Data Table Commentaries
3 Costs Wholesale Water

Contents

CW4aTransition and accelerated programme – Raw water transport, raw water storage and water treatment data

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CW7a Transition and accelerated programme – Demand management – Metering activities

CW12 Transitional expenditure – water resources and water network+

CW17 Accelerated programme expenditure – water resources and water network plus

CW18 Cost adjustment claims - base expenditure: water resources and water network+ (we have added NA to cells to remove a Proteus error message)

These tables have been intentionally left blank. Dŵr Cymru has no transition, accelerated programme or cost adjustment claims.

We have amended the format of input cells in columns H-L and N-R of CW15 to reflect the associated units and number of DPs in order to correctly register units of benefits associated with common performance commitments. For example, where a common performance commitment with an associated % unit is selected, we have changed the format to percentage so that 0.7% can be input. We have adopted this approach for all rows where we have input data into CW15 and CW16

1. Introduction

These tables collect companies' forecast costs and associated drivers from 2022-23 onwards. Some tables cover the period 2022-30 while others ask for longer term forecasts reflect that approach to long-term Delivery strategies.

The data forms the basis for setting cost allowances at PR24. It covers base, enhancement, developer services and best value data which we will be used in cost assessment models.

Where Confidence Grades are not detailed against line commentary, all forecasts have been produced from historical data with a confidence grade of B3 or better.

2. CW1 Totex analysis - water resources and water network+ (post frontier shift and real price effects)

Principal use- an explanation of the nature and extent of 'principal use' recharges between business units.

Principal use applies where an asset is used by more than one service: it is reported in the service of principal use with recharges made to other services that use the asset, reflecting the proportion of usage by those other services. In 2022/23 we have applied the principal use rule as follows:

£8.5m of capex spend on shared assets in the year has been reported directly in the service of principal use (Treated water Distribution – water network +) and relates to IT and other ʻmanagement and general' items. For the remaining years the following has been reported into the service of principal use

2023/24 - £12.44m
2024/25 - £9.16m
2025/26 - £18.15m
2026/27 - £19.47m
2027/28 - £8.62m
2028/29 - £8.67m
2029/30 - £7.97m

Recharges made to the other services are reported in table CW2and CWW2 and is included in other operating expenditure. This recharge is based on the depreciation on these assets with no financing adjustment. The amount recharged in the year amounts to £12.5m.

Schedule of Principal use adjustment recharges for 2022/23

Principal use recharge	Water Resources	Water network+	Wastewater network+	Bioresources	Retail	Total
	£m	£m	£m	£m	£m	£m
Recharges from	(1.0)	(1.4)	(7.5)	(2.1)	(0.5)	(12.5)
Recharges to	-	12.1	0.4	-	-	12.5
Net impact	(1.0)	10.7	(7.1)	(2.1)	(0.5)	-

The recharges made to other services use FTE numbers as the cost driver as the assets are "management and general" in nature. The split between household and non-household has been based on customer numbers.

The recharge for 2023/24 ,2024/25 is based on the same principal as above and the amount recharged is as follows:

Schedule of Principal use adjustment recharges for 2023/24, 2024/25 and AMP8

Principal use recharges	Water resources £m	Water network+ £m	Waste water network+ £m	Bioresources £m	Retail £m	Total £m
2025/26						
Recharges from	(0.9)	(2.9)	(7.6)	(2.0)	(0.6)	(14.0)
Recharges to	-	13.8	0.2	-	-	14.0
Net impact	(0.9)	10.9	(7.4)	(2.0)	(0.6)	-
2026/27						
Recharges from	(0.9)	(3.5)	(7.5)	(1.9)	(0.5)	(14.3)
Recharges to	-	14.1	0.2	-	-	14.3
Net impact	(0.9)	10.6	(7.3)	(1.9)	(0.5)	-
2027/28						
Recharges from	(0.8)	(3.9)	(7.1)	(1.7)	(0.5)	(14.0)
Recharges to	-	13.9	0.1	-	-	14.0
Net impact	(0.8)	10.0	(7.0)	(1.7)	(0.5)	-
2028/29						
Recharges from	(0.7)	(3.7)	(6.6)	(1.5)	(0.4)	(12.9)
Recharges to	-	12.8	0.1	-	-	12.9
Net impact	(0.7)	9.1	(6.5)	(1.5)	(0.4)	-
2029/30						
Recharges from	(0.6)	(3.5)	(6.3)	(1.3)	(0.4)	(12.1)
Recharges to	-	12.1	-	-	-	12.1
Net impact	(0.6)	8.6	(6.3)	(1.3)	(0.4)	-

A breakdown of which lines and business units any equity issuance costs (from table RR4 line 72) have been included in.

There are no equity issuance costs in CW1

Operating expenditure

CW1.1   *Base operating expenditure*

The basis of shadow year forecasting for wholesale Opex is our formal governed financial budgetary process which covers DCWW business wide activities direct to price controls and indirect activities.

Budgeting is undertaken in financial period for the following financial. The budget process in October 2022, which was signed off by our board of directors in Feb 2023, is the basis for the blind years table completion. We translate financial budgets into price controls using the 22/23 APR allocations to price controls to apportion costs to these areas.

Finance hold responsibility for completion of the overall Opex plan, however we place reliance on our energy, tax and developer services colleagues to provide a more detailed view of power (CW2.1), income treated as negative expenditure (CW2.2), Local authority and Cumulo rates (CW2.7) and developer services expenditure (CW1.3).

The start point for our AMP8 forecasts is our shadow year 24/25 Opex. We are faced with 3 key cost pressures over AMP8 that increase Opex;

1. Regulatory/strategic – where costs relating to categorisation changes are included for example diversions were previously classed as enhancement, but now follow 23/23 APR and are shown as 3rd party opex.
2. Rates revaluations – changes in legislation have resulted in increases in both the size and scale of rates expenses by the business and
3. Enhancement Opex – an output of capital planning for AMP8 was to model the unit cost drivers for increased operating activity and unavoidable expenditure for example material, chemical and power costs.

Cost forecasts within CW2 are post frontier and RPE assessments and tables are completed in 22/23 prices. The price base for financial cost information is base year prices indexed using the financial year average Consumer Price Index (including housing costs) i.e. 2022-23 prices FYA (CPIH deflated).

Throughout the process historical data was used to validate the models and monitor trends.

Movements can be summarised as follows;
- Base Operating Costs increase by £14m per annum from 2024-25 to 2029-30. This is impacted by the following:
- Net £6m reduction in the annual power costs by the end of AMP8 through a mixture of energy efficiency investment, and a forecast of lower electricity prices.
- £2m reduction in the annual power income (negative opex) figure by the end of AMP8 due to lower wholesale export power prices and hydro generators no longer being eligible for ROCs from 2027/28 onwards.
- £27m increase in the annual IRE charge by the end of AMP8 compared to 2024/25 , as a result of the charge in 2024/25 being much lower than previous years as leakage and safety and acceptability scheme costs are expected to reduce in the year.
- A £3.2m increase in rates in year 2 because of rates revaluation. The remainder of the AMP forecast no further changes to rates.
- Offset by an operating cost efficiency programme delivering £13m of savings by 29-30. The programme will target end to end process efficiencies in our water production and distribution cycle.

CW1.2   *Enhancement operating expenditure*

Enhancement Opex is allocated to the specific price controls implementing the investment, detailed reference to these schemes can be found in the asset management plan.

As per table guidance CW1.2 reconciles to CW3.142. For detailed commentary, see commentary supporting CW3.

CW1.3   *Developer services operating expenditure Confidence grade B3*

This line is the sum the opex of various other lines reported within tables DS2w. For detailed commentary on the lines which feed into this one, please see the commentary associated with DS2w.

CW1.4   *Total operating expenditure excluding third party services*

Sum of lines CW1.1-CW1.3

CW1.5   *Third party services Confidence Grade B2 / B3*

For detailed commentary see commentary supporting CW11

CW1.6   *Total operating expenditure*

Sum of CW1.4+CW1.5

Developer services revenue

CW1.7   *Grants and contributions - operating expenditure*

Water resources and water network+ developer services and non-developer services opex element of grants and contributions. As per table guidance, CW1.7 reconciles to DS1w.14 Fully recognised in income statement. For detailed commentary, see DS1w.

Capital expenditure

CW1.8   *Base capital expenditure*

The blind year movements are included in the IN23/03 early submission. For AMP8 detailed commentary is available on CW2.15 and CW2.16

CW1.9   *Enhancement capital expenditure*

For detailed commentary see commentary supporting the CW3 table

CW1.10   *Developer services capital expenditure Confidence Grade B3*

This line is the sum the Capex of various other lines reported within tables DS2w. For detailed commentary on the lines which feed into this one, please see the commentary associated with DS2w.

CW1.11   *Total gross capital expenditure excluding third party services*

Calculated cells

CW1.12   *Third party services Confidence Grade B2*

These charges relate to capital expenditure for providing third party services costs. The capital expenditure costs that are included relate to the supply of non-potable water and for bulk water. The same level of activity is planned for the remainder of AMP7 but for AMP8 there is an increase of £1.8m in bulk water and £0.3m for the reservoir operating agreements.

CW1.13   *Total gross capital expenditure*

Calculated cells

Developer services revenue

CW1.14   *Grants and contributions - capital expenditure*

Water resources and water network+ developer services and non-developer services capex element of grants and contributions. As per table guidance, CW1.14 reconciles to DS1w.14 Fully netted off capex. For detailed commentary, see DS1w.

CW1.15   *Net totex*

Calculated cells

Cash expenditure

CW1.16   *Pension deficit recovery payments Confidence Grade A1*

There are no planned deficit recovery payments.

CW1.17   Other cash items *Confidence Grade A1*

There are no other cash items forecasted.

CW1.18   *Totex including cash items*

Calculated cells

Atypical expenditure

CW1.19   *Item 1 Pension service cost Confidence* Grade *A1*

£19.0m of pensions service costs were reported as atypical in 2022-23 which related to an award of pension increases above a 5% cap. This is a one-off charge and was reported as an exceptional cost. We have not included any costs for future years. These costs were included in other operating expenditure.

Item 2 Compensation claim Confidence Grade *A1*

CW1.20
£2.6m related to compensation payments issued following supply interruptions. We have not included any costs for future years. These costs were included in other operating expenditure.

CW1.21   *Item 3 Cost of living payment Confidence Grad*e *A1*

£3.0m related to a cost of living payment paid to the employees during 2022-23. We have not included any costs for future years. These costs were included in other operating expenditure.

CW1.22   *Item 4 PSC claim Confidence Grade A1*

£0.9m related to settlement of personal search claims which is a one off event. We have not included any costs for future years. These costs were included in other operating expenditure.

CW1.23   *Item 5 – line not used*

CW1.24   *Total atypical expenditure*

Calculated cells

3. CW1a   Totex analysis - water resources and water network+

Table CW1 reports our Totex expenditure post frontier shift and RPEs. CW1a is a copy of CW1 but represents the costs pre frontier shift and RPEs. This section outlines our approach to the completion of CW1 and CW1a and the application of frontier shift and RPEs in SUP11. SUP11 reports the frontier shift and RPEs for the main cost categories including energy, labour etc.

Our business plan has been developed from a bottom-up approach to complete CW1 and a version of CW2 and CW3 post frontier and RPEs, these tables have been submitted alongside the plan which have been labelled CW2b and CW3b. We have completed CW1a by applying the assumptions in SUP11 to CW1. An illustration of the calculation is provided in the table below.

	CW1.1 Reported Value (2023-24)	Wholesale Water Base Net Price Effects (SUP11.71)	CW1a.1 Reported Value- Calculated (2023-24)
Base operating expenditure (£m)	202.359	(1.82%)	205.267 (CW1/(1+SUP11.71))

All opex costs have been uplifted using the base net price changes in SUP11.71 except for third-party services. No adjustment has been applied to third party services as the guidance outlines that CW1a should equal the values reported in CW11. Base capital expenditure has been adjusted using the wholesale base net price effects in SUP11.71. The remaining capital expenditure lines have been uplifted using the enhancement net price effects outlined in SUP11.74.

5. CW2   Base expenditure analysis - water resources and water network+

Our commentary for CW1 outlines our approach for developing our plan and completing the table. Our business plan has been built bottom up for the completion of a version of CW2 post frontier shift and RPEs, this table is included in our "SH201-additional table submission" called CW2b. In line with our approach for CW1, we have used the frontier shift and RPEs in SUP11 to back solve for CW2 pre frontier shift and RPEs.

Cost forecasts within CW2 are post frontier and RPE assessments and tables are completed in 22/23 prices.

Energy Costs

The lines CW2.1 and CW2.2 for Power and Income treated as negative expenditure are calculated by applying the energy net price effect reported in SUP11 to the energy costs reported in CW2b. The energy net price effect is calculated as the product of the real change in input price- Energy reported in lines SUP11.3 and the wholesale water base frontier shift assumption reported in SUP11.55.

Other operating expenditure

Total base operating expenditure reported in CW2.14 is equal to the Base operating expenditure reported in CW1a.1. The remaining lines making up the total operating expenditure are pro-rated based on CW2b (post frontier shift and RPEs).

Base capital maintenance

Lines CW2.15 and CW2.16 are calculated by applying the net Price effect for wholesale water base (SUP11.74) to CW2b (post frontier shift and RPEs).

All remaining commentary in this table reconciles to our base expenditure analysis reported in CW2b.

Operating expenditure

CW2.1   Power Confidence grade B3

Energy cost for clean water has a high level of uncertainty for AMP8 due to the uncertainty in wholesale electricity prices with a cost difference between high and low wholesale scenarios of approximately £10m a year. This is mitigated by advanced purchases in the blind years of AMP7.

The plan shows a cost reduction from £44m to £33m, a reduction of 26%, achieved primarily through a reduction of distribution input, energy efficiency investment, and a forecast of lower electricity prices.

CW2.2   Income treated as negative expenditure Confidence grade B3

There is a high level of uncertainty due to the uncertainty in wholesale electricity prices. Power related income is forecast to decrease significantly from £10m in the base year to £7m by the end of AMP8, a reduction of 28%. The reduction is due to lower wholesale export power prices and hydro generators no longer being eligible for ROCs from 2027/28 onwards.

CW2.3   Bulk Supply/Bulk discharge

The total cost of bulk supply is forecast to increase by £0.3m in 25/26 the remain flat for the remainder of the AMP in the absence of any information to suggest an increase in rates.

CW2.4 *Renewals expensed in year (infrastructure)*

£27m increase in the annual infrastructure renewal expenditure charge by the end of AMP8 compared to 2024/25, as a result of the charge in 2024/25 being much lower than previous years due to lower leakage and safety and acceptability scheme costs.

The costs included in this line relate to infrastructure renewal expenditure that are maintenance schemes with no enhancement benefits and does not satisfy the Property, Plant and Equipment standard to capitalise as fixed assets. The costs in this row as well as costs in CW2.15 need to be considered in totality as this is the amounts that is forecasted to be spent on infrastructure assets and we have assumed, in line with previous years, a percentage of this spend can be capitalised as it delivers long term benefits.

Maintenance investment across our non-infrastructure assets has been relatively evenly profiled across the AMP but there will be a different in year spend to that in AMP7 actual costs due to the mix and variation of investment needs in each year of the AMP.

Asset maintenance for AMP8 has been developed using a combination of deterioration modelling, bottom-up assessment using our risk-based optimisation model to develop programmes of work as well as a top down approach to budgeting supported by a review of the current age and where available condition of the current asset stock.

Our largest proportion of investment for infrastructure assets and notable increases from our PR19 plan includes impounding reservoirs, leakage, network repairs and ancillary assets. We recognise the increased investment is required to not only meet performance commitments but also more rigorous legal obligations for impounding reservoirs in a financially challenging climate.

CW2.5 *Renewals expensed in year (non-infrastructure)*

We have not expensed any non-infrastructure renewals in our business plan (or in 2022/23 actuals). Our treatment of non-infrastructure maintenance activity is capitalised under IFRS in the statutory accounts.

CW2.6 *Other operating expenditure*

Our approach to forecasting Other opex is set out in the commentary for CWW1.1

CW2.7 *Local authority and Cumulo rates Confidence grade A5*

A £3.0m increase in rates in year 2 because of rates revaluation. The remainder of the AMP forecast no further changes to rates. The rates charges are calculated in the CW10 table. Please refer to the commentary on CW10 for more details on how local authority and Cumulo rates have been calculated.

Service Charges

CW2.8 *Canal & River Trust abstraction charges/ discharge consents*

Zero costs are incurred for canal & river abstraction or discharge consents in any water price control.

CW2.9   *Environment Agency / NRW abstraction charges/ discharge consents*

The total cost of EA/NRW abstraction licences is forecast to remain flat over the AMP, due to immaterial activity in this area.

CW2.10   *Other abstraction charges/ discharge consents*

Zero costs are incurred for other abstraction charges/ discharge consents in any wastewater price control.

Location specific costs & obligations

CW2.11   *Costs associated with Traffic Management Act*

The total cost of service is forecast to remain flat in the absence of any information to suggest an increase in rates.

CW2.12   *Costs associated with lane rental schemes*

Zero costs are incurred for lane rental schemes in any water price control.

CW2.13   *Statutory water softening*

Zero costs are incurred for statutory water softening in any water price control.

CW2.14   *Total base operating expenditure*

Line is a sum, please refer to commentary per line above.

Capital expenditure

CW2.15   *Maintaining the long term capability of the assets – infra*

Details regarding the blind year movements are covered in the IN23/03 early submission document

The costs in this line needs to be considered with the costs reported in CW2.4. where the method for forecasting these costs are reported. The costs in this line relate to the amount that satisfies the requirement of the IFRS standard IAS16 Property, Plant and Equipment and includes a long term enhancement benefit to the infrastructure renewal expenditure.

CW2.16   *Maintaining the long term capability of the assets - non-infra*

Details regarding the blind year movements are covered in the IN23/03 early submission document

Maintenance investment across our non-infrastructure assets has been relatively evenly profiled across the AMP but the difference of in year spend will be different from AMP7 actual costs due to the mix and variation of investment needs in each year of the AMP.

Asset maintenance for AMP8 has been developed using a combination of deterioration modelling, bottom-up assessment using our risk-based optimisation model to develop programmes of work as well as a top-down approach to budgeting supported by a review of the current age and where available condition of the current asset stock.

Our largest proportion of investment across AMP8 will target maintenance of our raw water mains and raw water pumping stations, water treatment works, treated water pumping stations and service reservoirs.

CW2.17   *Total base capital expenditure*

Calculated Cells

Traffic Management Act

CW2.18   *Projects incurring costs associated with Traffic Management Act*

As per CW2.11 we have assumed the unit rates remain flat over AMP 8, with a slight reduction in volumes forecast.

6. CW3   Enhancement expenditure – water resources and water network+

The table CW3 reports the enhancement capital expenditure pre frontier shift and real price effects. Our PR24 business plan is built up using bottom-up detailed assessment of efficient costs. Our bottom-up assessment of enhancement schemes costs is reported in CW3b in "WSH201-Additional Business plan tables.xlsx". CW3 is the enhancement expenditure (pre frontier shift and real price effects), this table has been populated by applying the frontier shift and real price effects reported in SUP11 to our enhancement expenditure in CW3b. Capital expenditure has been adjusted by the cumulative net price effect- wholesale water enhancement (SUP11.74). Enhancement operating expenditure has been adjusted by the cumulative net price effect- wholesale water base (SUP11.71). Table commentary for CW3 on enhancement schemes are in line with our CW3b reported values.

Example of the application of frontier shift and real price effects

	CW3b Reported Value (2026-27)	Wholesale Water Enhancement Net Price Effects 2026-27 (SUP11.74)	CW3 Reported Value-Calculated (2026-27)
Eels/fish entrainment screens; (WINEP/NEP) water capex (CW3.4)	1.683	0.40%	1.676 (CW3/(1+SUP11.74))

EA/NRW environmental programme (WINEP/NEP) CW3.1 – CW3.40

CW3.1 – 3.3   *Biodiversity and conservation*

Details are available in the enhanced investment case WSH71-PE10.

CW3.4-
3.6
Eels/fish entrainment screens

Investment in this line is associated with 3 Eel Screen Schemes planned for AMP8. One of these schemes will be delivered in 2025/26 and two schemes delivered in 2029/30. Further details are available in the enhanced investment case WSH71-PE10.

CW3.7-
3.9
Eels/fish passes

CW3.10-
3.12
Invasive Non Native Species

CW3.13-
3.15
Drinking Water Protected Areas;

Investment in this line is associated with our catchment enhancement programme for schemes in Wales. Details of the investment included in this line can be found in our enhanced investment case WSH53-CW01.

Please note that there is a mistake in the tables between line CW3b.13 and CW3b.100, investment for table CW3b.13 should be represented as follows –

Water Resources			25/26	26/27	27/28	28/29	29/30
Drinking Water Protected Areas; (WINEP/NEP) water capex	£m	3	4.601	4.535	4.534	4.563	4.617
Drinking Water Protected Areas; (WINEP/NEP) water opex	£m	3	0.000	0.000	0.000	0.000	0.000
Drinking Water Protected Areas; (WINEP/NEP) water totex	£m	3	4.601	4.535	4.534	4.563	4.617

Total			25/26	26/27	27/28	28/29	29/30
Drinking Water Protected Areas; (WINEP/NEP) water capex	£m	3	4.601	4.535	4.534	4.563	4.617
Drinking Water Protected Areas; (WINEP/NEP) water opex	£m	3	0.000	0.000	0.000	0.000	0.000
Drinking Water Protected Areas; (WINEP/NEP) water totex	£m	3	4.601	4.535	4.534	4.563	4.617

CW3.16-
3.18
Water Framework Directive

Investment included in this line is associated with our WINEP & NEP commitments under the Water Resources price control. Details are available in the enhanced investment case WSH71-PE10.

CW3.19-
3.21
Wetland Creation

CW3.22-
3.24
Trade effluent discharge flow monitoring;

CW3.25-
3.27

25 year environment plan;

CW3.28-
3.35

Investigations

Investment included in this line is associated with our WINEP & NEP commitments under the Water Resources price control. Details are available in the enhanced investment case WSH71-PE10.

Supply-demand balance CW3.41 – CW3.59

CW3.41-
3.43

Supply-side improvements

This investment is for two schemes to be delivered solely for the benefit of the Canal & Rivers Trust (CRT):
1. CRT water supply support Scheme 1 – use of Grwyne Fawr reservoir
2. CRT water supply support Scheme 2 – increase the deployable output of Court Farm WTW

This is on that basis that 100% of the cost will be recovered from the CRT. This revenue is included in the figures in table DS1w. For further information, see the enhanced investment case WSH58-RS02.

CW3.44-
3.46

Demand-side improvements

This links to Table 8 line 8B4 within the WRMP "Demand-side improvements (excl. leakage and metering)" and includes investment related to our Project Cartref enhancement programme. Details of the investment associated with this line can be found in our enhanced investment case WSH58-RS02.

CW3.47-
3.49

Leakage improvements

This links to Table 8 line 8B7 within the WRMP "Leakage improvements"
We have no opex investment associated with this line for PR24
For further information, see the enhanced investment case WSH58-RS02.

CW3.50-
3.52

Interconnectors

Capex - This links to Table 8, Line B10 within the WRMP "Internal interconnectors CAPEX". Also included in this line is investment related to the automation of Deri Goch Water Pumping Station along with resources feasibility studies for the Pembrokeshire and Clwyd Coastal Water Resource
Opex - This links to Table 8, Line B11 within the WRMP "Internal interconnectors OPEX". Also included in this line is opex associated with the capex scheme investment related to the automation of Deri Goch Water Pumping Station.

Details of the investment associated with this line can be found in our enhanced investment case WSH58-RS02.

Metering Lines CW3.60 – CW3.90

The planned programme for metering in AMP8 is different from historical spend because a significant increase in investment in customer meters as part of Welsh Water's Metering Strategy. This will mean a significant increase in the number of customers being metered for the first time and for all meters

installed during AMP8 being Automated Meter Reading (AMR). Currently all new meters installed are basic meters.

The enhancement investment for metering has been developed using the forecast of the current business as usual approach (BAU) and comparing that to the Company Preferred Option which has come from the Welsh Water Customer Metering Strategy. Currently within BAU meter optants and selective meters are enhancement activities and meter maintenance to reactively replace failed meters are base activities. A summary of the approach for enhancement in AMP8 can be seen below:

- Meter Optants, customers requesting a meter
- New Meter Installations, the metering of unmeasured properties for the first time
- Proactive Replacement, the replacement of basic meters earlier than usual in their lifecycle with AMR meters
- Reactive Replacement of existing visually read meters at end-of-life the costs above business as usual reactive replacement. The additional costs are due installing an AMR meter over a basic meter and the increased level of AMR meter failure early in its lifecycle compared with basic meters.

Reactive Meter replacements BAU which include the cost of a basic meter are regarded as base interventions and so do not appear in Table CW3.

This data is different from historical spend because investment in customer meters is being increased as part of Welsh Water's Metering Strategy which will mean a significant increase in the number of customers being metered for the first time and for all meters installed during AMP8 being smart automated meter reading (AMR) from AMP8 being smart. Currently all new meters are basic meters.

In terms of the total number of customers with a meter the aim of the metering strategy will be to increase this from 808,571 (54% of customers) at the end of AMP7 to 1,068,576 (79% of customers) at the end of AMP8. This will mean that c50,000 to 82,000 new customer meters will be installed each year instead of the current 11,500 to 12,500 through the meter options programme.

The spend profile for AMP8 has been developed via a metering model. The model has been developed to deliver a reduction in demand through reduced levels of customer consumption and identification of demand side leakage.

The whole of the metering section of Table CW3, lines CW3.60 to CW3.90 has a direct link to Table CW9 lines CW9.57 to CW9.87.

The data in lines CW3.62, CW3.65 and CW3.68 also shares its raw cost data with lines CW7.1 to CW7.3 of Table CW7. The replacement values in lines CW3.71 and CW3.80 differ from those in Table CW7.4 and CW7.5 because they include both base and enhancement costs.

Linkage of CW3.60 to CW3.90 Tables to the WRMP Table 8.C it should be noted that guidance, "2023 07 PR24 query response - WRMP table 8" provided after the Welsh Water submission of the WRMP tables in June 2023 has changed the way that the enhancement element of meter replacements will be presented in Tables CW3 and CW9.

In the WRMP Table 8C the enhancement element for proactive and reactive replacements was added to the new meter costs for Residential and Business because there was nowhere else to add these because of the instruction; "These lines should only be completed by companies who were allocated enhancement expenditure to replace basic meters with smart meters in the PR19 final determinations." The updated instructions are to add the enhancement costs associated meter replacements. For example when replacing a basic meter with an AMR meter for a residential customer in lines CW3.69 to CW3.71.

Details of the investment associated with this line can be found in our enhanced investment case WSH58-RS02.

Water quality improvements CW3.91 – CW3.117

CW3.91-3.93   *Improvements to taste, odour and colour (grey solutions)*

Investment in this line will target our Acceptability of Water performance and water quality zonal and network interventions. Details of our acceptability of water enhancement can be found in our enhanced investment case WSH54-CW02.

CW3.94-3.96   *Improvements to taste, odour and colour (green solutions)*

CW3.97-3.99   *Addressing raw water quality deterioration (grey solutions)*

Details of the Investment allocated against this driver can be found in our enhanced investment case WSH55-CW03.

Investment to address raw water deterioration at WTW assets, including industry leading investigations and solutions to address compliance with Regulation 26 of Water Supply (Water Quality), end to end process update at Cefn Dryscoed WTW in response to raw water deterioration and customer acceptability, addressing disinfection by-products Capel Curig WTW along with an investigation of disinfection by-products for Anglesey.

Also included in this line is investment to address raw water deterioration and coastal erosion at Pendine WTW, mitigating the impact of raw water deterioration at Bontgoch WTW, improved treatment at Mayhill WTW in response to raw water taste & odour causing organic compounds, and treatment improvements at sites in response to increasing levels of raw water manganese which ultimately impacts upon customer acceptability.

Also included here is the enhancement OPEX associated with each of the schemes itemised above which commences in the year each scheme is delivered.

CW3.100-
3.102

Addressing raw water quality deterioration (green solutions)

Investment in this line is made up of our Drinking Water Catchment Improvement Programme in catchments in England which is related but not the same as our WINEP/NEP investment for Drinking Water Protected Areas. Details of the investment included in this line can be found in our enhanced investment case WSH53-CW01.

Please note that there is a mistake in the tables between line CW3b.13 and CW3b.100 for our AMP8 expenditure, investment for table CW3b.100 should be represented as follows –

Water Resources			25/26	26/27	27/28	28/29	29/30
Addressing raw water quality deterioration (green solutions); enhancement capex	£m	3	0.746	0.735	0.735	0.739	0.748
Addressing raw water quality deterioration (green solutions); enhancement opex	£m	3	0.000	0.000	0.000	0.000	0.000
Addressing raw water quality deterioration (green solutions); enhancement totex	£m	3	0.746	0.735	0.735	0.739	0.748

Total			25/26	26/27	27/28	28/29	29/30
Addressing raw water quality deterioration (green solutions); enhancement capex	£m	3	0.746	0.735	0.735	0.739	0.748
Addressing raw water quality deterioration (green solutions); enhancement opex	£m	3	0.000	0.000	0.000	0.000	0.000
Addressing raw water quality deterioration (green solutions); enhancement totex	£m	3	0.746	0.735	0.735	0.739	0.748

CW3.103-
3.105

Conditioning water to reduce plumbosolvency for water quality

CW3.106-
3.108

Lead communication pipes replaced or relined

Investment in this line is related to our strategic lead communication pipe replacement programme over the 5 year period using a flat even profile across the AMP. Investment in this line includes our rolling lead communication pipes replacement programme and lead communication pipes replaced for Water Quality purposes.
For further information, see the enhanced investment case WSH52-CW04.

CW3.109-
3.111

External lead supply pipes replaced or relined;

Investment in this line is related to our strategic lead external lead supply pipe replacement programme over the 5 year period using a flat and even profile across the AMP. Investment in this line includes the proposed grant scheme as well as the external supply pipes for which we will fund 100% of the replacement cost.
For further information, see the enhanced investment case WSH52-CW04.

CW3.112-
3.114

Internal lead supply pipes replaced or relined

CW3.115-
3.117

Other lead reduction related activity;

Water resilience and security CW3.118 – CW3.126

CW3.118- *Resilience*
3.120

Investment in this line includes improved raw water and treated water connectivity across the Welsh Water network, resilience of non-infra assets and feasibility studies to define the next stages of resilience work identified within Welsh Water's long-term delivery strategy. One of the schemes is the improved linkage between Nantybwch WTW and adjoining catchments along with a programme of schemes at WTW to improve resilience in response to potential long-term outages. The scheme includes capital and operational costs which have been developed bottom up. The programme also includes investment for our WTW critical tanks programme supported with a Regulation 28 notice from the DWI.

A summary of the PR24 resilience schemes and programmes can be seen in Table 2 below. Further details are available in the enhanced investment cases WSH62-RS01, WSH60-RS04 and WSH61-RS05.

Scheme Name
Increasing redundancy to remove current pinch-points for our treated or final water tanks at water treatment works
Inspections to assess compliance of third parties with the Water Regs and also undertake programmes of education to help inform third parties of requirements placed on them by the Water Regs
Improved Raw Water Resilience for Nantybwch WTW
Reducing customer supply interruptions and network burst rates from Asbestos Cement Mains failures
Increasing the reliability of short- and long-term water supply by increasing capacity within Tywi/SEWCUS
Relocation of the Wye Transfer main across the Usk in response to river bank erosion
Mitigating flood risks to our critical Water assets
Dry weather intervention projects (programme of smaller network connectivity projects to remove dry weather hotspots)
Feasibility studies of potential mitigations and implementation of high-priority controls to resolve risks to our critical trunk mains crossings
Feasibility study in AMP8 for the continued reliability of short- and long-term water supply to Cardiff to define scope and cost for a scheme in AMP9/10
Feasibility studies for priority strategic resilience schemes (incl. North Wales spine main, East Wales, Pembrokeshire, and SEWCUS connectivity improvements)
Strategic resilience to risks associated with sludge at Water Treatment Works

The Enhancement Opex for the resilience programme is associated with the Improved Raw Water Resilience for Nantybwch WTW and the strategic network project "Increasing the reliability of short- and long-term water supply by increasing capacity within Tywi/SEWCUS". This involves a pump upgrade at the Birchgrove water pumping station and a power upgrade at Margam pumping station. These upgrades will provide additional water pumping capacity and increased power use will result.

CW3.121- Security-SEMD
3.123

The AMP8 investment is to enhance existing security measures at 11 sites newly categorised as Critical National Infrastructure (CNI). Further details are available in the enhanced investment case WSH57-CS01.

CW3.124
-3.126   *Security - Cyber*

Investment required to enhance our Cyber security capabilities and controls in response to an increasing level of emerging risks and threats in order to remain compliant with regulatory standards, including NISR. Further details are available in the enhanced investment case WSH57-CS01.

Net zero CW3.127 – CW3.129

See CW21 and our enhanced investment case WSH66-PE11.

Other enhancement (Freeform lines - by exception) CW3.130 – CW3.139

CW3.130-
3.131   *Impounding Reservoirs*

The AMP8 investment is to increase safety and to lower risk for impounding reservoirs, such as addressing MITIOS actions identified in Section 10 inspections. Further details are available in the enhanced investment case WSH59-RS03.

CW3.132-
3.133   *Visitor Centre*

The AMP8 investment allocated to this line is for NEP driver W_BW_IMP3 and relates to the 5 sites identified through investigations and assessment of inland bathing water sites from W_BW_INV4. For further information, see the enhanced investment case WSH71-PE10.

CW3.133-
3.134   *Cwm Taf Water Supply*

The AMP8 investment is for a range of inputs that will be required to manage the tendering process and supervise and sign off the construction and commissioning of the new Cwm Taf WTW and its associated pipelines, storage tanks and pumping stations. A resource plan has been prepared, which reflects the roles considered necessary to deliver the DPC project through AMP8.

CW3.135-
3.139   *Additional Lines – Are intentionally left blank*

CW3.140-
3.143   *Calculated Cells*

7. CW4   Raw water transport, raw water storage and water treatment data

Raw water transport and storage

CW4.1   *Total number of balancing reservoirs*

CW4.2   *Total volumetric capacity of balancing reservoirs*

CW4.3   *Total number of raw water transport stations*

CW4.4   *Total installed power capacity of raw water transport pumping stations*
Confidence grade B3

Line 1 to 4 For the 2023/24 to 2029/30 years are based on the 2022/23 values, there are no planned changes.

CW4.5   *Total length of raw water transport mains and other conveyors Confidence grade B3*

Total length of raw water transport mains and other conveyors, an increase of 260m in 2028/29 resulting from a single scheme.

For the 2023/24 to 2029/30 years Lines 4.5, 4.12 (raw water asset numbers and capacities) have been graded B3 because they are based on the average of five years' worth of historic APR data and the actual values are forecast to be within +/- 10% these.

CW4.6   *Average pumping head – raw water abstraction Confidence grade B3*

For the years 2023/24 to 2029/30 a five year rolling average has been used to calculate the Average Pumping Head (APH), see row highlighted in light yellow Table 1a&b below. This is because no significant changes to water pumping are forecast which will impact the calculation of APH. However, the improvements to existing data which are outlined within the APR commentary will result in improvements to the data used to calculate APH values which may result in a change to the numbers currently forecast.

The APR 2022/23 commentary provided the updated calculation method and restated the values for 2019/20 and 2020/21 and for values for the 2022/23 APR. The APR commentary provides the detail for the calculation of APR for the four PR24 lines for APH lines in the bullets below. The linkage between the APR tables lines and the PR24 Table lines can also be seen in the bullets below.
- Line CW4.6 - Average pumping head – Raw water transport, RAG reference 6A.6
- Line CW4.49 Average pumping head – Water treatment, RAG reference 6A.34
- Line CW5.24 Average pumping head – Distribution, RAG reference 6B.24
- Line Res1.23 Average pumping head – Water Abstraction, RAG Reference 5A.23

Lines CW4.6 and CW4.49 (average pumping head) have been graded B4 and C4 to reflect the 2022/23 score and that they are based on the average of five years' worth of historic APR data and the actual values are forecast to be within +/- 25% these.

The new calculation method provides a more stable data set for APH which can be seen when comparing the values submitted for the 2021/22 APR and the restated values submitted for the 2022/23 APR which can be seen below in Figures 1 and 2 respectively.

Table 1a – APR Values

Line Ref	Average Pumping Head	Units	DPs	18/19	19/20	20/21	21/22	22/23
RES1.23	Abstraction (resources)	m.hd	2	35.99	31.02	38.83	34.17	37.46
CW4.49	Treatment	m.hd	2	13.42	16.01	12.85	12.96	12.44
CW5.24	Distribution	m.hd	2	70.91	70.35	72.57	73.64	71.58
CW4.6	Raw water transport	m.hd	2	22.25	22.50	16.82	14.95	16.94

Table 3b – Rolling Average Figures from 2023/24 to 2029/30

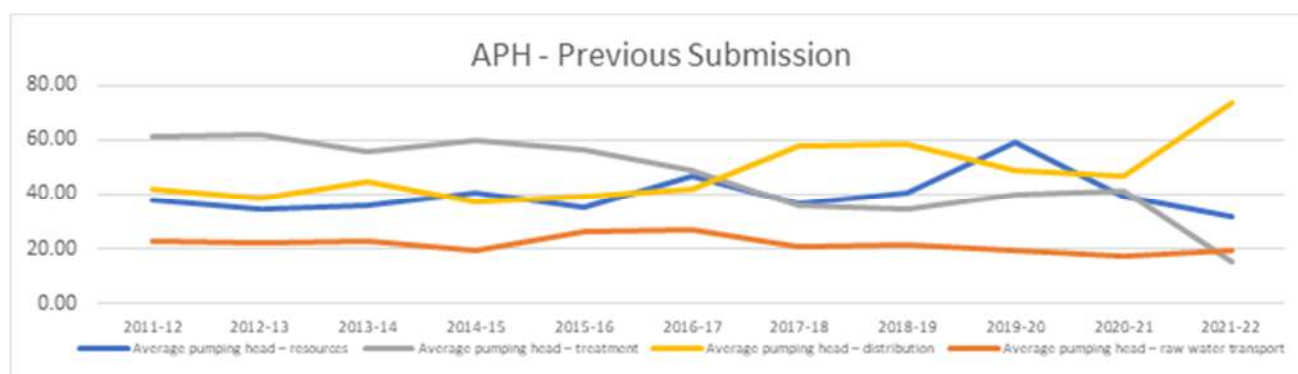| Line Ref	Average Pumping Head	Units	DPs	23/24	24/25	25/26	26/27	27/28	28/29	29/30
RES1.23	Abstraction (resources)	m.hd	2	35.49	35.39	36.27	35.76	36.08	35.80	35.86
CW4.49	Treatment	m.hd	2	13.54	13.56	13.07	13.11	13.14	13.28	13.23
CW5.24	Distribution	m.hd	2	71.81	71.99	72.32	72.27	71.99	72.08	72.13
CW4.6	Raw water transport	m.hd	2	18.69	17.98	17.08	17.13	17.56	17.69	17.49

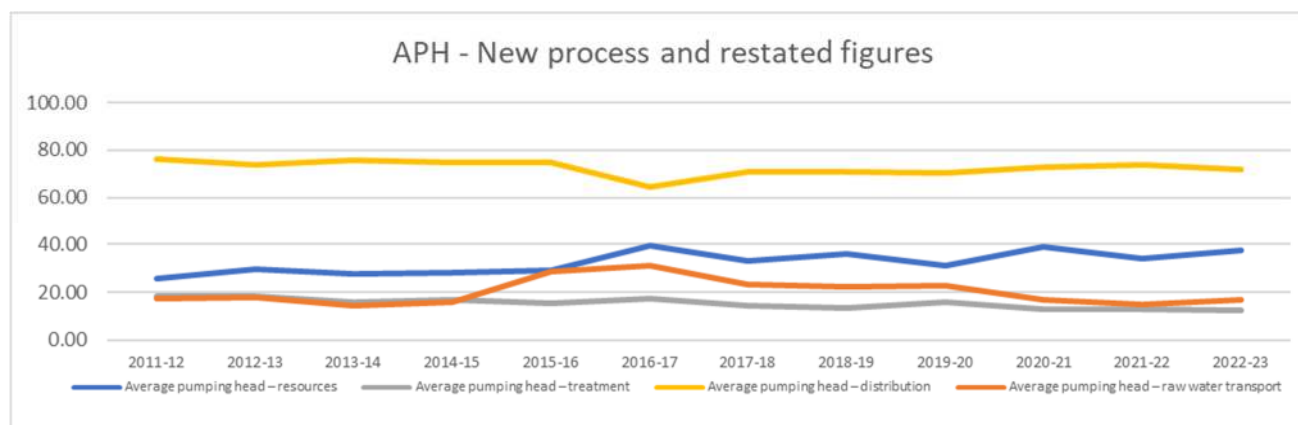Figure 1 – APH Values 2011/12 to 2021/22 Submitted for the 2021/22 APR

Figure 2 – Restated APH Values 2011/12 to 2022/23 Submitted for the 2022/23 APR

CW4.7   *Energy consumption – raw water transport (MWh) Confidence grade B4*

Energy consumption for clean water is expected to reduce over the period. This reduction is primarily driven by a reduction in Distribution Input (DI) but also contributed to by energy efficiency measures such as pump replacement and smart network optimisation.

The reduction in DI is planned to be achieved by a mix of demand reduction from customers and leakage reduction. The DI forecasts are in line with the figures provided in table CW5 line 39. The reduction in energy consumption is gradual over time reflecting the gradual delivery of reduction measures over the AMP. The energy consumption impact of the forecast DI reduction has been made by an extrapolation of the relationship between DI and energy usage in recent years.

CW4.8   *Total number of raw water transport imports*

Confidence grade A1

Lines 4.8, 4.10 and 4.51
In line with the equivalent lines for the APR, these lines ask us to report on the number of raw water transport import and export points and total number of water treatment imports, as shown in lines CW4.8, CW4.10 and CW4.51. The Ofwat RAG 4.11 guidelines ask us to only include all points even if unused during this year. Given the limited number of raw water exports / imports that fall within this category then we are confident in the numbers we are reporting and have selected an A1 grade. Our draft WRMP24 and PR24 Business Plan does not forecast any changes in the number of raw water transport import or export points or water import to water treatment works points.

CW4.9   *Water imported from 3rd parties to raw water transport systems*
Confidence Grade A3

Lines 4.11 and 4.52
In line with equivalent lines for the APR, these lines ask us to report on the daily average volume of raw water transported imported and exported from/to 3rd parties raw water transport systems, as shown in lines CW4 L9 and L10 and CW4 L52. The Ofwat RAG 4.11 guidelines ask us to use an average daily figure. Our draft WRMP24 and PR24 Business Plan does not forecast any material changes in raw water import and as a result the volume of raw water transported imported and exported is forecast to remain stable. The volume of water imported to our water treatment work has been profiled to the same movement as with other non-Household billed usage CW5.7.

Given the limited number of raw water exports/imports that fall within this category then we are confident in the numbers we are reporting, however a degree of uncertainty is present associated with the use of flowmeters as the basis of the dataset. We have therefore selected a confidence grade of A3 for these lines.

CW4.10   *Total number of raw water transport exports*

See commentary for CW4.8

CW4.11   *Water exported to 3rd parties from raw water transport systems*

See commentary for CW4.9

CW4.12   *Total length of raw and pre-treated (non-potable) water transport mains for supplying customers*
Confidence grade B3

For the 2023/24 to 2029/30 years Lines 4.5, 4.12 (raw water asset numbers and capacities) have been graded B3 because they are based on the average of five years' worth of historic APR data and the actual values are forecast to be within +/- 10% these.

Number of Works by type and volume of water treated CW4.13 – CW4.26
Confidence grade B2

We have no simple disinfection, W1, W2 or W6 sized works.

W3 works - Number of works
The number of WTW in this category remains constant from 2022/23 up to 2029/30.

W4 works - Number of works
The number of WTW remains constant until 2028/29 where the number of Surface Water W4 works reduces by 2 considering the delivery of solutions at Whitbourne WTW and Bretton WTW for the installation of UV treatment under Regulation 26 of Water Supply (Water Quality) Regulations, which increases the complexity of these works to W5.

W5 works - Number of works
The number of WTW remains constant until 2028/29 where the number of Surface Water W5 works increases by +2 considering the delivery of solutions at Whitbourne WTW and Bretton WTW for the installation of UV treatment under Regulation 26 of Water Supply (Water Quality) Regulations, which increases the complexity of these works to W5, as well as accounting for the

abandonment of Capel Curig WTW under the disinfection by-products scheme which reduces the figure by -1, resulting in a net change of +1.

Number of works by size and % of distribution Input CW4.27 – CW4.42

Confidence grade B2

WTWs in size band 1 - Number of works
The number of works remains constant from 2022/23 until 2027/28 where it reduces by 1 from 7 to 6 to account for the completion of the disinfection by-products scheme at Capel Curig WTW.

WTW in Size Bands 2 to 8 (odd numbered lines only)
There are no forecasted changes to these lines where the number of works remains constant from 2022/23 until 2029/30.

Water treatment - other information

CW4.43   *Peak week production capacity Confidence grade B2*

There are no forecast changes to Peak week production capacity from 2022/23 until 2028/29. From 2028/29 we are forecasting the abandonment of Capel Curig WTW at the start of Year 4 which reduces the PWPC capacity by 0.3 for the final two years of AMP8.

CW4.44   *Peak week production capacity having enhancement expenditure for grey solution improvements to address raw water quality deterioration Confidence grade B2*

This line is linked to our PR24 business plan in Table CW3.97 & CW9.97 and contains the PWPC capacity for the WTW identified for investment under this driver. We have included the PWPC for each site in the year the scheme is being delivered which results in a profile of 1 scheme in 2026/27, 3 schemes in 2027/28 and 3 schemes in 2028/29.

CW4.45   *Peak week production capacity having enhancement expenditure for green solutions improvements to address raw water quality deterioration Confidence grade B2*

This line is linked to our PR24 business plan in Table CW3.100 & CW9.100 and contains the PWPC capacity for the WTW identified for investment under this driver. We have included the PWPC for each site in the year the schemes are being delivered. As the catchment profile is continuous across the AMP, the sum of the PWPC for each of the sites included have been included in 2029/30, considered as the year of delivery.

CW4.46   *Total water treated at more than one type of works*

We have no water treated at more than one type of works

CW4.47   *Number of treatment works requiring remedial action because of raw water deterioration Confidence grade B3*

The starting position for this line is the 2022/23 APR submission. The two remaining blind years remain at zero. From 2025/26, the number of works in each year changes according to the number of works which are carrying out substantive activity to address raw water deterioration. We have understood this to include the year which the scheme is completed.

We are planning to Finish 1 scheme in Year 2; 2026/27, Organics Removal at Mayhill WTW. We are planning to complete 3 schemes in Year 3; 2027/28, UV schemes at Bretton & Mayhill WTW under

Regulation 26 and the Disinfection By-Products Scheme at Capel Curig. Finally, We are planning to complete a further 3 schemes in year 4; 2028/29, for UV schemes at Broomy Hill and Whitbourne WTW under Regulation 26 and the Raw Water Deterioration scheme at Cefn Dryscoed.

CW4.48   *Zonal population receiving water treated with orthophosphate Confidence grade B2*

The starting position for this line is the 2022/23 APR submission. As this population is considered on a zonal basis and is a forecast over the AMP, we are not considering any change to this number from the 22/23 APR. Therefore the population is flat across the 2 remaining blind years of AMP7 and through AMP8 until 2029/30.

CW4.49   *Average pumping head – water treatment Confidence grade C4*

See commentary for CW4.6

CW4.50   *Energy consumption - water treatment (MWh) Confidence grade B4*

Energy consumption for clean water is expected to reduce over the period. This reduction is primarily driven by a reduction in Distribution Input (DI) but also contributed to by energy efficiency measures such as pump replacement and smart network optimisation.

The reduction in DI is planned to be achieved by a mix of demand reduction from customers and leakage reduction. The DI forecasts are in line with the figures provided in table CW5 line 39.

The reduction in energy consumption is gradual over time reflecting the gradual delivery of reduction measures over the AMP. The energy consumption impact of the forecast DI reduction has been made by an extrapolation of the relationship between DI and energy usage in recent years.

CW4.51   *Total number of water treatment imports*

See commentary for CW4.8

CW4.52   *Water imported from 3rd parties to water treatment works*

See commentary for CW4.9

CW4.53   *Total number of water treatment exports*

CW4.54   *Water exported to 3rd parties from water treatment works*

CW4.55   *Total number of water treatment works effluent discharges requiring new MCERTS flow monitoring*

There are no WTW requiring new MCERTS flow monitoring from 2022/23 until 2029/30.

8. CW5   Treated water distribution - assets and operations

Reference is made to the DCWW WRMP24 submission which provides more detail and information around the forecasting mechanism and provides additional context to the forecast glidepaths and what strategies are behind them. All forecasts are based on the company preferred planning scenario and demand related forecasts are based on normal year forecasts.

Assets and operations

CW5.1   *Total installed power capacity of potable water pumping stations*

CW5.2   *Total volumetric capacity of service reservoirs*

CW5.3   *Total volumetric capacity of water towers*
Confidence grade
2023/24 – 2029/30 - 5.1, 5.2 and 5.3 B3

Lines 5.1 to 5.3, 5.16 to 5.22
For 2023/24 and 2024/25 there will be no significant changes to the 2022/23 values for Water Distribution WPS and Water Distribution Storage, 1 new pump and an increase of 40.3kW to the installed power in 2023/24.

Between 2025/26 and 2029/30 an increase of 1,259 kW to the installed power value for water pumping stations in CW5.1 and two new service reservoirs planned to be installed, one in 2028/29 and the second in 2029/30 with 7Ml and 3.5Ml capacity respectively in line CW5.2. The profiling for the new assets is consistent with the planned capital spend across the 2025/26 to 2029/30 period.

CW5.4   *Water delivered (non-potable*

Welsh Water are not forecasting a significant change in any of the data lines

CW5.5   *Water delivered (potable) Confidence Grade A3*

Forecast reduction of -73.5 MLd by 2029-30 from 2022-23 levels. This reduction reflects the planned reduction in Household and non-household demand as result of the progressive metering strategy and government and company led-demand interventions. Further details of these strategies are within the companies WRMP24 submission. Further to this Water Delivered component also includes customer supply pipe leakage which is also forecast to reduce across AMP8 inline with the preferred leakage reduction glidepath.

CW5.6   *Water delivered (billed measured residential properties) Confidence Grade A3*

Forecast increase of +61 Mld by 2029-30 from 2022-23 levels. This is a direct reflection of the progressive metering strategy and government and company led-demand interventions. Further details of these strategies are within the companies WRMP24 submission. Further to this Water Delivered component also includes customer supply pipe leakage which is also forecast to reduce across AMP8 inline with the preferred leakage reduction glidepath.

CW5.7   *Water delivered (billed measured businesses) Confidence Grade A3*

Forecast decrease of -3.2 Mld by 2029-30 from 2022-23 levels. This reflects elements of progressive metering strategy and moreover the company led-demand demand interventions in non-household planned across AMP8. Further details of these strategies are within the companies WRMP24

submission. Further to this Water Delivered component also includes customer supply pipe leakage which is also forecast to reduce across AMP8 inline with the preferred leakage reduction glidepath.

CW5.8   *Proportion of distribution input derived from impounding reservoirs*

CW5.9   *Proportion of distribution input derived from pumped storage reservoirs*

CW5.10   *Proportion of distribution input derived from river abstractions*

CW5.11   *Proportion of distribution input derived from groundwater works, excluding managed aquifer recharge (MAR) water supply schemes*

CW5.12   *Proportion of distribution input derived from artificial recharge (AR) water supply schemes*

CW5.13   *Proportion of distribution input derived from aquifer storage and recovery (ASR) water supply schemes*

CW5.14   *Proportion of distribution input derived from saline abstractions*

CW5.15   *Proportion of distribution input derived from water reuse schemes*
Confidence grade line 5.8 to 5.15 A3

Lines 5.8 to 5.15
These lines ask for the proportion of our distribution input, at a company level, that has been derived from the 8 source types defined in RAG4 guidance, lines 6B.8 to 6B.15. Operational sources from which no water has been obtained in the report year should not be included. RAG guidance related to reporting of number of sources is clear that it's only those sources that directly supply a WTW which are included, as per the definition of lines 5A.1 to 5A.8. In order to calculate the proportion of company DI per source, we have excluded the bulk supply from Elan Valley to Severn Trent Water as this does not form part of our DI. Our Revised draft WRMP24 and PR24 Business Plan does not forecast any material changes in source number and or source abstraction volume and so the main impact to future proportion of DI figures is linked to DI forecast.

CW5.16   *Total number of potable water pumping stations that pump into and within the treated water distribution system*

CW5.17   *Number of potable water pumping stations delivering treated groundwater into the treated water distribution system*

CW5.18   *Number of potable water pumping stations delivering surface water into the treated water distribution system*

CW5.19   *Number of potable water pumping stations that re-pump water already within the treated water distribution system*

CW5.20   *Number of potable water pumping stations that pump water imported from a 3rd party supply into the treated water distribution system*

CW5.21   *Total number of service reservoirs*

CW5.22   *Number of water towers*
Confidence grade 2023/24 – 2029/30;
5.1 to 5.3, 5.16 to 5.19, 5.21, 5.24 B3
5.20 B1, 5.22 B1

Lines 5.1 to 5.3, 5.16 to 5.22
For 2023/24 and 2024/25 there will be no significant changes to the 2022/23 values for Water Distribution WPS and Water Distribution Storage, 1 new pump to be installed in 2023/24.

Between 2025/26 and 2029/30 a total number of 26 additional WPS, for pumping stations in lines CW5.16 and CW5.19 are forecast to be installed, all pumping water within the distribution network. The profiling for the new assets is consistent with the planned capital spend across the 2025/26 to 2029/30 period.

CW5.23   *Energy consumption – treated water distribution (MWh) Confidence grade B4*

Energy consumption for clean water is expected to reduce over the period. This reduction is primarily driven by a reduction in Distribution Input (DI) but also contributed to by energy efficiency measures such as pump replacement and smart network optimisation.

The reduction in DI is planned to be achieved by a mix of demand reduction from customers and leakage reduction. The DI forecasts are in line with the figures provided in table CW5 line 39.

The reduction in energy consumption is gradual over time reflecting the gradual delivery of reduction measures over the AMP. The energy consumption impact of the forecast DI reduction has been made by an extrapolation of the relationship between DI and energy usage in recent years.

CW5.24   *Average pumping head – treated water distribution Confidence grade B3*

See commentary for C4.6

CW5.25   *Total number of treated water distribution imports Confidence grade A3*

No noteworthy changes to comment – insignificant change over forecast period

CW5.26   *Water imported from 3rd parties to treated water distribution systems Confidence grade A3*

No noteworthy changes to comment – insignificant change over forecast period

CW5.27   *Total number of treated water distribution exports Confidence grade A3*

No noteworthy changes to comment – insignificant change over forecast period

CW5.28   *Water exported to 3rd parties from treated water distribution systems Confidence grade A3*

No noteworthy changes to comment – insignificant change over forecast period

CW5.29   *Peak 7 day rolling average distribution input Confidence grade A3*

Forecast decrease of -128.54 Mld by 2029-30 from 2022-23 levels. This reflects the planned reductions in demand and leakage planned across AMP8 against the individual water balance components. Further details of these strategies are within the companies WRMP24 submission.

Peak forecasts are built from normal year forecasts as these are reducing across the forecast periods (Line 38 & 39) the relative critical peak forecasts which are proportion to normal year forecasts will also reduce.

CW5.30   *Peak 7 day rolling average distribution input / annual average distribution input Confidence grade A3*

No noteworthy changes to comment – insignificant change over forecast period. As noted above these are relative proportions of Peak DI (Line 29) to NY DI (Line 39), so the same relative peak % is expected

Water balance - Company level

CW5.31   *Measured household consumption (excluding supply pipe leakage) Confidence grade A3*

Forecast increase of +67 Mld by 2029-30 from 2022-23 levels. This is a direct reflection of the progressive metering strategy and government and company led-demand interventions. Further details of these strategies are within the companies WRMP24 submission.

CW5.32   *Unmeasured household consumption (excluding supply pipe leakage) Confidence grade A3*

Forecast decrease of -106 Mld by 2029-30 from 2022-23 levels. This is a direct reflection of the progressive metering strategy and government and company led-demand interventions. Further details of these strategies are within the companies WRMP24 submission.

CW5.33   *Measured non-household consumption (excluding supply pipe leakage) Confidence grade A3*

Forecast decrease of -1.98 Mld by 2029-30 from 2022-23 levels. This reflects elements of progressive metering strategy and moreover the company led-demand demand interventions in non-household planned across AMP8. Further details of these strategies are within the companies WRMP24 submission.

CW5.34   *Unmeasured non-household consumption (excluding supply pipe leakage) Confidence grade A3*

Forecast decrease of -1.81 Mld by 2029-30 from 2022-23 levels. This reflects elements of progressive metering strategy and moreover the company led-demand demand interventions in non-household planned across AMP8. Further details of these strategies are within the companies WRMP24 submission.

CW5.35   *Total annual leakage Confidence grade A3*

Forecast decrease of -80.5 Mld by 2029-30 from 2022-23 levels. This reflects the company preferred leakage reduction glidepath across AMP7 and AMP8. Further details of these strategies are within the companies WRMP24 submission.

CW5.36   *Distribution system operational use Confidence grade A3*

Some small increase which are reflect of the profess to forecast an increasing properties numbers in the supply area.

CW5.37   *Water taken unbilled Confidence grade A3*

Some small increase which are reflect of the profess to forecast an increasing properties numbers in the supply area.

CW5.38   *Distribution input*
CW5.39   *Distribution input (pre-MLE)*
           Confidence grade A3

Lines 5.38 and 5.39
Forecast decrease of -123Mld by 2029-30 from 2022-23 levels. This is a direct reflection of the demand reduction pathways within the company preferred plan i.e. progressive metering strategy and government and company led-demand interventions as well as the company preferred leakage

reduction glidepath across AMP7 and AMP8. Further details of these strategies are within the companies WRMP24 submission.

Water balance - Region 1

CW5.40 *Measured household consumption (excluding supply pipe leakage)*

CW5.41 *Unmeasured household consumption (excluding supply pipe leakage)*

CW5.42 *Measured non-household consumption (excluding supply pipe leakage)*

CW5.43 *Unmeasured non-household consumption (excluding supply pipe leakage)*

CW5.44 *Total annual leakage*

CW5.45 *Distribution system operational use*

CW5.46 *Water taken unbilled*

CW5.47 *Distribution input*

CW5.48 *Distribution input (pre-MLE)*

These lines have been intentionally left blank

Water balance - Region 2

CW5.49 *Measured household consumption (excluding supply pipe leakage)*

CW5.50 *Unmeasured household consumption (excluding supply pipe leakage)*

CW5.51 *Measured non-household consumption (excluding supply pipe leakage)*

CW5.52 *Unmeasured non-household consumption (excluding supply pipe leakage)*

CW5.53 *Total annual leakage*

CW5.54 *Distribution system operational use*

CW5.55 *Water taken unbilled*

CW5.56 *Distribution input*

CW5.57 *Distribution input (pre-MLE)*

These lines have intentionally left blank

Components of total leakage (post MLE) - Company level

CW5.58 *Leakage upstream of DMA Confidence grade A3*

Forecast decrease of -28.6 Mld by 2029-30 from 2022-23 levels. This reflects the company preferred leakage reduction glidepath across AMP7 and AMP8. Further details of these strategies are within the companies WRMP24 submission

CW5.59 *Distribution main losses Confidence grade A3*

Forecast decrease of -21 Mld by 2029-30 from 2022-23 levels. This reflects the company preferred leakage reduction glidepath across AMP7 and AMP8. Further details of these strategies are within the companies WRMP24 submission.

CW5.60   Customer supply pipe losses – measured households excluding void properties

CW5.61   *Customer supply pipe losses – unmeasured households excluding void properties*

CW5.62   *Customer supply pipe losses – measured non-households excluding void properties*

CW5.63   *Customer supply pipe losses – unmeasured non-households excluding void properties*

CW5.64   *Customer supply pipe losses – void measured households*

CW5.65   *Customer supply pipe losses – void unmeasured households*

CW5.66   *Customer supply pipe losses – void measured non-households*

CW5.67   *Customer supply pipe losses – void unmeasured non-households*

Confidence grade A3

Lines 5.60 to 5.67

Forecast decrease of -30.9 Mld by 2029-30 from 2022-23 levels. This reflects the company preferred leakage reduction glidepath across AMP7 and AMP8. Further details of these strategies are within the companies WRMP24 submission.

Components of total leakage (post MLE) - Region 1

CW5.68   *Leakage upstream of DMA*

CW5.69   *Distribution main losses*

CW5.70   *Customer supply pipe losses – measured households excluding void properties*

CW5.71   *Customer supply pipe losses – unmeasured households excluding void properties*

CW5.72   *Customer supply pipe losses – measured non-households excluding void properties*

CW5.73   *Customer supply pipe losses – unmeasured non-households excluding void properties*

CW5.74   *Customer supply pipe losses – void measured households*

CW5.75   *Customer supply pipe losses – void unmeasured households*

CW5.76   *Customer supply pipe losses – void measured non-households*

CW5.77   *Customer supply pipe losses – void unmeasured non-households*

These lines have intentionally be left blank

Components of total leakage (post MLE) - Region 2

CW5.78   *Leakage upstream of DMA*

CW5.79   *Distribution main losses*

CW5.80   *Customer supply pipe losses – measured households excluding void properties*

CW5.81   *Customer supply pipe losses – unmeasured households excluding void properties*

CW5.82   *Customer supply pipe losses – measured non-households excluding void properties*

CW5.83   *Customer supply pipe losses – unmeasured non-households excluding void properties*

CW5.84   *Customer supply pipe losses – void measured households*

CW5.85   *Customer supply pipe losses – void unmeasured households*

CW5.86   *Customer supply pipe losses – void measured non-households*

CW5.87   *Customer supply pipe losses – void unmeasured non-households*

These lines have intentionally been left blank

9. CW6   Water network+ - Mains, communication pipes and other data

Treated water distribution - mains analysis and mains age profile

CW6.1 to CW6.17

Total lengths of potable mains

Confidence grades
Lines 6.1 to 6.8 - B3
Lines 6.9 to 6.17 - B4

Lines 6.1 to 6.17
The mains lengths that have been renewed and are new and their associated diameters for the 2022/23 year have been filled in using the 2022/23 APR data.

The mains or planned for renewal or to be new between 2023/24 and 2029/30 and the associated diameters of those mains are based on a forecast of the delivery programmes for 2023/24 to 2024/25 and the AMP8 plans for all programmes of work and projects. The planned programmes of work include mains related activity which include; Developer Services schemes, Enhancement schemes for water resources, water quality, Asbestos Cement and Acceptability of water and resilience. The base maintenance programmes of work for Service Reservoirs, Worst Served Customers and Trunk mains will undertake shorter lengths of mains replacement.

All the mains lengths and sizes have been collated to provide an overall set of values by year from 2023/24 to 2029/30. The new pipelines lengths are mainly due to Developer Services activities and Water Network enhancement schemes.

During AMP8 there will be an increase in the level of mains replacement due to the asbestos cement mains programme which is driven by burst rate and deteriorating asset health. The Acceptability of Water (AOW) programme will continue to provide a steady level of replacement of iron mains to deliver the planned AOW performance for the end of AMP8.The annual length of mains replacement has been derived using an annual average of the total length planned for AMP8.

It should be noted that there is an error for the total length of mains replacement in the Table line CW6.3 which currently totals 332.3km between 2025/26 and 2029/30. The correct value total value should be 306.3km. The values that should be in the Table CW6 line CW6.3 can be seen in the Table below.

Table 5 – Corrected Values for Line CW6.3

Line description	Input					PR24 BP reference
	25-26	26-27	27-28	28-29	29-30	
Treated water distribution - mains analysis						
Total length of potable mains renewed	57.8	63.1	66.0	62.2	57.3	CW6.3

The replacement of mains impacts lines CW6.9 to CW6.17 age range of pipelines. The length of pipeline renewed by age range cohort has been undertaken using a high level assessment based on a combination of the current length of pipe in each cohort and the driver for mains replacement. AC mains for example forecast to be replaced will be in the in the range 50 to 70 years old will be in the 1941 to 1960 and 1961 to 1980 age range cohorts.

It should be noted that the error for the total length of mains replacement in the Table line CW6.3 has an impact on the age range data within lines CW6.9 to CW6.17 resulting in 26km less being replaced between 2025/26 and 2029/30. The correct values are summarised in the Table below.

Table 6 – Corrected Values for Table CW6 Lines CW6.9 to CW6.17

Line description	Input					PR24 BP reference
	25-26	26-27	27-28	28-29	29-30	
Treated water distribution - mains age profile						
Total length of potable mains laid or structurally refurbished pre-1880	126.8	126.2	125.5	124.9	124.3	CW6.9
Total length of potable mains laid or structurally refurbished between 1881 and 1900	736.9	736.3	735.6	735.0	734.5	CW6.10
Total length of potable mains laid or structurally refurbished between 1901 and 1920	2,470.0	2,464.9	2,459.6	2,454.7	2,450.1	CW6.11
Total length of potable mains laid or structurally refurbished between 1921 and 1940	1,900.9	1,891.5	1,881.6	1,872.3	1,863.7	CW6.12
Total length of potable mains laid or structurally refurbished between 1941 and 1960	4,450.4	4,428.3	4,405.2	4,383.5	4,363.4	CW6.13
Total length of potable mains laid or structurally refurbished between 1961 and 1980	6,059.9	6,037.8	6,014.8	5,993.0	5,972.9	CW6.14
Total length of potable mains laid or structurally refurbished between 1981 and 2000	6,682.0	6,680.4	6,678.7	6,677.2	6,675.7	CW6.15
Total length of potable mains laid or structurally refurbished between 2001 and 2020	5,189.9	5,188.3	5,186.7	5,185.1	5,183.7	CW6.16
Total length of potable mains laid or structurally refurbished post 2021	420.9	541.8	679.9	805.1	928.8	CW6.17

Communication and supply pipes

CW6.18   *Number of lead communication pipes Confidence grade C4*

The number of lead communication pipes for 2022/23 is as per the 2022/23 APR. The number of Lead communication pipes is reduced year on year from 2023/24 until 2029/30 considering the 4,012 communication pipe replacements we are forecasting to complete as shown in line CW6.21 and CW6.22. The number of communication pipes replaced has been evenly profiled across the AMP at 802 per year.

CW6.19   *Number of galvanised iron communication pipes Confidence grade C4*

The data for this line commences with the 2022/23 APR submission. The number of galvanised iron communication pipes replaced each year is based on a reactive replacement programme and will

continue to be forecast using this approach replacing approximately 48 galvanised pipes per year for the two remaining blind years and throughout the 5 years of AMP8.

CW6.20   *Number of other communication pipes Confidence grade C4*

The number of other communication pipes for 2022/23 is as per the 2022/23 APR. The number of other communication pipes increases year on year considering the number of Lead communication pipes being replaced with preferred material as indicated in lines CW6.21 and CW6.22, the number of galvanised iron communication pipes being replaced with preferred material This line also includes the number of new connections forecast for each year in Table DS4, Lines DS4.1 to DS4.3.

CW6.21   *Number of lead communication pipes replaced or relined for water quality Confidence grade C4*

The number of Lead pipes replaced in this line is as per the methodology developed for the 2022/23 APR submission. We are forecasting the same number of replacements year on year as per 2022/23 which equates to approximately 3 per year for the two remaining blind years as well as the AMP8 period.

CW6.22   *Number of lead communication pipes replaced for other reasons Confidence grade C4*

The number of Lead communication pipes replaced in 2023/24 and 2024/25 is the forecast number of replacements remaining we aim to replace to meet the performance commitment. The number of lead communication pipes replaced is derived from our Enhancement Lead Replacement programme for AMP8. We are planning to replace 3,995 Lead communication pipes, evenly profiled at 799 per year across AMP8 from 2025/26 until 2029/30.

CW6.23   *Total length of lead communication pipes replaced or relined Confidence grade C4*

The total length of lead communication pipes is the sum of the average length per replacement multiplied by the number of pipes we are planning to replace in each year found in line CW6.22. The length of pipes we are forecasting to replace in the two remaining blind years is 22,500 mtrs and the total length of pipes we are estimating to replace in AMP8 is 16,440 mtrs.

CW6.24   *Number of external lead supply pipes replaced or relined Confidence grade C4*

The number of external lead supply pipes replaced for the blind years 2023/24 and 2024/25 is based on run rate of external pipes we have replaced in AMP7 and the number of outstanding replacements required to fulfil our performance commitment. The number of external lead supply pipes replaced for AMP8 is derived from our Enhancement Lead Replacement programme. We are planning to replace 3,490 external lead supply pipes (including 2,200 from our proposed grant scheme and 1,290 where we will fund 100% of the cost), evenly profiled at 698 per year across AMP 8 from 2025/26 until 2029/30. The split between these two types of approach is shown in Lines 31 & 34.

CW6.25   *Total length of external lead supply pipes replaced or relined confidence grade C4*

The total length of external lead supply pipes is the sum of the average length per replacement multiplied the number of pipes we are planning to replace found in line CW6.24. The length of pipes we are forecasting to replace in the two remaining blind years is 17,894 meters evenly profiled across the 2 years and the total length of pipes we are estimating to replace in AMP8 is 37,365 meters, evenly profiled across the 5 year period.

CW6.26   *Number of internal lead supply pipes replaced or relined*

We are not forecasting any replacements for this line in any year.

CW6.27   *Total length of internal lead supply pipes replaced or relined*

We are not forecasting any replacements for this line in any year.
Other

CW6.28   *Company area*

DCWW`s Operating Area depicts the area where the company is responsible for supplying Potable Water to its customers and is therefore not subject to change. As the PR24 line definition states no adjustments are to be made for NAV areas, the total area reported would remain constant going forward.

The company area has been developed for the 2022/23 APR and an assumption has been made that this will not change until 2029/30.

CW6.29   *Compliance Risk Index*

As this is a Performance Commitment this line has been completed such that it is consistent with line 11 of OUT1

CW6.30   *Event Risk Index*

This line has been completed such that it is consistent with line 43 above.

2022-23: This is the provisional result for the 2022 calendar year. The final result will not be confirmed by the DWI until July 2024

2023-24: This is an estimate for the calendar year 2023 taking into account reported events so far. It takes into account performance in previous 5 years, with the removal of any compliance failures or events regarded as outliers.

2024-25: This is an estimate for the calendar year 2024. It takes into account performance in previous 5 years, with the removal of any compliance failures or events regarded as outliers.

2025 onwards: Based on the DWI expectation for the company of setting a target of zero for ERI, consistent with the approach taken for CRI

10.   CW7 Demand management - Metering activities

Supply Demand benefits of the proposed metering programme (excluding leakage) have been presented as shown within the Water Resource Management Plan submission Table 8. Reported savings from 22-23 are as outlined within our APR reporting for the same year. Estimated savings for the remaining years of this AMP are based on a forecast of meter installs over savings realised (22-23).

Average leakage benefits of typical metering activities (Lines 42 to 51) as well as Lines 24- 41 are based upon DCWW Metering Cost Benefit Model, produced to support the WRMP submission. As per guidance, all cells associated with

AMI installation, or "upgrade" have been left blank – as these do not align with our metering strategy in AMP8. We have no current plans for AMI installation, or for upgrades to form part of the metering strategy.

Where consumption / reduced wastage have been reported as part of our WRMP submission these are also provided.

Metering activities - Totex expenditure

CW7.1   *New optant meter installation for existing customers*

CW7.2   *New selective meter installation for existing customers*

CW7.3   *New business meter installation for existing customers*

Confidence grade A3

Lines 7.1 to 7.3
The data included in CW7 for metering is unique and includes both base and enhancement spend – post frontier shift and real price effects – within lines CW7.2 to 7.14 which differentiates it from the metering data in Tables CW3, CW3b, CW9 and CW9b except for Lines CW7.1 to CW7.3.

Lines CW7.1 to CW7.3 are post frontier shift and real price effects; they are consistent with the values entered into CW3b.62, CW3b.65, CW3b.68 and CW9b.59, CW9b.62 and CW9b.65 for the 2025/26 to 2029/30 period.

Totex For existing customers New Household Optant and Selective meter installation and New Meter Installation for Business Lines – CW7.1 to CW7.3
2022/23 the data is consistent with Lines 6D.1 to 6D.3 of the APR tables. 2023/24 – 2024/25 are based on delivery forecasts based on expected costs to be incurred as part of the existing AMP7 metering programme. The costs for AMP8 have used the values from the metering model which splits the planned AMP8 metering programme into household (HH) optants for line CW7.1, HH new (selective) meters for line CW7.2 and the business meters new meters for line CW7.3. All meters installed between 2025/25 and 2029/30 are forecast to be AMR.

Currently all meters planned for installation during 2023/24 and 2024/25 are forecast to be c96.4% basic and c3.6% AMR. This may be subject to change with the transition across from basic to AMR meters currently under review. If the change does occur all new and replacement meters will be AMR.

The Metering model data for the 2025/26 to 2029/30 period is provided in £'s within in 2021/22 prices. Consequently before the values are added to the table they are inflated to 2022/23 prices and have programme level efficiencies, overheads, frontier shift and real price effects applied to them to provide the final cost which is divided by 1,000,000 to provide the final value in £m to 3 decimal places.

In the WRMP Table 8C the enhancement element for proactive and reactive replacements was added to the new meter costs for Residential and Business because there was nowhere else to add these because of the instruction; "These lines should only be completed by companies who were allocated enhancement expenditure to replace basic meters with smart meters in the PR19 final determinations." The updated instructions are to add the enhancement costs associated meter replacements. Consequently for lines CW7.2 to CW7.3 they will differ from those in WRMP Table 8C6 because they do not include the replacement costs for meters which are included in lines CW7.4 and CW7.5 which also include the base maintenance costs for meter replacement.

CW7.4   *Residential meters renewed*

CW7.5   *Business meters renewed*

Confidence grade A3

Lines 7.4 and 7.5
2022/23 – Data for this year is based on actuals and is consistent with Lines 6D.4 or 6D.5 of the APR tables. 2023/24 – 2024/25 – Data for these years are based on forecasts of expected meter installations for the remainder of the AMP. Forecast figures are based on the number of residential and business meters renewed in 2022/23 plus 10% for 2023/24 and a further 10% of the 2023/24 value to provide the 2024/25 and a 10% increase replacement costs.

2025/26 – 2029/30 - These costs are based on data as provided by Welsh Water's metering model, for household customers relating to line CW7.4 "Proactive Meter Replacements" and "Reactive Meter Replacements" for households. For Line CW7.5 business meter costs these are made up of "Proactive Meter Replacements" and "Reactive Meter Replacements" for business.

The final costs in Table CW7 are post frontier shift and real price effects.

Metering activities - Explanatory variables

CW7.6   *New optant meters installed for existing customers*

CW7.7   *New selective meters installed for existing customers*

CW7.8   *New business meters installed for existing customers*

Confidence grade A3

Lines CW7.6 to 7.8
2022/23 - Data for this year is based on APR data from 2022/23. 2023/24 – 2024/25 - Data for these years are based on forecasts of expected meter installations for the remainder of the AMP. The

2023/24 values are based on the run rate report of 14th July 2023 for 2023/24 divided by the run rate for the year 2022/23 providing an increase of 15.24% to the 2022/23 total. The 2024/25 meter optant values have come from the forecast in the metering model.

There will be no household selective meters during 2023/24 or 2024/25.

The number of new business meters have been assumed to run at the same rate for 2023/24 and 2024/25 as 2022/23.

2025/26 – 2029/30 – Data for these years is based on DCWWs metering model which has provided the values for Household Meter Optants line CW7.6, Household Selective Meters line CW7.7 and New Business Meters (Optants and New) line CW7.8 cells. All the meters installed during this period will be AMR meters. The values have been based on the forecasts from the Preferred Plan based on the metering model methodology.

The original volumes in the model are in single units and have been divided by 1,000 to convert to the values required by CW7.6 to CW7.8 in 000's.

CW7.9   *Residential meters renewed*

CW7.10   *Business meters renewed*

Confidence grade A3

Lines 7.9 and 7.10
2022/23 - Data for this year is based on actuals as incurred in 2022/23 and the APR values have been used.

2023/24 – 2024/25 - Data for these years are based on forecasts of expected meter installations for the remainder of the AMP. Forecast figures are based on the number of residential and business meters renewed in 2022/23 plus 10% for 2023/24 and a further 10% of the 2023/24 value to provide the 2024/25 the number of meters renewed in 2023/24.

2025/26 – 2029/30 - Data for these years is based on DCWWs metering model for Proactive Meter Replacements plus Reactive Meter Replacements for household (residential) line CW7.9 and business customers proactive and reactive replacements line CW7.10 cells.

CW7.11   *Replacement of basic meters with smart meters for residential customers*

CW7.12   *Replacement of AMR meter with AMI meters for residential customers*

CW7.13   *Replacement of basic meters with smart meters for business customers*

CW7.14   *Replacement of AMR meter with AMI meters for business customers*

Confidence grade A3

Lines 7.11 and 7.13
These values are a repeat of the AMR and AMI values in rows CW7.9 to CW7.10 respectively.

Lines 7.12 and 7.14
No installations are forecast for these data lines.

CW7.15   *New residential meters installed for existing customers – supply-demand balance benefit*

CW7.16   *New business meters installed for existing customers – supply-demand balance benefit*

CW7.17   *Replacement of basic meter with smart meters for residential customers – supply-demand balance benefit*

CW7.18   *Replacement of AMR meter with AMI meter for residential customers– supply-demand balance benefit*

CW7.19   *Replacement of basic meter with smart meters for business customers – supply-demand balance benefit*

CW7.20   *Replacement of AMR meter with AMI meter for business customers– supply-demand balance benefit*

Confidence grade B2

Line 7.15-7.20
22/23 - Based on APR Table submission – table 6D. No savings reported in 22/23 for replacements or upgrades.

23-24 and 24-25. Based on savings identified per meter install reported in APR table submission 22-23, multiplied by the number of meters forecast for future years within WRMP Table 8.

AMP8 forecast - As per our forecasts reported in our WRMP submission (Lines E5.1 to E5.7).

CW7.21   *Residential properties - meter penetration Confidence grade A3*

2022/23 - Data for this year is based on actuals from the APR data.

2023/24 – 2024/25 - Data for these years are based on forecasts of expected meter installations. For the **2025/26 to 2029/30** period the meter penetration figures have been calculated from the metering model. The total HH meter penetration rate is based on a forecast total number of new meters. Due to the split between Basic, AMR and AMI type meters a further calculation has needed to be done to calculate the change from basic to AMR meters across the five year period. This can be seen in Table 1 below where the proportion of Basic meters to AMR meters is gradually reversing over the AMP period as the number of installed AMR meters increases.

Table 7 – 2025/26 to 2029/30 % HH Meter Penetration Values by Meter Type

Residential properties - meter penetration Unit of measure % Decimal point 1			
	Basic meter	AMR meter	AMI meter
2022-23	47.4%	0.2%	0.8%
2023-24	48.3%	0.2%	0.8%
2024-25	49.8%	0.3%	0.8%
2025-26	45.7%	11.4%	0.7%
2026-27	40.6%	22.0%	0.7%
2027-28	35.2%	32.7%	0.6%
2028-29	29.6%	43.4%	0.6%
2029-30	22.5%	54.6%	0.6%

Per capita consumption (excluding supply pipe leakage)
Reference is made to the DCWW WRMP24 submission which provides more detail and information around the forecasting mechanism and provides additional context to the forecast glidepaths and what strategies are behind them. All forecasts are based on the company preferred planning scenario and demand related forecasts are based on normal year forecasts.

Although household population is transferring between the unmeasured to measured household categories in line with the current and progressive metering programme (2025 onwards) the reductive impact of metering on measured household demand offsets any mPCC increase, hence mPCC remains constant. Conversely uPCC does not drop but remains constant or increases as demand and population transfers to measured.

In terms of overall or combined PCC the effect of the above is an overall reducing PCC glidepath reflecting our preferred WRMP24 plan and a reducing HH demand glidepath across AMP8. Household demand is forecast to reduce by c-39 Mld as meter rollout progresses and by 2029-30, with combined PCC forecast to reduce from 148 lhd in 2022-23 to 132 lhd by 2029-30.

CW7.22   *Per capita consumption (measured) Confidence grade A2*

2022-23 figures reflect the APR submission. mPCC forecasts remain constant over the forecast horizon. The household demand upon which the PCC forecasts are based upon the demand forecasting and WRMP process and reflect our normal year preferred plan scenario.

CW7.23   *Per capita consumption (unmeasured) Confidence grade A2*

2022-23 figures reflect the APR submission. uPCC forecasts remain constant over the forecast horizon, in not increasing very slightly. The household demand upon which the PCC forecasts are based upon the demand forecasting and WRMP process and reflect our normal year preferred plan scenario.

Average unit cost of typical metering activities - new meter installation

CW7.24   *New meter installation - residential property - cost per property*

CW7.25   *New meter installation - business property - cost per property*

Average unit cost of typical metering activities - meter replacement

CW7.26   *Replacement of existing basic meter - residential property - cost per property - total cost*

CW7.27   *Replacement of existing basic meter - residential property - enhancement element of total cost*

CW7.28   *Replacement of existing basic meter - business property - cost per property - total cost*

CW7.29   *Replacement of existing basic meter - business property - enhancement element of total cost*

CW7.30   *Replacement of existing AMR meter - residential property - cost per property - total cost*

CW7.31   *Replacement of existing AMR meter - residential property - enhancement element of total cost*

CW7.32   *Replacement of existing AMR meter - business property - cost per property - total cost*

CW7.33   *Replacement of existing AMR meter - business property - enhancement element of total cost*

Average unit cost of typical metering activities - meter upgrade

CW7.34   *Upgrade of existing basic meter - residential property - cost per property - total cost*

CW7.35   *Upgrade of existing basic meter - residential property - enhancement element of total cost*

CW7.36   *Upgrade of existing basic meter - business property - cost per property - total cost*

CW7.37   *Upgrade of existing basic meter - business property - enhancement element of total cost*

CW7.38   *Upgrade of existing AMR meter - residential property - cost per property - total cost*

CW7.39   *Upgrade of existing AMR meter - residential property - enhancement element of total cost*

CW7.40   *Upgrade of existing AMR meter - business property - cost per property - total cost*

CW7.41   *Upgrade of existing AMR meter - business property - enhancement element of total cost*

Average benefits of typical metering activities - new meter installations

CW7.42   *New meter installation - residential property - benefits per meter installation*

CW7.43   *New meter installation - business property - benefits per meter installation*

Average benefits of typical metering activities - meter replacement

CW7.44   *Replacement of existing basic meter - residential property - benefits per meter installation*

CW7.45   *Replacement of existing basic meter - business property - benefits per meter installation*

CW7.46   *Replacement of existing AMR meter - residential property - benefits per meter installation*

CW7.47   *Replacement of existing AMR meter - business property - benefits per meter installation*

   Confidence grade B2

Average benefits of typical metering activities - meter upgrade

CW7.48   *Upgrade of existing basic meter - residential property - benefits per meter installation*

CW7.49   *Upgrade of existing basic meter - business property - benefits per meter installation*

CW7.50   *Upgrade of existing AMR meter - residential property - benefits per meter installation*

CW7.51   *Upgrade of existing AMR meter - business property - benefits per meter installation*

We do not plan to undertake upgrading of meters, only replacements as part of our metering programme – in line with our metering strategy. As such all values are entered as zero.

11.   CW8 WRMP schemes (excluding leakage and metering activities)

Confidence grade for whole table B3

The list of schemes included in this table which align with the WRMP submission include –

Scheme	WRMP Reference
SEWCUS network upgrade	WRMP24-SEW166 (52bP)
Llwynon gravity	WRMP24-SEW168 (52bP)
Crai Distribution Options- Upsize Christopher Road WPS	WRMP24-TWG12 (52bP)
Ystradfellte- Reverse Flow through Tonna Control Valve	WRMP24-TWG14 (52aP)
Project Cartref	8001-PCC01_8206-PCC01

The details in table CW8 holds information for the CapEx, OpEx, benefits of each of the individual schemes along with further scheme and asset information for the interconnector schemes only. All costs or cost savings in this table are post frontier shift and real price effects. CapEx and OpEx figures in this table are post frontier shift and real price effects.

The benefits for 2029-30 have been annualised over the time period we have forecast and don't necessarily reflect the actual value for each subsequent year where is a high degree of variability between individual years and 5 year investment periods following this.

The CapEx and OpEx in table CW3 (and CW3b) for the Supply Demand Balance lines also includes 3 further schemes not included in this table as were not included in table 8 of the submitted WRMP. These schemes refer to enhancement scheme at Deri Goch WPS and 2 Feasibility Studies as described in table and line CW3.51 (and CW3b.51).

12.   CW9 Enhancement expenditure (cumulative) - water resources and water network+

The contents of the PR24 tables for 2023/24 are consistent with that already reported in the APR.
The forecast is based on our current AMP7 plan as presented to board in June 2023 which is forecasts from the business delivery owners.

Cumulative water spend peaks in 24/25 with the completion of schemes such as the zonal studies programme increases activities for improvements to taste and odour, and the continued emphasis on the programme of works to address leakage.

CW9.60 to CW9.90 are a direct repeat of the values in CW3b.60 to CW3b.90. The reason for this is that for each meter installed, there is beneficial use immediately and the cumulative spend is equal to the actual spend for each year of the programme.

For all other lines, the cumulative CapEx spend is incurred upon completion of the proposed individual CapEx schemes or programmes captured by the line in the table. The AMP 8 OpEx spend mirrors CW3b as the beneficial use of the OpEx expenditure is incurred in year. The AMP 7 OpEx spend is not aligned between CW3 and CW9.

EA/NRW environmental programme (WINEP/NEP)

CW9.1 –
CW9.40
The Eel Screen projects in CW9.4 to CW9.6 in this programme have been designated as an A3 rating as they have been developed bottom up using Welsh Water costing data to meet the outputs of the WINEP/NEP programme. The remaining lines in this programme, CW9.1 to CW9.3 and CW9.7 to CW9.40 have been designated as a B3 rating. Although we believe the programme is reliable with robust cost information, the outputs are more related to a programme of work and investigations where uncertainty over their outputs is less reliable at this stage.

Supply-demand balance

CW9.41 -
CW9.56
The confidence grade has been designated as A3. The schemes in this programme have been developed bottom up using Welsh Water cost data to meet the requirements of the Water Resources Management Plan and other strategic projects which will aim to contribute towards future projects in subsequent investment periods.

Metering:

CW9.57 –
CW9.87
The confidence grade has been designated as A2 because the data has been developed bottom up using Welsh Water data and AMR meter cost estimates using manufacturers' data in a well-defined process for both the costs and the planned number of meter installations and replacements.

Lead pipe replacement:

CW9.106 -
CW9.111
Lines CW9.106 to CW9.111 have been designated as a C4 rating, this is in line with the equivalent lines in table CW6.18 to CW6.27. Although the costs of this programme are reliable using Welsh Water cost data, the lower confidence grade reflects the reliability and accuracy of the source data contributing to this programme which has been produced from a model as opposed to bottom-up survey data. Therefore, although we believe the programme is robust, we currently allocate a lower confidence grading.

Resilience:

CW9.115 -
CW9.117
The confidence grade is B3 because the data has been developed bottom up using Welsh Water costing data for a range of projects and the project outputs agreed with internal stakeholders. The programme outturns are estimated to be +/- 10% of the proposed programmes of work.

13.   CW10   Wholesale water local authority rates

Confidence grade for the whole table is A2

Business rates are payable for the water business, based on its rateable value (RV), which is assessed as a single business.

Total rates payable by the water business include the RV of other assets e.g., offices which are used by the water business and assessed as separate assets ("hereditaments").

RVs are assessed periodically by the Valuation Office Agency (VOA) and published in Rating Lists. The current list applies from 1 April 2023 – 31 March 2026 (the 2023 List). The Government has announced that further rating lists will be published on 1 April 2026 and 2029, referred to as the "2026 and 2029 Revaluations".

We have assumed the Antecedent Valuation Date (AVD) used to calculate RVs will remain 2 years before the List date in line with the 2023 Revaluation.

The business rates charges for the year ended 31 March 2023 reflects the RV of the water business in the 2017 list (£31.3m), which applied for that year.

The valuation of the water business included in the 2023 List was £31.773m. However, we are still in discussion with the VOA and there are a few disputed items remaining which may reduce the RV. As we do not expect that the final 2023 RV will exceed the RV in the 2017 list, we have used the 2017 List RV of the water business to calculate the business rates charges for the years 2023/24 - 2024/26.

We have explained below how we have calculated the business rates liabilities at the 2026 and 2029 Revaluations. In assessing the profitability of the water business, we have included the significant ODI penalties that the water business expects to incur. However, the inclusion of ODI penalties remains under discussion with the VOA in relation to the 2023 revaluation and may not be accepted in the valuation methodology. If the ODI penalties are not included in the business rates assessments for the 2026 and 2029 Revaluations then our business rates liabilities would increase by c. £7m per annum, or £28m for the last 4 years of AMP8 (22/23 prices). As this remains a significant risk, we request that a cost sharing mechanism of 10:90 should be included in the Final Determination for business rates relating to the water business, in line with the Competition and Markets Authority's findings in relation to PR19 referrals.

Rateable value

CW10.1   *Rateable value*

To calculate the RV of the water business at the 2026 Revaluation, we have used the information from the Final Determination Allowed Revenue Appendix for 24-25 together with the forecast Allowed Revenue Appendix for AMP 8 for 25-26 and 26-27, enabling a 3-year average of expected profits to be calculated using the return on capital for water resources and water network plus price controls.

We have then adjusted this profit for depreciation relating to landlord's assets, the margin relating to the Retail Household business and rents, consistent with the methodology used by the VOA for the 2023 revaluation.

The forecast Allowed Revenue Appendix for AMP 8 included revenue reprofiling to smooth the increase in customer bills over the AMP, by deferring some revenue to later years. Revenue reprofiling has been removed from the calculation of profits as the deferral of revenue is voluntary action which should not reduce the RV at the 2026 revaluation.

In assessing the profitability of the water business, we have included the significant ODI penalties that the water business expects to incur. However, the inclusion of ODI penalties remains under discussion with the VOA in relation to the 2023 revaluation and may not be accepted in the valuation methodology. If the ODI penalties are not included in the business rates assessments for the 2026 and 2029 Revaluations then our business rates liabilities would increase by c. £7m per annum, or £28m for the last 4 years of AMP8 (22/23 prices).

We have assumed that the 'divisible balance', the profit resulting after making the above adjustments will be allocated to the tenant and landlord in the same proportions that the VOA used for the 2023 Revaluation of the water network. The proportion allocated to the landlord giving the RV.

Consistent with the 2023 revaluation, we have reduced the RV by £1.8m in relation to 'excepted hereditaments' i.e. those assets which are assessed individually. The business rates costs relating to these assets have been included within the relevant price controls to which the assets relate. A share of the offices etc used by the water business having been included in the water business rates charges.

Water wholesale local authority rates

CW10.2   *Wholesale Water business rates charge for current year before transitional relief*

The RVs calculated for the water business and other assets e.g. offices used by the business, have been multiplied by the current Uniform Business Rates (UBR) of £0.535 in Wales. The rates liabilities have been calculated in 2022/23 prices and it is assumed that the UBR thereafter will increase in line with inflation.

CW10.3   *Wholesale Water business rates transitional relief*

As the RV of the water business has remained unchanged from the 2023 Revaluation for the periods up to 31 March 2025, transitional relief will not apply. As there has been no announcement by the Welsh Government regarding the availability of transitional relief at the 2026 revaluation we have not factored this into the resultant rates liabilities. Hence this row is nil for all years.

CW10.4   *Wholesale Water business rates charge for current year after transitional relief*

This row is the sum of CW10.2 & CW10.3.

CW10.5   *Adjustments to wholesale water business rates charge for prior years*

All years are nil as there are no adjustments for prior years.

CW10.6   *[Other wholesale water business rates adjustments 1]*

Line CW10.6 includes an adjustment to reallocate business rates costs relating to "section 20 agreements" to non-appointed expenditure. The cost reallocated is £1.3m for the years up until the 2026 Revaluation when it increases to £1.6m in line with the increase in rates costs arising from the Revaluation.

CW10.7   *[Other wholesale water business rates adjustments 2]*

No entries in this row.

CW10.8   *[Other wholesale water business rates adjustments 3]*

No entries in this row.

CW10.9   *Wholesale Water business rates forecast for Business Plan*

This row is the sum of CW10.4 to CW10.8.

Analysis of change in charge before transitional relief

CW10.10   *Change in wholesale water business rates costs from prior year*

This row compares the year-on-year local authority rates charges included at CW10.2 and returns the difference in the rates charge between years. The difference is then explained in rows CW10.11 to CW10.15.

CW10.11   *Change in wholesale water business rates costs due to the impact of any revaluation*

The RV of the water business has increased by £6.1m at the 2026 Revaluation. This has increased business rates costs by £3.3m (£6.1m x £0.535) for each of the remaining years of AMP 8. We believe that the profitability of the water business will be consistent across AMP8 and therefore the same RV has been assumed for the 2029 List Revaluation.

CW10.12   *Change in wholesale water business rates costs due to change in asset stock*

We do not anticipate any changes to the other sites assessed as part of the Water business during AMP8 and therefore all years are nil.

CW10.13   *[Change in wholesale water business rates costs due to other 1]*

This row has an adjustment to eliminate the check difference otherwise arising (as the table doesn't hold 21/22 data).

CW10.14   *[Change in wholesale water business rates costs due to other 2]*

Insignificant other adjustments to the rates calculation for the blind years that net to £0.1m. All AMP 8 years are nil.

CW10.15   *[Change in wholesale water business rates costs due to other 3]*

No entries in this row.

CW10.16   *Change in wholesale water business rates charge before transitional relief*

This row is a sum of CW10.11 to CW10.15.

CW10.17   *Check difference*

This row is a check of the amounts in CW10.10 and CW10.16.

14.   CW11   Third party costs by business unit for the wholesale water service

Confidence grade for the table is a mixture of B2 and B3

An explanation of material year on year variances are included below.

Third party costs ~ price control (operating expenditure)

CW11.1   *Non potable water (which are not bulk supplies) Confidence grade B2*

The third party costs for non -potable water supplies in 2022-23 is £2.794m. We have assumed the same level of spend for the remainder of AMP7 and AMP8 which is adjusted by the movement in rates and abstraction cost.

CW11.2   *Rechargeable opex - Fluoridation*

There are no costs for this activity

CW11.3   *Rechargeable opex - Fire hydrant install & repair Confidence grade B2*

This related to recharging costs for the use of fire hydrants.We have assumed the same level of spend for the remander of AMP7 and AMP8 as 2022-23 of £0.222

CW11.4   *Rechargeable opex - third party damage Confidence grade B2*

This relates to the cost of rechargeable work in treated water distribution. We have assumed the same level of spend for the remander of AMP7 and AMP8 as 2022-23 of £1.076

CW11.5   *Rechargeable opex - build over*

There are no costs for this activity

CW11.6   *Other rechargeable opex Confidence grade B2*

In 2022.23 other rechargeable opex amounted to £0.235m. This included £0.072m standpipes and ships water and £0.163m bad debt on third party income. For the remainder of AMP7 and AMP8 we have only included the standpipes and shipwater charge of £0.072 as we have assumed no bad debt charge on third party income as this debt will be recovered.

CW11.7   *Third party water price control opex excluding developer services*

Calculated cells

CW11.8   *Diversions - s185 – opex Confidence grade B3*

The costs and year on year movement are shown below:

	22/23	23/24	24/25	25/26	26/27	27/28	28/29	29/30
	£m	£m	£m	£m	£m	£m	£m	£m
Diversions S185 - opex	7.24	2.973	2.964	2.947	2.88	2.865	2.817	2.773
year on year movements		-4.267	-0.009	-0.017	-0.067	-0.015	-0.048	-0.044

As with the forecasts for tables DSw.2 and DS3 the key assumption that underpins the modelling of costs is that the levels of work delivered across the different schemes, will be proportional to the level off total forecast work. The forecasts have been based on the assumed volumes of new connections within the draft water resource management plan (DWRMP). The assumption is that as the overall level of growth increases or decreases, this will have a knock-on effect on the overall profile of Developer Services work delivered. Whilst the amount spent may not directly correlate to

the number of connections, it is assumed that more connections increase the pressure on Highway Authorities to improve or adapt their network, and therefore we could reasonably expect to see an increase in our spend in this area. There is a reasonably high degree of confidence in the methodology that underpins the forecast. We are however looking to forecast across a significant time period, and there are inherent risks in doing this. The DWRMP is a forecast, and actual levels of service delivered may differ from this.

Overall, there are few significant year-on-year changes in the data. The forecasts are purely based on averages, with no attempts to forecast exceptional schemes. It is impossible to predict in anything other than the very short term as to if or when a significant scheme will be progressed. Recent experience shows that it is not uncommon for large schemes to be suddenly abandoned by developers, equally it is possible that a very large scheme may suddenly be required with very little warning. As such, the decision has been made to forecast on a flat basis. The reality is that the delivery of all schemes is likely to be far more variable year on year, however this is impossible to forecast accurately. The exception to this is the data for 2022/23 which varies significantly from the averages due to large schemes such as Heads of the Valley bypass scheme.

Despite there being limited year on year variances, there are several overall trends which should be noted. The DWRMP forecast across the period is between 94-102% of the historic 5-year average for new connections delivered. From this, we would not expect a significant change in the levels of expenditure across the entire forecasting period.

CW11.9   *Diversions - NRSWA – opex Confidence grade B2*

The costs and year on year movement are shown below:

	22/23	23/24	24/25	25/26	26/27	27/28	28/29	29/30
	£m	£m	£m	£m	£m	£m	£m	£m
Diversions NRSWA - opex	10.963	1.593	1.588	1.579	1.543	1.534	1.509	1.485
year on year movements		-9.37	-0.005	-0.009	-0.036	-0.009	-0.025	-0.024

In 2022-23 there was increased costs as a result of the Heads of the Valley scheme. For the remainder of AMP7 and AMP8 the forecast has been based on the assumed volumes of new connections within the draft water resource management plan (DWRMP)

The same commentary applies as CW11.8

CW11.10   *Diversions - other non-section 185 diversions – opex Confidence grade B2*

There are no costs for this activity

CW11.11   *Total third party water service costs ~ price control (operating expenditure)*

Calculated cells

Third party costs ~ non price control (operating expenditure)

CW11.12   *Bulk supplies (water) opex Confidence grade B2*

Third party operating expenditure has been derived by taking the volume of bulk supply and allocating abstraction charges. We have assumed the same level of spend in for the remainder of AMP7 and AMP8 adjusting only for movements in the abstraction charge.

CW11.13   *Reservoir operating agreements opex Confidence grade B2*

Reservoir operating costs recharged to Natural Resources Wales under section 20 of the Environment Agency agreement amounted to £1.5m for 2022-23. We have assumed the same level of activity for the remainder of AMP7 and AMP8 adjusting only for movements in cumulo rates.

CW11.14   *Other excluded charge opex*

There are no costs for this activity

CW11.15   *Total third party water service costs ~ non price control (operating expenditure)*

Calculated cells

Third party costs ~ price control (capital expenditure)

CW11.16   *Non potable water (which are not bulk supplies) Confidence grade B2*

We have assumed the same level of activity for the remainder of AMP7 and AMP8 as 2022-23.

CW11.17   *Rechargeable capex - Fluoridation*

CW11.18   *Rechargeable capex - Fire hydrant install & repair*

CW11.19   *Rechargeable capex - third party damage*

CW11.20   *Rechargeable capex - build over*

CW11.21   *Other rechargeable capex*

Lines 11.17 to 11.21
No costs in this line as no planned activity

CW11.22   *Third party water price control capex excluding developer services*

Calculated cells

CW11.23   *Diversions - s185 – capex Confidence grade B2*

All Diversion S185 costs are being reported as operating expenditure in CW11.8

CW11.24   *Diversions - NRSWA – capex Confidence grade B2*

All Diversion NRSWA costs are being reported as operating expenditure in CW11.9

CW11.25   *Diversions - other non-section 185 diversions – capex Confidence grade B2*

There are no costs for this activity

CW11.26   *Total third party water service costs ~ price control (capital expenditure)*

Calculated cells

Third party costs ~ non price control (capital expenditure)

CW11.27   *Bulk supplies (water) capex Confidence grade B2*

This relates to capital costs incurred for the reservoirs which supply the Severn Trent Bulk supply. For the remainder of AMP7 we have assumed the same level of activity as 2022-23 of £1.528m. For AMP8 this has increased to £3.3m p.a. due to increased investment planned at the Pen Y Garreg Reservoir which is part of the reservoir network which supplies the bulk supply.

CW11.28   *Reservoir operating agreements capex Confidence grade B2*

This relates to the capital maintenance costs recharged to the Natural Resources Wales. For the remainder of AMP7 we have assumed the same level of activity as 2022-23 of £2.390. For AMP8 this has increased to £2.681m p.a. due to increased investment planned.

CW11.29   *Other excluded charge capex*

There are no costs for this activity

CW11.30   *Total third party water service costs ~ non price control (capital expenditure)*

Calculated cells

16. CW13   Best value analysis; enhancement expenditure - water resources and water network+

All figures in this table are post frontier shift and real price effects.

CW13.1 to CW13.56	**EA/NRW environmental programme (WINEP/NEP).**
CW13.57 to CW13.80	**Supply-demand balance.**
CW13.81 to CW13.124	**Metering.**
CW13.125 – CW13.164	**Water quality improvements**
CW13.165 – CW13.180	**Water resilience and security**
CW13.181 – CW13.184	**Net Zero**
CW13.185 – CW13.204	**Additional Free form lines**
CW13.205 – CW13.208	**Total enhancement**

Lines 1 to 208

There are no third party financial or non financial contributions for any of these lines.
The key assumptions for calculating the NPV include:

- a useful asset life of 40 years;
- a WACC rate of 3.2%; and
- a discounted rate of 3.5%.

Due to there not being any third party financial or non-financial contributions there is a low level of uncertainty and sensitivity associated with these elements. The uncertainty and sensitivity of the NPV data is also low.

We have used the WACC and discount rate as specified by Ofwat in the final methodology. In addition, any repeat capital expenditure has been calculated using our unit cost data base, see the document "Approach to Investment" for further details.

An average asset life has been used which reflects the balance between civil structures, infrastructure assets and M&E assets.

An appraisal period of 30 years has been used for the calculation of the NPV values shown.

18.   CW14   Best value analysis of alternative option; enhancement expenditure - water resources and water network+

CW14.1 -   **EA/NRW environmental programme (WINEP/NEP).**
CW14.56

Lines 1 to 56
The best value and least cost programme are the same for all drivers within this category.

CW14.57 -   **Supply-demand balance.**
CW14.80

Line 57 to 80
The best value and least cost programme are the same for all drivers within this category.

CW14.81 -   **Metering.**
CW14.124

Line 51 to 124
The best value and least cost programme are the same for all drivers within this category.

CW14.125 –   **Water quality improvements**
CW14.164

Line 125 to 164
Within this category only the driver "Addressing raw water quality deterioration (grey solutions); BVA enhancement" (CW14.153-156) has a different least cost to best value solution. The scheme for Cefn Dryscoed has a least cost option looking at installing new 2nd stage filters vs a best value solution of CoCoDaff. The scheme for Mayhill has a least cost option of replacing GAC media vs a best value solution of constructing additional GAC filters. The scheme for Pendine has a least cost option looking at installing amazon filters vs a best value option of installing a new bore hole.

CW14.165 –   **Water resilience and security**
CW14.180

Line 165 to 180
Within this category only the driver "Resilience BVA enhancement" (CW14.165-168) has a different least cost to best value solution. The scheme for replacement of AC mains has a different extent of the programme between the least cost and best value programmes. The river erosion scheme for Wye Valley has a least cost option looking at installing twin mains vs a best value option of diverting the mains.

CW14.181 –   **Net Zero**
CW14.184

Line 181 to 184
The best value and least cost programme are the same for all drivers within this category.

CW14.185 –
CW14.204
Additional Free form lines

Line 185 to 204

The best value and least cost programme are the same for all drivers within this category.

CW14.205 –
CW14.208
Total enhancement

Line 205 to 208

There are no third party financial or non financial contributions for any of these lines.

The key assumptions for calculating the NPV for this area include:

- a useful asset life of 40 years;
- a WACC rate of 3.2%; and
- a discounted rate of 3.5%.

Due to no third party financial or non-financial contributions there is a low level of uncertainty and sensitivity associated with these elements. The uncertainty and sensitivity of the NPV data is low.

We have used the WACC and discount rate as specified by Ofwat in the final methodology. In addition, any repeat capital expenditure has been calculated using our unit cost data base see the document "Approach to Investment" for further details.

An average asset life has been used which reflects the balance between civil structures, infrastructure assets and M&E assets.

An appraisal period of 30 years has been used for the calculation of the NPV values shown.

19.   CW15 Best value analysis; benefits - water resources and water network+

All costs or cost savings in this table are post frontier shift and real price effects.

Table CW 15 contains the annual benefit (both the number of units and the monetised benefit of changes to service measures) associated with the proposed enhancement programme for Water. This benefit has been calculated by analysing the impact that a project/investment will have in comparison to the pre investment position of relevant service measures.

The value of a service measure change is calculated using the DCWW multi capital framework which applies a unit cost value dependant on the particular service measure, considering Intellectual, Human, Social and Natural Capitals alongside the private cost of failure.

Where the projects to be delivered are forecast to have a direct impact on a Performance Commitment the benefit has been shown.

Application of Carbon

The benefit or disbenefit of carbon is referred to as Greenhouse Gas Emission Reduction. Embedded Carbon has for the purpose of these tables been shown as the average annual impact over the cost benefit assessment period (30 years). This measure includes both the annual operational carbon and also the average annual embedded carbon calculated over 30 years.

Profiling of benefits (Columns H-AH)

Benefits have been profiled according to profile of the investment and the specific nature of the type of activity. Some schemes will only deliver benefit largely once the solution has been commissioned e.g., singular named non infrastructure schemes with some schemes delivering benefit part way through the project e.g., Multi Scheme Programmes of activity or infrastructure activity etc.

Benefit is calculated on an annual basis and then run forward for the entire period of the WLC exercise (30 years).

The annual benefits over time are discounted according to the discount factor of 3.5% as set out in the PR24 Final Methodology.

The WACC applied is 3.23%.

CW15.1 - CW15.133	**EA/NRW environmental programme (WINEP/NEP).**

Lines 1 to 133
No Benefits have been calculated against programmes of investigations.

CW15.134 - CW15.189	**Supply-demand balance.**

Line 134 to 189
Supply side improvements are consistent with the Welsh Water PR24 WRMP

CW15.145-146 *Demand-side improvements delivering benefits in 2025-30 (excl leakage and metering)*

PCC and Business Demand benefits from the Cartref Programme of work as set out by the WRMP. Please note that the trend of PCC benefit in years 5-10 is as a result of the application of the 3 year rolling average i.e there will not negative performance as a result of this investment.

CW15.156 *Leakage improvements delivering benefits in 2025-30*

Performance from enhancement is as forecast in the WRMP, the AMP 9 performance trend shown is as a result of the application of the 3 year rolling average.

CW15.167 *Interconnectors delivering benefits in 2025-30*
Benefit is from WRMP interconnector investment.

CW15.190 - CW15.300	**Metering.**

CW15.190 and CW15.201 *New meters requested by existing customers (optants)*
New meters introduced by companies for existing customers
Programmed PCC benefit of the metering programme. Please note that the performance trend shown in AMP 9 is as a result if the 3 year rolling average.

CW15.301 –
CW15.400

Water quality improvements

CW15.301
CW15.303

Improvements to taste, odour and colour (grey solutions)

Benefits are generated by Acceptability Network Schemes, no monetised benefit is shown against the PR24 Performance Commitment for Water Quality Contacts to avoid double counting of benefit.

CW15.334

Lead communication pipes replaced or relined

Benefit is forecast as a result of the DCWW programme of lead pipe removal.

CW15.378 -
CW15.387

Addressing raw water quality deterioration (grey solutions)

The following schemes and scheme types are forecast to give benefit against this enhancement driver:

- Mayhill Organics Removal

- Manganese Interventions Programme

- Pendine BH and Morfa Bychan raw pipeline risk of wash away due to coastal erosion

- Disinfection byproducts interventions programme - Capel Curig

- Cefn Dryscoed WTW - End to end process update

- UV Treatment Programme

- Raw Water Deterioration – Bontgoch

Performance commitment monetised benefit is not shown against the PR24 Performance Commitments CRI and WQC in both cases this has been removed to avoid duplication with other service benefits from lines 378-387. A Negative impact is shown against 2028-29 this is a balancing value to account for the cumulative nature of the calculations and alignment with the outcome tables.

CW15.389-
CW15.392

Addressing raw water quality deterioration (green solutions)

The following schemes are forecast to give benefit against this enhancement driver:

- Catchments WINEP/NEP No Deterioration / Improvements: Smart Catchments
- Catchments WINEP/NEP No Deterioration / Improvements: Brecon Beacons Megacatchment

Please note that benefit for the above two schemes has been split between this driver and Drinking Water Protected Areas (Line 54-64: CW15). There is a minor improvement to WQC Performance Commitment shown.

CW15.401– *CW15.434*	**Water resilience and security**
CW15.389- *CW15.392*	*Resilience*

The following schemes and scheme types are planned to give resilience benefit:
- Interconnectivity of East/West link
- Wye transfer main
- FCERM - Flood mitigation to critical Water assets
- Network connectivity schemes to improve resilience and mitigate tankering and other dry weather problems.
- Critical trunk mains - Condition and mitigation assessments to resolve critical crossings including emergency repair plans etc.
- Cardiff Ring main connectivity feasibility and strategy; New Trunk Main West, East, North of central Cardiff feasibility only AMP8 to define scope and cost for a scheme in AMP9/10
- Carno Abandonment - Nantybwch WTW Additional Resource
- Tank Resilience Schemes

Performance Commitment benefit has been forecast against Water supply interruptions (AC Mains), Leakage (AC Mains Programme) and Unplanned outage (Tanks resilience programme).

CW15.412	*Security SEMD*

Forecast benefit from Upgrades to sites to meet Critical National Infrastructure (CNI) requirements.

CW15.423: *CW15.424*	*Security Cyber*

Forecast benefit from Cyber Security Upgrade Programme.

CW15.435 – *CW15.445*	**Net Zero**
CW15.435- *CW15.436*	*Greenhouse gas reduction (net zero)*

Forecast benefit from: Energy Self-Sufficiency: Network Control Systems (waste and clean) Please note this scheme also delivers benefit across waste water assets (see CWW 15, Lines: 643 to 653)

Benefit has been shown against the Operational greenhouse gas emissions (water) performance commitment.

CW15.446 – *CW15.501*	**Additional Free form lines**
CW15.490 - *CW15.491*	*Additional Line 1: Impounding Reservoir Capex*

Benefit is forecast for the Impounding Reservoir Programme for the purpose of section 10 of the Reservoir Act compliance where enhancement activities are required.

CW15.490- *Additional line 5 - Visitor Centres*
CW15.491

   Benefit calculated for inland bathing waters visitor centres.

CW15.502 **Total enhancement**

   Calculated cells

20. CW16 Best value analysis of alternative option; benefits - water resources and water network+

All costs or cost savings in this table are post frontier shift and real price effects.

Table CW 15 contains the annual benefit (both the number of units and the monetised benefit of changes to service measures) associated with the proposed enhancement programme for Water. This benefit has been calculated by analysing the impact that a project/investment will have in comparison to the pre investment position of relevant service measures. The value of a service measure change is calculated using the DCWW multi capital framework which applies a unit cost value dependant on the particular service measure, considering Intellectual, Human, Social and Natural Capitals alongside the private cost of failure.

Where the projects to be delivered are forecast to have a direct impact on a Performance Commitment the benefit has been shown.

Application of Carbon
The benefit or disbenefit of carbon is referred to as Greenhouse Gas Emission Reduction. Embedded Carbon has for the purpose of these tables is shown as the average annual impact over the cost benefit assessment period (30 years). This measure includes both the annual operational carbon and also the average annual embedded carbon calculated over 30 years.

The number of lines completed is representative of the number of Service Measures or Performance Commitments where benefit has been calculated, additional lines have been left blank.

Profiling of benefits (Columns H-AH)
Benefits have been profiled according to profile of the investment and the specific nature of the type of activity. Some schemes will only deliver benefit largely once the solution has been commissioned e.g., singular named non infrastructure schemes with some schemes delivering benefit part way through the project e.g., Multi Scheme Programmes of activity or infrastructure activity etc.

Benefit is calculated on an annual basis and then run forward for the entire period of the WLC exercise (30 years).

The annual benefits over time are discounted according to the discount factor of 3.5% as set out in the PR24 Final Methodology. The WACC applied is 3.23%.

Selection of least cost programme
Where at least one or more of the schemes within an enhancement driver investment area have a least cost option (which is not also the best value), the least cost programme has been presented with supporting narrative.

All other lines do not contain data as a result of either no planned investment (please see table CW15) or because the best value option is also the least cost option for all schemes within the driver definition.

CW16.1 -
CW16.133

EA/NRW environmental programme (WINEP/NEP).

No Benefits have been calculated.

CW16.134 -
CW16.189

Supply-demand balance.

No Benefits have been calculated.

CW16.190 -
CW16.300

Metering.

Programmed PCC benefit of the metering programme. Please note that the performance trend shown in AMP 9 is as a result if the 3 year rolling average.

CW16.301 –
CW16.400

Water quality improvements

CW16.378 -
CW16.387

Addressing raw water quality deterioration (grey solutions)

The following schemes and scheme types are forecast to give benefit against this enhancement driver:
- Mayhill Organics Removal
- Manganese Interventions Programme
- Pendine BH and Morfa Bychan raw pipeline risk of wash away due to coastal erosion
- Disinfection byproducts interventions programme - Capel Curig
- Cefn Dryscoed WTW - End to end process update
- UV Treatment Programme
- Raw Water Deterioration – Bontgoch

CW16.401–
CW16.434

Water resilience and security

CW16.401-
CW16.407

Resilience

The following schemes and scheme types are planned to give resilience benefit:
- Interconnectivity of East/West link
- Wye transfer main
- FCERM - Flood mitigation to critical Water assets
- Network connectivity schemes to improve resilience and mitigate tankering and other dry weather problems
- Critical trunk mains - Condition and mitigation assessments to resolve critical crossings including emergency repair plans etc.
- Cardiff Ring main connectivity feasibility and strategy; New Trunk Main West, East, North of central Cardiff feasibility only AMP8 to define scope and cost for a scheme in AMP9/10
- Carno Abandonment - Nantybwch WTW Additional Resource
- Tank Resilience Schemes

Of the above listed scheme four schemes had a less cost option which was not chosen as it was not the best cost benefit ratio/NPV in comparison to the best value scheme.

CW16.435 –   **Net Zero**
CW16.445

    No Benefits have been calculated.

CW16.446 –   **Additional Free form lines**
CW16.501

    No Benefits have been calculated.

CW16.502   **Total enhancement**

    Calculated cells

21.   CW19   Demand management - Leakage expenditure and activities

Leakage expenditure - company level

CW19.1   *Maintain expenditure*
CW19.2   *Reduce expenditure*
CW19.3   *Total leakage expenditure*

Confidence grade B3

Leakage cost data split into Prevent, Aware, Locate and Mend (PALM) categories, further split on reporting of the maintain/reduce. The prevent category has been further sub-divided because it is made up of diverse activities which can be readily identified and that can be expected to have different costs and benefits. The AMP7 figures are based on the reported values through APR for Leakage, including private leakage.

Opex Costs for FY 2022/23 are in line with the 2022/23 table 6D APR submission.FY 2023/24 are in line with the 23/24 finance plan which is in line with forecast assumptions used in table CW2. Costs are split across the same cost categories as included in table 6D submission for 2022/23.

Opex Costs for FY 2024/25 are in line with 2023/24 however also include efficiencies as applied in table CW2, costs for 24/25 are split across the same cost categories as included in the table 6D submission for 2022/23.

Capex Costs for FY 2022/23 are in line with the 2022/23 table 6D APR submission

Capex Costs for FY 2023/24 2024/25are in line with the current board approved plan as used to populate table CW3.

AMP8 are based upon business plan forecasts and the SoLow Leakage Optimisation Model.

Leakage Expenditure by Region

CW19.4 –
CW19.9   Leakage expenditure by region has been intentionally left blank

Leakage expenditure - company level

CW19.10   *Mend supply pipe cost Confidence grade B3*

This has been derived from the SoLow model at an average of £844.07 unit cost applied to the forecast number of repairs across the period.

Leakage Expenditure by Region

CW19.11 -   Leakage expenditure by region as has been intentionally left blank
CW19.12

Prevent activities and attributes - company level

CW19.13   *Number of properties covered by PMAs with fixed outlet pressure control*
CW19.14   *Number of properties covered by PMAs with active pressure control*
CW19.15   *Number of new PMAs*
CW19.16   *Number of properties covered by new PMAs*
            Confidence grade B2

Lines 19.13 to 19.16

PRV / PMA asset information is held in our PRV Database. This notes the type of control type and also if the scheme is 'in-use'. As per Ofwat guidance we have only included assets that are defined as 'in-use' and are therefore defined as 'operationally active'. The majority of our pressure control is fixed outlet as shown by the property coverage reported in the lines.

PMA boundaries are digitised in our GIS system and connected properties are assigned to this supply geography in the same way that our connections are assigned to our leakage estate DMA boundaries. This involves placing the connection into a supply boundary using the geo-coordinates and spatial joins within GIS. This is consistent with how properties are assigned to supply boundaries for water balancing and year end counts used in the APR.

As per Ofwat guidance new PMAs are defined as 'The number of new PMAs installed and optimised in the report year'.

To identify new schemes in a given year is not exact as we don't store 'creation dates' of schemes in the PRV asset database *'per se'.* Only recently (since 2019) does the PRVdb store record change history including 'new scheme' creation activity.

As a workaround to this we have used 3 possible dates to identify scheme installation / creation and therefore provide a timeseries of new PMAs / Schemes back to 2017-18 to satisfy the data collection exercise ::

1. The 'Created Date' (digitisation date) of the PMA polygon in GIS.
2. The 'Date Used' as stored against the scheme in the PRVdb.
3. The create 'New Scheme' action in the PRVdb audit history table (which logs record change history).

The maximum date of the above date options is used as a surrogate for the scheme create date reference. Where the scheme is 'in-use' but no dates are available the scheme date is defaulted to the 1st April 2015.

The date reference is then used to assign 'New PMAs' to that reporting year and corresponding properties of the scheme. Pressure control is defined against the asset / scheme within the PRV asset database. These are defined as 'fixed outlet'. We have also included any 'unknown', 'blanks' or 'null' control types with the fixed outlet category as these are 'in-use' but the control type is not known / collected. Any other 'in-use' asset that is not 'fixed outlet', 'unknown', 'blanks' or 'null' is set to 'active'.

CW19.17–   **Prevent activities and attributes**
CW19.24

Prevent activities by region has been intentionally left blank

DMA characteristics - company level

CW19.25   *Number of fully operating DMAs Confidence grade B1*

On average 1108 DMA are fully operating of 1245 is the DMA Estate in 2022-23. This reflects a range of factors and how the DMA estate is monitored and managed from a data provision perspective as well as operationally.

Operational event such as temporary rezoning can render a DMA inoperable if the data is affect significantly and is not representative. It also reflects the creation of new and the splitting of existing DMA's to better monitor and manage the DMA estate.

CW19.26   *25th percentile DMA size*
CW19.27   *Mean DMA size*
CW19.28   *75th percentile DMA size*
Confidence grade B2

Line 19.26 to 19.28
The changing number of fully operating DMAs reflect a range of factors and how the DMA estate is monitored and managed from a data provision perspective as well as operationally. Operational event such as temporary rezoning can render a DMA inoperable if the data is affect significantly and is not representative. It also reflects the creation of new and the splitting of existing DMA's to better monitor and manage the DMA estate.

This is also reflected in the DMA size statistics reported in the table and a relatively consistent DMA size distribution.

CW19.29   *DMA Availability Confidence grade B1*

Given the PR24 guidance definition all properties contained within the DMA Reporting estate in a given reporting year are defined as available and used for regulatory reporting. The data of a particular DMA may be copied / suspended but these days are still used and contribute to the reporting process i.e. they are not omitted from the leakage calculation and are therefore available.

For clarity the figures are DMA based and exclude properties on the upstream losses network.
DMA characteristics - Regional level

CW19.30-
CW19.39   *DMA characteristics by region has been intentionally left blank*

Trunk main balances - company level

CW19.40   *Length of trunk mains and upstream network in trunk mains balances*
CW19.41   *Length of trunk mains*
CW19.42   *Proportion of trunk mains and upstream network in trunk mains balances.*
Confidence grade B2

Line 19.40 to 19.42
Line 40 is reported as Line 41. Our method to determine TM/SRV Leakage is based on zonal mass balancing and hence are contained with trunk main balances.

Trunk main balances – Regional Level

CW19.43-48   Truck mains by region has been intentionally left blank

Smart networks - company level

CW19.49   *Smart networks coverage - permanent acoustic/noise loggers Confidence grade A2*

Figures represents permanent acoustic logging projects / programmes that the company has undertaken across the years. Prior to 2019-20 there was no permanent acoustic logger deployed on our network.

During 2019-20 several product trails were undertaken across different sized areas these were then removed and a single supplier (HWM) was chosen, and which now represents our current small scale permanent acoustic logging programme.

During 2020-21 a single network area was logged permanently hence the drop in coverage.

During 2021-22 the permanent logging programme has been extended to other areas but remains small in scale.

During 2022-23; 1000 Gutermann Zonescan NB-IoT loggers were purchased to use alongside HWM equipment. The Gutermann loggers were rolled out in Central and West areas.

Forecasted number 2023-24 to 2029-30 assume a continued small scale rollout of 1000 units per year (and continued maintenance of existing loggers).

The total population considered in future years is forecast based on PR24 SUP1A.16 (line 30).

Forecast connection coverage is based on connection coverage increase attained during 2022-23 deployments. (1000 loggers which = 11154 connections)

All raw data extracted from corporate systems or via data suppliers is assumed to be correct and accurate.

Forecast connection coverage is based on previous year coverage increase, assigned budget and current strategy therefore is likely to change over the years.

All data/methods feeding into this process are accurate and have undergone associated validations, checks and assurance.

Smart Networks – Regional Level

Smart Networks by region has been intentionally left blank

Active leakage control - company level

CW19.52   *Hours on ALC activity per annum*

ALC hours increased to 273,167 for 2022/23, mainly due to planned ALC resource uplifts in order to combat a rising NRR, along with significant incidents throughout the reporting year – Water Resource stress in the summer, near drought conditions with hosepipe ban in place in West Wales, followed by winters freeze / thaw.

ALC Hours are forecast to rise over the upcoming years in order to meet leakage targets. Forecast evidence documented in "RPS Evidence for CW19 support" but as with other forecast lines provided by RPS data has been taken from the SoLow model which creates our WRMPs.

CW19.53-   **Active leakage control – regional level**
CW19.54

Active leakage control by region has been intentionally left blank

Mains repairs - company level

CW19.55   *Number of mains repairs – customer reported*
CW19.56   *Number of mains repairs – company detected*
CW19.57   *Average run time for customer reported mains repairs*
CW19.58   *Average run time for company detected mains repairs.*

 Mains repairs - Regional level

Cw19.59-   *Mains repairs by region has been intentionally left blank*
CW19.66

Mains fittings repairs - company level

CW19.67   *Number of mains fittings repairs – customer reported*
CW19.68   *Number of mains fittings repairs – company detected.*
CW19.69   *Average run time for customer reported mains fittings repairs*
CW19.70   *Average run time for company detected mains fittings repairs*

 Mains fittings repairs - Regional level

CW19.71-   *Mains fittings by region has been intentionally left blank*
CW19.78

Communication pipe repairs - company level

CW19.79   *Number of communication pipe repairs – customer reported*
CW19.80   *Number of communication pipe repairs – company detected*
CW19.81   *Average run time for customer reported communication pipe repairs*
CW19.82   *Average run time for company detected communication pipe repairs*

Communication pipe repairs - regional level

CW19.83-   *Communication pipe repairs by region has been intentionally left blank*
cw19.90

Supply pipes repairs - company level

CW19.91   *Number of supply pipe repairs – customer reported*
CW19.92   *Number of supply pipe repairs – company detected*
CW19.93   *Average run time for customer reported supply pipe repairs*
CW19.94   *Average run time for company detected supply pipe repairs*
CW19.95   *Number of free supply pipe repairs undertaken*
CW19.96   *Number of supply pipe repairs where financial assistance provided*
CW19.97   *Number of supply pipe repairs where other support provided*

Confidence grade B2

CW19.55 – CW19.97 are reported regularly within the company and processes are in place to be able to provide this data readily.

A focus on SPR repairs, specifically the increase in confirmed customer repaired SPRs, has driven the increase in SPR runtimes.

Customer Reported jobs have been forecast to stay at the same level as reported in 2022/23. Company detected (Y4) jobs have been forecast to rise, in line with the forecast increased ALC resource required to hit future leakage targets.

The number of free supply pipe repairs and the number with financial assistance provided has been forecast to remain at 2022/23 reported levels, whilst the forecast number of supply pipe repairs where other support is provided is the sum of the forecast Y1 and Y4 SPR numbers.

All forecasting that shows an increase / decrease (rather than flat profile) is a product of the SoLow Optimisation tool modelling carried out by RPS to assist DCWW in the development of their Water Resource Management Plan.

Confidence rating of B2 based on the forecasting element of these lines. Actual reported will be confidence rating of A2.

Assumptions Made:
All raw data extracted from corporate systems or via data suppliers is assumed to be correct and accurate.
All data/methods feeding into this process are accurate and have undergone associated validations, checks and assurance.
All raw data extracted from corporate systems is assumed to be correct and accurate.

Supply pipes repairs - regional level

CW19.98-CW19.111   *Supply pipe repairs by region has been intentionally left blank*

Leakage levels - company level

CW19.112   *Historical minimum achieved level of leakage*

CW19.113   *Volume of leakage that needs to be saved to maintain current level*

Confidence Grade B2

Line 112 and 113
Forecasting for these line has been carried out through the SoLow Optimisation tool modelling carried out by RPS to assist DCWW in the development of their Water Resource Management Plan. This report has been provided alongside our submission for further evidence.

The SoLow model calculates annual area level background leakage, which has been used to populate this line (112)

The Natural Rate of Rise (NRRt) is also equivalent to the amount of leakage needed to maintain current level, this is also calculated by SoLow as part of the optimisation process. (113)

This report has been provided alongside our submission for further evidence.

Leakage levels - Regional level

CW19.114-Cw19.117   *Leakage levels by region has been intentionally left blank*

22.   CW20   Water mains; asset condition

General

The supporting excel file which includes a full breakdown of cohorts and relative burst rate information has been submitted in file: *WSH301-Supplementary cohort tables (CW20).xlsx*.

Figure 1 is a graph of cumulative average annual bursts versus cumulative mains length. Cohorts are colour coded by condition grade.
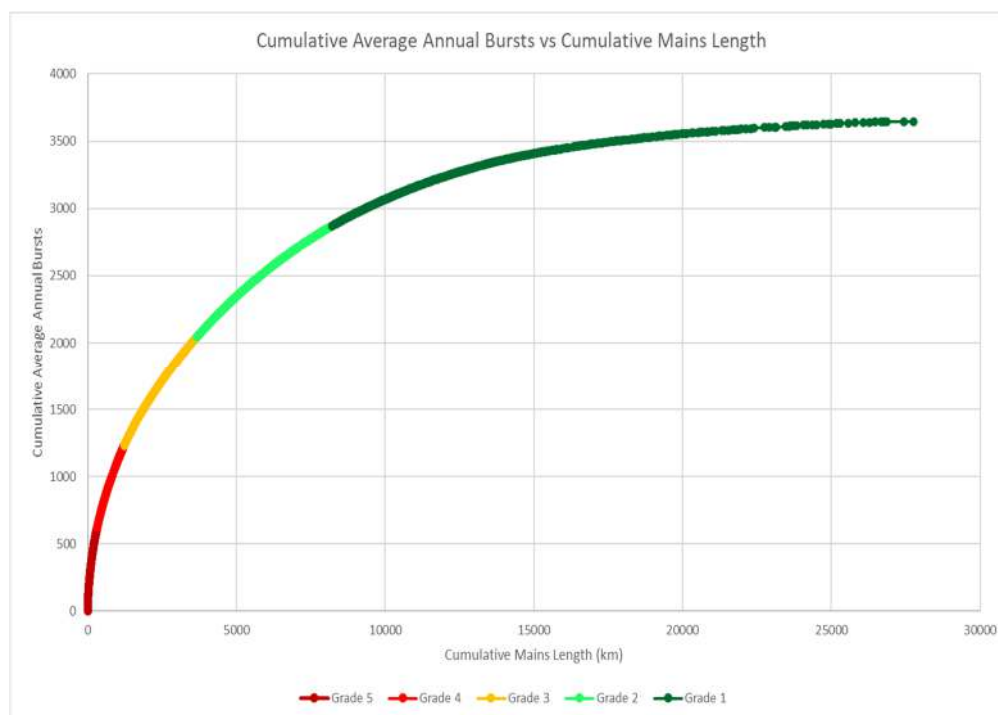

Figure 1 - Cumulative average annual bursts vs cumulative mains length

The shape of the curve is as expected, with relatively short lengths of Grade 4 and 5 mains (combined 5% of total mains length) contributing over a third (35%) of the bursts. A breakdown of these thresholds for each condition grade is given in Table 1.

	Cumulative bursts share	Cumulative length share
Grade 5	19%	1%
Grade 4	35%	5%
Grade 3	60%	16%
Grade 2	81%	32%
Grade 1	100%	100%

Table 1 - Cumulative bursts and length at each condition grade boundary

The equivalent curve from our PR09 submission is shown in Figure 2.
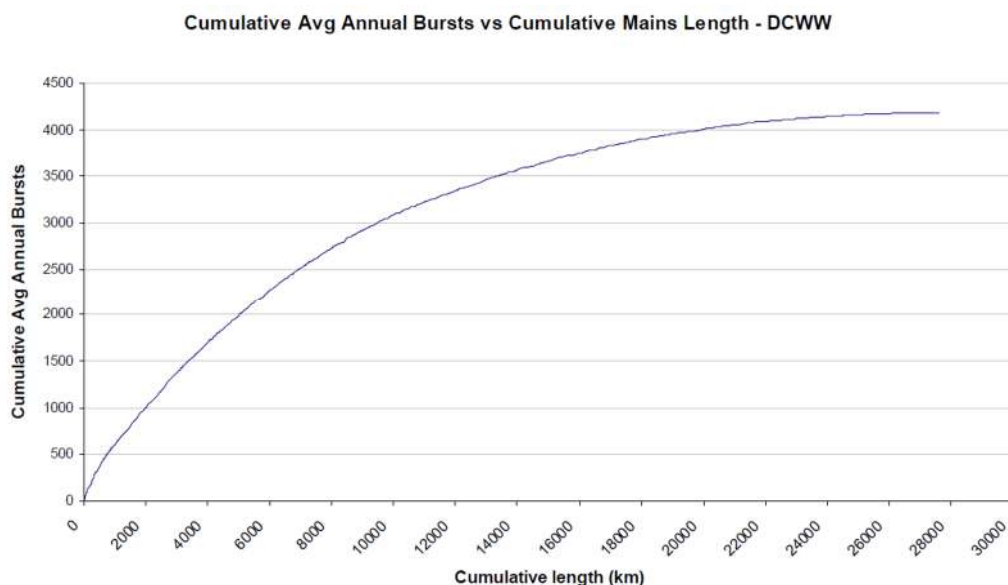

Figure 2 - Cumulative bursts vs cumulative length, PR09 submission

Figure 3 shows the % of asset length in each condition grade for Mains < 320mm and > 320mm respectively.
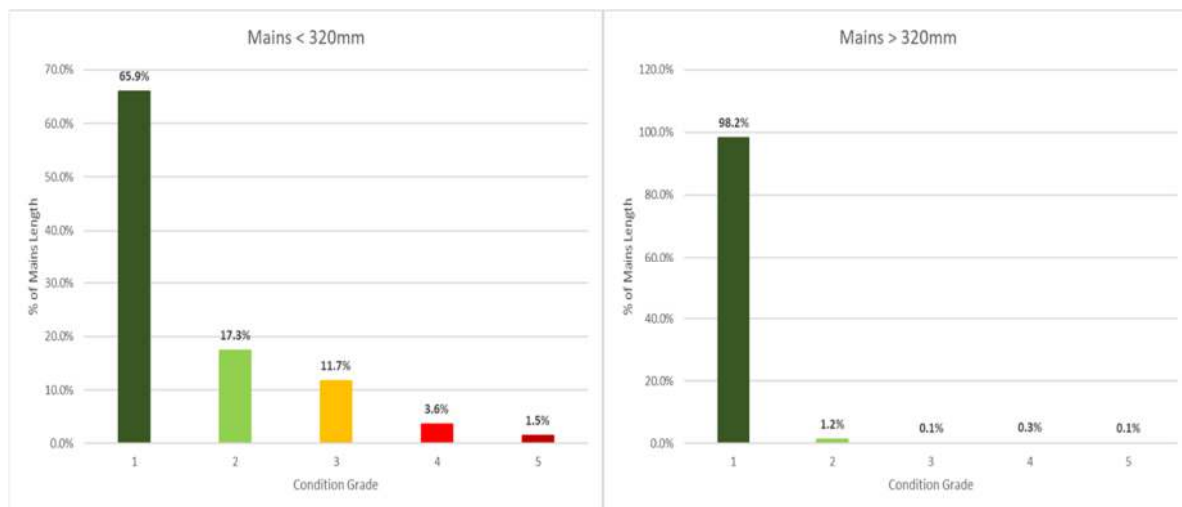

Figure 3 - % length by condition grade, mains < 320mm diameter

We have not been able to locate the calculation files used at PR09. Our only available source of information is the submission document 'C3 narrative FBP WSH.pdf', which covered the whole of Volume C3 - Asset Inventory. It appears that revised guidance (UKWIR methodology) was issued part way through the process, with the result that most of the document gives results pre-guidance change and there is only a brief update post-guidance change. Pre-guidance change, the results are clear, but presented divided between Distribution and Trunk mains, Figure 4.
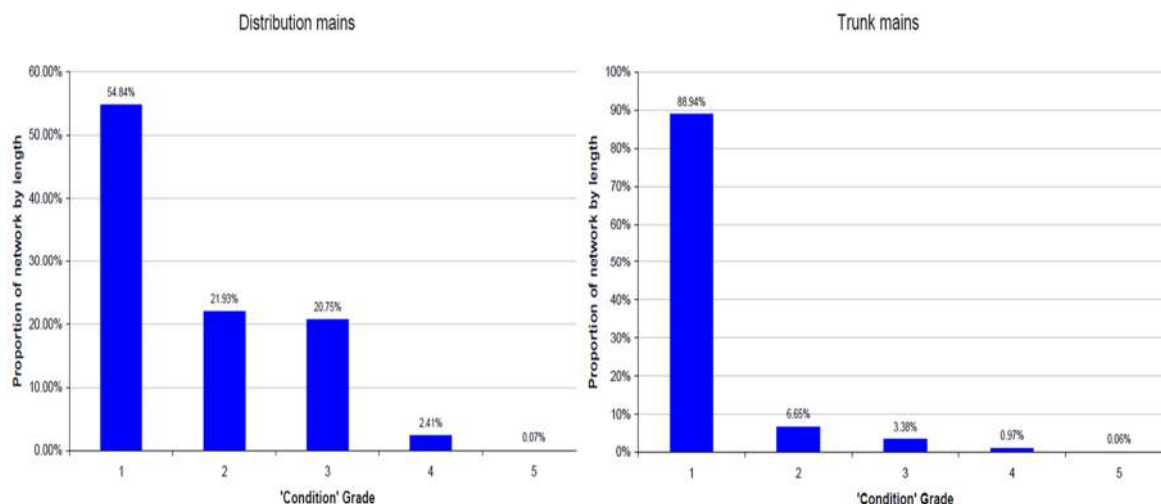
Figure 4 - PR09 % length by condition grade (N.B. split distribution / trunk, not </> 320mm)

Given the different definitions, it is not straightforward to draw conclusions about the differences between PR09 and PR24. Perhaps the most significant change is in the clearly greater share of Grade 5 mains at PR24, across both size categories.

The plots given in the PR09 C3 narrative post-guidance change are, unfortunately, both more complicated and less useful – Figure 5. Apart from Grade 1, the % length shares for the other condition grades are difficult to decipher.
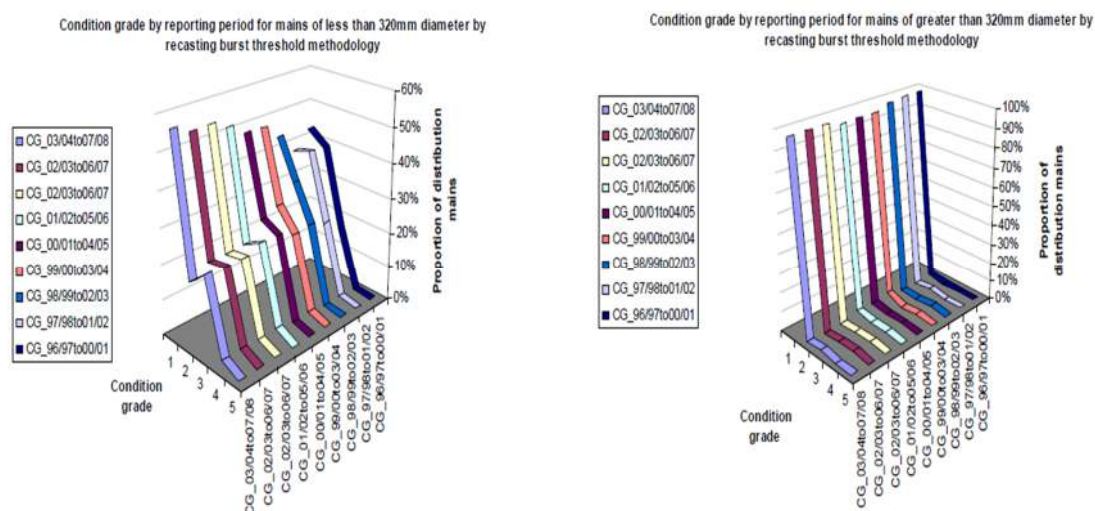
Figure 5 - PR09 % by condition grade, rolling five-year periods

The PR09 document states: "When examined against the specific cohort burst range criteria (i.e. from the UKWIR methodology), 145 cohorts met the burst criteria and 762 fell outside the range." In other words, only 16% of cohorts were compliant. This is very different to PR24, where 88% of cohorts are now compliant. Given the UKWIR methodology's emphasis on the importance of cohort size for consistency and comparison, there may be limited benefit in trying to compare our PR24 results with those from 15 years earlier. The exception, as stated above, is the clear increase in share of Grade 5 mains. The evidence shows that a major part of this is driven by the marked deterioration of AC Mains in recent years.

Figure 6 shows the difference per material between using burst data from three different five-year periods. Note that although these are three different five-year periods, the analysis is all based on a GIS-extract of water

mains at one point in time, 2021. In other words, the changes between five-year periods are not affected by mains renewal.

Note the marked deterioration of AC mains between the first five-year data period (April 2008 to March 2013) and the most recent (April 2018 to March 2023), i.e. the increasing share of Grade 4 and 5 mains. The length share of Grade 5 AC mains increases from 1% to 6% between these two periods. AC represents 13% of our mains network length. Note also that Ferrous mains show an improvement over the same period. This reflects the operational improvements we have undertaken, such as pressure management.
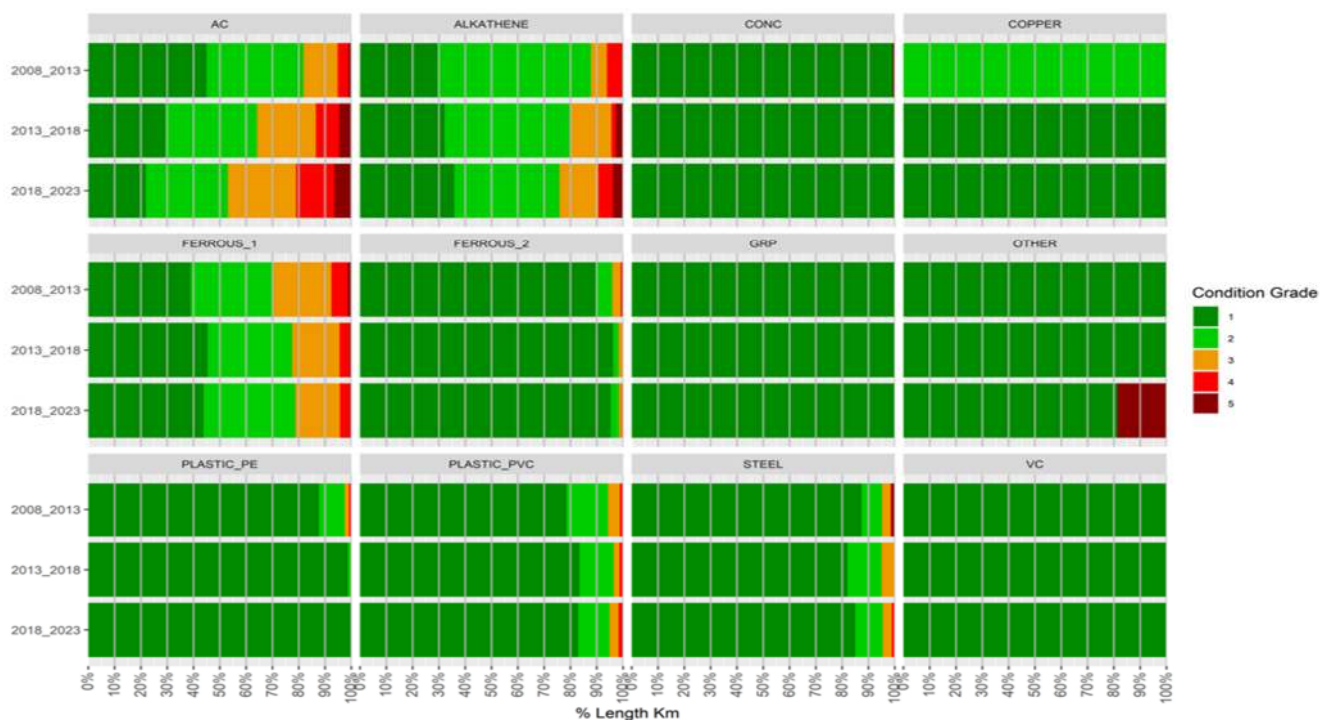

Figure 6 - Condition Grade comparison from earlier five-year periods

This contrast between AC and Ferrous mains is shown more clearly in Figure 7. AC mains show a marked reduction in the length of Grade 1 and 2, whilst the length of grades 3, 4 and 5 all increase sharply. The opposite is true of ferrous mains. This shows that whilst our operational improvements have helped reduce iron main bursts, the same techniques are not sufficient to cope with the very marked detrioration we are now seeing in AC mains.
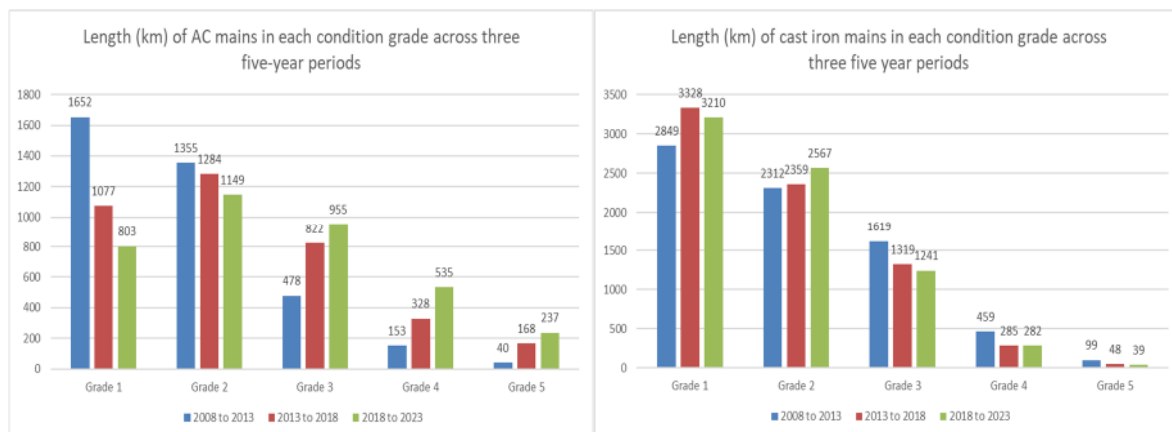

Figure 7 - Change in Condition Grade - AC vs Ferrous

Figure 8 shows the split, by material of all Grade 5 mains. Length is in km. Three quarters of our Grade 5 mains are AC.
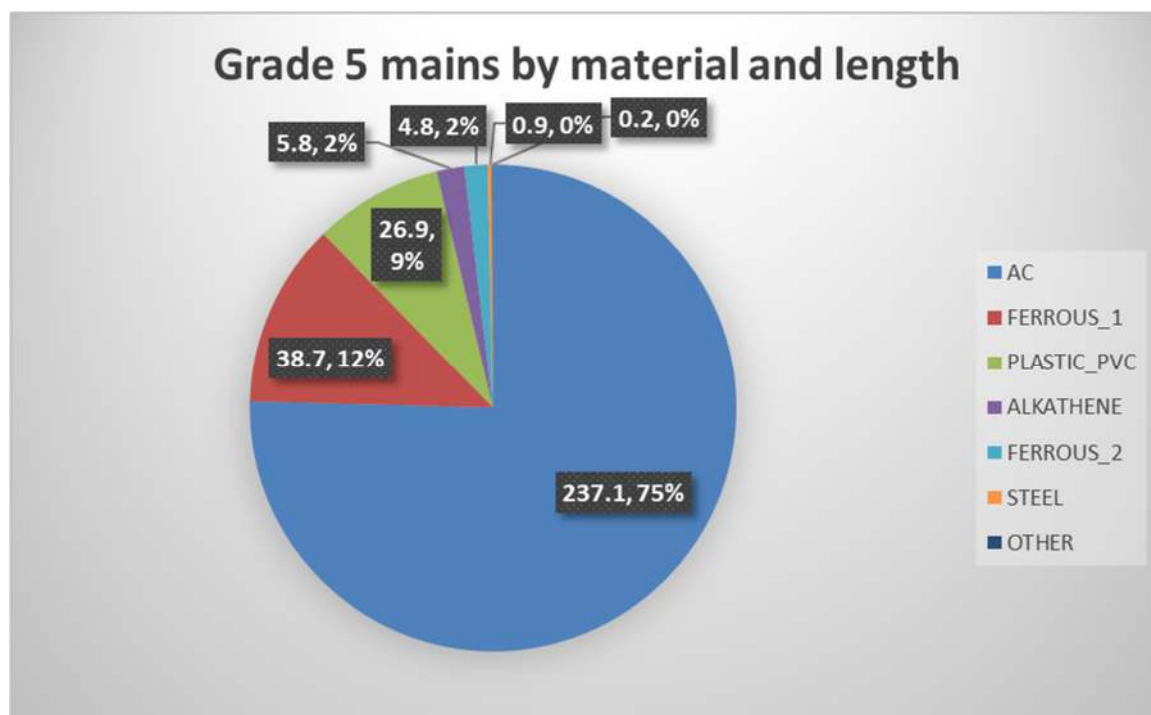

Figure 8 - Split by material of Grade 5 mains

We are confident that the data provided is of high quality and the condition grading system is in line with the guidance, taking into account the specific issues described below against individual lines, in particular our desire to have a process that was practical and readily repeatable.

Supporting file *WSH301-Supplementary cohort tables (CW20).xlsx* includes a cohort table, as suggested in Ofwat's 'CW20-Additional-Cohort-Table-Guidance.xlsx', as well as the graph of cumulative average annual bursts versus cumulative mains length.

Confidence grade for the whole table B3

Length of potable mains by Condition Grade

CW20.1   *Potable mains (up to 320mm)*

CW20.2   *Potable mains (greater than 320mm)*

Lines 20.1 and 20.2.
The sum of the total mains lengths in Lines CW20.1 and CW20.2 is 27,875km. This matches our APR23 Line 6C.1: Total length of potable mains at 31st March '23. Our cohort analysis was carried out using a mains data extract from GIS taken in March '21 for the purposes of deterioration modelling. The difference in length between March '21 and 31st March '23 is approx. 100km, only 0.4% of the total mains length. We added two dummy cohorts (<320mm and >320mm) to represent this reconciliation length of new pipe and have assumed it is all Condition Grade 1.

We have not applied any sub-division of grading.

With ~4,000 bursts/yr and an average cohort size of 2.5 bursts/yr (mains < 320mm diameter), we would expect ~1,600 cohorts. At this level, it was found to be impractical to assemble the cohorts manually. Instead, we used SQL commands to create cohort bins based on 12 different, sensible, pipe attributes, e.g. material, diameter, age, area, DMA. These included the primary and secondary attributes listed in the Ofwat guidance. Our burst modelling work (part of deterioration modelling to support PR24) identified a hierarchy of 'predictor variables', i.e. the pipe attributes with the strongest influence on failures. We have incorporated this information into selection of additional pipe attributes for this cohort analysis.   All attributes used in the cohort analysis are standard data fields in our corporate GIS; there was no requirement for any additional data mapping outside our GIS. We used a sequential approach, starting with all 12 attributes and removing one at a time in each run stage.

This automated process left some cohorts outside the defined tolerance. In total, 88% of cohorts were within the tolerance (1,450 from a total of 1,643). We tried several different approaches and combinations of attributes before finding an optimum solution. There were 193 cohorts outside the tolerance, of which 3 were >320mm (median burst rate 1.55 bursts/yr) and 190 were <320mm (median burst rate 4.65 bursts/yr). Whilst it is not practical to comment individually on these cohorts outside the tolerance, the supporting spreadsheet - 'CW20_Supporting Data_Cohorts and Burst Rates.xlsx' – can be filtered to review their attributes.   Of the 190 cohorts (<320mm) outside the tolerance, three materials dominate: AC (55%), cast iron (33%), and PVC (7%). This aligns with our experience of the higher burst rates of these materials, and AC in particular.

The average cohort sizes are 2.49 and 0.89 for mains <320mm and >320mm diameter respectively. Combined, as per the calculation in the supporting .xls file which follows Ofwat's example, the difference between average annual bursts and nominal expected is -0.4%, i.e. well within the required +/- 10% tolerance. Overall, we consider our approach has given a high % of compliant cohorts whilst still using a sensible set of standard pipe attributes from our GIS, and a practical, repeatable cohorting process.

We have used a period of 5 years for population of the table, 1st April 2018 to 31st March 2023. However, for our own purposes we also repeated the analysis using a 15-year dataset of bursts obtained for deterioration modelling. The most notable difference in the results is for Asbestos Cement (AC) mains where the proportion of Grade 5 mains has increased from 2% of AC length (15years) to 6% of AC length (5years). Further discussion on this is included in the 'General' section below.

Our GIS records 'Lining Type'. Lengths and length shares are as follows: Cement Mortar, 2687km, 9.7%; Epoxy Resin, 1517km, 5.5%; Polyurethane, 829km, 3%; Bitumen, 233km, 0.8%. The remaining 22,498km, 81%, have no recorded lining. In all cases, we have used the original pipe installation date for the cohort analysis.

Analysed burst rate comparison

CW20.3   *Analysed cohort potable mains (up to 320mm)*

CW20.4   *Annual average bursts from cohort analysis (5 year average) potable mains (up to 320mm)*

CW20.5   *Annual average bursts on analysed cohorts potable mains (up to 320mm)*

Lines 20.3 to 20.5.
Our GIS holds the installation year of mains but does not differentiate between mains that have been replaced, e.g. through a mains renewal programme, and new mains, e.g. to serve new development or improve resilience. We have based the exclusion for these three lines on mains laid in the last five years, i.e. those with age less than or equal to 5 years.

CW20.6   *Replaced and/or relined mains length*

CW20.7   *Annual average bursts on replaced potable mains (5 year average) up to 320mm*

Lines 20.6 and 20.7.
As above, these lines are based on mains laid in the last five years, i.e. those with age less than or equal to 5 years

CW20.8   *Annual average bursts (5 year average) on potable mains up to 320mm*

CW20.9   *Current annual bursts on potable mains (up to 320mm)*

CW20.10   *Current annual bursts on potable mains (up to 320mm)*

CW20.11   *Annual bursts on mains (5 year average) greater than 320mm and other mains*

CW20.12   *Annual bursts on mains (5 year average) on potable and other mains reported in APR 2019-2023*

Lines 20.8 to 20.12
The total 4,033 bursts/yr in this line matches the 5-year average between 1st April 2018 and 31st March 2023 from APR figures. Our automated analysis was carried out using a GIS extract from March '21 and only those burst events which could be linked to a current main. This was 3,646 bursts/yr. To reconcile this, we applied a post-analysis uplift of 1.1061 (4,033/3,646) to the bursts/yr figures in the supporting file '*CW20_Supporting Data_Cohorts and Burst Rates.xlsx*'. We then calculated Bursts/1000km/yr and associated Condition Grade in this spreadsheet and used pivot tables to extract the data required for lines in the table. The spreadsheet includes separate cohort tables for (a) all mains, and (b) all mains with age > 5 years. The former provided data for lines 20.1, 20.2, 20.9 and 20.11, whilst the latter provided data for lines 20.3 and 20.4. Lines 20.6 and 20.7 used figures from both tables.

Line 20.12 is a calculated sum of lines 20.8 and 20.11.

23.   CW21   Water - net zero enhancement schemes

Confidence grade C5
All costs or cost savings in this table are post frontier shift and real price effects.

CW21_1   Net Zero Carbon Strategy: Network Control Systems (Water)

This scheme is part of our National Environment Programme (NEP) under the Net Zero driver paper. It will deliver a new Network Control System for Water to reduce energy consumption by using factors such as weather and demand patterns to predict optimum set points, and as a result, control and optimise pumping regimes.

Building on the foundations of our AMP6 and AMP7 Net Zero Carbon investments. The assets/systems/functionality delivered in the previous and current AMPs must be maintained to enable the successful delivery of benefits from the AMP8 schemes. The costs of this maintenance activity are not included in the figures reported in CW21.

The scheme OpEx for represents the in-AMP8 OpEx savings as a benefit of the CapEx investment. For further information, see the enhanced investment case WSH66-PE11.

Calculation of carbon impact and benefits of schemes
In order to calculate the forecast Greenhouse Gas savings, forecast kWh electricity savings were multiplied by the relevant BEIS Greenhouse gas reporting conversion factors 2022 to give the annual tonnes of CO_2 equivalent (tCO2e) saving. For electricity, the emissions factor used is the BEIS consumption based, long-run marginal emission factor for the commercial sector.