs of treating and disposing of sludge are contained within Table E10.

Analysis of sewage treatment costs (for all works) by process type (E8.31-42):

- Changes to the numbers of STW by process type have arisen as a result of operational changes and process re-classifications in STW during 2019/20.
- Re-stating 2018/19 figures on a like-for-like basis shows the following variations:

	Septic tanks	Primary	Secondary	Tertiary	Sea Outfalls	Direct	General and Support	Total
Total treatment works	£m	£m	£m	£m	£m	£m	£m	£m
2019/20	3.119	1.454	39.128	11.417	0.269	55.387	10.963	66.350
2018/19	2.883	1.203	35.954	10.382	0.267	50.689	12.910	63.599
Variance	(0.236)	(0.251)	(3.174)	(1.035)	(0.002)	(4.698)	+1.947	(2.751)

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 £55.4m total direct wastewater treatment costs, £40.8m of costs or 73.7% 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. Support costs are, therefore, 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.

ANNUAL RETURN INFORMATION REQUIREMENT 2020

SECTION E : OPERATING COSTS AND EFFICIENCY
Table E8: Wastewater Explanatory Factors - Sewage Treatment Works

Line Ref	Description	Units	AR19	CG	AR20	CG	Variance	% Change	Explanation provided in AR20 Commentary?
Numbers									
E8.1	Size Band 0	nr	1116	B3	1115	B3	-1	-0.09	11.4 Key changes from 2018/19
E8.2	Size Band 1	nr	211	B3	209	B3	-2	-0.95	11.4 Key changes from 2018/19
E8.3	Size Band 2	nr	148	B3	150	B3	2	1.35	11.4 Key changes from 2018/19
E8.4	Size Band 3	nr	185	B3	183	B3	-2	-1.08	11.4 Key changes from 2018/19
E8.5	Size Band 4	nr	119	B3	121	B3	2	1.68	11.4 Key changes from 2018/19
E8.6	Size Band 5	nr	42	B3	36	B3	-6	-14.29	11.4 Key changes from 2018/19
E8.7	Size Band 6 (Large Works)	nr	22	B3	23	B3	1	4.55	11.4 Key changes from 2018/19
E8.8	Total Sewage Treatment Works	nr	1843	B3	1837	A2	-6	-0.33	11.4 Key changes from 2018/19
E8.9	Small Sewage treatment works with ammonia consent 5 - 10 mg/l	nr	44	A1	45	A1	1	2.27	11.1 Data sources and confidence grades
E8.10	Small Sewage treatment works with ammonia consent <= 5 mg/l	nr	65	A1	68	A1	3	4.62	11.1 Data sources and confidence grades
Loading (average daily load)									
E8.11	Size Band 0	kg BOD/day	436.021	B3	419	B3	-17.021	-3.90	Not in commentary*
E8.12	Size Band 1	kg BOD/day	1101.577	B3	1045	B3	-56.577	-5.14	Not in commentary*
E8.13	Size Band 2	kg BOD/day	2087.395	B3	2059	B3	-28.395	-1.36	Not in commentary*
E8.14	Size Band 3	kg BOD/day	10488	B3	10631	B3	143	1.36	Not in commentary*
E8.15	Size Band 4	kg BOD/day	34951	B3	35385	B3	-151.435	-0.43	Not in commentary*
E8.16	Size Band 5	kg BOD/day	35756.238	B3	31255	B3	4501.238	-12.59	Not in commentary*
E8.17	Size Band 6 (large works)	kg BOD/day	135371.121	B3	139636	B3	4264.879	3.15	Not in commentary*
E8.18	Total Load Received	kg BOD/day	220,053.00	B3	220430	B3	377	-0.17	Not in commentary*
E8.19	Small Sewage treatment works with ammonia consent 5 - 10 mg/l	kg BOD/day	7939.483	B3	7964.	A1	24.517	0.31	Not in commentary*
E8.20	Small Sewage treatment works with ammonia consent <= 5 mg/l	kg BOD/day	45182.755	B3	42651	A1	2531.755 129	-5.60	Not in commentary*

* A series of tables were provided in the AR19 commentary which are now superseded by this single table

12 Table E9 Large Sewage Treatment Works Information Database

12.1 Data sources and confidence grades

These lines report regulatory compliance using consent data as taken from our corporate consents database. The most onerous of Controlled Activity Regulations (CAR) or Urban Wastewater Treatment (UWWT) parameter was used, whereas the information in relation to treatment type is held within our corporate asset inventory (Ellipse).

The volume of sludge is recorded in our Gemini systems.

There are no changes to the Confidence grades reflecting the fact that the data is obtained directly from our corporate systems.

12.1.1 Financial Cost Data

Refer to section 3.1.1 for information on sources and confidence grades for the E tables.

12.2 Data improvement programmes

There were no notable data improvement programmes regarding sewage treatment works, with the exception of those discussed in other sections.

12.3 Assumptions used for forecast data

There is no forecast data for the E9 table.

12.4 Key changes from 2018/19

A summary of the variances between 2018/19 and 2019/20 for large sewage treatment works can be found at the end of this section – Table E9 comparison AR19 and AR20. The significant changes are detailed in this section.

There are 23 large sewage treatment works reported in AR20, comprised of the same works reported in AR19 with the addition of the new Inverurie works. Compliance with effluent consent standards showed that compared with the 9 works which failed to achieve full compliance last year, Shieldhall was the only works which did not achieve full compliance in 2019/20 but achieved 99%.

12.5 Functional costs

Analysis of functional costs for large sewage treatment works (E9.15-21):

	2019/20	2018/19	Variance
	£m	£m	£m
Daldowie	1.346	1.214	(0.132)
Dunbar	0.506	0.388	(0.118)
Galashiels	0.091	0.079	(0.012)
Tertiary treatment	1.943	1.681	(0.262)
Allers	0.454	0.353	(0.101)
Alloa	0.700	0.377	(0.323)
Ardoch	0.332	0.390	+0.058
Bothwellbank	0.225	0.326	+0.101
Carbarns	0.385	0.437	+0.052
Dalderse	0.388	0.336	(0.052)
Dalm amock	1.870	1.726	(0.144)
Dunfermline	0.261	0.300	+0.039
Dunnswood	0.391	0.319	(0.072)
Erskine	0.680	0.582	(0.098)
Hamilton	0.779	0.567	(0.212)
Inverurie	0.241	n/a	(0.241)
Kinneil Kerse	0.706	0.490	(0.216)
Kirkcaldy	0.837	0.675	(0.162)
Laighpark (Paisley)	0.820	0.907	+0.087
Perth	0.741	0.657	(0.084)
Philipshill	1.237	0.907	(0.330)
Shieldhall	2.769	2.113	(0.656)
Stirling	0.893	0.763	(0.130)
Troqueer	0.388	0.304	(0.084)
Secondary treatment	15.097	12.529	(2.568)
Direct large treatment works	17.040	14.210	(2.830)
General and Support	2.339	2.263	(0.076)
Total large treatment works	19.379	16.473	(2.906)

ANNUAL RETURN INFORMATION REQUIREMENT 2020

SECTION E: OPERATING COSTS AND EFFICIENCY
Table E9: Large Sewage Treatment Works Information Database

Line Ref	Description	Name	Units	AR19	CG	AR20	CG	Variance	% Change	Explanation provided in AR20 Commentary?
Population equivalent of total load received										
E9.1	Population equivalent of total load received	Allers	000	50	B3	34	B3	-16	-31.75	Not in commentary*
E9.1	Population equivalent of total load received	Alloa	000	44	B3	44	B3	0	-0.18	Not in commentary*
E9.1	Population equivalent of total load received	Ardoch	000	61	B3	61	B3	0	-0.36	Not in commentary*
E9.1	Population equivalent of total load received	Bothwellbank	000	25	B3	25	B3	0	0.25	Not in commentary*
E9.1	Population equivalent of total load received	Carbarns	000	48	B3	49	B3	1	1.41	Not in commentary*
E9.1	Population equivalent of total load received	Dalderse	000	92	B3	92	B3	0	0.30	Not in commentary*
E9.1	Population equivalent of total load received	Daldowie	000	318	B3	285	B3	-33	-10.36	Not in commentary*
E9.1	Population equivalent of total load received	Dalmarnock	000	233	B3	241	B3	8	3.50	Not in commentary*
E9.1	Population equivalent of total load received	Dunbar	000	29	B3	30	B3	1	4.21	Not in commentary*
E9.1	Population equivalent of total load received	Dunfermline	000	61	B3	85	B3	24	39.22	Not in commentary*
E9.1	Population equivalent of total load received	Dunnswood	000	31	B3	30	B3	-1	-3.18	Not in commentary*
E9.1	Population equivalent of total load received	Erskine	000	83	B3	83	B3	0	-0.02	Not in commentary*
E9.1	Population equivalent of total load received	Galashiels	000	31	B3	27	B3	-4	-12.08	Not in commentary*
E9.1	Population equivalent of total load received	Hamilton	000	63	B3	63	B3	0	-0.68	Not in commentary*
E9.1	Population equivalent of total load received	Kinneil Kerse	000	49	B3	53	B3	4	8.16	Not in commentary*
E9.1	Population equivalent of total load received	Kirkcaldy	000	61	B3	60	B3	-1	-1.73	Not in commentary*
E9.1	Population equivalent of total load received	Laighpark (Paisley)	000	126	B3	120	B3	-6	-5.09	Not in commentary*
E9.1	Population equivalent of total load received	Perth	000	100	B3	116	B3	16	16	Not in commentary*
E9.1	Population equivalent of total load received	Philipshill	000	54	B3	65	B3	11	19.80	Not in commentary*
E9.1	Population equivalent of total load received	Shieldhall	000	554	B3	623	B3	67	12.45	Not in commentary*
E9.1	Population equivalent of total load received	Stirling	000	78	B3	68	B3	-10	-12.94	Not in commentary*
E9.1	Population equivalent of total load received	Troqueer	000	43	B3	46	B3	3	6.22	Not in commentary*
E9.2	Population equivalent of total load received	Inverurie	000		B3	26	B3	26	n/a	Not in commentary*
E9.1	Population equivalent of total load received	Total	000	2259		2326		67	2.98	Not in commentary*

* A series of tables were provided in the AR19 commentary which are now superseded by this single table

13 Table E10 Sludge Treatment and Disposal

13.1 Data sources and confidence grades

The allocation of sludge treatment and disposal costs by disposal route relies on sludge movement data linked to financial data. We link sludge movement data from the Gemini waste management system to ABM costs to produce E10 cost analysis. Financial costs for this table are completed on the basis of a combination of ABM analysis, direct cost capture by asset, and our sludge model analysis.

The confidence grades for lines E10.1 and E10.2 remain the same as the previous year.

13.2 Data improvement programmes

There were no notable data improvement programmes regarding sludge treatment, with the exception of those discussed in other sections.

13.3 Assumptions used for forecast data

There is no forecast data for the E10 table.

13.4 Key changes from 2018/19

A summary of the variances between 2018/19 and 2019/20 for large sewage treatment works can be found at the end of this section – Table E10 comparison AR19 and AR20. There is no significant change in the volume of sludge or the proportions of sludge disposal categories.

13.5 Functional costs

Sludge treatment costs have increased by £0.5m (3.0%) from 2018/19. This is analysed as follows:

- £1.1m (21.2%) increase in hire and contracted services due primarily to increased use of contractors for inter-site sludge transport to maintain compliance;
- £0.6m (31.9%) increase in energy costs due to unit price and consumption increases offset by;
- £1.0m (20.9%) reduction in general and support costs partly due to the normalisation of IT costs after incurring £0.6m transition costs in 2018-19 associated with the transfer to new Digital partners and lower fuel costs; and
- £0.2m (3.5%) net reduction across other cost lines.

Scottish Water incurs costs associated with the transportation of sludge from its own sewage treatment works to PPP sludge treatment centres. These costs have been reported within E3a.20 with the corresponding sludge loads reported in E3.

Analysis of sludge treatment costs by disposal route:

	2019/20	2018/19	Variance
	£m	£m	£m
Farmland:			
Untreated	0.000	0.000	+0.000
Conventional	1.899	1.607	(0.292)
Advanced	7.885	8.406	+0.521
Incineration	0.000	0.000	+0.000
Landfill	1.386	1.451	+0.065
Composted	0.000	0.000	+0.000
Land reclamation	6.831	6.019	(0.812)
Other	0.000	0.000	+0.000
Total	18.001	17.483	(0.518)

The increase in costs for disposals to land reclamation is mainly driven by higher volumes through this route at Cupar, Dalderse and Brechin.

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 routes. However, other 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).

SCOTTISH WATER

ANNUAL RETURN INFORMATION REQUIREMENTS 2020

SECTION E : OPERATING COSTS AND EFFICIENCY

Table E10: Sludge Treatment and Disposal

Line Ref	Description	Units	AR19	CG	AR20	CG	Variance	% Change	Explanation provided in AR20 Commentary?
Sludge volumes									
E10.1	Resident population served	000	2596.235	C3	2605.035	C3	8.7996	0.34	13.1 Data sources and confidence grades 13.4 Key changes from 2018/19
E10.2	Amount of sewage sludge	ttds	15.278	B4	16.812	B4	1.5345	10.04	13.1 Data sources and confidence grades 13.4 Key changes from 2018/19

Section G – G Tables

14 Tables G1 & G2: Investment and Investment Monitoring

Tables G1 and G2 present a summary of our investment programmes for Quality and Standards 4 (Q&S4), Q&S3a & 3b (completion programme). The investment costs and outputs reported in these tables reflect the position at the end of March 2020. Elements reported include investment within the report year, 2019/20, and our forecasts to 2020/21.

14.1 Data sources and confidence grades

All data relative to the Capital Investment programme has been extracted from our new P3M system (see data improvement programme section below)

Additional operating expenditure (G1.27-G1.4) is calculated through the analysis of the proportion of capital spend allocated to quality, enhanced level of service or growth for future years. The value in the report year is based on the actual opex released as a consequence of the capital programme.

There are no confidence grades used in the G1 and G2 tables.

14.2 Data improvement programmes

During 2019-20, Scottish Water has introduced a new cloud-based IT system, P3M, to manage the capital programme. P3M went live in October 2019 and replaces the existing CISP system and is the data source for investment forecasting and other project attributes (dates, outputs, names etc.). The FAB system is integrated into P3M and provides actual cost data. The P3M system offers increased flexibility and will support our continuous improvement approach around data quality for our capital investment programmes.

14.3 Assumptions used for forecast data

All forecasts are based on the position prior to the Covid-19 pandemic. This position is not materially different to that set out in our 2020 Delivery Plan update.

14.3.1 Inflation Assumptions

The table below reflects the inflation assumptions used within the G Tables. Inflation assumptions are the same as used for our 2020 DP update.

Table 38: Inflation assumptions

	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21
Overall RPI Assumption 2012/13 = 100%	106.0%	108.3%	112.3%	115.8%	118.7%	122.0%

14.4 Key changes from 2018/19

14.4.1 Table G1 Summary – Investment

The total gross capital investment shown on table G1 is £4,260.1m which is the forecast cost to complete the SR15 programme, including £365.2m for the completion programme (Q&S3a & Q&S3b), all IR18 outputs and SR21 early start. The main components of this are detailed in the table below, which also provides a reconciliation with our 2020 Delivery Plan update.

Table 39: Components of the gross capital investment

	£m
Total in 2020 Delivery Plan update	3,985.3
Projects Cost Increases Post Delivery Plan update 2020*	4.6
Revised Programme Forecast	3,989.9
Early Start Expenditure (Pre April 2015)	46.8
IR18 Financed Post 2020-21	162.6
SR15 Financed Post 2020-21	13.6
SR21 Early Start	47.2
Table G Total Gross Capital Investment (G1.54)	4,260.1

* Project cost increases are predominantly due to the Loch Ness Regional Scheme (£2.4m), South Edinburgh Resilience (£0.6m) and Glenlatterach WTW (£0.5m)

The forecast post 2020-21 is £411.3m. This is the combination of:

- £235.0m SR15 Completion, and
- £162.6m for planned IR18 and £13.6m for projects started in SR15 that were always scheduled to complete post April 2021 with both these elements financed from SR21.

The tables below reconcile 2019 AR and AR 2020 total gross capital investment, capital maintenance and growth.

Table 40: Reconciliation of gross capital investment

Table G Total Gross Capital Investment AR19	4242.8
Impact of indexation changes SR15	-3.6
Impact of indexation changes IR18 and SR15 Financed Post 2020-21	-0.9
Increase in SR21 Early Start	17.2
Increase in SR15 Programme Cost	4.6
Table G Total Gross Capital Investment AR20	4260.1

Table 41: Reconciliation of capital maintenance

Capital Maintenance AR19	2150.6
Changes in Indexation	-2.1
Increase in Exceptional CM	33.5
Change in allocation of CM Risk	-0.5
Capital Maintenance AR20	2181.5

Table 42: Reconciliation of growth

Growth AR19	428.6
Reallocation of demand risk to Exceptional CM	-11.4
Increase in forecast cost IR18 Post 2021	4.4
Impact of indexation changes	-0.3
Growth AR20	421.3

As part of our investment planning and delivery arrangements for the 2015-21 period a strengthened risk management regime has been implemented. Under this regime sub-programme and programme risk allowances are removed from project allocations and are held and governed centrally. As projects mature, the central risk allocation can be drawn down to projects or increased as appropriate. For the purposes of Table G1, the inflation risk allowances removed from project costs have been re-instated and programme risk has been proportioned across the programme.

We successfully delivered £673.0m of capital investment in 2019/20, compared to £659.9m in 2018/19. During the year we benefited from an £8.4m recovery of historic investment costs from a contractor as a result of a commercial claim, thereby reducing the reported 2019/20 Total Capital Investment value to £664.6m on G1. The G tables include the settlement from the contractor for defective work of £8.4m as described above within the Water Service Infrastructure Capital Maintenance programme.

Whilst the investment level was higher in 2019/20 than the previous year, it was at the lower end of the range set out in the 2019 Delivery Plan. The 2019/20 capital investment of £664.6m is split by:

- £614.9m - Q&S4 and IR18 projects
- £31.3m - completion projects (Q&S3a and Q&S3b).
- £18.4m - SR21 Early Start and

The total gross investment in capital maintenance for SR15 is forecast at £2,181.5m as reported in table G1 (G1.49). This includes £192.5m of exceptional capital maintenance for Ayrshire Resilience and Strategic Mains Diversions. In 2019/20 expenditure of £345.0m was made on capital maintenance compared to £381.5m in 2018/19. Capital maintenance investment accounts for 52% of the investment in 2019/20. The table below shows the capital maintenance components.

Table 43: Capital maintenance components

CM Components (£m)	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	Post 2020-21	Total
CM Indexation Risk	0.0	0.0	0.0	0.0	0.0	26.9	0.0	26.9
Forecast CM Profile	254.8	301.2	345.1	361.5	337.7	361.8	0.0	1962.2
Additional CM Risk						0.0		0.0
Total Capital Maintenance	254.8	301.2	345.1	361.5	337.7	388.7	0.0	1989.0
Exceptional CM	5.2	37.0	49.4	19.9	7.3	19.5	54.0	192.5
Total Capital Maintenance (G1.06)	260.1	338.2	394.5	381.5	345.0	408.2	54.0	2181.5

Key points of clarification for additional lines are:

- The investment for the PFI project at Dalmuir has been included within the cost of the non OMG180 completion programme (G1.24). The expected total cost of Dalmuir is £25.0m with £7.3m forecast in the 2015-21 period.
- We have increased the forecast investment for early start projects (G1.26) for SR21 by £1.72m to £47.2m from the level set out in our 2020 Delivery Plan Update.
- Contributions (G1.41-G1.48) received to the end of March 2020 are all related to Service Relocations and Infrastructure Charges.

14.4.2 Table G2 Summary – Outputs

Delivery of outputs is closely monitored by the Scottish Government led Delivery Assurance group and detail information can be found in the quarterly Delivery Assurance Group (DAG) reports published on the Scottish Government website (<https://www.gov.scot/groups/output-monitoring-group/>). Q&S4 Enhancements Outputs delivered in this section (G2.5 to G2.26) reflect the forecast position on the milestone graphs provided to DAG in May 2020. Explanation of movement in forecasts, projects or programme specific issues are detailed within the quarterly monitoring report and graph commentary to the DAG Working Group (DAGWG).

In 2019/20 we completed 1,458 lead communication pipe replacements. These were made up of 1,454 customer requested jobs and 4 reactive jobs (where we replaced lead pipes when these were found as a result of a failed sample at a customer's tap).

In 2019/20 we removed 62 properties from the register of properties at risk of internal sewer flooding bringing the total number of properties at risk of internal flooding to 281. This is consistent with our aim to have fewer than 300 properties on our internal sewer flooding register by 2021.

A total of 78.6% of customers are covered by flood resilience assessments, an increase of 18% from the reported position in 2018/19 of 66.4%.

During the internal assurance process, it was noted that the number of connections for new households and businesses for 2016/17 was under reported by 851 connections. The previously reported number of 21,993 has been adjusted to 22,844. The cumulative position at March 2020 is 116,233 as reported to the DAG. We have now updated the approach to reporting the number of connections using Water Utility Billing as the source to calculate the number of annual connections and the monthly reported connections. This approach is far more reliable and consistent than the previous method and should avoid any issues in the future.

There were 1,443 assets vested (Part 2 and 3) during 2019/20 an increase of 73% from the reported position of 834 in 2018/19. During 2019/20 a number of changes and refinements have been made to our processes and approach including: delivery options to complete remedial and legal work on assets where the responsibility was no longer with the developer; and a league table to encourage developers to increase the rate of vesting.

There were 12,015 wholesale meter accuracy improvements for 2019/20. These are made up of 9,085 proactive exchanges and 2,930 reactive exchanges. During our internal assurance process and following a data cleansing exercise we noted that this figure has been under reported in previous years. An adjustment has now been made in 2019/20 of

5,722 additional reactive exchanges, bringing the total claimed for 2019/20 to 17,737. We have now moved to monthly reconciliation of both market data and operational data. Although this is a lengthy process given the number of market records it produces more accurate results and we intend to continue this approach moving forward.

15 Table G3 Monitoring Serviceability

15.1 Data sources and confidence grades

The G3 table covers performance indicators relating to monitoring serviceability as follows:

- Lines G3.1 – G3.5: Drinking Water Quality Indicators
- Lines G3.6 – G3.15: Environment Serviceability Indicators
- Lines G3.16 – G3.36: Customer Serviceability Indicators
- Line G3.37 – G3.38: Resilience of Supply

The relevant targets and actual reported performance is sourced from the following areas:

- The Delivery Plan 2015-21
- Annual Return 2019
- P12 Output Activity RAG reports (OARS) for fiscal measures and P9 for calendar measures.

There are a significant number of new lines included in G3.15 for 2019/20. Greenhouse gas (GHG) emissions (G3.15a) has been reported in previous years' Annual Return and, along with lines G3.15b-f, the data is sourced from the Carbon Accounting Workbook (v13.4). This is externally verified by Carbon Forecast Ltd, who confirm that our 2019/20 Carbon Footprint is materially correct, is a fair representation of the organisation's footprint, based upon the data available, and has been calculated in accordance with the relevant UKWIR methodology.

Energy data (G3.15g to G3.15i) has also been included for the first time in the 2019/20 annual return. The data for these lines comes primarily from meters that record our generation and consumption. The confidence grade for the data is A2 - sound records, procedures, investigations, or analysis properly documented and recognised as the best method of assessment and the accuracy range is +/- 5% to +/- 1%.

Finally, the reduction in energy use (G3.15j) and the total annual grid electricity use (G3.15k) have been added to the G3 table this year. Measures have been undertaken at a number of sites to enable the capacity of these sites to reduce energy use as detailed in the table below.

Table 44: Energy Efficiency projects

Project Name	GWh	Project Name	GWh
<i>Wastewater Efficiency Projects</i>		<i>Building Efficiency Projects</i>	
SP042 - Project 45 Philipshill RTC	0.423	FMH office - LED lighting upgrade as part of refurb	0.102
SP043 - Project 46 Erskine RTC	1.300	<i>Water Efficiency Projects</i>	
SP047 - Daldowie NTF Pump Overhaul	0.462	Auchneel (LED Lighting)	0.072
SP084 - Kirkcaldy WWTW Interstage PS VSDs	0.136	Westray (LED Lighting)	0.068
Dalmarnock Instrumentation	0.140	Blairlinnans (LED Lighting)	0.001
Daldowie Pump Overhaul	0.462	Belmore (LED Lighting)	0.011
Tyndrum DO probes	0.200	Mannofield - (Scada Modification for TRIAD)	0.004
Forth Valley SAF Timers	0.035	Cnoc Dubh (Treated Water Pumps and Pipework)	0.003

Project Name	GWh	Project Name	GWh
Lanark STW Lane 3 Refurb	0.087	Castle Moffat (LED Lighting)	0.000
Kishhorn Uig SAF Timers	0.035	Glassford WTW (Carnduff TWP VSD's)	0.007
Drymen Trace Heating	0.089	Whitehillocks WTW (LED Lighting)	0.000
Philipshill Heating	0.067	Glenfarg WTW (LED Lighting)	0.003
Glenmore Isolation Valve	0.022	Dhu Loch / Rothesay (LED Lighting)	0.001
SP0010 - Ardoch Blower Replacement	0.160	Lawhead TWP (VSD)	0.003
SP0016 - Forth Sites Various Heating	0.080	Killiecrankie (LED Lighting)	0.001
Cupar Replacement Blowers	0.324		
Carbarns Washwater Upgrade	0.130		
Dunbar Coarse Air Blowers	0.500		
SP0032 - Hamilton	0.560		
Stirling Instrumentation	0.143		
Dunfermline RAS Pumps	0.032		
SP050 - Perth RTC	0.395		
SP008 - Perth Blowers	0.230		
TOTAL		6.3GWh	

15.2 Data improvement programmes

There have been no notable data improvement programmes associated with the data used to populate the G3 tables.

15.3 Assumptions used for forecast data

There is no forecast data for the G3 tables.

15.4 Key changes from 2018/19

Overall, there has been a general improvement across the indicators reported in table G3. Where there has been a significant change in performance during 2019/20 this has been highlighted in the table below.

Table 45: Summary of changes from 2018/19 to 2019/20

Table Ref	Description	2018/19	2019/20	Variance (deterioration)/ improvement in performance
<i>Drinking Water Quality Indicators</i>				
G3.1	Number of failing zones for iron	29	21	28%
G3.2	Number of failing zones for manganese	15	10	33%
G3.3	Number of microbiological failures at WTWs	24	32	(33%)
G3.5	Number of Customer Contacts relating to Discolouration	6,101	7,111	(17%)
<i>Environment Serviceability</i>				

Table Ref	Description	2018/19	2019/20	Variance (deterioration)/ improvement in performance
G3.6	Number of failing WWTW	2	3	(50%)
G3.11	Serious pollution incidents (sewerage) Cat 1 & 2	9	5	44%
Customer Service Serviceability				
G3.16	Properties on the low-pressure register	51	37	27%
G3.17	Properties with unplanned interruptions to supply > 12 hrs	357	302	15%
G3.17a	Properties with unplanned interruptions to supply > 6 hrs	4,989	5,604	(12%)
G3.18	Number of hours lost due to water supply interruptions for three hours or longer	0.391	0.300	23%
G3.19	Bursts per 1,000km of mains	172	150	13%
G3.26	Incidents of external sewer flooding due to overloaded sewers	116	407	(251%)
G3.28	Maximum Number of 'Second Tier' Complaints Referred to Scottish Public Services Ombudsman	0	1	(100%)

The reduction (circa 30%) in the number of zones failing for iron and manganese (G3.1 and G3.2) is due to the work undertaken as part of the SR15 DW5 programme.

Water Treatment Works bacteriological performance (G3.3) in 2019 was significantly affected over a 4-week period from mid-June to mid-July, where an unprecedented combination of torrential downpours aligned with unusually warm temperatures brought severe challenges to our Treatment works capabilities / storage system integrity, and resulted in 12 of the years 32 coliform detections (37.5%). As a result, increased energy has been brought to both understanding and resolving integrity issues with our Clear Water Tank asset base and building enhanced Water Operational System Plans to ensure treatment performance is fully maximised prior to the delivery of any planned investment.

The table below provides a comparison of the performance in microbiological water quality for treatment works, service reservoirs and customer taps in 2018 and 2019

Table 46: Performance in microbiological water quality based on regulatory samples

Sample location	Parameter	2019 fails	2019 Compliance	2018 fails	2018 Compliance
Treatment works	Coliforms	32	99.88%	24	99.91%

	<i>E.coli</i>	3	99.99%	0	100%
Service reservoirs	Coliforms	72	99.85%	66	99.87%
	<i>E.coli</i>	6	99.988%	2	99.996%
Customer taps	Coliforms	37	99.75%	42	99.72%
	<i>E.coli</i>	2	99.99%	3	99.98%

There has been an overall improvement in the Chemical sampling compliance results for samples taken from customer taps during 2019 (137,738 samples). This is detailed in the table below.

Table 47: Comparison of chemical sampling compliance results at customer taps for 2018 and 2019.

Parameter	2019 fails	2019 Compliance	2018 fails	2018 Compliance
Trihalomethanes (THMs)	3	99.80%	8	99.50%
Iron	37	99.29%	36	99.34%
Colour	0	100%	0	100%
Manganese	10	99.81%	17	99.69%
Aluminium	0	100%	6	99.89%

Further information on drinking water quality can be found in the DWQR Annual Report 2019 (<https://dwqr.scot/media/45503/annual-report-public-supplies-main-report.pdf>).

The increase in discolouration contacts (G3.5) for 2019/20 is impacted by the change in system from Promise to Dynamics. Now individual contacts can be classed as multiple issues.

There were 5 category 1&2 (sewerage) pollution incidents (G3.11) compared to 9 incidents last year. Where such incidents occur, a full analysis of root cause is undertaken to inform any required improvement plans. The number of category 3 pollution incidents increased in 2019/20 from 210 to 218. Further information on wastewater pollution incidents can be found in the OPA 2020 submission.

The number of category 1 (water) pollution incidents (G3.12) remained unchanged at 0 this year while the number of category 1&2 incidents increased in 2019/20 from 0 to 2. Further information on water pollution incidents can be found in the OPA 2020 submission (SW AR20 – OPA Reporter’s Report 2020 v3 (final to WICS and SW 04 05 20)).

Targeted investment for the Whiting Bay WSZ project removed 11 properties in October and completion of Balbeuchly WSZ project providing operational changes removed a further 6 properties (G3.16) from the low-pressure register. With 3 properties added in Marchbank Hermiston WSZ, this gives a net improvement of 14.

There has been an overall increase in the number of interruptions to supply (G3.17, G3.17a and G18) of around 10%. However, in 2019/20 there has been an increased focus on reducing the duration of interruptions and this effort is reflected in a reduction in the number of long-term interruptions (>12 hours, G3.17). The table below provides further detail on the changes in the number of properties that experience unplanned interruptions to supplies compared to the previous year

Table 48: Changes in number of properties experiencing interruptions to supplies in 2019/20 and 2018/19

Interruptions to supplies	2019/20	2018/19	Variance
Properties interrupted for 6 to 12 hours	5,302	4,632	670
Properties interrupted for 12 to 24 hours	265	338	-73
Properties interrupted for more than 24 hours	37	19	18
Total number of properties interrupted for more than 6 hours	5,604	4,989	615
Total number of properties interrupted for more than 12 hours	302	357	-55
Total 'weighted' properties interrupted for more than 6 hours	5,980	5,384	596

The number of incidents of external sewer flooding due to overloaded sewers (G3.26) saw a 251% increase in 2019/20 compared to 2018/19. Scotland experienced a number of intense storms over the summer period resulting in the highest number of Internal and External Investigations in a reporting year since the beginning of SR15. Our priority is to investigate sewer flooding for customers who have been flooded internally leaving limited capacity to verify external flooding events. As a consequence, the "Annual number of incidents of external flooding due to overloading (all sewers)" is based on the number of reported but unverified incidents. However, the number of properties on our "at risk sewer flooding register" this year (G3.20) saw an 8% decrease in 2019/20 compared to 2018/19 (from 307 to 281 properties).

Our "satisfactory sludge disposal" compliance (3.14) remains at 100%. Within our Annual Sludge Register for 2019, we recycled 53,566 wet tonnes of sludge to agricultural land. This includes 8,557 wet tonnes that was produced in 2018 and stockpiled, prior to spreading in 2019. The 2019 register was issued to SEPA in March 2020 and will be reviewed for compliance with the Sludge (Use in Agriculture) Regulations 1989. We will seek SEPA's confirmation of the position later this year.

We received one 2nd tier complaint (G3.28) in 2019/20 compared with 0 in 2018/19 and three in 2017/18. The complaint related to communication between 2 customers with similar names with information being issued to the wrong customer.

This years' performance for each OPA indicator (G3.30) is summarised in the table below which compares it to last year's performance as outlined in the AR19 submission.

Table 49 Summary of changes in the OPA indicators scores from 2018/19 to 2019/20

Indicator	AR20 OPA Score	AR19 OPA Score	Change
% of properties subject to inadequate water pressure	37.41	37.37	0.04
Connected properties experiencing unplanned interruptions	36.44	36.68	-0.24
Hosepipe restrictions	12.50	12.50	0
Security of Supply absolute performance	11.25	11.25	0
Security of Supply performance against target	12.50	12.50	0
% of water samples that comply with parameters	43.58	42.09	1.49
Leakage	12.50	12.50	0
Water Service (sub-total)	166.18	164.89	1.29
% properties suffering sewer flooding incidents caused by overloading	24.84	25.00	-0.16
% properties suffering sewer flooding incidents caused by other causes	37.50	37.50	0
Sewer flooding (at risk)	12.50	12.50	0
Sewerage Service (sub-total)	74.84	75.00	-0.16
Category 1 & 2 sewage EPIs	25.00	23.90	1.10
Category 3 sewage EPIs	10.59	10.75	-0.16
Category 1 & 2 water EPIs	11.27	12.50	-1.23
Sewage sludge disposal	12.50	12.50	0
Number of non-compliant sewerage treatment works	47.00	48.00	-1.00
Environmental Performance (sub-total)	106.36	107.65	-1.29
Customer contact (Total of complaints and telephone performance)	17.65	18.13	-0.48
Assessed customer service	37.50	37.50	0
Customer Service (sub-total)	55.15	55.63	-0.48
Total	402.53	403.16	-0.64

The overall hCEM (**3.33**) score saw an increase of 0.49 points from 2018/19. The table below provides details of points gained and lost across each component. Further information on hCEM can be found in our hCEM 2020 submission (Scottish Water AR20 hCEM Reporter's Report 2020 v2 (Final to WICS and SW 04 05 20)).

Table 50: Details of the component elements of the household Customer Experience measure and the points gained from previous year

Measure	2019-20		2018-19		Points gained from 2018-19
	Input	Points Lost	Input	Points Lost	
Quantitative elements					
Service issue contacts	295,135	4.80	309,362	5.08	0.28
All lines busy and calls abandoned	13,008	0.42	6,973	0.23	-0.19
Written complaints	384	1.25	484	1.59	0.34
Regulatory upheld complaints	1	0.03	0	0	-0.03
Qualitative elements					
Customer experience survey	93.29%	1.96	92.32%	2.24	0.28
No experience – no contact	93.75%	1.09	94.43%	0.98	-0.11
Experience – no contact	79.23%	2.42	79.93%	2.34	-0.08
Total points lost		11.98		12.46	0.49

The overall nhCEM (3.34) score saw an increase of 3.45 points from 2018/19. The table below provides details of points gained and lost across each component. Further information

on NHCEM can be found in our nhCEM 2020 submission (Scottish Water AR20 nhCEM Reporter's Report 2020 v2 (Final to WICS and SW 04 05 20))"

Table 51: Details of the component elements of the non-household Customer Experience measure and the points gained from previous year

Measure	2019-20		2018-19		Points gained from 2018-19
	Input	Points Lost	Input	Points Lost	
Quantitative elements					
Service issue contacts	45,269	3.09	59,818	4.09	1.00
Escalations	162	1.10	305	2.08	0.98
Written complaints	189	2.58	199	2.72	0.14
Regulatory upheld complaints	0	0	1	0.14	0.14
Qualitative elements					
Developer services satisfaction score	62.84%	4.48	64.5%	4.46	-0.02
Licensed providers satisfaction score	95.44%	0.75	90.8%	1.59	0.84
Business end user satisfaction score	90.08%	2.81	87.6%	3.18	0.37
Total points lost		14.81		18.26	3.45

The wholesale key performance indicators (KPIs) (3.36) saw a very slight decrease in performance this year compared to 2018/19 (0.3%). In 2019/20 we completed 98.1% of licensed provider requested tasks within the required Operational Code KPI timescales.

16 Table G4 OMD Inputs

Table G4 shows the enhancements under the Q&S4 programme by Overall Measure of Delivery (OMD) grouping. The number of outputs recorded is split by the following 5 delivery milestones by quarter:

- Milestone 1: Feasibility
- Milestone 2: Approval of Financial Budget
- Milestone 3: Start on site
- Milestone 4: Scottish Water's internal acceptance of beneficial use to customers
- Milestone 5: Regulatory sign-off

The data reflects the cumulative actual and forecast position by year over the 2015-21 period. The data also reflects the position recorded in the milestone outputs graphs presented to the Delivery Assurance Group (DAG) Working Group in May 2020. The DAG and associated Working Group are tasked with monitoring the capital programme and delivery of Ministers objectives, with progress subsequently reported to Scottish Ministers.

There are no confidence grades for the G4 table. Further information on the OMD position and progress in the delivery of the Capital Programme can be found in the DAG reports, which are provided quarterly to the Delivery Assurance Group and associated Working Group. The DAG reports are published on the Scottish Government website (<https://www.gov.scot/groups/output-monitoring-group/>).

17 Table G5 Growth

17.1 Data sources and confidence grade

These lines show the expenditure Scottish Water has incurred or is forecast to incur on growth for the SR15 programme. All data has been sourced from the FAB financial system including the general ledger, projects, ledger, Accounts Payable records (payments to vendors) and the Water Utility Billing customer billing & management system.

The report has been produced using the same methodology as G1 with the projects actual expenditure taken from our financial systems and the forecast expenditure taken from Primavera. The % allocation assigned to each project has been taken from the systems which hold Scottish Water's CAPEX gateway approval forms. Most projects are assigned 100% to growth but there may be significant growth investment delivered as part of large quality schemes.

The total Growth expenditure shown on table G5 aligns with the total Growth on table G1.

At the start of the SR15 period, projects were set up for each unitary authority, water/wastewater and household/non household. This allows G1.9, G1.10 and lines G5.1, G5.2, G5.4 and G5.5 to be populated from the resultant outputs.

17.2 Data improvement programmes

There is no general data improvement programme but in April 2020 the Astro system was launched, replacing Optimum, which manages the new connections, income generation and reasonable cost contributions (RCC) provisions and payments. The new application, combined with the existing financial data sources, will enhance the data for connections and RCC in future years

17.3 Assumptions used for forecast data

All forecasts are based on the position prior to the Covid-19 pandemic.

17.4 Key changes from 2018/19

Total Net Growth Expenditure is £53.2m in the year and is forecast to be £264.7m in SR15 (G5.25). IR18 investment has been assigned to the appropriate areas. This includes £19.4m of work carried over into SR21. The reconciliation for the reduction in expenditure for 2019/20 compared to 2018/19 (£274.8) is provided in the table below.

Table 52: Reconciliation in net growth

Net Growth AR19	274.8
Reallocation of demand risk to Exceptional CM	-11.4
Increase in forecast cost IR18 Post 2021	4.4
Reduction in inflation	-0.3
Increase in growth income (infra charge)	-2.8
Net Growth AR20	264.7

The data reported in lines G5.44 and G5.45 represents the increase in strategic capacity delivered, or forecast to be delivered, by all relevant projects with the exception of any Infra Charge projects. In these completed tables the reported data has been intentionally matched to lines G2.1 and G2.2.

18 Table G6 Project Analysis – Actuals & Forecast – Water & Wastewater

The datasets used to create tables G1, G2 and G4 are taken from our corporate systems and are then also used to complete this table. The data in this table is consistent with our end of year reporting to our Board. The table analyses the 2015-21 programme by individual Project (by Row), detailing out Investment, Outputs and Dates (by Column).

Column 1 - Contains the unique project auto code number.

Column 2 - Contains the Project Title.

Column 3 - Contains the Q&S Period for each project. This is a project level assessment – some projects may have split funding.

Column 4 - Contains the group each project belongs to and is used to allocate project ownership and project type.

Column 5 - Contains a more detailed view of programme groupings.

Column 6 - Shows the split project ID to allow projects with multiple outputs to be shown

Column 7 – Shows the output group for the split projects

Column 8 – Shows the split between water, wastewater and general

Column 9 - Contains the Technical Expression sign-off owner (if required).

Column 10 - Contains the internal delivery vehicle assignment.

Column 11 - Contains a subset of Programme Grouping.

Column 12 – Shows the current milestone stage.

Column 13 - 17 Show the forecast Milestone dates.

Column 18 – Contains the Local Authority area each project falls into if it has one location.

Column 19 to 25 –Contain the project expenditure analysed by financial year.

Column 26 – Contains the total actual or forecast project expenditure to March 2021.

Column 27 - Post 2021 project expenditure

Column 28 - Grand total project expenditure.

Column 29 – Contains the Table K budget allocation. This is in outturn prices and reflects Table K with additional budget for contributions and allocations from elsewhere in Scottish Water. In many cases, projects that were originally identified in Table K have been split into multiple projects or aggregated to form larger projects. Although we do assess the programme cost compared with the Table K allocation, this is generally done at sub-programme and programme level.

Column 30 & 31 – Contain the infrastructure & non-infrastructure grants received.

Column 32 & 33 – Contain the infrastructure & non-infrastructure contributions received.

Column 34 – Contains the impact of projects on operating expenditure.

Column 35 – This has not been populated as any project with a regulatory output will require regulatory signoff or equivalent.

Column 36-55 – Contain the project's drivers and allocations as confirmed through the CAPEX approvals process.

Column 56 – 105 – Contain the low-level output groups and show the project level allocation of outputs. Due to our management of the outputs at output level and multiple projects potentially delivering an output, it is not possible to reconcile this data with G2/G4.

19 Table G7 Asset Maintenance

19.1 Data sources and confidence grade

Asset maintenance is comprised of repair, refurbish, replacement and inspection related activities. Some of these are carried out in a responsive manner due to unexpected and immediate asset failures while others are delivered in a planned and scheduled manner. The full definitions for the terms above can be found in the document “Section G definitions 2019-20”.

Table G7 provides the first analysis of asset maintenance activities using the definitions of asset maintenance we have developed and covers expenditures in 2019/20.

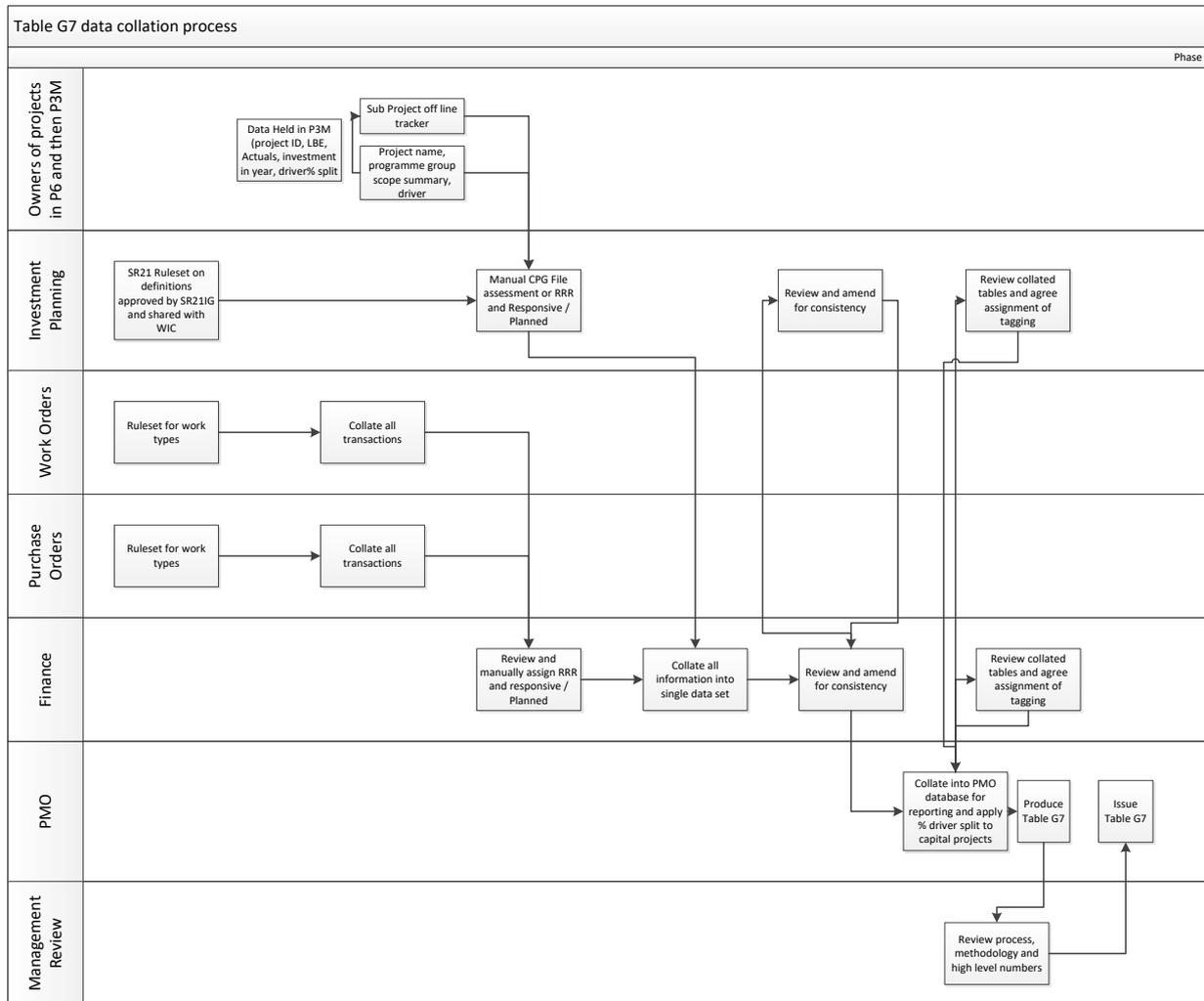
The source of the financial data within the G7 table is from the corporate financial ledgers and is therefore considered to be robust and has a full audit trail. Costs associated with asset maintenance are within the existing capital programme and also within operational expenditure. These data sources have been analysed to support the completion of table G7.

Table G7 analyses costs incurred during 2019/20 from these two sources but considerable judgment has been required in the allocation of costs within the table as the data capture processes have not yet been fully established and embedded within our core systems and processes. The level of confidence in the analysis is therefore C5 +/- 25%-50%.

This low confidence grade is predominantly associated with the manual allocation of expenditure to the separate categories within the table as this has required analysis, judgement and cross validations from a number of existing data sources. However, there may be some cost elements missing that are included with our current operational costs including digital and telemetry cost categories. Figure 1 provides a diagram of the data collation and analysis process applied in completing the G7 Asset Maintenance table.

Confidence in the analysis will increase in the future as the changes to data capture processes become established

Figure 1: Data Collection Flow Process



19.2 Data improvement programmes

There have been no notable data improvement programmes associated with the data used to populate the G7 table.

19.3 Assumptions used for forecast data

Figure 2 sets out the allocation of planned and responsive activities (for maintenance, enhancement and growth) against the Tier 1 and Tier 2 expenditure categories. The diagram highlights whether the planned or responsive maintenance activities are inspections, repairs, refurbishments or replacements and how this affects the allocation to Tier 1 or Tier 2.

Figure 2: Tier 1 & 2 Expenditure Hierarchy Allocation

	Business Costs	Tier 1 Opex	Tier 1 Operational Business Costs	Tier 1 Operational Business Costs	
Tier 1	Other	Tier 1 RCC	Tier 1 RCC Water	Tier 1 RCC	
			Tier 1 RCC Waste	Tier 1 RCC	
		Tier 1 PFI	Tier 1 PFI	Opex PFI	
	Asset Maintenance: G7	Tier 1 RR	Responsive Water	Responsive Water	Repair
			Responsive Water	Responsive Water	Refurbish
Responsive Water			Responsive Water	Inspections	
Responsive Waste			Responsive Waste	Repair	
Responsive Waste			Responsive Waste	Refurbish	
	Responsive Waste	Responsive Waste	Inspections		
Tier 2	Asset Maintenance: G7	Tier 2 RRRR	Responsive RRRR Water	Replace	
			Responsive RRRR Waste	Replace	
			Planned RRRR Water	Repair	
			Planned RRRR Water	Refurbish	
			Planned RRRR Water	Replace	
			Planned RRRR Water Inspections	Inspections	
			Planned RRRR Waste	Repair	
			Planned RRRR Waste	Refurbish	
			Planned RRRR Waste	Replace	
			Planned RRRR Waste Inspections	Inspections	
		Planned RRRR Support	Replace		
	Quality	Tier 2 Enhance	Planned Enhance Water	PPD Enhance	
			Planned Enhance Waste	PPD Enhance	
			Planned Enhance Water Inspections	PPD Enhance	
			Planned Enhance Waste Inspections	PPD Enhance	
			Planned Enhance Support	PPD Enhance	
	Growth	Tier 2 Growth	Planned Growth Water	PPD Growth	
Planned Growth Waste			PPD Growth		
Planned Growth Water Inspections			PPD Growth		
Planned Growth Waste Inspections			PPD Growth		
Planned Growth Support			PPD Growth		

19.3.1 Capital Programme - Asset Maintenance

The majority of investment projects have the single driver of asset maintenance; “Sustaining existing high service for customers” and “Exceptional Capital Maintenance”. These output drivers are well defined, audited and robust and have been established for many years as a key part of regulatory reporting. Some projects within the capital programme have multiple drivers and therefore all projects with a capital maintenance driver are proportionally included within Table G7. Accordingly, asset maintenance for 2019/20 of £345m as reported within Table G1 is included within the G7 total of £420.8m.

Other project attributes captured at project set up allow further analysis and allocation within G7 and includes, where appropriate, a water and wastewater split and an infrastructure and non-infrastructure split. Some asset maintenance projects such as Management and General projects are included in the analysis and have been split in proportion to water and waste activities.

Asset maintenance on infrastructure assets is not considered to significantly extend the original asset life or to fully replace the existing asset is therefore considered a repair. This allocation aligns with the methodology for preparing statutory accounts. The allocation of infrastructure between planned and reactive is where judgement has been applied and relies on the combinations of project name, project development process and delivery vehicle.

The same approach for the allocation of non-infrastructure projects within the G7 table has been applied recognising that the level of judgement for the allocation between responsive

and planned maintenance and further splits between replacement and refurbishment is more subjective as the information is not currently captured at source. There is little expenditure from the capital programme which has been allocated to repairs - specific activities such as fixed wire testing have been allocated. It is this subjective allocation of the non-infrastructure asset maintenance which accounts for the lower confidence grade of C5.

19.3.2 Operational Maintenance Expenditure

In addition to capital maintenance which has been captured through the in-year investment within the capital programme, there are asset maintenance costs captured through operational expenditure equivalent to £75.8m. This expenditure is captured against the operational sites and has a good level of confidence in the allocation on Table G7. These operational costs are captured within the corporate financial ledger against specific sites (cost centres) with specific allocation to account codes which together provide a robust basis for analysis. These costs are all allocated to repairs as the activities are all associated with operational repairs and maintenance.

Judgement has been applied to the allocation between planned and responsive activities and it is this aspect which reduces the level of confidence in the analysis. In addition to cost centre and account codes, data capture within Ellipse work orders and their associated standard job types have also been used in the allocation of costs with table G7 and provide an additional basis to allow the allocation between responsive and planned activities. Some work order and account code descriptions do not provide sufficient analysis for defined allocation and these costs have therefore been allocated in proportion to the known activities. The main cost categories which have been identified within the operational sites for inclusion with asset maintenance are external contractor costs, internal materials, supplies and services and operational staff costs. In future years further cost analysis will be undertaken to increase the completeness of operational asset maintenance costs and may need to include asset maintenance activities on digital and telemetry cost centres and account codes.

19.4 Key changes from 2018/19

Asset Maintenance costs as analysed on table G7 shows total costs of £420.8m with £199.2m being delivered responsively and £221.6m in a planned manner. Tier 1, responsive repair, refurbish and inspections, expenditure is £161.5m of which £62.5m is associated with responsive operational repair and maintenance costs and £99m responsive repair and refurbishment as reported through the capital programme. This £99m responsive repair and refurbishment as reported through the capital programme is significantly lower than the original estimate of between £130m-£150m. This reflects the following:

- There may be significant variability in year-to-year responsive refurbishment expenditure;
- We expect that the level of responsive refurbishment expenditure will generally rise as assets age; and
- The difficulties encountered in distinguishing between responsive refurbishment and responsive replacement from the current project names and attributes

2019/20 is the first year that Table G7 has been populated. The source of the information is robust but further work remains to ensure both the completeness of asset maintenance costs

and allocation of the costs in accordance with the definitions. The experience of completing table G7 in 2019/20 in advance of the SR21 period will assist us in developing business processes to capture activities in manner which will facilitate future reporting and planning.

Section H – Asset Inventory

The H tables report the number of infrastructure and non-infrastructure assets in our GIS and Ellipse inventories that were operational as of 31 March 2020 as compared to the E tables which report the number of non-infrastructure assets that were operational during the reporting period (2019/20).

20 Table H1 – Summary

20.1 Data sources and confidence grades

The sources of data for non-infrastructure and infrastructure are described in Section E of this commentary.

The method used to estimate the life expectancy of the assets remains the same as previous years and therefore there are no significant changes in the gross or net Value of Element categories. Confidence grades remain unchanged from AR19.

20.2 Data improvement programmes

This year the MEAV was calculated using the 2020 Delivery Plan update forecast of RPI inflation (2.5%). There are no other changes in the methodology used.

Changes to data quality are referred to in the other tables.

20.3 Assumptions used for forecast data

There is no forecast data for the table H1.

20.4 Key changes from 2018/19

A summary of the variances between 2018/19 and 2019/20 for the asset inventory summary can be found at the end of this section – Table H1 comparison AR19 and AR20. The significant changes are detailed in this section.

Our Annual Return gross asset valuation for 2019/20 is £74.98bn, 84% of which is from infrastructure assets.

Table 53: Changes in Gross MEAV from 2018/19 to 2019/20

Asset Type	AR19 Gross MEAV (£m)	% of total	AR20 Gross MEAV (£m)	% of total
Water Infrastructure	17,998	24.66%	18,210	24.29%
Water Non - Infrastructure	5,520	7.56%	5,518	7.36%
Wastewater Infrastructure	43,237	59.24%	44,847	59.82%
Wastewater Non-Infrastructure	6,050	8.29%	6,221	8.30%
Support Services	175	0.24%	180	0.24%
Total	72,979	100%	74,976	100%

The table below summarises the changes which incorporate a variance greater than +/- £200m or +/- 30% in any one asset category.

Table 54: Summary of Asset Category with significant variance between 2018/19 and 2019/20

Asset Category	Change (£m)	Change (%)
Sewers	1,578	3.75%
Total	1,578	

There is an increase of 1.8% in the total length of sewers reported in AR20 which has been primarily driven by an improvement in the calculation of lateral sewers. There has been an increase in the length of laterals taken from digitized GIS records, as opposed to being estimated statistically.

SCOTTISH WATER

ANNUAL RETURN INFORMATION REQUIREMENTS 2020

SECTION H - ASSET INVENTORY

Table H1: Summary

Line Ref	Description	Units	Gross MEAV AR19	% total	CG	Gross MEAV AR20	% total	CG	Variance	% Change	Explanation provided in AR20 Commentary	Units	Net MEAV AR19	% total	CG	Net MEAV AR20	% total	C G	Variance	% Change	Explanation provided in AR20 Commentary
Water Non - Infrastructure																					
H1.1	Water treatment works [101]	£m	3235.44	4.43	C4	3170.10	4.23	C4	-65.34	-2.02	Not in commentary*	£m	1075.52	26.71	C4	1021.61	26.87	C4	-53.91	-5.01	Not in commentary*
H1.2	Water storage [102]	£m	1930.55	2.65	C4	1991.23	2.66	C4	60.68	3.14	Not in commentary*	£m	786.28	19.53	C4	766.32	20.15	C4	-19.95	-2.54	Not in commentary*
H1.3	Water pumping stations [103]	£m	354.15	0.49	C4	356.17	0.48	C4	2.02	0.57	Not in commentary*	£m	138.79	3.45	C4	127.20	3.35	C4	-11.59	-8.35	Not in commentary*
Water Infrastructure																					
H1.4	Water resources [104]	£m	3388.18	4.64	C4	3414.39	4.55	C4	26.21	0.77	Not in commentary*	£m	n/a			n/a					Not in commentary*
H1.5	Water mains [105]	£m	14609.61	20.02	B4	14796.10	19.73	B4	186.49	1.28	Not in commentary*	£m	n/a			n/a					Not in commentary*
Wastewater Infrastructure																					
H1.6	Sewers [106]	£m	42125.58	57.72	C4	43703.31	58.29	C4	1577.73	3.75	Not in commentary*	£m	n/a			n/a					Not in commentary*
H1.7	Sewer structures [107]	£m	647.65	0.89	C4	674.01	0.90	C4	26.36	4.07	Not in commentary*	£m	n/a			n/a					Not in commentary*
H1.8	Sea outfalls [108]	£m	463.42	0.64	C4	469.40	0.63	C4	5.97	1.29	Not in commentary*	£m	n/a			n/a					Not in commentary*
Wastewater Non-Infrastructure																					
H1.9	Sewage pumping stations [109]	£m	1084.71	1.49	C4	1206.55	1.61	C4	121.83	11.23	Not in commentary*	£m	420.96	10.45	C4	423.63	11.14	C4	2.67	0.63	Not in commentary*
H1.10	Sewage treatment works [110]	£m	4739.71	6.49	C4	4790.19	6.39	C4	50.48	1.07	Not in commentary*	£m	1426.60	35.43	C4	1316.99	34.64	C4	-109.61	-7.68	Not in commentary*
H1.11	Sludge treatment	£m	225.93	0.31	C4	224.15	0.30	C4	-1.77	-0.79	Not in commentary*	£m	65.56	1.63	C4	59.60	1.57	C4	-5.96	-9.09	Not in commentary*

21 Table H2 Water Non-Infrastructure

21.1 Data sources and confidence grades

Ellipse is the source of data for the non-infrastructure values. The confidence grades have improved this year; lines H2.1 to H2.10 are A2 and lines H2.11 to H2.13 are A3.

21.2 Data improvement programmes

There have been no major improvements in the source data, however, there have been expected changes in line with continued data validation and ongoing surveys.

21.3 Assumptions used for forecast data

There is no forecast data for the H2 table.

21.4 Key changes from 2018/19

A summary of the variances between 2018/19 and 2019/20 for the asset inventory for water non-infrastructure can be found at the end of this section – Table H2 comparison AR19 and AR20. The significant changes are detailed in this section.

There has been a reduction of 3 Water Treatment Works from 235 to 232 (see table below). This has occurred due to the reduction of one works in each of Band 1 and Band 2 for SW2 Treatment Works and Band 0 for GW2 Treatment Works.

Table 55: Changes in WTW from 2018/19 to 2019/20

Category	WTW
AR19 Sites	235
Sites Non-Op	5
Site Non-SW	0
Site New	2
AR20 Sites	232

There has been an increase of 3 Water Pumping Stations from 777 to 780 (see table below). This reflects the addition of three Booster Pumping Stations. The movement in the numbers of assets in each banding is due to ongoing improvements in data quality and was expected.

Table 56: Changes in Water Pumping Stations from 2018/19 to 2019/20

Category	WPS
AR19 Sites	777
Sites Non-Op	10
Site Non-SW	0
Site New	13
AR20 Sites	780

The overall MEAV decreased to £5.518bn from £5.520bn. There were three factors that influenced this change. The first was due to changes in the Ellipse inventory which

decreased the MEAV from £5.520bn to £5.382bn. The second was due to changes in methodology, which were implemented this year, increasing the value to £5.383bn. The third and final factor involved applying inflation for 2019/20, which increased the MEAV to the reported value of £5.518bn.

There was no change in the number of reported Water Storage sites as summarised in the table below.

Table 57: Changes in Water Storage Assets from 2018/19 to 2019/20

Category	WS
AR19 Sites Reported	1313
Sites Non-Op in AR20	-11
Site Non-SW owned AR20	0
Site Newly reported AR20	11
AR20 Sites	1313

SCOTTISH WATER

ANNUAL RETURN INFORMATION REQUIREMENTS 2020

SECTION H - ASSET INVENTORY Table H2: Water Non-Infrastructure

Line Ref	Description	Units	AR19	CG	AR20	CG	Variance	% Change	Explanation provided in AR20 Commentary	Gross MEAV AR19 £m	CG	Gross MEAV AR20 £m	CG	Variance	% Change	Net MEAV AR19 £m	CG	Net MEAV AR20 £m	CG	Variance	% Change	Explanation provided in AR20 Commentary
Water Treatment Works																						
H2.1	SW0 Treatment works [201]	nr	1	A2	1	A2	0	0.00	21.4 Key changes from 2018/19	2.78	C4	2.85	C4	0.07	2.49	0.312	C4	0.279	C4	-0.033	-10.48	Not in commentary*
H2.2	SW1 Treatment works [202]	nr	1	A2	1	A2	0	0.00	21.4 Key changes from 2018/19	3.23	C4	3.31	C4	0.08	2.51	1.301	C4	1.188	C4	-0.113	-8.67	Not in commentary*
H2.3	SW2 Treatment works [203]	nr	25	A2	23	A2	-2	-8.00	21.4 Key changes from 2018/19	667.45	C4	627.09	C4	-40.36	-6.05	206.820	C4	190.813	C4	-16.007	-7.74	Not in commentary*
H2.4	SW3 Treatment works [204]	nr	160	A2	160	A2	0	0.00	21.4 Key changes from 2018/19	2373.60	C4	2343.36	C4	-30.24	-1.27	784.089	C4	746.679	C4	-37.410	-4.77	Not in commentary*
H2.5	GW0 Treatment works [205]	nr	22	A2	22	A2	0	0.00	21.4 Key changes from 2018/19	43.56	C4	44.65	C4	1.09	2.50	14.081	C4	13.209	C4	-0.872	-6.20	Not in commentary*
H2.6	GW1 Treatment works [206]	nr	4	A2	4	A2	0	0.00	21.4 Key changes from 2018/19	3.76	C4	3.95	C4	0.19	5.08	1.566	C4	1.429	C4	-0.137	-8.72	Not in commentary*
H2.7	GW2 Treatment works [207]	nr	3	A2	2	A2	-1	-33.33	21.4 Key changes from 2018/19	12.63	C4	10.98	C4	-1.66	-13.11	3.844	C4	3.423	C4	-0.421	-10.95	Not in commentary*
H2.8	GW3 Treatment works [208]	nr	19	A2	19	A2	0	0.00	21.4 Key changes from 2018/19	128.43	C4	133.91	C4	5.49	4.27	63.503	C4	64.586	C4	1.083	1.71	Not in commentary*
Water Storage																						
H2.9	Service reservoirs [209]	nr	1295	B2	1295	A2	0	0.00	No change to report	1903.65	C4	1963.66	C4	60.01	3.15	777.687	C4	757.864	C4	-19.823	-2.55	Not in commentary*
H2.10	Water towers [210]	nr	18	B2	18	A2	0	0.00	No change to report	26.91	C4	27.58	C4	0.67	2.50	8.589	C4	8.458	C4	-0.131	-1.52	Not in commentary*
Water Pumping Stations																						
H2.11	Intake (Installed pump capacity incl.	nr	100	B4	98	A3	-2	-2.00	21.4 Key changes from 2018/19	108.12	C4	103.04	C4	-5.08	-4.70	45.245	C4	36.695	C4	-8.550	-18.90	Not in commentary*

	Standby) [211]																					
H2.12	Source (Installed pump capacity incl. Standby) [212]	nr	69	B3	71	A3	2	2.90	21.4 Key changes from 2018/19	24.63	C4	26.32	C4	1.69	6.87	8.065	C4	7.654	C4	-0.411	-5.09	Not in text*
H2.13	Booster (Installed pump capacity incl. Standby) [213]	nr	608	B4	611	A3	3	0.49	21.4 Key changes from 2018/19	221.40	C4	226.81	C4	5.41	2.44	85.480	C4	82.849	C4	-2.631	-3.08	Not in text*

* A series of tables were provided in the AR19 commentary which are now superseded by this single table

22 Table H3 Water Infrastructure

22.1 Data sources and confidence grades

The confidence grades remain largely unchanged this year for the water infrastructure lines. However, Mains Potable and Mains Other have moved from B2 and B3 to A2 and A3, respectively, due to the improvements in data quality discussed in section E. The data for these lines comes from our GIS system which is our corporate system for infrastructure data where the input processes are auditable.

The number for household meters (H3.8), band 1 has reduced this year as the data source utilised was the one used to populate household billing lines in Table A1. This information is more accurate and provides consistency across the Annual Return tables.

22.2 Data improvement programmes

The correction of double counting reported in AR19 has resulted in a reduction in the length reported (H3.3) for Raw water band 1. Consequently, 9.7km were removed and applied to the correct category i.e. (H3.5) Mains other.

22.3 Assumptions used for forecast data

There is no forecast data for the H3 table.

22.4 Key changes from 2018/19

A summary of the variances between 2018/19 and 2019/20 for the asset inventory for water infrastructure can be found at the end of this section – Table H3 comparison AR19 and AR20. The significant changes are detailed in this section.

There are no significant changes to report for section H3.

SCOTTISH WATER

ANNUAL RETURN INFORMATION REQUIREMENTS 2020

SECTION H - ASSET INVENTORY Table H3: Water Infrastructure

Line Ref	Description	Units	Total Number AR19	CG	Total Number AR20	CG	Variance	% Change	Gross MEAV AR19 £m	CG	Gross MEAV AR20 £m	CG	Variance	% Change	Explanation provided in AR20 Commentary
Water Resources															
H3.1	Dams and impounding reservoirs [301]	nr	210.00	C4	206.00	C4	-4.00	-1.90	1395.15	C4	1415.34	C4	20.20	1.45	No significant changes to report**
H3.2	Raw water intake (lochs and burns) [302]	nr	299.00	C5	298.00	C5	-1.00	-0.33	34.05	C5	33.38	C5	-0.67	-1.96	No significant changes to report**
H3.3	Raw water aqueducts [303]	km	1735.88	B2	1715.09	B2	-20.80	-1.20	1958.98	B4	1965.66	B2	6.68	0.34	22.2 Data improvement programmes No significant changes to report**
Water Mains															
H3.4	Mains potable (nominal bore) [304]	km	48639.42	B2	48743.78	A2	104.36	0.21	13516.15	B4	13672.66	B4	156.51	1.16	22.1 Data sources and confidence grades No significant changes to report**
H3.5	Mains other (nominal bore) [305]	km	141.35	B3	142.62	A3	1.26	0.89	31.89	B4	33.48	B4	1.59	4.99	22.1 Data sources and confidence grades No significant changes to report**
H3.6	Communication pipes (lead) [306]	nr	57998.00	B4	56540.00	B4	-1458.00	-2.51	32.48	C4	32.46	C4	-0.02	-0.08	No significant changes to report**
H3.7	Communication pipes (other) [307]	nr	1716663.00	B4	1735158.00	B4	18495.00	1.08	961.45	C4	996.11	C4	34.66	3.61	No significant changes to report**
H3.8	Water meters [308]	nr	143908.00	A3	132835.00	A3	-11073.00	-7.69	67.64	B4	61.39	B4	-6.25	-9.23	No significant changes to report**

** AR19 commentary included line by line description highlighting the variances between years which is now superseded by this table

23 Table H4 Wastewater Infrastructure

23.1 Data sources and confidence grades

Wastewater infrastructure makes up 60% of the total Gross MEAV at £44.8bn with sewers contributing a value of £43.7bn alone.

Critical sewers have not been categorised separately for 2019/20 and have been reported together (H4.1) for the first time in AR20. This is to ensure consistency with our reporting for the Investment Planning and Prioritisation Framework (IPPF). This line also includes lateral sewers. Lateral length is based on GIS digitized data when available, with an increase of 2.6% in actual lateral based valuations in AR20. If no lateral length is available a length is estimated based on the type of property.

The combining of critical and non-critical sewers has necessitated a change in the confidence grades. The confidence grade for (H4.1) is now B2 for assets and C4 for the gross value.

23.2 Data improvement programmes

There has been an increase in the gross value reported for CSOs (H4.4) despite a reduction in the asset numbers, which is due to improvements to the screen type information held in our Ellipse system. The accuracy of the CSO capacity data used to value the assets has also been improved in AR20. However, this does not warrant a change in the confidence grade.

23.3 Assumptions used for forecast data

There is no forecast data for the H4 table.

23.4 Key changes from 2018/19

A summary of the variances between 2018/19 and 2019/20 for the asset inventory for wastewater infrastructure can be found at the end of this section – Table H4 comparison AR19 and AR20. There are no significant changes to report for section H4.

SCOTTISH WATER

ANNUAL RETURN INFORMATION REQUIREMENTS 2020

SECTION H - ASSET INVENTORY Table H4: Wastewater Infrastructure

Line Ref	Description	Units	Total Number AR19	CG	Total Number AR20	CG	Variance	% Change	Gross MEAV AR19 £m	CG	Gross MEAV AR20 £m	CG	Variance	% Change	Explanation provided in AR20 Commentary
Sewers															
H4.1	Critical sewers [401]	km	10924.08	B3	52809.92	B2	942.49	1.82	14754.97	B4	43174.32	C4	1563.60	3.76	23.1 Data sources and confidence grades No significant changes to report**
H4.2	Non-critical sewers [402]	km	40943.36	C5					26855.75	C5					
H4.3	Sewage and sludge pumping mains [403]	km	1335.18	B4	1353.01	A4	17.84	1.34	514.86	B4	528.99	B4	14.12	2.74	No significant changes to report**
Sewer structures															
H4.4	Combined sewer and emergency overflows [404]	nr	3687.00	B4	3641.00	A4	-46.00	-1.25	382.78	C5	402.48	C4	19.70	5.15	23.2 Data improvement programmes No significant changes to report**
H4.5	Other sewer structures [405]	nr	312.00	D5	312.00	D5	0.00	0.00	264.86	D5	271.52	D5	6.66	2.51	No significant changes to report**
Sea Outfalls															
H4.6	Short sea outfalls [406]	nr	1427.00	B4	1401.00	B4	-26.00	-1.82	371.78	C5	375.47	C5	3.69	0.99	No significant changes to report**
H4.7	Long sea outfalls [407]	nr	28.00	B3	28.00	B3	0	0.00	91.64	C5	93.93	C5	2.29	2.50	No significant changes to report**

** AR19 commentary included line by line description highlighting the variances between years which is now superseded by this table

24 Table H5 Wastewater Non-Infrastructure

24.1 Data sources and confidence grades

Ellipse is the source of data for the non-infrastructure values. The confidence grades have improved: lines H5.1 and H5.2 are A3 and lines H5.3 to H5.9 are A2.

Pumping station volumes have been classified as A3 due to ongoing work in the vesting programme which may influence volumes in the future.

24.2 Data improvement programmes

A cleansing/improvement review was carried out for sewage pumping stations sites (H5.1 and H5.2), which included a refresh of the site design rating. This has impacted both the volumes in bandings and the overall MEAV. For all other lines there were no major changes in the source data, aside from those that fall under our continued data validation and cleansing efforts through various initiatives and ongoing improvements in data quality.

24.3 Assumptions used for forecast data

There is no forecast data for the H5 table.

24.4 Key changes from 2018/19

A summary of the variances between 2018/19 and 2019/20 for the asset inventory for wastewater non-infrastructure can be found at the end of this section – Table H5 comparison AR19 and AR20. The significant changes are detailed in this section.

Overall, the total number of sites in this table has increased from 4,093 to 4,114. The majority of this change was due to three lines:

- (H5.1) increased by 8
- (H5.2) increased by 7
- (H5.3) increased by 6

For each line there was movement in the volumes of assets in each banding, with the most changes found (H5.1 and H5.2) due to the sewage pumping station review described above. The breakdown of sewage pumping stations, sewage treatment works and sewage treatment facilities is shown in the following tables.

Table 58: Changes in Sewage Pumping Stations from 2018/19 to 2019/20

Category	SPS
AR19 Sites Reported	2,239
Sites Non-Operational AR20	-6
Sites Non-SW Owned AR20	0
Newly Reported AR20	21
AR20 Sites Reported	2,254

Table 59: Changes in Sewage Treatment Works from 2018/19 to 2019/20

Category	STW
AR19 Sites Reported	1,835
Sites Non-Operational AR20	-2
Sites Non-SW Owned AR20	-1
Newly Reported AR20	9
AR20 Sites Reported	1,841

Table 60: Changes in Sewage Treatment Centres from 2018/19 to 2019/20

Category	STC
AR19 Sites Reported	19
Sites Non-Operational AR20	0
Sites Non-SW Owned AR20	0
Newly Reported AR20	0
AR20 Sites Reported	19

The overall Gross MEAV increased to £6.22bn from £6.05bn. There were 3 factors influencing this change. The first was due to changes in the Ellipse inventory (as outlined above), which increased the MEAV from £6.05bn to £6.06bn. The second was methodology changes, increasing the value to £6.07bn. The final influence was the application of inflation for 2019/20, which increased to MEAV to the reported value of £6.22bn. Shifts were primarily seen in lines H5.1 and H5.2 as the change in site design ratings had a direct impact on the calculation of the MEAV.

SCOTTISH WATER

ANNUAL RETURN INFORMATION REQUIREMENTS 2020 – VARIANCE TABLE

SECTION H - ASSET INVENTORY Table H5: Wastewater Non-Infrastructure

Line Ref	Description	Units	Total No. AR19	CG	Total No. AR20	CG	Variance	% Change	Gross MEAV AR19 £m	Gross MEAV AR20 £m	Variance	% Change	Net MEAV AR19 £m	CG	Net MEAV AR20 £m	CG	Variance	% Change	Explanation provided in AR20 Commentary
Sewage Pumping Stations																			
H5.1	Sewage pumping stations (in-line) [501]	nr	1838	B2	1846	A3	8	0.44	865.57	947.35	81.78	9.45	332.32	C4	332.94	C4	0.62	0.19	24.1 Data sources and confidence grades 24.2 Data Improvement programmes 24.4 Key changes from 2018/19
H5.2	Sewage pumping stations (terminal) [502]	nr	401	B2	408	A3	7	1.75	219.15	259.20	40.05	18.27	88.65	C4	90.69	C4	2.04	2.31	24.1 Data sources and confidence grades 24.2 Data Improvement programmes 24.4 Key changes from 2018/19
Sewage Treatment Works																			
H5.3	Cess & septic tanks [503]	nr	1178	B2	1184	A2	6	0.51	349.05	356.74	7.69	2.20	161.34	C4	157.19	C4	-4.16	-2.58	24.1 Data sources and confidence grades 24.4 Key changes from 2018/19
H5.4	Preliminary treatment only [504]	nr	16	B2	16	A2	0	0.00	63.55	63.67	0.11	0.18	18.62	C4	17.19	C4	-1.42	-7.65	No significant changes to report**
H5.5	Primary treatment only [505]	nr	39	B2	38	A2	-1	-2.56	81.53	83.16	1.64	2.01	33.02	C4	31.22	C4	-1.81	-5.47	No significant changes to report**
H5.6	Secondary treatment only [506]	nr	474	B2	475	A2	1	0.21	3260.15	3302.95	42.81	1.31	950.92	C4	874.12	C4	-76.80	-8.08	No significant changes to report**
H5.7	Tertiary treatment only [507]	nr	128	B2	128	A2	0	0.00	985.43	983.67	-1.76	-0.18	262.70	C4	237.28	C4	-25.42	-9.68	No significant changes to report**
Sewage Treatment Facilities by Disposal Type																			
H5.8	Sludge treatment - liquid disposal [508]	nr	1	B2	1	A2	0	0.00	4.00	4.10	0.10	2.49	0.32	C4	0.29	C4	-0.04	-11.18	No significant changes to report**
H5.9	Sludge treatment - cake disposal [509]	nr	18	B2	18	A2	0	0.00	221.93	220.05	-1.87	-0.84	65.24	C4	59.31	C4	-5.92	-9.08	No significant changes to report**
H5.10	Sludge treatment - compost disposal [510]	nr	0	A1	0	AX	0	0	0	0	n/a		0	A1	0	AX	n/a	n/a	No significant changes to report**
H5.11	Sludge treatment - dried pellet disposal [511]	nr	0	A1	0	AX	0	0	0	0	n/a		0	A1	0	AX	n/a	n/a	No significant changes to report**

H5.12	Sludge treatment - ash disposal [512]	nr	0	A1	0	AX	0	0	0	0	n/a		0	A1	0	AX	n/a	n/a	No significant changes to report**
H5.13	Sludge treatment - other disposal [513]	nr	0	A1	0	AX	0	0	0	0	n/a		0	A1	0	AX	n/a	n/a	No significant changes to report**

** AR19 commentary included line by line description highlighting the variances between years which is now superseded by this table

25 Table H6 Support Services

25.1 Data sources and confidence grades

There have been no significant changes to any of the quantity of Support Services assets reported this year, however the values in some categories have changed as a result of improvements in the application of the valuation methods. There are no significant changes to the confidence grades.

25.2 Data improvement programmes

A review of the inflation methods used for buildings valuations reported (H6.1 and H6.2) found inconsistent methods had been applied over the years. This meant the valuation had been overestimated and necessitated a consistent inflation recalculation from the baseline valuations.

As part of a data cleansing exercise the categories and values for vehicles and plant (H6.4) were updated for AR20, which means each vehicle is allocated a more accurate (Gross and Net) MEAV value.

25.3 Assumptions used for forecast data

There is no forecast data for the H6 table.

25.4 Key changes from 2018/19

A summary of the variances between 2018/19 and 2019/20 for the asset inventory for support services can be found at the end of this section – Table H6 comparison AR19 and AR20. The significant changes are detailed in this section.

Changes to the categorization of vehicles and plant (H6.4) in the source information resulted in increased difficulty in applying the correct values to individual items each year. The categories and values were updated for AR20, which provided more complete coverage of the asset stock. As a result, the gross MEAV (H6.4) increased from £51.85m to £74.57m.

SCOTTISH WATER

ANNUAL RETURN INFORMATION REQUIREMENTS 2020

SECTION H - ASSET INVENTORY Table H6: Support Services

Line Ref	Description	Units	AR19	CG	AR20	CG	Variance	% Change	Gross MEAV AR19 £m	Gross MEAV AR20 £m	Variance	% Change	Net MEAV AR19 £m	CG	Net MEAV AR20 £m	CG	Variance	% Change	Explanation provided in AR20 Commentary?
H6.1	Offices & laboratories [601]	m2 & nr	26394	B2	26394	B2	0	0.00	65.18	49.40	-15.78	-24.21	53.70	C4	40.39	C4	-13.30	-25%	25.1 Data sources and confidence grades 25.2 Data Improvement programmes
H6.2	Depots & workshops [602]	m2 & nr	30557	B4	30147	B4	-410	-1.34	15.59	11.84	-3.75	-24.04	8.32	C4	6.13	C4	-2.19	-26%	25.1 Data sources and confidence grades 25.2 Data Improvement programmes
H6.3	Control centres [603]	m2 & nr	0	A2	0	AX	0	0.00	0.00	0.00	0.00	0.00	0.00	C4	0.00	C4	0.00		25.1 Data sources and confidence grades No significant changes to report**
H6.4	Vehicles & plant [604]	£m	52	B3	75	B3	22.74	43.86	51.85	74.59	22.74	43.86	20.80	B3	20.54	B3	-0.26	-1%	25.1 Data sources and confidence grades 25.2 Data Improvement programmes 25.4 Key changes from 2018/19
H6.5	Telemetry systems [605]	% & nr	4907	A3	5062	A2	154.71	3.15	21.87	23.02	1.16	5.29	13.77	C4	3.32	B3	-10.45	-76%	25.1 Data sources and confidence grades 25.2 Data Improvement programmes No significant changes to report**
H6.6	Information systems [606]	nr	5464	A2	5237	A2	-227	-4.15	5.45	5.28	-0.17	-3.14	3.21	B2	1.85	B2	-1.36	-42%	25.1 Data sources and confidence grades
H6.7	Other Non-Operational Assets [607]	nr	30	C4	30	C4	0	0.00	14.57	15.83	1.26	8.64	13.35	C4	14.60	C4	1.25	9%	25.1 Data sources and confidence grades No significant changes to report**

** AR19 commentary included line by line description highlighting the variances between years which is now superseded by this table

