



SCOTTISH WATER

WICS ANNUAL RETURN 2020/21

Commentary

Document Control

Date	Version	Prepared by	Approved by	Sponsor
12 Oct 2021	2	Regulatory Reporting Team Leader	Regulatory Operations Manager	Strategy and Economic Regulation General Manager

INTRODUCTION

Every year Scottish Water submits an Annual Return (AR) to the Water Industry Commission for Scotland (WICS) to support them in their role in monitoring and reporting on Scottish Water's performance.

As we continue to embed the principles of Ethical Business Practice (EBP) we will work with WICS to review the AR in the context of a wider performance communication approach. In particular, our focus with WICS and all our stakeholders will be to develop the why, what and how we communicate to build trust and confidence. Part of this work will include an assessment of how we use AR data to better understand our business and how this can be best shared with our external stakeholders.

This introductory section is designed to draw links across tables and discuss emerging themes highlighted by the AR data. It will develop in the coming years.

Following discussion with WICS we have agreed that this year's focus should be on the following three areas:

- Key external impacts over 2020/21: highlighting the impacts of COVID-19 and the weather as the key emerging themes from this year's AR.
- Out-performance over the 2015-21 period: our assessment setting out the regulatory adjustments with explanations provided for each.
- Asset replacement: summarising the progress we are making and intend to make to improve our long-term forecast of asset replacement costs as this data is not currently provided in our AR submission.

KEY EXTERNAL IMPACTS OVER 2020-2021

2020/21 was an unprecedented year due to the COVID-19 pandemic. We also experienced weather challenges, particularly the warm spring, intense storms in late summer and extended freezing periods in the winter.

In line with the broader water industry¹, this year we have seen changes in the amount and patterns of water distribution, treatment and consumption and sewerage volumes. The impacts between COVID-19 and weather patterns are difficult to differentiate due to data availability (e.g., limited metered domestic information) which has been compounded by the restrictions imposed during the pandemic (e.g., access to meters for readings for non-domestic properties).

In 2020/21 we have seen a large increase in net consumption of 86 MI/d to 1530 MI/d². This has been driven by a c. 10% increase in per household consumption, increasing

¹ See for instance ['Economic impacts of COVID-19 on the water sector'](#)

² line A2.14

unmeasured household volume of water delivered³ by 114 MI/d, offset by reductions in non-household water delivered of 26 MI/d (a reduction of 7%)⁴. The cause of the overall increase in water consumption is unclear however we assume that contributing factors include a higher usage of water during the warm summer months (e.g., to water gardens) and compliance with COVID-19 guidance (e.g., stay at home requirements, home working and regular hand washing).

The challenging weather conditions in January and February 2021, with two freeze/thaw periods lasting around a fortnight each, contributed to an overall 17.6% increase in water mains bursts⁵ compared to 2019/20 and drove higher leakage during these months with a peak in Distribution Input (DI) considerably higher than previous years. However, leakage levels for the last week of the financial year were driven down to pre-Christmas levels with the overall leakage level driven slightly lower than in the previous year⁶.

The reported total volume of sewage also increased by 100 MI/d to 1083MI/d⁷. This was driven by the reported increase in unmeasured household volume which is calculated simply as 95% of the per household consumption (A2.23) multiplied by the number of properties connected to our wastewater system (A1.16). As such it takes no account of any changing use of water during the year. A more detailed analysis of these data and movements within them can be found in section 2.4 (water) and 3.4 (sewage) of the commentary.

Despite the impacts of COVID-19 on the housebuilding industry, the number of new properties connected to the water network, at 24,000, is broadly similar to last year⁸. Additional analysis highlighting where it is assumed COVID-19 has had an impact on the number of connected and billed properties can be found in section 1.4 of the commentary.

The reduction in non-household water led to a decrease in revenue of £29m, with this partially offset by the average price increase, revenue from vacant charging and other factors⁹. Wholesale activity costs increased by £33m (4%) from 2019/20¹⁰ partially driven by increases in hired and contracted services of £7m due to the cost of operating in line with COVID-19 restrictions and responding to high volumes of water mains bursts and managing leakage levels following the winter weather. Further detail on these increases can be found in section 4.2 of the commentary to the M tables.

It is widely recognised that the construction industry has been heavily impacted by the pandemic, particularly during the first lockdown period. The direct impacts on our delivery programme, both in terms of costs and delays in the delivery of projects, have been reported regularly to the Delivery Assurance Group throughout the year:(<https://www.gov.scot/groups/output-monitoring-group/>). In general terms the

³ Line A2.7

⁴ lines A2.7 and A2.10.

⁵ Line E6.19

⁶ Line A2.21

⁷ Line A3.9

⁸ Line G 5.26

⁹ Lines M7.17-22

¹⁰ Further detail can be found in the commentary on M18

shutdown, restart and ongoing productivity impacts of COVID-19 have resulted in lower investment levels than set out in the 2020 Delivery Plan; and lower than last year (£611.6m in 2020/21 compared to c£665m in 2019/20¹¹). This impact is also noticeable in the D tables in the reduction in mains cleaned (around 34%¹²) due to restricted working during COVID-19 lockdown periods. Further analysis is required to fully understand the impacts the reduction in mains cleaned may have had on customer contacts and experience.

Investment in responsive interventions has increased from last year and planned interventions have reduced, albeit that some of the movements reported in Table G7 will be due to data improvements. The reduction in planned interventions reflects the restrictions directed by COVID-19 compliant working practices, which focused resource on those essential interventions required to maintain service to customers (see section 19.4 of commentary for more detail). This was particularly noticeable during the first three months of lockdown from April to June 2020.

2015-21 OUT-PERFORMANCE ASSESSMENT

We have calculated our financial out-performance for the 2015-2021 period in accordance with the methodology set out by WICS on 16 November 2007, applied to Scottish Water's regulated business. Our assessment of financial outperformance sets out the regulatory adjustments with explanations provided for each and provides greater detail than that set out in the Performance and Prospects Report.

Out-performance has also been delivered through higher service levels. An overview of where we have delivered higher service levels than those required in the Final Determination is also set out below.

Service levels outperformance

The figures below highlight areas of service where we have consistently outperformed over the 2015-21 period, including that:

- OPA has consistently out-performed target every year and averaged over 400 over the regulatory period
- Household and non-household CEM have increased year on year
- Leakage had been 500 MI/d or lower every year of the period.

¹¹ Line G1.54

¹² Lines D5.4 and D5.5

Figure 1: Overall Performance Assessment (OPA)

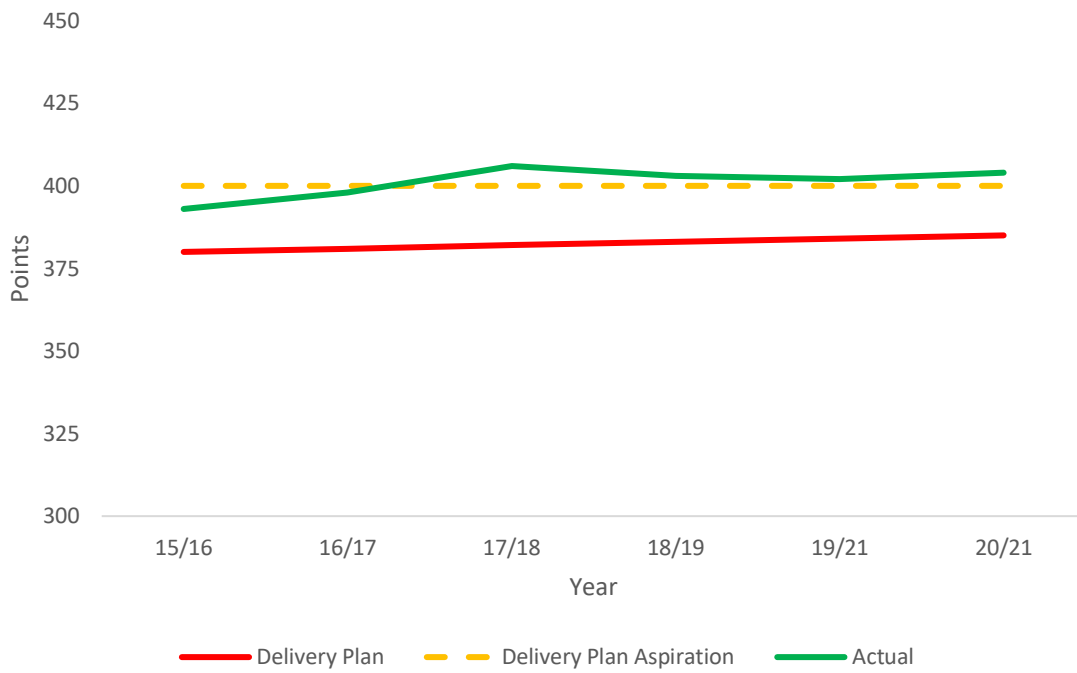


Figure 2: Household Customer Experience (hCEM)

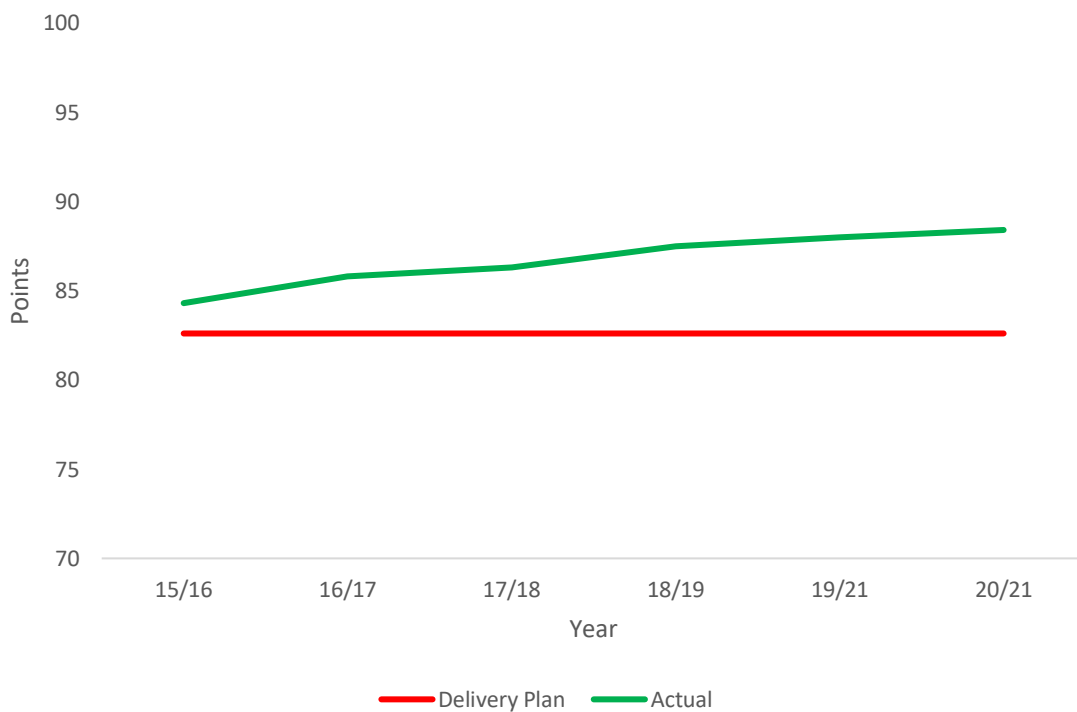


Figure 3: Non-Household Customer Experience (non-hCEM)

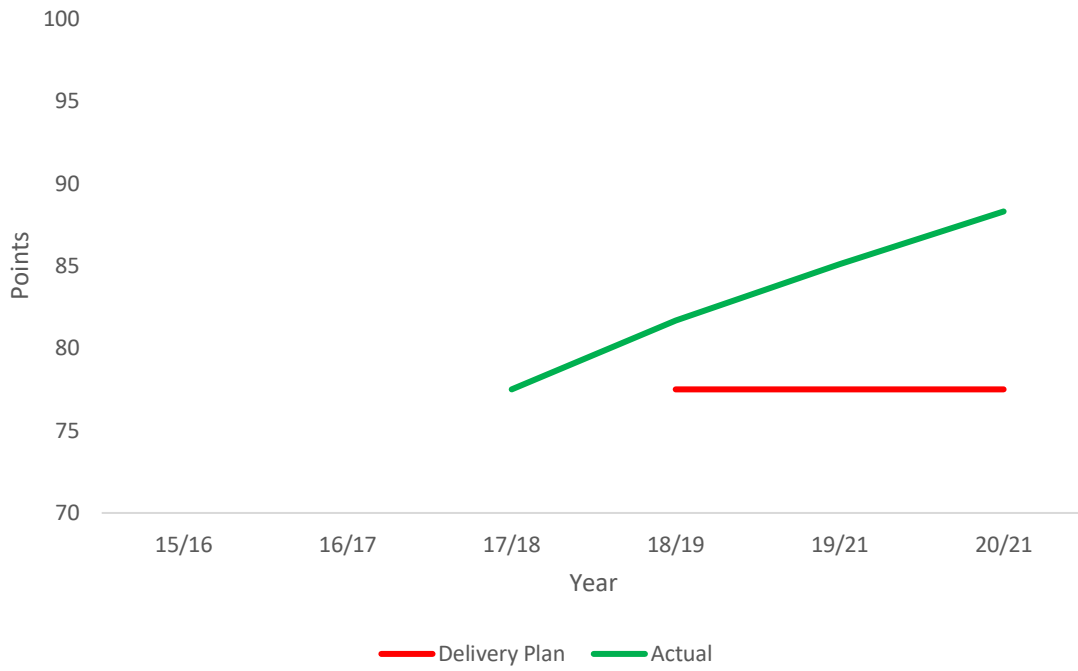
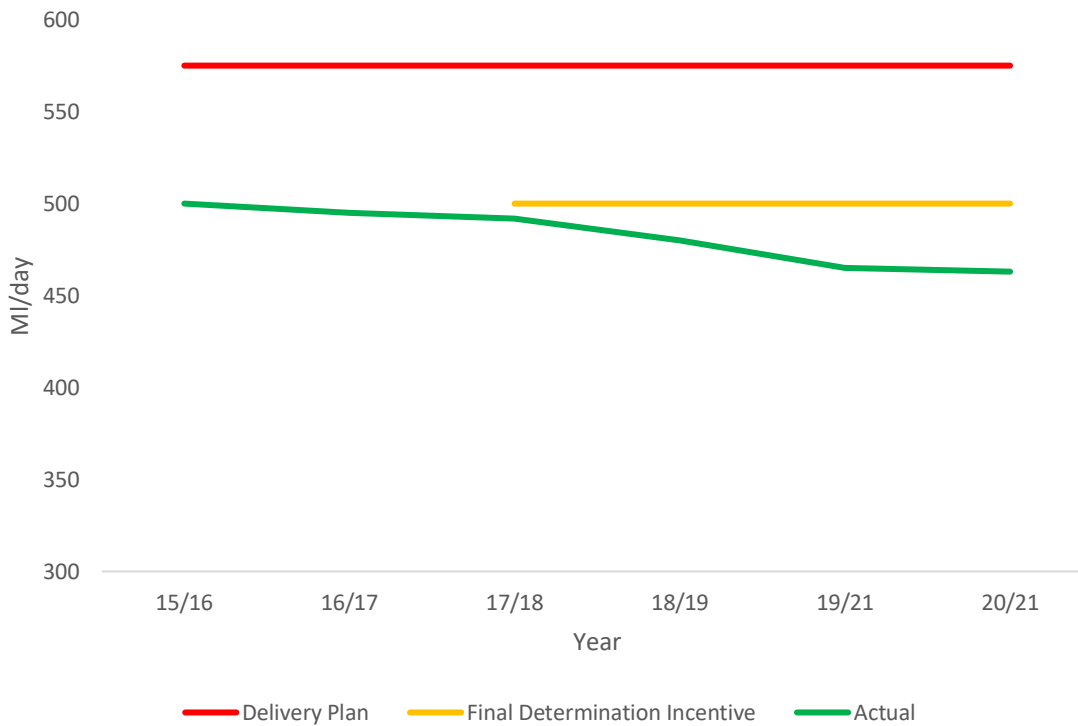


Figure 4: Average Annual Level of Leakage (MI/day)



Financial Outperformance Assessment

Each year in the AR we have set out our closing cash position relative to the Final Determination together with an analysis of what has driven the changes. Our closing cash position on 31 March 2021, at £428.7m, was £388.3m higher than the £40.4m forecast in the 2014 Final Determination (see M Tables commentary, section 5).

However, in comparing Scottish Water's closing cash balance with that allowed in the Final Determination several adjustments are necessary to reflect unforeseen events at the time of the Final Determination that were outside of Scottish Water's control.

Following these adjustments Scottish Water has generated cash out-performance against the 2014 Final Determination of £201 million.

From this £201 million, the outperformance generated in the period prior to April 2015 and used in the SR10 out-performance assessment¹³ needs to be deducted and the leakage outperformance incentive added, leading to financial outperformance for the 2015-2021 period of £202 million.

¹³ £14.1 million was used in the 2010-15 period out-performance assessment and £30.2 million was carried forward to cover costs associated with completing the 2010-15 period capital investment programme.

Financial Outperformance Assessment Summary

	£'m	Notes
Forecast cash on 31 March 2021 from 2014 Final Determination	40.4	2
<i>Adjustments</i>		
Addition for household revenue from higher annual price increases than the annual average of the 2015-21 period price limit	109.7	3a
Addition for net wholesale revenue above the wholesale revenue cap	109.6	3b
Addition for lower capital investment	43.1	3c
Addition for changes in costs outside of Scottish Water control	14.4	3d
Deduction for actual inflation relative to 2014 Final Determination assumptions	-26.0	3e
Deduction for temporary relaxation of prepaid wholesale charges due to COVID-19 market measures	-27.3	3f
Deduction for lower Scottish Water debt	-35.9	3g
Implied cash on 31 March 2021 after adjustments	228.0	4
Actual cash balance on 31 March 2021	428.7	5
2014 Final Determination less actual cash (Overall financial out-performance)	200.7	5
Deduction of out-performance generated in the period to 31 March 2015	-14.1	6
Additional of leakage incentive outperformance	15.0	7
Financial out-performance from April 2015 to March 2021	201.6	8

Explanation of approach

The assessment has been undertaken for Scottish Water's regulated business. All references in this section to Scottish Water therefore apply only to that business.

In the 2014 Final Determination, WICS expected that, on completion of the delivery of the 2015-21 ministerial objectives (Q&S3b), Scottish Water would have cash of £40.4 million.

Several regulatory adjustments are then required to incorporate unforeseen events. Details of each of these adjustments are set out below. In all cases, references to the Final Determination figures are those adjusted for out-turn inflation.

- a. Addition for household revenue from higher annual price increases than the annual average of the 2015-21 period price limit.

The Final Determination set a k factor of -1.8% across the 2010-15 period. However, the associated financial model assumed an annual k factor of -0.3%. We have therefore used the financial model assumption in this assessment. Due to the outturn on CPI inflation and the decision taken on charges in 2020/21 household revenue has been higher than assumed in the Final Determination by £109.7m as shown in the table below.

	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	Total
FD – K Factor	-0.3%	-0.3%	-0.3%	-0.3%	-0.3%	-0.3%	-1.8%
Actual – K Factor	0.3%	1.7%	0.7%	-1.4%	-0.8%	-0.6%	-0.1%
FD – H/H Revenue	806.9	808.9	819.1	848.0	872.6	891.1	5,046.6
Impact of actual K Factor on H/H Revenue	811.8	830.1	849.0	869.2	890.1	906.1	5,156.3
Difference	4.9	21.2	29.9	21.2	17.5	15.0	109.7

- b. Addition for net wholesale revenue above the wholesale revenue cap:

The Final Determination included a wholesale revenue cap. Across the 2015-21 period wholesale revenue has been £122.1m greater than forecast in the Final Determination. From this the additional costs of generating the additional wholesale revenue (£9.3m opex plus £3.2 capex) have been deducted to give a net wholesale revenue increase above the wholesale cap of £109.6m.

c. Addition for lower capital investment

The Final Determination allowed for £3,451m¹⁴ of investment to meet the objectives set by Scottish Ministers for the 2015-21 period.

Shortly after conclusion of the Final Determination, Scottish Water identified significant risks that should be addressed as a matter of priority in respect of strengthening the resilience of water supplies to customers in Ayrshire and reducing the risks to public safety from particular strategic water mains. In addition, through the 2018 investment review, normal minor changes to regulatory investment requirements, and planning for the 2021-27 period, changes were made to the base regulatory investment programme. These changes increased the regulatory investment programme by up to £219 million.

These changes to the regulatory investment programme are a normal feature of Scottish Water's investment periods. Similarly, it is normal for some elements of the investment programme to be completed after the end of the regulatory period, typically where unforeseen delays occur on a small number of projects. For the end of the 2015-21 period this was compounded by the impact of COVID-19 which caused construction sites across Scotland to be closed in spring/summer 2020. Together these have led to a range for £230 to £291 million¹⁵ of investment requiring to be completed after 31 March 2021. For this out-performance assessment we have adopted the most prudent approach of using the upper end estimate.

In addition to the impact on the timing of investment, COVID-19 has added £28.5 million to the cost of delivering the regulatory investment programme; £9.7 million from the requirement to close down and then remobilise sites during the spring/summer 2020 lockdown, and £18.8 million from the productivity impact associated with adopting new safe working arrangements to minimise the risk of catching or spreading the virus.

The additional COVID-19 costs on capital maintenance projects are estimated to be over £24m. However, while over the 2015-21 regulatory period more capital maintenance investment has been made than was allowed for in the Final Determination, these additional COVID-19 costs have not been included on this assessment. This is because prior to the pandemic, Scottish Water was forecasting to invest c. £50m more in capital maintenance than was actually invested.

The combined impact of these three adjustments is a reduction of £43.1m as set out in the table below.

¹⁴ Adjusted for out-turn inflation.

¹⁵ The costs in Table K that were to be funded from SR21 (£13.0 million outturn) have been deducted.

	2015-21	Post 31 March 2021	Total
Final determination financed investment	3,451.4	-	3,451.4
Maximum net additional investment committed in the period	219.0		219.0
Maximum investment to be completed after 31 March 2021	-290.6	290.6	0
COVID-19 cost impact	28.5	-	28.5
Adjusted regulatory investment	3,408.3	290.6	3,698.9
Change	-43.1	290.6	247.5

d. Addition for changes in costs outside of Scottish Water control:

There have been adverse and beneficial cost impacts outside of Scottish Water's control.

The final determination assumed that no corporation tax would be payable. However, following a change in tax legislation, corporation tax¹⁶ of £25.0m was paid in the final three years of the regulatory period.

On the beneficial side, rates refunds (including one for 2014/15) of £50.2m less the additional legislative driven costs highlighted in our 2020 Delivery Plan¹⁷ of £10.8m had a positive impact of £39.4m. Arguably, the £14.6 million operating cost consequences of COVID-19 could also have been offset here, but these have been absorbed by Scottish Water as part of the 'taken in the round' approach to the SR15 final determination.

The net impact has therefore increased our cash balance by £14.4m.

e. Deduction for actual inflation relative to 2014 Final Determination assumptions:

The first table below shows the inflation assumed in the Final Determination relative to the outturn for the 2015-21 period. The second table shows the impact of outturn values when applied through the 2014 Final Determination financial model to revenue, opex & PFI, and capex; and that the combined impact was to decrease our net cash generated by £26.0 million.

¹⁶ The Finance Act 2017 introduced changes that restricted the utilisation of losses carried forward to 50% of in year taxable profit.

¹⁷ The additional legislative costs are apprenticeship levy, Brexit costs, holiday pay, DWQR changes, land registration and GDPR costs.

	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21
Final Determination						
CPI - prices		1.90%	1.90%	1.90%	1.90%	1.90%
RPI – opex/capex	2.65%	2.65%	2.65%	2.65%	2.65%	2.65%
Actual						
CPI - prices		1.30%	-0.10%	0.90%	3.00%	2.40%
RPI – opex/capex	1.08%	2.14%	3.74%	3.06%	2.59%	1.21%

Increase in cash generated from inflation outturn	£'m
Revenue decrease from lower CPI	-157.8
Opex & PFI decrease from lower RPI	68.7
Capex decrease from lower RPI	63.1
Overall impact from inflation outturn	-26.0

- f. Deduction for temporary relaxation of prepaid wholesale charges due to COVID-19 market measures:

The temporary relaxation of prepaid wholesale charges due to COVID-19 measures has reduced the cash held by Scottish Water compared to the forecast in the Final Determination. The Final Determination forecast pre-paid wholesale income at 31 March 2021 of £27.5m whereas the outturn was £0.2m, a reduction of £27.3m.

- g. Deduction for lower Scottish Water debt

Scottish Water took out loans from the Scottish Government of £724 million across the 2015-21 period, which was £35.9 million lower than envisaged at the start of the regulatory period. This was because £35.9 million of Scottish Water's borrowing allowance from the Scottish Government was allocated to absorb the debt within Aberdeen Environmental Services Limited, the company that operates four wastewater treatment plants in north east Scotland under contract to Scottish Water, when it was acquired by Scottish Water Horizons Holdings in 2018.

Making the above adjustments the implied cash at 31 March 2021 was £228.0m.

As reported in table M2 our closing cash position at 31 March 2021 was £428.7m. Taking into account the above adjustments, the cash out-performance against the 2014 Final Determination is £200.7 million.

To assess financial outperformance relative to the six years from April 2015 to March 2021, the financial out-performance against the 2014 Final Determination as a whole needs to be adjusted for the opening cash position at 1 April 2015. The opening cash of Scottish Water at 1 April 2015, once the higher investment completion costs forecast in our Annual Return

2015 assessment of outperformance and timing differences are adjusted for, was £14.1 million higher than the level set out in the 2014 Final Determination, as set out in the table below.

Opening Net Debt Position at 1 April 2015	£'m
Opening cash position at 1 April 2015 relative to Final Determination ¹⁸	80.4
Lower opening debt at 1 April 2015 relative to the Final Determination	40.0
Lower capital investment in 2014/15 than assumed in the Final Determination - £65.3m of lower SR10 investment partially offset by £5.0m of higher SR15 early start investment	-60.3
Cash carried forward by Scottish Water to the 2015-21 period (and not reflected in SR10 out-performance assessment) to cover higher SR10 investment completion costs forecast in AR15 ¹⁹	-30.2
Less rates refund in 2014/15 ²⁰	-15.8
Out-performance generated in the period to 31 March 2015	14.1 ²¹

The 2014 Final Determination set an incentive to achieve leakage of 500 MI/D, with this incentive being £10.0 million if that level was achieved by 2019/20 and increasing to £15.0 million if it was achieved a year earlier. As leakage of 480 MI/D was achieved in 2018/19 (and was 500 ML/D or lower in all prior years of the regulatory period), the leakage incentive of £15.0 million is added to the outperformance assessment.

Scottish Water has therefore generated financial out-performance relative to the six years from April 2015 to March 2021 of £201.6m.

ASSET REPLACEMENT

Data to forecast asset replacement costs are not currently provided in our AR submission. We have agreed with WICS to submit our initial view after this year's submission date. In view of this we have outlined in the section below the areas of analysis we have improved this year and the areas of focus for next year.

Our analysis of the long term asset replacement costs is based on an assessment of our asset inventory (including the volume of assets and their age profile) and assumptions

¹⁸ The 2014 Final Determination assumed an opening cash position at 1 April 2015 of £265.0 million. Actual opening cash was £345.4 million, a difference of £80.4 million.

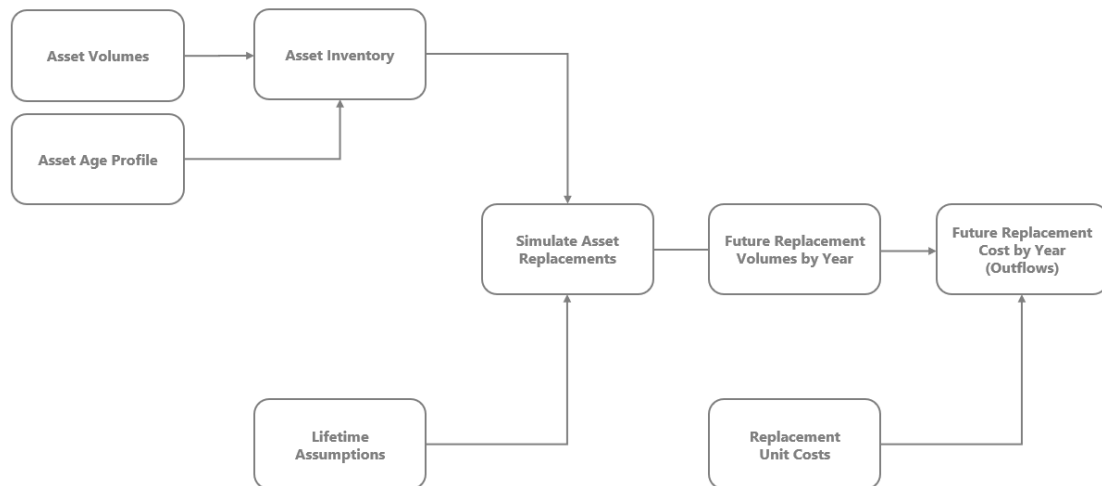
¹⁹ The 2014 Final Determination forecast the investment overhang at £260 million. Our Annual Return 2015 assessment of outperformance included a net forecast of £355.5 million, a difference of £95.5 million - £65.3m lower investment in 2014/15 than assumed in the Final Determination and £30.2m additional contribution to SR10 completion costs.

²⁰ Already accounted for above in costs outwith Scottish Water's control above.

²¹ This analysis was set out in the 2015/16 Annual Return commentary.

around the lifetime of these assets. These two elements combined allow us to calculate how many replacements we are likely to see in the future. Estimated replacement costs are then used to produce the “outflow” i.e. an estimate of our future asset replacement costs by year (figure 5).

Figure 5: Elements of long-term forecast of asset replacement costs analysis

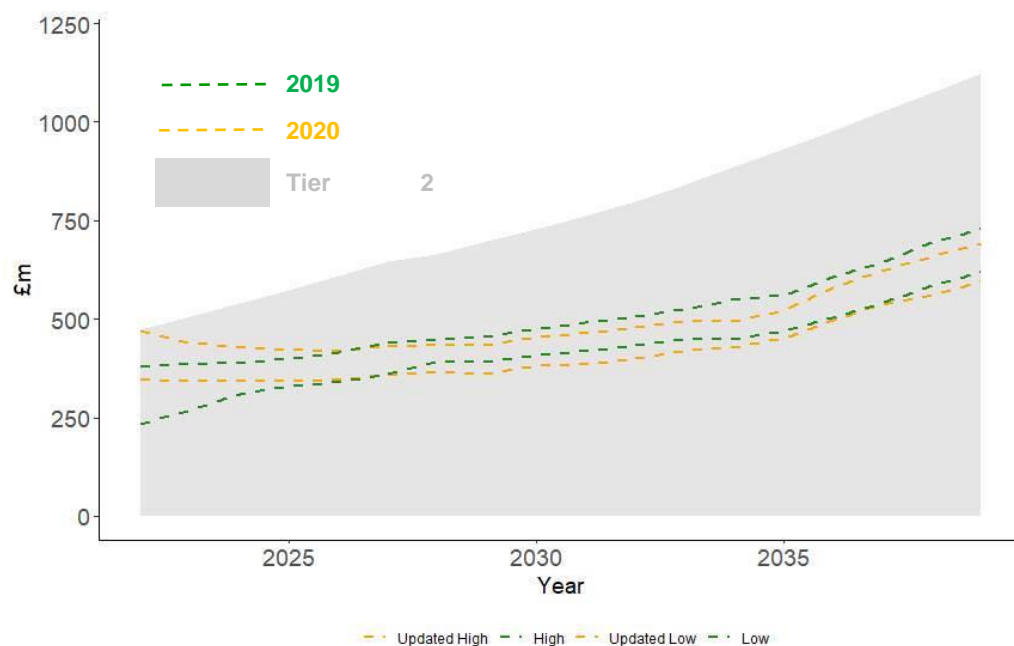


In 2020 Scottish Water produced an updated forecast of long-term asset replacement costs (figure 6). Based on the approach outlined above the update focussed on:

1. Making more granular assumptions about the lifetime of our assets and moving from one to three “age models”
2. Revising the analysis to incorporate the latest updates to the MEICA inventory
3. Revising the assumption around deferred replacements

Figure 5 below shows the forecast asset replacement costs following the incorporation of these changes.

Figure 6: Updated forecast of long-term asset replacement costs



Improvements planned for 2021 include:

1. A review of the replacement cost assumptions to identify and seek to strengthen those that are most material.
2. Updating the analysis to reflect the latest inventory and further strengthening our MEICA age profiles.
3. Further strengthening the approach to deferred MEICA replacements.

The updates we carried out in 2020 and those that we plan to carry out in 2021 are summarised in Figure 7 below.

Figure 7: Improvements to long term forecast of asset replacement costs

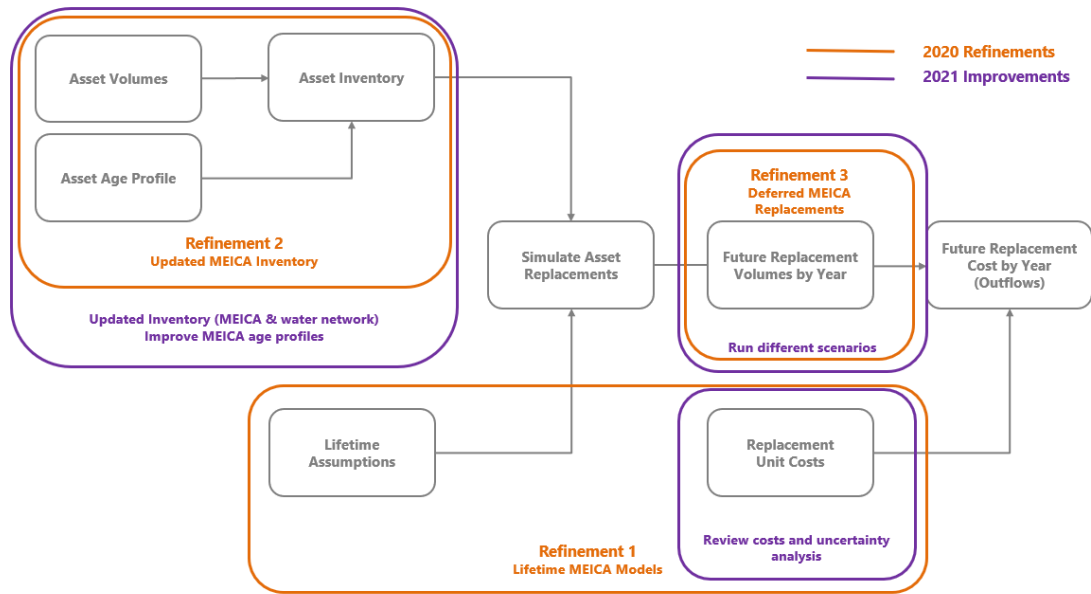


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Section A - Base Information

1 Table A1 Connected and Billed Properties

1.1 Data sources and confidence grades

The non-household figures have been sourced from settlement reports supplied by the Central Market Agency (CMA), which are loaded into the 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 2020 2nd reconciliation (R2), which was the latest available at the end of March 2021, along with the MDS file published at the same time, were used to populate the A Tables.

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

Unmeasured household property numbers are taken from the 30 September 2020 WIC4 Returns submitted by Councils.

The Unmeasured Household Billed properties (2,528,983) is the total of Billed properties and Exempt properties.

The Unmeasured Household Connected Properties (2,579,564) is the total of Billed properties, Exempt properties and Vacant properties.

Measured Household numbers have been sourced from Scottish Water's FAB billing system and give the numbers billed for water, wastewater and drainage as of 30 September 2020.

The confidence grade for Household Properties remains at B2 for AR21. The forecast has reduced to B3 because of the uncertainty around the tourist numbers, consistent with previous years' reporting.

While the household data is sourced from the Local Councils' Corporate Systems, once received by Scottish Water it is held on spreadsheets with some minor derivation required due to reporting constraints with some councils' billing systems.

The data source and methodology for trade effluent remain the same as AR20. The CMA send in the volumes via the X25 report, which is grouped by discharge point and monthly charge period, giving a better understanding of the data. The confidence grade for COD and BOD is B4 as it is reliant on Licensed Providers reading meters and providing the correct readings to calculate the volumes. The confidence grade for Billed and Connected properties remains at A2 for AR21.

1.2 Data improvement programmes

Data cleansing work to review and verify properties which are charged for water but not sewerage services was undertaken during the reporting period. The majority of such properties are correctly charged as they are in rural areas served by public water but not by public sewerage networks. This activity identified and corrected a number of properties which were found to be connected to the public sewer.

1.3 Assumptions used for forecast data

The SR21 Delivery Plan assumes zero growth in non-household revenue base and with no further data or market projects planned which will have a material impact on property numbers, Scottish Water is forecasting zero growth for 2021/22. The forecast is therefore assumed to be the same value as this year. Consideration will be given to the options for forecasting data for non-household values as we go forward into SR21.

The forecast of measured households is based on the average movement over the last 2 years.

The forecast growth for unmeasured households is based on the Scottish Water Delivery plan. For 21/22 it is assumed to be 0.65% on the current year billed properties for Water, giving an increase of 15,833 for 21/22.

1.4 Key changes from 20219/20

A summary of the variances between 2019/20 and 2020/21 for connected and billed properties can be found in the table at the end of this section – Table A1 comparison AR20 and AR21. The significant changes are detailed in this section.

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 had been stable at just over 9%, until the start of the COVID-19 pandemic. From March 2020 the vacancy rate gradually increased to a peak of 12.9% in July. This had decreased to 11% at the end of March 2021. This increase is due to businesses closing permanently and due to administrative changes carried out as a result of the Wholesale Charge Deferral Scheme introduced by WICS in response to COVID-19. As well as enabling Licensed Providers to defer a proportion of charges, estimated volumetric charges were suspended for measured supply points which were temporarily closed due to COVID-19 (so using no water) and this was administered by moving them to vacant status at the CMA. A total of 8,930 supply points were flagged as vacant under the scheme.

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

Occupancy status changes in 12 months prior to Annual Return data cut	Occupied to Vacant	Vacant to Occupied	Net change in occupied SPIDs
2017	21,855	25,241	3,386
2018	14,232	14,805	573
2019	13,336	16,670	-2,666
2020	25,695	12,590	-13,105

As a result of the COVID-19 pandemic many businesses permanently closed resulting in an increase in vacant premises. Also, in response to the pandemic WICS introduced the Wholesale Charge Deferral Scheme which enabled Licensed Providers to defer a proportion of charges and also enabled the suspension of estimated volumetric charges for measured Supply Points which were temporarily closed due to COVID, so using no water. This suspension of charges was administered by moving the Supply Points to vacant status at the CMA. A total of 8,930 were flagged as vacant under the scheme.

Disconnection numbers dropped during COVID due to government restrictions impacting the volume of field work which could be completed.

Table 1 shows the net occupancy changes by year since 2012. This does not reconcile with the data in the A tables as it's based on counts of properties whose occupancy status has changed in the period. Table 1 does not reconcile with the lines in Table A1 as these are also affected by other changes across periods such as new connections, disconnections, deregistrations and change of use. Table 1's purpose is to give an indicative view of market behaviours and trends in vacant properties.

The overall number of connected non-household properties remained similar to last year; water increased by 0.1% and sewerage increased by 0.5%. The only significant change is to vacant measured properties; measured non-household vacant properties for water (A1.4b) increased by +5,306 (60%) and measured non-household vacant properties for foul sewerage (A1.14b) increased by +4,586 (58%). These movements were the result of the COVID-19 deferral scheme, as mentioned above, and there were corresponding falls in the number of measured non-household occupied and billed properties for water (A1.4a) and foul sewerage (A1.14a).

The tables below provide a breakdown of the connected property movements by reason.

Table 2: Changes to Unmeasured Connected Non-Household Properties

Removed

	Total	Deregistered/ Permanently Disconnected	Remove Unmeasured Service Element	Unmeasured to Measured
Water	897	592	1	304
Sewerage	916	407	227	282

Added

	Total	Gap Site/ New Connection/Change of Use	Unmeasured Service Element Added	Measured to Unmeasured
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Water	681	570	0	111
Sewerage	611	446	70	95

Table 3: Changes to Measured Connected Non-Household Properties

Removed

	Total	Deregistration/ Permanent Disconnection	Remove Metered Service Element	Measured to Unmeasured
Water	1305	1193	1	111
Sewerage	1084	855	134	95

Added

	Total	Gap Site/ New Connection/Change of Use	Metered Service Element Added	Unmeasured to Measured
Water	1631	1326	1	304
Sewerage	1975	1617	76	282

The larger increase in measured sewerage properties relative to water was the result of the data cleansing work described in the data improvement programmes section.

Non-household permanent disconnections (A1.37) decreased from 388 to 205. This is due, in part, to last year's figure being high but is also assumed to be a result of COVID-19 restrictions. However, determining the impact of each variable is not currently possible. Field work had been put on hold where access to premises was not possible, either due to closure or due to Government COVID-19 guidance, especially during the first lockdown period.

Non-household water and wastewater properties (A1.38-A1.40) de-registered from the market have decreased by -2,959. This is due to improved market data, leading to less corrections, and the impact of COVID-19 on field work, as stated above.

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. Those supply points 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	100	16	
Demolished	80	87	130
Domestic	890	647	42
Duplicate SPID	51	31	51
Merged Property	223	209	541
No Drainage			90

De-registered Properties			
Categories	Water	Wastewater	Drainage Only
No Sewerage Connection		99	
No Water Connection	112	0	
Other	124	82	79
Grand Total	1580	1171	933

The number of non-household properties (A1.41-A1.43) temporarily transferred successfully to Scottish Water has increased from 58 to 88 properties for water, from 61 to 95 for wastewater and from 3 to 7 for drainage-only properties. Numbers have increased each year since the process was introduced in April 2018 and were relatively high at the start of 2020. Volumes have since decreased due to the impact of COVID-19 on legal work; mainly from Court closures and adaptive changes in debt recovery processes. Business Stream is still working through a large volume of approximately 800 accounts that are prospective transfer candidates, with potential increases to be expected as and when debt recovery processes fully resume. The pending volume refers only to those applications which are works-in-progress or pending review with an outcome to be determined.

Unmeasured Billed Household property numbers increased less than forecast (Water - 18,414, Waste - 17,518). This is in line with the increase in properties registered at the Scottish Assessors Association (SAA) with the increase to September 2020 being c15k as opposed to an average of 21k per year over the previous 3 years. It is assumed this is due to the impact of COVID-19 on the Construction Industry.

The Connected Unmeasured Household Properties movement (Water - 16,372, Waste - 15,636) is lower than Billed Household as previously connected properties move from vacant (void) into charge.

Measured Households Billed property numbers continued to reduce (from 387 to 369) as customers switch to Council Tax based charges which they determine to be more economical for them.

The number of billed properties for Trade Effluent has decreased slightly this year where the connected number of properties has increased. This reflects the fact that Scottish Water continues to issue an increasing proportion of "Letters of Authorisation" to small dischargers, rather than full consents. Letter of authorisation consent volume only and these properties are not billed as trade effluent.

The total BOD load receiving secondary treatment reported has decreased from 13,848T/yr to 10,446T/yr (A1.35). However, whilst the volume is similar to last year there are no clear discharge points that have led to the change in load. The strength at each individual discharge point varies each year, as there are often a small number of samples

and an extreme result can impact on the average. The sites²² with the top three increases and decreases in loads for AR21 are listed below:

Top three load increases:-

- Site 15037A – volume increased by 1,500m³. Strength changed from 300mg/l to 68,500mg/l due to one of the samples being very strong (the corresponding settled BOD of the samples was 91,576mg/l and 854mg/l which gives an average sBOD of 46,215mg/l which becomes 68,491mg/l when converted to tBOD using the standard methodology of multiplying the sBOD by 1.482. For comparison, the maximum permitted level is 4,000mg/l), and only two samples taken out of the four scheduled as a result of COVID-19 restrictions. The increase in volume and strength resulted in the annual load increasing by 640T.
- Site 0092B - volume reduced by 140,000m³ but strength changed from 100mg/l to 700mg/l. This change in strength caused the annual load to increase by 414T. This customer had periods of closure - approximately 26th March – 7th May and 19th June – 22nd July 2020 (and switched to producing hand sanitiser), which may account for the reduced volume.
- Site 11309B - volume increased by 65,800m³ and strength increased from 3,700mg/l to 4,000mg/l, resulting in an increase in load of 260T. However, the volume reported for AR20 by the LP was an erroneous negative volume, therefore the increase in volume does not reflect the actual change.

Top three load reductions:-

- Site 10050A - volume reduced by 83,000m³, and the strength reduced from 4,000mg/l to 3,000mg/l. This change in strength caused the annual Load to decrease to 463T.
- Site 3147A - volume reduced by 922,000m³ which was due to an incorrect reading of -753,000m³ submitted by the LP. There was a reduction in the average strength from 800 to 500. The reduction in these two values resulted in a reduction in annual load of 600T (based on the incorrect volume reported by the CMA). As this customer has an effluent meter the significant reduction in volume was investigated and the volume was re-calculated at 154,000m³, therefore the load should be 95.2T which is still less than the 136T reported in AR20. However, to be consistent with the methodology, the CMA value of -753,000m³ has been used in the annual return.
- Site 10020K - volume reduced by 52,500m³, and with the strength reducing to 70mg/l due to installation of treatment, the annual load was reduced by 1,360T.

The three largest increases and decreases in load only account for around a third of the overall reduction in total annual load.

The reported total COD load receiving secondary treatment has also decreased. from 27,654T/yr to 22,306T/yr in AR21. As per BOD, whilst the volume is similar to last

²² The site DPIDs are used to maintain anonymity for customers in a published document.

year, there are no clear discharge points that have led to the change in load. The strength in discharge points varies each year as there are often a small number of samples and an extreme result can impact on the average. The sites with the top three increases and decreases in loads for AR21 are listed below:

Top three load increases:-

- Site 15037A - volume increased by 1,500m³. Similar to BOD the strength increased from 630mg/l to 142,500mg/l due to one of these samples being very strong²³ and only two samples taken out of the four scheduled as a result of COVID-19 restrictions. The outcome is an increase in the annual load of 1,326T.
- Site 0092B - volume reduced by 140,000m³ but strength increased from 262mg/l to 1,131mg/l. This customer had periods of closure - approximately 26th March – 7th May and 19th June – 22nd July 2020 (and switched to producing hand sanitiser), which may account for the reduced volume.
- Site 11309B - volume increased by +65,800m³ which was due to an incorrect reading submitted by the LP for AR20, and strength increased from 6,643mg/l to 6,838mg/l. The incorrectly reported increased volume is likely to have resulted in an increase in load of 449T.

Top three load reductions:-

- Site 10039A - the volume discharged decreased by 91,000m³, and the average strength also decreased from 9,000 to 8,000 resulting in a decrease in annual load of 871T.
- Site 3147A - the volume decreased by 922,000m³ which was due to an incorrect reading of -753,000m³ submitted by the LP. The average strength also decreased from 1,500mg/l to 1,200mg/l resulting in a decrease in annual load of 1,200T. As this customer has an effluent meter the significant reduction in volume was investigated and the volume was re-calculated at 154,000m³; therefore, the load should be 191.8T compared to 262.3T as reported in AR20.
- Site 10020K - volume reduced to 52,500m³, and the strength decreased from 5,900mg/l to 312mg/l due to installation of treatment resulting in the annual load decreasing by 2,048T.

There have been some erroneous data flagged up during this year's Annual Return. The details from the above DPIDs have been provided as examples and Scottish Water will consider options for addressing this with CMA for SR21.

²³ See explanation for BOD

SECTION A : BASE INFORMATION

Table A1: Connected and billed properties

Line Ref.	Description	Units	Report Year 2020-21	CG	Report Year 2019-20	CG	Report Year 2018-19	CG	Variance	% Change	Explanation provided in AR21 Commentary
A1.1	Unmeasured household billed properties - potable water (including exempt)	Nr	2,528,983	B2	2,510,569	B2	2,481,891	A2	18,414	0.73	1.1 Data sources and confidence grades 1.4 Key changes from 2019/20
A1.2	Measured household billed properties - potable water	Nr	369	B2	387	B2	399	A2	-18	-4.65	1.1 Data sources and confidence grades 1.4 Key changes from 2019/20
A1.3a	Unmeasured non-household occupied billed properties - potable water (including exempt)	Nr	19,629	B3	19,927	B3	24,598	B3	-298	-1.50	1.1 Data sources and confidence grades 1.2 Data improvement programmes 1.4 Key changes from 2019/20
A1.3b	Unmeasured non-household vacant billed properties - potable water (including exempt)	Nr	3914	B3	3,832	B3	n/a	n/a	82	2.14	1.4 Key changes from 2019/20
A1.4a	Measured non-household occupied billed properties - potable water	Nr	115,261	B3	120,241	B3	127,853	B3	-4,980	-4.14	
A1.4b	Measured non-household vacant billed properties - potable water	Nr	14,112	B3	8806	B3	n/a	n/a	5,306	60.25	
A1.5	Total number of billed properties - potable water	Nr	2,682,268	B3	2,663,762	B3	2,634,741	B3	18,506	0.69	
Connected Properties - Water											
A1.6	Unmeasured household connected properties	Nr	2,579,564	B2	2,563,192	B2	2,537,704	A2	16,372	0.64	1.3 Assumptions used for forecast data 1.4 Key changes
A1.7	Measured household connected properties	Nr	369	B2	387	B2	399	A2	-18	-4.65	1.3 Assumptions used for forecast data 1.4 Key changes from 2019/20
A1.8	Unmeasured non-household connected properties	Nr	23,543	B3	23,759	B3	24,598	B3	-216	-0.91	1.4 Key changes from 2019/20
A1.9	Measured non-household connected properties	Nr	129,373	B3	129,047	B3	127,853	B3	326	0.25	11.4 Key changes from 2019/20
A1.10	Total number of connected properties	Nr	2,732,849	B3	2,716,385	B3	2,690,554	B3	16,464	0.61	
Billed Properties - Foul Sewerage											
A1.11	Unmeasured household billed properties (including exempt)	Nr	2426,901	B2	2,409,383	B2	2,382,783	A2	17,518	0.73	1.4 Key changes from 2019/20
A1.12	Measured household billed properties	Nr	82	B2	94	B2	99	A2	-12	-12.77	1.4 Key changes from 2019/20
A1.13a	Unmeasured non-household occupied billed properties (including exempt)	Nr	16,824	B3	17,173	B3	21,645	B4	-349	-2.03	No significant changes to report
A1.13b	Unmeasured non-household vacant billed properties (including exempt)	Nr	3,576	B3	3,532	B3	n/a	n/a	44	1.25	No significant changes to report
A1.14a	Measured non-household occupied billed properties	Nr	93,195	B3	96,890	B3	103,545	B4	-3,695	-3.81	1.4 Key changes from 2019/20
A1.14b	Measured non-household vacant billed properties	Nr	12,444	B3	7,858	B3	n/a	n/a	4,586	58.36	1.4 Key changes from 2019/20
A1.15	Total number of billed properties	Nr	2,553,022	B3	2,534,930	B3	2,508,072	B4	18,092	0.71	
Connected Properties - Foul Sewerage											
A1.16	Unmeasured household connected properties	Nr	2,475,578	B2	2,459,942	B2	2,436,568	A2	15,636	0.64	1.4 Key changes from 2019/20
A1.17	Measured household connected properties	Nr	82	B2	94	B2	99	A2	-12	-12.77	1.4 Key changes from 2019/20
A1.18	Unmeasured non-household connected properties	Nr	20,400	B3	20,705	B3	21,645	B3	-305	-1.47	1.4 Key changes from 2019/20
A1.19	Measured non-household connected properties	Nr	105,639	B3	104,748	B3	103,545	B3	891	0.85	1.4 Key changes from 2019/20
A1.20	Total number of connected properties	Nr	2,601,699	B3	2,585,489	B3	2,561,857	B3	16,210	0.63	
Billed Properties - Surface Drainage											
A1.21	Unmeasured household billed properties (including exempt) not billed for property drainage	Nr	0	B2	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	16	B2	18	B2	17	A2	-2	-11.11	1.4 Key changes from 2019/20

A1.23	Unmeasured non-household billed properties not billed for property drainage	Nr	38	B3	37	B3	3,019	B3	1	2.70	1.2 Data improvement programmes 1.4 Key changes from 2019/20
A1.24	Measured non-household billed properties not billed for property drainage	Nr	7405	B3	7,099	B3	2,197	B3	306	4.31	1.2 Data improvement programmes 1.4 Key changes from 2019/20
A1.25	Household properties billed for surface drainage only	Nr	0	0	0	B2	0	A2	0	0	1.1 Data sources and confidence grades
A1.26a	Non-household properties billed for surface drainage only	Nr	44,022	B3	41,342	B3	42,891	B3	2,680	6.48	1.2 Data improvement programmes
A1.26b	Non-household vacant properties billed for surface drainage only	Nr	6,498	B3	6,105	B3	n/a	n/a	393	6.44	1.2 Data improvement programmes
A1.27	Total number of billed properties	Nr	2,596,083	B3	2,575,223	B3	2,599,515	B3	20,860	0.81	
Connected Properties - Surface Drainage											
A1.28	Unmeasured household connected properties	Nr	2,475,578	B2	2,459,942	B2	2,436,568	A2	15,636	0.64	1.1 Data sources and confidence grades
A1.29	Measured household connected properties	Nr	501	B2	518	B2	545	A2	-17	-3.28	1.1 Data sources and confidence grades
A1.30	Unmeasured non-household connected properties	Nr	74,407	B3	71,398	B3	67,602	B3	3,009	4.21	1.4 Key changes from 2019/20
A1.31	Measured non-household connected properties	Nr	95,970	B3	95,430	B3	96,935	B3	540	0.57	1.4 Key changes from 2019/20
A1.32	Total number of connected properties	Nr	2,646,456	B3	2,627,288	B3	2,601,650	B3	19,168	0.73	
Trade Effluent											
A1.33	Billed Properties	Nr	1,297	A2	1,304	A2	1,321	A2	-7	-0.54	1.1 Data sources and confidence grades
A1.34	Connected Properties	Nr	3,462	A2	3,417	A2	3,399	A2	45	1.32	1.1 Data sources and confidence grades
A1.35	Trade effluent load receiving secondary treatment (BOD/yr)	Nr	10,446	B4	13,848	B3	16,414	B2	-3403	-24.57	1.4 Key changes from 2019/20
A1.36	Trade effluent load receiving secondary treatment (COD/yr)	Nr	22,306	B4	27,654	B3	34,856	B2	-5348.12	-19.34	1.4 Key changes from 2019/20
Vacant Charging and Disconnections											
A1.37	Non-household permanent disconnections	Nr	205	B3	388	B3	179	B3	-183	-47.16	1.4 Key changes from 2019/20
A1.38	Non-household water properties de-registered from the market	Nr	1,580	B3	2,673	B3	4,178	B3	-1,093	-40.89	1.4 Key changes from 2019/20
A1.39	Non-household wastewater properties de-registered from the market	Nr	2,104	B3	3,333	B3	4,929	B3	-1,229	-36.87	1.4 Key changes from 2019/20
A1.40	Non-household drainage only properties de-registered from the market	Nr	933	B3	1,570	B3	1,972	B3	-637	-40.57	1.4 Key changes from 2019/20
A1.41	Non-household water properties under successful temporary transfer to Scottish Water	Nr	88	B3	58	B3	4	B3	30	51.72	1.4 Key changes from 2019/20
A1.42	Non-household wastewater properties under successful temporary transfer to Scottish Water	Nr	95	B3	61	B3	4	B3	34	55.74	1.4 Key changes from 2019/20
A1.43	Non-household drainage only properties under successful temporary transfer to Scottish Water	Nr	7	B3	3	B3	0	B3	4	133.33	1.4 Key changes from 2019/20
A1.44	Non-household water properties pending temporary transfer to Scottish Water	Nr	3	B3	6	B3	0	B3	-3	-50.00	No significant changes to report
A1.45	Non-household wastewater properties pending temporary transfer to Scottish Water	Nr	3	B3	9	B3	0	B3	-6	-66.67	No significant changes to report
A1.46	Non-household drainage only properties pending temporary transfer to Scottish Water	Nr	1	B3	3	B3	0	B3	-2	-66.67	No significant changes to report
A1.47	Discontinuation of Trade Effluent services	Nr	0	A1	0	A1	0	A1	0	0	No significant changes to report

2 Table A2 Population, volumes and loads - Water

2.1 Data sources and confidence grades

The base Populations data is sourced from the National Records for Scotland (NRS) using the latest published data including council breakdowns. For AR21 this has been updated to the 2018 based reports (from 2016 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 WIC4 returns is used 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 2019) according to Visit Scotland statistics was used.

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

A2.3 Population of Unmeasured Households with Water:

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

A2.4 Population of Measured Households with Water:

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

Population Not in Households with Water:

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

Winter Tourists with Water:

- The lowest winter visitor month (January 2019) according to Visit Scotland statistics was used.

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

The non-resident properties that contribute to A2.1 (winter population) and A2.2 (summer population) are identified from Address Based Premium (ABP) properties in Scottish Water's GIS.

There has been a 17% increase in the number of water connected properties classified as tourist accommodation this year, mostly in the Holiday Let/Accommodation/Short-Term Let category. This increase has led to a corresponding increase in the population not in households reported this year. The number of tourist properties are reported in the ABP database and this year individual caravans have been identified and given an address. This has resulted in an increase in the number of tourist properties. This change is not uniform across Scotland and appears to be skewed towards the south-west of Scotland, particularly around Dumfries and Galloway. Scottish Water will need to consider the suitability of these categories going forward.

The occupancy rate of the properties comes from Visit Scotland's statistics for occupancy by month for different accommodation types (hotel, caravan etc.). The most recent figures cover January to December 2019. Overall, there has been a small increase in occupancy rates for AR21. However, the data pre-dates the lockdown restrictions businesses faced during the COVID-19 pandemic. The full impact of these measures will not be known until next year.

A decision was made by Scottish Water to continue with the standard methodology, using the most recently available occupancy data, as there is no method to accurately account for any fluctuation caused by COVID-19. However, surveys by Visit Scotland estimate a 40% reduction in occupancy rates.

There has been no change in data sources or confidence grades for 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 – Scottish Water's own measured volumes dataset
- Measured Non-household (NHH) volumes - Wholesale/CMA
- Unmeasured NHH volumes extrapolated using rateable value (RV) supplied by Wholesale/CMA

2.2 Data improvement programmes

The NRS data has been updated to the 2018 based reports (from 2016 reports), as this is the most recent data split to Council area.

2.3 Assumptions used for forecast data

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

This year the forecasting method for the water balance section of table A2, future years volumes, has been improved upon from the simple method used previously. The improved method assumes that the per property values for domestic and non-domestic consumption

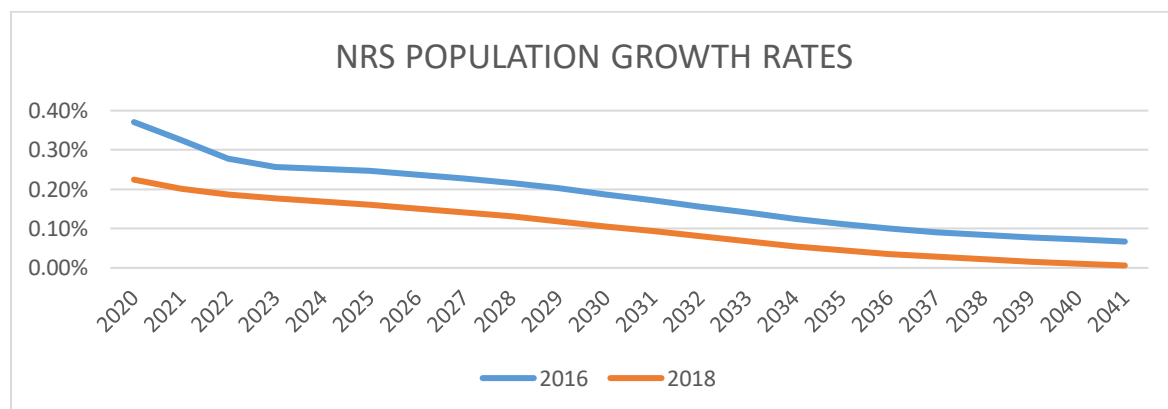
will be similar to the values seen in 2019/20, and the annual averages for these components will be around the mid-point between the values for years 2019-20 and 2020-21. It has been assumed that the other demand components of the Water Balance will remain similar to this year's values. Scottish Water's target range for leakage this year is a 15 MI/d band. The forecast reduction has taken the mid-point in this range (7.5MI/d) as the value that Scottish Water will out-turn at next year. The forecast reduction for Distribution Input takes account of these predictions in the demand components and leakage.

2.4 Key changes from 2019/20

A summary of the variances between 2019/20 and 2020/21 for population, volumes and loads (Water) can be found at the end of this section – Table A2 comparison AR20 and AR21. The significant changes are detailed in this section.

The largest impact to the figures in 2020/21 is due to the changes in NRS population projection between 2016 and 2018 publications.

The NRS 2016 population projections had 0.5% growth over 25 years (2016 – 2041), whereas the 2018 population projections have reduced the growth to 0.25% over 25 years (2018 – 2043). In both cases the growth rates slow over time, as shown in the graph below, with the 2018 projections dropping to almost 0% by 2043. This change, coupled with a lower base position in 2018 than forecast, has had the effect of reducing the 2020 Household Population projection by 45k.



Offsetting this is the forecast annual increase from 2019 to 2020 of +20k and an increase in the Water Dwelling Ratio (+3k) (derived from the WIC4 number of households connected for Water) which give a net movement of -22k to Household population for 2020 (A2.3).

Table 5: Changes in NRS Water household population data

A2.3 Population in Households with Water	TOTAL POPULATION	Water Dwelling Ratio	WATER POPULATION	Movement
2016 NRS forecast 2019	5,366,541	0.97198	5,216,173	
Rebasing 2019 for 2018 NRS Forecast	20,122			

A2.3 Population in Households with Water	TOTAL POPULATION	Water Dwelling Ratio	WATER POPULATION	Movement
2016 NRS forecast 2019	5,366,541	0.97198	5,216,173	
2018 NRS Forecast growth for 2020	-44,907			
2018 NRS forecast for 2020	5,341,756	0.97237	5,194,144	-22,029

In contrast the 2020 Total Winter Population (A2.1) shows a movement of 11,853 from 2019, as shown below. The drop in Household population is offset by an increase in both the Winter Tourist numbers (+15k) and an increase in the Not in Household population (+19k).

Table 6: Changes in Water household population data

Summary - Population - Water		2019-20	2020-21	Movement
	Population in Households with Water	5,216,172.8	5,194,144.0	-22,028.8
	Winter Tourist Populations - Water	65,084.6	79,957.0	14,872.4
	Population Not in Households - Water	101,107.7	120,161.1	19,053.4
	Population of measured household properties	830.3	785.5	-44.8
A2.1	Winter Population - Water	5,383,195	5,395,047	11,853 ²⁴

As described above, the Population Not in Households is derived from the NRS Total population projection less the Household population projection. The difference between these two sets of figures has increased in the 2018 publication due to an increase in the proportion of people living in Communal Establishments (from approx. 104,000 per year 2016 data to 123,000 per year in 2018 data).

Communal Establishments are listed as:

- Adult Care
- Children's Care
- Defence
- Hospitals
- Hostels
- Hotels & Boarding Houses
- Prisons
- Residential Schools
- Student Halls of Residence – Further Education or Higher Education

The Winter Tourist numbers have increased due to an increase in the number of tourist properties in 2020/21, with the largest movements being in Self-catering accommodation (+23%) and Guest Houses/B&B (+10%), coupled with an increase in occupancy rates, primarily in Guest Houses/B&B (+12%). Note, the Visit Scotland data used is based on the

²⁴ Slight difference in total change due to rounding: 11853 is the difference between the total values as reported in line A2.1

year Jan – Dec 2019 due to the date their reports are published (July 2021 for the 2020 data).

There were changes in the water balance and leakage primarily related to the extreme weather events and the COVID-19 lockdown effects on customer consumption. The key areas and contributing factors are described below and further information can be found in the leakage auditor report.

There has been an overall increase in Distribution Input of 54.82 MI/d (to 1824.53 MI/d) (A2.6) in 2020/21. The year was a challenging one for leakage management, particularly due to unusual weather events specifically two freeze/thaw periods in January and February 2021 which lasted about a fortnight each. This resulted in multiple bursts leading to a peak in DI and leakage during this period. In addition, COVID-19 restrictions affected Scottish Water’s ability to manage the data required to generate the annual water balance, e.g. meter readings for non-household properties were difficult to obtain, but the leakage auditor has reported that the data presented is sufficiently robust. By the year end, much of the increased winter leakage had been recovered by employing additional resources on burst find-and-fix activity. The leakage level for the last week of the year had returned to pre-Christmas levels, further details of which can be found in the leakage auditor’s report.

There has been a significant increase in the volume of water delivered to unmeasured households of almost 115MI/d (to 1107.12MI/d (A2.7) and a 10% increase in PHC for unmeasured households, both of which are assumed to be a result of working from home and home schooling during COVID-19 lockdown, as well as the warmer weather in May 2020 increasing usage in gardens. Further details can be found in the leakage auditor’s report. For measured households the consumption has reduced due to 18 properties moving away from meters.

Measured non-household volume reduced by 25.85MI/d to 340.37MI/d (A2.10) in AR21 following a reduction in the final quarter of 2019/20 which continued into the first quarter of 2020/21, which is assumed to be a result of businesses closing due to COVID-19 restrictions supported by the increase in vacant measured non-household properties discussed in section A1. These restrictions also meant meter readings were reduced from 302,970 meters read in AR20 to 263,206²⁵ in AR21 (13% reduction) due to difficulties accessing meters. The result is that there will be less accuracy in the non-household volumes.

Table 7: Total leakage post MLE comparison

Report Year	Top Down Leakage (MI/d)	Bottom Up Leakage (MI/d)	MLE Leakage (MI/d)
AR11	757	693	699
AR12	661	617	629
AR13	617	561	575
AR14	608	553	566

²⁵ Based on CMA data

Report Year	Top Down Leakage (MI/d)	Bottom Up Leakage (MI/d)	MLE Leakage (MI/d)
AR15	590	531	544
AR16	531	492	500
AR17	559	480	495
AR18	543	480	492
AR19	472	482	492
AR20	454	467	465
AR21	426	471	463

There are significant percentage changes in the volume of water taken unbilled reported in lines A2.11, A2.12 and A2.13 (-5.9%, -21.8% and +17.6% respectively). There has been no methodology change in this area, the reason for the change in volumes is due to changes in the activity levels. Further detail is available in the Consumption section of the leakage auditor's report. Also of note, a number of these components are relatively small volumes as a proportion of overall balance and can exhibit larger % changes year on year.

This year Scottish Water completed a refresh of the economic level of leakage (ELL). The refresh was carried out as part of a planned review and was completed in May of 2020. It is intended that the detail of zonal ELL values will become part of a wider set of criteria that will support future investment decisions to deliver the greatest value for Scottish Water's customers within individual zones.

The methodology adopted for the refresh closely followed the previous assessment reported in December 2013 to enable meaningful comparisons to be drawn. Where appropriate, revisions to the method were made to incorporate the latest best practice recommendations.

As in 2013, Scottish Water has incorporated the external costs and benefits associated with leakage and leakage management to provide an assessment of the Sustainable ELL (SELL). This includes a quantitative assessment of the full range of social, environmental and carbon costs associated with leakage and leakage management.

The table below shows the differences between 2013 and 2020:

Table 8: Changes in SELL between 2013 and 2020

Refresh Year	Unconstrained SELL, ML/d	Constrained SELL, ML/d
2013	636	493
2020	454	409

SELL zonal estimates will be used by the Water demand management teams as one of many criteria to determine the most appropriate investment within a zone.

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 14.354 ML/day for this report period, an increase of 2.203ML/d. This increase is mainly due to an increase in consumption at one customer site, Kerry Food Manufacturers in Menstrie.

The Per household consumption (measured household) reported in line A2.24 has decreased significantly. The very small number of metered properties (less than 400) means that small changes in readings can result in significant changes in reported consumption values. Further detail is available in the Consumption section of the leakage auditor's report.

SECTION A : BASE INFORMATION

Table A2: Population, volumes and loads (Water)

Line Ref	Description	Units	Report Year 2020-21	CG	Report Year 2019-20	CG	Report Year 2018-19	CG	Variance	% Change	Explanation provided in AR21 Commentary?
Summary - Population - Water											
A2.1	Winter	000	5,395.05	B2	5,383.20	B2	5,376.72	B2	11.85	0.22	2.1 Data sources and confidence grades 2.4 Key changes from 2019/20
A2.2	Summer	000	5,471.25	B2	5,456.14	B2	5,548.54	A2	15.11	0.28	2.2 Data improvement programmes 2.4 Key changes from 2019/20
Household - Population - Water											
A2.3	Population of unmeasured household properties	000	5,194.14	B2	5,216.17	B2	5,195.66	A2	-22.03	-0.42	2.1 Data sources and confidence grades
A2.4	Population of measured household properties	000	0.79	B2	0.83	B2	0.86	A2	-0.04	-5.36	2.1 Data sources and confidence grades
A2.5	Household population connected to the water service	000	5,194.93	B2	5,217.00	B2	5,196.52	A2	-22.07	-0.42	2.4 Key changes from 2019/20
Water Balance											
A2.6	Net Distribution input treated water (water put into supply)	MI/d	1,824.53	B2	1,769.71	B2	1,806.16	B2	54.82	3.10	2.4 Key changes from 2019/20
A2.7	Unmeasured household volume of water delivered (including losses)	MI/d	1,107.12	B2	992.81	B2	986.11	B2	114.31	11.51	2.4 Key changes from 2019/20
A2.8	Measured household volume of water delivered (including losses)	MI/d	0.22	B2	0.29	B2	0.32	B2	-0.07	-24.30	2.1 Data sources and confidence grades 2.4 Key changes from 2019/20
A2.9	Unmeasured non-household volume of water delivered (including losses)	MI/d	15.66	C5	15.00	C5	15.75	C5	0.66	4.39	2.1 Data sources and confidence grades 2.4 Key changes from 2019/20
A2.10	Measured non-household volume of water delivered (including losses)	MI/d	340.37	B3	366.22	B3	386.76	B3	-25.85	-7.06	2.4 Key changes from 2019/20
A2.11	Water taken unbilled - legally	MI/d	58.72	C4	62.40	C4	62.18	C4	-3.68	-5.90	No significant changes to report
A2.12	Water taken unbilled - illegally	MI/d	1.34	C4	1.71	C4	1.91	C4	-0.37	-21.81	No significant changes to report
A2.13	Water taken unbilled - Distribution System Operational Use (DSOU)	MI/d	6.79	C3	5.77	C3	5.75	C3	1.02	17.60	2.1 Data sources and confidence grades 2.4 Key changes from 2019/20
A2.14	Net Consumption (including supply pipe losses)	MI/d	1,530.20	B3	1,444.20	B3	1,458.77	B3	86.00	5.96	2.1 Data sources and confidence grades 2.4 Key changes from 2019/20
A2.15	Distribution losses (including trunk mains and reservoirs)	MI/d	294.32	B3	325.51	B3	347.39	B3	-31.19	-9.58	2.4 Key changes from 2019/20
A2.16	Customer supply pipe losses	MI/d	131.08	C3	128.50	C3	124.18	C3	2.58	2.01	2.4 Key changes from 2019/20
A2.17	Overall water balance	-		B3		B3		B3			
Leakage											
A2.18	Total Leakage (pre-MLE Adjustment)	MI/d	470.43	B3	466.66	B3	481.89	B3	3.77	0.81	2.4 Key changes from 2019/20
A2.19	Water Balance Closing Error	%	-2.47	B3	-0.71	B3	-0.57	B3	-1.75	245.27	2.4 Key changes from 2019/20
A2.20	MLE Adjustment	MI/d	-7.76	B3	-2.25	B3	-1.88	B3	-5.51	245.04	Refer to AR21 Leakage Auditor's Report
A2.21	Total Leakage (post-MLE Adjustment)	MI/d	462.66	B3	464.41	B3	480.01	B3	-1.75	-0.38	2.4 Key changes from 2019/20
Water delivered - non-potable											
A2.22	Volume of non-potable water delivered	MI/d	14.35	C4	12.151	C4	15.262	C4	2.20	18.13	2.4 Key changes from 2019/20
Water delivered - components											
A2.23	Per Household consumption (unmeas'd h'hold - excl s/pipe leakage) PHC	l/household/day	380.43	B2	346.000	B2	348.730	B2	34.43	9.95	2.4 Key changes from 2019/20
A2.24	Per Household consumption (meas'd h'hold - excl s/pipe leakage) PHC	l/household/day	573.29	B3	720.860	B3	793.056	B3	-147.57	-20.47	2.4 Key changes from 2019/20
A2.25	Meter under-registration (measured households) (included in water delivered)	MI/d	0.01	C3	0.012	C3	0.013	C3	0.00	-27.94	2.4 Key changes from 2019/20
A2.26	Meter under-registration (measured non-households) (included in water delivered)	MI/d	15.16	C3	16.201	C3	17.226	C3	-1.04	-6.45	2.4 Key changes from 2019/20

3 Table A3 Population, volumes and loads - Wastewater

3.1 Data sources and confidence grades

The non-resident properties that contribute to A3.1 (winter population) and A3.2 (summer population) are identified from Address Based Premium (ABP) properties in Scottish Water's GIS.

The occupancy rate of the properties comes from Visit Scotland's statistics for occupancy by month for different accommodation types (hotel, caravan etc.) and this is explained in Section A2.

The source data and the methodology used for wastewater populations are the same as for Water population; using the ratio of Dwellings with wastewater to Total Dwellings from the WIC4 returns.

As with Water populations, the figures are given a confidence grading of B2. As with previous Annual Return submissions all reported Scottish Water figures for sludge were taken directly from the corporate Gemini system; recycling contractors invoice tracker data sheets; and duty of care documentation.

A small change was made to the calculation of the Unmeasured household sewage volume (A3.4) to bring it in line with the calculation used for the unmeasured household volume of water (A2.7) and is based on per property consumption as opposed to the consumption per person used in AR20). The wastewater volume is calculated from the Per Household consumption (A2.23) in ML multiplied by 0.95 (95% return to sewer) multiplied by unmeasured household connected properties to the wastewater network (A1.16). This calculation uses figures directly from the Annual Return. The change in methodology explains the difference in the percentage change.

The confidence grades for trade effluent remain at B2 and B4 for the reporting and forecast years respectively to maintain consistency as the methodology has not changed. It is recognised that the confidence grades will need to be re-consider in future years as the options for improving CMA data are explored.

3.2 Data improvement programmes

There have been no data improvement programmes this year.

3.3 Assumptions used for forecast data

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

3.4 Key changes from 2019/20

A summary of the variances between 2019/20 and 2020/21 for population, volumes and loads (wastewater) can be found at the end of this section – Table A3 comparison AR20 and AR21. The significant changes are detailed in this section.

Household Population (A3.3) decreased by -21,337 for the reasons given in the previous section on Water.

Table 9: Changes in NRS Wastewater population data

A3.3 Population in Households with Wastewater	Total Population	Wastewater Dwelling Ratio	Wastewater population	Difference
2016 NRS forecast 2019	5,366,541	0.93326	5,008,371	-
Rebasing 2019 for 2018 NRS Forecast	20,122	-	-	-
2018 NRS Forecast growth for 2020	-44,907			
2018 NRS forecast for 2020	5,341,756	0.93360	4,987,061	-21,310

Due to the change to NRS 2018 data, the Total Population Projections decreased by -2,417 but was offset by an increase of 10,907 in Winter Tourist numbers giving a movement of +8,490 in the Total Population (A3.1). However, the household population connected to the wastewater service has reduced by -21,337.

Table 10: Changes in Wastewater population data

Summary - Population - Wastewater	2019-20	2020-21	Change
Population in Households with Wastewater	5,008,371.3	4,987,061.4	-21,309.9
Winter Tourist Populations - Wastewater	49,734.1	60,641.0	10,906.9
Population Not in Households - Wastewater	97,630.9	116,550.6	18,919.7
Population of measured household properties	201.7	174.6	-27.1
Winter Population - Wastewater A3.1	5,155,938.0	5,164,427.6	8,489.6

There has been a 16% increase in the number of wastewater connected properties classified as tourist accommodation in AR21, mostly in the Holiday Let/Accommodation/Short-Term Let category, as discussed in section 2.1.

There has been an overall increase in the total volume of wastewater from 983MI/d to 1083MI/d (circa 10%). This is a result of a number of factors including an overall increase in wastewater connected properties and an increase in unmeasured household volumes. There is also a decrease in measured non-household volume. COVID-19 restrictions may have had a similar impact on household and non-household proportions as for Water (section A2).

Trade Effluent

The volume of trade effluent discharged has increased slightly from 59.853MI/d to 60.929MI/d. This is calculated by pro-rating the current year's volume, based on the number of DPIDs billed at P06 that were still active at P12.

The top three increases in volume:-

- *Site 15173A* – up 1.275Mm³. This was due to the CMA not providing actual meter readings in AR20 and an “industry standard” estimation was submitted based on 42m³ per month which resulted in a DPID consented to discharge 12,000m³/d being charged for 500m³.
- *Site 12752A* – volume increased by 526,000m³ this is attributed to the CMA submitting an erroneous meter reading (see table below) during the year.

Read Date	Read Type	Read Value	Rollover
16/03/2021	U	33162	False
08/01/2021	U	222081	False
06/12/2020	U	20725	False

- *Site11349A* – increased by 294,302m³. This appears to be a genuine increase in volume as there have been no reported issues from customers or licence providers.

Top three decreases in volume:-

- *Site 12707C* – decreased by 101,000m³. This appears to be a genuine decrease in volume as there have been no reported issues from customers or licence providers.
- *Site 0092B* – decreased 139,500m³. This customer had periods of closure - approximately 26th March – 7th May and 19th June – 22nd July 2020 and switched production to making sanitiser during 2020 which confirms the reduction in annual load.
- *Site 3147B* – decreased by 922,000m³ resulting in the customer being charged a negative volume of -753,443m³. As this customer has an effluent meter, this was investigated, and it was confirmed that the reading provided by the LP was incorrect. This has been corrected, and Scottish Water was able to calculate the actual discharge volume to be 153,716m³. The timing of the CMA reconciliation runs meant this hadn't fed through to all the runs and was not available in time for AR21, as per the discussion in section A1.

Approximately 10% (137) DPIDs have a discharge volume less than zero as calculated using the CMA reconciliation reports (R3). This calculation is incorrect but illustrates the problems arising from faulty meters, incorrect allowances and/or poor meter reads submitted by LPs. Challenges with poor quality meter readings impacting settlement have been discussed with the CMA who have implemented a number of processes to detect and correct such readings at the time of submission. These issues are also being considered as part of the market's review of the performance standards regime with respect to meter readings.

The total, calculated, negative volume is 1.098Mm³/yr which is 3.01Ml/d, so the true value of A3.8 for the reporting year and forecast is probably around 64Ml/d (not considering any identifiable erroneous increases).

The total BOD load discharged to the network²⁶ from trade effluent has decreased significantly from 14,269T/year to 10,832T/year (A3.15). The changes have been explained in section A1.

Private septic tank load has reduced by 21.5% due to the irregular collection periods of these treatment types. These are usually emptied at the request of the customers as they reach capacity and therefore this does not equate to a regular annual load figure.

Table 11: Changes in Equivalent population served between 2019/20 and 2020/21

Description	AR20	AR21	Difference
Unmeasured Household	5,007,927	4,986,799	-21,128
Measured Household	202	175	-27
Measured Non-Household (Metered & Assessed)	780,730	636,774	-143,956
Trade Effluent Load, PE	632,350	503,215	-129,135
Imported Public Septic Tank, PE	6,295	7,517	1,222
Imported Private Septic Tank, PE	11,937	9,371	-2,566
Imported WTW Sludge, PE	15,040	11,163	-3,877
Imported WWTW Sludge, PE	157,516	107,480	-50,036
Other Tanker Loads, PE	16,171	15,560	-611
Sludge Return Liquors, PE	12,454	12,151	-303
PE for Table A (exc. Tourist)	6,640,622	6,290,205	-350,417

The reported mass of wastewater treatment sludge recycled (A3.26 and A3.27) was 117.379ttds in 2020/21 (compared to 123.83ttds in 2019/2020), of which the majority, 100.949ttds, came from the PPP works, with the Scottish Water figure equating to only 16.43ttds.

For sludge there was a slight decrease of 0.45ttds in the volume of enhanced treated sludge produced. This small decrease could be attributed to some material sitting in stockpiles on sites. A slight decrease in the volume of conventionally treated sludge produced from the previous year by 0.915ttds should be noted. This is due to process compliance issues at Cumnock Sludge Treatment Centre resulting in the material not complying with the Sludge Use in Agriculture Reg and Biosolids Assurance Scheme (BAS). This material was diverted to land reclamation causing an increase of 0.93ttds going to land reclamation.

The Scottish Water Biosolids Assurance Scheme Certificate of Conformity was awarded in June 2021 and is valid from June 2021 to June 2022. A surveillance audit took place in June 2021 (1st - 3rd June 2021). Due to COVID-19 restrictions, the audit was a virtual audit, as was the case last year.

²⁶ This value is the load discharged to the network, compared to line A1.35 which is only the load to secondary treatment.

SECTION A : BASE INFORMATION

Table A3: Population, volumes and loads (Waste water)

Line Ref	Description	Units	Report Year 2020-21	CG	Report Year 2019-20	CG	Report Year 2018-19	CG	Variance	% Change	Explanation provided in AR21 Commentary
Summary - Population - Waste water											
A3.1	Winter	000	5,164.428	B2	5,155.938	B2	5,152.536	A2	8.490	0.16	3.1 Data sources and confidence grades 2.4 Key changes from 2019/20
A3.2	Summer	000	5,218.317	B2	5,206.792	B2	5,240.506	B2	11.525	0.22	3.1 Data sources and confidence grades 2.4 Key changes from 2019/20
A3.3	Household Population connected to the wastewater service	000	4,987.236	B2	5,008.573	B2	4,990.247	A2	-21.337	-0.43	3.4 Key changes from 2019/20
Sewage - Volumes											
A3.4	Unmeasured household volume (including exempt)	MI/d	894.695	A2	766.85	B3	767.88	B3	127.842	16.67	3.4 Key changes from 2019/20
A3.5	Measured household volume	MI/d	0.025	B3	0.026	A2	0.080	A2	-0.001	-3.85	3.4 Key changes from 2019/20
A3.6	Unmeasured non-household foul volume (including exempt)	MI/d	12.688	B3	12.724	B3	12.776	B3	-0.036	-0.28	3.4 Key changes from 2019/20
A3.7	Measured non-household foul volume	MI/d	1,14.666	B2	143.457	B3	150.075	B3	-28.791	-20.07	3.4 Key changes from 2019/20
A3.8	Trade effluent volume	MI/d	60.929	B3	59.853	B2	64.860	B2	1.076	1.80	3.4 Key changes from 2019/20
A3.9	Total volume	MI/d	1,083.003	B3	982.913	B3	995.667	B3	100.090	10.183	3.4 Key changes from 2019/20
A3.10	Volume septic tank waste	MI	56.528	B3	61.023	B3	30.048	A3	-4.495	-7.37	3.4 Key changes from 2019/20
Sewage - Load (BOD/yr)											
A3.11	Unmeasured household load (including exempt)	tonnes	109,210.900	B4	109,673.610	B3	109,281.723	B3	-462.710	-0.42	3.4 Key changes from 2019/20
A3.12	Measured household load	tonnes	2.936	B4	2.969	B4	9.323	B4	-0.033	-1.11	3.4 Key changes from 2019/20
A3.13	Unmeasured non-household foul load (including exempt)	tonnes	1,389.237	B3	1,393.252	B4	1,398.997	B4	-4.015	-0.29	3.4 Key changes from 2019/20
A3.14	Measured non-household foul load	tonnes	12,555.952	B4	15,704.750	B3	16,433.162	B3	-3148.798	-20.05	3.4 Key changes from 2019/20
A3.15	Trade effluent load	tonnes	10,831.840	B3	14,269.517	B4	17,132.347	B2	-3437.677	-24.09	3.4 Key changes from 2019/20
A3.16	Total load discharged from primary services	tonnes	133,990.865	B3	141,044.098	B3	144,255.552	B3	-7053.233	-5.001	3.4 Key changes from 2019/20
A3.17	Private septic tank load	tonnes	205.232	B3	261.409	B3	96.419	B3	-56.177	-21.49	3.4 Key changes from 2019/20
A3.18	Public septic tank load	tonnes	164.629	B3	137.862	B3	100.186	B3	26.767	19.42	No significant changes to report
A3.19	Other tanker load	tonnes	340.767	B3	354.141	B3	396.189	B3	-13.374	-3.78	No significant changes to report
A3.20	Total load entering sewerage system (BOD/yr)	tonnes	134,701.493	A1	141,797.510	B3	144,848.346	B3	-7,096.017	-5.004	3.4 Key changes from 2019/20
A3.21	Average COD concentration	mg/l	350.000	A1	350.00	A1	350.00	B2	0.000	0.00	3.4 Key changes from 2019/20
A3.22	Average suspended solids concentration	mg/l	250.000	B3	250.00	A1	250.00	B2	0.000	0.00	3.4 Key changes from 2019/20
A3.23	Equivalent population served (resident)	000	6,290.205	B3	6,640.621	B3	6,704.447	B3	-350.416	-5.28	3.4 Key changes from 2019/20
A3.24	Equivalent population served (resident)(numerical consents)	000	5882.300	B3	6,185.013	B3	6,300.900	B3	-302.713	-4.89	3.4 Key changes from 2019/20
A3.25	Total load receiving treatment through PPP treatment works	tonnes	61,317.708	B3	64,534.055	B3	66,469.070	B3	-3216.347	-4.98	3.4 Key changes from 2019/20
Sewage Sludge Treatment and Disposal											
A3.26	Total sewage sludge disposal	ttds	16.430	B4	16.810	B4	122.605	B4	-0.380	-2.26	3.4 Key changes from 2019/20
A3.27	Total sewage sludge disposal by PPP treatment works	ttds	100.949	B4	107.028	B4	107.405	B4	-6.079	-5.68	3.4 Key changes from 2019/20
A3.28	Percentage unsatisfactory sludge disposal	%	0.000	A1	0.00	A1	0.00	A1	0.000	0	3.4 Key changes from 2019/20

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 Scottish Water’s 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 the capital programme.

The number of pipes replaced is taken from the records of Scottish Water’s 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 Sewers – replaced (D6.6) which is B2. This was erroneously reported as AX in AR20 when it should have been reported as B2.

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.

In the past the unique GIS ID for mains pipes was used to identify those that were not in the previous year’s mains data set. Better analysis showed that these pipes were often existing pipes that had been split during the digitising of a new branch. One side of the split would retain the original ID and the other side would get a new ID. The methodology was changed to prevent ‘new’ mains created this way from being included. The figure now more accurately reflects mains that have become operational or been adopted during the report year.

4.3 Assumptions used for forecast data

There is no forecast data for the D5 table.

4.4 Key changes from 2019/20

There has been a 21.4km increase in the length of renewed mains reported (D5.2). WICS guidance states “Include mains sleeving/pipe cracking/slip-lining” for this line. Improved analysis and understanding of GIS attributes enabled pipes meeting these criteria to be identified. The ‘Formed By’ attribute along with the date commissioned, which is updated when these interventions occur, were used.

The accuracy of analysis used to identify mains for mains relined (D5.3) was similarly improved by using the "Lining Material" attribute in GIS and comparing it to last year's mains dataset, to identify lining that occurred in the report year.

D5.4 and D5.5, relating to mains cleaned both report a reduction of around 34% due to restricted working during COVID-19 lockdown periods.

The length of new mains reported (D5.6) has reduced from 445.87km to 106.91km.

The length of abandoned mains (D5.7) has decreased from 203km to 86km in AR21. Efforts were made to identify actual abandonments rather than apparent removals caused by digitizing.

As a result of the improved data analysis techniques the balancing line for other changes (D5.7a) has decreased from 147km to -37km.

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 Scottish Water's GIS system.

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, it should however be noted that the confidence grade for line D6.6 in the AR20 submission was erroneously reported as AX when it should have been reported as B2.

5.2 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.

In the past the unique GIS ID for sewer pipes was used to identify those that were not in the previous year's data set. Better analysis showed that these pipes were often existing pipes that had been split during the digitising of a new branch. One side of the split would retain the original ID and the other side would get a new ID. The methodology was changed to prevent 'new' sewers created this way from being included. The figure now more accurately reflects mains that have become operational or been adopted during the report year.

5.3 Assumptions used for forecast data

There is no forecast data for the D6 table.

5.4 Key changes from 2019/20

There has been a 786km decrease in the length of new sewers reported in D6.3, which is largely because of the data improvements described in the data improvement programmes section. There were 166.5km identified by operational status, adoption, or newly laid pipes being added to GIS in the report year. A further 113.5km of lateral sewers were identified as being new, based on the increase in the number of properties (E7.4) from which lateral lengths are estimated.

The length of abandoned sewers has decreased in D6.7 from 124km to 15km due to more accurate GIS attribute analysis used to identify genuine abandonments.

The improvements to the analysis and recording processes of infrastructure assets have resulted in the 'other changes to sewers' (D6.7a) being considerably lower than previous years at (-)393.7km. This is comprised of 363.8 km lateral sewers due to an improvement to the lateral identification methodology from last year, 85.5 km of sewers reclassified to sea outfalls due to new analysis and a -55.6 km balancing line. Further

commentary for the lateral and sea outfall methodology change is provided in the Table H commentary.

Section E - Operating Costs and Efficiency

The E tables report the number of non-infrastructure assets in Scottish Water's inventory that were operational during 2020/21 as compared to the H tables which report the number of non-infrastructure assets in the inventory that were operational as of 31 March 2021.

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 12: 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 following tables show a breakdown of the scope of the PPP works.

Table 13: 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.
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.

PPP Works	Scope of works
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 14: 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 Scottish Water 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 March 2021 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 Flow to Full Treatment (FFT) flows or stormwater flows to storm tanks and/or storm outfalls. The Terminal Pumping Station may form part of the sewerage network (i.e. be remote from the WWTW) or may be associated with a wastewater treatment works depending on actual location and power supply source. It is not a Combined Pumping Station or a Stormwater Pumping Station.

The 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 15: 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 Operator Self-Monitoring (OSM) results for the period ending 31 December 2020 provided by SEPA and Scottish Water's Wastewater Compliance Reporting Team, have

been taken as the definitive data source, 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 16: Tertiary A1 – Activated sludge process (E3.18)

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

Table 17: Tertiary A2 – Activated sludge process (E3.19)

Site	Treatment Process Details
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.

Table 18: Tertiary B2 - biological sludge process (E3.21)

Site	Treatment Process Details
Blackburn	Disc filters.

The sewerage data (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, Scottish Water 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 19: Combined pumping stations (E3.27)

Site	Description
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, Cummington, Hopeman, Moycroft
Buckie	Portgordon West, Portgordon East, Seatown, Cluny, Cullen East, Portknockie, Findochty, Portessie
Banff/Macduff	Whitehills, Whitehills Harbour, Inverboyndie, Scotstown, Castlehill Park, Union Road, Bankhead
Seafield	Wallyford Transfer, Wallyford SWW, Portobello SWW, Harelaw SWW, Dalkeith SWW, Mayshade SWW*
Newbridge	Broxburn SWW
Levenmouth	Methil M1

*Mayshade SWW: pumping station comprises a separate duty/standby pump set in two separate storm tanks. As only one duty pump operates at any one time (i.e., 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 20: Stormwater pumping stations (E3.29)

Site	Description
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 21: List of CSOs (E3.31)

Site	Description
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.

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

6.2 Data improvement programmes

There have been no notable data improvement programmes in 2020/21.

6.3 Assumptions used for forecast data

There is no forecast data for the E3 table.

6.4 Key changes from 2019/20

A summary of the variances between 2019/20 and 2020/21 for PPP Project Analysis can be found at the end of this section – Table E3 comparison AR20 and AR21. The significant changes are detailed in this section.

The reason for the increase of 15% in Annual average non-resident connected population (E3.2) is included in the A3 commentary, Data Sources and Confidence Grades.

The 5% reduction in the PE of total reported load received (E3.3) has been driven by the reduction in non-household and trade effluent use (see table below) due to businesses, shops and offices closing during COVID-19 restrictions, discussed in section A1.

Table 22: Changes in PE at PPP sites between 2019/20 and 2020/21

	AR20	AR21	Difference	% change in category	% change of total PE
Unmeasured_Household_PE	2,248,836	2,231,692	-17,144	-0.76%	11.67%
Measured_Household_PE	82	72	-9	-11.28%	0.01%
Non_Household	405,445	316,729	-88,717	-21.88%	60.41%
Tourist_PE	23,440	27,142	3,702	15.79%	2.52%
Trade_Effluent_PE_RY	250,757	213,482	-37,275	-14.86%	25.38%
SumOfPublic_ST_PE	355	248	-107	-30.08%	0.07%
SumOfPrivate_ST_PE	1,516	1,220	-296	-19.50%	0.20%
SumOfWTW_Sludge_PE	0	70	70	0.00%	0.05%
SumOfWwTW_Sludge_PE	14,126	7,858	-6,268	-44.37%	4.27%
Other_Tanker_PE	0	0	0	0.00%	0.00%
Return_Liquors_PE	2,204	1,382	-822	-37.31%	0.56%
Total_PE	2,946,761	2,799,895	-146,865		-4.98%

Failures and exceedances at Scottish Water PPP sites are listed in the table below. A comparison of these is shown in the following two tables, which show a reduction in the number of exceedances from 11 to 3 and no failures.

Table 23 Exceedances and Failures 2020

Site	CAR/UWWTD standards	Parameter	Exceedance (E) / Failure (F)	
Lossiemouth	UWWTD	BOD	E	28/07/2020
Lossiemouth	UWWTD	COD	E	28/07/2020
Lossiemouth	UWWTD	COD	E	31/08/2020

Table 24: Exceedances 2020 vs 2019

Site	CAR/UWWTD standards	Parameter	2020	2019
Inverness	UWWTD	COD		1
Nigg	UWWTD	COD		1
Newbridge	CAR	Ammonia		1
East Calder	CAR	Ammonia		4
Blackburn	CAR	Ammonia		2
Whitburn	CAR	Ammonia		1
Stevenston	UWWTD	BOD		1
Lossiemouth	UWWTD	BOD	1	
Lossiemouth	UWWTD	COD	2	

Table 25: Failures 2020 vs 2019

Site	CAR/UWWTD standards	Parameter	2020	2019
Meadowhead	UWWTD	BOD		1

The Lossiemouth exceedance in BOD and COD on the 28th of July was associated with a period of high flows and a flush event. Influent was very dilute which resulted in a low percentage reduction. The increase in flow caused some solids carryover from the Sequencing Batch Reactor (SBR) and a decrease in sludge settleability within the SBR. The COD failure at the same site in August was caused by higher strength influent received onsite which resulted in low dissolved oxygen levels in 2 of the SBR basins and poor settlement with resulting poorer quality final effluent and solids carryover. The site recovered and was back into compliance the next day.

The Meadowhead failure in July 2019 was linked with the breakdown of mechanical equipment (sludge centrifuge). Measures have been put in place to ensure adequate contingency and operational response which has contributed to the improvement seen in AR21.

There are a number of variances in sludge treatment and disposal, with incineration reducing and the volume going to land reclamation increasing. The sludge disposal variances are subject to factors out with Scottish Water's control and weather, population movement, operational issues, Scottish Water imports (SW may elect to use different sites), trade effluent changes and process optimisation can all have a consequence on tonnages. The tonnages supplied are a theoretical calculation and therefore have inherent variances that can't be pinpointed.

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

Line Ref	Description	Units	AR19	CG	AR20	CG	AR21	CG	Variance	% Change	Explanation provided in AR21 Commentary
Project Data											
E3.1	Annual average resident connected population	000	2,238.3	B3	2,248.9	B2	2,231.8	B2	-17	-0.76	3.1 Data sources and confidence grades 3.4 Key changes from 2019/20
E3.2	Annual average non-resident connected population	000	31.48	B3	23.44	B3	27.14	B3	4	15.79	3.1 Data sources and confidence grades 3.4 Key changes from 2019/20
E3.3	Population equivalent of total load received	000	3,035.10	B3	2,946.84	B3	2,799.9	B3	-147	-4.99	6.4 Key changes from 2019/20
Sewerage Data											
E3.22	Total length of sewer	km	222	B3	222	B3	222	B3	0	0.01	6.1 Data sources and confidence grades
E3.23	Length of critical sewer	km	222	B3	222	B3	222	B3	0	0.01	6.1 Data sources and confidence grades
Sludge Treatment and Disposal Data											
E3.33	Farmland Untreated	ttds	0	B4	0	N	0	N	0	0	6.1 Data sources and confidence grades 6.4 Key changes from 2019/20
E3.34	Farmland Conventional	ttds	2.24	B4	1.86	B4	2.03	B4	0	8.92	6.1 Data sources and confidence grades 6.4 Key changes from 2019/20
E3.35	Farmland Advanced	ttds	45.64	B4	60.28	B4	55.30	B4	-5	-8.27	6.1 Data sources and confidence grades 6.4 Key changes from 2019/20
E3.36	Incineration	ttds	40.68	B3	32.42	B3	29.32	B3	-3	-9.58	6.1 Data sources and confidence grades 6.4 Key changes from 2019/20
E3.37	Landfill	ttds	0	B4	0.00	N	0	N	0	0	6.1 Data sources and confidence grades 6.4 Key changes from 2019/20
E3.38	Composted	ttds	0	B4	0.00	N	0	N	0	0	6.1 Data sources and confidence grades 6.4 Key changes from 2019/20
E3.39	Land Reclamation	ttds	19.02	B4	12.04	B4	14,31	B4	2	18.86	6.1 Data sources and confidence grades 6.4 Key changes from 2019/20
E3.40	Other	ttds	0.47	B4	0.42	B4	0	N	0	-100.00	6.1 Data sources and confidence grades 6.4 Key changes from 2019/20

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 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).

During 2019/20 one of the traders discharging trade effluent through Scottish Water's inlet reached agreement with the Meadowhead PPP operator to discharge directly into the WWTW which resulted in reduced costs to Scottish Water. This reduction of cost for the operation of the Meadowhead WWTW is included, from 2020/21, with wastewater treatment (E3a.8) and sludge treatment (E3a.16).

Actual costs are not known and could vary considerably from the contractual financial model. A confidence grade of D6 has therefore been used. A confidence grade of A3 was allocated to the Dalmuir sludge treatment costs as there is some visibility of these costs.

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 26: 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

	E3a.2	E3a.9	E3a.17	
				cost moved to Meadowhead
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 2020/21.

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

Table 27: Confidence grades for PPP Contractor SEPA charges

	E3a.3	E3a.10	E3a.18	
Site	Sewerage	Sewage Treatment	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	No separate cost for sewerage
Persley	N	A2	N	No separate cost for sewerage, no sludge centre at works
Peterhead	N	A2	N	No separate cost for sewerage, no sludge centre at works
Fraserburgh	N	A2	N	No separate cost for sewerage, no sludge centre at works
Lossiemouth	A2	A2	N	No subsistence charge included in invoices
Buckie	A2	A2	N	No sludge centre at works
Banff/Macduff	A2	A2	N	No sludge centre at works
Seafield	A2	A2	A2	
Newbridge	A2	A2	N	No WML charge included in invoice
East Calder	N	A2	N	No sewerage and no sludge centre at works
Blackburn	N	A2	N	No sewerage and no sludge centre at works
Whitburn	N	A2	N	No sewerage and no sludge centre at works
Levenmouth	A2	A2	A2	
Dalmuir	N	N	A2	Only WML fees paid by the PFI Co
Daldowie	N	N	A2	Sludge treatment only
Meadowhead	N	N	A2	Only WML fees paid by the PFI Co
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 which administers PPP projects. Costs have been allocated to projects, relative to the operational costs at each site. Costs are as per the Profit & Loss (P&L).
- Scottish Water's costs of sludge disposal from Inverness, inter-site sludge tankering and terminal pumping costs (where tankering or pumping has taken place between a Scottish Water works and a PFI site) and additional support costs.

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

Table 28: Confidence grades for total charges

	E3a.5	E3a.12	E3a.20	Comment
Site	Sewerage	Sewage Treatment	Sludge Treatment	Comment on confidence grade
Fort William	CX	C4	N	Network cost very small, no sludge centre at works
Inverness	C4	C4	C4	
Hatton	C4	C4	C4	
Nigg	C4	C4	C4	
Persley	CX	C4	N	Network cost very small, no sludge centre at works
Peterhead	CX	C4	N	Network cost very small, no sludge centre at works
Fraserburgh	CX	C4	N	Network cost very small, no sludge centre at works
Lossiemouth	C4	C4	C4	
Buckie	C4	C4	N	No sludge centre at works
Banff/Macduff	C4	C4	N	No sludge centre at works
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 License SEPA charges are paid for by the PPP Company and are included in the tariff rates (see table below). Costs are as per the P&L and reflect charges as invoiced by SEPA.

Table 29: Confidence grades for Scottish Water SEPA charges

	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	SEPA charges paid by PFI Co
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.

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.

7.2 Data improvement programmes

There have been no notable data improvement programmes in 2020/21.

7.3 Assumptions used for forecast data

There is no forecast data for the E3a table.

7.4 Key changes from 2019/20

A summary of the variances between 2019/20 and 2020/21 for PPP Cost Analysis can be found at the end of this section – Table E3a comparison AR20 and AR21. The significant changes are detailed in this section.

The changes between 2020/21 and 2019/20 for Scottish Water cost and for annual charges are summarised below.

Estimated terminal pumping costs E3a.15:

Reported costs are as per the costs incurred for the Scottish Water operated terminal pumping stations. As a result of transition between information management systems as we prepare for 2020/21 and beyond, Scottish Water was unable to allocate estimated terminal pumping costs in 2019/20.

Estimated annual direct operating costs (E3a.8, E3a.16):

During 2019/20 one of the traders discharging trade effluent through Scottish Water's inlet reached agreement with the Meadowhead PPP operator to discharge directly into the WWTW which resulted in reduced costs to Scottish Water. This reduction of cost for the

operation of the Meadowhead WwTW is included, from 2020/21, with wastewater treatment (E3a.8) and sludge treatment (E3a.16).

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 30: Summary of changes in Scottish Water cost from 2019/20 to 2020/21

Site	2020/21 £m	2019/20 £m	Variance £m	Costs lower than previous year	Costs higher than previous year
Ft William	0.008	0.029	-0.021	20/21 includes lower legal/consultants costs £5k, lower other Scottish Water operating costs £0.010m, and lower ABM support costs £0.006m	
Inverness	0.728	0.696	0.032	20/21 includes lower sludge tankering and disposal costs £0.065m, and lower ABM support costs £0.039m	20/21 includes higher legal/consultants costs £37k, other Scottish Water operating costs £0.098m, and terminal pumping costs £0.001m (no terminal pumping costs have been identified in 19/20)
Hatton	0.277	0.358	-0.081	20/21 includes lower legal/consultants fees £0.007m, lower other Scottish Water operating costs £0.020m, lower sludge tankering costs £0.014m, and lower ABM support costs £0.0042m	20/21 includes terminal pumping costs £0.002m (no terminal pumping costs have been identified in 19/20)
Nigg	1.192	1.037	0.155	20/21 includes lower ABM support costs £0.100m	20/21 includes higher legal/consultants fees £0.002m, higher other Scottish Water operating costs £0.025m, higher sludge tankering costs £0.228m
Persley	0.010	0.026	-0.016	20/21 includes lower other Scottish Water operating costs £0.010m, and lower ABM support costs	

Site	2020/21 £m	2019/20 £m	Variance £m	Costs lower than previous year	Costs higher than previous year
				£0.006m	
Peterhead	0.021	0.030	-0.009	20/21 includes lower other Scottish Water operating costs £0.015m, and lower ABM support costs £0.007m	20/21 includes terminal pumping costs £0.013m (no terminal pumping costs have been identified in 19/20)
Fraserburgh	0.007	0.025	-0.018	20/21 includes lower other Scottish Water operating costs £0.012m, and lower ABM support costs £0.006m	
Lossiemouth	0.174	0.208	-0.034	20/21 includes lower other Scottish Water operating costs £0.015m, lower sludge tankering costs £0.003m, and lower ABM support costs £0.016m	
Buckie	0.010	0.029	-0.019	20/21 includes lower other Scottish Water operating costs £0.013m, and lower ABM support costs £0.006m	
Banff/Macduff	0.015	0.029	-0.014	20/21 includes lower other Scottish Water operating costs £0.008m, and lower ABM support costs £0.006m	
Seafield	0.137	0.462	-0.325	20/21 includes lower legal/consultants fees £0.191m, lower other Scottish Water operating costs £0.039m, and lower ABM support costs £0.095m	
Newbridge	0.020	0.045	-0.025	20/21 includes lower other Scottish Water operating costs £0.016m, and lower ABM support costs £0.009m	
East Calder	0.007	0.027	-0.020	20/21 includes lower other Scottish Water operating costs £0.013m, and lower ABM support costs	

Site	2020/21 £m	2019/20 £m	Variance £m	Costs lower than previous year	Costs higher than previous year
				£0.007m	
Blackburn	0.004	0.021	-0.017	20/21 includes lower other Scottish Water operating costs £0.013m, and lower ABM support costs £0.004m	
Whitburn	0.004	0.022	-0.018	20/21 includes lower other Scottish Water operating costs £0.013m, and lower ABM support costs £0.005m	
Levenmouth	0.251	0.305	-0.054	20/21 includes lower other Scottish Water operating costs £0.014m, and lower ABM support costs £0.059m	20/21 includes higher legal/consultants fees £0.019m
Dalmuir	2.006	2.061	-0.055	20/21 includes lower other Scottish Water operating costs £0.045m, and lower ABM support costs £0.319m	20/21 includes higher legal/consultants fees £0.079m, higher Scottish Water sludge disposal costs £0.230m
Daldowie	3.884	3.137	0.747	20/21 includes lower ABM support costs £0.134m	20/21 includes higher legal/consultants fees £0.069m, higher Shieldhall centrifuging costs £0.252m, higher other Scottish Water operating costs £0.234m, higher sludge tankering costs £0.326m
Meadowhead	0.978	0.488	0.490	20/21 includes lower other Scottish Water operating costs £0.093m, lower inlet headworks costs £0.015m, and lower ABM support costs £0.021m	20/21 includes higher legal/consultants fees £0.028m, and terminal pumping costs £0.591m (no terminal pumping costs have been identified in 19/20)
Stevenston	0.336	0.464	-0.128	20/21 includes lower other Scottish Water operating costs £0.042m, and lower inlet headworks costs £0.079m, and lower ABM support costs £0.007m	
Inverclyde	0.457	0.445	0.012	20/21 includes lower	20/21 includes higher

Site	2020/21 £m	2019/20 £m	Variance £m	Costs lower than previous year	Costs higher than previous year
				ABM support costs £0.005m	other Scottish Water operating costs £0.017m
TOTAL	10.526	9.944	0.582		

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 31: Summary of changes in Annual Charge from 2019/20 to 2020/21

Site	2020/21 £m	2019/20 £m	Variance £m	Costs lower than previous year	Costs higher than previous year
Ft William	3.783	3.853	-0.070	20/21 lower flows/loads £0.190m,	20/21 inflation £0.075m, additional works £0.005m, lower release of accruals £0.040m,
Inverness	7.832	7.958	-0.126	20/21 lower flows/loads £0.623m, 19/20 additional works £0.040m,	20/21 inflation £0.160m, lower penalties £0.221m, lower release of accruals £0.156m,
Hatton	23.501	22.812	0.689	20/21 lower flows £0.225m,	20/21 inflation £0.285m, additional works £0.020m, lower release of accrual £0.609m
Nigg	15.956	15.645	0.311	20/21 lower flows/loads £0.324m, higher business rates rebate £0.028m, lower SEPA recharge from SWSG £0.034m, higher release of accruals £0.016m	20/21 inflation £0.370m, lower penalties £0.333m, higher electricity recharge from SWSG £0.010m,
Persley	3.306	3.004	0.302	20/21 higher penalties £0.011m, higher business rates rebate £0.008m,	20/21 higher flows/loads £0.238m, inflation £0.082m, lower release of accruals £0.001m
Peterhead	2.507	2.446	0.061	20/21 lower flows/loads £0.119m, higher penalties £0.005m, higher business rates rebate £0.016m, higher release of accruals £0.035m	20/21 higher flows/loads £0.042m, lower penalties £0.007m, inflation £0.063m,
Fraserburgh	1.916	2.034	-0.118	20/21 lower flows/loads £0.119m,	20/21 inflation £0.049m,

Site	2020/21 £m	2019/20 £m	Variance £m	Costs lower than previous year	Costs higher than previous year
				higher penalties £0.005m, higher business rates rebate £0.015m, higher release of accruals £0.028m	
Lossiemouth	4.867	4.419	0.448	20/21 lower sludge imports £0.043m,	20/21 inflation £0.095m, lower penalties £0.012m, lower release of accruals £0.384m
Buckie	2.954	2.785	0.169		20/21 inflation £0.043m, lower penalties £0.007m, lower release of accruals £0.119m
Banff/Macduff	3.283	3.200	0.083		20/21 inflation £0.041m, lower release of accruals £0.042m
Seafield	23.732	23.045	0.687	20/21 lower Seafield Odour Improvement project costs £0.021m, lower OSM £0.032m, lower business rates £0.001m, lower additional works £0.039m	20/21 based on 100% compliance with the contract plus inflation £0.587m, lower release of accruals £0.417m
Newbridge	3.192	3.090	0.102		
East Calder	1.741	1.685	0.056		
Blackburn	0.871	0.843	0.028		
Whitburn	1.161	1.123	0.038		
Levenmouth	12.135	12.082	0.053	20/21 lower inflation, £0.105m (tariff lower than previous year due to lower gas inflation), lower business rates and SEPA fees £0.420m, lower OSM £0.055m, lower NC Catchment Boundary Extension £0.018m, lower Uninsurability Cost £0.047m,	20/21 higher Odour Project costs £0.012m, additional works £0.004m, lower release of accruals £0.682m
Dalmuir	13.806	14.322	-0.516	20/21 base tariff change and inflation £0.342m, higher Capital Project opex £0.055m, higher Operator Self- Monitoring £0.041m, lower additional works £0.023m, higher release of accruals £0.174m	20/21 higher flows £0.039m, higher Annual Operations Compensation £0.060m, higher New Capital Investment costs £0.020m,
Daldowie	20.838	20.089	0.749	20/21 lower sludge volumes £0.240m, lower business rates	20/21 inflation £0.273m, higher necessary change costs £0.013m, lower release

Site	2020/21 £m	2019/20 £m	Variance £m	Costs lower than previous year	Costs higher than previous year
				£0.031m, lower additional works £0.319m,	of accruals £1.053m
Meadowhead	6.940	6.654	0.286	20/21 UPM Change £0.025m, lower Operator Self- Monitoring £0.015m, lower gas cost £0.015m, lower additional works £0.119m,	20/21 inflation £0.077m, higher business rates £0.007m, lower release of accruals £0.383m
Stevenston	3.184	3.616	-0.432	20/21 lower business rates £0.016m, higher release of accruals £0.496m	20/21 inflation £0.057m, higher flows/fees £0.023m,
Inverclyde	4.402	3.749	0.653	19/20 lower Operator Self-Monitoring £0.029m,	20/21 inflation £0.034m, lower release of accruals £0.648m
TOTAL	161.907	158.454	3.453		

SECTION E : OPERATING COSTS AND EFFICIENCY

Table E3a: PPP Cost Analysis

Line Ref	Description	Units	AR19	CG	AR20	CG	AR21	CG	Variance	% Change	Explanation provided in AR21 Commentary?
Sewerage Costs											
E3a.1	Estimated direct operating cost	£m	7.28	D6	7.32	D6	8.00	D6	0.68	9.27	7.1 Data sources and confidence grades
E3a.2	Rates paid by the PPP contractor	£m	0	N	0	N	0	N	0.00	0	7.1 Data sources and confidence grades
E3a.3	SEPA charges paid by the PPP contractor	£m	0.05	A2	0.05	A2	0.05	A2	0.00	3.85	7.1 Data sources and confidence grades
E3a.4	Total direct cost	£m	7.33	D6	7.37	D6	8.06	D6	0.68	9.24	7.1 Data sources and confidence grades
E3a.5	Scottish Water general & support expenditure	£m	0.35	C4	0.34	C4	0.27	C4	-0.06	-18.75	7.1 Data sources and confidence grades
E3a.6	Scottish Water SEPA charges	£m	0.00	BX	0.00	N	0.00	N	0.00	0	7.1 Data sources and confidence grades
E3a.7	Total sewerage cost	£m	7.68	D6	7.71	D6	8.33	D6	0.62	8.02	7.1 Data sources and confidence grades
Sewage Treatment Costs											
E3a.8	Estimated direct operating cost	£m	35.36	D6	35.71	D6	37.10	D6	1.392	3.90	7.1 Data sources and confidence grades 7.4 Key changes from 2019/20
E3a.9	Rates paid by the PPP contractor	£m	4.14	B3	4.12	B3	4.00	B3	-0.124	-3.01	7.1 Data sources and confidence grades
E3a.10	SEPA charges paid by the PPP contractor	£m	1.27	A2	1.19	A2	1.10	A2	-0.093	-7.79	7.1 Data sources and confidence grades
E3a.11	Total direct cost	£m	40.77	D6	41.03	D6	42.20	D6	1.175	2.86	7.1 Data sources and confidence grades
E3a.12	Scottish Water general & support expenditure	£m	3.26	C4	2.30	C4	2.39	C4	0.094	4.09	7.1 Data sources and confidence grades
E3a.13	Scottish Water SEPA charges	£m	0.84	A2	0.73	A2	0.60	A2	-0.125	-17.15	7.1 Data sources and confidence grades
E3a.14	Total sewage treatment cost	£m	44.87	D6	44.05	D6	45.20	D6	1.144	2.60	7.1 Data sources and confidence grades
E3a.15	Estimated terminal pumping cost	£m	0.46	A3	0.00	M	0.69	A3	0.689	0	7.1 Data sources and confidence grades 7.4 Key changes from 2019/20
Sludge Treatment and Disposal Costs											
E3a.16	Estimated direct operating cost	£m	29.05	D6	29.65	D6	32.80	D6	3.156	10.65	7.1 Data sources and confidence grades 7.4 Key changes from 2019/20
E3a.17	Rates paid by the PPP contractor	£m	1.70	B3	1.73	B3	1.61	B3	-0.118	-6.84	7.1 Data sources and confidence grades
E3a.18	SEPA charges paid by the PPP contractor	£m	0.15	A2	0.20	A2	0.18	A2	-0.022	-11.17	7.1 Data sources and confidence grades
E3a.19	Total direct cost	£m	30.90	D6	31.57	D6	34.58	D6	3.016	9.55	7.1 Data sources and confidence grades
E3a.20	Scottish Water general & support expenditure	£m	6.56	C4	6.58	C4	7.26	C4	0.676	10.27	7.1 Data sources and confidence grades
E3a.21	Scottish Water SEPA charges	£m	0.00	N	0.00	N	0	N	0	0	7.1 Data sources and confidence grades
E3a.22	Total sludge treatment & disposal cost	£m	37.46	D6	38.15	D6	41.84	D6	3.692	9.68	7.1 Data sources and confidence grades
Total Cost Analysis											
E3a.23	Total direct cost	£m	79.00	D6	79.97	D6	84.84	D6	4.872	6.09	7.1 Data sources and confidence grades
E3a.24	Total Scottish Water cost	£m	11.02	C4	9.94	C4	10.53	C4	0.582	5.85	7.1 Data sources and confidence grades 7.4 Key changes from 2019/20
E3a.25	Total operating cost	£m	90.01	D6	89.91	D6	95.36	D6	5.454	6.07	7.1 Data sources and confidence grades
E3a.26	Annual charge	£m	141.88	A1	158.45	A1	161.91	A1	3.453	2.18	7.1 Data sources and confidence grades 7.4 Key changes from 2019/20
E3a.27	Public sector capital equivalent value	£m	1,124.39	B3	1,151.56	B3	1,182.65	B3	31.086	2.70	7.1 Data sources and confidence grades

8 Table E4 Water Resources and Treatment

8.1 Data sources and confidence grades

All asset data for both Raw Water Sources and WTWs are derived from Ellipse, Scottish Water's asset inventory, whereas the Average Daily Output data is exported from the corporate Distribution Input (DI) reporting system (Z-One) - refer to Table A2 commentary and the leakage audit report for more detail as required.

Where the methodology for assigning each reportable WTW with DI values is a one-to-one relationship, merging the Raw Water Source data with respective DI values requires a more complex approach.

As in previous years, Scottish Water has completed columns 110–140 by assuming that, where multiple sources feed a WTW, the total average daily output comes only from the primary source. The primary source is therefore allocated 100% of the DI and all other sources are allocated 0%.

There are six WTWs where the primary source is already assigned as the primary source to another WTW (conjunctive use sources). An example of conjunctive use sources is at Glencorse WTW which is directly supplied with raw water from Talla, Megget and Glencorse Reservoirs, where the bulk of raw water is supplied from Talla. However, Megget Reservoir is also the sole primary source for both Marchbank and Bonnycraig WTWs.

In this case Talla, Megget and Glencorse Reservoirs are counted in E4.1 as three Impounding Reservoirs serving Glencorse WTW and the DI value is linked to Talla as the Primary Source to the works. There is, therefore, no DI allocated to Megget and Glencorse reservoirs from Glencorse WTW. As Megget Reservoir is also identified as the direct source of raw water to both Bonnycraig and Marchbank WTWs then DI values for both works are assigned accordingly to Megget Reservoir in E4.1, albeit the impounding reservoir is only counted once to avoid duplication.

Table 32: Example of primary source impounding reservoirs and allocation of distribution input

Source Name	WTW Name	Conjunctive Source	Region	Source Type	Primary Source for WTW	AR21 Count as Source	DI AR21 (MI/d)
Megget Reservoir	GLENCORSE WTW		SOUTH	IR		1	-
Talla Reservoir	GLENCORSE WTW		SOUTH	IR	GLENCORSE WTW	1	106.96
Glencorse Reservoir	GLENCORSE WTW		SOUTH	IR		1	-
Megget Reservoir	MARCHBANK WTW	Duplicate	SOUTH		MARCHBANK WTW	-	40.35
Megget Reservoir	BONNYCRAIG WTW	Duplicate	SOUTH		BONNYCRAIG WTW	-	2.65

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 four different WOAs supplied from Balmore; three 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 a WTW's DI, the cross-boundary flow is accounted for and assigned to the region within its treatment rather than abstraction. This is consistent with the historic methodology.

The confidence grade for the average daily output of these sources (columns 110-140) is assessed as B2 (in line with reported confidence grade for Table A2; unchanged from previous years).

The overall confidence grade assigned for Table E4 lines 1-5 is therefore B2 as this is the lower of the two confidence grades described above.

The confidence grade for Table E4 lines 6-7 (Bulk water exports and imports) is A1 as Scottish Water does not have any raw water exports or imports to other water companies.

8.2 Data improvement programmes

There have been no significant data improvement programmes in 2020/21 for water resources and treatment.

8.3 Assumptions used for forecast data

There is no forecast data for the E4 table.

8.4 Key changes from 2019/20

A summary of the variances between 2019/20 and 2020/21 for Water resources and treatment can be found at the end of this section – Table E4 comparison AR20 and AR21. The significant changes are detailed in this section.

The overall number of direct sources has reduced by three, from 275 to 272. As shown below, the reduction in source count is due to WTW closures only.

Table 33: Changes in sources

	2019/20 No. of sources	275
Additions	N/A	0
Reductions	Closed Sources	3
	2020/21 No. of sources	272

These closed sources were hydraulically linked to the abandoned WTWs as shown in the table below.

Table 34: Closed Sources and linked WTWs

Source ID	Source	WTW ID	WTW	WTW Closed	Ellipse Updated
RWI000066	CRAIGNURE RWI NM696370	WTW000075	CRAIGNURE WTW 1990 NM696372	27/02/2020	Oct-2020
DIR000099	KAIM LOCH DIR 1940 NS344625	WTW000121	KAIM WTW 1997 NS347624	12/03/2020	Dec-2020
DIR000272	LOCH MHIC GILLE-BHRIDE DIR NF771697	WTW000335	BAYHEAD WTW 1984 NF770700	09/08/2019	Oct-2019

Of the three WTWs linked to the closed sources, only Bayhead WTW was abandoned before the AR21 reporting period and was not included in E4.20 to E4.39 numbers. Both Craignure and Kaim WTWs are included in E4.20 to E4.39 because these sites remained operational in Ellipse and were abandoned during the reporting year (see table above). This was due to the full Project sign-off process not being complete before the end of the financial year 2019/20.

Distribution Input has increased by +54.816 MI/d to 1824.526 MI/d. This change is likely to be explained by notable warm weather-related increases in DI in late May 2020, as well as bursts related to freeze-thaw events in January and February 2021²⁷. This can be further reflected in the peak week average (the highest weekly DI value) of 1968.4MI/d in February 2021. This gave a peak to average ratio of 1.079, which is higher than AR20.

Table 35: Summary of distribution input between 2019/20 and 2020/21

Source Type	2019/20	2020/21	Net Change
	MI/d		
Impounding reservoirs	1291.896	1348.094	56.198
Lochs	20.933	20.943	0.009
River and burn abstractions	389.524	385.721	-3.803
Boreholes	67.357	69.768	2.412
Total	1769.710	1824.526	54.816

²⁷ Refer to Table A2 and the leakage audit report for further commentary.

There are 237 WTWs reported for the 2020/21 period. Although this number is the same as AR20 there were a number of sites added and removed as shown in the table below. The net changes in WTW numbers for AR21 based on Size band are as follows.

- Size band <=1 MI/d (E4.28) change +2
- Size band >1 - <=2.5 MI/d (E4.29) change -1
- Size band >10 - <=25 MI/d (E4.32) change -1

Table 36: Changes in WTWs by size band

Equipment Description	Removed or Added	Size band
TULLICH WTW NM858277	Removed	Size band >10 - <=25 MI/d
BAYHEAD WTW 1984 NF770700	Removed	Size band >1 - <=2.5 MI/d
OYKEL BRIDGE WTW 1960 NC387003	Removed	Size band <=1 MI/d
LOCHMADDY WTW 1993 NF893712	Removed	Size band <=1 MI/d
BEASDALE WTW 2005 NM701850	Removed	Size band <=1 MI/d
KATRINE PIER WTW 2012 NN496071	Added	Size band <=1 MI/d
STRONACHLACHAR WTW 2012 NN393098	Added	Size band <=1 MI/d
SAVALBEG WTW 2019 NC598079	Added	Size band <=1 MI/d
HARRIS BEDERSAIG WTW 2019 NB010102	Added	Size band <=1 MI/d
STRONSAY 2020 WTW HY653280	Added	Size band <=1 MI/d

Since 2019/20 there has been an overall increase of one WTW in the W1 process type category, a reduction of three in the W2 category, an overall increase of six WTWs in the W3 category and a reduction of four in the W4 category, resulting in no change in the total number. A summary of the changes is shown in the table below.

Table 37: Changes in WTWs by Process Type

Process Type	Change	Reason	WTWs
W1	+1	Brought into Operation	Stronsay
W2	-3	Abandoned	Oykel Bridge Bayhead Lochmaddy
W3	+4	Brought into Operation	Katrine Pier Stronachlachar Savalbeg Harris Bedersaig
	+2	Improved nano-membrane filtration	Kinlochbervie Bonar Bridge
W4	-2	Abandoned	Tullich Beasdale
	-2	Changed to W3 due nano-membrane filtration (as above)	As above

The two 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.

8.5 Functional costs

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

	Total £m	Functional expenditure:	Total £m
Functional expenditure:			
2020/21	65.765	2020/21	65.765
2019/20	61.878	2019/20	61.878
Variance	(3.887)	Variance	(3.887)

Water resources and treatment costs increased by £3.9m (6%) from 2019/20 analysed as follows:

- £2.9m (78%) increase in hired and contracted services due to additional costs associated with operating under COVID-19 restrictions, responding to winter weather related incidents (for example frozen inlet pipes), additional asset cleaning activity, an increase in the number of service contracts in place for repairs and statutory inspections, and an increase in sludge treatment and disposal costs;
- £1.0m (7%) increase in materials and consumable costs due to higher chemical usage and a higher level of E&M materials required for asset repairs;
- a net zero change across other cost types including power costs, employment costs and general and support costs.

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:							
2020/21	12.237	15.757	11.245	16.380	55.619	10.146	65.765
2019/20	12.161	13.719	9.857	15.883	51.620	10.258	61.878
Variance	(0.076)	(2.038)	(1.388)	(0.497)	(3.999)	+0.112	(3.887)

Minor changes to the numbers of WTW by process type and size band have arisen because of operational changes and process re-classifications in WTW during 2020/21. Re-stating 2019/20 figures on a like-for-like basis shows the following variations:

Analysis of water resources and treatment costs by process type:

Process Type	2020/21 £m	2019/20 £m	Variance £m
SD : Simple Disinfection	1.249	1.451	+0.202
W1 : SD plus simple physical or chemical treatment	0.200	0.164	(0.036)
W2 : Single stage complex physical or chemical treatment	9.793	9.252	(0.541)
W3 : Multiple stage complex treatment, excluding W4	39.441	35.902	(3.539)
W4 : Very high cost treatment Process	4.935	4.851	(0.084)
Direct	55.618	51.620	(3.998)
General and Support	10.147	10.258	+0.111
Total	65.765	61.878	(3.887)

Direct costs by process type have moved broadly in line with the overall cost movements explained above with the exception of process types SD and WD4, which both reflect a reduction in the number of treatment works in these categories.

Analysis of water resources and treatment costs by size band:

Size band	2020/21 £m	2019/20 £m	Variance £m
<=1 MVd	8.244	7.321	(0.923)
>1 to <=2.5 MVd	2.815	3.031	+0.216
>2.5 to <=5 MVd	4.066	4.132	+0.066
>5 to <=10 MVd	4.994	5.072	+0.078
>10 to <=25 MVd	9.151	8.208	(0.943)
>25 to <=50 MVd	9.300	8.873	(0.427)
>50 to <=100 MVd	7.452	6.355	(1.097)
>100 to <=175 MVd	5.960	5.635	(0.325)
>175 MVd	3.636	2.993	(0.643)
Direct	55.618	51.620	(3.998)
General and Support	10.147	10.258	+0.111
Total	65.765	61.878	(3.887)

The allocation of costs by size band remained broadly consistent with 2019/20 apart from:

- Size band > 50 to <= 100 which is primarily due to increased energy and chemicals costs at Glenfarg WTW due to dry weather conditions in early 2020-21 as well as reduced power export income due to turbine issues at Turret WTW; and
- Size band > 175 MI/d which is primarily due to increased energy and chemicals costs at Balmore and Milngavie WTWs due to dry weather conditions.

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 £55.6m total direct resource and treatment costs, £47.5m of costs, or 85.4%, have been directly charged to assets in Scottish Water's 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, most of these support costs have been allocated to the activities completed by employees.

SECTION E : OPERATING COSTS AND EFFICIENCY

Table E4: Water Resources and Treatment

Line Ref	Description	Unit	Total Number of Sources AR19	CG	Total Number of Sources AR20	CG	Total Number of Sources AR21	CG	Variance	% Change	Explanation provided in AR21 Commentary?	Units	Total Source Outputs AR19	CG	Total Source Outputs AR20	CG	Total Source Outputs AR21	CG	Variance	% Change	Explanation provided in AR21 Commentary?
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Source Types			Number								
E4.1	Impounding reservoirs	nr	102	B2	100	B2	98	B2	-2	-2.00	8.4 Key changes from 2019/20
E4.2	Lochs	nr	38	B2	38	B2	38	B2	0	0.00	No change
E4.3	River and burn abstractions	nr	78	B2	74	B2	73	B2	-1	-1.35	8.4 Key changes from 2019/20
E4.4	Boreholes	nr	64	B2	63	B2	63	B2	0	0.00	No change
E4.5	Total	nr	282	B2	275	B2	272	B2	-3	-1.09	8.4 Key changes from 2019/20
E4.6	Bulk exports water	nr	0	AX	0	AX	0	AX	0	0	No change
E4.7	Bulk imports water	nr	0	AX	0	AX	0	AX	0	0	No change

Average daily output (MI/d)									
MI/d	1,327.606	B2	1,291.896	B2	1,348.094	B2	56.20	4.35	8.1 Data sources and confidence grades 8.4 Key changes from 2019/20
MI/d	20.835	B2	20.933	B2	20.943	B2	0.01	0.04	8.4 Key changes from 2019/20
MI/d	388.188	B2	389.524	B2	385.721	B2	-3.80	-0.98	8.4 Key changes from 2019/20
MI/d	69.529	B2	67.357	B2	69.768	B2	2.41	3.58	8.4 Key changes from 2019/20
MI/d	1,806.158	B2	1,769.710	B2	1,824.526	B2	54.82	3.10	8.4 Key changes from 2019/20
MI/d	0.000	AX	0.000	AX	0.000	AX	0.00	0	8.1 Data sources and confidence grades
MI/d	0.000	AX	0.000	AX	0.000	AX	0.00	0	8.1 Data sources and confidence grades

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

Proportion of Own Source Output									
nr	0.735	n/a	0.730	n/a	0.739	n/a	0.009	1.21	8.1 Data sources and confidence grades
nr	0.012	n/a	0.012	n/a	0.011	n/a	0.000	-2.96	8.1 Data sources and confidence grades
nr	0.215	n/a	0.220	n/a	0.211	n/a	-0.009	-3.95	8.1 Data sources and confidence grades
nr	0.038	n/a	0.038	n/a	0.038	n/a	0.000	0.47	8.1 Data sources and confidence grades
nr	1.000	n/a	1.000	n/a	1.000	n/a	0.000	0.00	No change

Peak demand and Pumping Head			Total AR19	CG	Total AR20	CG	Total AR21	CG	Variance	% Change	Explanation provided in AR21 Commentary?
E4.13	Peak demand - peak to average ratio	nr	1	C3	1	C3	1	C3	0.032	3.06	8.1 Data sources and confidence grades
E4.14	Average pumping head - resources and treatment	nr	28	C4	28	C4	28	C4	-0.248	-0.89	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	Total number of works AR21	CG	Variance	% Change	Explanation provided in AR21 Commentary?
E4.20	Simple Disinfection	nr	23	A2	23	A2	23	A2	0	0.00	No change
E4.21	W1	nr	5	A2	5	A2	6	A2	1	20.00	8.4 Key changes from 2019/20
E4.22	W2	nr	28	A2	28	A2	25	A2	-3	-10.71	8.4 Key changes from 2019/20
E4.23	W3	nr	151	A2	155	A2	161	A2	6	3.87	8.4 Key changes from 2019/20
E4.24	W4	nr	32	A2	26	A2	22	A2	-4	-15.38	8.4 Key changes from 2019/20
E4.25	Total numbers of works	nr	239	A2	237	A1	237	A2	0	0.00	8.1 Data sources and confidence grades 8.4 Key changes from 2019/20
E4.26	Total distribution input										

Total volume Dist'n input							Variance	% Change	Explanation provided in AR21 Commentary?
MI/d	22.821	B3	20.232	B3	22.498	B3	2.266	11.20	8.1 Data sources and confidence grades
MI/d	0.188	B3	0.160	B3	0.236	B3	0.076	47.63	8.1 Data sources and confidence grades
MI/d	645.027	B3	626.726	B3	640.052	B3	13.326	2.13	8.1 Data sources and confidence grades
MI/d	1081.065	B3	1047.958	B3	1085.382	B3	37.424	3.57	8.1 Data sources and confidence grades
MI/d	57.056	B3	74.634	B3	76.358	B3	1.725	2.31	8.1 Data sources and confidence grades
MI/d	1806.158	B3	1769.710	B3	1824.53	B3	54.816	3.10	8.1 Data sources and confidence grades 8.4 Key changes from 2019/20

Water Treatment Works by Size Band			Total number of works AR19	CG	Total number of works AR20	CG	Total number of works AR21	CG	Variance	% Change	Explanation provided in AR21 Commentary?
E4.28	Size band <=1 MI/d	nr	130	A2	129	A2	131	A2	2	1.55	8.4 Key changes from 2019/20
E4.29	Size band >1 - <=2.5 MI/d	nr	23	A2	23	A2	22	A2	-1	-4.35	8.4 Key changes from 2019/20
E4.30	Size band >2.5 - <=5 MI/d	nr	22	A2	22	A2	22	A2	0	0.00	No change
E4.31	Size band >5 - <=10 MI/d	nr	19	A2	17	A2	17	A2	0	0.00	No change
E4.32	Size band >10 - <=25 MI/d	nr	18	A2	19	A2	18	A2	-1	-5.26	8.4 Key changes from 2019/20
E4.33	Size band >25 - <=50 MI/d	nr	12	A2	12	A2	12	A2	0	0.00	No change
E4.34	Size band >50 - <=100 MI/d	nr	9	A2	9	A2	9	A2	0	0.00	No change
E4.35	Size band >100 - <=175 MI/d	nr	4	A2	4	A2	4	A2	0	0.00	No change
E4.36	Size band >175 MI/d	nr	2	A2	2	A2	2	A2	0	0.00	No change
E4.37	Total number of works	nr	239	A2	237	A1	237	A2	0	0.00	No change
E4.38	Proportion of distribution input - total										

	Proportion of DI AR19	CG	Proportion of DI AR20	CG	Proportion of DI AR21	CG	Variance	% Change	Explanation provided in AR21 Commentary?
nr	0.012	C3	0.012	B3	0.012	B3	-0.0003	-2.44	8.1 Data sources and confidence grades
nr	0.013	C3	0.013	B3	0.012	B3	-0.0008	-6.25	8.1 Data sources and confidence grades
nr	0.028	C3	0.027	B3	0.028	B3	0.0010	3.70	8.1 Data sources and confidence grades
nr	0.046	C3	0.045	B3	0.043	B3	-0.0023	-5.08	8.1 Data sources and confidence grades
nr	0.106	C3	0.105	B3	0.105	B3	0.0000	0.00	8.1 Data sources and confidence grades
nr	0.154	C3	0.156	B3	0.157	B3	0.0015	0.96	8.1 Data sources and confidence grades
nr	0.228	C3	0.229	B3	0.228	B3	-0.0012	-0.52	8.1 Data sources and confidence grades
nr	0.206	C3	0.214	B3	0.209	B3	-0.0050	-2.34	8.1 Data sources and confidence grades
nr	0.206	C3	0.199	B3	0.206	B3	0.0071	3.57	8.1 Data sources and confidence grades
nr	1.000	C3	1.000	B3	1.000	B3	0	0.00	No change

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 majority of potable mains are recorded in Scottish Water's 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 E6.12-15, has continued to improve from last year due to less data infilling and using the actual values recorded in GIS. However, the confidence grades remain as A2. The confidence grade for the total line E6.16 remains A1, as no infilling is required.

GIS records are continuously updated as notifications from capital investment and operational teams are received; there being an internal service target of within one week for water mains replacement. Capturing the flushing of mains is currently under review and the update of GIS is time consuming and a new process needs to be developed. There will be a small number of revisions and additions to the GIS for new and existing assets that have not been included in the current reported numbers. The impact of this will be reviewed prior to the next annual return.

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

Annual average resident connected population (E6.1) balances with the number reported in A2.5. The total figure used for Scotland was correlated to the Scottish Water region split obtained using GIS properties to ensure there was a consistent figure reported across the Annual Return tables.

The total for the four Scottish Water regions in total connected properties (E6.2) balances with A1.10. The total property figure used for Scotland was correlated to the Scottish Water region split obtained using GIS properties to ensure there was a consistent figure reported across the Annual Return tables.

The confidence grades remain the same as AR20.

9.2 Data improvement programmes

Further work has been undertaken during 2020/21 to improve the recording of pump Kw capacities and tank storage capacities. A further seven sites in both categories have improved data quality.

9.3 Assumptions used for forecast data

There is no forecast data for the E6 table.

9.4 Key changes from 2019/20

A summary of the variances between 2019//20 and 2020/21 for Water Distribution can be found at the end of this section – Table E6 comparison AR20 and AR21. The significant changes are detailed in this section.

The area of the four Scottish Water regions increased slightly by 39km² to 79,838km². This change is due to the identification of some small islands omitted from the GIS polygon, and subsequently not reported in previous years.

There are four fewer supply zones reported this year as listed below.

Table 38: Changes in Water supply zones

Supply Zone	Region	Added/Removed
Govig Western Isles	NORTH	Removed
Hushinish Western Isles	NORTH	Removed
Craignure Mull	NORTH	Removed
Daer Coulter	SOUTH	Removed
Dougliehill	WEST	Removed
Kaim Lochwinnoch	WEST	Removed
Daer D	SOUTH	Added
Harris Bedersaig	NORTH	Added

The zones for Craignure, Dougliehill and Kaim were all removed in 2020/21 as they were amalgamated into larger regulatory supply zones. Daer Coulter was replaced by Daer D zone as the feed from Coulter WTW no longer exists. Both Govig and Hushinish zones were amalgamated into the new Harris Bedersaig zone as both associated WTWs were mained out from the newly operational works.

Potable mains are reported by diameter and in total have increased by around 90km 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 118km in 2020/21. The reported length of unlined iron mains does not include a reduction for lengths of main believed to have been relined, but where GIS had not been updated. This may result in inaccuracies in reporting and relates to the GIS records in the data sources section, the impact of which will be reviewed for SR21.

The leakage level reported in table E6 is the top-down leakage (from DI meters). It has reduced from 454 MI/d in 2019/20 to 425 MI/d in 2020/21.

The number of water mains bursts has increased by 1,283 to 8,579 over the report year representing an overall 17.6% increase on last year. Most notably a 60% increase in the last quarter compared to last year, due mainly to the freeze-thaw event in January and February 2021. The increase in bursts relates to a corresponding increase in Distribution

Input value and Peak Week ratio as highlighted in Section E4. The number of reported bursts showed an 18.9% increase during the report year compared to last year's 11.9% decrease. The number of unreported bursts showed a 13.7% increase during the report year compared to last year's 15.2% decrease.

The overall number of low-pressure properties has decreased from 407 to 211. Targeted investment and operational changes have improved pressure to 196 properties during 2020-21; 193 in one WSZ (Lochgelly Spion Kop WSZ) and 3 in a second zone (Marchbank, Hermiston WSZ).

Table 39: Changes in number of low-pressure properties

2019/20 Properties reported for low pressure	407
Removed due to operational improvements	0
Removed due to asset improvements	196
Removed due to better information	0
Added due to asset deterioration	0
Added due to better information	0
Added due to operational changes	0
2020/21 Properties reported for low pressure	211

The number of pumping stations (E6.22) has decreased by three this year. However, the total capacity (E6.23: m³/d and E6.24: Kw) has decreased by around 1,080Kw, not only due to changes in stations but also due to the data improvements. The increased number of pumping stations are as a result of the changes detailed in the table below, which demonstrates that seven stations were removed and four were added.

Table 40: Changes in pumping stations (E6.22)

Equipment Description	Removed or Added	KW
WOODHEAD TWP NS521378	Removed	0.775
LUSS AVENUE TWP 1982 NS290743	Removed	2.2
BAYHEAD BOOSTER TWP 2001 NF749684	Removed	8
RAITLOAN TWP 1971 NH885534	Removed	10
OVERTON HIGH TWP NS272749	Removed	3
CAIRNHALL TWP1970 NO276536	Removed	8
WHALSAY TWP	Removed	6
TARVES YTHSIE TWP 2006 NJ873312	Added	4
DUMBARTON HIGHMAINS ESTATE TWP NS415752	Added	16
ALEXANDRIA MARGARET DR TWP 2019 NS386801	Added	16
FENWICK RAITHHILL TWP 2019 NS477457	Added	16

There are four fewer service reservoirs (E6.26) and an overall increase of 17MI in the total capacity of these assets has been recorded this year. This is because of twelve reservoirs being removed and eight reservoirs being added as per the changes detailed in the table below, and further tank capacity data improvements during the reporting year.

Table 41: Changes in service reservoirs (E6.26)

Equipment Description	Removed or Added
SANQUHAR DSR 3 NS789105	Removed
DUNBEATH DSR 1958 ND154297	Removed
BAYHEAD DSR (OLD) 1958 NF770700	Removed
CARBOST DSR 1960 NG373324	Removed
FAICHEM SR	Removed
ARDNAGRASK DSR 1980 NH506479	Removed
URCHANY DSR 1930 NH877505	Removed
RAITLOAN DSR 1971 NH885534	Removed
MARYPARK DSR 1994 NJ195388	Removed
ESHANESS DSR 1966 HU257782	Removed
BLAIRVOCKIE DSR NS379971	Removed
DRUMLEAN DSR NN482023	Removed
LANDHEADS DSR 2 NY202695	Added
TIREE CWT 1989 NL955411	Added
CLOCHANDIGHTER DSR 1930 NO894983	Added
WHALSAY WORKS CWT 1955 HU548622	Added
HARRIS BEDERSAIG CWT 2019 NB007104	Added
CRAIGHEAD CWT 1975 TWS NJ497405	Added
HAZLEHEAD DST NJ879050	Added
LOCHMADDY CWT 2 TWS 2018 NF892712	Added

9.5 Functional costs

Functional expenditure for water distribution (E6.11):

Table W02 : Water Distribution

	Total
Functional expenditure:	£m
2020/21	82.292
2019/20	<u>72.353</u>
Variance	<u>(9.939)</u>

Water distribution costs have increased by £9.9m (14%) from 2019/20 analysed as follows:

- £1.9m (7%) increase in employment costs due to average pay progression of 2.5% (£0.7m), a change in mix of employees (£0.4m), additional overtime and agency costs of £0.6m associated with Scottish Water's response to COVID-19 operating constraints and high volumes of incidents relating to burst pipes, and other employment cost changes of £0.2m;
- £1.7m (15%) increase in power costs due to an average 8% increase in tariffs (£0.9m), an average 3% increase in consumption (£0.3m), new operating costs associated with capital investment of £0.2m and the impact of a carbon reduction credit of £0.3m received in 2019-20 but not 2020-21;
- £3.0m (20%) increase in hire and contracted costs driven by (i) the cost of operating in line with COVID-19 restrictions and supplementing SW resources when required to maintain service levels and (ii) responding to high volumes of

- water mains bursts and the associated cost of repairs, reinstatements and managing leakage levels;
- £0.5m (34%) decrease in materials and consumables costs primarily related to higher capitalisation of repair & maintenance materials with a smaller impact from reduced chemical usage;
 - £0.6m (22%) increase in other direct costs primarily driven by tankering water to maintain water supplies because of bursts in the distribution network; and
 - £3.2m (20%) increase in general and support costs due to increases in support department employment costs linked to pay progression, an increase in costs related to Scottish Water's transformation planning activity including internal resources, external consultants and some early project specific costs, a 5% increase in telecoms and IT costs and higher contract prices for vehicle repair and maintenance.

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:							
2020/21	9.796	16.991	14.593	21.294	62.674	19.618	82.292
2019/20	7.868	15.102	14.833	18.221	56.024	16.329	72.353
Variance	(1.928)	(1.889)	+0.240	(3.073)	(6.650)	(3.289)	(9.939)

Expenditure in the south region has been broadly similar to 2019-20. The north, east and west regions have incurred relatively higher increases in costs driven by different factors by region but including tankering water to maintain supplies (N,E,W), contractor costs due to COVID-19, winter weather disruption and burst repairs (N), low levels of insurance claim costs (N,E,S) but a normalised level of insurance claims (W) and higher chemical usage (E,W).

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	Total Report Year 2020-21	CG	Variance	% Change	Explanation provided in AR21 Commentary?
Area Data											
E6.1	Annual average resident connected population	000	5,377.35	A2	5,217.00	A2	5,194.93	A2	-22.07	-0.42	9.1 Data sources and confidence grades - reference to values in A1 and A2
E6.2	Total connected properties	000	2,690.55	B4	2,716.39	B4	2,732.84	B4	16.45	0.61	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	1,107.34	B2	114.23	11.50	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	356.02	B4	-25.20	-6.61	9.1 Data sources and confidence grades - reference to values in A1 and A2
E6.5	Area	km2	79,799.04	A1	79,799.40	A1	79,838.41	A1	39.00	0.05	9.1 Data sources and confidence grades
E6.6	Number of supply zones	nr	285	A1	282	A1	278	A1	-4	-1.42	9.4 Key changes from 2019/20
Water mains data											
E6.12	Potable mains: Band 1 (≤165mm)	km	35,880.50	B2	35,964.37	A2	36,018.12	A2	53.75	0.15	9.1 Data sources and confidence grades 9.4 Key changes from 2019/20
E6.13	Potable mains: Band 2 (166 - 320mm)	km	8,783.19	B2	8,807.43	A2	8,824.00	A2	16.57	0.19	
E6.14	Potable mains: Band 3 (321 - 625mm)	km	3,083.75	B2	3,078.19	A2	3,097.45	A2	19.26	0.63	
E6.15	Potable mains: Band 4 (>625mm)	km	858.76	B2	891.59	A2	892.36	A2	0.77	0.09	
E6.16	Total length of mains	km	48,606.19	B2	48,741.58	A1	48,831.93	A1	90.35	0.19	
E6.17	Total length of unlined iron mains	km	14,815.80	B2	14,576.38	A2	14,457.87	A2	-118.51	-0.81	9.4 Key changes from 2019/20
E6.18	Total length of mains > 320mm diameter	km	3,942.51	B2	3,969.78	A2	3,989.81	A2	20.03	0.50	9.4 Key changes from 2019/20
E6.19	Water mains bursts	nr	8,358	B3	7,296	B3	8,579	B3	1,283	17.58	9.4 Key changes from 2019/20
E6.20	Leakage level	MI/d	471.57	B3	454.01	B3	425.40	B3	-28.61	-6.30	9.4 Key changes from 2019/20
E6.21	Properties reported for low pressure	nr	421	B2	407	B2	211	B2	-196	-48.16	9.4 Key changes from 2019/20
Pumping Stations											
E6.22	Total number of pumping stations	nr	613	B2	616	A2	613	A2	-3	-0.49	9.4 Key changes from 2019/20
E6.23	Total capacity of pumping stations	m3/d	2,604,278.31	C4	2,434,417.81	C4	2,368,778.70	C4	-65,640.11	-2.70	9.2 Data improvement programmes 9.4 Key changes from 2019/20
E6.24	Total capacity of booster pumping stations	Kw	45,806.16	C3	42,976.40	A3	41,895.42	A3	-1,080.98	-2.52	9.2 Data improvement programmes 9.4 Key changes from 2019/20
E6.25	Average pumping head	m	29.86	C4	29.87	C4	30	C4	-0.01	-0.02	9.1 Data sources and confidence grades
Service Reservoirs											
E6.26	Total number of service reservoirs	nr	1311	B2	1305	A2	1301	A2	-4	-0.31	9.4 Key changes from 2019/20
E6.27	Total capacity of service reservoirs	MI	3,853.28	B2	3,948.77	A2	3,965.68	A2	16.91	0.43	9.4 Key changes from 2019/20
Water Towers											
E6.28	Total number of water towers	nr	18	B2	18	A2	18	A2	0	0.00	No significant changes to report
E6.29	Total capacity of tower towers	MI	29.27	B2	29.27	A2	29.27	A2	0	0.00	No significant changes to report

10 Table E7 Wastewater Explanatory Factors – by Area

10.1 Data sources and confidence grades

Annual average resident connected population (E7.1) broadly balances, with the number reported in A3.3, the sources of which are described in Section A3. The minor differences are due to rounding of figures when splitting across SW regions. The total figure used for Scotland was correlated to the Scottish Water Region split obtained using GIS properties to ensure there was a consistent figure reported across the Annual Return tables.

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 Scottish Water Region level.

The average daily volume collected has been calculated as the flow which arrives in a public sewer (of any type) from any source e.g. rainfall, infiltration, domestic use, industrial use, tidal flows and connected watercourses. The approach used is the same as that in previous years and has been applied consistently across the country. It uses data sets for rainfall, connected properties and sewered areas consistent with the wastewater elements of the Annual Return. The flow has been calculated in two parts; 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 a number of recordings of flows with a known connected population were analysed to establish a range of flow per connected population. These factors were averaged and applied to all sewered areas to establish a total dry weather flow contribution per sewered area.

Storm Flow: The storm flow element was calculated by using existing sewer models to establish a relationship between rainfall depth, area of the sewered area and the amount of run-off generated. A selection of models was used and an average value of run-off per millimetre rainfall per hectare of sewered area was established. This was then applied to each sewered area to establish a total storm flow contribution per sewered area.

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

The Total connected properties (E7.4) for the four Scottish Water regions balances with A1.20, the sources of which are described in Section A1. The total property figure used for Scotland was correlated to the Scottish Water Region split obtained using GIS properties to ensure there was a consistent figure reported across the Annual Return tables.

The annual precipitation measurement (E7.7) was obtained from Met Office radar rainfall data. This data is provided at a regional level that allows Scottish Water to match it to the wastewater catchments and use the data for calculating the storm flow element of sewage volume reported in E7.3. This was the methodology followed historically, prior to the AR20 period. For AR20 access to the Met office data was unsuccessful due to technical issues with working from home due to COVID-19 restrictions; instead the annual rainfall data (E7.7) was obtained from Statista's website and AR19 rainfall data was used for the catchments

(E7.3). AR19 data was used as it was the most recent data available, however it may not have been a representative data set as AR20 was a particularly wet year and values used may have been low. A comparison between AR20 and AR21 is, therefore, not appropriate for E7.3.

As with previous years the data that supports the population of lines relating to Pumping station capacity (m3/d) and pumping head is very limited. These values are extrapolations based on size banded kW ratings to infill any missing values per pumping station. Confidence Grades for both sets of lines remain as C4 and C5 respectively.

As per the commentary in section E6, GIS records are continuously updated as notifications from capital investment and operational teams are received. There is a longer response time for wastewater assets; however, it is expected that any backlog will be easily addressed in 2021/22. There will be a small number of revisions and additions to the GIS for new and existing assets that have not been included in the current reported numbers. The impact of this will be reviewed prior to the next annual return.

All remaining data sources and methodologies remain unchanged from 2019/20. All Confidence Grades in Table E7 are the same as reported for AR20.

10.2 Data improvement programmes

Scottish Water continues to collect and update corporate systems with more accurate information. Most notable for this section is the continued updating of sewage pumping station kW ratings.

10.3 Assumptions used for forecast data

There is no forecast data for the E7 table.

10.4 Key changes from 2019/20

A summary of the variances between 2019/20 and 2020/21 for Wastewater Explanatory Factors can be found at the end of this section – Table E7 comparison AR20 and AR21. The significant changes are detailed in this section.

The annual rainfall (E7.7) has fallen from 1803mm/year in AR20 to 1392mm/year in AR21.

The Area (E7.5) has increased by 39km² for 2020/21. This is the same as the data used for water and a brief explanation can be found in section 9.4.

Although the number of Sewage pumping stations (E7.20) has increased by 21 to 2,277 for 2020/21, the overall Capacity (E7.22) has reduced by over 1,500kW. This decrease was mainly due to continued data improvement for kW rating values for around 200 Pumping stations in corporate systems during the reporting year. These changes are detailed as follows.

Table 42: Changes in Pumping Stations

Line Reference	Number of Pumping Stations	kW Capacity
----------------	----------------------------	-------------

Line Reference	Number of Pumping Stations	kW Capacity
AR20 reported	2,256	97,594
SPS removed	3	59
SPS added	24	171
kW Improvement change	-	-1,642
AR21 reported	2,277	96,064

Errors in AR20 reporting were identified during the processing of the sewage pumping stations data for AR21. This issue was unrelated to reported values above. An inconsistency in applying formulae towards the calculations of all capacity of pumping stations values and the average pumping head was found to be the cause of this.

The values for Capacity in lines E7.21, E7.25 and E7.27 are calculated from values where this limited data is available. Infill values are extrapolated from these figures to produce an average capacity value, based on Table H5 size banding of kW ratings. The infill average value is applied to each site where there is no capacity data available and whose kW rating lies within the size band range.

The AR20 infill errors identified for Capacity were as follows.

Table 43: Corrected AR20 capacity values for pumping stations

kW Band	Size	AR20 Infill Capacity (m ³ /d)	AR20 Corrected Infill Capacity (m ³ /d)
1		257.95	274.58
2		2,307.63	2,310.31
3		5,910.99	5,910.99
4		36,030.67	36,030.67
5		97,823.21	134,877.5

On comparison between AR20 and AR21 corrected values for E7.21, E7.25 and E7.27, the following changes apply.

Table 44: Changes in pumping station values 2019/20 to 2020/21

Description	AR20 (Corrected values) m ³ /d	AR21 m ³ /d	Change
Total capacity of pumping stations (E7.21)	15,664,672	16,348,133	683,461
Total capacity of combined pumping stations (E7.25)	11,487,943	12,135,755	647,812
Total capacity of stormwater pumping stations (E7.27)	692,551	674,007	-18,544

The change in capacity value is further reflected where pumping station infill values have changed when a movement between kW size banding has occurred for affected sites.

The average pumping head values in E7.23 are produced by two different methodologies for Annual Return purposes. The figures reported for each Scottish Water region are calculated using a Hydraulic-based procedure, whereas the average pumping head for the whole of Scotland follow a Power-based calculation.

An error has been found in the AR20 reported average pumping head numbers for each region, where values used to populate the E7.23 line were Power based. The average pumping head across the regions reported in E7.23 for AR20 have been recalculated and are shown below.

Table 45: Changes in average pumping head by region between 2019/20 and 2020/21

Reporting Year	North (m)	East (m)	South (m)	West (m)
AR20	69.6	35.7	21.8	40.8
AR21	66.1	33.7	18.5	39.2
Change	-3.5	-2.0	-3.3	-1.6

The power-based average pumping head value reported for AR20 was also found to have a slight error due to the extrapolation of Power based work done values, where average infill values were calculated from pumping stations with actual power data, based on the H5 size banded kW rating. The infill errors were identified as follows.

Table 46: Corrected AR20 infill capacity

kW Size Band	AR20 Infill Work Done (m4/y)	AR20 Corrected Infill Work Done (m4/y)
1	3,347,169	3,347,169
2	4,154,910	4,154,910
3	17,099,112	17,099,112
4	80,374,575	80,374,575
5	283,683,073	294,593,960

On comparison with the corrected average pumping head for Scotland for AR21 the following changes were found.

Table 47: Changes in average pumping head for Scotland between 2019/20 and 2020/21

Description	AR20 Corrected (m)	AR21 (m)	Change (m)
Average pumping head (E7.23)	34.1	29.8	-4.3

The changes to average pumping head are explained by pumping station infill values having changed, where a movement between kW size banding for AR21 has occurred for affected sites. There has also been an increase in Sewage volume reported (E7.3) for AR21 which has further enhanced the decrease in pumping head.

The number of reported sewage treatment works remains at 1,837 for AR21. The respective Total load has reduced to 214,836kg/BOD/day. The loading constituents are shown below.

Table 48: Changes in Sewage treatment works load between 2019/20 and 2020/21

Constituent	AR20 (% total load)	AR20 (kg/BOD/day)	AR21 (% total load)	AR21 (kg/BOD/day)	Variance
Population	73.2	165,552.7	76.9	165,312.5	-240.2
Tourist	1.4	3,173.8	1.8	3,788.8	615
Non-domestic	10.0	22,517.1	8.9	19,202.7	-3,314.4
Trade effluent	10.1	22,895.6	8.1	17,384	-5,511.6
Imported private septic tanks	0.3	625.2	0.2	489.1	-136.1
Imported public septic tanks	0.2	356.4	0.2	436.2	79.8
Imported other loads	0.4	970.2	0.4	933.6	-36.6
Imported WWTW sludge	3.8	8,603.4	2.8	5,977.3	-2,626.1
Imported WTW sludge	0.4	902.4	0.3	665.6	-236.8
Sludge return liquors	0.3	615.0	0.3	646.2	31.2

The highest reduction in load is in the Trade effluent constituent for AR21 (see section A3). Further details for Sewage treatment works are found in Section E8.

10.5 Functional costs

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

	Total
Functional expenditure:	£m
2020/21	50.661
2019/20	<u>48.048</u>
Variance	<u>(2.613)</u>

Sewerage costs have increased by £2.6m (5%) from 2019/20. The increase is analysed as follows:

- £1.3m (35%) increase in hired and contracted services primarily due to securing additional contractor resources to maintain operations impacted by COVID-19 constraints but also a higher number of reinstatements as a result of damage due to heavy rainfall.
- £0.3m (10%) increase in SEPA costs due to inflationary cost increases of 2.4% and reclassification of licences (for example individual licences to network licences).
- £1.1m (3%) net increase across other cost types including power (9% increase in tariffs, 1% reduction in consumption), other direct costs (higher levels of insurance claims) and general and support costs.

Analysis of sewerage costs by region:

	North	East	South	West	Direct	General and Support	Total
	£m	£m	£m	£m	£m	£m	£m
Functional expenditure:							
2020/21	4.164	9.323	11.102	12.991	37.580	13.081	50.661
2019/20	4.260	8.479	9.319	13.223	35.281	12.767	48.048
Variance	+0.096	(0.844)	(1.783)	+0.232	(2.299)	(0.314)	(2.613)

Expenditure in the East & South regions increased at a relatively higher level due to additional sludge transport and disposal costs (E), higher cost of insurance claims (S) and relatively high power costs due to rainfall (E,S).

Table WW02 : Sewage Treatment

	Total
	£m
Functional expenditure:	
2020/21	67.805
2019/20	66.350
Variance	(1.455)

Sewage treatment costs have increased by £1.5m (2%) from 2019/20. The main movements are as follows:

- £1.0m (5%) increase in power costs due to an average 9% increase in tariffs (£1.5m) partially offset by an average 1% decrease in consumption (£0.2m) and a reduction in central provisions;
- £0.5m (10%) increase in materials and consumables costs including protective equipment and chemicals; and
- a net zero change across other cost types including general and support costs, SEPA charges and employment costs.

Analysis of sewage treatment costs by region:

	North	East	South	West	Direct	General and Support	Total
	£m	£m	£m	£m	£m	£m	£m
Functional expenditure:							
2020/21	7.607	14.602	18.680	15.679	56.568	11.237	67.805
2019/20	6.948	13.297	18.804	16.339	55.388	10.962	66.350
Variance	(0.659)	(1.305)	+0.124	+0.660	(1.180)	(0.275)	(1.455)

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Table E7: Wastewater Explanatory Factors - Sewerage & Sewage treatment by area

Line Ref	Description	Units	AR19	CG	AR20	CG	AR21	CG	Variance	% Change	Explanation provided in AR21 Commentary?
Area Data											
E7.1	Annual average resident connected population	000	4,990	B2	5,008	B2	4,987	B2	-20.894	-0.42	6.1 Data sources and confidence grades 10.1 Data sources and confidence grades 10.4 Key Changes from 2019/20
E7.2	Annual average non- resident connected population	000	107	C4	76	B3	90	B3	13.979	18.31	6.1 Data sources and confidence grades 10.1 Data sources and confidence grades 10.4 Key Changes from 2019/20
E7.3	Volume of sewage collected (daily average)	MI/d	2,914	C3	2,921	C3	3,327	C3	405.828	13.89	10.1 Data sources and confidence grades
E7.4	Total connected properties	nr	2,561,857	B4	2,585,489	B3	2,601,699	B3	16,210	0.63	6.1 Data sources and confidence grades 10.1 Data sources and confidence grades
E7.5	Area of Sewerage District	km2	79,799	A1	79,799	A1	79,838	A1	39.004	0.05	10.4 Key Changes from 2019/20
E7.6	Drained Area	km2	1,937	B2	1,957	A1	1,966	A1	9.468	0.48	10.1 Data sources and confidence grades
E7.7	Annual Precipitation	mm	979	A2	1,803	C3	1,392	C3	-411	-22.80	10.1 Data sources and confidence grades
Sewerage Data											
E7.8	Total length of sewer	km	53,203	B2	52,810	B2	53,468	B2	658.51	1.25	10.1 Data sources and confidence grades
E7.9	Total length of lateral sewer	km	18,496	B2	19,286	B2	19,767	B2	480.74	2.49	10.1 Data sources and confidence grades
E7.10	Length of combined sewer	km	17,506	B2	17,534	B2	17,563	B2	28.37	0.16	10.1 Data sources and confidence grades
E7.11	Length of separate stormwater sewer	km	8,449	B2	8,479	B2	8,496	B2	16.37	0.19	10.1 Data sources and confidence grades
E7.12	Length of sewer > 1000 mm diameter	km	802	B2	854	B2	856	B2	1.72	0.20	10.1 Data sources and confidence grades
E7.13											Agreed with WICS to remove line for AR20
E7.14	Sewer Collapses	nr	1,541	B4	1,358	B4	1,355	B4	-3	-0.22	10.1 Data sources and confidence grades
Pumping Stations											
E7.20	Total number of pumping stations	nr	2,250	A3	2,256	A3	2,277	A3	21	0.93	10.4 Key changes from 2019/20
E7.21	Total capacity of pumping stations (m3/d)	m3/d	13,889,371	C4	14,652,750	C4	16,348,133	C4	1,695,383	11.57	10.2 Data improvement programmes 10.4 Key changes from 2019/20
E7.22	Total capacity of pumping stations (kw)	Kw	85,646	C4	97,594	A3	96,064	A3	-1530	-1.57	10.2 Data improvement programmes 10.4 Key changes from 2019/20
E7.23	Average pumping head	m	34	C5	34	C5	30	C5	-3.89	-11.56	10.2 Data improvement programmes
E7.24	Total number of combined pumping stations	nr	1,331	A3	1,328	A3	1,329	A3	1	0.08	10.4 Key changes from 2019/20
E7.25	Total capacity of combined pumping stations	m3/d	10,108,065	C4	10,741,414	C4	12,135,755	C4	1,394,341	12.98	10.2 Data improvement programmes
E7.26	Total number of stormwater pumping stations	nr	49	A3	49	A3	49	A3	0	0.00	10.4 Key changes from 2019/20
E7.27	Total capacity of stormwater pumping stations	m3/d	717,712	C4	655,363	C4	674,007	C4	18,644	2.84	10.2 Data improvement programmes 10.4 Key changes from 2019/20
E7.28	Number of combined sewer overflows	nr	3,067	A3	3,072	A3	3,083	A3	11	0.36	10.2 Data improvement programmes
E7.29	Number of combined sewer overflows (screened)	nr	1,352	A3	1,219	A3	1,185	A3	-34	-2.79	10.2 Data improvement programmes
Sewage Treatment works											
E7.30	Number of sewage treatment works	nr	1,843	A3	1,837	A2	1,837	A2	0.0	0.0	10.1 Data sources and confidence grades
E7.31	Total Load	kg BOD/day	226,579	B3	226,212	B3	214,836	B3	-11376.0	-5.0	10.4 Key changes from 2019/20

11 Table E8 Wastewater Explanatory Factors – Sewage Treatment Works

11.1 Data sources and confidence grades

The numbers for small sewage treatment works with specific ammonia consents are sourced from Scottish Water's compliance database and are aligned with lines E8.9 and E8.10, as per previous years.

The percentage compliance has been calculated based on SEPA results. Scottish Water's 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.

11.2 Data improvement programmes

There have been no significant data improvement programmes regarding sewage treatment works.

11.3 Assumptions used for forecast data

There is no forecast data for the E8 table.

11.4 Key changes from 2019/20

A summary of the variances between 2019/20 and 2020/21 for Sewage Treatment Works can be found at the end of this section – Table E8 comparison AR20 and AR21. The significant changes are detailed in this section.

Although the number of STW remains unchanged at 1837 this year, there have been 6 added and 6 removed as shown below.

Table 49: Changes in sewage treatment works (E8.8)

Works Removed	Works Added
KYLESKU CHALETS SEP 1970 NC225333	WELLRIG WWTW NT768533 (secondary biological)
THRUMSTER TANNOCH ROAD SEP 1966 ND333447	KILMUN HILLRIG SEP WWTW 2017 NS173814
FERRYMANS HOUSES SEP 1980 NF792122	RHU LARGARIE LODGE SEP 2017 NS277835
DUACKSIDE SEP 1975 NH998204	STORNOWAY MCKENZIE PK (SEP) WWTW 2015 NB452322
INNELLAN, DUNADD UNS SO	MILLHALL SEPTIC TANK WWTW NS816922
INNELLAN, ASHBURNE LODGE UNS SO	SANDWICK SWINISTER SEP WTW HU417238
BLAIRINGONE SEP (removed from primary)	BLAIRINGONE SEP (primary to septic)

Blairingone changed from primary to septic tank, which corrected an erroneous classification from 2019/20. Two fewer works are reported in the Sea Unscreened category this year, which accounts for the largest percentage decrease in the load by treatment category. The changes in the category of works are summarised in the table below.

Table 50: Changes in category of Wastewater Treatment Works

Category	AR19	AR20	AR21	Difference AR20 and AR21
Septic Tanks	1178	1178	1180	2
Primary	40	40	39	-1
Sec Activated Sludge	177	176	176	0
Sec biological	296	296	297	1
TertiaryA1	36	36	36	0
Tertiary A2	19	19	19	0
Tertiary B1	59	59	59	0
Tertiary B2	14	14	14	0
Sea Preliminary	8	8	8	0
Sea Screened	3	3	3	0
Sea Unscreened	13	8	6	-2
Total	1843	1837	1837	0

Bothwellbank and Dunbar STWs reduced the BOD Kg/day value from 1520kg/day to 1456kg/day and 1800kg/day to 1118kg/day respectively. These reductions in load moved them in Band 5 works from Band 6.

Table 51: Changes in WWTW Bands

Description	AR19	AR20	AR21	Difference (AR20 to AR21)
Size Band 0	1116	1115	1123	8
Size Band 1	211	209	202	-7
Size Band 2	148	150	147	-3
Size Band 3	185	183	183	0
Size Band 4	119	121	122	1
Size Band 5	42	36	39	3
Size Band 6 (Large Works)	22	23	21	-2

The reduction in the Sea Unscreened category accounts for the largest percentage change in the load by treatment category (see table below), although not the most significant volume. The decrease in the Tertiary A2 load is due to the Trade Effluent component of the load at Dunbar WWTW decreasing by around 60% from 2019/20 to 2020/21. The reduction at Dunbar may be related to COVID-19 restrictions impacting on production at Belhaven brewery.

The most significant change in load was in the secondary activated sludge category. Approximately 50% of this load comes from non-household and trade effluent loads and the changes in these volumes and loads are assumed to be the main cause of change for secondary activated sludge. The changes in non-household and trade effluent are discussed in section 1.4.

Table 52: Changes in load by treatment category

Category	2019/20 kg/BOD/Day	2020/21 kg/BOD/Day	Change	Change %
Septic Tanks	5,780	5,791	11	0.2%
Primary	3,489	3,575	86	2.5%
Sec Activated Sludge	152,018	140,899	-11,119	-7.3%
Sec biological	23,095	23,120	25	0.1%
TertiaryA1	24,832	25,345	513	2.1%
Tertiary A2	5,002	4,303	-699	-14.0%
Tertiary B1	8,265	8,084	-181	-2.2%
Tertiary B2	1,659	1,712	53	3.2%
Sea Preliminary	1,819	1,800	-19	-1.0%
Sea Screened	227	196	-31	-13.7%
Sea Unscreened	24	11	-13	-54.2%
Total	220,430	209,045	-11,385	-5.2%

Compliance has improved from 87.5% in AR20 to 100% in AR21 for sewage treatment works in the primary treatment and size band 2 categories (E8.23). In AR20, 2 sewage treatment works were non-compliant: Tomintoul WWTW and Inchmarlo WWTW. There were no failing Band 2 sewage treatment works in AR21, therefore the compliance was 100%.

Improvements/interventions at Tomintoul included:

- Move to twin tank operation
- Further investigative sampling undertaken to establish optimal chemical dose rates. Supplier engaged to advise on correct dosing system & best practice
- Sludge management improvement plan completed - tankering frequency increased & onsite desludge frequency increased
- Programme of increased sample monitoring set up & increased frequency of site visits by Ops & Process Scientist

Improvements/interventions at Inchmarlo included:

- SAF installed (2021) to support improved performance to replace decommissioned RBC
- Investigation completed on the high intermittent flows from the private pumping stations and pump flows optimised to pump frequently at a lower flow rate
- Sludge management improvement plan completed - onsite desludge frequency increased
- Programme of increased sample monitoring set up & frequency of site visits by Ops & Process Scientist increased

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 10.

Analysis of sewage treatment costs by process type:

Changes to the numbers of STW by process type have arisen as a result of operational changes and process re-classifications in STW during 2020/21. Re-stating 2019/20 figures on like-for-like basis shows the following variations:

	Septic tanks	Primary	Secondary	Tertiary	Sea Outfalls	Direct	General and Support	Total
	£m	£m	£m	£m	£m	£m	£m	£m
Total treatment works 2020/21	3.624	1.268	39.711	11.686	0.279	56.568	11.237	67.805
2019/20	3.119	1.454	39.128	11.420	0.268	55.389	10.962	66.351
Variance	(0.505)	+0.186	(0.583)	(0.266)	(0.011)	(1.179)	(0.275)	(1.454)

A year-on-year reduction in the cost of primary treatment reflects one less asset in this category, and a lower level of employment costs recorded at works of this process type.

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 £56.6m total wastewater treatment costs, £40.7m of costs or 71.9% 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.

SECTION E : OPERATING COSTS AND EFFICIENCY

Table E8: Wastewater Explanatory Factors - Sewage Treatment Works

Line Ref	Description	Units	AR19	CG	AR20	CG	AR21	CG	Variance	% Change	Explanation provided in AR21 Commentary
Numbers											
E8.1	Size Band 0	nr	1116	B3	1115	B3	1123	B3	8	0.72	11.4 Key changes from 2019/20
E8.2	Size Band 1	nr	211	B3	209	B3	202	B3	-7	-3.35	11.4 Key changes from 2019/20
E8.3	Size Band 2	nr	148	B3	150	B3	147	B3	-3	-2.00	11.4 Key changes from 2019/20
E8.4	Size Band 3	nr	185	B3	183	B3	183	B3	0	0.00	11.4 Key changes from 2019/20
E8.5	Size Band 4	nr	119	B3	121	B3	122	B3	1	0.83	11.4 Key changes from 2019/20
E8.6	Size Band 5	nr	42	B3	36	B3	39	B3	3	8.33	11.4 Key changes from 2019/20
E8.7	Size Band 6 (Large Works)	nr	22	B3	23	B3	21	B3	-2	-8.70	11.4 Key changes from 2019/20
E8.8	Total Sewage Treatment Works	nr	1,843	B3	1,837	A2	1,837	A1	0	0.00	11.4 Key changes from 2019/20
E8.9	Small Sewage treatment works with ammonia consent 5 - 10 mg/l	nr	44	A1	45	A1	48	A1	3	6.67	11.1 Data sources and confidence grades
E8.10	Small Sewage treatment works with ammonia consent <= 5 mg/l	nr	65	A1	68	A1	72	A1	4	5.88	11.1 Data sources and confidence grades
Loading (average daily load)											
E8.11	Size Band 0	kg BOD/day	436	B3	419	B3	421	B3	2	0.48	11.4 Key changes from 2019/20
E8.12	Size Band 1	kg BOD/day	1,102	B3	1,045	B3	998	B3	-47	-4.50	11.4 Key changes from 2019/20
E8.13	Size Band 2	kg BOD/day	2,087	B3	2,059	B3	2,141	B3	82	3.98	11.4 Key changes from 2019/20
E8.14	Size Band 3	kg BOD/day	10,485	B3	10,631	B3	10,501	B3	-130	-1.22	11.4 Key changes from 2019/20
E8.15	Size Band 4	kg BOD/day	35,536	B3	35,385	B3	34,998	B3	-387	-1.09	11.4 Key changes from 2019/20
E8.16	Size Band 5	kg BOD/day	35,756	B3	31,255	B3	34,089	B3	2,834	9.07	11.4 Key changes from 2019/20
E8.17	Size Band 6 (large works)	kg BOD/day	135,371	B3	139,636	B3	125,897	A1	-13,739	-9.84	11.4 Key changes from 2019/20
E8.18	Total Load Received	kg BOD/day	220,774	B3	220,430	B3	209,045	A1	-11,385	-5.16	11.4 Key changes from 2019/20
E8.19	Small Sewage treatment works with ammonia consent 5 - 10 mg/l	kg BOD/day	7,939	B3	7,964	A1	7,185	A1	-779	-9.78	11.1 Data sources and confidence grades
E8.20	Small Sewage treatment works with ammonia consent <= 5 mg/l	kg BOD/day	45,183	B3	42,651	A1	49,095	A1	6,444	15.11	11.1 Data sources and confidence grades

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 Scottish Water's corporate consents database. The most onerous of Controlled Activity Regulations (CAR) or Urban Wastewater Treatment (UWWT) parameters was used, whereas the information in relation to treatment type is held within Scottish Water's corporate asset inventory (Ellipse).

The volume of sludge is recorded in Scottish Water's Gemini systems.

There are no changes to the Confidence grades reflecting the fact that the data is obtained directly from Scottish Water's corporate systems.

12.2 Data improvement programmes

There were no significant data improvement programmes regarding sewage treatment works.

12.3 Assumptions used for forecast data

There is no forecast data for the E9 table.

12.4 Key changes from 2019/20

A summary of the variances between 2019/20 and 2020/21 for Large Sewage Treatment Works can be found at the end of this section – Table E9 comparison AR20 and AR21. The significant changes are detailed in this section.

STW000085 – Bothwellbank and STW003728 - Dunbar are not on the large STW list this year as their BOD Kg/day value reduced from 1520 to 1456 and 1800 to 1118 respectively, which moved them into Band 5 from Band 6. The Dunbar reduction was mainly caused by a reduction in the trade effluent load at the works, which may be related to COVID-19 restrictions as mentioned in section E8. The change at Bothwellbank was mainly due to a reduction in the wholesale (non-domestic) load.

There are 21 large sewage treatment works reported in AR21, two fewer than AR20 due to Bothwellbank and Dunbar STWs moving into Band 5 works from Band 6 as described in the previous section. Compliance with effluent consent standards showed that compared with the single works that failed to achieve full compliance last year, there were nine that failed in AR21: Alloa (96%), Daldowie (98%), Dalmarnock (98%), Dunnswood (96%), Galashiels (95%), Hamilton (97%), Kinneil Kerse (99%), Kirkcaldy (97%), Philpshill (97%) and Stirling (99%). Scottish Water will review the current methodologies used for table E9 for SR21 and ensure that these align with data reported elsewhere.

The reduction in Population equivalent of total load received reported in line E9.1 for Dalmarnock STW and Laighpark (Paisley) STW are the result of the following;

- The trade effluent figure at Dalmarnock has dropped from 73.4k to 12.5k. This is likely due to a combination of reduced waste from businesses due to the Covid lockdown and corrections to trade effluent meter reading calculations.

- The trade effluent PE for Lighthpark (Paisley) STW has reduced by 17.8k due to a combination of reduced waste from businesses due to the Covid lockdown and corrections to trade effluent meter reading calculations. There has also been a small increase in household PE this year

Reductions in trade effluent and non-household properties are mainly responsible for the decrease in PE at the large STWs (E9.1) . This is likely due to a combination of reduced waste from businesses due to the Covid lockdown and corrections to trade effluent meter reading calculations.

Power costs reported in line E9.15 for Dunfermline sewage treatment works have decreased by 83% between AR20 and AR21. Power costs at this site are split between the sewage treatment works and sludge treatment centre based on the activity based methodologies (ABM) outlined in the AR20 commentary to the M tables. The decrease in the reported value is a consequence of an increase in imported sludge volumes which in turn resulted in a greater allocation of power costs to sludge processing rather than to the sewage treatment works. Total power costs for Dunfermline are broadly in line with prior year.

The increase in power costs for Galashiels STW was caused by:

- a decrease in sludge volumes which resulted in an increased allocation of power costs to sewage treatment (as explained above)
- the maintenance activities carried out on the CHP (used to generate renewable energy) resulting in an increase amount of power being purchased from the grid while this asset was not fully functioning. .

12.5 Functional costs

Analysis of functional costs for large sewage treatment works:

	2020/21	2019/20	Variance
	£m	£m	£m
Daldowie	1.590	1.346	(0.244)
Galashiels	0.173	0.091	(0.082)
Tertiary treatment	1.763	1.437	(0.326)
Allers	0.385	0.454	+0.069
Alloa	0.473	0.700	+0.227
Ardoch	0.267	0.332	+0.065
Carbarns	0.560	0.385	(0.175)
Dalderse	0.674	0.388	(0.286)
Dalmarnock	2.330	1.871	(0.459)
Dunfermline	0.235	0.262	+0.027
Dunnswood	0.484	0.391	(0.093)
Erskine	0.635	0.680	+0.045
Hamilton	0.700	0.779	+0.079
Inverurie	0.322	0.241	(0.081)
Kinneil Kerse	0.668	0.706	+0.038
Kirkcaldy	0.826	0.837	+0.011
Laighpark (Paisley)	0.900	0.820	(0.080)
Perth	0.699	0.741	+0.042
Philipshill	1.123	1.238	+0.115
Shieldhall	2.785	2.769	(0.016)
Stirling	0.706	0.893	+0.187
Troqueer	0.335	0.388	+0.053
Secondary treatment	15.107	14.875	(0.232)
Direct large treatment works	16.870	16.312	(0.558)
General and Support	2.511	2.266	(0.245)
Total large treatment works	19.381	18.578	(0.803)

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

- Dalderse - additional contractor costs were incurred to clear choked primary tanks; and
- Dalmarnock – the cost increase at this larger site was due in part to the impact of higher energy tariffs and in part to employment costs recorded at this site.

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Table E9: Large Sewage Treatment Works Information Database

Line Ref	Description	Name	Units	AR19	CG	AR20	CG	AR21	CG	Variance	% Change	Explanation provided in AR21 Commentary?
E9.1	Population equivalent of total load received	Allers	000	50	B3	34	B3	32	B3	-2	-5.88	Not in commentary*
E9.1	Population equivalent of total load received	Alloa	000	44	B3	44	B3	43	B3	-1	-2.27	Not in commentary*
E9.1	Population equivalent of total load received	Ardoch	000	61	B3	61	B3	62	B3	1	1.64	Not in commentary*
E9.1	Population equivalent of total load received	Bothwellbank	000	25	B3	25	B3	n/a	n/a	n/a	n/a	12.4 Key changes from 2019/20
E9.1	Population equivalent of total load received	Carbarns	000	48	B3	49	B3	49	B3	0	0.00	Not in commentary*
E9.1	Population equivalent of total load received	Dalderse	000	92	B3	92	B3	89	B3	-3	-3.26	Not in commentary*
E9.1	Population equivalent of total load received	Daldowie	000	318	B3	285	B3	293	B3	8	2.81	Not in commentary*
E9.1	Population equivalent of total load received	Dalmarnock	000	233	B3	241	B3	164	B3	-77	-31.95	12.4 Key changes from 2019/20
E9.1	Population equivalent of total load received	Dunbar	000	29	B3	30	B3	n/a	n/a	n/a	n/a	12.4 Key changes from 2019/20
E9.1	Population equivalent of total load received	Dunfermline	000	61	B3	85	B3	81	B3	-4	-4.71	Not in commentary*
E9.1	Population equivalent of total load received	Dunnswood	000	31	B3	30	B3	30	B3	0	0.00	Not in commentary*
E9.1	Population equivalent of total load received	Erskine	000	83	B3	83	B3	82	B3	-1	-1.20	Not in commentary*
E9.1	Population equivalent of total load received	Galashiels	000	31	B3	27	B3	26	B3	-1	-3.70	Not in commentary*
E9.1	Population equivalent of total load received	Hamilton	000	63	B3	63	B3	64	B3	1	1.59	Not in commentary*
E9.1	Population equivalent of total load received	Kinneil Kerse	000	72	B3	53	B3	50	B3	-3	-5.66	Not in commentary*
E9.1	Population equivalent of total load received	Kirkcaldy	000	61	B3	60	B3	60	104	0	0.00	Not in commentary*
E9.1	Population equivalent of total load received	Lairpark (Paisley)	000	126	B3	120	B3	99	B3	-21	-17.50	12.4 Key changes from 2019/20
E9.1	Population equivalent of total load received	Perth	000	99	B3	116	B3	104	B3	-12	-10.34	Not in commentary*
E9.1	Population equivalent of total load received	Philipshill	000	54	B3	65	B3	64	B3	-1	-1.54	Not in commentary*
E9.1	Population equivalent of total load received	Shieldhall	000	556	B3	623	B3	575	B3	-48	-7.70	Not in commentary*
E9.1	Population equivalent of total load received	Stirling	000	78	B3	68	B3	64	B3	-4	-5.88	Not in commentary*
E9.1	Population equivalent of total load received	Troqueer	000	43	B3	46	B3	43	B3	-3	-6.52	Not in commentary*
E9.1	Population equivalent of total load received	Inverurie	000		B3	26	B3	25	B3	-1	-3.85	Not in commentary*
E9.1	Population equivalent of total load received	Total	000	2259		2326		2099		-227	-9.76	12.4 Key changes from 2019/20

* Explanation of the most significant changes in Total direct costs reported in line E9.17 and the General and support expenditure reported in line E9.18 for these works are provided in table 52 below following the first round of queries

The most significant changes in Total direct costs reported in line E9.17 and the General and support expenditure reported in line E9.18 are explained in the table below

Table 53; Explanation of significant changes on total direct costs (E9.17) and General and supported expenditure (E9.18)

Line reference	AR20	AR21	Difference (£000s)	% Difference	Explanation
E9.17: Total direct costs at large sewage treatment works (£000)					
Alloa	699.9	472.6	-227.332	-32%	Cause: Hire and Contracting costs relating to an unauthorised trader discharge in AR20.
Ardoch	332.1	267.2	-64.869	-20%	Cause: Reduction in direct employment costs.
Carbarns	385.1	560.1	175.054	45%	Cause: Tank cleaning at works.
Dunnswood	390.5	484.4	93.893	24%	Cause: Tank cleaning at works.
Galashiels	91.4	173.4	81.969	90%	See section 12.4
Inverurie	241.3	322.1	80.827	33%	Cause: Service contracts for new Nereda plant.
Stirling	893.3	706.0	-187.234	-21%	Cause: Reduction in direct employment costs.
E9.18 General and support expenditure at large sewage treatment works (£000)					
	AR20	AR21	Difference (£000s)	% Difference	Response
Allers	120.089	73.93	-46.159	-38%	As we do not capture general and support (G&S) costs at an asset level, we allocate the expenditure to each works based on the allocation methods outlined in the AR20 M18 commentary appendix and Annual Return commentary. For sewage treatment, the total general and support expenditure per region is identified and then allocated to each works within the region on the basis of the labour activity at each site. As a result, the amount allocated to each specific works is impacted by both the total level of general and support costs attributable to sewage treatment and by the amount of labour activity at the works. Overall general and support expenditure at large works has increased in the year. The variance at the works therefore relates to the movement in labour activity at each site, which fluctuates year-on-year as a result of maintenance schedules, incidents and staff movements.
Ardoch	108.457	66.66	-41.797	-39%	
Carbarns	25.928	67.759	41.831	161%	
Dalderse	101.708	142.886	41.178	40%	
Daldowie	36.522	83.07	46.548	127%	
Dalmarnock	250.91	479.903	228.993	91%	
Dunnswood	46.229	73.561	27.332	59%	
Erskine	107.214	74.273	-32.941	-31%	
Galashiels	20.334	28.484	8.15	40%	
Kinneil Kerse	118.203	92.578	-25.625	-22%	
Kirkcaldy	78.658	123.943	45.285	58%	
Lairpark (Paisley)	85.421	192.354	106.933	125%	
Philipshill	79.358	126.819	47.461	60%	
Stirling	248.426	129.734	-118.692	-48%	
Troqueer	34.988	18.319	-16.669	-48%	

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. The sludge movement data from the Gemini waste management system is linked to ABM costs to produce E10 cost analysis. Financial costs for this table are completed on the basis of a combination of ABM analysis, direct cost capture by asset, and Scottish Water's 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 2019/20

A summary of the variances for totals between 2019/20 and 2020/21 for Sludge Disposal and Treatment can be found at the end of this section – Table E10 comparison AR20 and AR21. There are no significant changes to report.

There has been a minor decrease in the amount of sewage sludge (E10.2) from 16.8ttds in AR20 to 16.4ttds in AR21. Around 25% of sewage sludge is taken to land restoration outlets due to untreated/non-compliant sludge cakes at several Scottish Water operated sludge treatment centres. In the Shetland Islands, 0.42 ttds of untreated/raw sewage sludge cake continues to be landfilled accounting for the landfill volume reported in E10.2.

13.5 Functional costs

Table WW03 : Sludge Treatment

	Total
Functional expenditure:	£m
2020/21	16.755
2019/20	18.001
Variance	+1.246

Sludge treatment costs have decreased by £1.2m (7%) from 2019/20. This is analysed as follows:

- £0.1m (5%) increase in power costs primarily reflecting higher tariffs,
- £0.3m (5%) reduction in hired and contracted services reflecting a reduction in use of contractors for inter-site sludge transport,
- £0.4m (23%) reduction in materials and consumable costs primarily due to reduced chemical usage; and

- £0.5m (12%) reduction in general and support costs primarily due to a reduction in hired vehicles.

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:

	2020/21	2019/20	Variance
	£m	£m	£m
Farmland:			
Untreated	0.000	0.000	+0.000
Conventional	0.912	1.899	+0.987
Advanced	7.538	7.885	+0.347
Incineration	0.000	0.000	+0.000
Landfill	1.371	1.386	+0.015
Composted	0.000	0.000	+0.000
Land reclamation	6.934	6.831	(0.103)
Other	0.000	0.000	+0.000
Total	16.755	18.001	+1.246

A reduction in costs for disposals to Farmland Conventional due to lower volumes through this route at Dunfermline, Girvan, and Stornoway.

Sludge cost analysis by ultimate disposal route requires analysis of all sludge treatment, tankering and disposal costs by works, linked to intermediate works (where applicable) and ultimate disposal route. Certain costs are clearly captured by works with identified disposal route. However, certain costs are not fully captured directly against sludge. The principal areas of difficulty are inter-site sludge tankering and sludge treatment/conditioning at dual function works (sludge/wastewater treatment).

SECTION E : OPERATING COSTS AND EFFICIENCY

Table E10: Sludge Treatment and Disposal

Line Ref	Description	Units	AR19	CG	AR20	CG	AR21	CG	Variance	% Change	Explanation provided in AR21 Commentary?
Sludge volumes											
E10.1	Total Resident population served	000	2,596.235	C3	2,605.035	C3	2,490.532	C3	-114.5030	-4.40	No significant changes to report
E10.2	Total Amount of sewage sludge	ttds	15.278	B4	16.812	B4	16.424	B4	-0.3880	-2.31	13.4 Key changes from 2019/20

Section G – G Tables

14 Tables G1 & G2: Investment and Investment Monitoring

Tables G1 and G2 present a summary of Scottish Water's 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 2021. Elements reported include investment within the report year, 2020/21, and our forecasts post 2020/21.

14.1 Data sources and confidence grades

All data relative to the Capital Investment programme has been extracted from Scottish Water's P3M system.

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. The process followed was the same as in previous years.

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

14.2 Data improvement programmes

No significant data improvement programmes have been undertaken in 2020/21 for investment monitoring.

14.3 Assumptions used for forecast data

This position is not materially different to that set out in Scottish Water's 2020 Delivery Plan update.

14.3.1 Inflation Assumptions

The table below reflects the inflation assumptions used within the G Tables. Inflation assumptions reflect the actual results for RPI.

Table 54: 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%	118.8%	120.2%

14.4 Key changes from 2019/20

14.4.1 Table G1 Summary – Investment

The total gross capital investment shown in table G1 is £4,092.9m which is the forecast cost to complete the SR15 programme, including the SR10 completion programme (Q&S3a & Q&S3b), IR18 projects in the 15-21 period, SR21 early start and projects on the Committed List which are not maintenance or growth. The main components of this are detailed in the table below, which also provides a reconciliation with Scottish Water's 2021 Delivery Plan update.

Table 55: Components of the gross capital investment

	£m
Total in 2021 Delivery Plan update	3,934.3
Projects Cost Changes Post Delivery Plan update 2021	-7.9
Insurance claim for defective work	-8.4
Revised Programme Forecast	3,918.0
Early Start Expenditure (Pre April 2015)	46.8
Committed Post 2020-21	71.3
SR15 Financed Post 2020-21	13.0
SR21 Early Start	43.9
Table G Total Gross Capital Investment (G1.54)	4,092.9

The forecast post 2020-21 is £374.9m. This is the combination of:

- £290.7m SR15 Completion, and
- £71.3m for committed projects and £13.0m 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 2020 AR and AR 2021 total gross capital investment, capital maintenance and growth.

Table 56: Reconciliation of gross capital investment

Table G Total Gross Capital Investment AR20	4,260.1
Decrease in SR21 Early Start	-3.2
Decrease in SR15 Programme Cost	-72.6
Removal of IR18 Post 2021	-162.6
Addition of Committed List ex CM and Growth	71.3
Table G Total Gross Capital Investment AR21	4,092.9

Table 57: Reconciliation of capital maintenance

Capital Maintenance AR20	2,181.5
Increase in Exceptional CM	38.3
Reduction in CM Investment	-54.5
Capital Maintenance AR21	2,165.3

Table 58: Reconciliation of growth

Growth AR20	421.3
Decrease in forecast cost IR18 Post 2021	-19.4
Decrease in investment in 15-21 Period	-0.8
Growth AR21	401.0

As part of Scottish Water’s 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, risk allowances removed from project costs have been re-instated and programme risk has been proportioned across the programme.

Scottish Water successfully delivered £611.6m of capital investment in 2020/21, compared to £664.6m in 2019/20.

Whilst investment has recovered during the 2nd half of 2020/21, it was lower than set out in the 2020 Delivery Plan. The primary reason for this was the impact of COVID-19 i.e. shutdown, restart and ongoing productivity impact. The 2020/21 capital investment of £611.6m is split by:

- £573.1m - Q&S4 and IR18 projects
- £13.6m - completion projects (Q&S3a and Q&S3b).
- £24.9m - SR21 Early Start

The total gross investment in capital maintenance is forecast at £2,165.3m as reported in table G1 (G1.49). This includes £230.8m of exceptional capital maintenance for Ayrshire Resilience and Strategic Mains Diversions. In 2020/21 expenditure of £342.2m was made on capital maintenance compared to £348.4m in 2019/20. Capital maintenance investment accounts for 56% of the investment in 2020/21. The table below shows the capital maintenance components.

Table 59: 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	0.0	0.0	0.0
Forecast CM Profile	254.8	301.6	345.5	363.6	341.1	327.8	0.0	1934.5
Additional CM Risk	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Capital Maintenance	254.8	301.6	345.5	363.6	341.1	327.8	0.0	1934.5
Exceptional CM	5.2	37.0	49.4	19.9	7.3	14.4	97.5	230.8
Total Capital Maintenance (G1.06)	260.1	338.7	394.9	383.5	348.4	342.2	97.5	2165.3

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 £25.2m with £7.4m forecast in the 2015-21 period.

There are differences between the actual figures from lines G1.01 to G1.26, column F to column K reported in AR21 versus those numbers in AR20 (see table below). The differences are due to corrections and recategorization of projects between returns:

- SR15 Meter Maintenance has been corrected in AR21 to Water Infrastructure from WW Infrastructure.
- Several Reservoir projects have been reassigned to Water Infrastructure from Improving drinking water availability and resilience of service.
- Several SR21 Early Start projects were reassigned to Maintenance following discussions with WICS.
- 503106 Newfield Trunk Main Reinforcement was previously tagged as Growth Part 3. This was reviewed and amended to Water Infrastructure Maintenance

Table 60: Capital maintenance components

AR	Line Reference	2015-16	2016-17	2017-18	2018-19	2019-20
AR20	G.1.01: Water Service Infrastructure	81.00643	115.36897	144.71127	92.04289	65.64228
AR21	G.1.01: Water Service Infrastructure	84.24543	116.02523	146.54050	95.54023	74.47169
	% Difference	4.00%	0.57%	1.26%	3.80%	13.45%

14.4.2 Table G2 Summary – Outputs

Delivery of outputs is closely monitored by the Scottish Government-led Delivery Assurance Group (DAG) and detailed information can be found in the quarterly DAG reports. These are 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 the DAG in May 2021. 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).

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 data provided in the G3 table is sourced directly from the OAR reports and where applicable Ministerial target figures are included for 2015-21.

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

- The Delivery Plan 2015-21
- Annual Return 2020
- P12 Output Activity RAG reports (OARS) for fiscal measures and P9 for calendar measures.

For the reduction in energy-use (G3.15j), measures have been undertaken at several sites to enable the capacity of these sites to reduce energy-use as detailed in the table below.

Table 61: Wastewater Energy Efficiency projects

Site	Project	GWh
Philipshill	Phase B Blowers	0.280
Dollar	DO Optimisation	0.040
Garnieland	VSD Replacement	0.050
Dunfermline	Heating and Lighting	0.075
Bathgate	Heating and Lighting	0.020
Dunnswood	Blowers	0.130
Allers	Heating and Lighting	0.022
Shotts	Heating and Lighting	0.010
Biggar	Heating and Lighting	0.017
Salsburgh	Heating and Lighting	0.017
Harthill	Heating and Lighting	0.006
Ardoch	Heating and Lighting	0.055
Carbarns	Heating and Lighting	0.079
Lanark	Heating and Lighting	0.035
Dornoch WwTW	Heating and Lighting	0.007
Dornoch WwPS	Heating and Lighting	0.008
Bonnybridge	Heating and Lighting	0.018
Stonehouse	Heating and Lighting	0.008
Fauldhouse	Heating and Lighting	0.010
Rigside	Heating and Lighting	0.010
Portree	Heating and Lighting	0.003
Dunvegan	Heating and Lighting	0.005

Site	Project	GWh
Plockton	Heating and Lighting	0.003
Locharron	Heating and Lighting	0.007
Kishorn	Heating and Lighting	0.005
Dingwall	Heating and Lighting	0.011
Muir of Ord	Heating and Lighting	0.012
Garnieland SPS	Heating and Lighting	0.017
Greengairs	Heating and Lighting	0.007
Longriggend	Heating and Lighting	0.003
Glassford	Heating and Lighting	0.012
Chapelton	Heating and Lighting	0.004
Whitehills SPS	Heating and Lighting	0.016
Total		1.002

15.2 Data improvement programmes

There have been no significant data improvement programmes associated with the data used to populate the G3 table.

15.3 Assumptions used for forecast data

There is no forecast data for the G3 tables.

15.4 Key changes from 2019/20

Overall, there has been a general improvement across the indicators reported in G3, although there are some indicators that show deterioration. Where there has been a significant change in performance during 2020/21 this is highlighted in the table below.

Table 62: Summary of changes from 2019/20 to 2020/21

Table Ref	Description	2019/20	2020/21	Variance (deterioration)/ improvement in performance
<i>Drinking Water Quality Indicators</i>				
G3.1	Number of failing zones for iron	21	16	-24%
G3.2	Number of failing zones for manganese	10	13	(30%)
G3.3	Number of microbiological failures at WTWs	32	18	-44%
G3.4	Number of Customer Contacts relating to Taste	2,027	1,553	-23%
G3.5	Number of Customer Contacts relating to Discolouration	7,111	9,495	(34%)
<i>Environment Serviceability</i>				
G3.6	Number of failing WWTW	3	2	-33%

Table Ref	Description	2019/20	2020/21	Variance (deterioration)/ improvement in performance
G3.9	Number of pollution incidents	229	203	-11%
G3.10	Total number of Pollution incidents (sewerage)	223	193	-13%
G3.15b	Scope 1: All direct emissions (process, onsite combustion of fossil fuels and vehicles owned or leased)	29 tCO2e	39 tCO2e	(34%)
G3.15e	Carbon intensity ratios for water services (tonnes per MI)	0.1	0.08	-20%
G3.15j	Reduction in energy use from efficiency projects	6.3	1	-84%
<i>Customer Service Serviceability</i>				
G3.17	Properties with unplanned interruptions to supply > 12 hrs	302	596	(97%)
G3.18	Number of hours lost due to water supply interruptions for three hours or longer	0.300	0.219	-27%
G3.19	Bursts per 1,000km of mains	150	176	(17%)
G3.20	Properties at risk of internal sewer flooding	281	314	(12%)
G3.21	Properties internally flooded due to other causes	341	267	-22%
G3.22	Properties internally flooded due to overloaded sewers	131	332	(153%)
G3.23	Incidents of internal sewer flooding for properties that have flooded within the last ten years	339	270	-20%
G3.26	Incidents of external sewer flooding due to overloaded sewers	407	314	-23%
G3.28	The maximum number of 'second tier' complaints referred to Scottish Public Services Ombudsman	1	0	-100%
G3.29	The number of telephone contacts relating to drinking water quality	10,658	12,925	(21%)
<i>Resilience of supply</i>				
G3.38	Water Available for Supply Index: % of Population covered by 1:100 level of service	75.85%	61.4%	(-19%)

The number of telephone contacts relating to drinking water quality reported in 2020/21 was 12,925 compared with 10,658 in the previous year; a 21% increase. Four key events led to increases in water quality contacts and they are covered below.

Customer contacts relating to taste decreased in 2020. The largest decrease was in earth/musty and taste/smell contacts. Seasonal algal blooms are associated with these types of complaints. This may be a reflection of different weather conditions over the two years and is a factor Scottish Water will aim to understand for future reporting.

The number of customer contacts relating to discolouration increased on the previous year. A combination of drought, planned repairs and bursts contributed to this increase. The four key events impacting on the number of customer contacts relating to discolouration were:

1. Fife (drought conditions), May 2020;
2. Hopeman DMA (repairs to burst mains) July 2020
3. Blantyre (repairs to burst mains), July 2020;
4. Kelty (planned works and burst main), September 2020.

Water sampling was affected by the COVID-19 pandemic as water zonal sampling was moved to service reservoirs rather than customers' taps. Where a regulatory supply zone did not have a service reservoir, the zonal sample was taken at a water treatment works. As iron builds up lower in the network Scottish Water recorded a reduction in failures. Conversely, as manganese builds up higher in the system an increase in failures were recorded.

The decrease in microbiological failures at WTWs reflects the optimisation of Scottish Water works by maintaining disinfection levels. The tables below provide a comparison of the performance in microbiological water quality and chemical compliance from 2019 to 2020. During lockdown Scottish Water teams were unable to take samples at customers' taps. Sampling for zonal tests were moved to service reservoirs or water treatment works. This should be considered when comparing compliance across the two years i.e. it is not a like for like comparison.

Table 63: Performance in microbiological water quality based on regulatory samples

Sample location	Parameter	2020 fails	2020 Compliance	2019 fails	2019 Compliance
Treatment works	Coliforms	18	99.93%	32	99.88%
	<i>E.coli</i>	1	99.996%	3	99.99%
Service reservoirs	Coliforms	54	99.891%	72	99.85%
	<i>E.coli</i>	6	99.988%	6	99.988%
Regulatory Supply Zone *	Coliforms	20	99.865%	37	99.75%
	<i>E.coli</i>	2	99.987%	2	99.99%
Customer taps					

*Regulatory Supply Zone samples for 2019 were at customers' taps. From March 2020 they moved to service reservoirs or water treatment works (where there wasn't a service reservoir in the zone) due to COVID-19 restrictions preventing access to customers' properties.

Table 64: Comparison of chemical sampling compliance results in regulatory supply zones at customer taps for 2019 and 2020

Parameter	2020 fails	2020 Compliance	2019 fails	2019 Compliance
Trihalomethanes (THMs)	1	99.932%	3	99.80%
Iron	21	99.597%	37	99.29%
Colour	0	100%	0	100%
Manganese	15	99.712%	10	99.81%
Aluminium	2	99.962%	0	100%

Further information on drinking water quality will be found in the DWQR Annual Report 2020 ([not](#) yet published).

The number of failing wastewater treatment works reported in 2020 was two compared with three in the previous year. The two non-compliant wastewater treatment works equate to a 99.66% compliance and is an outperformance of Scottish Water's delivery plan target of five. The failing works were Torwood WWTW, which had two spot BOD failures in the three regulatory samples taken; and Ellon WWTW, which had three spot Ammonia failures in the nine regulatory samples taken. In each case, these failures resulted in a failure for the year, on a look-up table basis.

The number of total pollution incidents reported in 2020/21 was 203 compared with 229 in the previous year, an 11% reduction. The reduction in the number of category 1-3 incidents has been due to the good quality site evidence which Scottish Water's teams have continued to capture throughout the pandemic period. This has led to a substantial number of events being agreed as third party/private/compliant with licence and therefore, discounted from our numbers. This improvement in performance was also reflected in the reduction in the total number of sewerage pollution incidents.

Scottish Water's Scope 1 emissions increased due to a change in the UK water sector's agreed accounting method for calculating process emissions from wastewater treatment works. The revised methodology applies retrospectively and is therefore considered a baseline change rather than a genuine increase. Conversely the carbon intensity ratio for water services decreased due to the higher distribution input covered in the commentary for Table A2.

It appears from the reported data that the reduction in energy-use from efficiency projects is showing an 84% decrease from the previous year. However, the 1GWh reported is an additional reduction gained this year and Scottish Water has now delivered 7.3GWh in energy savings over the two-year period. As part of the Green Recovery Funding, from the Scottish Government, Scottish Water has committed to develop four wastewater projects, and these are expected to deliver in AR22.

In addition to the wastewater projects, three renewable energy projects have been identified under the Green Recovery Funding. Only one of these projects, Campbeltown WTW, was commissioned during AR21 with the capacity to generate 0.052GWh/annum; the other two projects, Cults Pitfodels TWP (0.054GWh/a) and Perth WWTW (0.8GWh/a) are not due to be commissioned until AR22. Consequently, the increase in renewable energy generation during AR21 from the funding is limited to the small site at Campbeltown.

The number of properties with unplanned interruptions to supply >12hrs reported in 2020/21 was 596, compared with 302 in the previous year, a 97% increase. It is difficult to compare across years for ITS as every event is different and can depend on where and when the interruption takes place. There were 70 events in 2020/21 of which only four impacted on more than 32 properties. All four events took place after 9pm and before 6am. The four events are detailed below:

1. Dundee (Charleston DMA) – 99 properties
2. Aberdeen (Maryculter East DMA) – 49 properties
3. Shetland (Lerwick Town Super DMA) – 43 properties
4. East Kilbride (Kirktonholme DMA) – 39 properties

However, the number of hours lost due to water supply interruptions for three hours or longer reported in 2020/21 was 0.219 compared with 0.300 in the previous year - a 27% reduction. On analysis, the main contributory factor is that the average amount of hours per event has reduced from 375.1 hours in 2019/20 to 228.9 hours in 2020/21.

The table below provides further detail on the changes in the number of properties that experienced unplanned interruptions to supply, compared to the previous year.

Table 65: Changes in number of properties experiencing interruptions to supplies in 2019/20 to 2020/21

Interruptions to supplies	2020/21	2019/20	Variance	% change
Properties interrupted for 6 to 12 hours	4,785	5,302	-517	-10%
Properties interrupted for 12 to 24 hours	539	265	274	103%
Properties interrupted for more than 24 hours	57	37	20	54%

The commentary on bursts is covered in the section on table E6.

The number of properties internally flooded due to other causes reported in 2020/21 was 267 compared with 341 in the previous year, a 22% reduction. Investigations will be required to try to determine the reasons for this lower reported figure.

The number of properties internally flooded due to overloaded sewers reported in 2020/21 was 332 compared with 131 in the previous year. The significant increase from last year was due to the impact of extreme weather, especially during August 2020 when there was exceptionally heavy rainfall, particularly in the East of Scotland. Some events had return periods estimated in excess of 1,000 years. An increased number of incidents hit an increased number of properties. In addition, the number of properties affected per incident increased.

The number of incidents of internal sewer flooding for properties that have flooded within the last ten years, as reported in 2020/21, was 270. Compared with 339²⁸ incidents the previous

²⁸ For AR20 there was an error in the number of properties reported. The correct figure should have been 339 not 119.

year; this represents a 20% reduction. A change in rainfall patterns may be one of the reasons for this reduction. A review of rainfall in 2020/21 has shown that areas badly affected by extreme weather in 2020/21, such as the east of Scotland in August, had not suffered high rainfall in many of the previous years. This led to a smaller number of properties affected this year that have also been affected in the previous ten years.

The number of incidents of external sewer flooding due to overloaded sewers reported in 2020/21 was 314 compared with 407 incidents the previous year; this represents a 23% reduction. A significant number of incidents that would ordinarily have resulted in external flooding, resulted in internal flooding this year due to extreme weather. In addition, a drier period during January and February resulted in fewer incidents of external flooding than in the same period the previous year.

Scottish Water received zero second tier complaints in 2020/21 compared with one in 2019/20. The complaint in 2019/20 related to communication between two customers with similar names, with information being issued to the wrong customer.

Water available into supply (WASI), which measures the presence or absence (in simple terms) of supply/deficit for a zone, has reduced almost 20%. There has been a large swing in the population going into a deficit principally due to a small deficit occurring in the Clatto, Lintrathen and Whitehilllocks WRZ which has a population of over 300,000 (nearly 6% of total population) and the Fife WRZ (which has a population of 374,000) bringing a further 7% of the total population into this category. These two zones alone account for the vast majority of the deterioration at 1 in 100 level of service this year. The SOSI score gives greater weighting to the zonal supply/deficit and given that the changes in volume were comparably small, there was a smaller impact on the SOSI score.

This year's 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 AR20 submission.

Table 66 Summary of changes in the OPA indicators scores from 20219-20 to 2020-21

Indicator	AR20 OPA Score	AR21 OPA Score	Change
% of properties subject to inadequate water pressure	37.41	37.42	0.01
Connected properties experiencing unplanned interruptions	36.44	36.41	-0.03
Hosepipe restrictions	12.50	12.50	0.00
Security of Supply absolute performance	11.25	11.25	0.00
Security of Supply performance against target	12.50	12.50	0.00
% of water samples that comply with parameters	43.58	43.58	0.00
Leakage	12.50	12.50	0.00
Water Service (sub-total)	166.18	166.15	-0.02
% properties suffering sewer flooding incidents caused by overloading	24.84	24.75	-0.09
% properties suffering sewer flooding incidents caused by other causes	37.50	37.50	0.00
Sewer flooding (at risk)	12.50	12.50	0.00
Sewerage Service (sub-total)	74.84	74.75	-0.09
Category 1 & 2 sewage EPIs	25.00	25.00	0.00

Indicator	AR20 OPA Score	AR21 OPA Score	Change
Category 3 sewage EPIs	10.59	10.84	0.25
Category 1 & 2 water EPIs	11.27	11.27	0.00
Sewage sludge disposal	12.50	12.50	0.00
Number of non-compliant sewerage treatment works	47.00	48.00	1.00
Environmental Performance (sub-total)	106.36	107.61	1.25
Customer contact (Total of complaints and telephone performance)	17.65	18.37	0.72
Assessed customer service	37.50	37.50	0.00
Customer Service (sub-total)	55.15	55.87	0.72
Total	402.53	404.38	1.85

The overall hCEM score saw an increase of 0.41 points from 2019/20. The table below provides details of points gained and lost across each component. Further information on hCEM can be found in the hCEM 2020 submission (Scottish Water AR21 hCEM Reporter's Report 2021 v2 (Final to WICS and SW 04 05 21)).

Table 67: Details of the component elements of the household Customer Experience measure and the points gained from previous year.

Measure	2020-21		2019-20		Points gained from 2019-20
	Input	Points Lost	Input	Points Lost	
Quantitative elements					
Service issue contacts	305,640	4.94	295,135	4.80	-0.14
All lines busy and calls abandoned	5,503	0.18	13,008	0.42	0.24
Written complaints	426	1.38	384	1.25	-0.13
Regulatory upheld complaints	0	0	1	0.03	0.03
Qualitative elements					
Customer experience survey	94.08%	1.73	93.29%	1.96	0.23
No experience – no contact	94.68%	0.93	93.75%	1.09	0.16
Experience – no contact	79.42%	2.40	79.23%	2.42	0.02
Total points lost *		11.55		11.98	0.41

*Figures may not total exactly due to rounding of individual figures

The overall nhCEM (3.34) score saw an increase of 3.45 points from 2019/20. The table below provides details of points gained and lost across each component. Further information on NHCEM can be found in our nhCEM 2021 submission (Scottish Water AR21 nhCEM Reporter's Report 2021 v2 (Final to WICS and SW 04 05 21))

Table 68: Details of the component elements of the non-household Customer Experience measure and the points gained from previous year.

Measure	2020-21		2019-20		Points gained from 2019-20
	Input	Points Lost	Input	Points Lost	
Quantitative elements					
Service issue contacts	35,848	2.44	45,269	3.09	0.65
Escalations	48	0.33	162	1.10	0.77
Written complaints	187	2.55	189	2.58	0.03
Regulatory upheld complaints	0	0	0	0	0

Measure	2020-21		2019-20		Points gained
Qualitative elements					
Developer services satisfaction score	75.00%	3.59	62.84%	4.48	0.89
Licensed providers satisfaction score	95.57%	0.65	95.44%	0.75	0.10
Business end user satisfaction score	93.00%	2.08	90.08%	2.81	0.73
Total points lost		11.64		14.81	3.17

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 DAGWG in May 2021. The DAG and its associated Working Group are tasked with monitoring the capital programme and the delivery of ministerial 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 Delivery Assurance Group (DAG) reports which are provided quarterly to the DAG 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 and 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 Scottish Water's 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 lines 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

In April 2020 the Astro system for managing new connections, asset relocations and strategic growth funding requirements was launched. Scottish Water expects this application, combined with existing financial data sources, to enhance data for connections and RCC in future years.

17.3 Assumptions used for forecast data

There is no forecast data for the G5 table.

17.4 Key changes from 2019/20

Total Net Growth Expenditure is £61.8m in 2020/21 with a cumulative total of £251.3m in SR15 (G5.25). IR18 investment has been assigned to the appropriate areas. The reconciliation for the reduction in expenditure for 2020/21 compared to 2019/20 (£264.7) is provided in the table below.

Table 69: Reconciliation in net growth

Net Growth AR20	264.7
Decrease in forecast cost IR18 post 2021	-19.4
Decrease in investment in 15-21 period	-0.8
Decrease in growth income (service relocations)	6.4
Decrease in growth income (infra charge)	0.4
Net Growth AR21	251.3

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 Scottish Water's corporate systems (primarily P3M and FAB) and are also used to complete this table. The data in this table is consistent with end of year reporting to the Scottish Water 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 and programme 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 27a - Post 2021 programme expenditure

Column 27b - Post 2021 programme expenditure including risk

Column 28 - Grand total project expenditure.

Column 28a - Shows the additional risk added to the SR15 Completion programme at project level and aligns with previous analysis of additional Completion Costs. This is included within G1 post March 21

Column 28b - shows the additional risk added to the IR18 programme and used as part of the Outperformance Assessment to arrive at a reasonable worst case IR18 cost.

Column 28c – Shows the additional risk added to the projects as they have been added to the Committed List. This has generally been added to projects that are SR21 Enhancement, Growth or Maintenance.

Column 28d – Contains the totals the previous 3 columns. In some cases this is negative and this is usually where SW Commercial's reasonable worst case assessment is lower than the LBE. This can happen where the latest information available supersedes the system forecast at the end of March (for expected scope reductions or contractual settlements) or where a project has a negative forecast spend to go (eg. contractual incentivisation projects, projects where a credit is expected due to contractual changes or where costs are expected to transfer to another project).

Column 28e - Shows the expected total cost including risk and aligns with the Committed List Budget.

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 Scottish Water does 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 to 55 - Contain the project's drivers and allocations as confirmed through the CAPEX approvals process.

Column 56 to 105 - Contain the low-level output groups and show the project level allocation of outputs. Due to the 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 analysis of asset maintenance activities using the definitions of asset maintenance Scottish Water has developed and covers expenditures in 2020/21.

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 investment programme and within operational expenditure. These data sources have been analysed to support the completion of table G7 and this analysis has been performed monthly since September 2020 as “shadow reporting” in preparation for the commencement of monthly reporting from April 2021. The G7 table was also prepared for the first time in March 2020 covering the 2019/20 financial activities with the analysis carrying a low confidence grade due to the retrospective nature of project allocations to the new categories and definitions.

Table G7 analyses costs incurred during 2020/21 from P3M and Fusion. However, considerable judgment has been used in the allocation of costs within the table as the data capture processes and system functionality were not fully established and embedded within Scottish Water’s core systems and processes. The level of confidence in the analysis therefore remains at 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 retrospective analysis, judgement and cross validations from a number of existing data sources. However, there may be some cost elements missing that are included with the 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.

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. The table in Figure 2 provides a full breakdown of the financial categories and allocations required for regulatory and internal business reporting commencing from April 2021. The asset maintenance categories for G7 reporting will be directly extracted from the table allowing increased visibility and robustness of reporting.

Figure 8: Data Collection Flow Process

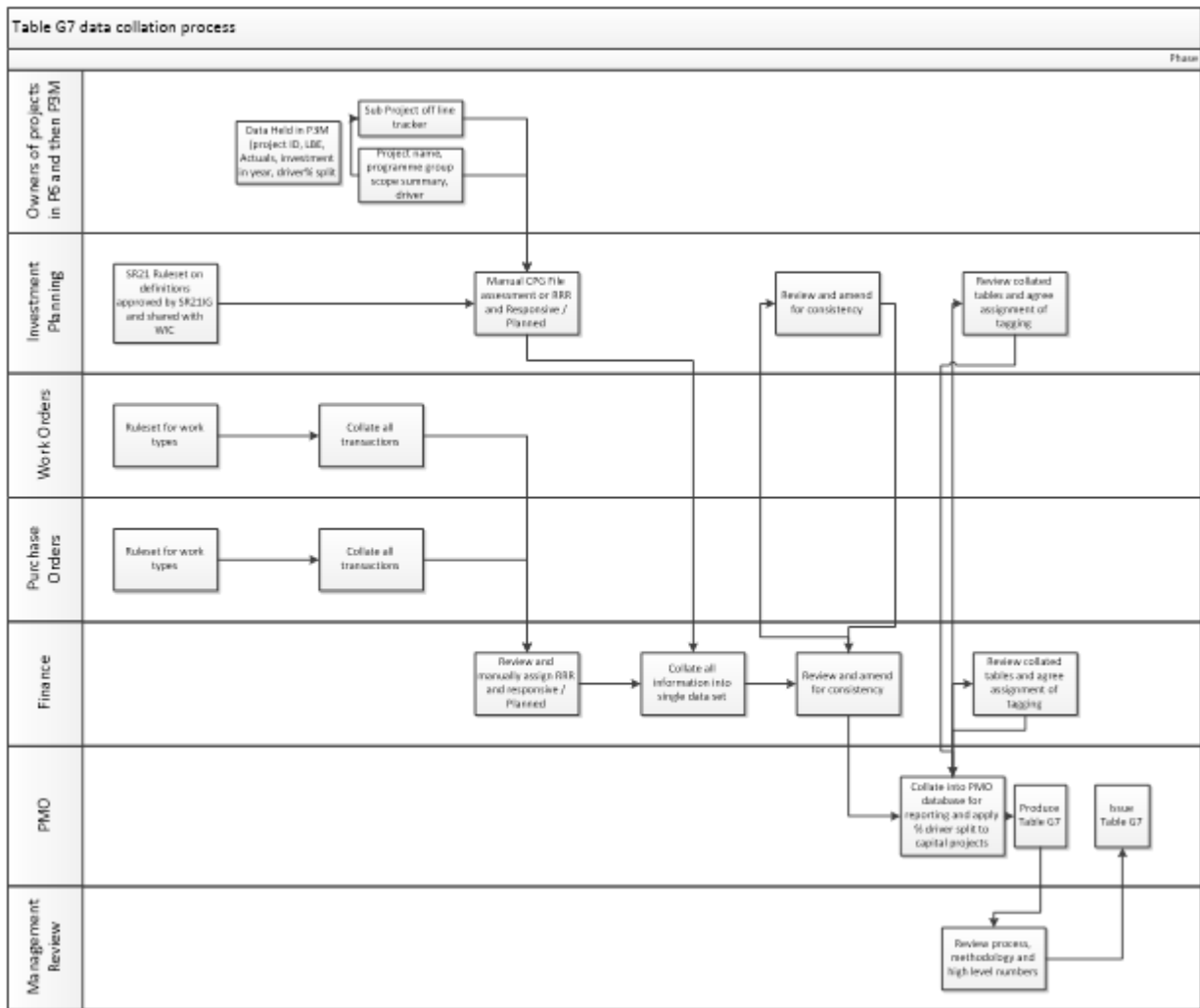


Figure 9: Tier 1 & 2 Expenditure Hierarchy Allocation

Tier1	Business Revenues	Tier 1 Revenue	Household Revenue
			Wholesale Revenue
			Other Revenue
			Infrastructure Charge Income
			Customer Contribution
	Business Costs	Tier 1 Business Costs	Disposal Proceeds
			Operational Business Costs
			Interest
	Other	Tier 1 RCC	Tax
			Tier 1 PFI
Tier2	Asset Maintenance	Tier 1 RR	Tier 1 RCC Water
			Tier 1 RCC Waste
			Opex PFI
			Responsive Repair Water
			Responsive Refurbish Water
			Responsive Inspections Water
			Responsive Repair Waste
			Responsive Refurbishment Waste
			Responsive Inspections Waste
			Responsive Repair Support
	Responsive Refurbish Support		
	Asset Maintenance	Tier 2 RRRR	Responsive Replace Water
			Responsive Replace Waste
			Responsive Replace Support
			Planned Repair Water
			Planned Refurb Water
			Planned Replace Water
			Planned Inspections Water
			Planned Repair Waste
			Planned Refurbish Waste
Planned Replace Waste			
Quality	Tier 2 Enhance	Planned Inspections Waste	
		Planned Repair Support	
Growth	Tier 2 Growth	Planned Replace Support	
		Planned Refurb Support	
Support	Support	PPD Enhance Water	
		PPD Enhance Waste	
		PPD Enhance Support	
Support	Support	PPD Growth Water	
		PPD Growth Waste	
		PPD Growth Support	
Support	Support	Asset Support Indirect	
		Asset Support Direct	
Support	Support	Non-Asset Support	

19.1.1 Capital Programme - Asset Maintenance

The majority of investment projects share the single driver of asset maintenance, i.e. “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 2020/21 of £342.2m as reported within Table G1 (£327.8m capital maintenance plus £14.4m exceptional capital maintenance) is included within the G7 total of £382.3m comprising of £327.8m of capital maintenance projects plus £54.5m of asset maintenance repairs. Exceptional capital maintenance is excluded from table G7.

Other project attributes captured at project set up allow further analysis and allocation within G7 and the table includes, where appropriate, a water and wastewater split and an infrastructure and non-infrastructure split. Some asset maintenance projects such as

Management and General support 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 and 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 a combination 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. This recognises the level of judgement used for the allocation between responsive and planned maintenance. Further splits between replacement and refurbishment are more subjective as the information has historically not been captured at source. There is little non-infrastructure expenditure from the investment programme allocated to repairs whilst specific activities, such as fixed wire testing, have been allocated. It is this subjective and retrospective allocation of the non-infrastructure asset maintenance which accounts for the lower confidence grade of C5.

19.1.2 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 £54.5m. 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 as determined predominantly by the standard job type category captured by Ellipse work orders.

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.

19.2 Data improvement programmes

From March 2021, mandatory data capture of additional project attributes, including those allowing a more robust analysis of asset maintenance interventions required for completion of table G7, was implemented within P3M.

Confidence in the analysis will increase in the future as recent changes to data capture processes become established and embedded. The implementation and integration of the Non-Complex Service Delivery app (NCSD) planned for August 2021, will provide the next step-change in business processes to improve data capture and reporting capabilities.

19.3 Assumptions used for forecast data

There is no forecast data contained in table G7.

19.4 Key changes from 2019/20

Asset maintenance was reported as £420m in 2019/20. Retrospective review and challenge of the 2019/20 G7 table identified that the operational cost category of Supplies and Services, £12.7m, should not have been included within G7 Asset Maintenance. Supplies and Service costs are predominantly SEPA costs (47%), sludge disposal (33%) and protective equipment (15%). Excluding these costs from 2019/20 analysis reduces asset maintenance to £403m, reducing the responsive repairs reported by £4.1m water and £8.6m waste in AR20.

Scottish Water's focus for asset maintenance activity was broadly comparable to the previous year. Expenditure changes are therefore due to weather related impacts, such as the c.18% increase in water main bursts, COVID-19 impacts on investment and better granularity of information as processes have been improved and work activities identified at source.

Asset maintenance in 2020/21 was £382m (G7.23). Responsive interventions have increased from £199m to £221m (G7.21) with this increase driven by interventions on drinking water assets. Planned interventions reduced to £161m from £222m (G7.22). The reduction in planned interventions reflects the restrictions directed by COVID-19 compliant working practices, which focussed resource on those essential and responsive interventions required to maintain service to customers. This was particularly noticeable during the first three months of lockdown from April to June 2020. Responsive interventions are, by their nature, entirely demand driven and subject to significant year-on-year variation.

Recognising the demand driven nature of asset maintenance, particularly responsive, it is appropriate to adopt a long-term view. As set out in Scottish Water's 2021 Delivery Plan in 2021/22, and for future regulatory reporting, a long-term normative charge will be applied to financially smooth out peaks and troughs in the annual expenditure profile while continuing to report actual expenditure in the G Tables. Reporting of actual expenditure will continue to improve through the use of improved processes, further training and the introduction of new systems (for example the non-complex app later in 2021/22).

Section H – Asset Inventory

The H tables report the number of infrastructure and non-infrastructure assets in Scottish Water's GIS and Ellipse inventories that were operational as of 31 March 2021 as compared to the E tables which report the number of non-infrastructure assets that were operational during the reporting period (2020/21).

20 Table H1 – Summary

20.1 Data sources and confidence grades

The data for the non-infrastructure asset inventory is extracted from Ellipse whereas the infrastructure inventory is extracted from GIS. The cost models are provided by Scottish Water's internal costing team, the cost models have not been changed from those used for AR20.

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.

The confidence grades for the H1 table are assessed individually taking into account the proportion of each asset as opposed to defaulting to the lowest value in the H2-H6 tables. There are no changes to the confidence grades associated with this table.

20.2 Data improvement programmes

A review of cost models mapping to unit types in Ellipse was completed to ensure that all units were priced using a cost model, where available.

This year the MEAV was calculated using the 2021 Delivery Plan update forecast of RPI inflation (1.3%). There are no other changes in the methodology used.

20.3 Assumptions used for forecast data

There is no forecast data for the table H1.

20.4 Key changes from 2019/20

A summary of the variances between 2019/20 and 2020/21 for the asset inventory summary can be found at the end of this section – Table H1 comparison AR20 and AR21. The significant changes are detailed in this section.

Overall, the non-infrastructure MEAV was relatively stable between AR20 and AR21, with reported values of £11,738m and £11,869m respectively. This represents a 1.1% increase in the reported MEAV. This increase can be attributed to the following:

- Changes in asset inventory data (-0.4 %)
- Updated cost model mapping (0.2%)
- Inflation (1.3%)

The infrastructure MEAV was also stable between AR20 and AR21, with an increase of 2.8% from £63,057m to £64,794m. The increase was caused by:

- Changes in the asset inventory data (1.4%)
- Inflation (1.3%)

Table 70: Changes in Gross MEAV from 2019/20 to 2020/21

Asset Type	AR20 Gross MEAV (£m)	% of total	AR21 Gross MEAV (£m)	% of total	Change (£m)
H1.01 Water Treatment Works	3,170	4.23	3,176	4.13	6
H1.02 Water Storage	1,991	2.66	2,013	2.62	22
H1.03 Water Pumping Stations	356	0.48	359	0.47	3
H1.04 Water resources	3,414	4.55	3,642	4.74	228
H1.05 Water mains	14,796	19.73	15,108	19.66	312
H1.06 Sewers	43,703	58.29	44,763	58.25	1,060
H1.07 Sewer structures	674	0.90	679	0.88	5
H1.08 Sea outfalls	469	0.63	603	0.78	134
H1.09 Sewage Pumping Stations	1,207	1.61	1,230	1.60	23
H1.10 Sewage Treatment Works	4,790	6.39	4,864	6.33	74
H1.11 Sludge Treatment Facilities	224	0.30	227	0.30	3
H1.12 Support services	180	0.24	180	0.23	0
	74,976	100	76,844	100	1,870

The increase in water resources are due to recalculations for dams and impounding reservoirs and raw water intakes undertaken following the identification of inconsistencies in previous years. The water mains and sewers have both increased due to increases in assets as described in previous sections.

SECTION H - ASSET INVENTORY

Table H1: Summary

Line Ref	Description	Unit	Gross MEAV AR19	% total	CG	Gross MEAV AR20	% total	CG	Gross MEAV AR21	% total	CG	Variance	% Change	Net MEAV AR19	% total	CG	Net MEAV AR20	% total	CG	Net MEAV AR21	% total	CG	Variance	% Change
Water Non - Infrastructure																								
H1.1	Water treatment works [101]	£m	3,235.44	4.43	C4	3,170.10	4.23	C4	3,176.31	4.13	C4	6.21	0.20	1,075.52	26.71	C4	1,021.61	26.87	C4	981.94	26.60	C4	-39.67	-3.88
H1.2	Water storage [102]	£m	1,930.55	2.65	C4	1,991.23	2.66	C4	2,012.75	2.62	C4	21.52	1.08	786.28	19.53	C4	766.32	20.15	C4	751.90	20.37	C4	-14.42	-1.88
H1.3	Water pumping stations [103]	£m	354.15	0.49	C4	356.17	0.48	C4	358.81	0.47	C4	2.64	0.74	138.79	3.45	C4	127.20	3.35	C4	122.10	3.31	C4	-5.10	-4.01
Water Infrastructure																								
H1.4	Water resources [104]	£m	3,388.18	4.64	C4	3,414.39	4.55	C4	3,641.48	4.74	C4	227.10	6.65	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
H1.5	Water mains [105]	£m	14,609.61	20.02	B4	14,796.10	19.73	B4	15,107.62	19.66	B4	311.51	2.11	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	B4	n/a	n/a
Wastewater Infrastructure																								
H1.6	Sewers [106]	£m	42,125.58	57.72	C4	43,703.31	58.29	C4	44,763.05	58.25	C4	1,059.75	2.42	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	C4	n/a	n/a
H1.7	Sewer structures [107]	£m	647.65	0.89	C4	674.01	0.90	C4	678.98	0.88	C4	4.97	0.74	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	C4	n/a	n/a
H1.8	Sea outfalls [108]	£m	463.42	0.64	C4	469.40	0.63	C4	602.83	0.78	C4	133.44	28.43	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	C4	n/a	n/a
Wastewater Non-Infrastructure																								
H1.9	Sewage pumping stations [109]	£m	1,084.71	1.49	C4	1,206.55	1.61	C4	1,230.25	1.60	C4	23.70	1.96	420.96	10.45	C4	423.63	11.14	C4	414.68	11.23	C4	-8.95	-2.11
H1.10	Sewage treatment works [110]	£m	4,739.71	6.49	C4	4,790.19	6.39	C4	4,863.94	6.33	C4	73.75	1.54	1,426.60	35.43	C4	1,316.99	34.64	C4	1,279.24	34.65	C4	-37.75	-2.87
H1.11	Sludge treatment facilities by disposal type [111]	£m	225.93	0.31	C4	224.15	0.30	C4	227.42	0.30	C4	3.27	1.46	65.56	1.63	C4	59.60	1.57	C4	57.65	1.56	C4	-1.95	-3.27
Support Services																								
H1.12	Support services [112]	£m	174.50	0.24	C4	179.96	0.24	C4	180.29	0.23	C4	0.33	0.18	113.13	2.81	C4	86.82	2.28	C4	84.57	2.29	C4	-2.26	-2.60
Total		£m	72,979.43			74,975.55			76,843.74			1,868.19	2.49	4,026.84			3,802.17			3,692.07			-110.10	-2.90

Explanations for changes in the H1 table are captured in section 20.2 Data improvement programmes and section 20.4 Key changes from 2019/20

21 Table H2 Water Non-Infrastructure

21.1 Data sources and confidence grades

The data for the non-infrastructure asset inventory is extracted from Ellipse. The cost models are provided by Scottish Water's internal costing team, the cost models have not been changed from those used for AR20.

There are no changes to the confidence grades associated with this table.

21.2 Data improvement programmes

A review of cost models mapping to unit types in Ellipse was completed to ensure that all units were priced using a cost model, where available.

21.3 Assumptions used for forecast data

There is no forecast data for the H2 table.

21.4 Key changes from 2019/20

A summary of the variances between 2019/20 and 2020/21 for the asset inventory for water non-infrastructure can be found at the end of this section – Table H2 comparison AR20 and AR21. The significant changes are detailed in this section.

Overall, the MEAV for this category was relatively stable between AR20 and AR21, with reported values of £ 5,518m and £ 5,548m respectively. This represents a 0.6% increase in the reported MEAV²⁹. This increase can be attributed to the following:

- Changes in asset inventory data (-1.0 %)
- Updated cost model mapping (0.3%)
- Inflation (1.3%)

GW1 Treatment Works (H2.6) has the largest reported increase from £3.95m in AR20 to £7.51m in AR21. This is due to the previous Stronsay WTW being decommissioned and replaced with a new site in Ellipse. The previous site was reported against H2.5 but the new site is now reported against H2.6. The new site is considerably larger than the other four sites reported in this category and is primarily responsible for the change in reported MEAV.

The table below shows the movement of WTWs between AR20 and AR21.

²⁹ Improvements in methodologies over the period would make it difficult to identify any investment impacts and there are no forecast figures available to compare.

Table 71: Changes in WTW from 2019/20 to 2020/21

Category	WTW
AR20 Sites Reported	232
Sites Non-Operational AR21	-7
Sites Non-SW Owned AR21	0
Newly Reported AR21	5
AR21 Sites Reported	230

The number of WTWs reported in the table above varies from the 237 in the E tables, due to the fact that only sites that were operational at the end of the AR21 period are included for the purposes of calculating the MEAV.

The table below shows the movement of water pumping stations (WPS) between AR20 and AR21.

Table 72: Changes in Water Pumping Stations from 2019/20 to 2020/21

Category	WPS
AR20 Sites Reported	780
Sites Non-Operational AR21	-10
Sites Non-SW Owned AR21	0
Newly Reported AR21	9
AR21 Sites Reported	779

The table below shows the movement of treated water storage assets (TWS) between AR20 and AR21.

Table 73: Changes in Water Storage Assets from 2019/20 to 2020/21

Category	TWS
AR20 Sites Reported	1313
Sites Non-Operational AR21	-12
Sites Non-SW Owned AR21	0
Newly Reported AR21	8
AR21 Sites Reported	1309

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

Line Ref	Description	Unit	No. assets AR19	CG	No. assets AR20	CG	No. assets AR21	CG	Variance	% Change	Gross MEAV AR19 £m	CG	Gross MEAV AR20 £m	CG	Gross MEAV AR21 £m	CG	Variance	% Change	Net MEAV AR19 £m	CG	Net MEAV AR20 £m	CG	Net MEAV AR21 £m	CG	Variance	% Change	
Water Treatment Works																											
H2.1	SW0 Treatment works [201]	nr	1	A2	1	A2	1	A2	0.00	0.00	2.78	C4	2.85	C4	2.89	C4	0.04	1.30	0.312	C4	0.279	C4	0.262	C4	-0.017	-6.12	
H2.2	SW1 Treatment works [202]	nr	1	A2	1	A2	1	A2	0.00	0.00	3.23	C4	3.31	C4	3.22	C4	-0.09	-2.72	1.301	C4	1.188	C4	1.236	C4	0.048	4.05	
H2.3	SW2 Treatment works [203]	nr	25	A2	23	A2	23	A2	0.00	0.00	667.45	C4	627.09	C4	640.76	C4	13.67	2.18	206.820	C4	190.813	C4	183.991	C4	-6.821	-3.57	
H2.4	SW3 Treatment works [204]	nr	160	A2	160	A2	159	A2	-1.00	-0.63	2,373.60	C4	2,343.36	C4	2,334.51	C4	-8.85	-0.38	784.089	C4	746.679	C4	717.466	C4	-29.213	-3.91	
H2.5	GW0 Treatment works [205]	nr	22	A2	22	A2	21	A2	-1.00	-4.55	43.56	C4	44.65	C4	41.17	C4	-3.48	-7.80	14.081	C4	13.209	C4	12.372	C4	-0.837	-6.33	
H2.6	GW1 Treatment works [206]	nr	4	A2	4	A2	5	A2	1.00	25.00	3.76	C4	3.95	C4	7.51	C4	3.56	90.21	1.566	C4	1.429	C4	1.860	C4	0.431	30.14	
H2.7	GW2 Treatment works [207]	nr	3	A2	2	A2	2	A2	0.00	0.00	12.63	C4	10.98	C4	11.12	C4	0.14	1.30	3.844	C4	3.423	C4	3.294	C4	-0.129	-3.77	
H2.8	GW3 Treatment works [208]	nr	19	A2	19	A2	18	A2	-1.00	-5.26	128.43	C4	133.91	C4	135.14	C4	1.23	0.92	63.503	C4	64.586	C4	61.458	C4	-3.128	-4.84	
Water Storage																											
H2.9	Service reservoirs [209]	nr	1,295	B2	1,295	A2	1291	A2	-4	-0.31	1,903.65	C4	1,963.66	C4	1,984.64	C4	20.99	1.07	777.687	C4	757.864	C4	743.411	C4	-14.453	-1.91	
H2.10	Water towers [210]	nr	18	B2	18	A2	18	A2	0	0.00	26.91	C4	27.58	C4	28.11	C4	0.53	1.94	8.589	C4	8.458	C4	8.488	C4	0.030	0.35	
Water Pumping Stations																											
H2.11	Intake (Installed pump capacity incl. Standby) [211]	nr	100	B4	98	A3	96.00	A3	-2.00	-2.04	108.12	C4	103.04	C4	102.75	C4	-0.29	-0.28	45.245	C4	36.695	C4	33.825	C4	-2.869	-7.82	
H2.12	Source (Installed pump capacity incl. Standby) [212]	nr	69	B3	71	A3	74.00	A3	3.00	4.23	24.63	C4	26.32	C4	26.99	C4	0.67	2.54	8.065	C4	7.654	C4	7.494	C4	-0.160	-2.09	
H2.13	Booster (Installed pump capacity incl. Standby) [213]	nr	608	B4	611	A3	609.00	A3	-2.00	-0.33	221.40	C4	226.81	C4	229.07	C4	2.26	1.00	85.480	C4	82.849	C4	80.775	C4	-2.073	-2.50	

Explanations for changes in the H2 table are captured in section 21.4 Key changes from 2019/20

22 Table H3 Water Infrastructure

22.1 Data sources and confidence grades

Dams and Impounding Reservoirs (H3.1) and Raw Water Intakes (H3.2) have both had their MEAV re-established using the available asset details. This contrasts with the former method, which used extrapolated values from the preceding year. This involved collating available asset data and applying the cost models developed specifically for these asset types. The values were then inflated using RPI from the baseline year of the cost models, to 2021. This approach provides clarity on the source of the values and traceability of the present day MEAV.

Raw mains and aqueduct pipes make up some of the asset types included in mains other (H3.5). They were previously valued using the distribution mains cost model along with the other asset types (distribution mains, service pipes) that make up H3.5 but have now been costed separately using the medium depth sewer model, which is the same cost model as used in H3.3 Raw Water Aqueducts. This is a more accurate and consistent approach to valuations across table H3.

The other data sources remain unchanged from 2019/20. The data for table H3 is sourced from Scottish Water's GIS asset data for asset lengths, numbers and sizes and costing information is calculated using the same cost models as 2019/20.

There are no changes to the confidence grades associated with this table. Whilst there have been improvements to the calculation for assets such as dams and impounding reservoirs, the data is extrapolated and it is not possible to calculate on a unit basis. Consequently, despite improvements in methodology the confidence grades remain the same as AR20.

22.2 Data improvement programmes

No significant data improvement programmes have been undertaken this year to the infrastructure methodology.

22.3 Assumptions used for forecast data

There is no forecast data for the H3 table.

22.4 Key changes from 2019/20

A summary of the variances between 2019/20 and 2020/21 for the asset inventory for water infrastructure can be found at the end of this section – Table H3 comparison AR20 and AR21. The significant changes are detailed in this section.

MEAV has increased by 14% (£196.5m) due to the revised approach to valuing dams and impounding reservoirs as described in the Data Sources and Confidence Grades section.

The ten sites with the largest MEAV increase are listed in the table below.

Table 74: The 10 sites with the largest MEAV increase

Function Plant No	Asset description	Current MEAV (£m)	Previous year MEAV (£m)	Change (£m)
DIR000503	MEGGET DIR 1982 NT184219	97.0	83.9	13.0
DIR000529	LOCH LOMOND DIR NS408874	16.2	4.8	11.5
DIR000052	DAER DIR 1956 NS979090	77.0	66.7	10.3
DIR000389	BACKWATER DIR NO254592	66.1	57.2	8.9
DIR000518	TALLA DIR 1905 NT117215	51.3	44.4	6.9
DIR000140	LOCH KATRINE DIR 1859 NN489067	34.2	28.0	6.2
DIR000484	GLENDEVON UPPER DIR NN909045	44.9	39.0	5.9
DIR000027	CAMPS DIR NT001225	44.4	38.5	5.9
DIR000467	CARRON VALLEY DIR NS718838	41.1	35.2	5.8
DIR000534	WHITEADDER DIR 1969 NT653636	41.0	35.6	5.5

The MEAV for raw water intakes (H3.2) has decreased by 16% (£5.36m) due to the revised approach to valuing this asset type as described in the Data Sources and Confidence Grades section.

The 10 sites with the largest MEAV decrease are listed in the table below.

Table 75: The 10 sites with the largest MEAV decrease

Function Plant No	Asset description	Current MEAV (£m)	Previous year MEAV (£m)	Change (£m)
RWI000679	STOCK BURN RWI NS542468	0.08	0.36	-0.28
RWI000151	MAIDENMIRE RWI NS543464	0.08	0.36	-0.28
RWI000195	STOCK BURN RWI NS540470	0.08	0.36	-0.28
RWI000680	STOCK BURN RWI NS541466	0.08	0.27	-0.19
RWI000666	TURRET RWI NN805252	0.08	0.27	-0.19
RWI000665	TURRET RWI NN868270	0.08	0.27	-0.19
RWI000654	ROSS PRIORY RWI	1.53	1.69	-0.16
RWI001068	FRANDY OUTER BURN RWI 1950 NN940038	0.08	0.16	-0.08
RWI001044	RIVER EWE RWI NG862795	0.08	0.16	-0.08
RWI001069	FRANDY INNER BURN RWI 1950 NN942039	0.08	0.16	-0.08

Mains Other (H3.5) has increased by 59% (£19.8m) due to the separate valuations applied for the raw water aqueduct component of the line. The impact of the change is shown in the table below.

Table 76: Impact of the raw water aqueduct component on Mains Other (H3.5)

Line	AR21		AR20		Change	Reason
	£m	Length km	£m	Length km	£m difference	
Raw water mains	£35.6	62.7	£16.1	61.4	£19.5	Change from water main cost curve to sewer medium depth cost curve, in line with valuation method of raw mains in H3.3

SECTION H - ASSET INVENTORY

Table H3: Water Infrastructure

Line Ref	Description	Units	AR19	CG	AR20	CG	AR21	CG	Variance	% Change	Gross MEAV AR19 £m	CG	Gross MEAV AR20 £m	CG	Gross MEAV AR21 £m	CG	Variance	% Change
Water Resources																		
H3.1	Dams and impounding reservoirs [301]	nr	210.00	C4	206.00	C4	204.00	C4	-2.00	-0.97	1,395.15	C4	1,415.34	C4	1,611.82	C4	196.48	13.88
H3.2	Raw water intake (lochs and burns) [302]	nr	299.00	C5	298.00	C5	295.00	C5	-3.00	-1.01	34.05	C5	33.38	C5	28.04	C5	-5.34	-16.00
H3.3	Raw water aqueducts [303]	km	1,735.88	B2	1,715.09	B2	1,719.22	B2	4.13	0.24	1,958.98	B4	1,965.66	B2	2,001.62	B2	35.96	1.83
Water Mains																		
H3.4	Mains potable (nominal bore) [304]	km	48,639.42	B2	48,743.78	A2	48,831.93	A2	88.15	0.18	13,516.15	B4	13,672.66	B4	13,943.79	B4	271.13	1.98
H3.5	Mains other (nominal bore) [305]	km	141.35	B3	142.62	A3	144.26	A3	1.64	1.15	31.89	B4	33.48	B4	53.30	B4	19.82	59.18
H3.6	Communication pipes (lead) [306]	nr	57,998.00	B4	56,540.00	B4	55,409.00	C4	-1,131.00	-2.00	32.48	C4	32.46	C4	32.22	C4	-0.23	-0.72
H3.7	Communication pipes (other) [307]	nr	1,716,663.00	B4	1,735,158.00	B4	1,747,148.00	C4	11,990.00	0.69	961.45	C4	996.11	C4	1,016.05	C4	19.94	2.00
H3.8	Water meters [308]	nr	143,908.00	A3	132,835.00	A3	133,172.00	A3	337.00	0.25	67.64	B4	61.39	B4	62.26	B4	0.87	1.41

Explanations for significant changes in the H3 table are captured in section 22.1 Data sources and confidence grades and section 22.4 Key changes from 2019/20

23 Table H4 Wastewater Infrastructure

23.1 Data sources and confidence grades

Data sources remain the same as previous years with the exception of sea outfalls as discussed in the data improvement programmes section below.

The outfalls' asset confidence grade has been changed from B4 to B2 this year as a result of the outfalls being sourced from an identifiable list with GIS references (see section 23.2.) The MEAV confidence grade was more accurate due to the robust outfall length, as length is the only variable in the cost curve for outfalls. However, as the cost curve takes no account of diameter due to the limited source of projects available to develop it, B4 was deemed the correct grade. The MEAV confidence grade in AR20 was C5.

23.2 Data improvement programmes

Scottish Water's method of identifying sea outfalls has been improved since AR20. Historically, outfall pipes have not been accurately categorised within GIS and the data has been held on an offline excel spreadsheet for sea outfalls. It was not feasible to relate the outfalls on the spreadsheet to assets held in GIS. These offline spreadsheets have been updated each year with new or abandoned outfalls. Since AR20 a review of the data has been undertaken, starting with the WICS definition for sea outfalls, which is:

The number of all pipelines used for the disposal of foul and surface water and sewage effluent to the marine environment including diffusers, [Short -] less than or equal to 500 metres in length. [/ Long -] greater than 500 metres in length. Exclude headworks, which should be included in the appropriate treatment category.

GIS analysis has been undertaken during 2020/21 to identify the pipes and outfalls intersecting with the 'marine environment' (as per the WICS definition). The "Marine Environment" was defined in GIS using a layer of Marine Regions from the website www.marine.gov.scot. The start of the outfall was taken as the pipe that intersects the marine high-water spring boundary line. The reasons for this were:

- To exclude sections of outfall laid in the ground as a standard sewer would be, sea outfalls are identified in the Annual Return for the sole purpose of obtaining a MEAV (modern equivalent asset value). The cost model used for them is based on the higher cost associated with laying pipes in the seabed; therefore, it would be incorrect to use this for lengths laid in the ground.
- The WICS definition includes surface water sewer usage. These tend to run directly from the network catchment, with no definite treatment point, unlike combined usage that has a treatment works to mark the change to treated effluent.
- It was not desirable to crop pipes at a boundary. This would complicate the separation of gravity pipes into the WICS reporting categories – sewers and sea outfalls.

A robust inventory of outfalls is now established which has the length and diameter details for segregating into H4.6 or H4.7 and the correct diameter-based size band. It is not possible to compare lists to identify which outfalls were previously included or not, but it is possible to

compare the length. The improved methodology resulted in circa 60km increase in length of outfalls, which would previously have been identified as sewers (H4.1).

23.3 Assumptions used for forecast data

There is no forecast data for the H4 table.

23.4 Key changes from 2019/20

A summary of the variances between 2019/20 and 2020/21 for the asset inventory for wastewater infrastructure can be found at the end of this section – Table H4 comparison AR20 and AR21. There are no significant changes to report for section H4.

An error was found for rising mains (H4.3) in the AR20 diameter infill method. It used the diameter for gravity pipes when infilling based on average diameter for pipe material, instead of the diameter for rising mains. This has resulted in approximately 10km of mains changing from size band 1 to size band 2. There is however a small positive change shown in band 1 due to new assets.

There have been 327 more short sea outfalls and 27 more long sea outfalls identified from using the revised method in AR21. This has resulted in a 51.7% increase in the length of long sea outfall in AR21 accounting for the 54% MEAV increase. This is a methodology change rather than an increase in assets.

The valuation method is unchanged. However, the increase in the number of assets identified has resulted in a 22% (£82.7m) increase in the value of short sea outfalls and a 54% (£50.7m) increase in the value of long sea outfalls.

SECTION H – ASSET INVENTORY
Table H4: Wastewater Infrastructure

Line Ref	Description	Units	AR19	CG	AR20	CG	AR21	CG	Variance	% Change	Gross MEAV AR19 £m	CG	Gross MEAV AR20 £m	CG	Gross MEAV AR21 £m	CG	Variance	% Change
Sewers																		
H4.1	Critical sewers [401]	km	10,924.08	B3	52,809.92	B2	53,468.42	B2	658.50	1.25	14,754.97	B4	43,174.32	C4	44,216.35	C4	1042.02	2.41
H4.2	Non-critical sewers [402]	km	4,0943.36	C5							26,855.75	C5						
H4.3	Sewage and sludge pumping mains [403]	km	1,335.18	B4	1,353.01	A4	1,382.02	A4	29.01	2.14	514.86	B4	528.99	B4	546.71	B4	17.72	3.35
Sewer structures																		
H4.4	Combined sewer and emergency overflows [404]	nr	3,687.00	B4	3,641.00	A4	3,648.00	A4	7.00	0.19	382.78	C5	402.48	C4	407.45	C4	4.97	1.23
H4.5	Other sewer structures [405]	nr	312.00	D5	312.00	D5	312.00	D5	0.00	0.00	264.86	D5	271.52	D5	271.52	D5	0.00	0.00
Sea Outfalls																		
H4.6	Short sea outfalls [406]	nr	1,427.00	B4	1,401.00	B4	1,728.00	B2	327.00	23.34	371.78	C5	375.47	C5	458.16	B4	82.69	22.02
H4.7	Long sea outfalls [407]	nr	28.00	B3	28.00	B3	55.00	B2	27.00	96.43	91.64	C5	93.93	C5	144.67	B4	50.75	54.03

Explanations for significant change to the H4 table can be found in section 23.2 Data improvement programmes and section 23.4 Key changes

24 Table H5 Wastewater Non-Infrastructure

24.1 Data sources and confidence grades

The data for the non-infrastructure asset inventory is extracted from Ellipse. The cost models are provided by Scottish Water's internal costing team. The cost models have not been changed from those used for AR20

There are no changes to the confidence grades associated with this table.

24.2 Data improvement programmes

A review of cost models mapping to unit types in Ellipse was completed to ensure that all units were priced using a cost model, where available.

24.3 Assumptions used for forecast data

There is no forecast data for the H5 table.

24.4 Key changes from 2019/20

A summary of the variances between 2019/20 and 2020/21 for the asset inventory for wastewater non-infrastructure can be found at the end of this section – Table H5 comparison AR20 and AR21. The significant changes are detailed in this section.

Overall, the MEAV for this category was relatively stable between AR20 and AR21, with reported values of £ 6,221m and £ 6,322m respectively. This represents a 1.6% increase in the reported MEAV. This increase can be attributed to the following:

- Changes in asset inventory data (0.2%)
- Updated cost model mapping (0.1%)
- Inflation (1.3%)

The tables below show the changes in wastewater non infrastructure assets (specifically sewage pumping stations and sewage treatment works). The explanations for the changes in assets can be found in the relevant E table sections, but it is important to note the minor differences in values due to the E tables including any assets that have been operational during the year compared to the H tables only including the assets that are operational at the end of 2020/21.

Table 77: Changes in Sewage Pumping Stations from 2019/20 to 2020/21

Category	SPS
AR20 Sites Reported	2254
Sites Non-Operational AR21	-5
Sites Non-SW Owned AR21	0
Newly Reported AR21	24
AR21 Sites Reported	2273

Table 78: Changes in Sewage Treatment Works from 2019/20 to 2020/21

Category	STW
AR20 Sites Reported	1841
Sites Non-Operational AR21	-4
Sites Non-SW Owned AR21	0
Newly Reported AR21	3
AR21 Sites Reported	1840

SECTION H - ASSET INVENTORY

Table H5: Wastewater Non-Infrastructure

Line Ref	Description	Units	AR19	CG	AR20	CG	AR21	CG	Variance	% Change	Gross MEAV AR19 £m	Gross MEAV AR20 £m	Gross MEAV AR21 £m	Variance	% Change	Net MEAV AR19 £m	CG	Net MEAV AR20 £m	CG	Net MEAV AR21 £m	CG	Variance	% Change
Sewage Pumping Stations																							
H5.1	Sewage pumping stations (in-line) [501]	nr	1,838	B2	1,846	A3	1,864	A3	18	0.98	865.57	947.35	964.88	17.54	1.85	332.32	C4	332.94	C4	326.993	C4	-5.94	-1.79
H5.2	Sewage pumping stations (terminal) [502]	nr	401	B2	408	A3	409	A3	1	0.25	219.15	259.20	265.36	6.17	2.38	88.65	C4	90.69	C4	87.685	C4	-3.00	-3.31
Sewage Treatment Works																							
H5.3	Cess & septic tanks [503]	nr	1,178	B2	1,184	A2	1,182	A2	-2	-0.17	349.05	356.74	361.75	5.01	1.40	161.34	C4	157.19	C4	155.115	C4	-2.07	-1.32
H5.4	Preliminary treatment only [504]	nr	16	B2	16	A2	16	A2	0	0	63.55	63.67	64.50	0.83	1.30	18.62	C4	17.19	C4	16.747	C4	-0.44	-2.58
H5.5	Primary treatment only [505]	nr	39	B2	38	A2	38	A2	0	0	81.53	83.16	84.31	1.15	1.38	33.02	C4	31.22	C4	30.729	C4	-0.49	-1.56
H5.6	Secondary treatment only [506]	nr	474	B2	475	A2	476	A2	1	0.21	3,260.15	3,302.95	3,350.87	47.92	1.45	950.92	C4	874.12	C4	846.814	C4	-27.30	-3.12
H5.7	Tertiary treatment only [507]	nr	128	B2	128	A2	128	A2	0	0	985.43	983.67	1,002.51	18.84	1.92	262.70	C4	237.28	C4	229.831	C4	-7.45	-3.14
Sewage Treatment Facilities by Disposal Type																							
H5.8	Sludge treatment - liquid disposal [508]	nr	1	B2	1	A2	1	A2	0	0	4.00	4.10	4.15	0.05	1.30	0.32	C4	0.29	C4	0.281	C4	-0.01	-1.87
H5.9	Sludge treatment - cake disposal [509]	nr	18	B2	18	A2	18	A2	0	0	221.93	220.05	223.27	3.21	1.46	65.24	C4	59.32	C4	57.373	C4	-1.94	-3.27
H5.10	Sludge treatment - compost disposal [510]	nr	0	A1	0	AX	0	AX	0	0	0	0	0	0	0	0	A1	0	AX	0	AX	0	0
H5.11	Sludge treatment - dried pellet disposal [511]	nr	0	A1	0	AX	0	AX	0	0	0	0	0	0	0	0	A1	0	AX	0	AX	0	0
H5.12	Sludge treatment - ash disposal [512]	nr	0	A1	0	AX	0	AX	0	0	0	0	0	0	0	0	A1	0	AX	0	AX	0	0
H5.13	Sludge treatment - other disposal [513]	nr	0	A1	0	AX	0	AX	0	0	0	0	0	0	0	0	A1	0	AX	0	AX	0	0

Explanations for changes in the H6 table are captured in section 24.2 Data improvement programmes and section 24.4 Key changes from 2019/20

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. The MEAV confidence grade for line H6.3 was wrongly reported as C4 in AR20, instead of AX, as there is no value. This has been corrected in AR21, as there is again no value.

25.2 Data improvement programmes

A summary of the variances between 2019/20 and 2020/21 for the asset inventory for support services can be found at the end of this section – Table H6 comparison AR20 and AR21. The significant changes are detailed in this section.

No significant data improvement programmes have been undertaken this year affecting the Support Services assets or valuations carried out in 2020/21.

25.3 Assumptions used for forecast data

There is no forecast data for the H6 table.

25.4 Key changes from 2019/20

For most asset categories, the numbers and valuations for Support Services assets remains broadly the same as in AR20.

The demolition of Gremista Depot has reduced the number reported in H6.2 band 2 from 36 to 35. The removal of the ground floor area for this building has reduced the band 1 value by 1416 m².

SECTION H - ASSET INVENTORY
Table H6: Support Services

Line Ref	Description	Units	AR19	CG	AR20	CG	AR21	CG	Variance	% Change	Gross MEAV AR19 £m	Gross MEAV AR20 £m	Gross MEAV AR21 £m	Variance	% Change	Net MEAV AR19 £m	CG	Net MEAV AR20 £m	Net MEAV AR21 £m	CG	Variance	% Change
H6.1	Offices & laboratories [601]	m2 & nr	26,394	B2	26,394	B2	26,394	B2	0.00	0.00	65.18	49.40	49.14	-0.26	-0.53	53.70	C4	40.39	40.19	C4	-0.21	-0.51
H6.2	Depots & workshops [602]	m2 & nr	30,557	B4	30,147	B4	28,730	B4	-1,417.00	-4.70	15.59	11.84	11.25	-0.59	-4.97	8.32	C4	6.13	5.89	C4	-0.24	-3.87
H6.3	Control centres [603]	m2 & nr	0	A2	0	AX	0	AX	0.00	0	0.00	0.00	0.00	0.00	0	0.00	C4	0.00	0.00	AX	0.00	0.00
H6.4	Vehicles & plant [604]	£m	52	B3	75	B3	76	B3	1.31	1.76	51.85	74.59	75.90	1.31	1.76	20.80	B3	20.54	19.48	B3	-1.06	-5.15
H6.5	Telemetry systems [605]	% & nr	4,907	A3	5,062	A2	5,057	A2	-5.14	-0.10	21.87	23.02	23.00	-0.02	-0.10	13.77	C4	3.32	3.10	B3	-0.22	-6.60
H6.6	Information systems [606]	nr	5,464	A2	5,237	A2	4,918	A2	-319.00	-6.09	5.45	5.28	5.16	-0.12	-2.20	3.21	B2	1.85	1.31	B2	-0.54	-28.98
H6.7	Other Non-Operational Assets [607]	nr	30	C4	30	C4	30	C4	0.00	0.00	14.57	15.83	15.83	0.01	0.03	13.35	C4	14.60	14.60	C4	0.00	0.00

Explanations for changes in the H6 table are captured in section 25.4 Key changes from 2019/20