Cost Wastewater
PR24 data tables commentary

October 2023

Costs (wholesale) Wastewater PR24 Data Table Commentary

CWW1 Totex analysis - wastewater network+ and bioresources (post frontier shift and real price effects)

AMP7

Please refer to Past Delivery section for detailed commentary on our AMP7 numbers.

AMP 8

Base operating expenditure

Base operating expenditure for AMP8 has been assessed using our planned outturn for 2024/25 based on our latest Board approved forecast. This has been reconciled to our 2022/23 actual expenditure included in our latest Annual Performance Report. To ensure that we put forward a stretching and ambitious plan we have performed a series of benchmarking exercises. These included a review against the Ofwat econometric models to understand how our current expenditure compared to that of our peers.

We have challenged ourselves to target an overall Botex cost base that will be assessed as efficient against a peer group assessment. We appreciate Ofwat will use econometric models to make this assessment using data over a number of years. Over AMP7 we have seen companies across the sector overspending against the allowed determination from PR19 as the industry attempts to meet more stretching delivery targets, a challenge that is expected to continue into the future. We are therefore of the opinion that in the econometric modelling assessment, more weight should be placed on nearer term data points. However, we have followed Ofwat's approach of modelling with all years back to 2011/12 in our botex benchmarking.

There are a small number of costs which are not included within the Ofwat econometric models (unmodelled costs). These unmodelled costs are closely managed and continually reviewed by the business to minimise these as far as possible. For example, we process rate rebate claims to drive future rates down or mitigate increases. For additional commentary on rates and third party costs, please refer to the commentary for CWW10 and CWW11 respectively.

Energy market prices increased significantly in 2022/23 due to the war in Ukraine. Whilst we had previously purchased forward contracts for 2022/23 which largely protected us from this cost shock, we had much less protection in place for 2023/24, 2024/25 and almost no protection into AMP8, as would be usual for this point in the regulatory cycle. Thus, whilst market prices have been falling back somewhat since 2022/23, our actual cost incurred will increase sharply in 2023/24 and again in 2024/25 as we move from paying our pre 'war in Ukraine' hedge price to a price partially reflecting the increase in market prices as a result of it. These higher prices will continue into AMP8 unless market prices fall back further.

We have engaged with Ofwat on this subject and have put forward a cost adjustment claim, together with real price effect adjustments, as the most appropriate way to fund these costs.

As a result of this, and other benchmarking analysis, we have put forward a plan for base operating expenditure which is stretching and ambitious, whilst also being achievable. We have taken the approach of allocating our AMP 8 total base operating expenditure on a straight line basis across the 5 years presented given its reasonably consistent nature.

Our future assumption on the nature and extent of the principal use recharges between business units is unchanged. As the business unit of principal use, Wastewater Network+ incurs the gross Capex charge for shared assets in the first instance. The calculation of the Opex recharges between price controls uses the same allocation used for information services operating expenses, under the assumption that this closely equates to the number of personnel in each area and therefore asset users.

We are not categorising any costs as atypical within this table.

There are no costs associated with equity issuances within this table.

Base capital expenditure

Wastewater Capital Maintenance comprises £749 million within AMP8, with a broadly flat profile of around £149 million per annum.

Within the business plan, capital maintenance costs are organised into three broad areas:

- Cross Business: this area comprises business-wide back office programmes (e.g. IT, laboratories and vehicles investments) that contribute to both Water and Water Recycling. Their expenditure is coded to each service in proportion

to the expected benefit and in line with the regulatory accounting rules of principal use.

- Water Recycling Capital Maintenance: this area contains investments entirely attributable to capital maintenance of Water Recycling assets such as gravity and vacuum sewers, manhole covers, pumping stations, storage tanks, overflows, treatment plants and long sea outfalls.
- Water Capital Maintenance: this area contains investments entirely attributable to capital maintenance of Water assets such as boreholes, reservoirs, water towers, tunnels, pipelines and treatment plants.

In addition, both water and water recycling programmes include improvement programmes that are not classed as enhancement. These often do not contribute to asset health as they do not replace or upgrade existing assets and instead involve construction of new assets that are required to comply with existing historic permits and legislation. An example is the work to reduce surface water ingress into sewers to ensure flow in the sewer complies with the permit. These are new assets but funded by capital maintenance as the standard is not new.

Base funding also has to fund the production of many investigations and strategic plans such as the DWMP.

Both of the categories Water and Water Recycling also include maintenance of buildings, roads and fencing, electrical supplies and generators, telemetry and control systems, health and safety equipment, lifting and access assets such as fixed cranes, grid flooring, handrails and ladders, as well as spend for the proportion of diversion projects not funded by the developer who requested the diversion.

Investments in these areas can be categorised as either modelled allowances or as manual schemes.

- Modelled allowances represent a level of projected spend that has been arrived at through analysis using Copperleaf Predictive Analytics to forecast the long-term maintenance needs of our assets based on economics and risk. Such investments do not identify specific assets for intervention. More detail is available on modelled allowances in the ANH38 Asset system resilience appraisal.
- Manual schemes are individually created solutions intended to address a specifically-identified need that does not overlap with a modelled allowance. This includes assets for which there is no deterioration model such as sea outfalls or meter chambers, but also contains schemes that are necessary to improve performance, as modelled investments (as explained further within the ASRAP commentary) are not on their own sufficient to maintain long term stable performance when constrained to fit within the regulatory funding allowance. The manual investments therefore provide short term mitigation to maintain performance ahead of a longer-term increase in capital maintenance.

Maintenance timing

The primary reduction in Botex from year 3 (as reported in our APR) to year 5 of AMP7 is the phasing of our capital maintenance spend as we manage the delivery of our overall Capex programme. As mentioned in the recent letter to David Black on 14 July 2023, we have experienced a number of delays in our Strategic Pipeline project which means a greater proportion of the work and spend will be in the final 2 years of AMP7. We therefore took the decision to accelerate maintenance work in our wastewater business units into year 3 which means a year on year reduction through to year 5. As a result of this acceleration, our year 5 maintenance is predicted to be in the region of £46m lower than the AMP7 average, having spent more in the earlier years of the AMP.

We have deliberately profiled capital maintenance evenly over the period 2025-2030 but will vary that as required in the delivery phase, as we have in AMP7.

Revenue Impact on a Capital Scheme (RICS)

We are expecting to see a significant increase in our base expenditure as a result of AMP7 RICS. This is largely represented in the cost adjustment claim we have put forward in relation to AMP7 phosphorus removal operating expenditure. Due to the timing of delivery, the additional operating costs from the phosphorus removal programme increase year on year, and are not fully represented until AMP8 where these costs will form part of base expenditure.

RPE

The assumptions concerning Real Price Effects have been set out in detail within the commentary for SUP11.

Efficiency challenge

For the last two years of the current AMP, we have used the frontier shift challenge set by the CMA in its re-determination. For each year of AMP8, we have chosen to use the most challenging and ambitious end of the Economic Insight plausible range, 0.8% pa, for all categories of cost and for each price control. Refer to the commentary for SUP 11 for further detail.

Enhancement expenditure

Please refer to the commentary within CWW3 for details of enhancement expenditure.

Developer Services Summary

The data populated for the following lines relates to Developer Services activities for Wastewater expenditure and revenue. This includes; infrastructure charges, site-specific services and diversions.

The data populated correlates with data presented in tables DS1e for wastewater revenue, DS3 for wastewater expenditure and table CWW11 wastewater diversions.

Year 3 (2022-23) for AMP7 has been populated in line with our 2022-23 APR submission. All future years have been reported based on forecast shown in table DS4. All data has been populated to report in 'Network+ sewerage collection' only. Similarly, from AMP8, we have only reported under 'Foul' sewerage as we do not consider we will have standalone 'Surface Water' or 'Highway Drainage' schemes to be reported.

All assumptions and explanations of the data can be found in the developer services tables mentioned.

The data populated here is inclusive of frontier shift and real price effect.

Operating Expenditure Lines 1.1 - 1.6

CWW1.3 - Developer Services Operating Expenditure

This is the data for Developer Services wastewater site-specific costs, as per Opex expenditure reported in table DS3.

Developer Services Revenue Lines 1.7, 1.14 and 1.15

CWW1.7 - Grants and Contributions Operating Expenditure

This is the data for Developer Services wastewater revenue for all Developer Services activities, including; infrastructure charges, site-specific services and diversions. This data is in line with data reported in table DS1e.

CWW1.14 - Grants and Contributions Capital Expenditure

This is the data for Developer Services for wastewater for all Developer Services activities, including; infrastructure charges, site-specific services and diversions. This data is in line with data reported in table DS1e.

Capital Expenditure Lines 1.8 - 1.13

CWW1.10 - Developer Services Capital Expenditure

This is the data for Developer Services wastewater site-specific costs, as per Capex expenditure reported in table DS3.

Cash Expenditure Lines 1.16 - 1.18

The only cash expenditure incurred that is not included in our operating cost totals relates to our forecast pension deficit payments. In line with the pension deficit plan, the final two payments occur in the first two years of AMP8.

Atypical Expenditure Lines 1.19 - 1.24

We are not categorising any costs as atypical within the data tables.

CWW1a Totex analysis - wastewater network+ and bioresources

This table is completed pre frontier shift and real price effects as discussed in the commentary to SUP11. Please refer to the commentary in CWW1 details of movements.

Developer Services Summary

The data populated for the following lines relates to Developer Services activities for Wastewater expenditure and revenue. This includes; infrastructure charges, site-specific services and diversions.

The data populated correlates with data presented in tables DS1e for wastewater revenue, DS3 for wastewater expenditure and table CWW11 wastewater diversions.

Year 3 (2022-23) for AMP7 has been populated in line with our 2022-23 APR submission. All future years have been reported based on forecast shown in table DS4. All data has been populated to report in 'Network+ sewerage collection' only. Similarly, from AMP8, we have only reported under 'Foul' sewerage as we do not consider we will have standalone 'Surface Water' or 'Highway Drainage' schemes to be reported.

All assumptions and explanations of the data can be found in the developer services tables mentioned.

Operating Expenditure Lines 1a.1 - 1a.6

CWW1a.3 - Developer Services Operating Expenditure

This is the data for Developer Services wastewater site-specific costs, as per Opex expenditure reported in table DS3.

Developer Services Revenue Lines 1a.7, 1a.14 and 1a.15

CWW1a.7 - Grants and Contributions Operating Expenditure

This is the data for Developer Services wastewater revenue for all Developer Services activities, including; infrastructure charges, site-specific services and diversions. This data is in line with data reported in table DS1e.

Capital Expenditure Lines 1a.8 - 1a.13

CWW1a.10 - Developer Services Capital Expenditure

This is the data for Developer Services wastewater site-specific costs, as per Capex expenditure reported in table DS3.

CWW1a.12 Third Party Services

As explained in table commentary for CWW3, we have presented enhancement spend gross of third party costs to align to Ofwat's PR19 approach and assist with cost assessment. We have also shown third party enhancement costs on this line and provided visibility of a line by line breakdown of the split of enhancement third party costs in table CWW13, using the lines for 'third party contributions'.

CWW1a.14 - Grants and Contributions Capital Expenditure

This is the data for Developer Services for wastewater for all Developer Services activities, including; infrastructure charges, site-specific services and diversions. This data is in line with data reported in table DS1e.

Cash Expenditure Lines 1a.16 - 1a.18

The only cash expenditure incurred that is not included in our operating cost totals relates to our forecast pension deficit payments. In line with the pension deficit plan, the final two payments occur in the first two years of AMP8.

CWW2 Base expenditure analysis - wastewater network + and bioresources

Please refer to the base operating expenditure commentary within CWW1 for commentary in relation to CWW2.

CWW3 Enhancement expenditure - wastewater network+ and bioresources

Detailed business cases to support our planned enhancement expenditure are featured in the Enhancement Narrative. Each line of expenditure in the data tables is cross referenced to an enhancement case. We have developed a comprehensive evidence base covering all our enhancement expenditure and aligned the structure of our enhancement cases to the evidential requirements set out by Ofwat in the Final Methodology Appendix 9, Annex 1 . The enhancement expenditure reported in this table is at the heart of our business plan and feeds many other data tables such as:

- Tables which aggregate categories of spend such as CW(W)1, CW(W)1a, RR30 and SUM4
- Tables which provide more detail for specific lines of investment such as CW7, CW8, CW19, CWW19, CWW22, BIO6 and SUP12
- Tables which present the same data cumulatively such as CW(W)9
- Tables which present the long term forecast beyond 2030 such as LS3 and LS4
- Tables which provide the details of early expenditure accelerated ahead of 2025 such as CW(W)12 and CW(W)17
- Tables which provide the whole life cost of the AMP8 investments such as CW(W)13
- Tables which provide the associated benefits such as CW(W)15, LS1 and OUT3
- Tables which provide the associated non-financial outputs of the expenditure such as CW5, CW(W)6, CWW20 and BIO5
- Tables presented in the appendices showing how customers are protected via PCDs
- Tables which feed the financial modelling and associated bill impacts such as RR2 and PD9

Ensuring alignment between all of these tables that draw data from our enhancement programmes has been an enormous logistical task, in large part due to emerging regulatory guidance both for WINEP and PR24 table formats since the Final Methodology was published in December 2022. We have worked with our internal assurance and external auditor teams to ensure that data is presented correctly, but we welcome the opportunity to work closely with Ofwat in the coming months through the query process to assist Ofwat teams in their assessment of our plans.

For opex reported in this table the expenditure includes both the planned operational costs for on-going operation of the new assets created, as well as for one-off costs for activities that cannot be capitalised.

The expenditure presented in this table is excluded from table CW(W)2 as those costs are base expenditure to operate and maintain assets already in service prior to 2025.

Because of the integrated nature of our asset systems with other water suppliers, a proportion of our enhancement programme is recovered from adjacent companies to whom we provide a service, for example water exports to supply their customers, or treatment of sewage collected from their customers. At PR19 we presented our enhancement expenditure in table W(W)S2 net of these third party contributions to comply with the guidance for the those expenditure tables. Following queries on this subject, in their Final Determination Ofwat reallocated third party expenditure into the enhancement totals in order to facilitate cost assessment modelling of the gross total enhancement cost. We have followed this precedent at PR24 and presented enhancement costs in table CW(W)3 as gross to facilitate cost assessment modelling. This means we have also deliberately excluded the third party enhancement costs from the third party tables CW(W)11, so that validation checks of the totals between those tables align. However, to make third party contributions to our enhancement programme visible we have included details of these in the additional lines provided in table CW(W)13.

Due to having only 5 additional lines available, we have combined all AMP7 additional lines into Additional line 1. A breakdown is provided below to the individual components making up the total of Additional line 1; AMP7 use.

Table 1 AMP7 additional lines reconciliation (£m)

Other enhancement (freeform lines by exception)	2022/23	2023/24	2024/25
Innovation fund projects capex	0	0	0
Innovation fund projects opex	2.155	6.340	2.234
Sludge enhancement (quality) capex	-1.198	0.612	1.052
Sludge enhancement (quality) opex	0	0	0
High spilling CSO - WINEP capex	0	3.052	0.033
High spilling CSO - WINEP opex	0	0	0
Total AMP7 use capex	-1.198	3.664	1.085
Total AMP7 use opex	2.155	6.340	2.234

CWW3 - Other enhancement (Freeform lines - by exception)

Table 2 Additional line descriptions

Line reference	Additional line use	Rationale
Additional line 1	AMP7 use	This line was used for AMP7 costs, please refer to table 'AMP7 additional lines reconciliation' table above for breakdown of costs associated with this line.
Additional line 2	SRO's	Discrete investment that is outside of price control and has been requested by Ofwat to be put into this line.
Additional line 3	Bioresources Resilience	Discrete investment linked to Bioresources which were previously covered under WINEP now requiring separate investment lines
Additional line 4	Bioresources - Non WINEP cake pads	Discrete investment linked to Bioresources which were previously covered under WINEP now requiring separate investment lines
Additional line 5	Bioresources - IED and Reg changes	Discrete investment linked to Bioresources which were previously covered under WINEP now requiring separate investment lines

CWW4 Wastewater network+ - Functional expenditure

This table has been prepared taking into account the guidance on improving cost allocation between the sewage treatment and bioresources units in relation to sludge liquors, energy generation and overheads.

The forecasted base operating expenditure has been assessed using our planned outturn for 2024/25 based on our latest Board approved forecast. Enhancement costs are aligned to CWW1 therefore the totals excluding third party expenditure is consistent. Please refer to the relevant enhancement narrative for details of the schemes.

There have been no changes in the reporting methods or assumptions across the period, changes seen are as a result of fluctuations in the total cost.

CWW5 Wastewater network+ - Large sewage treatment works

Sewage treatment works - Explanatory variables Lines 5.1 - 5.10

CWW5.1 to CWW5.3: Sewage treatment works details

We have calculated the population equivalent (PE) and the loads consistent with guidance provided by Ofwat in response to our query on the PR24 Large STW cost assessment data set in October 2022. As such, the assessment of size banding excludes imported effluents (tankered loads from septic tanks and cesspools). PE and loads reported in lines 3 and 9 also include an assessment of non-resident (holiday) population loads.

For our forecasts to 2030, we have assumed that the treatment types of the works (CWW5.2) have remained the same, and the growth profile of the works is consistent with the growth that is reported in SUP1A.17. We have also assumed that the other elements that compose the load remain constant over the period. This is due to the inherent difficulties in determining economic outputs of traders over the period and as domestic population makes up the majority of the load we experience at our works (>85%), it wouldn't have a large impact overall.

We anticipate three additional works being added to the list by 2030. These are Jaywick New (expected in 2025/26) along with Cromer and Market Harborough (both expected in 2026/27).

CWW5.4 to CWW5.8: Suspended Solids, BOD, Ammonia, P and UV

We have an application called PACE which summarises details of the permit limits relating to our Water Recycling Centre (WRC) discharges. These are the limits which are detailed in the Environmental Permits issued to us by the Environment Agency.

Information for these lines has therefore been taken from PACE for those WRCs which fall into size band 6.

Limits for the forecast years have been based upon the remaining obligations that are due to be delivered as part of the AMP7 WINEP and the best information that we currently have available on the tighter permit limits that may be applied to WRC as part of the AMP8 WINEP programme.

For a number of WRCs the UWWTD BOD limit of 25mg/l is tighter than the normal BOD limit specified in the Environmental Permit. At these WRCs we have therefore reported the UWWTD BOD limit as we believe this is more appropriate to use for comparative efficiency purposes. This approach is consistent with the approach taken when we supply data as part of our APR return.

CWW5.10: Flow passed to full treatment

We have an application called iREM which records details of the measured flow discharged from our WRCs.

The measured flows for these WRCs can vary significantly from year to year as it is affected by the levels of rainfall. We have therefore derived the values for the forecast years by averaging the reported flows for the last 5 years for each site and inflating it by factor which reflects the predicted population growth at each WRC on a year by year basis through until 2029/30.

Sewage treatment works - Functional expenditure Lines 5.11 - 5.16

This table has been prepared taking into account the guidance on improving cost allocation between the sewage treatment and bioresources units in relation to sludge liquors, energy generation and overheads.

The forecasted base operating expenditure has been assessed using our planned outturn for 2024/25 based on our latest Board approved forecast. Enhancement costs are aligned to CWW1 therefore the totals excluding third party expenditure is consistent. Please refer to the relevant enhancement commentary for details of the schemes.

There have been no changes in the reporting methods or assumptions across the period, changes seen are as a result of fluctuations in the total cost.

Sewage treatment works - Functional expenditure Line 5.17

CWW5.17: Population equivalent of total load received (resident population and trade effluent)

Our DWMP Growth Demand Forecast Model is designed to produce growth forecasts in alignment with our WRMP 2024 (Water Resources Management Plan) and WRE (Water Resources East) Water forecasting processes. These forecasts are both based upon a unified foundation of Local Authority Planning data (collated by the external consultant, Edge Analytics), new-build site specific information and ONS occupancy data.

This forecast process aims to produce robust Water Recycling growth projections designed to support investment planning and capital delivery decisions. It utilises spatial data systems and geographical information system (GIS) to facilitate data management, apportionment, reporting and visualisation.

The Population Equivalent (PE) forecasting systems account for:

- The production of trend and plan-based forecasts for comparative analysis, based upon ONS, Local Authority Planning and internal Anglian Water datasets; additionally, forecasts are segmented according to EA guidance e.g. household (HH), non-household (NHH).
- Site specific details regarding development locations and build out rates (aligned with Local Authority Planning data).
- Assessments for influences on demand, and outputs including:
  - population/household/occupancy changes,
  - transient holiday population,
  - Non-HH (industrial) usage and forecasts for both water, trade and tankered effluent,
  - population equivalent (for biological load purposes), and
  - dry weather flow.

Forecasts at the Water Recycling Catchment level are assessed using a risk-based approach to developing an appropriate investment strategy.

Due to the large number of discrete sewer catchments we serve, forecasts are highly sensitive to development site locations, development timings and delivery build-out rates. This is of greater risk than within the WRMP due to the connectivity and larger scale of water resource zones. It has, therefore, been imperative that we gain access to reliable site location and timing information in alignment with Local Authority Plans and we have therefore commissioned Edge Analytics to collate this data.

Forecasts include fixed assessments of tankered load and non-resident population, based upon DWMP base-line values.

Over-all we see an increase of 197,919 in PE from 2020/23 (4,857,610 PE) to 2029/30 (5,055,529), reflecting Local Authority plan projection growth.

Note that for Line CWW5.17 we are reporting PE, population equivalent including tankering, but excluding non-resident populations, in accordance with the Guidance.

Furthermore, the current forecast that has been included, has not been reconciled with the 2022/23 APR out-turn values, but has been fully aligned with the forecast generated for the DWMP, which has informed PR24 planning decisions.

CWW6 Wastewater network+ - Sewer and volume data

Wastewater network Lines 6.1 - 6.22

CWW6.1-CWW6.2: S101a properties

We have accepted duty to serve 17 locations with s101a schemes for the period 2025-2030. No allowance has been made for schemes that may make future applications to Anglian Water. The connectable properties associated with each scheme along with the year of delivery is provided in the below table.

Table 3 S101a Investment detail

Investment	Nearest Town/City	Connected Properties	Profiled delivery dates
Walpole Cross Keys	Kings Lynn	203	2029
Garvestone	Dereham, Norfolk	135	2029
Barton Turf	Stalham, Norfolk	96	2029
Runham	Gt Yarmouth, Norfolk	86	2029
Lincoln Road, Lincoln	Lincoln City	25	2029
Ludham	Stalham, Norfolk	15	2028
Bessingham	Cromer, Norfolk	42	2029
Aisby	Sleaford, Lincs	51	2029
Hanworth	Cromer, Norfolk	54	2027
Little Oakley	Harwich, Essex	33	2027
Crafton	Leighton Buzzard, Bucks	40	2028
Happisburgh	Cromer, Norfolk	24	2027
Bungay, Staithe Road	Lowestoft, Norfolk	14	2027
Sutton St James	Sutton Bridge, Lincs	21	2028

CWW6.3: Total pumping station capacity

Throughout the period 2023-2030 the new pumping stations, with the associated rated power capacity increases, have been driven primarily by our first time sewerage and growth portfolios.

CWW6.4: Number of network pumping stations

Throughout the period 2023-2030 the new pumping stations have been driven primarily by our first time sewerage and growth portfolios.

CWW6.6: Total number of gravity sewer collapses

There were 259 reactive sewer collapses reported in 2022/23. This is a decrease compared to 2021/22 when we reported 297, this is due to a programme of work aimed at proactively finding sewer collapses to repair and improving our internal reporting to accurately capture these jobs.

The 259 reactive sewer collapses reported in 2022/23 includes 10 open sewer collapses that have not been closed by the 31 March 2023.

In 2023/24 we are forecasting 281 sewer collapses.

The forecast to 2030 is based on the assumptions behind our AMP8 forecast for line CWW6.6 and CWW6.7 are the same as those used in tables OUT1, OUT2 and OUT5 which have been assured by Jacobs and reflects our performance commitment level for PR24. These lines in CWW6 need to align to the proposed PCL. Our logic is that, for asset health performance commitments, we're funded to maintain the health of the assets and not necessarily improve them if there's no customer benefit. As a company with the lowest number of sewer collapses we are proposing to maintain our PR19 target (5.5/1,000km sewer) Whilst this is worse than 2022/23 performance, it is better than our three year average. The predictive analytics tool which looks at asset deterioration predicts small degradation in performance with current levels of maintenance but that is within our historic performance variation which suggests there isn't significant upwards pressure on performance.

In order to calculate the absolute number of sewer collapses and burst rising mains for CWW6 we have reversed the normalisation of 5.5/1,000km sewer using the forecast sewer lengths also provided in the table. We have estimated the split between gravity sewer collapses and burst rising mains based on our AMP7 average performance.

CWW6.7: Total number of sewer rising main bursts

There were 142 reactive burst rising mains reported in 2022/23. This is a slight increase compared to 2021/22 when we reported 132, we believe this is due to adverse weather.

In 2023/24 we are forecasting 145 burst rising mains.

The forecast to 2030 is based on the assumptions behind our AMP8 forecast for line CWW6.6 and CWW6.7 are the same as those used in tables OUT1, OUT2 and OUT5 which have been assured by Jacobs and reflects our performance commitment level for PR24. These lines in CWW6 need to align to the proposed PCL. Our logic is that, for asset health performance commitments, we're funded to maintain the health of the assets and not necessarily improve them if there's no customer benefit. As a company with the lowest number of sewer collapses we are proposing to maintain our PR19 target (5.5/1,000km sewer) Whilst this is worse than 2022/23 performance, it is better than our three year average. The predictive analytics tool which looks at asset deterioration predicts small degradation in performance with current levels of maintenance but that is within our historic performance variation which suggests there isn't significant upwards pressure on performance.

In order to calculate the absolute number of sewer collapses and burst rising mains for CWW6 we have reversed the normalisation of 5.5/1,000km sewer using the forecast sewer lengths also provided in the table. We have estimated the split between gravity sewer collapses and burst rising mains based on our AMP7 average performance.

CWW6.8 - CWW6.10: Number of combined sewer overflows, Number of emergency overflows, Number of settled storm overflows

To ensure consistency we have aligned the figure for our number of combined sewer overflows with those which are included within our annual storm overflow Event Duration Monitoring (EDM) report to the Environment Agency (EA). We reported 1,552 storm discharges to the EA for the 2022 calendar year, which comprised 1,189 storm overflows and 363 storm tanks. In our APR return we also included 14 Unpermitted CSOs (which are awaiting permits from the EA, do not have Event Duration Monitors on them and data is not reported to the EA in our return). We are therefore reporting 1,203 storm overflows for line CWW6.8 (1,189 plus 14 UCSOs).

In our forecasts for these lines we are predicting constant figures for the number of combined sewer overflows, emergency overflows and settled storm discharges.

Although we are working closely with the EA to deliver the planned reduction in spill frequencies outlined in the Storm Overflow Reduction Framework, we do not believe this will necessarily lead to the closure of any storm overflows, or removal of the need for settled storm discharges at our WRCs.

Emergency overflows play a vital role in ensuring that customers are not flooded with sewage in the event of electrical or mechanical breakdown of our pumping stations, or as a result of rising main failure. We are not therefore proposing to remove any of these during AMP8 as they protect public health and safety.

CWW6.11: Length of sewers laid post 2001

Data for this line includes the APR submitted number for 2022/23 and the following inputs:

Developer services on-site projections for both surface water sewers and foul sewers, using a value of 2.04 metres per property for foul sewers and 2.14 metres per property for surface water sewers. The property data for this comes from the number of properties by the incumbent (excluding NAVs) from table DS04.

Sewers and rising mains rehabilitated and structural refurbished - see commentary for lines CWW6.14 and 15 for more detail.

Then finally new sewers and rising mains planned to be laid for AMP8 extracted from our corporate cost modelling software (Copperleaf/C55). These planned schemes cover new assets for the purpose of providing s101a first time sewerage schemes and for growth schemes.

CWW6.12: Volume of trade effluent

For 2022/23 the volume of wastewater is as per the APR, line 7C.12.

The volume forecast to 2029/30 is consistent with the annual average change in business water use as reported in table CW5 and in line with projections of the general economic activity and demand efficiency initiatives.

CWW6.13: Volume of wastewater receiving treatment at sewage treatment works

For smaller WRCs (serving less than 250 population equivalent) an estimate has been made of the flow discharged per year. The numbers for this line were then produced by combining the separate values for the measured flows from larger WRCs with this estimated flow from the smaller WRCs.

The definition for this line requires us to reflect the flow data reported to the EA in the annual OMA report. Measured flow data is reported to the EA on a calendar year basis consequently data for the 2022 calendar year has been used for 2022/23.

The volume of wastewater received by our WRCs can vary significantly from year to year as it is affected by the levels of rainfall. We have therefore derived the values for the forecast years by averaging the reported flows for the last five years and inflating it by a factor which reflects the predicted population growth within our region through until 2029/30.

CWW6.14: Length of gravity sewers rehabilitated

Downward trend seen for the last two years of AMP7 as a result of the focus on the delivery of large diameter sewers with high impact. This strategy yielded reduced lengths due to the increased complexity/size (e.g. Potters Way and Fengate Sewer Rehab, approx. 1km rehab of >1000mm diameter sewer), but also through a higher apportionment of budget, resulting in a smaller year 4 and 5 programme being expected.

Since 2022, the business has taken greater measures to proactively replace or reline smaller diameter sewers, when they were identified whilst carrying out emergency repairs on adjoining sewers that had already failed.

This trend is expected to continue from now on into PR24 and may become a source of minor variation in lengths reported compared to forecast depending on the frequency of events encountered each year.

As a result of our focus on large diameter mains in AMP7, the overall lengths expected in PR24 will likely trend upwards compared to AMP7.

Sourcing of data:

AMP7 current figures for 2022/23 were sourced from the 2023 APR. Projected figures for the next two years of this AMP have been derived by a combination of sourcing from all relevant actual and planned investments with planned delivery milestone dates that are in years 4 and 5 at the time of entering these values in the tables.

The AMP8 figures represent the projected values of physical replacement (that is to say, not life extending interventions) derived from the predictive analysis results that form the basis for the proposed PR24 investment plan. These have been averaged out to reflect the flat and stable profile currently proposed by the business for delivery (that is, each year representing one fifth of the total for the AMP).

CWW6.15: Length of rising mains replaced or structurally refurbished

For rising mains in particular, capital interventions include (but are not limited to) installation of air valves along the rising main length and VSDs (variable speed drives) at the pumping station to reduce pressure spikes. These interventions are made possible through a programme employing pressure monitors from which data is used to generate transient reports which in turn can identify these specific opportunities.

The current year's figures include fourteen rising mains (totalling approx. 33km length) that benefitted from these types of interventions in 2022/23. These rising mains we believe are consistent with the interpretation of the term 'structurally refurbished' as the life of the physical asset is being genuinely extended.

Rising main replacement schemes are completed when mitigation is not possible or cost effective, or if further bursts occur post mitigation. Four rising mains were fully or partially relined or replaced in 2022/23 (totalling approx. 2km in length).

It is important to note when comparing the current year figures with projected year 4 and year 5 figures and also those for PR24 (which currently only have the expected physical replacement figures), that these will appear much lower compared to 2022/23 (which included the 33km referred to above) and will be in fact more similar to the remaining 2km length reported as refurbished for 2022/23.

It is expected that significant differences between predicted and actual lengths refurbished are likely to arise due to more transient reports being generated and leaner interventions being identified before/during the delivery process in the rest of years 4 and 5.

It is also expected that in PR24, a combination of more physical relining and a potential continuation of the current mitigation programme, will be used to meet the outcomes we are proposing for our performance commitments.

Sourcing of data:

AMP7 current figures for 2022/23 were sourced from the 2023 APR figures/reports. Projected figures for the next two years of this AMP have been derived by a combination of sourcing from all relevant actual and planned investments with planned delivery milestone dates that are in years 4 and 5 at the time of entering these values in the tables.

The AMP8 figures represent the projected values of physical replacement (that is to say, not life extending interventions) derived from the predictive analysis results that form the basis for the proposed PR24 investment plan. These have been averaged out to reflect the flat & stable profile currently proposed by the business for delivery (that is, each year representing one fifth of the total for the AMP).

CWW6.16: Length of foul (only) public sewers

Data for this line includes the APR submitted number for 2022/23 and the following inputs:

Developer services on-site projections for foul water sewers, using a value of 2.04 metres per property. The property data for this comes from the number of properties by the incumbent (excluding NAVs) from table DS04.

New sewers planned to be laid for AMP8 extracted from our corporate cost modelling software (Copperleaf/C55). These planned schemes cover new assets for the purpose of providing s101a first time sewerage schemes and for growth schemes.

CWW6.17: Length of surface (only) public sewers

Data for this line includes the APR submitted number for 2022/23 and the following inputs:

Developer services on-site projections for surface water sewers, using a value of 2.14 metres per property. The property data for this comes from the number of properties by the incumbent (excluding NAVs) from table DS04.

CWW6.18: Length of combined public sewers

There are no planned changes to this length from the 2022/23 APR number.

CWW6.19 - Length of rising mains

Data for this line includes the APR submitted number for 2022/23 and the following inputs:

New rising mains planned to be laid for AMP8 extracted from our corporate cost modelling software (Copperleaf/C55). These planned schemes cover new assets for the purpose of providing s101a first time sewerage schemes for example.

CWW6.21: Length of other wastewater network

There are no planned changes to this length from the 2022/23 APR number, for 6km of sludge transfer pipe.

CWW6.22: Length of formerly private sewers and lateral drains (s105A sewers)

There are no planned changes to this length from the 2022/23 APR number, for 31,200km of modelled transferred sewer network.

CWW6a Transition and accelerated programme - Wastewater network + - Sewer and volume data

We do not have any transition or accelerated schemes in Wastewater Networks+ planned. Therefore, table CWW6a contains no data.

CWW7a Wastewater network+ - Sewage treatment works size and consents

Load received at sewage treatment works Lines 7a.1 - 7a.7

CWW7a Lines 1-7: Load received at sewage treatment works

The loads reported in this table provide a consistent record which aligns with how we report tables 7D Annual Performance Report.

The size banding of the individual Water Recycling Centres (WRCs) has been determined using the total resident population, which is comprised of domestic population, tankered waste (from septic tanks and cesspools) and trade effluent loads. Non-resident population has not been included when determining the size banding of the works, in line with the guidance.

The treatment types at our WRCs are assumed to be the same as prior years, unless evidence from operations has been provided. There have been no changes to treatment types in 2022/23.

The loads received volumes in lines CWW7a.1-CWW7a.7 include non-resident population, but exclude the tankered imports from septic tanks and cesspools. This is consistent with our approach to reporting historically and in line with previous Ofwat guidance JR08/004 and RAG 4.11.

The totals on line CWW7a.7 aligns with the totals generated in CWW5.9.

CWW7b Wastewater network+ - Sewage treatment works data UV permits

CWW7b.1 - CWW7b.6: Weighted average number of days that UV permit applies per year for STWs

All of our works with UV disinfection adhere to a standard that is <=30mW/s/cm2. Currently we have 12 works with UV disinfection, but in AMP7 we are proposing to add a further 7 sites to the list. These are summarised below:

Table 4 Proposed new UV disinfection sites

Asset Name	Short Code	Dose rate (mW/s/cm2)	No of days dosing per year	Completion Date
Boston STW	BOSTST	30	365	31/03/2026
Kings Lynn STW	KLYNST	30	365	31/03/2026
Southwold Common STW	SWOLST	30	365	31/03/2026
Maldon STW	MALDST	30	365	31/03/2026
Melton STW	MELTST	30	365	31/03/2026
Tollesbury STW	TOLLST	30	365	31/03/2026
Woodbridge-Creek Farm STW	WOODST	30	365	31/03/2026

CWW7c Wastewater network+ - Sewage treatment works data treatment type

Load received at sewage treatment works Lines 7c.1 - 7c.8

The loads reported in this table provide a consistent record which aligns with how we historically reported tables 7D in the Annual Performance Report (APR). The size banding of the individual Water Recycling Centres (WRCs) has been determined using the total resident population, which is comprised of domestic population and trade effluent loads. Non-resident population has not been included when determining the size banding of the works, in line with the guidance.

The treatment types at our WRCs are assumed to be the same as prior years, unless evidence from operations has been provided. There have been no changes to treatment types in 2022/23, and for subsequent years in AMP7 we are assuming that the treatment types remain the same.

The loads received volumes in lines CWW7c.1-CWW7c.7 include non-resident population, but exclude the tankered imports from septic tanks and cesspools. This is consistent with our approach to reporting historically and in line with RAG 4.11.

This table differs from the numbers reported in our APR which includes loads from nine additional WRCs. These WRCs belong toother water companies but to which our customers drain and we receive a charge for thetreatment of this load. Forecasting changes to these works would be disproportionately complex and accounts for less than 0.3% of our load.

CWW8 Wastewater network+ - Energy consumption and other data

Other Lines CWW8.1 - 8.6

CWW8.1: Total sewerage catchment area

The area reported covers the aggregate of all Anglian Water's sewer catchment areas. The figure reported matches that in the 2023 Annual Performance Report.

CWW8.2: Designated coastal bathing waters

Total numbers of bathing waters may change at the start of each year following the completion of the Defra Designation and De-Designation application process. Anglian Water is expecting a number of newly designated bathing waters, which is reflected in the numbers in this table. The numbers included for 2022/23 reflect those reported in this years APR return.

CWW8.3: Designated inland bathing waters

3 inland bathing waters were designated ahead of the 2023 bathing water season.

CWW8.4: Number of intermittent discharge event duration monitors

The numbers included for 2022/23 reflect those reported in this years APR return. The numbers for 2023/24 reflect the remaining EDM obligations in the AMP7 WINEP, which we are delivering early in order to achieve 100% coverage of storm overflows by December 2023. Alongside the EDMs being delivered through our AMP7 WINEP programme, we are also delivering 356 EDMs under our maintenance programme in order to meet 100% coverage of storm overflows by December 2023 (96 in year 2022/23 and 260 in year 2023/24). These have not been included in line CWW8.4 as the guidance states only WINEP schemes should be included for AMP7.

As identified in commentary for line CWW6.8, Anglian Water currently has 14 applications with the EA for UCSOs. In completing line CWW8.4 we have assumed that all 14 application are granted by the EA in 2025, with a condition to install an EDM at all locations. For this reason we have included an entry of 14 EDMs for financial year 2025/26.

CWW8.5: Number of monitors for flow monitoring at STWs

For AMP7, figures are included for UMON4 WINEP schemes only, with UMON3s reported in line CWW8.4. For AMP8 the figure is for both UMON3 and UMON4, this matches CWW20.32. A breakdown of solution types can be found in CWW20.33-35. The numbers included for 2022/23 reflect those reported in this years APR return.

CWW8.6: Number of odour related complaints

We are projecting a stable profile for this AMP and next AMP, based on the current 22/23 APR value.

Despite the stable position, further enhancement is required to maintain the existing number of odour complaints stable, as the company is expecting these to trend upward over the next few years due to a variety of reasons:

1. Increased population growth increasing both expected frequency and chance of complaints, as well as overall increasing customer expectations on odour;

2. New build/developments occurring closer to AW sites increasing risk/frequency of complaints;

3. Projected impact of climate change: higher average temperatures in the future will result in increased levels of septicity in the network compared to now, which in turn create new odour risk hotspots and require new odour treatment to control."

Energy consumption Lines 8.7 - 8.9

This table captures energy consumption for sewage collection and treatment.

The data covers the years 2022/23 to 2029/30. The structure of the information replicates that used in the 2022/23 Annual Performance Report (APR). This commentary does not seek to replicate the APR commentary, more to explain any material differences, changes to assumptions and outline methodology.

All 2022/23 information has been replicated from the APR for that year. For the following years, the following represents the outline methodology.

For 2023/24:

- we have populated our APR template with the budgeted consumption and costs for that year. The exception to this is where we have adjusted the forecasts of

energy generation and fuel (heat) usage to match the latest forecasts from the Bioresources Team, and also adjusted for the impact upon grid energy
- the total energy consumption from transport and on-site fuel on all wastewater function sites is assumed not to have changed from 2022/23. The exception is for the gas forecast to be delivered to the administration function (a share of which is allocated to all wastewater function sites), where the budgeted gas consumption has been used
- Additional consumption as a result of new capital schemes (Revenue Impact of Capital Schemes, or RICS) being delivered in the year has been added
- An assumption of base energy efficiency has been added, consistent with historic averages for the wastewater function.

For 2024/25 to 2029/30:

- We have assumed that the consumption forecast will follow on from that for 2023/24, adjusted for:
  - Change in the forecast of the population served, pro-rata to energy consumption
  - RICS for schemes forecast for delivery from 2024/25 to 2029/30
  - The same base energy efficiency assumption as 2023/24
  - Changes in the generation of electricity and heat in the Bioresources price control and the impact upon grid energy requirements.

In 2022/23, the total energy consumption across both lines was **332,370 MWh**, 99,046 MWh from sewage collection and 233,324 from sewage treatment. This was 2.65 per cent lower than in 2021/22, the primary reason for which was lower rainfall during the year, especially during the extreme hot and dry weather of the summer, so less electricity was required in collecting wastewater and pumping it to sewage treatment works.

For 2023/24 we are budgeting for more normal, average climatic conditions, rather than the most recent extremes, with a total across both lines of **338,587 MWh**, 100,093 MWh for sewage collection and 238,494 MWh for sewage treatment. This includes for a total of 3,935 MWh of forecast RICS and 7,000 MWh of assumed efficiencies across both lines.

The forecast for 2024/25 across both lines is **336,973 MWh**, 99,276 MWh for sewage collection and 237,697 MWh for sewage treatment. The changes from 2023/24 are driven by a forecast increase in population served, adding 3,216 MWh, plus a total of 2,169 MWh from forecast RICS across both lines. Assumed efficiencies of 7,000 MWh have been added across both lines.

The forecast for 2025/26 across both lines is **339,075 MWh**, 99,409 MWh for sewage collection and 239,666 MWh for sewage treatment. The changes from 2024/25 are driven by a forecast increase in population served, adding 2,508 MWh, plus a total of 6,594 MWh from forecast RICS across both lines. Assumed efficiencies of 7,000 MWh have been added across both lines.

The forecast for 2026/27 across both lines is **344,937 MWh**, 99,299 MWh for sewage collection and 245,637 MWh for sewage treatment. The changes from 2025/26 are driven by a forecast increase in population served, adding 2,365 MWh, plus a total of 10,497 MWh from forecast RICS across both lines. Assumed efficiencies of 7,000 MWh have been added across both lines.

The forecast for 2027/28 across both lines is **355,109 MWh**, 99,603 MWh for sewage collection and 255,506 MWh for sewage treatment. The changes from 2026/27 are driven by a forecast increase in population served, adding 2,093 MWh, plus a total of 15,079 MWh from forecast RICS across both lines. Assumed efficiencies of 7,000 MWh have been added across both lines.

The forecast for 2028/29 across both lines is **370,025 MWh**, 99,719 MWh for sewage collection and 270,306 MWh for sewage treatment. The changes from 2027/28 are driven by a forecast increase in population served, adding 1,771 MWh, plus a total of 20,145 MWh from forecast RICS across both lines. Assumed efficiencies of 7,000 MWh have been added across both lines.

The forecast for 2029/30 across both lines is **395,862 MWh**, 101,706 MWh for sewage collection and 294,156 MWh for sewage treatment. The changes from 2028/29 are driven by a forecast increase in population served, adding 1,492 MWh, plus a total of 31,344 MWh from forecast RICS across both lines. Assumed efficiencies of 7,000 MWh have been added across both lines.

A number of assumptions have been made in calculating the water recycling energy consumption data.

- For the whole of the water recycling function, we have applied a financial split from the 2022/23 regulatory accounts between bioresources and wastewater network plus for electricity consumption. This financial split is based upon assessments of proportional use by different Ofwat business units made by operational experts.
- We have included energy from renewable sources generated and used on site, including CHP (combined heat and power), wind and solar.
- Grid electricity and fuel (oil and natural gas) used in offices has been included and split equally between water and water recycling.
- Fuel oil is not recorded on our corporate systems against Ofwat's business units and therefore the same split used for electricity has been assumed for each

fuel type with the exception of gas oil and diesel delivered to water recycling sites;

- We have assumed a 35 per cent thermal efficiency for natural gas consumption in converting to energy output (boilers and CHP).
- In line with fuel reports produced from our SAP system for 2022/23, we have allocated 68 per cent of diesel deliveries to bioresources and 32 percent to wastewater network plus.
- Transport (claimed mileage and fleet fuel purchased on fuel cards) is not recorded in our corporate systems against Ofwat's business units and therefore we have split the total 50/50 between water and water recycling and then assumed that they split in the same proportions as electricity between the business units. This is with the exception of RES fleet Biosolids haulage which has been allocated entirely to bioresources.
- Sub contracted transport (bioresources and cake) has not been included, only fleet (directly operated) vehicles.
- Transport for company cars is collected as mileage. For 2022/23, we have converted mileage into kWh through using BEIS' greenhouse gas reporting condensed conversion factors for 2022, and we have assumed no change to 2023/24 and through to 2029/30.
- For electric vehicles in 2022/23, a small volume of energy was collected via fuel cards or was metered at employees' homes. For the remaining, larger volume we made the assumption that the mileage claimed relates to charging at home or on public charging points, rather than using the charging points at our offices. Many people are still working from home a lot of the time and we don't have a reliable source to tell us how many miles are being claimed from charging at Anglian Water sites. We believe this assumption to be safe and not capable of skewing the overall figures since (i) electric car consumption from claimed mileage totalled just 238,643 kWh across the whole of Anglian Water and (ii) wherever cars are charged, the driver may be charging for domestic and commuting miles (which cannot be claimed) as well as for business. While there may be an overlap with the electricity consumption data, we consider that this will be de-minimus. We are looking to improve our processes in order to better capture consumption by electric cars charged at home and AW infrastructure. For 2023/24 and through to 2029/30 we have assumed no change to this approach, however, it should be noted that whatever the blend between electric, hybrid, petrol and diesel driven vehicles, the fundamental unit of the energy consumed - the Watt - does not change. It is a measure of work done, in this case to move vehicles, people and bioresources from A to B, and the amount consumed for a given journey will be similar for differently fuelled vehicles, regardless of the fuel used.
- Electricity figures used for 2022/23 are all metered so there is a high confidence in them.

CWW8a Transition and accelerated programme - Wastewater network+ - Energy consumption and other data

We do not have any transition or accelerated schemes in Wastewater Networks+ planned. Therefore, table CWW8a contains no data.

CWW9 Enhancement expenditure (cumulative) - wastewater network+ and bioresources

For the completion of this data table, reporting from Copperleaf (C55) was used. This alignment with Copperleaf enhances transparency and accuracy in financial reporting. Copperleaf provides the necessary inputs for populating the PR19 Strategic Regional Water Resources Reconciliation Model. Additionally, it supports the calculation of end-of-period revenue and Regulated Capital Value (RCV) adjustments for PR24, as per the Ofwat guidance.

Where a quality enhancement scheme has more than one cost driver, we have allocated the expenditure to the line of the primary driver. Any additional cost for delivering further drivers have been included in the relevant line.

Expenditure included within third party services in table CWW1a are not included inthis table. We have reported schemes as completed when they come into beneficial use, as per the guidance.

CWW10 Wholesale wastewater local authority rates

Rateable value Lines 10.1

CWW10.1: Rateable value

The 2023 rateable value list will be effective for the period 2023 to 2026, and will then be followed by further revaluations in 2026 and 2029. The most recent review increased the rateable value effective from 2023 therefore the actual is used for this period. There is currently no reliable information to project the likely rateable values at the 2026 or 2029 revaluations, or any information on rate poundage or transition relief arrangements, as such we have shown no movement in the rateable value.

Wastewater wholesale local authority rates Lines 10.2 - 10.9

CWW10.2: Wholesale wastewater business rates charge for current year before transitional relief

Our starting point is the reported charge for 2022/23. There is an increase in cost from 2022 to 2023 as a result of the 2023 revaluation. No inflation was applied on business rates in 2023.

CWW10.3: Wholesale wastewater business rates transitional relief

The value of transition relief is a calculated number, intended to smooth the impact of the last revaluation in 2023. Our transition relief numbers to 2024/25 have been entered as negative numbers as we saw an increase in our liability as a result of the 2023 revaluation. Following increases relative to the 2017 rateable value, transitional arrangements apply to limit the 2023/24 and 2024/25 liabilities to ensure that the 2023 rateable value multiplied by rate poundage does not exceed the set transitional limits.

CWW10.6: Charges to third party services (Other wholesale wastewater business rates adjustments 1)

Based on the assessed use of our sites, we make a recharge to third party services which is included in the total recharge to third parties. These recharges are assumed to continue in line with the current levels during AMP8.

CWW10.7: Recharges from other business units (Other wholesale wastewater business rates adjustments 2)

We also make a recharge to water services to reflect the occupancy of non-water sites. These recharges are assumed to continue in line with the current levels during AMP8 and are an estimate based on the charges after transition relief.

Analysis of change in charge before transitional relief Lines 10.10 - 10.17

CWW10.11: Change in wholesale wastewater business rates costs due to the impact of any revaluation

In 2023/24 we have included the impact of the revaluation which is calculated based on the change in the rates bill before transition relief.

CWW10.13: Business rate inflation freeze (Change in wholesale wastewater business rates costs due to other 1)

The government announced a business rate inflation freeze as a result of the cost of living crisis. This had the impact of reducing our future rates bill as shown in line CWW10.13.

CWW11 Third party costs by business unit for the wholesale wastewater service

Third party costs ~ operating expenditure Lines 11.1 - 11.13

CWW11.4 and CWW11.11: Third party wastewater price control/non-price control opex excluding developer services

With the exception of bulk supplies, where we are forecasting to see increase in activity, operating expenditure reported costs are based on rolling forward our 2024/25 forecast as we do not expect costs to change materially during AMP8.

CWW11.5, CWW11.6 and CWW11.12: Diversions - Opex

The data in these sections relates to wastewater diversions opex expenditure. For AMP8 we have chosen to use our AMP7 base model as we feel we have better insight into these diversion types and are more confident that the forecast is in line with AMP7 levels.

Third party costs ~ capital expenditure Lines 11.14 - 11.26

CWW11.21: Bulk supplies (wastewater) capex

Table 5 Recharge rate breakdown

Investment Reference	Investment name	Scheme cost (£m)	Rate %	Cost recharged (£m)	Line ref.	Price control
I032489	Doddinghurst STW UMON3	0.010	31.1	0.003	CWW11.21	WW Networks+
I039007	Doddinghurst WRC WFD_IMP P<0.5 mg/l	2.964	31.1	0.922	CWW11.21	WW Networks+
I033972	Chalton WRC Digested cake pad permit compliance	0.439	84.4	0.370	CWW11.21	Bioresources
I039325	Chalton WRC WFD_IMP P<0.5 mg/l	5.840	84.4	4.929	CWW11.21	WW Networks+
TOTAL				6.221		

Investments in the table above represent assets where we receive sewer flow for treatment as a service to Thames Water. As such, we are recharging the costs of these with the above rates. The recharge rates have been agreed between Anglian Water and Thames Water.

The investments are all enhancement investments and in line with guidance provided at PR19 we have left these costs in to show the full enhancement costs in CWW3 (please see table CWW3 table commentary for further explanation). We have included the enhancement third party costs in table CWW13 for information to show the allocation to each line of cost.

CWW11.18, CWW11.19 and CWW11.25: Diversions - Capex

For AMP8 we have used two different models to understand this; linear projection, based on prior AMP diversion activity and AMP7 base level activity model.

In table below is a breakdown of the third party charge rates related to diversions with the scheme name and line reference.

Table 6 Diversions third party charge rate

Reference number	Investment name	Rate %	Line ref.	Price control
1	S185 Sewerage Diversions AMP8	100	CWW11.25	WW Networks+
2	Other WR Diversions IMW AMP8	82	CWW11.19	WW Networks+
3	NRSWA WR Diversions IMW AMP 8	82	CWW11.18	WW Networks+

Investments above are developer services driven diversion investments and are explained in more detail below.

CWW11.18: Diversions - NRSWA

For AMP8 we have chosen to use our AMP7 base model as we feel we have better insight for this diversion type and are more confident that the forecast is in line with AMP7 levels.

CWW11.19: Diversions - other non-section 185 diversions

For AMP8 we have chosen our linear projection as it gave a slightly higher rate for diversion activity than our AMP7 base model. NSWRA diversions, are harder to predict the level of activity as it is associated with National Highways and Local Authority activity and could be of significant value should we be requested to undertake this service.

CWW11.25: Diversions - s185

For AMP8 we have chosen to use our AMP7 base model as we feel we have better insight into these diversion types and are more confident that the forecast is in line with AMP7 levels.

CWW12 Transitional expenditure - wastewater network+ and bioresources

We have included transition expenditure in accordance with the published guidelines in the PR24 Final Methodology.

The programme and projects we have identified allow for achieving early benefit for customers in AMP8, efficient resource profiles and will enable us to meet agreed completion dates with our quality regulators.

Our Board have approved early funding for transition plans including £68.8 million of expenditure across 2023/24 and 2024/25 broken down in the table below. This represents 1.7% of our planned enhancement capital expenditure, similar to the 1.9% of enhancement expenditure we proposed at PR19.

Table 7 Transition programme overview

Transition programme	Water (£m)	Water Recycling (£m)
AID CW(W) 17	12.14	18.98
Non-AID CW(W)12	15.48	22.20
Total	27.62	41.18

The PR24 Final Methodology details what type of investments qualify for transition spending. We have aligned the projects proposed to this guidance:

- Companies must provide convincing evidence to justify the early start (such as reducing overall delivery costs, or delivering early environmental benefit)
- Companies must be on track to deliver their PR19 investment programme
- Spend in 23/24 must only be on investments that are part of AID, WRMP24 or WINEP
- Spend in 24/25 should relate to early statutory deadlines in the next price control period; or to early design and planning of large, non-routine investments
- It cannot be used to fund deliverables already previously funded, or for base activity
- It cannot be used for bioresources or retail

Through the Accelerated Infrastructure Deliver (AID) programme we have already provided evidence to justify the early start. This table commentary explains further the reasons for inclusion of non-AID spend in transition.

This transition plan will allow more effective use of resources than starting all design work for AMP8 on 1st April 2025, which would risk construction resources being non-productive or being lost from our supply chain which we will rely on for the deliverability of the wider PR24.

EA/NRW environmental programme wastewater (WINEP/NEP) Lines 12.1 - 12.130

CWW12.4: Flow monitoring at sewage treatment works; (WINEP/NEP) wastewater

UMON4 MCERT's reporting change (multiple WINEP IDs).To meet the new reporting requirements of this regulation these schemes have early obligation dates 01/01/27.

BOTTISHAM STW UMON4(WINEP ID08AW100948) -Modifications to the site to comply with the new regulations have early obligation dates 01/01/27.

CWW12.46: Storm overflow - new / upgraded screens (WINEP/NEP) wastewater

Gt Yarmouth-Bryants Quay SM IMP5(WINEPID08AW100283) -CSO New Screen with blinding monitoring high priority improvement required early.

CWW12.52: Chemicals and emerging contaminants monitoring, investigations, options appraisals; (WINEP/NEP) wastewater

CIP4 (4a) TraC investigations WFD_INV_CHEM (WINEPID08AW101965) -CIP investigation enabling work is required to ensure that the monitoring programme is able to successfully delivery by 2027. Detailed scoping exercise and early sampling will be funded with contributions from across the industry and is therefore essential to include in transition.

CWW12.61: Nitrogen technically achievable limit monitoring, investigation or options appraisal; (WINEP/NEP) wastewater

Eye-Hoxne Rd WRC N TAL (WINEPID 08AW100183) - Eye-Hoxne Rd WRC Optimisation monitoring and sampling have early obligation dates 01/05/26.

CWW12.64: Treatment for phosphorus removal (chemical) (WINEP/NEP) wastewater

Phosphorous removal (WINEPID 08AW101651, 08AW101654, 08AW101762, 08AW101657, 08AW101656) - These 5 phosphorus removal schemes (Copford, Potton, Morcott, Wymondham, Shenfield) to install tertiary filtration, new dosing plant and ancillaries have early obligation dates 01/04/26, therefore must start early.

CWW13 Best value analysis (enhancement expenditure) - wastewater network+ and bioresources

We have used Copperleaf, our investment management system, to report on the best value analysis of projects starting in AMP8 as per the Ofwat guidance. Present value figures have an appraisal period of 30 years as specified by the table guidance. Our plan contains over 3,500 individual investments, each with multiple alternatives, each alternative with multiple benefits assigned, all recorded in our investment planning system, copperleaf. We have therefore automated table population as far as possible.

In some cases where the least cost alternative would have appeared on a different cost line, we have allocated the least cost alternative to the same line as the preferred alternative to aid comparison. For instance, when comparing two options to solve an environmental target, when comparing a nature based option with a traditional engineering option the table may allocate costs and benefits to separate lines, but we have shown both options on the same line.

In addition it should be noted that although many options are considered and discounted, as explained in the options consideration sections of our enhancement evidence, non-selected options are not subject to the same level of cost assurance and cost benchmarking as those in the core pathway. For this reason, some lines of data in CWW14 have identical data to CWW13. This does not mean only one option was considered, it means that only one option had sufficiently well developed costs to populate the table. We have investigated with our internal teams some lines of data that appear to show lower cost options available that were better value using Ofwat's marginal benefit valuation approach. In some cases the lower cost alternative was considered infeasible in combination with other investments at the site or in the rest of the asset system.

More detail on how we have populated these tables is available in the table commentary for CWW15/16.

CWW14 Best value analysis of alternative option (enhancement expenditure) - wastewater network+ and bioresources

We used Copperleaf, our investment management system, to report on the least cost alternatives to populate the CW14 and CWW14 tables, as per the Ofwat guidance.

Out of the 3611 investments in our PR24 plan (Water and Waste waste), there were 476 that had an alternative that was least cost but not the preferred option.There are a variety of reasons to explain why the least cost option was not selected as the preferred option, including; The Environment Agency (or other regulator) not permitting the alternative option, a technology not yet being viable or permitted by regulators.

For the CW(W)14 report, these least cost alternatives were changed to be the recommended option in a separate scenario in Copperleaf, named 'PR24 Least Cost Alternative'.Out of those 476 investments, 159 had a different start date to the preferred alternative and so these were manually changed to reflect the same start date as the main plan. This process has resulted in 52 investments missing their EA Obligation date and in addition some spend being pushed into AMP9 (included in the 10 years of data).

The AID investments were treated in the same way, as some of this spend appears in 2023/24 and 2024/25 it will not appear in the CW(W)14 table.

We have considered multiple alternatives throughout the optioneering process and used the best data that is available to us.

CWW15 and CWW16 Best value analysis benefits

Tables CW15 and CWW15 - Best value analysis (benefits) - water and wastewater network+ and bioresources. This is the Recommended option, or Best Value plan.

We welcome the opportunity to provide data on how best value options have been selected in our business plan, taking account of wider environmental and social value, and aligning with Ofwat's Public Value principles.[1]

Figure 1 Ofwat's Public Value Principles

	The Principle
Principle 1	Companies should seek to create further social and environmental value in the course of delivering their core services, beyond the minimum required to meet statutory obligations. Social and environmental value may be created both in direct service provision and through the supply chain.
Principle 2	Social and environmental benefits should be measurable, lasting and important to customers and communities. Mechanisms used to guide activity and drive decision-making should support this, for example through setting and using company purpose, wide external engagement and explicit consideration of non-financial benefits.
Principle 3	Companies should be open with information and insights on operational performance and impacts (both good and bad). This will support stakeholder engagement, facilitate collaboration and help identify opportunities for delivering additional social and environmental value.
Principle 4	Delivery of social and environmental value outcomes should not come at greater cost to customers without customer support.
Principle 5	Companies should consider where and how they can collaborate with others to optimise solutions and maximise benefits, seeking to align stakeholder interests where possible, and leveraging a fair share of third-party contributions where needed. Companies' public value activities should not displace other organisations who are better placed to act.
Principle 6	Companies should take account of their capability, performance and circumstances in considering the scope for delivering greater social and environmental value.

This is an important part of how we achieve company purpose, and we have taken value-based decision making into the core of our processes for many consecutive price reviews, and were assessed by Ofwat in the 2021 AMMA as 'competent' or 'optimising', indicating high maturity in all questions relating to decision making. Over the last 18 months, we have used these solid foundations to apply best value decision making in PR24. The vast majority of our AMP8 enhancement programme has followed strict guidance on best value decision making and options appraisal set out be the Environment Agency via WRMP and WINEP.[2]These set out the values to be used in option selection as part of a staged process:

Stage 1 - setting the WINEP framework

Stage 2 - collaboratively identifying risks and issues

Stage 3 - proposing solutions

Stage 4 - assess proposals

Stage 5 - price review

Stage 6 - delivery

Over the course of PR24 we have attended Ofwat's cross-industry Outcomes Working Group, often discussing societal values. We took the decision in 2022 to complete a full refresh of our societal valuation programme to inform best value decision making in our business plan. At the June 2023 meeting Ofwat's minutes noted that where companies had not used Ofwat valuation of benefit to inform option selection in the business plan, companies should also present the benefit impacts of the schemes using standardised unit values for comparison. We confirm that the value-based decision making used to select options in our plan was based on our own value updated PR24 framework in combination with the EA's outcome measures, rather than Ofwat's implied marginal benefits, since the implied marginal benefits were not available at the point when those decisions were being made. The EA asked us to complete optioneering of much of our plan by January 2023 with option selection continuing through until May 2023, with implied marginal benefits only published in June 2023.

1 Ofwats-Final-Public-Value-Principles.pdf
2 Water industry national environment programme (WINEP) methodology - GOV.UK (www.gov.uk)

The tables as produced therefore are not an expression of the value data used to make optioneering or optimisation decisions, rather they represent a sensitivity analysis - testing how the value of our investments is affected when we replace our own benefit data with Ofwat's. We've followed the table guidance to provide in a format suitable for industry comparisons to be completed centrally, but it is therefore possible that this data table suggests other options appear better value. As we understand the main purpose of these tables is to express consideration of wider societal and environmental benefits, we have made the decision to populate the tables with societal values only, meaning that any private benefits to Anglian Water such as avoided reactive costs during incidents are not taken into account. For this reason some lines appear to have cost but no value.

Detailed Notes

CWW15.452-461 A-WINEP: To quantify the benefit of this programme we have used the lower end of the range of benefit defined in our A-WINEP submission sent to Ofwat on 7th August 2023.

Timing of least cost alternatives: We have set the start dates of non-preferred least cost alternatives to match the start dates of the preferred alternatives so that their benefits profiles are more closely aligned. Some of these options have longer implementation periods/project durations and therefore those non-preferred alternatives may appear to miss their obligation dates, or potentially carrying cost over into AMP9. For this reason we recommend costs are compared across the 10 years of cost data in the table rather than only for 2025-2030.

Alignment of units: the units we have used for some of the benefits don't align with performance commitment definitions. Please see comments in column AK for clarity on units of benefit used.

Omissions: Due to the limit of 10 lines of benefit data for each line of cost, we have omitted certain benefits and disbenefits with lower materiality, including temporary benefits and disbenefits such as traffic disruption associated with the construction works. Many of our Water Recycling investments also include minor benefits related to WINEP such as Air Quality, WINEP - Climate Change and WINEP - Volunteering, which have also been omitted as their value is negligible.

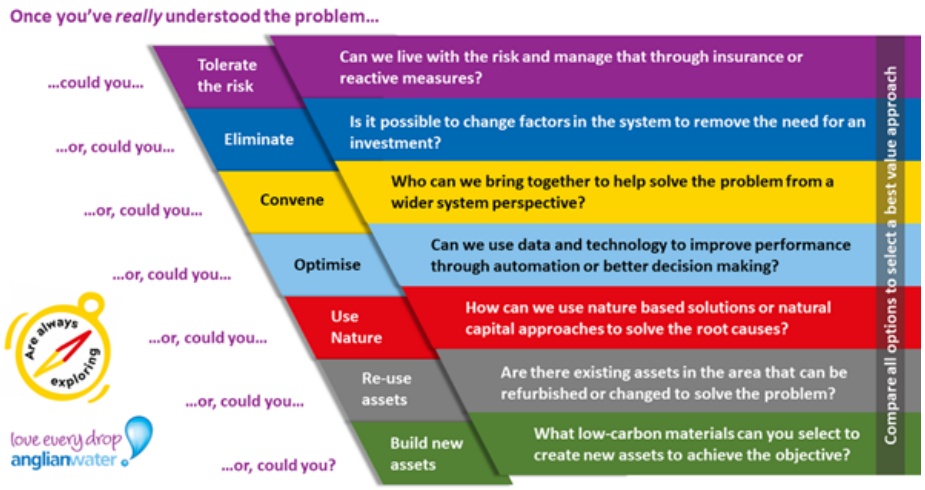
A note on Operational carbon increases: all carbon emissions are calculated using a fixed grid emissions factor as of today. Grid electricity in the future will have a much lower carbon intensity than today - but as the methodology fixes the emissions factor the reported emissions are higher than will (almost certainly) be the case in the future. In addition, any 'green' power we buy from the grid is excluded. This means that the table guidance over estimates the levels of carbon which will be the case in reality, making some investments appear less cost beneficial.

Alignment with table OUT3 'Outcome performance from enhancement expenditure - Performance commitments': The table guidance expects alignment between the best value plan benefits tables CW(W)15 and OUT3. We have reviewed this alignment and in many cases the data correlates, however there are some Performance Commitments with differences, explained by the benefits assessment in the CW(W)15 tables including risk avoidance, meaning that the baseline risk is increasing due to other factors and the benefit only brings the residual risk back to previous levels. This is therefore not a performance improvement and does not flow through to OUT3.

Our approach to Best Value Planning and Cost Benefit appraisal

Different investment options are considered using the below hierarchy to encourage thinking beyond typical or existing solutions.

Figure 2 Hierarchy



Each option is robustly costed using a library of over 3,000 cost models based on real costs captured from previous investments. This costing process considers Capex, Opex and any Capex repeats to calculate a Whole Life Cost.

Each option is also assessed from a benefits perspective using benefits valuation such as the EA outcomes measures or our own Value Framework.

We have developed a Value Framework, structured by the Six Capitals, which allows us to express benefits and disbenefits in a common language (£) for use in cost-benefit analysis and to inform our investment decisions.

Our Value Framework covers a wide range of categories and incorporates environmental and social measures (such as Biodiversity net gain, carbon, traffic disruption and noise) alongside traditional measures such as flooding, interruptions to supply and pollution. This enables us to consider a broader range of benefits and disbenefits of our investments and their alternatives, leading to investment decisions that more holistically consider value and the impacts our actions may have on the environment, customers and communities.

The impact values within our Value Framework are made up of both private costs (e.g. costs to resolve an incident) and societal costs. Societal costs are derived through a robust Societal Valuation Programme considering a broad range of sources where customers views, preferences and priorities are canvassed, analysed and incorporated into the values through a triangulation process. The values were updated in 2022 using research commissioned for PR24. This ensures that customer preferences are reflected in the cost benefit analysis.

The Value Framework, structured by the Six Capitals, allows us to express benefits and disbenefits in a common language (£) for use in cost-benefit analysis and to inform our investment decisions.

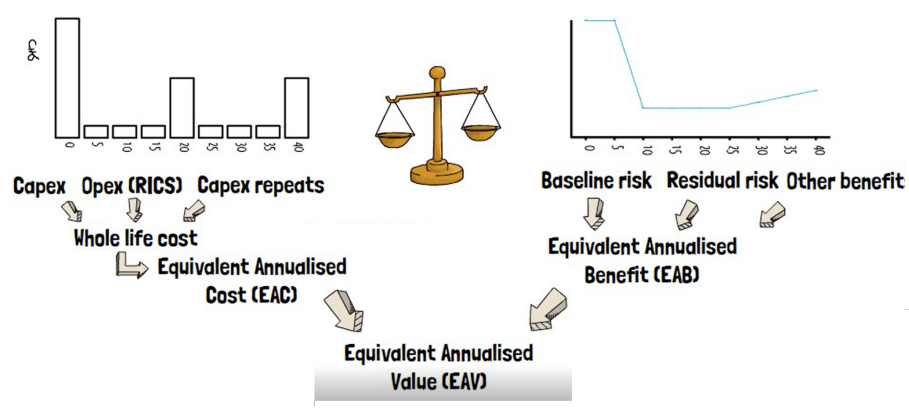
Figure 3 Our Value Framework categorised by six capitals

Natural	Social	Manufactured
Pollution	**Water supply**	**Water efficiency**
Category 1-4	Supply deficit Interruptions to supply Low pressure	Potable water leakage Raw water leakage Consumption reduction
Permit failures and discharges	**Water quality**	**First time connections**
WRC quality compliance WRC volumetric compliance WTW discharge compliance	Notices Health and regulatory impact Aesthetic impact DWI prosecution	Developer request water Developer request water recycling Section 101a request
Water resources	**Flooding**	**Business enables**
Over-abstraction Aquifer protection	Internal External Public Areas Dam failure	Information services
Environmental quality	**Customer (BAS and construction)**	**Security**
Bathing waters River water quality Biodiversity net gain Air quality	PR (only for one off cases) Visual Noise Odour Traffic disruption Amenity access Customer experience	Operational Security Cyber Security
Carbon and emissions		**Resilience to climate change**
Capital carbon Operational carbon Process emissions		Resilience to climate change
Financial	**People**	**Intellectual**
Income	**Health, safety and wellbeing**	**New/different ways of working**
Income protection Renewable generation Bioresources Non-domestic income Domestic income	Physical safety (staff and public) Employee wellbeing	Employee productivity Intellectual property utilisation
Opex increase		
Additional activity indicators		

Each candidate investment is appraised to establish a baseline position that captures any current or expected impacts to service, customers, the environment, safety etc (and their respected likelihoods) if no action is taken. (For example no. of properties expected to flood and frequency). This is established using modelling data, incident trends, growth data etc and expert judgement.

Each alternative (i.e. option) is appraised to establish a residual position which updates the baseline post solution, with updated impacts and likelihoods. This residual position also considers any additional benefits and disbenefits that may apply as a result of the intervention. These could be permanent (e.g. visual impact) or temporary (traffic disruption during construction) and consider a range of environmental and social measures including both capital and operational carbon.

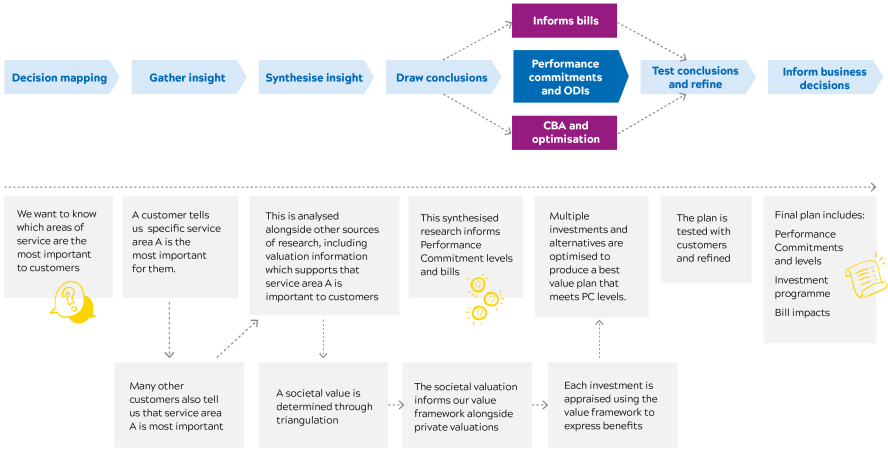
Figure 4 Ewquivalent Annualised Value



This information is combined with whole life cost information within our investment optimisation system (Copperleaf) to determine which alternative offers best value calculated as Equivalent Annualised Value (EAV), i.e. maximum net benefit for least whole life cost. The Net present Value (NPV) is calculated as the sum of the discounted values over thirty years. Year 0 is set at 2025 to align with the cost tables (Tables CW(W)13 & 14). As specified by Ofwat, the discounting calculation uses the social rate of time preference as outlined in His Majesty's Treasury (HMT) Green Book. This is a rate of 3.5%.

Investments and alternatives are then optimised to produce an overall best value plan that meets Performance Commitment (PC) levels and other constraints such as obligation dates or resource profiles.

Figure 5 How customer insight fits into out business planning process



CWW17 Accelerated programme expenditure - wastewater network+ and bioresources

As explained in the table commentary for CWW12, we have included transition expenditure in accordance with the published guidelines in the PR24 Final Methodology.

The Accelerated Infrastructure Deliver (AID) programme has been run as a separate process to achieve early benefit for customers and provide confidence of Ofwat's support for the early start for this expenditure. Ofwat's Final Decision for AID was published at the end of June: Accelerated Infrastructure Delivery Project - Ofwat

This table commentary provides updated detail on progress of the AID programme.

Since June 2023 we have worked closely with our internal delivery teams and partners in the supply chain to advance these schemes. A summary of progress is provided below for each scheme.

EA/NRW environmental programme wastewater (WINEP/NEP) Lines 17.1 - 17.130

Regional overflow reduction plan

We have refined the list of feasible locations for digital or blended solutions with our design teams and begun investigation and modelling work in the field. We explain more about the digital approaches used to reduce overflows in the main narrative chapter

In Appendix 2 section 1.3 of their final decision, Ofwat provided a PCD for the regional overflow reduction plan within AID and noted "The final list of overflows will be provided by Anglian Water at the time at the time of the submission of its strategic business plan in October 2023". We provide the updated list of which sites are proposed to be accelerated for digital solutions below:

Table 8 Accelerated programme, WINEP Obligations

WINEP ID	Name of Obligation	Ofwat Line reference
08AW100055	Boston WRC BOSTST Disinfection	CWW17.16: Increase storm tank capacity at STWs - grey solution; (WINEP/NEP) wastewater capex, CWW17.43 Storm overflow - sewer flow management and control; (WINEP/NEP) wastewater capex & CWW17.90 Microbiological treatment - bathing waters, coastal and inland (WINEP/NEP) wastewater capex [proportionately allocated]
08AW100053	Kings Lynn STC KLYNST Disinfection	CWW17.16: Increase storm tank capacity at STWs - grey solution; (WINEP/NEP) wastewater capex, CWW17.43 Storm overflow - sewer flow management and control; (WINEP/NEP) wastewater capex & CWW17.90 Microbiological treatment - bathing waters, coastal and inland (WINEP/NEP) wastewater capex [proportionately allocated]
08AW100053	Kings Lynn-Gaywood CSO - EnvIMP4 and SW-ND	CWW17.16: Increase storm tank capacity at STWs - grey solution; (WINEP/NEP) wastewater capex
08AW100053	Kings Lynn-Gaywood Outfall SSO - EnvIMP4 and SW_ND	CWW17.16: Increase storm tank capacity at STWs - grey solution; (WINEP/NEP) wastewater capex
08AW100067	Tetney Newton Marsh WRC Bathing Water	CWW17.19: Increase storm system attenuation / treatment on a STW - green solution; (WINEP/NEP)

WINEP ID	Name of Obligation	Ofwat Line reference
08AW100008	Barton on Humber WRC EnvIMP4	CWW17.16: Increase storm tank capacity at STWs - grey solution; (WINEP/NEP) wastewater capex
08AW100031	Earls Barton TPS EnvIMP4	CWW17.31: Storm overflow - increase in combined sewer / trunk sewer capacity; (WINEP/NEP) wastewater
08AW100175	Grimsby Riby Street EnvIMP4	CWW17.31: Storm overflow - increase in combined sewer / trunk sewer capacity; (WINEP/NEP) wastewater
08AW100174	Grimsby Pyewipe TPS EnvIMP4	CWW17.31: Storm overflow - increase in combined sewer / trunk sewer capacity; (WINEP/NEP) wastewater
08AW100103	Ipswich Cliff Quay WRC EnvIMP4	CWW17.16: Increase storm tank capacity at STWs - grey solution; (WINEP/NEP) wastewater capex
08AW100102	Ipswich Cliff Quay (SE Sewr) WRC EnvIMP4	CWW17.31: Storm overflow - increase in combined sewer / trunk sewer capacity; (WINEP/NEP) wastewater
08AW100178	Jaywick WRC EnvIMP4 EnvIMP3	CWW17.19: Increase storm system attenuation / treatment on a STW - green solution; (WINEP/NEP)
08AW100155	Ulceby Skitter SP EnvIMP4	CWW17.31: Storm overflow - increase in combined sewer / trunk sewer capacity; (WINEP/NEP) wastewater
08AW100156	Ulceby WRC EnvActIMP4	CWW17.19: Increase storm system attenuation / treatment on a STW - green solution; (WINEP/NEP)
08AW100161	Winteringham WRC EnvImp4	CWW17.19: Increase storm system attenuation / treatment on a STW - green solution; (WINEP/NEP)

Please note that the first two lines in the table are proportionately allocated across three lines as we have used a place based approach to keep costs down and combined one solution to several drivers at those sites.

The costs for the above overflow reduction schemes that we have included in our business plan are shown on lines CWW17.16, 19,31,34,43 and 90 totalling £39.748m in 22/23 prices. We corresponded with Ofwat via the query process and provided updated costs with Ofwat's final decision listing the approved costs as £26.84m in 20/21 prices. In addition to high inflation in the period, our cost estimates have

increased since the query response was prepared due to the agreed change in sites selected as suitable for digital solutions. More detail can be found in our main narrative section 7.3.3.1 option consideration.

CWW17.64: Treatment for phosphorus removal (chemical) (WINEP/NEP) wastewater

Three Nutrient Neutrality schemes, which all deliver reduction to Phosphorus discharge levels to 0.25mg/l are included within Anglian Waters approved Accelerated infrastructure delivery programme. These schemes are located at Fakenham WRC, Dereham WRC and Whitingham WRC under WINEP driver HD_IMP_NN.

The government's recent decision to change the planning rules for developments held up due to Nutrient Neutrality have reduced the urgency for these schemes. However, we are still committed to accelerating these schemes to achieve early environmental benefit and improve deliverability of the main programme. Our delivery teams have completed feasibility work and engaged external partners, have held optioneering meetings, assessed in detail the planning requirements and held meetings with operational teams to plan the exact location and integration of the new plant into existing assets. We have an existing AMP7 FFT obligation at Dereham which is mid-way through delivery and have concerns that the delivery of the AMP8 scheme at this site could cause delays to obtaining planning permission for the FFT scheme. We have held high level meetings with Norfolk County Council planning authority to establish a way forward with this situation.

The costs for the three nutrient schemes that we have included in our business plan are shown on lines CWW17.64 and 65 and total £17.874m in 22/23 prices. We corresponded with Ofwat via the query process and provided updated costs for these projects in query ANH-AP-NN-002 as £10.307m in 20/21 prices as requested in the template. In addition to high inflation in the period, our cost estimates have increased since January 2023 when the query response was prepared for the following reasons:

- Collection of actual costs from projects in AMP7 delivery to update our PR24 cost models for assets used in these estimates
- Identified missing scope in the estimate as part of our internal QA and external assurance
- Improved feasibility for ecology/archaeology and planning risks

These estimates align with WINEP, therefore, this option is still best value.

CWW18 Cost adjustment claims - base expenditure: wastewater network+ and bioresources

We submit three cost adjustments claims as submitted in June 2023. The narrative of our CACs can be found in ANH23.

Table 9 Cost adjustment claims

Subject	Type of claim	Net Value (£m five years)
Energy	New costs	605
Larger water recycling centres	Missing / inadequate model driver	109
Phosphate removal costs	New costs	60

Energy - As set out in the previous section, our Energy CAC works alongside our Real Price Effects as a way of dealing with the substantial challenge of ensuring cost allowances reflect the higher costs we will face for energy purchase in 2025-30. This is not necessarily our preferred way of dealing with this pressing problem: we put forward an uncertainty mechanism to address energy price volatility in Chapter 8 Dealing with Uncertainty in our Plan 2025-2030. We would also be open to the idea of a true up. Because of the magnitude of this cost issue, we have included the CAC in our Table submission. Ultimately, we are agnostic as to which approach is taken - what matters is that the matter is addressed.

The concerns raised over the quality of APH data during PR19 and the subsequent CMA process have substantially been addressed by the industry since the start of AMP7 with significant improvements and homogenisation of approach to deriving APH put in place through a collaborative process between the industry and Ofwat. We also show in ANH45 on the base cost modelling] that historical APH data prior to AMP7 is of a high enough quality to be relied upon.

Large water recycling centres- There is a material, observable reduction in the unit cost of treating wastewater as WRC size increases. Our WRCs are very small by industry standards and the consultation base cost models made insufficient allowance for the absence of these economies of scale.

Phosphate removal costs- By 2025 we will have installed phosphate removal plants at 182 additional WRCs as part of our AMP7 WINEP. The costs of operating these plants will not be represented in the historical years that inform the base cost models so will not be provided for in the allowances derived from those models.

CWW19 Wastewater network+ - WINEP phosphorus removal scheme costs and cost drivers

CWW19.1-160: Phosphorous Removal

Schemes included in the table have been identified through collaborative working with the Environment Agency, our Phosphorous removal programme is based on the most up to date understanding of the WINEP programme.

Scheme solutions have been selected based on a matrix of solutions updated with learning from AMP7. High level site specific analysis has been carried out to determine the site specific scope.

Scheme design population equivalent, included under Cost Driver 1, is the same as the 2030 population equivalent as we ask our delivery vehicles to design the scheme to an end of AMP design horizon. The design of the scheme is not generally based on the PE served, but is based on a combination of flow and load data and anticipated increase in PE. The design PE quoted is used for reference and will be updated through detailed design therefore our forecasts may subsequently be updated also.

Line CWW19.224 has been included as part of our AMMA initiative to ensure that post investment benefits realisation could be captured across all schemes

Population Equivalent served After 2029-30 column has been left blank as no year has been specified and all schemes are due to be completed by 2030.

We have agreement with the EA to phase 21 AMP7 schemes to 2027. These were part of our 34 potential wetland schemes identified at PR19.

The investigations on these sites have been carried out in AMP7 but the design and construction will be in AMP8. These have been included in CWW19.

The schemes are:

Table 10 Phosphorus removal sites

WINEP ID	Site
7AW200077	Elmdon STW
7AW200109	CAMPS STW
7AW202086	Upton (Lincs) STW
7AW200172	Great Ellingham STW
7AW200105	Quendon STW
7AW200064	Bradenham STW
7AW200058	Beachampton STW
7AW200116	Ravenstone-stk Goldington STW
7AW200167	Dunton STW
7AW202085	Toynton STW
7AW200209	Ridgewell STW
7AW202034	Great Ponton STW
7AW200091	Lidgate STW
7AW200178	Old Buckenham STW
7AW200061	Blakesley STW
7AW200100	Olney STW
7AW200206	Rendlesham-park STW
7AW200095	Newport STW
7AW201933	Kedington STW
7AW202055	Navenby STW
7AW200068	Castlethorpe STW

Cost Driver 10 has been completed following the latest guidance 'Other' has been used for sites where tertiary treatment will be installed alongside chemical dosing.

9 investments have been identified to start in 2023 as part of either the Accelerated Infrastructure Delivery (AID) programme or Transition. These investments will have spend in 2023-24, there is no column in the table for year 2023-24 so the first year of spend has been excluded, it will be included in APR24 Table 7F. The full financial profile of these investments is profiled in the table below:

Table 11 Accelerated programme details

	2023-24 £million	2024-25 £million	2025-26 £million	2026-27 £million	2027-28 £million	2028-29 £million	2029-30 £million
Accelerated Infrastructure Delivery							
Dereham- Rushmeadow Road STW - 08AW101652	0.295	2.651	-	-	-	-	-
Fakenham STW (Old & New) - 08AW101853	0.877	2.046	-	-	-	-	-
Whitlingham Trowse STW - 08AW101864	1.039	1.904	5.064	4.000	-	-	-
Transition							
Raunds STW - 08AW101655	0.085	1.27	2.134	-	-	-	-
Shenfield and Hutton STW - 08AW101656	0.142	2.038	3.544	-	-	-	-
Morcott STW - 08AW101762	0.046	0.654	1.138	-	-	-	-
Copford STW - 08AW101651	0.055	0.794	1.381	-	-	-	-
Potton STW - 08AW101654	0.070	1.010	1.757	-	-	-	-
Wymondham STW - 08AW101657	0.092	1.317	2.291	-	-	-	-

CWW19.402-420: Nitrogen removal

19 Nitrogen removal schemes have been identified for investment. These sites are in the Nutrient Neutrality area of Norfolk.

Scheme design population equivalent, included under Cost Driver 1 has been completed by back calculating the PE from the flow used to size the solutions. The design of the scheme is not generally based on the PE served, but is based on a combination of flow and load data and anticipated increase in PE. The design PE quoted is used for reference, but not in detailed design and this is taken at the point of scheme design and our forecasts may subsequently be updated.

Business Rate and Sludge Transport Costs

We recognise that business rates are an unmodelled cost in base allowances. We also note Ofwat's request to remove rates from the enhancement opex reported in table CWW19. We removed 10% from actual totex to date in table 7F and table 4M in APR23 to account for this. However as we are using the forecast years in table 7F in APR as the basis of our Cost Adjustment Claim for PR24 to reflect the increased opex burden we face to operate at the new consents from 2025, we have not removed business rates from future years forecast in table 7F. We believe that if we were to do that then it would lead to understating of the value of our claim and we would have no other mechanism to request the additional cost, since the additional business rates from enhancement schemes is excluded from those reported in table 4C. Similarly we are concerned that removing the rates from

table CWW19 without increasing the rates within base would leave the company unfunded for the increase in business rates that will result from the additional enhancement schemes.

This table shows the value business rates and bioresources included within the Opex rates:

Table 12 Value business rates and bioresources included within opex

	Units	2025-26	2026-27	2027-28	2028-29	2029-30	After 2029-30
Phosphorous Investments	£m	0.260	1.247	2.596	5.450	9.478	11.238
Nitrogen Investments	£m	0.018	0.037	0.083	0.199	0.528	0.787

CWW20 Wastewater network+ - Sewage treatment works population, capacity and network data

Sewage treatment data Lines 20.1 - 20.35

CWW20.1: Current population equivalent served by STWs

Number takes SUP1A.17 and includes the additional population from trade, as included in APR 4R.28 and assuming a flat forecast. Information provided by DWMP manager based on population forecasting spreadsheets for all STWs.

CWW20.2: Current population equivalent served by STWs with tightened/new P permits

Figures based upon the current and predicted PE of sites with WINEP schemes under WFD_IMP, WFD_ND, SSSI_IMP, HD_IMP and U_IMP1/2 drivers, where P permits are introduced or tightened. A list of STW sites is attained from the finalised WINEP spreadsheet for each of the line requirements, with population equivalent figures taken from the LAUA forecast for 2025 (AMP7 deliverables) or 2030 (AMP8 deliverables).

Three phosphorus schemes are included in the PR24 transition strategy, affecting lines CWW20.2 and CWW20.20. Figures have been updated to reflect the movement of two deliverables (Fakenham and Whitlingham) from 2030 to 2025 and 2027 respectively, and one deliverable (Dereham) from 2027 to 2025.

CWW20.3: Current population equivalent served by STWs with tightened/new N permits

Figures based upon the current and predicted PE of sites with WINEP schemes under HD_IMP_NN schemes, where N permits are introduced or tightened. A list of STW sites is attained from the finalised WINEP spreadsheet for each of the line requirements, with population equivalent figures taken from the LAUA forecast for 2025 (AMP7 deliverables) or 2030 (AMP8 deliverables).

CWW20.4: Current population equivalent served by STWs with tightened/new sanitary parameter permits

Figures based upon the current and predicted PE of sites with WINEP schemes under U_IMP1, WFD_ND or WFD_IMP schemes, where new sanitary permits are introduced or tightened (ammonia and BOD). A list of STW sites is attained from the finalised WINEP spreadsheet for each of the line requirements, with population equivalent figures taken from the LAUA forecast for 2025 (AMP7 deliverables) or 2030 (AMP8 deliverables).

CWW20.5: Current population equivalent served by STWs with tightened/new microbiological standards

Figures based upon the current and predicted PE of sites with WINEP schemes under BW_IMP, BW_ND, SW_IMP and SW_ND drivers, where new/ tightened microbiological standards are met using disinfection (e.g. UV). A list of STW sites is attained from the finalised WINEP spreadsheet for each of the line requirements, with population equivalent figures taken from the LAUA forecast for 2025 (AMP7 deliverables) or 2030 (AMP8 deliverables).

CWW20.6: Population equivalent served by STWs with enhanced treatment capacity

Taken to be the increase in PE catered for through growth enhancement schemes, taking the difference in PE between current and design horizon. Increase in PE catered for shown in the year currently profiled for scheme completion. Information provided by DWMP manager based on population forecasting spreadsheets for all STW growth schemes.

CWW20.7: Current population equivalent served by STWs with tightened/new permits for chemicals / hazardous substances

Figures based upon WFD_CHEM_IMP/ ND permit changes in WINEP, with the assumption that population numbers are not double counted in 2025 (when additional improvement schemes are forecast to complete). A list of STW sites is attained from the finalised WINEP spreadsheet for each of the line requirements, with population equivalent figures taken from the LAUA forecast for 2025 (AMP7 deliverables) or 2030 (AMP8 deliverables).

CWW20.8: Current population equivalent served by septic tank replacement projects

There are no septic tank replacement schemes in WINEP or the wider business plan.

CWW20.9: Number of new wetland treatment solutions for tightened sanitary or nutrient (N or P) permits

Figures include all wetland schemes within a WINEP portfolio, as these are specifically designed for P/N removal. Solutions have been confirmed for each obligation by our Asset Delivery Planning (ADP) team for both AMP7 and AMP8 deliverables. Solution information for each obligation has been verified and assured for consistency across data tables.

CWW20.10: Total area of new wetlands for tightened sanitary or nutrient (N or P) permits

Figures associated with the identified wetland schemes in CWW20.9, as captured within AMP7 delivery plans and PR24 C55 investments. This information has been updated with the latest preferred options agree with the Environment Agency.

CWW20.11: Total number of septic tank replacement projects

There are no septic tank replacement schemes in WINEP or the wider business plan.

CWW20.12: Total number of STW outfall screens

Anglian Water are not installing any new screens for fish entrainment at STW outfalls, and have no costs associated with corresponding CWW3:97-99.

CWW.20.13: Cumulative shortfall in FFT addressed by WINEP / NEP schemes to increase STW capacity

Figures calculated from forecast deliverables associated with U_IMP5 WINEP schemes. L/s information for each of the WINEP U_IMP5 FFT schemes was provided by Anglian Water's permitting team and summed per delivery year, with PR24 information coming directly from C55 investments.

CWW20.14: Additional storm tank capacity provided at STWs - grey infrastructure

AMP7 information taken directly from corporate reporting systems, with solutions agree with Anglian Water Asset Delivery Planning team.

Storm capacity includes all storm tanks installed at STWs through WINEP obligations UIMP6, ENVACT2-4 and Bathing Water and shellfish obligations that require improvement in storm spills. Where other grey infrastructure (including 'smart catchment balancing and UV treatment of storm flows') is being installed instead of storage tank, these solutions have been converted to an equivalent storage tank size to align with Ofwat guidance.

CWW20.15: Additional volume of effective storm storage at STWs - nature based/green solution

AMP7 information taken directly from corporate reporting systems, with solutions agree with Anglian Water Asset Delivery Planning team - green solutions limited in years ahead of AMP8.

Storm capacity includes all green and nature based storage scheme installed at STWs as a result of WINEP obligations ENVACT2-4 and Bathing Water and shellfish obligations that require improvement in storm spills.

Improvements to storm overflows spill at 12 STWs are being delivered through sustainable drainage and attenuation schemes in the catchment (totalling 56101 m2 attenuated). These scheme have been included in line CWW20.44, and have not been accounted for in this line.

CWW20.16: Total number of STW sites where additional storage has been delivered

AMP7 information taken directly from corporate reporting systems, with solutions agree with Anglian Water Asset Delivery Planning team.

Number of sites includes all STWs with WINEP obligations under UIMP6, ENVACT2-4 and Bathing Water and shellfish obligations that require improvement in storm spills that have been delivered through storage scheme (grey or green) and have volumes associated with lines CWW20.14-20.15. This includes STWs improvements being delivered through smart/flow balancing scheme and blended schemes (where at least part of the solution is for storage at the STW.

STWs which will receive all improvements through catchment sustainable drainage schemes have not been included in this line and will instead be recorded in CWW20.44.

CWW20.17: Number of STW sites where additional storage has been delivered with pumping

AMP7 information taken directly from corporate reporting systems, with solutions agree with Anglian Water Asset Delivery Planning team.

This line includes all STWs where new PSs are required as part of the storage solutions for WINEP obligations under UIMP6, ENVACT2-4 and Bathing Water and shellfish obligations.

CWW20.18: Number of STW sites benefitting from green infrastructure replacing the need for storm tank storage

AMP7 information taken directly from corporate reporting systems, with solutions agree with Anglian Water Asset Delivery Planning team - green solutions limited in years ahead of AMP8.

Number of sites includes all STWs with WINEP obligations under ENVACT2-4 and Bathing Water and shellfish obligations that require improvement in storm spills that have been delivered through green solutions and have volumes associated with lines CWW20.14-20.15.

STWs which will receive all improvements through catchment sustainable drainage schemes have not been included in this line and will instead be recorded in CWW20.44. 10 of these sites will be completed in 2027/28, 1 in 2028/29 and 1 in 2029/30.

CWW20.19: Total number of schemes with tightened / new P permits (met by biological treatment)

Figures based on number of investments aligned with WINEP P removal through biological treatment (single site), with the list of P obligations and the solution type being agreed with Asset Delivery Planning. For lines 20.19-20.23, solution information has been verified and updated in response to WINEP clarifications, and assured for consistency across data tables.

CWW20.20: Total number of schemes with tightened / new P permits (met by chemical treatment)

Figures based on number of investments aligned with WINEP P removal through chemical treatment, both dosing only and with tertiary treatment, with the list of P obligations and the solution type being agreed with Asset Delivery Planning.

Three obligations associated with this data line are impacted by transition spend, as outlines in 20.2.

CWW20.21: Total number of schemes with tightened / new N permits (met by biological treatment)

Figures based on number of investments aligned with WINEP N removal through biological treatment, with the list of N obligations and the solution type being agreed with Asset Delivery Planning.

CWW20.22: Total number of schemes with tightened / new N permits (met by chemical treatment)

Figures based on number of investments aligned with WINEP N removal through chemical treatment, both dosing only and with tertiary treatment, with the list of N obligations and the solution type being agreed with Asset Delivery Planning.

CWW20.23: Total number of schemes with tightened/new sanitary parameter permits

Figures based upon WINEP schemes under U_IMP1, WFD_ND or WFD_IMP schemes, where new sanitary permits are introduced or tightened (ammonia and BOD).

CWW20.24: Total number of schemes with tightened/new microbiological standards (UV, ozone etc)

Figures based upon WINEP schemes under BW_IMP, BW_ND, SW_IMP and SW_ND drivers, where new/ tightened microbiological standards are met using disinfection (e.g. UV), with named sites confirmed with technical leads.

CWW20.25: Total number of STWs with microbiological treatment - new and existing (UV, ozone etc)

Figures based on BW_IMP. BW_ND, SW_IMP and SW_ND WINEP schemes. 12 existing treatment sites in the AWS region. Figure does not include Water Treatment works, only wastewater recycling. Forecast total numbers reflect anticipated deliverables as outlined in 20.24.

CWW20.26: Total number of schemes with tightened/new chemicals/hazardous substances permits

Figures based upon WFD_CHEM_IMP/ ND schemes with investments currently in the business plan - we are aware that two additional investments are required, whilst these figures also do not represent the costs associated with wider chemical permit changes.

CWW20.27: Total number of schemes with new chemical dosing installations

Figures based on number of investments including chemical treatment from across both WINEP and wider portfolios. AMP7 information reflects ongoing delivery profiles, whilst AMP8 information is reported directly from C55, reflecting all relevant investments within the PR24 business plan. Final values reflect changes brought about through the transitional programme, with 2 schemes requiring chemical dosing and tertiary treatment moving from AMP8 to 2025, as indicated in CWW20a.

CWW20.28: Volume of chemical dosing storage installed (m3)

Figures associated with the identified new chemical dosing investments in line 20.27. AMP7 information reflects ongoing delivery profiles, whilst AMP8 information is reported directly from C55, reflecting all relevant investments within the PR24 business plan. An assumption has been made that each chemical installation is 15m3 per unit. Final values reflect changes brought about through the transitional programme, with 2 schemes requiring chemical dosing and tertiary treatment moving from AMP8 to 2025, as indicated in CWW20a.

CWW20.29: Total number of schemes with new tertiary solids removal

Figures based on number of investments including tertiary filtration from across both WINEP and wider portfolios. AMP7 information reflects ongoing delivery profiles, whilst AMP8 information is reported directly from C55, reflecting all relevant investments within the PR24 business plan. Final values reflect changes brought about through the transitional programme, with 2 schemes requiring chemical dosing and tertiary treatment moving from AMP8 to 2025, as indicated in CWW20a.

CWW20.30: Volume to water treated through tertiary solids removal (m3/day)

Figures associated with the identified tertiary filtration investments in line 20.29. AMP7 information reflects ongoing delivery profiles, whilst AMP8 information is reported directly from C55, reflecting all relevant investments within the PR24 business plan. Final values reflect changes brought about through the transitional programme, with 2 schemes requiring chemical dosing and tertiary treatment moving from AMP8 to 2025, as indicated in CWW20a.

CWW20.31: Total number of N-TAL trials

Figures based on all sites included in AMP8 N-Trials. Eye-Hoxne Rd WRC forms part of our transition strategy and is expected to be delivered by 2025. This has been reflected with CWW20 and CWW20a.

CWW20.32: Number of STW flow monitors installed

For AMP7, figures are included for UMON4 WINEP schemes only, with UMON3s reported in lines CWW20.52-55. For AMP8, the figure is for both UMON4 and UMON3, with a full list of WINEP schemes categorised by complexity. Eight (8) UMON sites are included within our PR24 transition strategy, with outputs for these captured within the 2025 column of data table lines CWW20.32 (total monitors) and CWW20.35 (high complexity), as well as in CWW20a.

CWW20.33: Number of STW flow monitoring schemes requiring permit changes only

Figures based on solution types associated with line 20.32.

CWW20.34: Number of STW flow monitoring schemes requiring simple meter installations

Figures based on solution types associated with line 20.32.

CWW20.35: Number of STW flow monitoring schemes requiring complex civils installations

Figures based on solution types associated with line 20.32.

Network / Storm overflow data Lines 20.36 - 20.60

CWW20.36: Additional volume of network storage at CSOs etc to reduce spill frequency - grey infrastructure

AMP7 figures includes SOAF (U_IMP4) schemes where appropriate.

The AMP8 values provided include the modelled storage volumes required for network assets to prevent storm spills (including for climate change) for WINEP obligations to address storm spills. The do not include any allowance for volumes from lengths of sewer or rising mains in order to convey sewage to any offline storage.

CWW20.37: Additional volume of effective network storage to reduce CSO spill frequency - nature based/green solution

A zero return has been recorded for this line. It has been assumed that sustainable drainage attenuation schemes are captured in line CWW20.43 and should therefore not be captured separately in CWW20.37 to avoid double counting, despite all of the solutions in CWW20.43 expected to be delivered through green solutions.

CWW20.38: Number of individual sites delivering additional network storage - grey infrastructure

AMP7 figures includes SOAF (U_IMP4) schemes where appropriate.

This line records the number of network storm overflows spill reductions schemes delivered through grey solutions. Solutions include offline and online storage, and smart flow balancing solutions.

Solutions that remove spills via surface water separation (ie disconnection of property downpipes) have not been included in the figures recorded for this line as are recorded in line CWW20.42.

CWW20.39: Number of individual sites delivering additional network storage - grey infrastructure - which include pumping

AMP7 figures includes SOAF (U_IMP4) schemes where appropriate.

Only two network solutions are expected to require additional pumping arrangement, both of which will be delivered in 2027/28

CWW20.40: Number of individual sites delivering additional network storage through green infrastructure

A zero return has been recorded for this line.

CWW20.41-42: Surface water separation drainage area removed & Total number of surface water separation schemes to reduce storm overflows

All surface water separation schemes have currently been scoped as the removal of property downpipes. In order to convert the number of downpipe disconnection to m2 removed, the average property roof size has been assumed as 96m2 which is based on the UK average area of a semi-detached property. Each property has been assumed to have two downpipes meaning that one downpipe disconnection equates to 48m2 of drainage area removed.

CWW20.43-44: Sustainable drainage / attenuation schemes (green) area removed / attenuated & Total number of sustainable drainage / attenuation schemes

This lines includes all schemes that include Sustainable Drainage (SuDs) as a full or partial solution to reducing storm spills, both in the network (39 schemes) and at STW's (12 schemes). The m2 provided is the area of the catchment attenuated by SuDs features.

CWW20.45: Flow rate diverted to reduce storm overflow spills

A zero return has been recorded for this line.

CWW20.46: Total number of sewer flow management / control schemes to reduce storm overflow spills

This line records the number of scheme currently planned to include some form of flow management or control to reduce storm spills. The benefit from these solutions has been provided as m3 storage equivalent (within lines CWW20.14 and CWW20.36). The flow rate diverted (CWW20.45) will not be known until detailed design of each scheme has taken place and has therefore been reported as 0.

44 of the schemes include in year 2029/30 relate to the expected solutions to deliver 'no adverse ecological impact' under WINEP obligation ENVACT_IMP2. The actual spill reductions (and therefore solutions) required for these sites will not be known until the completion of investigations under WINEP obligation ENVACT_INV4 which have an obligations date of April 2027.

CWW20.47: Total storm overflow spill volume avoided

For AMP7, figures were provisionally calculated using the following formula for each scheme reported in line CWW20.16: Average number of spills (calculated from EDM data from delivery date to installation, or predicted pre-scheme) * 50% of permitted spill volume (10 or 2, depending on WINEP driver).

To calculate the 'Total storm overflow spill volume avoided' for AMP8, the modelled spill volume and frequency has been used to estimate the volume per spill, which has then been multiplied by the number of spills required for the WINEP obligation to give a post intervention spill volume.

Spill volume avoided has been reported in the year after the scheme has been completed. For example, storm overflow schemes completed in 2025/26 have had their predicted spill volume avoided recorded in 2026/27. For the schemes completing in 2029/30 the predicted spill volume avoided is 7158281.48m3/yr and would be expected to be reported in 2030/31.

CWW20.48: Total number of new storm overflow screens installed

New for AMP8, the data reported for 2025/30 is the number of storm screen to be installed to deliver WINEP obligation ENVACT_IMP5.

CWW20.49: Number of continuous water quality monitor installations

New for AMP8, the data reported for 2025/30 is the number of continuous water quality monitors to be installed based on our current understanding of this WINEP obligation. This is subject to change as no final guidance as been published. We are proposing to manage this via an uncertainty principal.

CWW20.50-51: Number of new MCERTs event duration monitors installed at SPS emergency overflows & Number of new MCERTs flow monitors (PFF) installed at SPSs with combined emergency and storm overflows.

New for AMP8, the data reported for 2025/30 is the number of monitors to be installed, rather than the number of sites with emergency overflows. This is because some sites require multiple monitors, for example when they include both a permit for storm overflows and emergency overflows.

CWW20.52-20.55: Event duration monitors

Number stated use data from CWW8.4 plus EDMs installed under maintenance scheme in AMP7 (96 in 2022/23, and 260 in 2023/24).

CWW20.56-20.60: Storm overflows

Figures for length of rising main and sewer installations provided directly from C55 investment information.

Other data Lines 20.61 - 20.77

CWW20.61-20.64: Total number of investigations, categorised by complexity

All investigation lines are collated within the All lines tracker spreadsheet, sheet "20.64 - investigations". Complexity has been assigned in column H "Investigation Type", with all investigations expected to deliver in 2027.

There is currently an error in the coding of chemical investigations investments in C55, meaning that these outputs have needed to be represented in 2030. This will be corrected and updated at draft determination.

CWW20.65-20.67: Catchment management for chemicals, nutrient balancing, and catchment permitting

There are no schemes included under these lines in our PR24 submission.

CWW20.68: Catchment management for habitat restoration

One scheme has been captured on this line under the Water Recycling price control deliverable for AMP7 (Market Harborough), with two further schemes anticipated by the end of AMP8 (Broadholme and further Market Harborough improvements). CWW20 should only include investments within Water Recycling portfolios, therefore relevant schemes within Water portfolios are excluded.

CWW20.69: River connectivity schemes

There are no schemes included under these lines in our PR24 submission (screening of WRC outfalls for eel and fish). Eel schemes are captured elsewhere as part of delivery under the Water price control.

CWW20.70: Number of Marine Conservation Zones

There are two MCZs within the Anglian Water region (Cromer and Blackwater), with on the Blackwater conservation objectives being linked to Anglian Water operations. This is an area of focus for AMP8 investigations, and is therefore captured within CWW20 as a single output from 2026 onwards.

CWW20.71: Total 3rd party contributions

No 3rdparty contributions have yet been confirmed for PR24 investments, therefore this line has been left blank within the CWW20 data table. Our ambition remains to increase 3rd party contributions in partnership through our A-WINEP approach, should this submission be accepted by regulators.

CWW20.72: Total number of 25 yr Environment Plan schemes

The Anglian Water A-WINEP submission is currently captured as a 25 YEP obligation within WINEP and is therefore captured on this line of CWW20. This will be updated at draft determination if this categorisation changes following the regulatory decision on A-WINEP proposals.

CWW21 Wastewater sewers asset condition

Length of sewer by Condition Grade Lines 21.1 - 21.7

CWW21.1 - CWW21.6: Condition grades for sewers

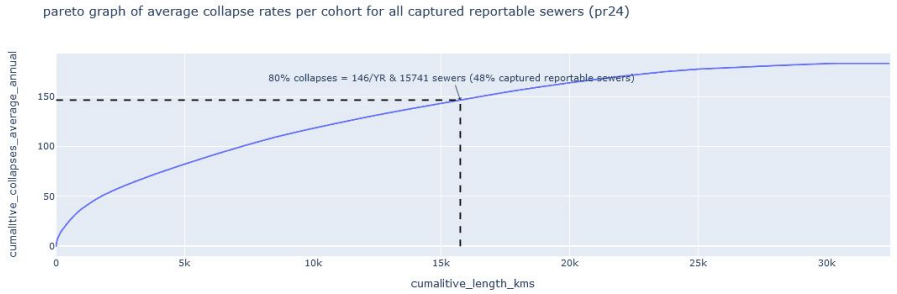
The condition grades for sewers were produced using the suggested Pareto method from Ofwat using python and databricks. As a company we don't use this method of analysis to select sewers for replacement or those at highest risk, instead we employ a more advanced regression model in ourcorporate investment planning system, Copperleaf (C55).

To achieve the grouping of sewers into cohorts, an algorithm in python was written to recursively loop through the different primary and secondary attributes (such as the material groupings and diameter bandings) to try and ensure as many cohorts were within the suggested +/-50% of the nominal average annual collapse number of 2.5. The level of matching for this was 88% of all cohorts were within this tolerance as a function of length.

The method for reporting on condition grades for PR09 did not use the suggested Ofwat pareto method and used the ICAM (Infrastructure assessment condition model) instead, also the sewers were broken down by criticality not liquid type, so comparisons to this period will not be possible.

The pareto graph shows that the 80% collapse value is 146 collapses per year, which equates to 1,541kms of sewers (48% of captured reportable sewers):

Figure 6 Pareto graph of average collapse rates per cohort for all captured reportable sewers (PR24)



The reportable sewer lengths are then split out by type, into foul, surface and combined condition grades. The modelled transferred sewer length has been proportionally allocated to the different condition grades based on the captured sewer length condition grade allocation.

The 6kms of sludge main has been set to a condition grade of 3.

For the private transferred sewer condition grades, a proportional allocation was applied to this number across the condition grades, based on the results of the above analysis conducted on known sewer lengths.

A direct comparison between PR09 and this years sewer condition grades is difficult due to the results being presented in a different way for PR09.

CWW21.7: Condition grades for rising mains

The condition grades for rising mains and vacuum sewers (to reflect the same inclusion criteria used for PR09) were produced using the suggested Pareto method from Ofwat using python and databricks. As a company we don't use this method

of analysis to select sewers for replacement or those at highest risk, instead we employ a more advanced regression model in our main corporate costing model platform C55. All rising mains were used as part of this analysis.

To ensure that the severity of the consequences of a rising main burst are adequately reflected, the following condition grade burst rates were used and applied:

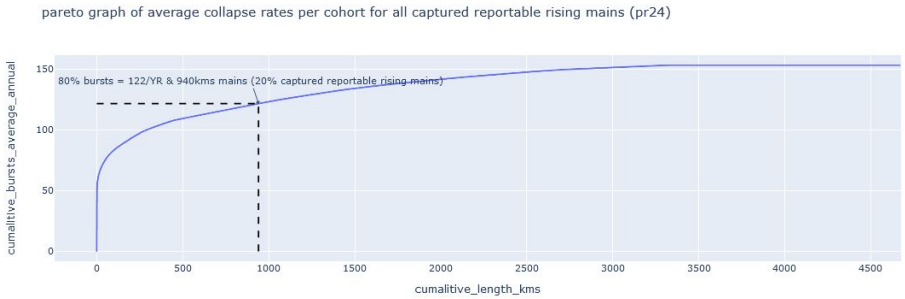
Table 13 Condition grades definitions

Condition grades	General meaning
1	Excellent Burst average up to 24/1000km/annum over five years
2	Good Burst average greater than 24 up to 50 burst/1000 km/annum over five years
3	Adequate Burst average greater than 50 up to 100 collapses/1000km/annum over five years.
4	Poor Burst average greater than 100 up to 200/1000 km/annum over five years
5	Very Poor Burst average greater than 200/1000 km/annum over five years

To achieve the grouping of sewers into cohorts, an algorithm in python was written to recursively loop through the different primary and secondary attributes (such as the material groupings and diameter bandings) to try and ensure as many cohorts were within the suggested +/-50% of the nominal average annual burst number of either 2.5 for rising mains with a diameter of <=320mm and 1 for a diameter of >320mm (to reflect the approach for water mains). The level of matching for this was 89% of all cohorts were within this tolerance as a function of length.

The pareto graph shows that the 80% burst value is 122 bursts per year, which equates to 940kms of rising mains (20% of captured reportable rising mains):

Figure 7 Pareto graph of avg collapse rates per cohort for all captured reportable rising mains (PR24)



Condition grades for rising mains were reported on as a function percentage of gross MEAV, not as lengths in condition grade, so direct comparison with PR09 lengths would not be possible.

CWW22 Wastewater - net zero enhancement schemes

Our Net Zero ambition has been set out in the corresponding enhancement cases. Please refer to the enhancement cases for further detail.

Operational carbon savings,shown in Columns 21-25, have been calculated using the carbon accounting workbook (CAW) v17 as per Ofwat guidance.

Embedded (capital) Carbon has been calculated from cradle to as built basis, as per the Ofwat guidance. Within our Copperleaf Investment management system embodied carbon models are back-to-back with cost models. Therefore, when an asset is created, the various cost elements have an embedded carbon and operational carbon value generated. Column 26 shows the cumulative operational savings over AMP8 minus the embedded carbon associated with constructing the asset, as per Ofwat guidance.

Where the net zero activity overlaps with base maintenance funded activities, such as the replacement of current assets, the base element has been identified and removed from the request together with any future base savings. The assumptions made for this adjustment have been described in the table commentary.

CWW22.2, CWW22.3 and CWW22.5: Gas to Grid

We have considered all our ten Sludge Treatment Centres (STC) where we currently use our biogas to generate heat and power via CHP engines for conversion to biomethane and gas injection to grid. The options assessment included a review of the asset condition and remaining life on the existing engine fleet, date at which existing renewable obligations schemes close and viability of obtaining a gas grid connection for export of biomethane into the grid. Through this exercise we have identified three of our sites - Cottonvalley, Great Billing and Whitlingham for transition in AMP8. The enhancement expenditure is net of base capital maintenance that would have been required to replace those engines on the selected sites that would reach end of life.

Possible transition of our remaining STC sites from CHP to gas to grid are included on the feasible options list. Again, these costs exclude those associated with CHP replacement.

CWW22.38 - CWW22.42: Feasible Gas to Grid investments

We have proposed 5 feasible investments whilst the CHP engines at these 5 sites are not approaching the end of their working life, their conversion to Gas to Grid would deliver considerable carbon savings. Therefore, they have been included as feasible options.

CWW22.4, CWW22.6 - CWW22.14: Methane (CH4)

Following a study with Mott MacDonald we have delivered a set of recommended robust interventions.

We have ten dedicated sludge treatment centres (STC), co-located on our largest WRC's.

In identifying the sites to consider potential reduction in methane emissions, a long list of sites based on annual sludge treated and population equivalent was produced. The long list was reduced to a short list of eight sites; comprised of the eight STCs where advanced anaerobic digestion (AAD) (thermal hydrolysis, and biological hydrolysis (Monsal EEH, and Helea HpH)) is practised. The sewage treatment works (STW) sites were discounted, as it was considered that the potential for reducing methane losses wouldn't be cost effective compared with the STCs given the significantly lower methane production rates pre-digestion. Therefore, the sites that offered the most efficient potential for reducing methane losses were the eight AAD STCs (Great Billing, Cotton Valley, Whitlingham, Cliff Quay, Pyewipe, Colchester, Basildon, and King's Lynn).

The approach to reducing methane losses has been to maximise its collection and utilisation in combustion plant such as combined heat and power (CHP) and heat boilers:

- Minimise leakage
- Maximise methane harvesting and utilisation.
- Optimise connection of methane generating plant to the biogas system
- Extraction of dissolved methane using vacuum degassing, and transfer to the biogas system
- Treat and/or abate residual methane.

The methane emissions associated with secondary digestion and fugitive emissions were taken forward for the application of mitigating technologies. These are only covering Scope 1 emissions.

This methodology allowed for the development of solutions specific to particular sites. These solutions were developed in the context of existing full scale or demonstration plants across the UK or Europe to ensure viability and deliverability. Solutions have been assessed on a potential range of emissions reductions available. Where this range exists, we have adopted a value in the lower range to ensure no over-estimations

CWW22.1, CWW22.14 - CWW22.29 and CWW22.36: N2O Process Emissions

We are proposing 19 N2O reduction enhancement investments which will deliver cumulative carbon savings across AMP8 of 5043.25 tonnes and 4143 tonnes per annum when all schemes are fully operational.

In developing our approach to N2O enhancement investments we asked Jacobs to undertake a study into N2O reductions.

The study delivered a set of ambitious, but science driven, approaches that are proven, cost-effective solutions. The baseline and N2O reductions (reported as CO2e) was calculated using the Carbon Accounting Workbook (CAW) factor as per the Ofwat methodology.

To gain a more detailed estimation of the relative source and magnitude of N2O from wastewater, screening of our Band 6 sites has been undertaken. This reviewed and assessed N2O production 'risk factors' evident from operational data from the sites, including dissolved oxygen (DO), plant loading and sludge liquors, partial nitrification and denitrification.

From this analysis, and our own N2O monitoring in place at four sites to better understand emissions, a prioritised list of sites was produced, containing the greatest opportunities for N2O emissions reduction potential. Each site was then reviewed, and an options appraisal developed, considering specific treatment and asset type e.g. nitrifying activated sludge with fine bubble diffused aeration, against a list of potential interventions.

Several investments are outlined at the same site to drive the best solution considering overall N2O mitigation and the efficiency or marginal abatement cost of the investment. Emission monitoring and real time control is included at each site where further investment is proposed as it provides the foundation of understanding and reduction.

Proposed investment outlined below has been focussed on sites with the activated sludge process where nitrification is carried out. Carbonaceous non-nitrifying plants and extended aeration plants have not been prioritised at this stage due to the lower emission reduction potential that exists in this process configuration.

N2O monitoring and real time control (RTC)

Combined with monitoring other operational parameters (Dissolved Oxygen, flow, load etc), an optimised operating regime can be developed and implemented using an advanced process control system. Long term monitoring will be essential to maintain the optimisation, calculate the benefit, and to develop a more accurate understanding of emissions over time, informing future emissions reduction and deriving an accurate emission factor for the sector when reviewed alongside data from other sites. The exact specification of the number of monitors and controllers varies depending on site specific factors such as the number of lanes/phases of treatment process at each site.

Aeration changes including anoxic zones and aeration systems

On some sites operational changes alone will not deliver appropriate N2O reductions, and process modification is required to reduce the N2O risk factor and enable a potential reduction to be realised. This investment will be stacked with N2O monitoring and process control.

Investment in this category is targeted to modify or fortify existing treatment process to provide further emissions reduction. This includes provision of less air in some processes and extending anoxic zones or conversely, provision of more air at some sites with aeration process redesign. This group of investment will optimise emission reductions without impacting treatment compliance and attempt to minimise compromising energy efficiency.

Membrane Aerated Biofilm Reactor (MABR)

MABR is one of the most promising technologies that may offer a significant and transformational reduction in N2O emissions from wastewater treatment, with the drastically lower emissions than conventional activated sludge process.

MABR could also offer further potential for emissions reduction, by treating the lower residual N2O contained in the aeration exhaust air flow, eliminating the need for expensive and cumbersome process covers and presenting a more effective option with multiple benefits.

Ammonia recovery or treatment from digested sludge centrate

In contrast municipal wastewater treatment, digested sludge centrate is characterised by significantly higher ammonia concentration (40 to 50 times higher than domestic wastewater) and much lower volume to treat. This has led to emissions from centrate treatment becoming an emission hotspot and a priority. Selected investments to mitigate include:

- Cover process tanks and treat off-gas at our four existing Liquor Treatment processes at Sludge treatment centres

- New sludge liquor treatment plant established at our largest sludge treatment centre, designed and operated to minimise N2O emissions from outset, including covering and treating N2O in off-gas. Currently the centrate is returned to the existing wastewater treatment works
- Ammonia from Liquor recovery pathfinder, building on the Ammonia Recovery Innovation project funded under the Innovation in Water Challenge, we are supporting and led by Northumbrian Water

CWW22.43 - CWW22.45: Feasible N20 investments

We have proposed 3 feasible options which have been excluded from our selected investments based on ensuring a balance between financial requirements of Net Zero with other areas of the PR24 programme.

CWW22.32 - CWW22.35: Heavy Goods Vehicles (HGV)

To identify the most effective low carbon alternatives we have incorporated capital and operational costs for our specific vehicle types and for the annual mileage for our vehicles. These broad mileages are dependent on specific work activity but are around 100,000Kms annually for each vehicle.

We have modelled our routes across vehicle types and found the best £ invested per T/CO2 saved benefit to exist on an electric drivetrain, this includes benefits on maintenance, servicing and parts.

Bulk tippers have been chosen as the most suitable vehicle type, as have opportunities for overnight charging as our rapid charging infrastructure becomes established, and routes of around 300Kms/day which is within real world range forecasts after 5-year battery degradation and shown to be outperformed by existing early adopters of the technology

As part of this investment, we will continue to review the emerging commercially viable alternatives to diesel vehicles and associated infrastructure.

CWW22.37: Feasible option Photovoltaic (PV)

PV affords a cost-effective way of delivering renewable energy on or adjacent to our sites. Previously in AMP6 and in AMP7 we have worked with external financiers to develop, construct, own and operate solar PV installations across our estate. We then procure this energy. However, we have large numbers of smaller sites which are below the size threshold that has been commercially viable for us and our investment partners. We will develop up to 400 solar installations across our wastewater and water asset base utilising both roof and ground mounted installations to provide renewable energy behind the meter at our sites.

This feasible option for wastewater of a small scale solar investment would target 10 GWh's of installations, equating to circa 1.35% of Anglian Water annual energy demand.

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