PR24 Data Table Commentary

Section 3. Costs (wholesale) – water

1. Introduction

This table details our forecast cost and associated drivers from 2022-23 onwards and some tables go beyond this to 2030. It covers base, enhancement, developer services and best value which are used within the cost assessment models.

2. CW1a and CW1 - Totex analysis - water resources and water network+ (post frontier shift and real price effects)

The property connection forecasts used for AMP8 are based on forward forecasts of quantities reported in the APR in the periods FY17 to FY23 in Table 4Q. AMP8 numbers in PR24 Table DS4 are based on Developer Services knowledge of historic growth rather than other external forecasts.

The spread and growth of SLPs and NAVs in the numbers is based on what we expect to happen in the market based on market intelligence.

Line CW1.3 Developer services operating expenditure
AMP8 forecast £0 for five years from FY26-FY30.
DS operating expenditure is CAPEX.

Line CW1.7 Grants and contributions - operating expenditure
AMP8 forecast £0 for five years from FY26-FY30.
DS G&C operating expenditure is CAPEX.

Line CW1.10 Developer services capital expenditure
Our forecasts at FY23 prices have been based on average capital expenditure for connections and mains requisitions from FY18 to FY23. The expenditure excludes infrastructure expenditure and diversion scheme costs. The average expenditure for property excludes NAV properties in Table DS4 where we have forecast more activity for NAVs moving through AMP8. The expenditure at FY23 prices declines through the AMP8. **For assurance purposes CW1.10, CW1.10a and table line DS2e.10 match. Total AMP 8 £75.483m.**

CW1a

The data is the Base capital expenditure, the Enhancement capital expenditure and the Enhancement operational expenditure for Water Resources and Water Network Plus Wholesale Price Controls, these three lines are a summation of the capital expenditure from CW2, CW3 and CW3 respectively. In addition, on a separate line, is the capital expenditure associated with Third Party schemes.

The outputs have been mapped using our Investment Categories to ensure that the expenditure is mapped to the correct line and column for each year. These mappings are consistent with those used in our Annual Performance Report process and in populating the 2022-2025 columns of this table - they have been developed in line with Regulatory Accounting Guidelines.

We have included the transition and accelerated expenditure set out in table 12 & 17 within the appropriate line/columns in 2025/2026.

Line	2025-26	2026-27	2027-28	2028-29	2029-30	AMP8 Total
CW1a. 2	£28.963m	£30.637m	£28.642m	£29.124m	£29.763m	£147.129m
CW1a.8	£241.171m	£205.544m	£216.264m	£215.841m	£224.118m	£1,102.938m
CW1a.9	£97.174m	£122.055m	£105.328m	£78.893m	£47.321m	£450.771m
CW1a.12	£3.678m	£3.678m	£3.678m	£3.678m	£3.678m	£18.390m

For further information please see CW2 for base expenditure commentary & CW3 for enhancement commentary.

Converting CW1a to CW1

We apply our assumptions for frontier shift and real price effects as set out in SUP11 to the CW1a data table to populate CW1. We note that:

- We do not propose real price effects in wholesale water.
- We do not apply a frontier shift efficiency to charges outside of our control, namely Local Authority and Cumulo rates and Service Charges – identified in CW2.

3. CW2: Base expenditure analysis – water resources and water network plus

Total operating costs across the clean water price controls are forecast to be relatively consistent year on year during AMP8, in line with the AMP7 expected exit run rate. AMP7 has seen volatility throughout the AMP in operating costs due to specific factors including rising energy and chemical prices, abnormal weather events such as the summer 2023 drought, and the impact of the business rates periodic revaluations.

From 2022/23 there was a change in how the principal use recharge has been reflected in base operating costs, before this date it was included within depreciation but since then it is an additional charge within "other operating costs". The approach to principal use is covered in the commentary for table 1a/1. There have been no other changes in reporting methods.

Power

Whilst PR19 assumed power costs of £23m per year would remain relatively flat across AMP7, the 2023/24 budget is £59m due to the impact of increased energy prices throughout the AMP but with significant increases and volatility in 2022/23 as a result of the global impact on wholesale energy costs as a result of the Ukraine / Russia conflict.

Energy prices have steadily increased during AMP7 and unhedged energy was exposed to a very volatile energy market. We continue to manage price risk by hedging according to the energy purchasing policy and making trades according to carefully governed price targets. As of 31 March 2023, we had fixed over 77% of its forecast baseload power requirements for the remainder of AMP7, including 98% for the year to 31 March 2024.

Forecasts for 2023/24 and 2024/25 therefore reflect known hedged prices. The reduction in prices from 2023/24 to 2024/25 reflects the full year effect of a Power Purchasing Agreement undertaken during 2023. The business plan power forecasts for 2023/24 and 2024/25 have then been deflated from 2023/24 prices (used in internal planning and forecasting) to 2022/23 prices for completion of the business plan tables using the average CPIH forecast for 2023/24 as at 1 July 2023.

AMP8 power costs have been assumed to remain at the 2024/25 levels due to the lack of any certainty around future energy prices.

Bulk Supply

Bulk supply costs of £4.1m pa reflect the bulk purchase of water from Severn Trent. The forecast into AMP8 is assumed to remain constant with AMP7 and is in line with the PR19 forecast of £3.7m (at 17/18 prices).

Other operating costs

Other operating costs experienced a significant increase in 2022/23 compared to 2021/22 of c£30m predominantly due to:

- c£10m drought related exceptional costs (£25m including exceptional power costs)
- £12m additional chemical costs due to increasing market price and availability pressures in the chemical supply chain. Chemical prices have increased significantly to cover soaring energy, fuel and raw material prices. This has resulted in accelerated price increases from suppliers being passed through
- A higher proportion of G&S costs, apportioned across price controls on the basis of the rest of the cost base.

The 2023/4 forecast reduces down by £10m as the drought exceptional costs are not expected to recur.

Further cost reductions are forecast into 2024/25 as the full benefit of the modernisation programme (IPSL in particular) is due to be delivered and contingency built into the 2023/24 business plan (allocated across all price controls) is released to cover increased bad debt and WINEP costs (which sit outside the water price controls).

The exit cost run rate at the end of AMP7 is then expected to continue throughout AMP8 with minor fluctuations as a result of the principal use recharge reducing slightly each year as assets become fully depreciated.

PR19 forecast other operating costs of c£150m pa. for AMP7 (at 17/18 prices) which is £177m at 22/23 prices. This compares to an average of £172m pa in CW2.6.

Cumulo rates

See commentary for business rates table CW10.

Abstraction charges and discharge consents

Following the Environment Agency's (EA) Water Resource consultation and Strategic Review of Charges for abstraction, we have incurred abstraction charges at the new, revised rates in 2022/2023 increasing our annual fee from £5.0m to £9.7m. This increased cost has been included in AMP8, with no further step changes in cost assumed.

Costs associated with TMA

We are not expecting any additional councils to start charging traffic management permit fees. The permit fees for the current business plan year have been based upon business planned volumes of activity and contractual price increases for TTROs. Beyond the current business plan year we do not expect the level of activity to fluctuate significantly.

Equity issuance costs

There are no new equity issuances expected between now and 2030.

4. CW3 Enhancement expenditure analysis – water resources and water network plus

CW3 is the Enhancement data associated with the Water Resources and Water Network Plus Price Controls, for both capital and operation expenditure.

As part of our PR24 planning we have assessed what parts of the programme are driven from base. All our solutions are broken down into individual cost elements and these elements are allocated as a new / additional asset or a like for like replacement asset. Where a cost element if for like for like replacement, we have allocated this to base. We carried out extensive engagement with our customers, communities and stakeholders. Information on our engagement approach can be found in Chapter 6. Much of this engagement related to storm overflows and the importance of water quality in the rivers, streams and seas of Yorkshire as outlined below

Lines CW3.1 and CW3.2 contains the expenditure associated with Biodiversity and Conservation, along with CW3.10, CW3.11 and part of CW3.29 and CW3.32 (£2.005m total Investigations), the justification and evidence behind these costs are set out in our Enhancement Case "WINEP Biodiversity and Invasive Species".

For Lines CW3.3 and CW3.4 we have identified £9.699m of expenditure that will be for Eels/fish entrainment screens, with £0.115m on Investigations. Details behind this value can be found in the Enhancement Case "Fish screening- Eels/SAFFA".

Eels/fish passes, lines CW3.7 and CW3.8, is equal to £7.697 totex and alongside £3.436m of Investigations, the justification for this expenditure can be found in the "Fish Passage and Rover Restoration" Enhancement Case.

The Drinking Water Protected Area lines, CW3.13 and CW3.14, contain the operational expenditure associated with the Catchment Management schemes. Further details of these solutions are available in the Enhancement case "Surface Water".

Lines CW3.16 and CW3.17 contains the expenditure associated with the Water Framework Directive, totalling £9.648m, this along with a proportion of the Investigations (£3.695m), is evidenced in our Enhancement Case "Water Resources".

There is no proposed investment for lines CW3.19 and CW3.20, Wetland Creation.

There is no proposed investment for lines CW3.22 and CW3.23, Trade effluent discharge flow monitoring.

There is no proposed investment for lines CW3.25 and CW3.26, 25 year environment plan for either of the Clean water Price Controls.

The Water Resource Management Plan is split over the lines CW3.41 – CW3.49, with the detailed justification and evidence behind the values held in the Enhancement Case "Supply-Demand Balance".

There is no proposed investment for lines CW3.50 and CW3.51, Interconnectors delivering benefits in 2025-2030.

There is no proposed investment for lines CW3.53 and CW3.54, Supply demand balance improvements delivering benefits starting from 2031.

There is no proposed investment for lines CW3.56 and CW3.57, Strategic regional resource solutions.

Metering for our Enhancement Programme is captured in lines CW3.60-CW3.90, this is in addition to the Base expenditure we have in the Programme at £141.108m. We propose no expenditure in AMP8 for Replacement of existing basic meters with AMR meters for residential customer (lines CW3.69-70) nor Replacement of existing basic meters with AMR meters for business customers (lines CW3.78-79). Full details of our Metering expenditure can be found in Enhancement case "Metering"

The justification for our Water Quality Improvement drivers can be found in the Enhancement Case "DWI enhancement case". This covers lines CW3.91-92, CW3.97-98, CW3.106-107 and CW3.109-110. In addition, associated with these lines is the base elements of these schemes, totalling £6.909m.
There is no proposed expenditure for lines CW3.64-95, Improvements to taste, odour and colour (green solutions); CW3.100-101 - Addressing raw water quality deterioration (green solutions); CW3.103-104 - Conditioning water to reduce plumbosolvency for water quality; CW3.112-13 - Internal lead supply pipes replaced or relined; and CW3.115-16 - Other lead reduction related activity.

Our Resilience expenditure is detailed in the Enhancement case "WSS Resilience Strategy." There is no expenditure in lines CW3.118 and CW3.119 as we propose this is delivered using the direct procurement for customers route.

Lines CW3.121 and CW3.122 hold the expenditure the SEMD side of security. Full justification and evidence for these solutions can be found in the Enhancement Case "Security – SEMD". These are solutions fall completely into the Water Network Plus price control.

Security – Cyber is fully in the Water Resources and Water Network price controls in lines CW3.124 and CW3.125. Justification and evidence of these costs can be found in Enhancement case "Security – Cyber".

Lines CW3.127 and CW3.128 is the expenditure for Greenhouse gases. This is 50% of the expenditure, the other 50% is in CWW3.177 and CWW3.178 (with additional expenditure). The costs for the full solutions (including waste) can be found in Enhancement case "Net Zero".

For 2025-30 we have added one extra line, DWI-E-CAFF new target, to CW3 line 132. This equates to £10.370m capital expenditure to provide for the Regulatory Compliance with the Enhanced Cyber Assessment Framework introduced by the DWI in June 2023. Further details can be found in the Enhancement case "Security – Cyber-ECAF". This is as per Ofwat guidance to use an additional line for this expenditure.

5. CW4 Raw water transport, raw water storage and water treatment

Table CW4, Lines 1 & 2 - Total number of balancing reservoirs, Total volumetric capacity of balancing reservoirs

In 2020-21 it became a new requirement to report balancing reservoirs, previously they had been included in the total number of reservoirs. In 2021-22, Tophill Low No 1 & No 2 ESR changed from Balancing to Resource. Therefore, the total number of balancing reservoir decreased by two. There have been no further changes to the reported number and there is no intention for this to change during AMP8.

Table CW4, Lines 3 & 4 - Total number of raw water transport stations & installed power capacity

The main source of information has been the breakdown of the APR data (Table 6A) which provided us the 2022-23 data. There are no schemes planned within the PR24 Submission, therefore this has been carried over at the same value.

Table CW4, Line 5 - Total length of raw water transport mains and other conveyors

Raw Water mains length is calculated within our Geographic Information System so only the total values are available. There was a reduction in the length of transport mains reported in 2020-21 which coincides with a similar increase to the reported length of abstraction mains. The assumption is that this would have been a result of a validation exercise. The reported numbers in the APR over the last two years have remained

consistent and there are no schemes planned for PR24, so this has been carried over at the same value.

Table CW4, Line 6 - Average pumping head ~ raw water transport
The values for average pumping head have remained consistent over time but recently has seen a small reduction. This has been reflected in the forecast by applying a 3-year rolling average using historically reported APR values.

Table CW4, Line 7 - Energy consumption – raw water transport (MWh)
Reported energy consumption values have remained consistent for the last 3 years. This has been reflected in the forecast by applying a 3-year rolling average using historically reported APR values.

Table CW4, Lines 8 & 9 - Total number of raw water transport imports, Water imported from 3rd parties to raw water transport systems
We have a single bulk transfer agreement to import from Severn Trent Water. The import provides a raw water source (approximately 50Ml/d) to a single water treatment works in the south of our region from the Derwent Valley reservoirs in the Severn Trent Water region. This will continue to 2030. No other agreements are planned.

Table CW4, Lines 10 & 11 - Total number of raw water transport exports, Water exported to 3rd parties from raw water transport systems
There is an agreement in place to allow transport export from Scammonden to privately owned catchments which will continue. Volumes for the last 2 years are low this data has been used to forecast for AMP8.

Table CW4, Line 12 - Total length of raw and pre-treated (non-potable) water transport mains for supplying customers
We do not currently operate any schemes of this nature, this is reflected through historic APR data which has been consistently reported as 0. After consultation with the relevant company expert and a review of the PR24 submission there will be no change to these values.

Table CW4, Lines 13-42 - Water treatment - treatment type analysis, works size
Table 6A of the APR has provided the 2022-23 data. This data has its own A written assurance procedure signed off by its relevant tier 2 Manager. WTW band is based on the distribution input at each WTW in comparison to the size band ranges. Some WTWs operate close to the band boundaries which explains the occasional shift in bands. WTW Type has been assigned by listing the treatment processes at each WTW and comparing this to the WTW type criteria.
The forecast accounts for any site-specific changes planned through the remainder of AMP7 and AMP8 in line with DWI and WRMP programmes. The forecasted annual leakage projections have then been applied to the proportion of distribution input.
We have two non-operational, unused WTW, however, as they have not been decommissioned, there is potential for them to come back into service so in accordance with the guidance they have been included:

Littleworth WTW, is not operational, but still included in the WTW count.
North Newbald WTW, is not operational, but is still included in the WTW count.

Table CW4, Line 43 - Peak week production capacity
The reported value from the 22-23 APR submission has been used as the baseline. PR24 project charter data and WRMP draft plans have been assessed to identify any site-specific improvements that would increase maximum site flow, these increases have then been applied to the baseline at the expected time of benefit realisation. Improvement schemes comprise –
AMP7 DWI-Fixby WTW-4mld increase–expected completion 2023-24
AMP8 WRMP-Brayton BH–6mld increase–expected completion 2025-26
AMP8 WRMP-Marton-cum-Grafton–5mld increase-expected completion 2027-28
AMP8 DWI-East Ness WTW-5mld Increase-expected completion 2027-28
AMP8 WRMP-Sherwood Sandstone BH-15mld increase-expected completion 2028-29
AMP8 WRMP-New WTW (Doncaster BH) Magnesium Limestone-5mld increase-expected completion 2028-29
AMP8 DWI-Loxley WTW-5mld increase-expected completion 2028-29
AMP8 WRMP-Elvington WTW-50mld increase-expected completion 2029-30

Table CW4, Line 44 - Peak week production capacity having enhancement expenditure for grey solution improvements to address raw water quality deterioration
There are 3 schemes planned to deliver a peak week production capacity benefit through addressing raw water quality. Fixby WTW works will be completed during AMP7 with schemes for Loxley WTW and East Ness WTW being implemented in AMP8 as part of the DWI submission.

Table CW4, Line 45 - Peak week production capacity having enhancement expenditure for green solutions improvements to address raw water quality deterioration
There are a number of schemes included within the AMP8 WINEP programme that will investigate the feasibility of options for improvements in the future but will yield no benefit in the period up to 2030.

Table CW4, Line 46 - Total water treated at more than one type of works
We don't currently treat water at more than one type of works. This is consistent with previous APR reports and no change is expected.

Table CW4, Line 47 - Number of treatment works requiring remedial action because of raw water deterioration
There are currently 6 treatment works requiring remedial action because of raw water deterioration. Improvements to Sladen WTW, Chellow WTW, Embsay WTW & Tophill Low WTW are programmed to be completed within AMP7. A scheme for Fixby WTW is planned for AMP8 as part of the DWI submission.

Table CW4, Line 48 - Zonal population receiving water treated with orthophosphate
There are no additional site or population zones receiving water treated with orthophosphate. The increase in population is as a result of forecast population growth.

Table CW4, Line 49 - Average pumping head – water treatment
We do not anticipate any major changes in average pumping head. A 3-year rolling average using historically reported APR values has been used to forecast forward.

Table CW4, Line 50 - Energy consumption - water treatment (MWh)
There has been minimal movement year on year, and we do not expect anything to significantly impact this measure.

Table CW4, Line 51-54 – Water Treatment Import & Export
No third-party imports or exports for water treatment works.

Table CW4, Line 55 - Total number of water treatment works effluent discharges requiring new MCERTS flow monitoring
4 sites require MCERTS flow monitoring as part of the WINEP programme for AMP8.

We have given the data in this table a confidence grade C3.

For a forward-looking view for AMP8 we have used project charter information (manual EDA data) which is independently assured, or we have spoken to relevant company experts for water resources elements.

CW4a is purposefully left blank as we do not have any transitional or accelerated expenditure to report.

6. CW5 Treated water distribution – assets and operations.

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

AMP7
Build on APR data and knowledge of 1 new pumping station being constructed in year 4 (Hainworth 12Kw). Additional 12Kw added in Year 4 and rolled forward in Year 5.

AMP8
Year 1,2,3,4 rolled forward from AMP7. There are 2 pumping stations due to be abandoned in Year 5 (Springhill 12kW & Stepney Road 6kW) replaced with 1 new pumping station (Springhill No2 13.5kW). 4.5Kw taken off in Year 5.

CW5.2 - Total volumetric capacity of service reservoirs
AMP7
Build on APR data, no changes in Year 4.
1 new service reservoir being constructed (Malton Norton 3.8ML) in Year 5. Additional 3.8ML included in Year 5.

AMP8
1 new service reservoir to be constructed (Harton 9.7ML), capacity increase to 1 existing reservoir (Scotton 2.5ML) and decommissioning of 2 reservoirs (Gandale No1. 0.45ML & No2. 0.9ML) in Year 1. Additional 10.85ML included in Year 1.

Year 2 nothing in the plan, rolled forward.

1 new clean water tank in the programme for Year 3 (Nutwell 30ML) and 1 new reservoir in Year 5 (Riddlesden 6ML). Additional 30ML included in Year 3, Year 4 rolled forward, and additional 6ML included in Year 5.

CW5.3 - Total volumetric capacity of water towers
AMP7/8
APR Data rolled forward as no schemes in plan - no change in numbers.

CW5.4 - Water delivered (non-potable)
AMP7/8
APR Data rolled forward as no schemes in plan - no change in numbers.

CW5.8 - Proportion of distribution input derived from impounding reservoirs
AMP7/AMP8
Build on APR data and 3 year rolling average applied to all years.

CW5.9 – Proportion of distribution input derived from pumped storage reservoirs
AMP7/AMP8
Build on APR data and 3 year rolling average applied to all years.

CW5.10 – Proportion of distribution input derived from river abstractions
AMP7/AMP8
Build on APR data and 3 year rolling average applied to all years.

CW5.11 – Proportion of distribution input derived from groundwater works, excluding managed aquifer recharge (MAR) water supply schemes
AMP7/AMP8
Build on APR data and 3 year rolling average applied to all years.

CW5.12 - Proportion of distribution input derived from artificial recharge (AR) water supply schemes
AMP7/8
Build on APR data and 3 year rolling average applied to all years.

CW5.13 - Proportion of distribution input derived from aquifer storage and recovery (ASR) water supply schemes
AMP7/8
Build on APR data and 3 year rolling average applied to all years.

CW5.14 - Proportion of distribution input derived from saline abstractions
AMP7/8
Build on APR data and 3 year rolling average applied to all years.

CW5.15 - Proportion of distribution input derived from water reuse schemes
AMP7/8
Build on APR data and 3 year rolling average applied to all years.

CW5.16 - Total number of potable water pumping stations that pump into and within the treated water distribution system
Sum of the lines CW5.17, 18, 19 & 20.
AMP7 Year 4/5 Is based on the company business plan, 1 additional new pumping station in Year 4 (Hainworth 12Kw).
AMP8
PR24 Business Plan includes 2 pumping stations planned for decommission (Springhill 12kW & Stepney Road 6kW) and replaced with 1 new pumping station in Year 5 (Springhill No2 13.5kW).

CW5.17 - Number of potable water pumping stations delivering treated groundwater into the treated water distribution system
AMP7/8
APR Data rolled forward as no schemes in plan - no change in numbers.

CW5.18 - Number of potable water pumping stations delivering surface water into the treated water distribution system
AMP7/8
APR Data rolled forward as no schemes in plan - no change in numbers.

CW5.19 - Number of potable water pumping stations that re-pump water already within the treated water distribution system
AMP7
Build on APR data and knowledge of 1 new pumping station being constructed in year 4 (Hainworth 12Kw).
Additional 1 included in Year 4 and rolled forward in Year 5.

AMP8
Year 1,2,3,4 rolled forward from AMP7. There are 2 pumping stations due to be abandoned in Year 5 (Springhill 12kW & Stepney Road 6kW) replaced with 1 new pumping station (Springhill No2 13.5kW). 1 taken off in Year 5.

CW5.20 - Number of potable water pumping stations that pump water imported from a 3rd party supply into the treated water distribution system
AMP7/8
APR Data rolled forward as no schemes in plan - no change in numbers.

CW5.21 Total number of service reservoirs
AMP7
Build on APR data, no changes in Year 4.
1 new service reservoir being constructed (Malton Norton 3.8ML) in Year 5. Additional 1 included in Year 5.

AMP8
1 new service reservoir to be constructed (Harton 9.7ML), capacity increase to 1 existing reservoir (Scotton 2.5ML) and decommissioning of 2 reservoirs (Gandale No1. 0.45ML & No2. 0.9ML) in Year 1. Exclude 1 in Year 1.

Year 2 nothing in the plan, rolled forward.

1 new clean water tank in the programme for Year 3 (Nutwell 30ML) and 1 new reservoir in Year 5 (Riddlesden 6ML). Additional 1 included in Year 3, Year 4 rolled forward, and additional 1 included in Year 5.

CW5.22 - Number of water towers
AMP7/8
APR Data rolled forward as no schemes in plan - no change in numbers.

CW5.23 - Energy consumption – treated water distribution (MWh)
AMP7/AMP8
Build on APR data, 3-year average applied to all years.

CW5.24 - Average pumping head – treated water distribution.
AMP7/AMP8
Build on APR data, 3-year average applied to all years. Based on one drought year and two normal years this will take into account historical growth rates. We do not anticipate any major changes in average pumping head. A 3-year rolling average using historically reported APR values has been used to forecast forward. Includes 1 dry year in the average. Where averages have been applied the historic growth rate has been considered as part of this method.

CW5.25 - Total number of treated water distribution imports
AMP7/8
APR Data rolled forward as no schemes in plan - no change in numbers.

CW5.26 - Water imported from 3rd parties to treated water distribution systems.
AMP7/8
APR Data rolled forward as no schemes in plan - no change in numbers.

CW5.27 - Total number of treated water distribution exports
AMP7/8
APR Data rolled forward as no schemes in plan - no change in numbers.

CW5.28 - Water exported to 3rd parties from treated water distribution systems.
AMP7/8
APR Data rolled forward as no schemes in plan - no change in numbers.

CW5.29 - Peak 7 day rolling average distribution input.
AMP7/8
Based on % adjustment of line CW5.38 Distribution Input 2022/23 data. Subject to change following revised WRMP.

CW5.30 - Peak 7 day rolling average distribution input / annual average distribution input
AMP7/8
This line is calculated. Subject to change following revised WRMP.

CW5.31 - Measured household consumption (excluding supply pipe leakage)
CW5.32 -Unmeasured household consumption (excluding supply pipe leakage)
CW5.33 - Measured non-household consumption (excluding supply pipe leakage)
CW5.34 - Unmeasured non-household consumption (excluding supply pipe leakage)

AMP7/8
Back calculated from company PC forecasts for PCC/Business demand. Subject to change following revised WRMP.

CW5.35 – Total Annual Leakage
AMP7/8
Based on company PC forecasts. Subject to change following revised WRMP.

CW5.36 -Distribution system operational use
AMP7/8
APR process no change to current performance. This is lower than the allowed threshold. Subject to change following revised WRMP.

CW5.37 -Water Taken Unbilled
AMP7/8
Unbilled Water – marginal decrease forecast over the next 7 years to return to 2017/18 levels.
The effort of reducing voids and gap sites has materialised this AMP7 resulting in recent reduction. The ongoing austerity and predicted increase in void performance forecast in WRMP will impact delivering much of a reduction in this area. Subject to change following revised WRMP.

CW5.38 -Distribution Input
AMP7/8 Forecasts
Based on all the water balance elements. Percentage adjustment applied based on line CW5.38 Distribution Input 2022/23 data. Subject to change following revised WRMP.

CW5.39 -Distribution Input pre MLE

AMP7/8 Forecasts based on a % adjustment of actual data 2022/23. Subject to change following revised WRMP.

Components of total Leakage (post MLE) CW5.58-67

CW5.58 Leakage Upstream of DMA

See current APR procedure document listed above for current methodology.
The forecast for the next 7 years predicts Leakage Upstream of DMA remaining as a constant of 14% of total leakage. Subject to change following revised WRMP.

CW5.59 Distribution Main Losses

See current APR procedure document for current and ongoing methodology.
Distribution Main Losses is DMA leakage minus supply pipe losses. We've assumed supply pipe losses remain a constant of 29.9% of through the remainder of this AMP and throughout AMP8.
Total Leakage – Leakage Upstream of DMA = DMA Leakage .
DMA Leakage – 29.9% of DMA Leakage = Distribution Main Losses.
Subject to change following revised WRMP.

CW5.60-67 Supply Pipe Losses

See Water Balance APR procedure for current and ongoing methodology of calculating supply pipe losses across each of the component groups.

We assume three different supply pipe rates to calculate supply pipe losses for each property type based on the 2021-22 assessment for supply losses completed by Stantec.

Type	1	2	3
Properties	Unmeasured households, internally metered households, void properties, unmeasured non-households	Externally metered households	Measured non-households
2021-22 Rate	X	X*0.26	X*0.36

To apportion total supply pipe leakage across the different property types, a Goal Seek approach is used. The Goal Seek tool in Excel is a process of calculating a value (in this case, supply pipe leakage rate X) by performing a 'what-if' analysis on a given set of values. It allows you to adjust a value (X) to achieve a specific goal. In our example, this ensures the supply pipes losses for each property type give the correct total SPL value based on the allocated rates.

GOAL SEEK INSTRUCTIONS		Ml/d	l/prop/d
-Assumes 29.9% of DMA leakage is Supply Pipe Leakage	Total Supply Pipe Leakage	70.88	
-Relative rates of property SPL are defined in relation to an unmetered household	Unmeasured households	36.60	41.35
	Measured households (external metered)	8.47	10.75
- [Data > What-If Analysis > Goal Seek] then set cell E11 to 0 by changing cell F4 (highlighted cells)	Measured households (internal metered)	18.51	41.35
	Measured non-households (external metered)	1.18	14.89
	Measured non-households (internal metered)	1.04	41.35
	Unmeasured non households	0.55	41.35
	Voids: households and non households	4.53	41.35
	diff.	0.00	

For the forecast years, the forecast property numbers from the WRMP have been used to calculate the associated supply pipe leakage volumes.

Property Counts							
	2023/24	**2024/25**	**2025/26**	**2026/27**	**2027/28**	**2028/29**	**2029/30**
Measured Households	1317884	1366653	1416369	1464454	1510906	1556171	1600567
Unmeasured Households	829533	802533	775533	750533	725533	700533	675533
Measured HH Voids	47402	49507	51673	53783	55847	57883	59902
Unmeasured HH Voids	45574	44412	43229	42119	40984	39826	38646
Unmeasured Non HH	13590	13470	13350	13330	13250	13200	13150
Measured Non HH	106598	106494	106391	106287	160184	16080	105977
Total NHH Voids	20900	20900	20900	20900	20900	20900	20900

Subject to change following revised WRMP.

We have given the data in this table a confidence grade C3.

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

CW6.1 - Total length of potable mains

AMP7/8 Build on APR data, previous year plus Total length of new potable mains line (CW6.4).

CW6.2 - Total length of potable mains

AMP7/8 No plans to carry out re-lining.

CW6.3 - Total length of potable mains renewed.
AMP7 Lengths based on the AMP7 turnaround plan.
AMP8 Lengths based on 0.66% mains renewal program.

CW6.4 - Total length of new potable mains
AMP7/8 Lengths based on 5-year average.

CW6.5 – CW6.8
AMP7/8 Based on previous year proportional diameter splits.

CW6.9 TO CWCW6.16
AMP7/8 Reduced the mains lengths by the contribution of age band from previous year.

CW6.17 - Total length of potable mains laid or structurally refurbished during and after 2021.
AMP7/8 Build on APR data plus CW6.3 & CW6.4

CW6.18 - Number of lead communication pipes
AMP7/8 Previous year minus CW.21 & CW.22

During APR23 there was a methodology change for this line, Ofwat APR queries have been responded to and historic numbers restated. For PR24 data table lines the new methodology has been adopted as a starting point for this line.

CW6.19 - Number of galvanised iron communication pipes
AMP7/8 Reduction based on 3-year average comm pipe jobs 2570, of which a proportion is assumed to be GI based on the APR process (51.7%).

APR23 there was a methodology change for this line, Ofwat APR queries have been responded to and historic numbers restated. For PR24 data table lines the new methodology has been adopted as a starting point for this line.

CW6.20 – Number of communication pipes Other
Increase based on forecast of new properties in SUP1B.

CW6.21 - Number of lead communication pipes replaced or relined for water quality.
AMP7
Based on year 3 only as Year 1/2 we replaced more than usual.

AMP8

The numbers are based on the DWI Submission for Lead removal.

CW6.22 - Number of lead communication pipes replaced for other reasons.
AMP7/8 Based on 3-year average replacements.

CW6.23 - Total length of lead communication pipes replaced or relined.
AMP7/8 Length assumed to be 4 meters average (combination of short and long side)

CW6.24 - Number of external lead supply pipes replaced or relined.
AMP7 22/23 Based on PS20/PS21 jobs including proactive batched jobs for supply pipe 2655 were replaced (41.2%) and 3787 were repaired. The 2023/2024 and 2024/2025 Business Plan target is 1508 replaced (41.2%) 2152 replaced.

CW6.25 - Total length of external lead supply pipes replaced or relined.
Assumed length 10m. Multiply by line above.

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

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

CW6.28 - Company Area
Based on previously reported APR values, assuming no change.

CW6.29 - Compliance Risk Index
This is based on the company's PC forecast for CRI.

CW6.30 - Event Risk Index
ERI scores are by nature very variable, a typical 3 year rolling average calc is skewed by extreme values. The most recent very high scoring events now have instruments etc in place so in theory shouldn't happen again. A method has been used to remove the outlying extreme values to get to a more reasonable forecast.

We have given the data in this data table a confidence grade C3.

CW6a Transition and accelerated programme -Water network+ - Mains, communication pipes and other data - is purposefully left blank as we do not have any transitional or accelerated expenditure to report.

8. CW7 Demand management - Metering and leakage activities

CW7.01

This row has been populated in line with Ofwat guidance. The row reports actual levels of New optant meters, plus forecast levels of optants from FY23/24 onwards. The main point of clarity is that in FY 22/23 we have transitioned to AMI smart metering. As such there is a split between AMR and AMI meters in 23/24, before all meters thereafter are installed as AMI. The AMP8 WRMP24 forecast is 25K meters being installed as DMO per year.

CW.02

NA

CW.03 & 0.8

We install meters on business new connections as standard. There are a small number of new connections for business customers which do not follow the developer services process. As such they end up without a metering being fitted. We have reported actual and modelled future levels of business customers who do no follow Developer Services process. We then retrospectively fit a smart meter, once this property has been identified as being converted to a business dwelling or is a new connection but not gone through developer services process (this may occur a significant time post the original connection). As such for AMP8 it is forecasted 500 Meters per year will require installing for Business customers, who previously were not metered.

CW.04 & 05

The AMP7 costs have been established using APR reported data. The main change being we have transitioned to AMI as standard during the year 2023/24. Future costs are a combination of costs for the meter exchange programme (end of life AMR replacement with AMI), plus the costs for meters failing per year, based on a modelled failure rate.

For AMP8 the meter exchange programme which Dominates the costs in this row are in line with the number of exchanges forecasted per year. In year 1 the ~140K meters exchanged, followed by ~320K meters exchanged years 2-4, before a drop to ~198K meters in year 5.

CW7.06

These forecasts have been calculated in line with WRMP methodology and included inWRMP24. Note the move to AMI as standard in FY 2023/24. For AMP8 25K meters are forecasted per year.

CW7.07
N/A

CW7.09-14
These forecasts have been derived using corporate system data of our metering asset records. The categorisation into basic, AMR, HH and NHH has had limited assumptions applied. These numbers are aligned to WRMP exchange programme numbers + an accepted meter failure rate.

All new meters installed or exchanged are AMI from partway through FY2023/24.

For AMP8 most meter exchanges are AMR to AMI for Household customers with the highest volume of meters being exchanged in year 2-4.

CW7.15
Forecasted benefits for AMI install, compared to AMR are assumed to be 4% greater. This accounts for the increase in benefit from 23/24 when smart meters have been installed as standard. The additional benefit per year is consistent with 1.44 additional MLD being saved per year in line with the 25K meters being installed per year.

CW7.16
Forecasted benefits for AMI install, compared to AMR are assumed to be 3% greater. This accounts for the increase in benefit from 23/24 when smart meters have been installed as standard.
The additional benefit per year is consistent per year in AMP8 at 0.02 MLD in line with the 500 meters installed per year.

CW7.17
Basic to Smart (AMI) meters account for 200 meters per year. As such the return is 0 to 2 decimal points. The PCC improvement would be 3% vs AMR. This programme is a consistent programme per year in AMP8.

CW7.18
Most of the smart metering exchange programme by number of meters is AMR to AMI exchange for HH customers. The additional benefits derived per year is proportional to the number of meters installed with year's 2-4 having the highest install rate and accruing 2.36MLD of benefit per year, with years 1 and 5 providing a proportional improvement according to the meter exchange numbers

CW7.19
The additional benefits derived per year for NHH basic meters being exchanged for AMI meters, is proportional to the number of meters installed with year's 2-4 having the highest install rate and accruing 0.4LD of benefit per year, with years 1 and 5 providing a proportional improvement according to the meter exchange numbers.

CW7.20
The additional benefits derived per year for NHH AMR meters being exchanged for AMI meters, is proportional to the number of meters installed with year's 2-4 having the highest install rate and accruing 0.58LD of benefit per year, with years 1 and 5 providing a proportional improvement according to the meter exchange numbers.

CW7.21
Smart Metering penetration for HH properties following Ofwat guidance starts at 60.1% in FY22/23 being AMR. As we change policy for AMI only for installs and exchange the % meter penetration transitions from AMR to AMI. With the additional of new meters through DMO and new development, this ends the AMP with 66.5% of HH customers be metered with an AMI, and 2.9% of customers being metered with an AMR. The remaining AMR customers will be converted to AMI in AMP9.

CW7.22 & 23
PCC in FY22/23 starts at 103.7 for metered customers and 149 for unmetered customers before rising to 110.82 and 158.04 for the remainder of AMP7. The increase in PCC from 22/23 values is due to the exceptional circumstances in FY22/23 where a national drought was in place across a range of water companies, with Temporary Usage Bans put in place, and significant water efficiency messaging being sent to customers.
Investment in Smart metering through the AMP, identifying continuous flow, water wastage and habit change then improves the PCC values incrementally through the AMP in line with the meter exchange and install programme finishing the AMP at 107.11 for metered and 157.6 for unmetered customers.

CW7.24 & 25
New meter installation costs based on the most common meter size DN15 externally installed are detailed in this return. All meters installed from FY23/24 are AMI.

CW7.26-33
We will only exchange or install AMI technology from FY22/23.
The base cost for HH meters, are the costs to replace the current solution. The enhancement costs are the costs to install an AMI in its entirety if the meter has previously not had an AMR installed. Or the delta in cost from an AMR to an AMI if the meter has previously had an AMR installed.

The same logic has been applied for business customers.

CW7.34-41
NA, the proposed programme does not plan to retrofit/ upgrade existing meters to AMI.

CW7.42 & 43
New mesters installed derive a leakage benefit based on the prevalence of supply pipe leakage, this is consistent for HH & business customers at 22.00 L/day.

Savings from Water consumption/ wastage are based on a % saving from the unmetered PCC and occupancy rate for HH customers resulting in 57.7 L/d.
For NHH customers the figure of 49.6L/d is based upon a % saving from the average NHH consumption (accommodating voids), which are not already logged as a Continuously Logged User, which already have 15-minute flow granularity in data.

CW7. 44 & 46
We are only exchanging to fit AMI's from FY23/24.
Savings from leakage of 3.9L/d are based on an expected saving in supply pipe leakage per property when converted to AMI. PCC savings are calculated at 11.3L/d based upon a % PCC improvement based on existing metered PCC and occupancy rate. There is no difference in benefit whether the previous metering solution was basic on a 6-month billing cycle or an AMR meter on a 6 month billing cycle.

CW7.45 & 47
Savings from leakage of 3.9L/d are based on an expected saving in supply pipe leakage per property when converted to AMI.

For NHH customers the figure of 49.6L/d is based upon a % saving from the average NHH consumption (accommodating voids), which are not already logged as a Continuously Logged User, which already have 15-minute flow granularity in data.

CW7.48-51
We are not planning a meter upgrade programme, as such there is 0 return in these rows.

We have given the data in this table a confidence grade B3.

CW7a - Transition and accelerated programme - Demand management - Metering activities is purposefully left blank as we do not have any transitional or accelerated expenditure to report.

9. CW8 - WRMP schemes (excluding leakage and metering activities)

This section of the data table commentary will outline how the draft WRMP outputs have been aligned and transposed into the CW8 table.

1. Naming and reference alignment with draft WRMP

The names of schemes in CW8 has been aligned to the names in the draft WRMP submission. See 'Draft WRMP Alignment' sheet in the evidence spreadsheet for more information.

2. Benefits

The benefit year has been aligned to the figures defined in the WRMP. Confirmed with WRMP SMEs to include the benefit on completion column in tables. Benefit year aligned with WRMP but assuming no early start.

3. Early start/Transitional funding

No transitional funding proposed for the WRMP plan, the phasing of cost and benefits has been altered to align with this.

4. Direct Procurement for customers (DPC)

DV8 (iv), DV8 (V) are delivered through DPC so costs have been removed from the CW8 table.

5. Inflation

Inflation of costs to 22-23 CPIH annual average.

6. Scheme Costing

Costing of schemes have been aligned to the dWRMP solutions entered into the WRMP data tables in the November 2022 submission. Due to the change in phasing required a percentage weighted split has been applied to all supply schemes. Note: Water efficiency costs are also included in this split across the supply schemes.

The methodology for calculating operating costs for less than 12 months is to enter ½ of annual operating costs derived from our unit cost database models. All costs in years after 2029/30 apply to annual operating costs.

There are no schemes delivered through transitional expenditure, all investment moved to start in 2025 or later.

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

CW9 is the cumulative Enhancement data associated with the Water Resources and Water Network Plus Price Controls, for both capital and operation expenditure. The overall AMP8 expenditure, by line, is the same for CW3 as CW9.

As part of our PR24 planning we have assessed what parts of the programme are driven from base. All our solutions are broken down into individual cost elements and these elements are allocated as a new / additional asset or a like for like replacement asset. Where a cost element if for like for like replacement, we have allocated this to base.

Lines CW9.1 and CW9.2 contains the expenditure associated with Biodiversity and Conservation, along with CW9.10, CW9.11 and part of CW9.29 and CW9.32 (£2.005m total Investigations), the justification and evidence behind these costs are set out in our Enhancement Case "WINEP Biodiversity and Invasive Species".

For Lines CW9.3 and CW9.4 we have identified £9.699m of expenditure that will be for Eels/fish entrainment screens, with £0.115m on Investigations. Details behind this value can be found in the Enhancement Case "Fish screening- Eels/SAFFA".

Eels/fish passes, lines CW9.7 and CW9.8, is equal to £7.697 Totex and alongside £3.436m of Investigations, the justification for this expenditure can be found in the "Fish Passage and Rover Restoration" Enhancement Case.

The Drinking Water Protected Area lines, CW9.13 and CW9.14, contain the operational expenditure associated with the Catchment Management schemes. Further details of these solutions are available in the Enhancement case “Surface Water”.

Lines CW9.16 and CW9.17 contains the expenditure associated with the Water Framework Directive, totalling £9.648m, this along with a proportion of the Investigations (£3.695m), is evidenced in our Enhancement Case “Water Resources”.

There is no proposed investment for lines CW9.19 and CW9.20, Wetland Creation.

There is no proposed investment for lines CW9.22 and CW9.23, Trade effluent discharge flow monitoring.

There is no proposed investment for lines CW9.25 and CW9.26, 25-year environment plan for either of the Clean water Price Controls.

The Water Resource Management Plan is split over the lines CW9.41 – CW9.49, with the detailed justification and evidence behind the values held in the Enhancement Case “Supply-Demand Balance”.

There is no proposed investment for lines CW9.50 and CW9.51, Interconnectors delivering benefits in 2025-2030.

There is no proposed investment for lines CW9.53 and CW9.54, Supply demand balance improvements delivering benefits starting from 2031.

There is no proposed investment for lines CW9.56 and CW9.57, Strategic regional resource solutions.
Metering for our Enhancement Programme is captured in lines CW9.60-CW9.90, this is in addition to the Base expenditure we have in the Programme at £141.108m. We propose no expenditure in AMP8 for Replacement of existing basic meters with AMR meters for residential customer (lines CW9.69/70) nor Replacement of existing basic meters with AMR meters for business customers (lines CW9.78/79). Full details of our Metering expenditure can be found in Enhancement case “Metering”.

The justification for our Water Quality Improvement drivers can be found in the Enhancement Case “DWI enhancement case”. This covers lines CW9.91/92, CW9.97/98, CW9.106-107 and CW9.109-110. In addition, associated with these lines is the base elements of these schemes, totalling £6.909m.
There is no proposed expenditure for lines CW9.64-95, Improvements to taste, odour and colour (green solutions); CW9.100-101 - Addressing raw water quality deterioration (green solutions); CW9.103-104 - Conditioning water to reduce plumbosolvency for water quality; CW9.112-13 - Internal lead supply pipes replaced or relined; and CW9.115-16 - Other lead reduction related activity.

Our Resilience expenditure is detailed in the Enhancement case "WSS Resilience Strategy." There is no expenditure in lines CW9.118 and CW9.119 as this has a proposed direct procured for customer delivery route.

Lines CW9.121 and CW9.122 hold the expenditure the SEMD side of security. Full justification and evidence for these solutions can be found in the Enhancement Case "Security – SEMD". These are solutions fall completely into the Water Network Plus price control.

Security – Cyber is fully in the Water Resources and Water Network price controls in lines CW9.124 and CW9.125. Justification and evidence of these costs can be found in Enhancement case "Security – Cyber".

Lines CW9.127 and CW9.128 is the expenditure for Greenhouse gases. This is 50% of the expenditure, for these schemes as they are split between clean & waste price controls. The costs for the full solutions (including waste) can be found in Enhancement case "Net Zero".

For 2025-30 we have added one extra line, DWI-E-CAFF new target, to CW9 line 132. This equates to £10.370m capital expenditure to provide for the Regulatory Compliance with the Enhanced CAF introduced by the DWI in June 2023. Further details can be found in the Enhancement case "Security – Cyber-ECAF".

If further information is required, please see the relevant enhancement case per CW3 commentary.

11. CW10 Wholesale water local authority rates

The current and forecasted liabilities, 2023-24 year have benefitted from a significant 26% reduction in the rating assessment and liability on the 2023 Revaluation. Here the initial assessment from HMRC Valuation Office Agency was Rateable Value £68.2m but after representations and detailed discussions finished as Rateable Value £58.9m. This benefit continues through future years of 2024-25 and 2025-26, and we expect and forecast no material change. We have assumed here that the expected Duty to Declare being introduced by the government will either come into effect from April 2026 or if earlier will not impact significantly on the Clean Water assessment.

From 2026-27 when the next 2026 Revaluation occurs the uncertainty and risk increases significantly – not least as for this submission we have taken a conservative approach to forecasting these liabilities recognising that the actual liability will be totally dependent upon the outcome of the PR24 Final Determination because the rating assessment is likely (assuming it remains the same as the 2023 Revaluation methodology) to be based on Revenue and Expenditure of the Clean Water business from 2026-27. This gives a small increase in liability from the 2026 Revaluation, but with the risk from the uncertainties

already noted and highlighted. We forecast similar costs to continue through future years of 2027-28 and 2028-29, where we expect and forecast no material change. We have assumed here that the expected Duty to Declare being introduced by the government will come into effect from April 2026 and will not impact significantly on the Clean Water assessment.

We have rationalised office premises and space post-pandemic and change to working employee practices with closure of three offices. We have reflected this change of asset stock from 2026-27 which is also the next Revaluation Year with the assumption that the properties will be disposed of by that date. Clean Water has 50% benefit of this saving (c£200K annual).

For 2029-30 when the next 2029 Revaluation occurs, the uncertainty and risk increases significantly again – for the same reasons explained for the 2026 Revaluation - where the actual liability will be totally dependent upon the outcome of the PR24 Final Determination because the rating assessment is likely (assuming the same 2023 Revaluation methodology) to be based on Revenue and Expenditure of the Clean Water business from 2029-30 but with the added uncertainty (and risk) that the rating methodology may change for that Revaluation. We have assumed here that the expected Duty to Declare being introduced by the government due by April 2026 will not impact significantly on the Clean Water assessment in the 2029 Revaluation.

SUPPORT is required in respect of the uncertainty from the two Revaluations, plus the external decisions relating to annual multiplier which is government decided together with our 'default' approach to forecasting the 2026-27 and onwards years using limited data (i.e. not the PR24 Submitted Business Plan data); and these risks should be recognised. Given the uncertainty of two Revaluations where the first in 2026 will impact costs early in the AMP from year 2, together with the 'new' extra liability for the Duty of Declaration (Notification); we consider these cost risks and uncertainty should be acknowledged and covered in the Risk Reward mechanism of 10:10.

CW10.3 To calculate/estimate rates transitional relief CW10.3: 2023/24 is the Actual Relief or Surcharge applied to Charge Bill. This is zero/nil. Relief/Surcharges are set at each national Revaluation next due April 2026. Therefore zero/nil for 2024-25 + 2025-26.
Years 2026/27 + 2027/28 + 2028/29 + 2029/30 figure is estimated as zero/nil following national Revaluations due April 2026 + April 2029 based on the forecasted rateable values and bill liability, per the following assumptions.

2026-27 + 2027-28 + 2028-29 figure has been estimated using methodology adopted by VOA for 2023 Revaluation, taking PR24 Final Determination Income Expenditure Depreciation values of Clean Water business only for 2024-25 Year (see Assumption A & Data Source I). Actual figures will depend on PR24 FD, and then negotiations with VOA.
2029 – 30 figure will be subject to national Revaluation due April 2029 (committed to by current government). Figure kept same as previous FY as no data to forecast from. Actual figures will depend on PR24 FD, and then negotiations with VOA.

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

Third party – price control

Within the price control third party costs, the main contributor is in relation to fire hydrant install and repair (c£0.6-0.7m pa). There is no indication from the fire service that the volume of activity is likely to increase or decrease from current levels into the future and therefore the AMP8 forecast has been held in line with 2024/25 levels.

The remaining costs relate to rechargeable disconnections and third-party damage. No forecast for either of these items is included within the company budgets, with any activity that happens having an equal cost and income impact. Therefore, no forecast has been included for these in AMP8, showing a step down in forecasts after 2022/23.

Third party – non price control

During AMP7 the only third-party costs reported in relation to bulk supply export (NAV activity) has been in relation to staff in the Wholesale Markets team who manage NAV activity. The volume of water supplied to NAV sites has been an immaterial proportion of the overall cost of water supply and combined with the fact that costs cannot be individually identified as directly relating to NAV water supply, they have not been reported as part of third-party costs.

However, with the volume of properties served via a NAV expected to have increased 6 fold between now and the end of AMP8, it felt appropriate to recognise an estimate of the cost of producing the water supplied to NAVs throughout AMP8.

A forecast of the scale of cost was derived by calculating an average Opex cost per ML produced for 2023/24 and applying that unit cost to the forecast ML supplied to NAVs each year throughout AMP8.

Costs are forecast to increase over AMP8 in line with the forecast increase of NAV connections.

13. CW12 Transitional spending in the wholesale water service

We have requested transitional expenditure for 2 areas of the clean water programme, these relate to the smart metering proposal & WINEP Investigations.

Line CW12.31 relates to CW WINEP - River Derwent Habitats Regulations Investigations which have a regulatory date of 31st December 2026 so to enable delivery of that date we require transitional expenditure. More detail on this can be found in enhancement case fish passage river restoration.

Line CW12.84 smart meter infrastructure
We have an ambitious target for AMP 8 to install over 1.55m Smart meters into the network, these meters will provide much greater insight to customers on their usage, help to identify leakage and become a valuable tool in helping to improve customer water efficiency. The transitional expenditure will deliver early benefit to customers and enable benefit linked to the WRMP from the beginning of the AMP8 period. Further information about smart metering can be found in enhancement case metering.

To achieve these targets and be ready to realise the benefits of Smart Metering from the start of AMP8 we need to accelerate the Business Readiness programme.

We are designing and implementing the systems across the business Tec Architecture to enable the benefits realisation from Smart Metering.
This will result in the delivery of upgrades or deployment of new modules to systems such as SAP, Dynamics, EZRI, the billing system, Meter Data Management system and CTP/SDP.

We can confirm that this transitional expenditure meets the criteria set out in appendix 9 as being;
Early design & planning, of large non routine investments and does not include any expenditure related to investments that have 2020-2025 deliverables.
All transitional expenditure aligns with the mapping of expenditure to lines in CW3. There is no proportional allocation to base for the above expenditure.

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

CW13 is the Enhancement data associated with the Water Resources and Water Network Plus Price Controls, for both capital and operation expenditure. The data captures expenditure in both AMP8 and AMP9 for schemes that start in AMP8, and the Present value of costs for the years 2025-2055.

The Present value expenditure was discounted in line with the HMT Green book guidance at the rate of 3.5%.

AMP8 numbers match the relevant lines in table CWW3, further details can be found in CW3 commentary or the relevant Enhancement case.

CW13.2 - Biodiversity and conservation; BVA (WINEP/NEP) water Opex, continues into AMP9 for the River CSMG complimentary measures which starts in 2029/30 and continues for two years in AMP9.

CW13.22 - Water Framework Directive; BVA (WINEP/NEP) water Opex, continues into AMP9 for two schemes Townhead Weir- Bridge Weir Removal and Springhead Weir – Fish Passage.

CW13.61/62 - Demand-side improvements delivering benefits in 2025-2030 (excl. leakage and metering). Work will continue into AMP8 for our WRMP.

CW1.126 - Improvements to taste, odour and colour (grey solutions); BVA enhancement Opex. As part of our DWI submission at Ingbirchworth WTW operational expenditure is required into AMP9 as part of the capital expenditure in AMP8.

CW13.137 - Lead communication pipes replaced or relined for water quality; BVA enhancement capex. Our Lead replacement on our communication pipes continues into AMP9.

CW13.141 - External lead supply pipes replaced or relined; BVA enhancement capex. Our Lead replace or reline programme continues into AMP9.

CW13.154 - Addressing raw water quality deterioration (grey solutions); BVA enhancement Opex. As part of our DWI submission operational expenditure

continues into AMP9 at East Ness WTW, Littleworth BHS and Highfield/Austerfield BHS.

CW13.170 - Security - SEMD; BVA enhancement water Opex. We will require resources to support Alternative Water Supplies into AMP9.

CW13.182 - Greenhouse gas reduction (net zero); BVA enhancement water Opex. We will continue to see a reduction in operational expenditure into AMP9 from the capital investment into Renewable energies in AMP8.

15. CW14 - Best value analysis; enhancement expenditure of least cost options - water resources and water network+

is intentionally left blank as we have not submitted an alternative option (enhancement expenditure)

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

This table provides the number of units of benefit created and the benefit value that will be generated by enhancement proposals for each of the categories of expenditure outlined in table CW3. The table also includes the present value of benefits.

Data from a variety of sources has been utilised to inform and assess future risks and impacts to service and therefore predict the benefits. Applied to this are two levels of internal quality assurance checks to aid validation to provide a degree of confidence to those predictions. However, the presence of uncertainty is inherent when predicting future events as unknown factors may affect possible outcomes.

A best value plan calculator has been created to calculate the benefits for the different types of interventions covering clean water.

The calculator estimates the benefits of interventions in a 5-year AMP period. Benefits are presented as either in-year benefits or the total discounted level of benefits.

In-year benefits are calculated by inputting the change in associated performance output as a result of the intervention. For example, for interventions which reduce leakage (e.g., increasing the number of customers on meters) the benefit of the intervention is inputted as a reduction in ML/d for a three-year average).

The table below shows the unit change input measurement for each of the clean water interventions, along with their source.

Benefit or performance commitment	Performance measurement	Unit	Value (£)	Source
Water supply interruptions	No. minutes lost per customer for interruptions that lasted three or more hours	Minutes	£2,025,468.28	Ofwat marginal benefit rates
Compliance risk index (CRI)	Sum of individual CRI score for every compliance failure reported during year	Index score	£1,979,478.13	Ofwat marginal benefit rates
Customer contacts about water quality	Customer contacts per 1,000 population	No. contacts	£19,896,623.95	Ofwat marginal benefit rates
Biodiversity	Biodiversity units per 100km2 for which the company provides monopoly services	No. units	TBC	TBC
Operational greenhouse gas emissions (water)	Tonnes CO2e per [unit and date range TBC]	Tonnes CO2	TBC	TBC
Leakage	reduction in Ml/d for a three year average from 2019/20	Ml/d	£521,265.45	Ofwat marginal benefit rates
Per capita consumption	reduction in litres/person/day for a three year average from 2019/20	l/p/d	£2,776,153.46	Ofwat marginal benefit rates
Business demand	reduction in Ml/d for a three year average from 2019/20	Ml/d	£521,265.45	Ofwat marginal benefit rates
Serious pollution incidents	Number of serious pollution incidents	No. incidents	£1,625,865.91	Ofwat marginal benefit rates
Discharge permit compliance	Percentage of treatment works in line with their numeric discharge permit conditions	%	£3,274,169.06	Ofwat marginal benefit rates
Mains repairs	Number of repairs per 1,000 kilometres of mains	No. repairs	£401,432.50	Ofwat marginal benefit rates
Unplanned outage	Unplanned loss of peak week production capacity as percentage of overall company peak week production capacity.	%	£2,815,020.00	Ofwat marginal benefit rates

Impacts monetised using other sources

For WINEP impacts, we have used values from other sources as these are not covered by the marginal benefit impacts issued by Ofwat. These include improvements to areas such as river water quality, change in land use to improve environmental outcomes and recreational benefits. The table below provides a summary of the benefit values that we are using for these impacts, along with their sources.

Clean Water WINEP Benefit Area	YW Service Measure	YW Impact Category	Units	£ benefit total value	original source	Original price base	22/23 FY average CPIH (£ benefit per unit)
River Quality - WINEP Moderate to Good	River Water Quality	WINEP Moderate to Good	kms of river improved	£27,813.73	[YW SMF and 6 Capitals spreadsheet v5.1 for WINEP (but original values come from NWEBS)]	April 22 RPI, then adjusted to 20/21 CPIH for WINEP	£31,365.59
Additional Metrics - Nature Based Volunteering	Additional Metrics	Nature Based Volunteering	number of hours of volunteering	£12.47	Environment Agency Natural Capital Team	20/21 CPIH	£14.06
Land Use - Area of additional inland wetland	Land Use	Area of additional inland wetland	hectares	£1,252.72	Environment Agency Natural Capital Team	20/21 CPIH	£1,412.69
Land Use - Area of existing inland wetland	Land Use	Area of existing inland wetland	hectares	£838.48	Environment Agency Natural Capital Team	20/21 CPIH	£945.56
Land Use - Area of farmland	Land Use	Area of farmland	hectares	£1,082.71	Environment Agency Natural Capital Team + [YW SMF and 6	April 22 RPI, then adju	£1,220.97

					Capitals spreadsheet v5.1 for WINEP]	sted to 20/21 CPIH for WINEP	
Land Use - Area of greenspace	Land Use	Area of greenspace	hectares	£9,279.96	[YW SMF and 6 Capitals spreadsheet v5.1 for WINEP]	20/21 CPIH	£10,465.03
Land Use - Area of peatland in actively eroding condition	Land Use	Area of peatland in actively eroding condition	hectares	£7,804.92	Environment Agency Natural Capital Team	20/21 CPIH	£8,801.62
Land Use - Area of peatland in modified condition	Land Use	Area of peatland in modified condition	hectares	£828.09	Environment Agency Natural Capital Team	20/21 CPIH	£933.84
Land Use - Area of wetlands and floodplains	Land Use	Area of wetlands and floodplains	hectares	£4,098.07	[YW SMF and 6 Capitals spreadsheet v5.1 for WINEP]	April 22 RPI, then adjusted to 20/21 CPIH for WINEP	£4,621.40
Recreation - Angling medium to high fish quantity	Recreation	Angling medium to high fish quantity	number of visits	£2.43	Environment Agency Natural Capital Team	20/21 CPIH	£2.74
Recreation - Angling medium to large fish size	Recreation	Angling medium to large fish size	number of visits	£7.77	Environment Agency Natural Capital Team	20/21 CPIH	£8.76

Application of discounting and inflation

Discounting

Once impacts have been monetised, we have discounted all benefits to year 0, which we have assumed to be 2023 (the current, decision-making year). As per HMT Green Book guidance, the first 30 years of the appraisal period (i.e., from 2023 to 2052) we have discounted all benefits using a discount rate of 3.5%. Beyond this, we have used a lower discount rate of 3.00% as per HMT Green Book guidance.

Inflation

All values have been converted to a 2022/23 financial year average using the CPIH index published by the ONS.

EA/NRW environmental programme (WINEP/NEP)

The need for enhancement spending in AMP8 is due to:

-New information about our asset base and impact on the environment

-Increased Government expectations

Following publication of the PR24 driver guidance and confirmation of the drivers to apply in PR24, We undertook a strategic approach to the identification of risks and issues across the Yorkshire operational area. This process followed the EA WINEP methodology and involved combining potential risks from options appraisals undertaken in previous AMPs and issues brought to our attention via any route (stakeholder, Customers, etc) since PR19 with potential risks and issues identified by a Geographical Information System search using the latest asset data.

There are 87 implementation schemes proposed along with 28 investigation schemes. It is not expected that we will see any direct benefit to our performance commitments from the investigations during AMP8 as these will focus on the development of feasible intervention options for the future.

Supply-demand balance

The WRMP24 draft highlighted a risk of a supply demand deficit in our area. The plan proposes investment in demand reduction and new supplies. Strategies

and options for achieving regulatory demand reduction targets have been developed using a demand option optimisation model and the WRMP decision making process to output the leakage, PCC and non-household demand reduction options considered best value. There are several supply side options that will deliver a Megalitres per day (Ml/d) supply-side benefit to the supply-demand balance this benefit is reported elsewhere within the tables. As this type

of benefit isn't directly linked to a performance commitment no benefit has been reported in CW15 for this category.

Metering

Delivering an ambitious AMI smart water metering rollout from AMP8 would enable us to accelerate progress towards reducing water demand, in addition to achieving other benefits for customers including greater engagement and control over household usage and bills. We have > 1 million AMR meters which will be asset life expired in AMP8. As such we will be including exchange of the end-of-life assets with AMI meters within our scenario developed to establish the cost and service impact of adopting differing strategies and policies.

*Note – The OUT2 table has been populated incorrectly with zero for AMP8/9 due to misinterpretation of the guidance. This results in a change to the values reported in table OUT3 for PCC and NHH demand. Subsequently values in CW15 have also been amended for PCC and NHH Demand under the 'Supply Demand Balance' and 'Metering' sections. This remains subject to change following the final Water Resources Management Plan.

		2025-26	2026-27	2027-28	2028-29	2029-30	2025-30	2030-31	2031-32	2032-33	2033-34	2034-35	2030-35
Supply-demand balance													
CW15.145		0.0%	0.6%	0.4%	0.4%	0.4%	0.018	0.5%	0.5%	0.5%	0.4%	0.3%	0.022
CW15.146		0.2%	0.1%	0.0%	0.1%	0.1%	0.004	0.3%	0.3%	0.3%	0.3%	0.3%	0.015
Metering													
CW15.191		0.0%	0.0%	0.0%	0.0%	0.0%	0.001	0.1%	0.1%	0.0%	0.0%	0.0%	0.003
CW15.212		0.0%	0.0%	0.0%	0.0%	0.0%	0.000	0.0%	0.0%	0.0%	0.0%	0.0%	0.000
CW15.246		0.0%	0.1%	0.2%	0.1%	0.1%	0.006	0.0%	0.0%	0.0%	0.0%	0.0%	0.001
CW15.267		0.1%	0.1%	0.1%	0.2%	0.2%	0.006	0.0%	0.0%	0.0%	0.0%	0.0%	0.000
CW15.278		0.1%	0.1%	0.2%	0.2%	0.2%	0.009	0.1%	0.1%	0.1%	0.1%	0.1%	0.006

Raw Water and Drinking Water Quality

Under the Water Quality programme for AMP8, we propose 5 treatment schemes to address risks associated with taste and odour, raw water colour, pesticides, nitrates and microbial parameters.

A review of water quality risks has been undertaken utilising data from various sources. data and information considered:
- Drinking Water Safety Plans (DWSPs)
- Compliance Risk Index trends in water quality sample detections
- Microbiology and coliform compliance
- Aesthetic (including discolouration) & metals sample and incident data
- Taste and Odour sample and incident data
- Lead monitoring programme data
- Notified Water Quality events
- Raw water data – identification of deteriorating trends such as colour in upland raw waters or increase in groundwater nitrates

• Managed operational restrictions – e.g. self-imposed reduction in Water Treatment Works through put or requirements for mixing that are implemented as mitigation to water quality parameter failure risk.
• Monitoring of emerging risks
These risks are assessed through the application of a risk score. We use future risk trends to estimate when, if un-mitigated, raw water quality would be impacted, such that it would result in the reduction in treatment works through-put or in an unacceptable deterioration in treated water quality.

In line with our WQ Strategy, green, catchment-based solutions are considered first, only moving to grey, end of pipe solutions once the green approach has proven insufficient to deliver the improvements required. Our Amp 8 scheme's all fall into this category, with greens solutions either not showing improvements of the required magnitude, or not able to deliver in a suitable timeframe.

Water resilience and security

SEMD and Cyber security activities contain benefits within our internal service measure framework but do not directly link to a performance commitment therefore no benefit has been reported, however both areas are constrained within the regulatory DWI submission.

Net Zero

Benefits as stated in OUT3 Outcome performance from enhancement expenditure table. Provided by Andrew Thomson Manager of Net Zero Carbon

17. CW16 – Best value analysis; enhancement benefits of least cost options - water resources and water network+

This table provides the number of units of benefit created and the benefit value that will be generated by enhancement proposals for each of the categories of expenditure outlined in table CW3. The table also includes the present value of benefits.

Data from a variety of sources has been utilised to inform and assess future risks and impacts to service and therefore predict the benefits. Applied to this are two levels of internal quality assurance checks to aid validation to provide a degree of confidence to those predictions. However, the presence of uncertainty is inherent when predicting future events as unknown factors may affect possible outcomes.

A best value plan calculator has been created to calculate the benefits for the different types of interventions covering clean water.

The calculator estimates the benefits of interventions in a 5-year AMP period. Benefits are presented as either in-year benefits or the total discounted level of benefits.

In-year benefits are calculated by inputting the change in associated performance output as a result of the intervention. For example, for interventions which reduce leakage (e.g., increasing the number of customers on meters) the benefit of the intervention is inputted as a reduction in ML/d for a three-year average).

The table below shows the unit change input measurement for each of the clean water interventions, along with their source.

Benefit or performance commitment	Performance measurement	Unit	Value (£)	Source
Water supply interruptions	No. minutes lost per customer for interruptions that lasted three or more hours	Minutes	£2,025,468.28	Ofwat marginal benefit rates
Compliance risk index (CRI)	Sum of individual CRI score for every compliance failure reported during year	Index score	£1,979,478.13	Ofwat marginal benefit rates
Customer contacts about water quality	Customer contacts per 1,000 population	No. contacts	£19,896,623.95	Ofwat marginal benefit rates
Biodiversity	Biodiversity units per 100km2 for which the company provides monopoly services	No. units	TBC	TBC
Operational greenhouse gas emissions (water)	Tonnes CO2e per [unit and date range TBC]	Tonnes CO2	TBC	TBC
Leakage	reduction in Ml/d for a three year average from 2019/20	Ml/d	£521,265.45	Ofwat marginal benefit rates
Per capita consumption	reduction in litres/person/day for a three year average from 2019/20	l/p/d	£2,776,153.46	Ofwat marginal benefit rates
Business demand	reduction in Ml/d for a three-year average from 2019/20	Ml/d	£521,265.45	Ofwat marginal benefit rates
Serious pollution incidents	Number of serious pollution incidents	No. incidents	£1,625,865.91	Ofwat marginal benefit rates
Discharge permit compliance	Percentage of treatment works in line with their numeric discharge permit conditions	%	£3,274,169.06	Ofwat marginal benefit rates
Mains repairs	Number of repairs per 1,000 kilometres of mains	No. repairs	£401,432.50	Ofwat marginal benefit rates
Unplanned outage	Unplanned loss of peak week production capacity as percentage of overall company peak week production capacity.	%	£2,815,020.00	Ofwat marginal benefit rates

Impacts monetised using other sources

Yorkshire Water - Data Table Commentary

Section 3: costs (wholesale) - water

For WINEP impacts, we have used values from other sources as these are not covered by the marginal benefit impacts issued by Ofwat. These include improvements to areas such as river water quality, change in land use to improve environmental outcomes and recreational benefits. The table below provides a summary of the benefit values that we are using for these impacts, along with their sources.

Clean Water WINEP Benefit Area	YW Service Measure	YW Impact Category	Units	£ benefit total value	original source	Original price base	22/23 FY average CPIH (£ benefit per unit)
River Quality - WINEP Moderate to Good	River Water Quality	WINEP Moderate to Good	kms of river improved	£27,813.73	[YW SMF and 6 Capitals spreadsheet v5.1 for WINEP (but original values come from NWEBS)]	April 22 RPI, then adjusted to 20/21 CPIH for WINEP	£31,365.59
Additional Metrics - Nature Based Volunteering	Additional Metrics	Nature Based Volunteering	number of hours of volunteering	£12.47	Environment Agency Natural Capital Team	20/21 CPIH	£14.06
Land Use - Area of additional inland wetland	Land Use	Area of additional inland wetland	hectares	£1,252.72	Environment Agency Natural Capital Team	20/21 CPIH	£1,412.69
Land Use - Area of existing inland wetland	Land Use	Area of existing inland wetland	hectares	£838.48	Environment Agency Natural Capital Team	20/21 CPIH	£945.56
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Land Use - Area of greenspace	Land Use	Area of greenspace	hectares	£9,279.96	[YW SMF and 6 Capitals spreadsheet v5.1 for WINEP]	20/21 CPIH	£10,465.03
Land Use - Area of peatland in actively eroding condition	Land Use	Area of peatland in actively	hectares	£7,804.92	Environment Agency Natural Capital Team	20/21 CPIH	£8,801.62

		eroding condition					
Land Use - Area of peatland in modified condition	Land Use	Area of peatland in modified condition	hectares	£828.09	Environment Agency Natural Capital Team	20/21 CPIH	£933.84
Land Use - Area of wetlands and floodplains	Land Use	Area of wetlands and floodplains	hectares	£4,098.07	[YW SMF and 6 Capitals spreadsheet v5.1 for WINEP]	April 22 RPI, then adjusted to 20/21 CPIH for WINEP	£4,621.40
Recreation - Angling medium to high fish quantity	Recreation	Angling medium to high fish quantity	number of visits	£2.43	Environment Agency Natural Capital Team	20/21 CPIH	£2.74
Recreation - Angling medium to large fish size	Recreation	Angling medium to large fish size	number of visits	£7.77	Environment Agency Natural Capital Team	20/21 CPIH	£8.76

Application of discounting and inflation

Discounting

Once impacts have been monetised, we have discounted all benefits to year 0, which we have assumed to be 2023 (the current, decision-making year). As per HMT Green Book guidance, the first 30 years of the appraisal period (i.e., from 2023 to 2052) we have discounted all benefits using a discount rate of 3.5%. Beyond this, we have used a lower discount rate of 3.00% as per HMT Green Book guidance.

Inflation

All values have been converted to a 2022/23 financial year average using the CPIH index published by the ONS.

EA/NRW environmental programme (WINEP/NEP)

The need for enhancement spending in AMP8 is due to:

-New information about our asset base and impact on the environment

-Increased Government expectations

Following publication of the PR24 driver guidance and confirmation of the drivers to apply in PR24, we undertook a strategic approach to the identification of risks and issues across the Yorkshire operational area. This process followed the EA WINEP methodology and involved combining potential risks from options appraisals undertaken in previous AMPs and issues brought to our attention via any route (stakeholder, Customers, etc) since PR19 with potential risks and issues identified by a Geographical Information System search using the latest asset data.

There are 87 implementation schemes proposed along with 28 investigation schemes. It is not expected that we will see any direct benefit to our performance commitments from the investigations during AMP8 as these will focus on the development of feasible intervention options for the future.

There is no variation to the values reported in CW15 and CW16. This is due to the nature of the clean water WINEP programme which is heavily focussed on improvements to the environment. This limits to possibilities for alternative options to be considered.

Supply-demand balance

Benefits reported have been developed and supplied by those involved in the WRMP24 revised draft submission. Of the best value options benefits reported in CW15 only one of the options was not the lowest cost option. The values reported in CW16 reflect the decrease to the benefits from reducing the expenditure of that initiative.

Metering

Delivering an ambitious AMI smart water metering rollout from AMP8 would enable Us to accelerate progress towards reducing water demand, in addition to achieving other benefits for customers including greater engagement and control over household usage and bills. We have more than one million AMR meters which will be asset life expired in AMP8. As such we will be including exchange of the end-of-life assets with AMI meters within our scenario developed to establish the cost and service impact of adopting differing strategies and policies. We had initially considered 8 scenarios regarding our

metering strategy but were rejected at an early stage as they were considered to be unacceptably regressive in terms of service and would not align with our strategic requirement to reduce water demand, therefore the best value option reported in CW15 is also the least cost option.

*Note – The OUT2 table has been populated incorrectly with zero for AMP8/9 due to misinterpretation of the guidance. This results in a change to the values reported in table OUT3 for PCC and NHH demand. Subsequently values in CW15 have also been amended for PCC and NHH Demand under the 'Supply Demand Balance' and 'Metering' sections. This remains subject to change following the final Water Resources Management Plan

		2025-26	2026-27	2027-28	2028-29	2029-30	2025-30	2030-31	2031-32	2032-33	2033-34	2034-35	2030-3
Supply-demand balance													
CW16.145		0.0%	0.2%	0.1%	0.1%	0.1%	0.005	0.0%	0.0%	0.0%	0.0%	0.0%	0.001
CW16.146		0.1%	0.1%	0.1%	0.1%	0.0%	0.004	0.1%	0.0%	0.0%	0.0%	0.0%	0.002
Metering													
CW16.191		0.0%	0.0%	0.0%	0.0%	0.0%	0.001	0.1%	0.1%	0.0%	0.0%	0.0%	0.003
CW16.212		0.0%	0.0%	0.0%	0.0%	0.0%	0.000	0.0%	0.0%	0.0%	0.0%	0.0%	0.000
CW16.246		0.0%	0.1%	0.2%	0.1%	0.1%	0.006	0.0%	0.0%	0.0%	0.0%	0.0%	0.001
CW16.267		0.1%	0.1%	0.1%	0.2%	0.2%	0.006	0.0%	0.0%	0.0%	0.0%	0.0%	0.000
CW16.278		0.1%	0.1%	0.2%	0.2%	0.2%	0.009	0.1%	0.1%	0.1%	0.1%	0.1%	0.006

Raw Water and Drinking Water Quality

Under the Water Quality programme for AMP8, we propose 5 treatment schemes to address risks associated with taste and odour, raw water colour, pesticides, nitrates and microbial parameters.

A review of water quality risks has been undertaken utilising data from various sources. data and information considered:
• Drinking Water Safety Plans (DWSPs)
• Compliance Risk Index trends in water quality sample detections
• Microbiology and coliform compliance
• Aesthetic (including discolouration) & metals sample and incident data
• Taste and Odour sample and incident data
• Lead monitoring programme data
• Notified Water Quality events
• Raw water data – identification of deteriorating trends such as colour in upland raw waters or increase in groundwater nitrates
• Managed operational restrictions – e.g. self-imposed reduction in Water Treatment Works through put or requirements for mixing that are implemented as mitigation to water quality parameter failure risk.
• Monitoring of emerging risks

These risks are assessed through the application of a risk score. We use future risk trends to estimate when, if un-mitigated, raw water quality would be impacted, such that it would result in the reduction in treatment works through-put or in an unacceptable deterioration in treated water quality.

In line with our WQ Strategy, green, catchment-based solutions are considered first, only moving to grey, end of pipe solutions once the green approach has proven insufficient to deliver the improvements required. Our Amp 8 scheme's all fall into this category, with greens solutions either not showing improvements of the required magnitude, or not able to deliver in a suitable timeframe.

Water resilience and security

SEMD and Cyber security alternative options contain benefits within our internal service measure framework but do not directly link to a performance commitment therefore no benefit has been reported, however both areas of the programme are constrained within the regulatory DWI submission.

Net zero

Benefits as stated in OUT3 Outcome performance from enhancement expenditure table. Provided by Andrew Thomson Manager of Net Zero Carbon.

CW17 Accelerated programme expenditure - water resources and water network+ is intentionally blank as we have not wish to submit any accelerated programme expenditure – water resources and water network plus

18. CW18 - Cost adjustment claims - base expenditure: water resources and water network+

	Title	Commentary
CW18.1	**Description of cost adjustment claim**	"Meter and AMR replacement not funded in the base cost models. Enabling Smart Programme and WRMP delivery."
CW18.2	**Type of cost adjustment claim**	We have assigned this to 'atypically large investment' as the claim is for a large programme of meter replacement over and above what can be considered funded through the base models.
CW18.3	**Symmetrical or non-symmetrical**	This is a forward-looking claim and therefore non-symmetrical.
CW18.4	**Reference to business plan supporting evidence**	Refers to Cost Adjustment Claim Appendix.
CW18.5	**Total Gross Value of Claim**	We populate the gross value of the claim as the total Base cost element of the metering programme for AMP8 as set out in out cost adjustment claim appendix. We do not claim for any costs in 2022-25 so these cells are left blank. The costs all sit within Treated Water Distribution.
CW18.6	**Implicit Allowance**	We populate an implicit allowance* by estimating and adding: what could be considered funded at PR24 based on industry meter replacement rates in the benchmarking period the difference between our anticipated AMP7 activity and what could have been considered funded this period. And multiplying by our average unit rate for meter installation. *We note that in reality no such allowance is made in a Totex and Outcomes framework.
CW18.7	**Total Net Value of Claim**	Calculated from above two lines

CW18.8	**Historic Base Expenditure**	We have populated these lines with our historic levels of expenditure in meter replacement and AMR installation inflated to 2022/23 prices.
CW18.9	**Totex for the control**	We are not required to populate Totex value as it is a calculated cell but identify that this claim is in the WN+ price control.
CW18.10	**Materiality**	N/A We note that the size of the claim is significantly higher than 1% of WN+ Totex historically.

19. CW19 Leakage expenditure and activity data

Please note leakage outturn is a combination of proactive leakage management activities and reactive leakage management activities. Our definition of these terms is based on the Priority allocation the burst repair has been categorised as. Priority 0 and 1 bursts are customer impacting repairs which cause significant pressure reduction for customers or an interruption to supply. Burst response of lower priority are categorised as proactive leakage activity whether found by a leakage technician through surveys of analytic system or customer reported but not service level impacting.

Costs for leakage management within CW19 are those associated with proactive leakage control and as such are not double counted with costs associated with maintaining pressure or supply as a result of reactive leakage management,

CW19.01

Maintenance of leakage activities combine the cost of people resources, repair activity and systems to maintain leak performance. we have applied a consistent blend of activities for maintaining leakage across AMP8, based on activity levels in year 4 of AMP7 and categorised within the PALM methodology.

These activities have been excluded from the supply demand enhancement case within the PR24 submission and are not included within the WMRP as the activities with counteract the Natural Rate of Rise, rather than drive leakage levels down.

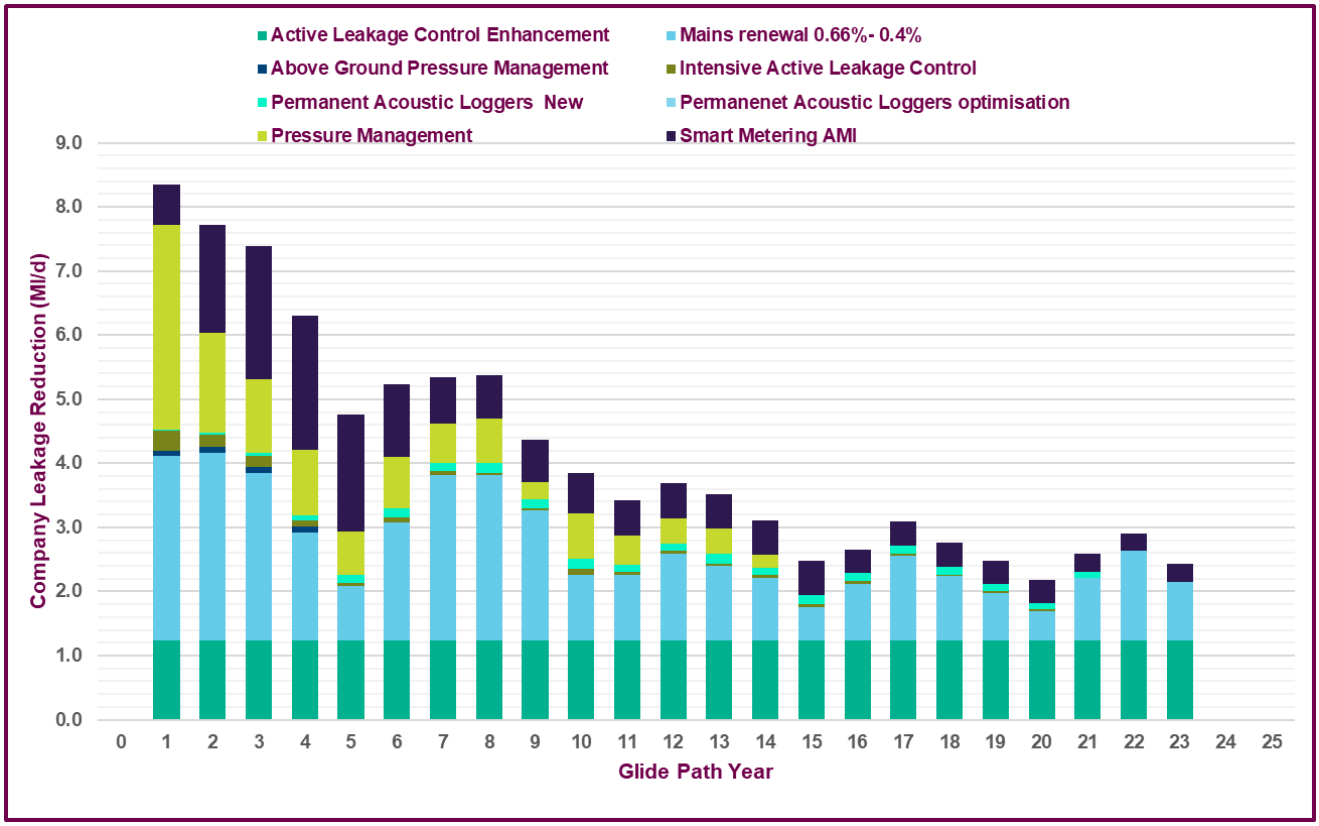
CW19.02

Leakage reduction activities have been included in table CW3, within the supply demand balance enhancement case, Metering enhancement case (but costs from metering not included in this table), and within a cost adjustment claim for mains renewal.

We have optimised the reduction plan utilising RPS industry leading software SoLow and is consistent with the WRMP plan, at the time of PR24 submission.

In our AMP8 plan to undertake significant levels of mains renewals, give the multi benefit nature of mains renewal the costs in this table have been proportionally allocated to leakage costs within this table, rather than all the costs. We are also delivering a multi-faceted approach to leakage reduction with a differing blend of options per year, as optimised within the RPS SoLow software.

The costs within this row will deliver the leakage reduction per intervention as outlined in the table below.



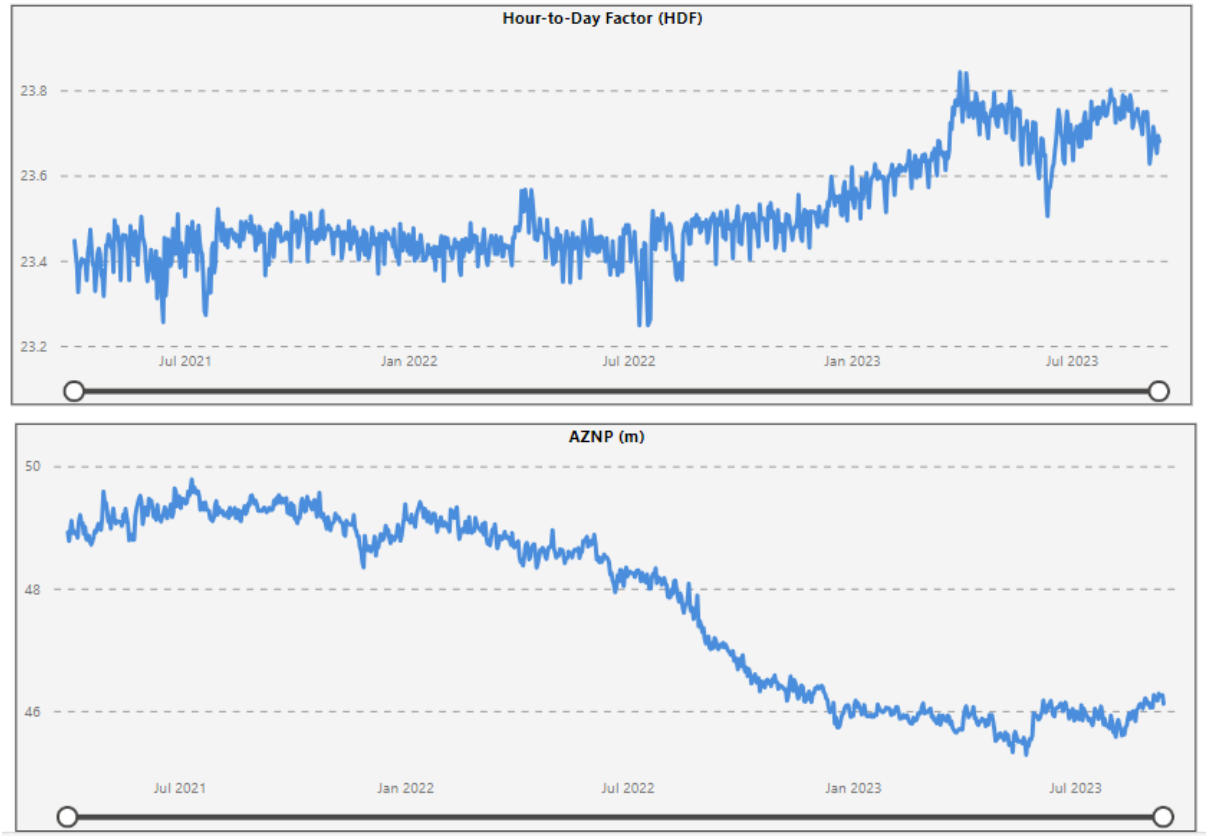
CW19.10

Throughout AMP7 we are adopting a policy of increasing awareness of the customer ownership of supply pipes and reducing our FOC services for supply pipe repairs. We will maintain this service for financially vulnerable customers through AMP8. This results in a significant reduction in costs for supply pipe repairs through AMP7 and into AMP8. This change in policy is underpinned by the transition to smart metering where we can interact with customers in an informed, quantified and timely manner. We have started this journey already and will including the learnings from this approach in the procedures implemented ahead of AMP8.

CW19. 13-16

As per the table in CW19.02, we will continue to increase our coverage of pressure managed areas, shown by the rows indicating new PMA's and the number of properties covered by new PMA's, but we are also focussing on maturing the level of control within existing pressure managed areas. This more mature pressure management should result in lower levels of leakage and a reduced burst rate. This maturation of existing pressure managed systems is displayed through the significant growth in numbers of properties covered by active pressure control in row CW19.14.

The reduction in leakage through advanced pressure control has to be carefully managed as a component of the leakage calculation "hour to day factor" can counteract gains in pressure reduction through the leakage calculation. Therefore we are carefully monitoring the relationship between HDF and average zonal night pressure to achieve multiple gains, but potentially not gains as large as those not considering HDF may consider.



CW19 25-29 DMA Characteristics

We already have strong availability and operability performance; achieving over 91% consistently over the last 3 report years, topped at 94.4% delivered at APR22.

Forecast is realistic to return to these levels through DMA optimisation, meter replacement schemes, smart metering and improvement in night use models improving operability performance. Significant investment would be required to close the final 5% gap.

DMA Sizing – We continue to focus on optimisation of large property count DMAs with ambition to reduce mean property counts slightly as delivered. Return on investment reduces.

Availability of DMA data is already overachieving the industry average, however we forecast a 0.6% increase over the 7 years to achieve 96.5%. This will be delivered through the creation of additional DMAs, optimisation of existing DMAs, and flow balance analysis on the upstream network.

CW19 40-42 Trunk Main Balance

We forecast an increase in reported Trunk Main length to 50% by the end of AMP8. Report length has steadily been increasing by c2% year on year and have started

further upstream flow and tile balance analysis with Crowder Consulting to support the delivery of this. The approach of bringing trunk mains online and into reporting will increase gradually as we incorporate potential new ways of working, reporting, and aligning methodologies.

Trunk main length is captured directly from Netbase and will remain consistent. Currently undergoing exercise to re-trace and recalculate total trunk main report length but impact will be insignificant to any calculation.

CW19.49

We have an existing 32,000 acoustic loggers which cover ~20% of the population of Yorkshire. This has been established through analysing the DMA's we have acoustic loggers deployed in and the property counts in those DMA's. The investment planned in AMP8 will increase the number of acoustic loggers deployed in Yorkshire. The increase in population coverage is in line with the planned investment in new acoustic loggers.

CW19.52

The existing hours of ALC is based on a report of ALC staff activity from our corporate systems. The increase in hours through AMP8 is based on the increased funded activity in AMP8 to deliver leakage reduction.

CW19 91-94

We will likely continue to have a sustained level of supply pipe leakage reported from the public. The customer reported numbers are therefore unchanged.

Our detected supply pipe leaks will increase as visibility of continuous flows from the data derived from smart meters increases. The number of supply pipe leaks increase in line with the deployment programme of smart meters and the assumed prevalence of supply pipe leaks.

In AMP7 the average run time of supply pipe leaks is based on reported times from point of knowledge of the need to investigate to repair being undertaken. For AMP8 we have analytics in place to understand the trigger point/start of the continuous flow. Further in the transition to working with customers to repair leaks/ using section75 enforcement the overall awareness and repair time will increase. However, it is likely that due to an unknown amount of time where supply pipe leakage could have been occurring in AMP7, due to the retrospective nature of AMR reading, that the AMP8 supply pipe leak duration is shorter in reality compared to AMR repair time lines.

CW95-97

We have reported for AMP7 the actual number of free supply pipe repairs and expected free repairs in years 4 &5. The decrease in number is due to a change in policy, whereby we are working with customers to encourage the repair of customer owned pipes by the customer, whilst enforcement of section 75 will increase especially for Business customers. In AMP8 with the increase in smart metering the quantified, timely and accurate communication of supply pipe leakage will allow for us to significantly increase the amount of supply pipe repairs undertaken by the customer, whilst free of charge repairs will remain for customers who are financially vulnerable.

CW19. 112 & 113

Historical minimum achieved leakage was calculated by reviewing the Lowest leakage achieved for each DMA, which has been operable for 2 weeks. The sum total of those DMA's have been aggregated to deduce 121.15 MLD. The focus for ongoing leakage activity is to try and maintain all DMA's at as close to their minimum achieved leakage, for as long as possible through the year, mitigating the increase in leakage through the winter due to weather/ climatic conditions. There will be some gains in the Minimum achieved level of leakage at a DMA level.

The NRR is the industry recognised measure of the volume of leakage reduction required to maintain leakage at the current level. We have reported the actual NRR total volume for 22/23, with the average NRR from 2016 to 2023/23 being the estimated value for the remainder of the table, which will account for years with adverse and positive weather conditions for leakage management.

20. CW20 Distribution mains condition

The condition grade reconciles with bursts per annum based on the last 5 years of work order history. Following spatial analysis and merging of the burst dataset together with the assets dataset, a small number of bursts (less than 4%) from the last 5 years could not be linked to the relevant asset.

The data provides an overview of condition grade as defined in the business plan table guidance document.

The asset and attribute data (material, soil, diameter, population, length, location) is derived from the Asset modelling dataset, which contains just over 31800km of Potable water mains (31871km). The reason for the use of this dataset is to ensure the use of the valuable asset attributes for cohorting.

The variables used for cohorting the data set include

- Material (Primary as per APR guideline requirements)
- Diameter(Primary as per APR guideline requirements)
- Age group (Primary as per APR guideline requirements)
- Hotspot analysis:
- DMA (District Metered Areas)
- WSS (Water Supply Systems)
- Ground Cover (Building, Garden, Highway, Landform, Open Ground, Paths, Others)
- Pipe Length

The APR burst data (2018-2023) has been appended to the appropriate pipes from the pipes dataset – this means that the dataset used for cohorting has a slightly lower number of bursts than the APR report, due to the modelled network length used.

APR Year(s)	APR Bursts Reported	Mapped to Dataset
2018-2023	33893	32573

The cohorting is carried out using an automated multistage grouping process (developed in R) which uses a combination of variables to group assets based on similar attributes; where these groups are deemed too small, the cohorts are then grouped further by using fewer variables in order to create new groups, until the volume and size of the cohorts is deemed reasonable for meaningful analysis.

Grouping Stage	Small Diameter Pipes (<=320mm)	Large Diameter Pipes (>320mm)
Stage 1	Age, Diameter, Material, Hotspot DMAs, Ground Cover, DMA, Water Supply Zone (WSS)	Age, Diameter, Material, Geographical Zone, Water Supply Zone (WSS)
Stage2	Age, Diameter, Material, Hotspot DMAs, Ground Cover, Water Supply Zone (WSS)	Age, Diameter, Material, Geographical Zone
Stage3	Age, Diameter, Material, Hotspot DMAs, Ground Cover	Age, Diameter, Material
Stage4	Age, Diameter, Material,	Not Used
# Number of cohorts	2592	103

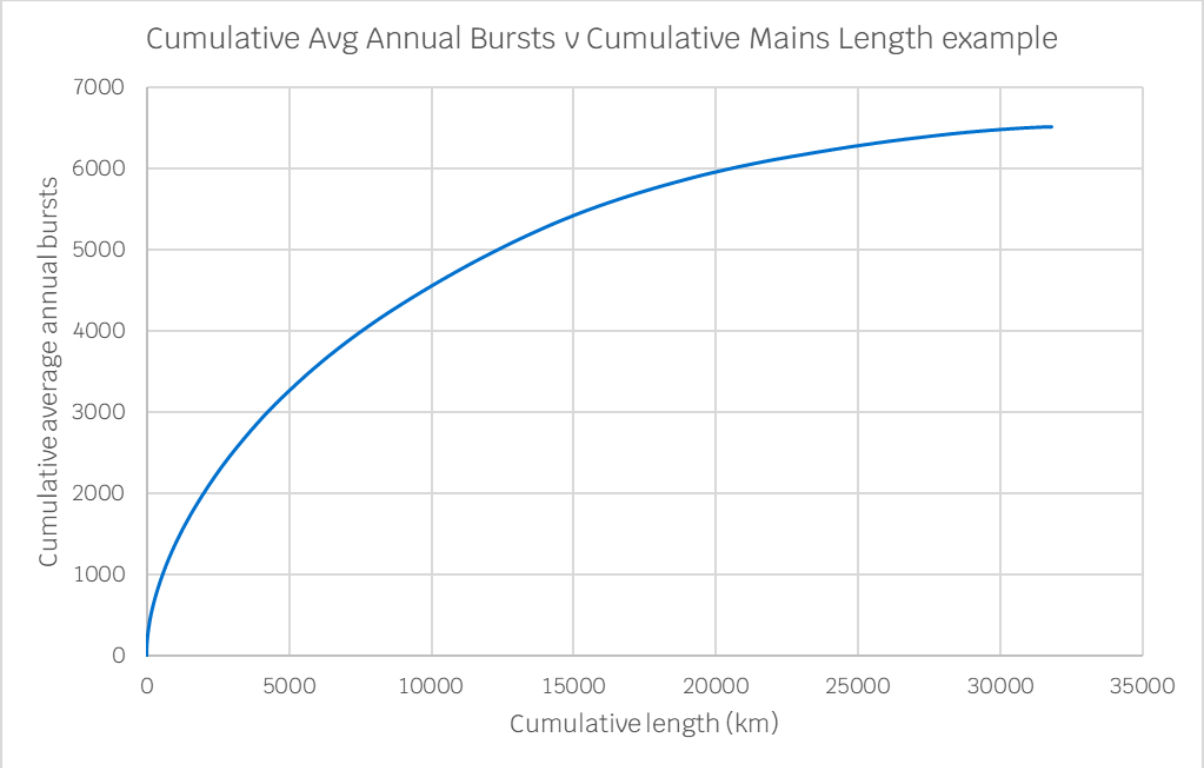
This approach allows for a replicable process which can be repeated, whilst also minimising the risk of manual error when processing or transposing the data to create cohorts.

Many cohorts exceed the +/- 50% threshold for bursts; that being said, the resulting cohorts from the automated script are all mutually exclusive and homogenous in characteristics and attributes – it was deemed difficult to group the data geographically beyond the DMA level aggregation as no coherent zonal boundaries exist at a slightly higher level.

About 50% of cohorts are within the 50% tolerance for small and large pipes; That being said, both the small and large cohorts are near the 10% tolerance for average bursts per cohorts (2.5 and 1 respectively). We do not believe that it is practical nor wholly necessary to ensure a consistent size to all cohorts because:

- Our Network Length and Average Burst Rate p/a would result in ~ 2650 cohorts (we currently have 2695) which is a very limited difference.
- It is difficult to create cohorts (with the minimum primary variables) which have some bursts within them – some groups had to be truncated at DMA or Supply system level but certain could not be aggregated in a meaningful way, so it was decided to keep certain cohorts empty to preserve the consistency of their inputs. Details of empty cohorts (a total of 53) have been added to the additional guidance sheet. Given the total length of empty cohorts (63km or 0.2%), we do not feel these are detrimental to the overall cohorts analysis.

For replaced and relined mains, we have used historic failure rates (2001-2020) against network abandoned between 2018-2023 – it was impractical to map the APR burst history to pipes replaced between 2018 and 2023, so historic burst rate was used instead.



Please note that a total of 53 cohorts do not have any bursts – these were relatively small and thus given a condition grade of 1, they are listed in the Burst Free Cohorts tab and not included in the cumulative graph.

We have a range of confidence grades across this table, the majority have been classified at B1.

We have followed the thresholds from the guidance 'CW20.2 Mains Condition Grading' as per the Ofwat guidance.

The attributes mapping is described in section 1 of this document – the primary and secondary mapping are listed in the additional guidance cohorts table, together with the individual cohorts.

21. CW21 – Net zero enhancement schemes

The data (CW21) tells us the enhancement investment required for the water process controls during AMP 8 to invest in additional renewable (solar) energy to reduce scope 2 emissions associated with purchased electricity (location-based emissions per Ofwat reporting requirements for AMP 8). Limited investment has been put forward for AMP 8 for water price controls as our focus has been on keeping bills affordable, and to allow us to address process emissions on the wastewater side of the business.

There is no overlap with base maintenance funded activities as the investment is for new renewable assets only.

Overview of the number:

The net zero enhancement investment for water is c. £17.57 million Totex and includes Opex savings that will continue beyond the end of the AMP out to 2050 (assumes 25-year life of systems).

Opex savings (from reduction in purchased electricity) are not included and have been reported in the wider business plan. All values are price adjusted to 2023 prices.

Carbon benefit associated with the plan are related to reduction in purchased grid electricity and their associated Scope 2 and Scope 3 (Transmission and Distribution and well to tank losses) emissions. The total electricity avoidance has been calculated by using the standard formulae for converting solar assets in the UK to annual power use. This takes total power, asset availability (c.10.8% capacity factor in the UK). The GHG conversion factors for the applicable Scope 2 and 3 categories has then been applied to this consumption to give a total for emissions on deployment – see Table 1 below. This has then been split across the AMP according to the phasing of installation to provide the cumulative benefit.

Table 1 – Carbon savings from solar installation – assumed that installations equivalent to 7000tCO2e would be completed in AMP 8 and that 50% would apply to water and 50% to wastewater sites, so gross carbon benefit of 3500tCO2e.

	Emission Factor kgCO2e/kWh	Annual Energy saving from solar install (kWh)	Annual Carbon saving tCO2e
UK elec grid 2022	0.19338	30274560	5,854
UK T& D 2022	0.01769	30274560	536
UK WTT 2022	0.04625	30274560	1,400
UK WTT/T&D 2022	0.00423	30274560	128
TOTAL			**7,918**
Assumed completion in AMP			**7000**
Total for water 50% share of gross benefit			**3500**

Finally, to calculate the embedded carbon and net benefit, we have applied the industry standard figure of 730kgCO2e per KWp installed. Across our proposed solar investment, we anticipate 32MWp installation. Based on the KWp value, 1MW power = 730tCO2e of embedded carbon. This equates to 23360tCO2e for 32MWp installed, which over the 25-year life is amortised to 934.4tCO2e/annum. Maintenance and end-of life are not typically factored in, so we have applied a loading factor which increases the embedded emissions to 1027.8tCO2e/annum. 50% of this total is applicable to water installations and 50% to wastewater, so annual embedded carbon emissions to net off have been taken as 514tCO2e/annum, which we have rounded to 500tCO2e. This gives the net benefit total per annum of 3000tCO2e as reported in table CW21.

Differences with previous plans/Lessons learned:

None/Not applicable this first-time enhancement investment for net zero has been requested.

What is coming in the next few years that may impact investment:

Grid decarbonisation is expected by 2040, so long term investment in solar will be less necessary, and energy cost and resilience will become the primary drivers.

Other information:

The investment in solar is part of a c. £35.5m package across the business with costs and benefits split 50:50 across water and wastewater.

Risks and other information

Capacity to deliver and experience with earlier renewable projects is expected to mitigate any risks associated with delivery of this investment.

Volatility in the energy market may continue to impact the Opex benefit either positively or negatively.

Power output and cost of panels may change over time and calculations apply average performance values that may vary year on year and by installation due to weather conditions and impact on capacity factors etc.

We have highlighted a discrepancy between what we published to Ofwat as an early submission requirement on the 7th August 2023, and our final Table submission. These were errors within the first submission, and have now been corrected. The below summarises the changes:

Changes	Table	Cell	Data Line	Early Submission	Corrected Value
1	CW1	I23	CW1.10	27.018	25.943
2	CW1	I25	CW1.12	1.683	3.804
3	CW1	I39	CW1.19	1.915	2.469
4	CW1	O23	CW1.10	30.28	30.42
5	CW1	O25	CW1.12	1.524	3.492
6	CW1	U23	CW1.10	19.485	19.748
7	CW1	U25	CW1.12	1.752	3.597