TMS59 PR24 Data Table Commentary - Costs (Wholesale) - Wastewater

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

CWW1a - Totex analysis - wastewater network+ and bioresources

1. Atypical expenditure
- We are not reporting any atypical expenditure for FY23-30

2. Principal Use recharges
- We have followed the guidance for principal use recharges per RAG 2.09 and as set out in our Annual Performance report methodology. Where possible we have directly attributed capital expenditure and the corresponding depreciation to the price control units, and applied the principle use guidance for shared assets, primarily Digital and Group Services, apart from where relevant exceptions have been communicated by Ofwat.
- Set out in the table below is a summary of the capital expenditure movements associated with principal use rules, for FY24-30 in 22/23 price base

Principle Use Capex	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Water Network Plus	-6.857	16.310	-53.537	-44.640	-33.112	-28.311	-22.866
Water Resources	-3.105	-2.849	-7.261	-5.854	-4.086	-3.328	-2.656
Waste Network Plus	15.016	-13.953	109.344	89.519	57.732	43.755	35.596
Bioresources	-1.175	-0.909	-21.844	-17.128	-11.333	-9.271	-7.661

3. Significant Changes in costs
- Set out in the table below shows the year-on-year delta from FY23 through to FY30, with significant changes commented on

Data Table	Whole Table or Line	Commentary
CWW1 and CWW1a	Whole Table	All costs, profile, price control and upstream allocation are aligned with the forecasted FY24-30 totex costs. APR23 allocation to upstream service for Bioresources has been recalculated following an Ofwat query. This change in methodology has been replicated for FY24-30
	1.1	Base operating expenditure, the profile of opex from AMP7 to AMP8 reflects our recognition of the importance of making an early start in AMP8 to deliver our performance.
	1.2	Enhancement operating expenditure, aligned with CWW3 profiling. AMP7 enhancement programme is reducing over FY24+25 with new schemes planned for AMP8 onwards.
	1.3	Developer services operating expenditure, refer to DS2e and DS3 commentary, and explanation of APR23 restatement.
	1.5	Third party services, restated for 1) DS third party costs, refer to DS1e - DS5 methodology, and explanation of APR23 restatement. 2) Bulk supply costs as per APR23 Ofwat query TMS-APR-CA-012

	1.7	Grants and contributions - operating expenditure, refer to DS1e commentary, and explanation of APR23 restatement.
	1.8	Base capital expenditure, the profile of capex from AMP7 to AMP8 reflects that a lot of early design work has been completed to ensure delivery of performance and benefits at the start of AMP8. The Digital programme also follows this profile to ensure early delivery of benefits.
	1.9	Enhancement capital expenditure, refer to CWW3 commentary.
	1.10	Developer services capital expenditure, refer to DS2e and DS3 commentary, and explanation of APR23 restatement.
	1.11	Total gross capital expenditure excluding third party services, the formula within this sum line is incorrect.
	1.12	Third party services, restated DS third party costs refer to DS1e - DS5 methodology, and explanation of APR23 restatement.
	1.14	Grants and contributions - capital expenditure, refer to DS1e commentary, and explanation of APR23 restatement.
	1.16	Pension deficit recovery payments, as per the forecasted cash payments.

4. Equity issuance costs
- We are not reporting any equity issuance costs for FY24-30

CWW2 - Base expenditure analysis - wastewater network + and bioresources

1. Significant changes, actual and forecast
   Set out in the table below shows any significant and material (question 2) changes between actual (FY23) and forecast costs (FY24-30)

Data Table	Whole Table or Line	Commentary
CWW2	CWW2.1	Power Following more granular analysis during the AMP8 forecast process, we have identified an element of cost in the AMP7 early submission tables, that resulted in an overstatement of power cost and an equal and opposite understatement of other costs. This has been restated and corrected in the full submission. AMP8 energy strategy sees a slight increase in energy import requirement being more than offset by the expected gradual decrease in wholesale prices and return towards the long term power price trend (albeit at a new normal) following

		the extenuating recent peaks in the market in FY23, resulting in a gradual drop over AMP8.
	CWW2.2	ROC certificates start to expire from FY27 onwards, reducing the amount of income we receive.
	CWW2.6	Other operating expenditure Refer to CWW1.1 commentary for base opex
	CWW2.7	Local authority and Cumulo rates Refer to CWW10 commentary for key changes. A restatement of cost has been made for FY24+5, which is now different to the early data table submission of PD8.
	CWW2.8-10	Bioresource Discharge consent costs. These were wrongly allocated to Bioresources sludge costs in APR23, they should have been allocated to Wastewater Network+ sewage treatment. This has been corrected from FY24 onwards.
	CWW2.15-17	Base Capital Expenditure Refer to CWW1.8 commentary for key changes.

2. Material year-on-year variations
   Refer to question 1 above.

3. Changes in methodology
- A change has been made to the allocations used for CWW2 lines 8-10 discharge consents.
  In APR23, discharge consent costs were wrongly allocated into Bioresources sludge costs, where it should have been allocated to sewage treatment in Wastewater Network+, as we do not have discharge consents on Bioresources, but have permit fees which don't fall into the RAG definition for discharge consents.
  The correct treatment has been made from FY24 data onwards.
- A change has been made to the allocation to upstream service within Bioresources.
  APR23 allocation to upstream service for Bioresources has been recalculated following an Ofwat query. This change in methodology has been replicated for FY24-30
- A restatement of APR23 has been made following queries raised by Ofwat and carried forward for FY24-30.
  Third Party services in CWW1.5, restated for the below changes which then impact CWW1.1 base operating expenditure and therefore CWW2.14 Total base operating expenditure.
    1. DS third party costs, refer to DS1e - DS5 methodology, and explanation of APR23 restatement.
    2. Bulk supply costs as per APR23 Ofwat query TMS-APR-CA-012

4. Equity issuance costs
- We are not reporting any equity issuance costs for FY24-30

CWW3 - Enhancement expenditure - wastewater network+ and bioresources

Use of Additional Lines 1-5

As some of our Annual Return (AR) makes use of Additional lines, and we wanted to ensure alignment with the AR as far as possible, some of the Additional lines in CWW3 have different uses for AMP7 (22/23 - 24/25) to AMP8 (25/26 – 29/30)

Table Reference	Line Description	Values in AMP7	Values in AMP8
CWW3.181, CWW3.182	Additional Line 1	New Development and Growth (was Additional 2 in AR23)	IED Enhancement Case
CWW3.183, CWW3.184	Additional Line 2	Lee Tunnel Capex (was Additional 1 in AR23)	WINEP AMP7 Close
CWW3.185, CWW3.186	Additional Line 3	Conservation Drivers (4M.1/4M.2)	Asset Deficit
CWW3.187, CWW3.188	Additional Line 4	Sludge Enhancement (Quality) (4M.57/ 4M.58)	Cyber Digital Enhancement case
CWW3.189, CWW3.190	Additional Line 5	Not used	Not used

Following commentary relates to AMP7 'historic' costs only for table CWW3 (and CWW9):

- Costs have been allocated to the different PR24 data table lines as stated in the methodology statement and guidance for this table.
- Not all lines have been used in the PR24 proforma where there is no spend driver applicable to the AMP7 plan.
- Costs exclude the impact of the frontier shift and real price effects and are presented in 2022/23 price base.
- Additional lines used in table CWW3 / CWW9 to capture AMP7 historic spend are: 'Asset Debt' – this contains spend for 'New development and growth capex' & 'Lee Tunnel capex' & 'Sludge enhancement (quality) capex' and AMP7 WINEP Close' – this contains spend for ''Biodiversity and Conservation capex' as there are not enough additional lines to itemise this spend separately when combined with the AMP8 plan.
- Where a project has both a base and an enhancement element this will be designated by purpose and the percentage allocation determined and ratified through rigorous internal governance before the project commences.

    The table below shows the historic enhancement capex spend c£274m (AMP7 Y3-5) that also has a Base driver in the plan, split by cost driver.

AMP7 Historic Spend (Y3-5) - Enhancement Spend that also has a Base Driver in the AMP7 Plan (This is Just the Enhancement spend element only)
2022/23 Price Base

Waste PR24 Data table mapping	Waste PR24 data table lines	Foul	Sewage treatment and disposal	Sludge disposal	Sludge treatment	Grand Total
CWW3.1	Event duration monitoring at intermittent discharges (WINEP/NEP) wastewater capex	-	48,681	-	- -	48,681
CWW3.13	Increase flow to full treatment; (WINEP/NEP) wastewater capex	-	8,467,985	-	-	8,467,985
CWW3.153	Growth at sewage treatment works (excluding sludge treatment); enhancement capex	-	187,862,171	-	-	187,862,171
CWW3.156	Reduce flooding risk for properties; enhancement capex	10,019	-	-	-	10,019
CWW3.159	First time sewerage; enhancement capex	- 15,358	-	-	- -	15,358
CWW3.16	Increase storm tank capacity at STWs - grey solution; (WINEP/NEP) wastewater capex	-	9,238,720	-	-	9,238,720
CWW3.162	Sludge enhancement (growth); enhancement capex	-	-	-	47,642	47,642
CWW3.165	Odour and other nuisance; enhancement capex	-	390,750	-	-	390,750
CWW3.168	Resilience; enhancement wastewater capex	1,640,357	806,608	-	-	2,446,964
CWW3.171	Security - SEMD; enhancement wastewater capex	- -	0	-	- -	0
CWW3.181	New development and growth	- 796,728	-	-	- -	796,728
CWW3.187	Sludge enhancement (quality); enhancement capex	-	-	2,942,181	7,853	2,950,033
CWW3.49	Treatment for chemical removal (WINEP/NEP) wastewater capex	- -	289,719	-	- -	289,719
CWW3.52	Chemicals and emerging contaminants monitoring, investigations, options appraisals	- -	103,037	-	- -	103,037
CWW3.64	Treatment for phosphorus removal (chemical) (WINEP/NEP) wastewater capex	-	54,670,394	-	-	54,670,394
CWW3.73	Treatment for tightening of sanitary parameters (WINEP/NEP) wastewater capex	-	8,998,998	-	-	8,998,998
Grand Total		789,609	270,042,869	2,942,181	55,495	273,830,153

- The Total amounts (£m) in Table 3 – Historic spend AMP7 do not align to the early submission table CW1. A correction to CWW1 will rectify this so that tables 1 & 3 are in alignment.

The reasons for the variances between these tables are largely as follows:

1. Process methodology - CWW1 identified Growth (that was not submitted under the Developer Services price control) as base. This has been reinstated as enhancement spend in CWW3.
2. Updates to the data – The early submission table (CWW1) used an earlier iteration of a control file that at the time had high level manual adjustments processed as the annual Budget was under review. CWW3 has been populated using a later more detailed control file with these adjustments finalised and processed.

Following commentary relates to AMP8 only costs for table CWW3:

- Cost have been allocated to the different table lines as stated in the methodology statement for this table. Not all lines have been used.
- Costs exclude the impact of the frontier shift and real price effects, presented in 22/23 price base.
- CWW3 is for wastewater and CW3 for water expenditure. All costs in these tables have originated from business solutions that are either 100% wastewater or 100% water. The only exception is on the additional lines relating to Digital Cyber enhancement case (CWW3.187/188 & CW3.136/137). Proportional allocation has been applied to shared assets for these lines, predominantly weighted to FTE in line with annual return historic allocations. In total 60% to wastewater and 40% to water.
- No solutions have been proportionally allocated between base and enhancement.
- Additional lines used in table CWW3 are:
  - Industrial Emissions Directive – no defined line in published template, separate enhancement case submitted.
  - AMP7 WINEP Close – Separated these costs for AMP7 WINEP delivery from AMP8 WINEP delivery (lines CWW3.1 to CWW3.152). Individual defined case for AMP7 WINEP close included in submission.
  - Asset Deficit – Base investment not included in CWW1 & CWW2. Individual defined case included in submission, across wastewater and water.
  - Cyber – All costs allocated to separate enhancement case submitted. Lines CWW3.174 to 176 not used as these are just for compliance with Network and Information Systems regulations (NISR) 2018. The enhancement case is for compliance with NISR and the Data Protection Act (DPA), and to meet other

drivers and therefore enhancement case costs have been kept whole on additional lines.

- Focus of profiling spend for the 5 years of AMP8 has been at a programme level and will be subject to change as better information in made available and resources are optimised. This will result in a change at a project level when delivered.

The following table is specific commentary on the individual lines:

Data Table	Applicable to Whole Table or Individual Line/s	Commentary
CWW3	Lines 1 to 130 EA/NRW environmental programme wastewater (WINEP/NEP)	- All spend relates to new AMP8 WINEP commitments and excludes completion of AMP7 WINEP commitments. - Not all lines have been used. - AMP8 defined enhancement case, covering storm overflows and bathing waters. - Specific PCD proposed for storm overflows. - Expenditure increases through AMP8 as schemes are defined and delivered.
	Lines 153 to 155 Growth at sewage treatment works (excluding sludge treatment)	- AMP8 defined enhancement case. Defined list of 15 sites. - Specific PCD proposed. - Data table spend provisionally profiled in last 2 years of AMP8, with some spend (~£23m) profiled into AMP9. AMP8 data table profile differs from enhancement case write up as the data table numbers were locked for internal governance before more detailed review with enhancement case owner. - See note 1 below for further details on how population growth forecasts have been used to drive expenditure requirements. - Cost allocated to specific sewerage treatment site locations when headroom is exceeded by population growth.
	Lines 156 to 158 Reduce flooding risk for properties	- Not an AMP8 defined enhancement case. - Investment linked to DWMP, including flooding resolution by hydraulic lack of capacity. - Low spend in 25/26 as scope defined
	Lines 159 to 161 First time sewerage	- Not an AMP8 defined enhancement case. - Completion of successful S101A applications, all received. - No PCD proposed. - High level planning profile of spend in advance of detailed project level planning.
	Lines 181 to 182 IED	- AMP8 defined enhancement case. - Specific PCD proposed. - Capex investment in 25/26, with additional annual Opex required each year.

	Lines 183 to 184 AMP7 WINEP Close	• AMP8 defined case. • Project level investment to complete AMP7 WINEP commitments with associated CM and growth requirements. • Profile includes top down adjustment.
	Lines 185 to 186 Asset Deficit	• AMP8 defined case. • Additional investment above base tables. • Increase in spend during AMP8 as schemes move from definition into delivery.
	Lines 187 to 188 Cyber	• AMP8 defined enhancement case. • Addresses compliance with Network and Information Systems regulations (NISR) 2018 and the Data Protection Act (DPA); and to meet other drivers. • No PCD proposed. • Relatively flat profile during AMP8

Note 1 – Additional information relating to Lines 153 to 155 Growth at sewage treatment works (excluding sludge treatment)

Our sewage treatment growth enhancement case is aligned to a plan-based forecast; a forecast driven by a growth in housing stock and therefore the associated population occupying it. This forecast has been used to develop our preferred plan as it aligns to the framework for the production of Drainage and Wastewater Management Plans, specifically the following:

- 'Planned residential new development' is one of the risk-based catchment screening indicators.
- "Companies should make use of the long-term forecasts developed as part of the water resources management plan (WRMP)". The WRMP is required to use plan-based growth forecasts.

The scale of investment required at each of the sites within this enhancement case has been assessed in detail by our engineering team. Each upgrade has been scoped to enable robust compliance with permits and is linked to published Local Planning Authority growth plans. Our solutions deliver capacity for ten years' (up to 2036) worth of growth.

Local Planning Authority housing trajectories are published by each Authority, but they vary in detail. The majority publish at least a five to ten year look ahead but detail beyond this often deteriorates and is extremely limited post 15 years. Our plan-based growth forecasts are supplied for each of our 354 sewage treatment works by Edge Analytics who source the data directly from the Local Planning Authorities. This data is then verified by our internal planning teams to ensure it aligns with our detailed catchment knowledge.

CWW4 - Wastewater network+ - Functional expenditure

1. Material year-on-year variations
   Set out in the table below shows any material year-on-year variations in costs from FY24-30

Data Table	Whole Table or Line	Commentary
CWW4	Whole Table	Refer to commentary CWW2 for material variations, as the total costs per year are aligned to base opex excluding Local authority and Cumulo rates within Sewage Treatment & Disposal and Sludge Liquor Treatment upstream services

Addendum: change in methodology

- A change has been made to the allocation to upstream service within Bioresources. APR23 allocation to upstream service for Bioresources has been recalculated following an Ofwat query. This change in methodology has been replicated for FY24-30. APR23 data table 7A has been re-calculated using the updated allocations, but not re-submitted to Ofwat, but for consistency within the PR24 submission this has been updated in FY23 to ensure that values between CWW2, CWW4, and CWW5 are aligned.

CWW5 - Wastewater network+ - Large sewage treatment works

Data Table	Whole Table or Individual Line/s	Commentary
CWW5	Line 10	Material year-on-year variations: - The majority of sites show a material variation between the actual reported 2022/23 (APR23) data and the first forecast year 2023/24. All forecast years are based on an average year so as to limit the impact of precipitation and groundwater. The reporting year 2022/23 was significantly drier (92%) of the 136 year average rainfall. Therefore, the reporting year 2021/22 was used as a proxy for 'average conditions', being 102% of the 136 year average. The 2021/22 reported flow passed to treatment was therefore used as the starting point before growth and any impact of WINEP schemes was applied.
	Line 1, 2, 4, 5, 6, 7, 8	Data quality / confidence: - A1 – Sound records and high accuracy
	Lines 3, 9 and 17	Data quality / confidence: - A2 – Sound analysis (population forecast derived from externally produced data).
	Line 10	Data quality / confidence: - B2 – Average precipitation and groundwater conditions used for forecast.

Lines 11-16
1. Material year-on-year variations

Set out in the table below shows any material year-on-year variations in **costs only** from FY24-30. For reasons for dropping any large sewage treatment works from the table refer to commentary relating to lines 1-10.

Data Table	Whole Table or Line	Commentary
CWW5	Whole Table	Refer to commentary CWW2 for material variations, as the total costs per year are aligned to base opex excluding Local authority and Cumulo rates within Sewage Treatment & Disposal and Sludge Liquor Treatment upstream services

2. Changes in methodology / assumptions

- A change has been made to the allocation to upstream service within Bioresources.
  APR23 allocation to upstream service for Bioresources has been recalculated following an Ofwat query. This change in methodology has been replicated for FY24-30.
  APR23 data table 7B has been re-calculated using the updated allocations, but not re-submitted to Ofwat, but for consistency within the PR24 submission this has been updated in FY23 to ensure that values between CWW2, CWW4, and CWW5 are aligned.

3. Data quality

All data inputs are assured, either internally or externally, and reconciled back to source information.

CWW6 - Wastewater network+ - Sewer and volume data

Data Table	Whole Table or Line	Commentary
CWW6	CWW6.1	Values reported in this line are governed by the number of successful S101a applications from customers that meet the EA guidance "Water Quality: first time sewerage duty – S101a Water Industry Act 1991" and therefore vary from year to year. The size of schemes also varies and is dependent on the locality and opportunity for additional properties to connect, over and above the applicant/driver properties. Values reported are high confidence (A2 confidence grade) as schemes to serve these properties are in the delivery phase (for those in AMP7) or design phase (for AMP8). There have been no changes in the reporting method and no material changes from APR23 reported data.
	CWW6.2	Values reported in this line are governed by the number of successful S101a applications from customers that meet the EA guidance "Water Quality: first time sewerage duty – S101a Water Industry Act 1991" and therefore vary from year to year. Values reported are high confidence (A2 confidence grade) as schemes are either in the delivery phase (for those in AMP7) or design phase (for AMP8). There have been no changes in the reporting method and no material changes from APR23 reported data.
	CWW6.3 and CWW6.4	The key difference between PR19 and PR24 forecasts is an improved understanding of the actual number of eligible S105a SPS. In recent years the discovery rate of S105a SPSs has effectively fallen to zero.

Therefore, this PR24 forecast is built from the numbers in table DS6, and primarily consists of sites being adopted under Section 102 and 104, and those constructed by Thames Water for S101a first time sewage schemes. |

		The PR24 forecast shows a slower rate of increase than was forecasted for PR19, which was overestimating the number of S105a SPSs.

Installed capacity (kw) is not recorded for the majority of S105a SPS and a representative infill value is used for APR 7C.3. Future data improvement programmes could lead to the population of these values which may lead to a small deviation from the forecast.

As per the guidance FLIPS and offline SPS are excluded. As a result, some of TWUL largest SPS are excluded e.g. the Lee/Tideway tunnel lift station.

See table DS6 commentary for further details.
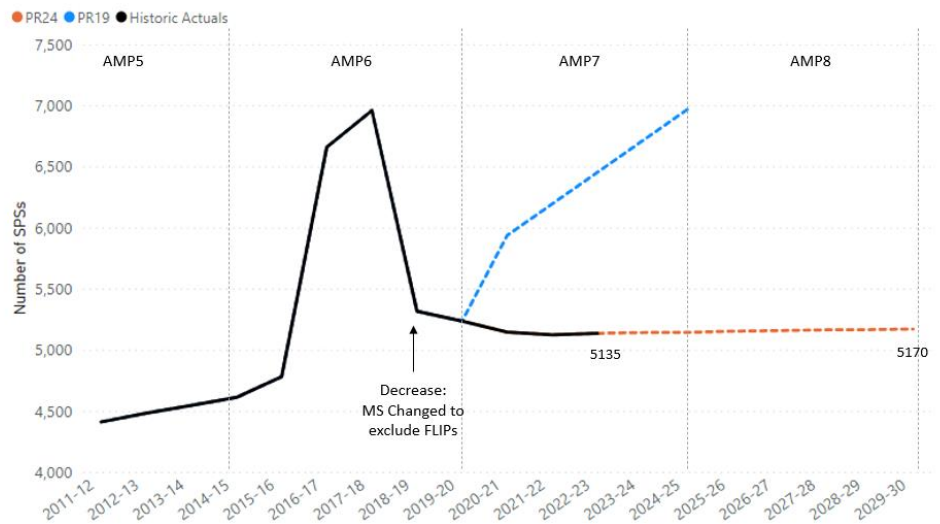
Figure 1 PR19 vs PR24 forecasts CWW6.22 (Number of Sewage Pumping Stations) |
| CWW6.3 and CWW6.4 | Data quality / confidence: B3 – Improved confidence in forecast due to the stabilisation of the S105a numbers and since PR19. |
| CWW6.5 | The year-on-year variations in the AMP7 (years 4 and 5) and AMP8 blockage forecast are trending down (improving) because of increasing investment in planned interventions such as sewer rehabilitation and interceptor removals.

Data quality assessment = B2
The source sewer blockage data includes minor manual reviews and adjustments as documented in the Annual Return method statement. |
CWW6.6 and CWW6.7	The definitions of these lines are the same as the current table definitions in the annual performance report. Our methodology and assumptions are consistent with the current regulatory reporting assurance process therefore there are no material year-on-year variations or a material change in reported figures.
CWW6.6 and CWW6.7	The quality of data provided is sound given that it informs our current Performance Commitment reporting subject to annual performance reporting assurance process. Our confidence grade for the forecast values is B3.
CWW6.8	Values reported in this line are sourced from a register of permitted overflows maintained with the Environment Agency.

		On occasions we identify historic (legacy) overflows not previously permitted, on detection we assess the need to retain or remove the overflow. We then seek to obtain a formal permit for these overflows, an allowance has been made in the reported numbers for overflows that are in the process of becoming permitted. Values reported are high confidence as they relate to physical assets we know about, the number may change minimally in the future as we find further overflows or build schemes to make overflows redundant. | Confidence Grade (line 8)	**B4**	
CWW6.9	Values reported in this line are sourced from a register of permitted overflows maintained with the Environment Agency. On occasions we identify historic (legacy) overflows not previously permitted, on detection we assess the need to retain or remove the overflow. We then seek to obtain a formal permit for these overflows, an allowance has been made in the reported numbers for overflows that are in the process of becoming permitted. Values reported are high confidence as they relate to physical assets we know about, the number may change minimally in the future as we find further overflows or build schemes to make overflows redundant. 	Confidence Grade (line 9)	**B2**	
CWW6.10	Values reported in this line are sourced from a register of permitted overflows maintained with the Environment Agency. In the main settled storm overflows are located at the STWs. Values reported are high confidence as they relate to physical assets we know about, the number may change minimally in the future as we find further overflows or build schemes to make overflows redundant. 	Confidence Grade (line 10)	**B2**	
CWW6.11	The definition of this line is the same as the current table definition in the annual performance report. Our methodology and assumptions are consistent with the current regulatory reporting assurance process therefore there are no material year-on-year variations or a material change in reported figures.
CWW6.11	Forecast of annual length increases: The annual increases of sewer lengths is derived from the following elements: • AMP7 historic reported length reported on CWW6.11 • Forecast length of sewers laid post 2001 reported on CWW6.21 and CWW6.22 • Forecast lengths of gravity sewers and rising mains rehabilitated post 2001 reported on CWW6.14 and CWW6.15.
CWW6.11	The quality of data provided is relatively sound given that it informs the current APR data tables audited through our annual performance reporting assurance process. Our confidence grade for the forecast values is B3.

| | CWW6.12 | The data used is best available data based on volumes Trade Effluent (TE) Customers' retailers have been charged for.

Logarithmic trend line used as best fit for prediction. Linear would trend to 0 eventually. Other lines (polynomial) predict upturn. Neither option is likely.

2020/21 and 2021/22 years were not used due to lockdown having noticeable and atypical reduction on volume of TE produced.

It is expected that Trade Effluent volumes will continue to decrease as effluent-producing industry declines and as companies become more water efficient. Major national economic events will affect volumes (as shown by the Covid pandemic) but otherwise the prediction follows a gradual declining trend.

Confidence Grade B2. |
|---|---|---|
| | CWW6.13 | Material year-on-year variations:
• There is material variation between the actual reported 2022/23 (APR23) data and the first forecast year 2023/24. All forecast years are based on an average year so as to limit the impact of precipitation and groundwater. The reporting year 2022/23 was significantly drier (92%) of the 136 year average rainfall. Therefore, the reporting year 2021/22 was used as a proxy for 'average conditions', being 102% of the 136 year average. The 2021/22 reported volume of wastewater receiving treatment was therefore used as the starting point before growth and any impact of WINEP schemes was applied |
| | CWW6.13 | Reporting methods:
• Historic data is constituent with reported numbers. The forecast has been calculated based on the assumption that future years follow the long-term average rainfall and infiltration rates |
| | CWW6.13 | Data quality / confidence:
• B2 – Average precipitation and groundwater conditions used for forecast. |
| | CWW6.14 | The length of planned gravity sewers rehabilitation in AMP8 will continue at a stable rate focussing on our critical sewers (e.g. sewers in the rail environment) and known hotspots. |
| | CWW6.14 - CWW6.15 | The definitions of these lines are the same as the current table definitions in the annual performance report. Our methodology and assumptions are consistent with the current regulatory reporting assurance process therefore there are no material year-on-year variations or a material change in reported figures. |
| | CWW6.14 - CWW6.15 | The quality of data provided is relatively sound given that it informs the current APR data tables audited through our annual performance reporting assurance process. Our confidence grade for the forecast values is B3. |
| | CWW6.15 | The length of planned replacement or structural refurbishment of rising mains will increase at the end of AMP7 to offset deterioration and maintain stable performance in AMP8. |
| | CWW6.16 – CWW6.21 | The key difference between PR19 and PR24 forecasts is the removal of forecasted growth data from the methodology. For PR24 the methodology to forecast changes to sewer length out until 2029-30 has not use population forecasts. This is because:

• Population forecasts carry their own assumptions and limitations. |

		• A significant number of greenfield sites are seeing their newly constructed sewers adopted by NAVs. • Brownfield sites, typically result in the upsizing of existing sewers as opposed to the laying of new sewers. • The introduction of table DS6, has improved the gathering of data regarding future schemes. Therefore, this PR24 forecast is built from the numbers in table DS6, and primarily consists of sewer laid and adopted under Section 102 and 104, and those constructed by Thames Water for S101a first time sewage schemes. See table DS6 commentary for further details. *Figure 2- PR19 vs PR24 forecasts CWW6.21 (Legacy Sewers)*
	CWW6.16 – CWW6.21	Data quality / confidence: B3
	CWW6.22	their rising mains would be fully mapped as well. Actuals reported for 2020-23 show that this assumption did not materialise.
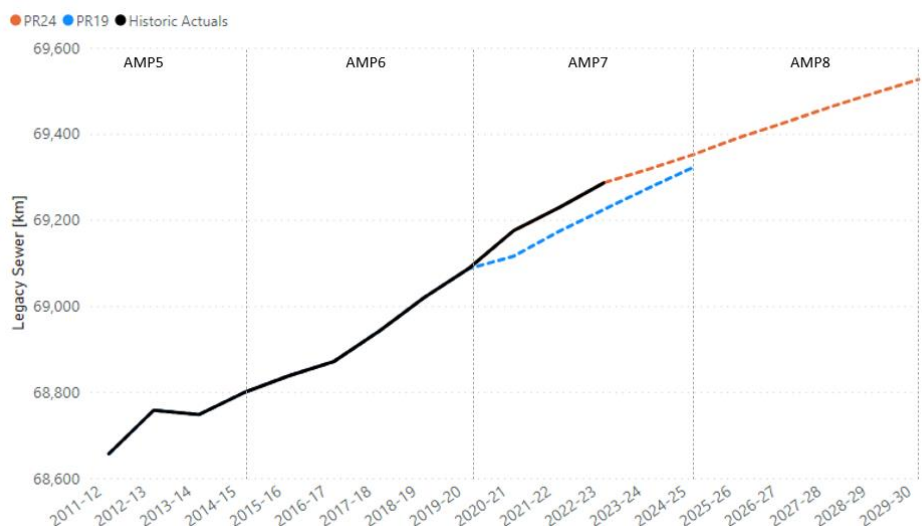
Figure 3- PR19 vs PR24 forecasts CWW6.22 (S105 Sewers)

	CWW6.22	Data quality / confidence: B4 - Improved confidence in forecast due to the stabilisation of the S105a SPS and their associated rising mains since PR19. However, the base 40,000km is still an estimated number and ongoing research has suggested it could low.

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

This table is a Nil Return for Thames Water.

CWW7a - Wastewater network+ - Sewage treatment works; size and consents

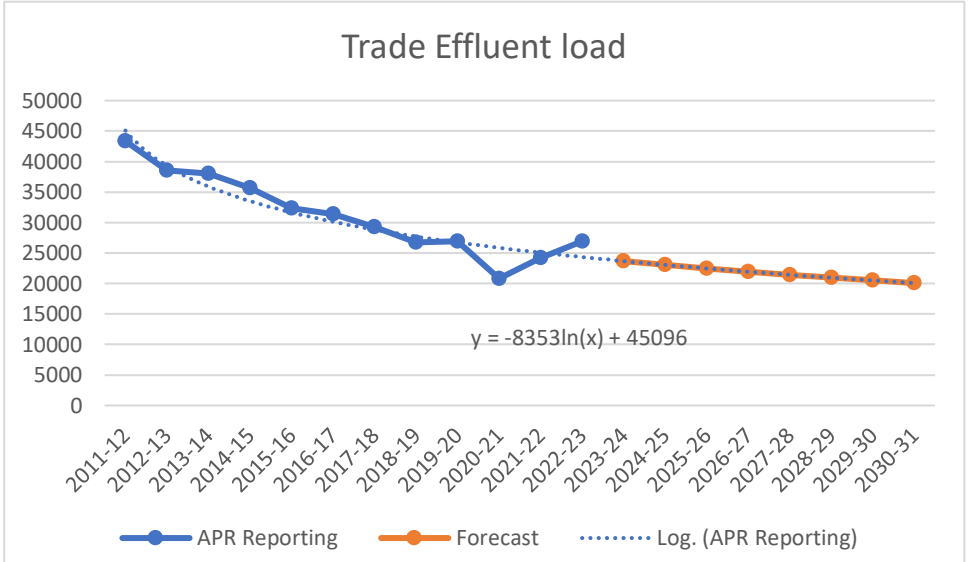| Data Table	Whole Table or Individual Line/s	Commentary
CWW7a	Line 15	Material year-on-year variations: • 1 additional works is to be reported from 2023/24. This corrects an issue that Swinford STW (A small STW connected to Swinford WTW) has not been reported historically. • 1 STW (Chilton Foliat) is planned for closure in 2024/25 with wastewater transferred to Hungerford STW.
	Line 7	Comparison: • The average annual change for our forecast years is +0.8%. This forecast is based on our externally produced plan-based population forecast. • The average annual change from 2011/12 to 2022/23 was +1.0%. • Our forecast is comparable with the historic reported trend (see graph below)

Total load recieved

	All lines	Data quality / confidence: • A2 – Sound analysis (population forecast derived from externally produced data).

CWW7b - Wastewater network+ - Sewage treatment works data; UV permits

Data Table	Whole Table or Individual Line/s	Commentary
CWW7b	All lines	Additional detail: We have not included any new UV permits associated with the three STWs that are to be upgraded as part of our Bathing Waters programme. The specific solution installed at these three STWs will be defined following the investigation. We have reported new microbiological treatment at these three STWs.
	All lines	Data quality / confidence: • A1 – Sound analysis

CWW7c - Wastewater network+ - Sewage treatment works data; treatment type

Data Table	Whole Table or Individual Line/s	Commentary
CWW7c	Line 15	Material year-on-year variations: • 1 STW (Chilton Foliat) is planned for closure in 2024/25 with wastewater transferred to Hungerford STW.
	Line 7	Comparison: • The average annual change for our forecast years is +0.8%. This forecast is based on our externally produced plan-based population forecast. • The average annual change from 2011/12 to 2022/23 was +1.0%. • Our forecast is comparable with the historic reported trend (see graph below)

Total load recieved

All lines excl. 8	Data quality / confidence: • A2 – Sound analysis (population forecast derived from externally produced data).
Line 8	Data quality / confidence: Trade effluent forecast has been applied using a log. Trend against previously reported numbers. This is consistent with data reported in CWW6.12. • B2 – Extrapolation

Trade Effluent load

$$y = -8353\ln(x) + 45096$$

CWW8 - Wastewater network+ - Energy consumption and other data

Data Table	Whole Table or Individual Line/s	Commentary
CWW8	CWW8.1 (AR7e.1)	Note – 2022/23 data aligns with APR Table 7e, Line 1.

Historic data:

Historic data from the past 11 years of APR submissions was sourced and used to calculate an annual catchment area percentage increase.

Table	7E		
Line	I		
Item description	Total sewerage catchment area	Increase	
Unit	km^2		%
DPs	2		
2011-12	2,602.85		
2012-13	2,608.62	5.76	0.22%
2013-14	2,614.39	5.76	0.22%
2014-15	2,620.17	5.76	0.22%
2015-16	2,625.94	5.76	0.22%
2016-17	2,631.71	5.76	0.22%
2017-18	2,635.50	3.78	0.14%
2018-19	2,640.63	5.12	0.19%
2019-20	2,643.48	2.85	0.11%
2020-21	2,649.53	6.04	0.23%
2021-22	2,654.52	4.98	0.19%
2022-23	2,667.92	13.33	0.50%
Average increase		**5.90**	**0.22%**

Forecast data

To determine the forecast data, source data from the past 11 years of APR submissions was compiled. This data was used to populate a table showing data from 2011/12 to 2022/23. An average of 2011/12-2022/23 annual percentage increase was calculated; this average annual percentage increase is used to forecast the year-on-year catchment area increase.

Key assumptions – no change in legislation for additional transfer of private pumping stations; growth rate for sewerage adoptions and first-time sewerage remains in line with that over the past 11 years

Table	7E	
Line	I	
Item description	Total sewerage catchment area	Increase

Unit	km²		%
DPs	2		
2022-23	2,667.92		
2023-24	2,673.90	5.98	0.22%
2025-25	2,679.90	5.99	0.22%
2025-26	2,685.91	6.01	0.22%
2026-27	2,691.93	6.02	0.22%
2027-28	2,697.96	6.04	0.22%
2028-29	2,704.01	6.05	0.22%
2029-30	2,710.07	6.06	0.22%
Average increase		**6.02**	**0.22%**

CWW8.2 – CWW8.3	For 2022-2023, there were seven designated inland bathing waters on Defra's website within Thames Water's operating area. We are aware of two areas where there is intent for applications to be made in 2023, which if successful would be designated from the 2024 bathing season. (The Thames at Wallingford, and the Thames at Henley). These have been included in the forecast. Previous reporting requirements did not require all Bathing Waters within the company's operating boundary to be included, so the numbers reported from 2022/23 follow this new methodology. Data for current number of Bathing Waters comes from Defra, so can be considered to have high accuracy. Forecasts are based on best known information, as Thames Water have no control over the number or location of Bathing Waters which Defra designate.
CWW8.4 – CWW8.5	At the end of the financial year, the details of the U_MON3, U_MON4 & U_MON5 monitors installed are provided with evidence to the Environment Agency. The Environment Agency updates their WINEP tracker with the date the monitors were delivered accordingly, also recording where monitors are no longer required. Monitors completed, or agreed completion dates for each report year are added to the corresponding column within the tracker. Agreed completion dates are subject to change with EA agreement.
CWW8.6	• The variation between the previous annual return submission and the first year of the forecast is substantial, this is due to the underreporting that was experienced over the last 3 AR years. We have assumed in the forecast that underreporting issues will be resolved. • The data is highly impacted by external factors and internal factors such as actual complaints made by our customers and improvement of our internal reporting procedures to reach a similar coverage achieved over the AR 2011/12 to AR 2019/20 period. Therefore the confidence in the forecast is low.

		• We have also assumed that annual change in reported complaints year on year follows the trend from the AR 2011/12 to AR 2019/20 period.
	CWW8.7 – CWW8.9	The energy consumption has been calculated using the forecast flow data and a representative kWh/Ml based on previous years' energy use data and accounting separation.

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

This table is a Nil Return for Thames Water.

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

Use of Additional Lines 1-5

As some of our Annual Return (AR) makes use of additional lines, and we wanted to ensure alignment with the AR as far as possible, some of the Additional lines in CWW3 have different uses for AMP7 (22/23 - 24/25) to AMP8 (25/26 – 29/30)

Line Description	Values in AMP7	Values in AMP8
Additional Line 1	New Development and Growth (was Additional 2 in AR23)	IED Enhancement Case
Additional Line 2	Lee Tunnel Capex (was Additional 1 in AR23)	WINEP AMP7 Close
Additional Line 3	Conservation Drivers (4M.1/4M.2)	Asset Deficit
Additional Line 4	Sludge Enhancement (Quality) (4M.57/ 4M.58)	Cyber Digital Enhancement case
Additional Line 5	Not used	Not used

Following commentary relates to AMP7 'historic' costs only for table CWW9:

- Costs have been allocated to the different PR24 data table lines as stated in the methodology statement and guidance for this table.
- Not all lines have been used in the PR24 proforma where there is no spend driver applicable to the AMP7 plan.
- Costs exclude the impact of the frontier shift and real price effects and are presented in 2022/23 price base.
- Additional lines used in table CWW3 / CWW9 to capture AMP7 historic spend are: 'Asset Debt' – this contains spend for 'New development and growth capex' & 'Lee Tunnel capex' & 'Sludge enhancement (quality) capex' and AMP7 WINEP Close' – this contains spend for ''Biodiversity and Conservation capex' as there are not enough additional lines to itemise this spend separately when combined with the AMP8 plan.
- Where a project has both a base and an enhancement element this will be designated by purpose and the percentage allocation determined and ratified through rigorous internal governance before the project commences.

The table below shows the historic enhancement capex spend c£274m (AMP7 Y3-5) that also has a Base driver in the plan, split by cost driver.

AMP7 Historic Spend (Y3-5) - Enhancement Spend that also has a Base Driver in the AMP7 Plan (This is Just the Enhancement spend element only)
2022/23 Price Base

Waste PR24 Data table mapping	Waste PR24 data table lines	Foul	Sewage treatment and disposal	Sludge disposal	Sludge treatment	Grand Total
CWW3.1	Event duration monitoring at intermittent discharges (WINEP/NEP) wastewater capex	-	48,681	-	- -	48,681
CWW3.13	Increase flow to full treatment; (WINEP/NEP) wastewater capex		8,467,985	-	-	8,467,985
CWW3.153	Growth at sewage treatment works (excluding sludge treatment); enhancement capex	-	187,862,171	-	-	187,862,171
CWW3.156	Reduce flooding risk for properties; enhancement capex	10,019	-	-	-	10,019
CWW3.159	First time sewerage; enhancement capex	15,358	-	-	- -	15,358
CWW3.16	Increase storm tank capacity at STWs - grey solution; (WINEP/NEP) wastewater capex	-	9,238,720	-	-	9,238,720
CWW3.162	Sludge enhancement (growth); enhancement capex	-	-	-	47,642	47,642
CWW3.165	Odour and other nuisance; enhancement capex	-	390,750	-	-	390,750
CWW3.168	Resilience; enhancement wastewater capex	1,640,357	806,608	-	-	2,446,964
CWW3.171	Security - SEMD; enhancement wastewater capex	- -	0	-	- -	0
CWW3.181	New development and growth	-	796,728	-	- -	796,728
CWW3.187	Sludge enhancement (quality); enhancement capex	-	-	2,942,181	7,853	2,950,033
CWW3.49	Treatment for chemical removal (WINEP/NEP) wastewater capex	- -	289,719	-	- -	289,719
CWW3.52	Chemicals and emerging contaminants monitoring, investigations, options appraisals	- -	103,037	-	- -	103,037
CWW3.64	Treatment for phosphorus removal (chemical) (WINEP/NEP) wastewater capex	-	54,670,394	-	-	54,670,394
CWW3.73	Treatment for tightening of sanitary parameters (WINEP/NEP) wastewater capex	-	8,998,998	-	-	8,998,998
Grand Total		**789,609**	**270,042,869**	**2,942,181**	**55,495**	**273,830,153**

- The Total amounts (£m) in Table 3 – Historic spend AMP7 do not align to the early submission table CW1. A correction to CWW1 will rectify this so that tables 1 & 3 are in alignment.

The reasons for the variances between these tables are largely as follows:

1. Process methodology - CWW1 identified Growth (that was not submitted under the Developer Services price control) as base. This has been reinstated as enhancement spend in CWW3.
2. Updates to the data – The early submission table (CWW1) used an earlier iteration of a control file that at the time had high level manual adjustments processed as the annual Budget was under review. CWW3 has been populated using a later more detailed control file with these adjustments finalised and processed.

Following commentary relates to 2025 – 2030 years only for table CWW9:

- Cost have been allocated to the different table lines as stated in the methodology statement for this table. CWW3 profiles used as the start point to calculate the cumulative profiling for this table.
- Important to note that Opex spend in the enhancement tables is either:
    - A change in Opex directly resulting from Capex intervention investment, or
    - Intervention investment that is classified as Opex per IFRS.
- For this cumulative table only Opex intervention spend is included, as by definition change in Opex spend from Capex continues into the future.
- Not all lines have been used.
- Costs exclude the impact of the frontier shift and real price effects, presented in 22/23 price base.
- CWW9 is for wastewater and CW9 for water expenditure. All costs in these tables have originated from business solutions that are either 100% wastewater or 100% water. The only exception is on the additional lines relating to Digital Cyber enhancement case (CWW3.187/188 & CW3.136/137). Proportional allocation has been applied to shared assets for these lines, predominantly weighted to FTE in line with annual return historic allocations. In total 60% to wastewater and 40% to water.
- No solutions have been proportionally allocated between base and enhancement.
- Additional lines used in table CWW3 are:

- Industrial Emissions Directive – no defined line in published template, separate enhancement case submitted.
- AMP7 WINEP Close – Separated these costs for AMP7 WINEP delivery from AMP8 WINEP delivery (lines CWW9.1 to CWW9.152). Individual defined case for AMP7 WINEP close included in submission.
- Asset Deficit – Base investment not included in CWW1 & CWW2. Individual defined case included in submission, across wastewater and water.
- Cyber – All costs allocated to separate enhancement case submitted. Lines CWW9.174 to 176 not used as these are just for compliance with Network and Information Systems regulations (NISR) 2018. The enhancement case is for compliance with NISR and the Data Protection Act (DPA), and to meet other drivers and therefore enhancement case costs have been kept whole on additional lines.

The following table is specific commentary on the individual lines, please refer to table CWW3 for supplementary commentary:

Data Table	Whole Table or Individual Line/s	Commentary
CWW9	Lines 1 to 130 EA/NRW environmental programme wastewater (WINEP/NEP)	- All spend relates to new AMP8 WINEP commitments and excludes completion of AMP7 WINEP commitments. - Not all lines have been used. - Includes high volume number of storm overflow schemes/sites that at this stage in the planning process spend allocated in-year to reflect a continual delivery of benefits during AMP8.
	Lines 153 to 155 Growth at sewage treatment works (excluding sludge treatment)	- AMP8 defined enhancement case. Defined list of 15 sites. - Note that although per CWW3 commentary circa ~£23m profiled into AMP9 as a top down adjustment, benefits in the table all assumed to deliver in AMP8.
	Lines 156 to 158 Reduce flooding risk for properties	- Not an AMP8 defined enhancement case. - Investment linked to DWMP. - Benefits start to deliver in 2026/27 and continue annually for 4 years.
	Lines 159 to 161 First time sewerage	- Not an AMP8 defined enhancement case. - Completion of successful S101A applications, all received. - Benefits assigned to deliver annually, as properties assumed to come on-line. As definition of schemes progress understanding of project level benefits profile will increase.
	Lines 181 to 182 IED	- AMP8 defined enhancement case. - Specific PCD proposed. - Capex investment in 25/26 with benefits in this year. Benefits of annual additional Opex investment allocated each year.
	Lines 183 to 184 AMP7 WINEP Close	AMP8 defined case.

		• Project level investment to complete AMP7 WINEP commitments. • Benefits delivering during AMP8 period. Data includes top down provisional profiling adjustment subject to further in-house refinement.
	Lines 185 to 186 Asset Deficit	• AMP8 defined case. • Additional investment above base tables. • Annual delivery of benefits
	Lines 187 to 188 Cyber	• AMP8 defined enhancement case. • Annual delivery of benefits from multiple different initiatives.

CWW10 - Wholesale wastewater local authority rates

Data Table	Applicable to Whole Table or Individual Line/s	Commentary
CWW10	Line 10.1	An explanation of the rateable value (RVs) used to populate line 1 are documented below. 2022-23 – based on the 2017 rateable value 2023-24 to 2025-26 – based on the actual 2023 rateable value as at the end of July 2023 2026-27 to 2028-29 – forecast value taking into consideration expected movements in building costs and land value using the 2023 RV as a base and including London Crossrail supplement. The significant increase in RVs is caused by the Rating Income being linked to RCV of the assets (ie increasing with CPIH as well as investment), whereas the Rating Costs are linked to the Net Book Value of the assets (ie do not increase with CPIH). This increasing gap between RCV and NBV drives RV to increase over time at a faster rate than CPIH. 2029-30 – forecast value taking into consideration expected movements in building costs and land value using the 2023 RV as a base and including London Crossrail supplement.
	Line 10.3	The basis for transitional relief included in line 2 are documented below. 2022-23 – based on the relief available in 2022-23. 2023-24 to 2025-26 – based on the transitional arrangement available for the period as publicated. 2026-27 onwards - transitional relief has been applied in line with publicated allowances for 2023-24 to 2025-26.
	Line 10.11	• 2023-24– actual movement between the 2017 RV and 2023 RV issued by the VOA. • 2026-27 – calculated by taking into consideration expected movements in building costs and land value using the 2023 RV as a base and including London Crossrail supplement. • 2029-30 – calculated by taking into consideration expected movements in building costs and land value using the 2023 RV as a base and including London Crossrail supplement.

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

Developer Services lines – table CW11 and CWW11 general assumptions

Fair Value entries for Self-Lay adopted assets are excluded (consistent with our APR expenditure table submissions 4NOP and Ofwat removed the adopted asset line from DS1e in May23). Any Thames Water delivered activity on these jobs has been included in these tables. This is typically the Non-Contestable elements and any Project Management and Design activities that Thames Water has provided. Similarly, any contribution using the NRSWA or Deferment of Renewal assessment that Thames Water makes towards these Self Lay jobs has also been included in these tables. This is determined to be actual cash expenditure and therefore deemed as reportable in the expenditure tables. We consider this to be analogous to our treatment of SL schemes with non-contestable elements where we are treating the value of TW contribution within table definitions, and the value of fair value entries outside of table definitions for expenditure data tables, as adopted assets.

HS2 is being delivered under it's own act of parliament and so this activity is not covered under NRSWA and has therefore been included in "Diversions - other non-section 185 diversions - capex". Any HS2 Opex is for monitor only activity which does not result in a capex diversion and so has been reported in DS2e line 4 "Other site-specific developer services activities or DS3 line 9 "Other site-specific developer services activities" which sit outside the price control as it does not meet the definition of a diversion, as only monitoring equipment is used to ensure no detriment to the asset.

There is considerable programme uncertainty relating to HS2 which Ofwat are bringing inside price control and increases risk for end customers. We have challenged this further through our consultation response to Ofwat on the draft proposed licence condition B changes.

Consistent with how information has been historically presented within the Annual Performance Report, our capex information includes an apportionment of centrally capitalised overhead rates. However, our opex figures presented reflect the direct costs expected to be incurred in delivering activities and thus does not include any apportionment of central overheads (e.g. rent/rates). We acknowledge that at the time of writing there is an open consultation to this effect however we note that there has been no specific guidance issued in this area.

Values are stated in 2022-23 price base.

Our delivery contracts are either structured on a schedule of rates arrangement, or certain larger projects are individually tendered. Consequently, there are no differences between pre and post frontier shift adjustments for these tables.

Data Table	Whole Table or Individual Line/s	Commentary
CWW11	2 Rechargeable opex - build over	Costs disclosed within this line relate to the teams that undertake the underlying Buildover activities such as CCTV surveys and application reviews related to customers wanting to build over company assets for example sewers or drains.
	5,6,12 Opex Diversionary Activities	Represents an apportionment of the operating expenses of the back-office DS teams who support, but do not directly contribute towards, DS CAPEX scheme.

		The costs were allocated between the relevant diversionary (and non-diversionary in some instances) activities through using the total CAPEX spend forecast for each activity for that year.
	10 Other excluded charge opex	Costs disclosed within this line represent operating expenses for activities that meet OFWATs definition of developer services such as sewer consents and customer relationship managers (whose roles are more supportive in nature), however, cannot be directly allocated to any of the activities within tables DS3. As well as odour control costs.
	18 NRSWA Capex	These jobs sit outside our schedule of rates contract. The Non-Contestable elements of the self-lay jobs were also added in. For these activities we took the AMP7 forecast, converted it to 2022-23 price base and calculated an AMP average for the activities. These were then projected forward into AMP8 using the change in property growth profile. The AMP7 profile includes a small number of large value schemes such as Silvertown Tunnel which are due to be delivered in 2023-24 and 2024-25 and this explains the increase in profile compared to 2022-23. This profile is matched in table DS1e line 16 with a 90% assumed recovery rate under the NRSWA contribution rules. This is a weighted average of the scale between 7.5% and 18% to reflect assumed work mix.
	19 other non-section 185 diversions - capex	The Thames Water delivered HS2 Non-Contestable schemes are reported on this line, the majority of which will be completed in AMP7 reflecting the higher numbers compared to AMP8. The Non-Contestable elements of the Self-Lay HS2 programme are also reported on this line including the PMO activities and will continue into AMP8. The Self Lay profile is estimated by our PMO team, with very little detail from HS2 directly as to the impact of the recent government announcement that the HS2 programme will be slipped 2 years. This assumes schemes already in flight will continue to completion, and those not yet commenced will be impacted by the slippage. The PMO and Thames Water delivered Non-Contestable construction is 100% recovered from HS2, and the Self Lay construction elements assume 90% in line with our assessment of NRSWA cost sharing rules and deferment of renewal.
	25 S185 Diversions	The remaining 2/3 of these jobs sit outside our schedule of rates contract. The Non-Contestable elements of the self-lay jobs were also added in. For these activities we took the AMP7 forecast, converted it to 2022-23 price base and calculated an AMP average for the activities. These were then projected forward into AMP8 using the change in property growth profile.

CWW12 - Transitional expenditure - wastewater network+ and bioresources

This table is a Nil Return for Thames Water.

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

- Cost have been allocated to the different table lines as stated in the methodology statement for this table.
- Not all lines have been used.
- Costs exclude the impact of the frontier shift and real price effects, presented in 22/23 price base.
- See table CWW3 commentary for details on proportional allocation and additional lines used.
- The Ofwat guidance for table 13 says in a number of places that the costs are for projects starting in AMP8. we have therefore excluded any projects which have started in AMP7, but are continuing to spend in AMP8. The impact of this is that the AMP8 columns on table 13 do not match the AMP9 totals on table 3.
- A worked example of how both the capex and Opex Present Value is calculated is available. The following section in this document describes the calculation which is based on the APS 'PV Revenue Requirement' calculation which is *"a representation of the Spackman approach which, instead of using one-off (or recurrent) capital peaks when investment is undertaken, replaces those with the cost of borrowing that capital and the depreciation (erosion of asset value) of the asset, year on year, based on its expected life. In terms of regulatory financial modelling this provide a more realistic depiction of the impact on business cashflow for which they fund through revenue (i.e. impact on customer bills)."* (Quote taken from the suppliers of APS). The APS calculation aligns with the Ofwat table guidance and hence is recreated for use in table 13 as described in the following section.

Data Item	Example	Note
PV Base Year	2022	2022 is how APS represents the 22/23 reg year which is the base year for PR24. In the absence of other guidance, this year is used as the base year for the PV calc (ie the year to discount costs back to)
WACC	3.23%	The Ofwat methodology stated this value as 'Wholesale WACC', page 102 in PR24_ final_methodology_main_document.pdf issued Dec 2022 (and not updated in May 23)
Window Start Year	2025	Ofwat have asked for a 30 year window. The start of AMP8 is taken as the start of this window.
Window Duration	30	30 years is the default that Ofwat have asked for.

- There are two Capex categories (1201 Land and 9000 Assets Under Construction) which don't have an asset life, so those are treated as if they are Opex (costs hit the P&L in the year that the cost is incurred)
- The AMP9 data is repeat capex (due to short life assets needing replacement) and on-going opex impacts. There are no new interventions included.

- The AMP9 costs are only the tail-spend, or repeat/on-going costs associated with the new interventions that are starting in AMP8. As there are no new AMP9 inventions shown here the costs for AMP9 are substantially lower than those for AMP8.
- The overall confidence grade is assessed as A3. This data is based on bottom up cost data which costs have been generated at the asset class level, all with associated asset lives. These asset lives are used to create the PV.
- No specific line commentary for this table.

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

All of the enhancement cases are Least Cost, so CWW14 is a mirror of CWW13. Please refer to the commentary for CWW13 for details.

Enhancement Case	Commentary
Waste WINEP (Storm Overflows, Bathing Waters)	The WINEP plan is already least cost, there are therefore no different schemes to report on this table compared to CWW13.
Sewer Flooding	The Sewer flooding plan is already least cost, there are therefore no different schemes to report on this table compared to CWW13.
IED	The IED plan is already least cost, there are therefore no different schemes to report on this table compared to CWW13.
STW Growth	The STW Growth plan is already least cost, there are therefore no different schemes to report on this table compared to CWW13.
First time rural sewerage	The First Time rural Sewerage plan is already least cost, there are therefore no different schemes to report on this table compared to CWW13.

CWW15 - Best value analysis; benefits - wastewater network+ and bioresources

CWW16 - Best value analysis of alternative option; benefits - wastewater network+ and bioresources

Key assumptions underpinning the benefit and present value figures

Our approach to benefits determination in CWW15 and CWW16 is about delivering public value and maximising the positive impact we have on customers, communities, and the environment, as we provide water and wastewater services. It is about being a force for good in our communities and the environment.

In each enhancement case we applied the Thames Water Public Value Framework, outlined in each enhancement case, to determine identify a range of benefits against the six capitals: natural, social, human, intellectual, manufactured and financial. From the identified benefits, we determined monetised benefits across the range of measures.

We calculated the present value of benefits using a:
- 30-year period
- discount rate for benefits using HM Treasury's social time preference rate.

Consistent with our approach for the present value of costs, we had no reason to deviate from Ofwat's guidance in its final methodology. Please refer to the commentaries for CWW13 and CWW14 for how costs were determined.

Our benefits assessment methodology

To quantify the benefits for each enhancement case, the analysis must be meaningful and practical. This involves conducting the CBA across feasible options rather than evaluating all possible solutions. By focusing on feasible options, the CBA can provide relevant insights and aid in decision-making criteria to determine the best option.

The following considerations were considered for each possible solution:

- Does this option meet the required statutory/ legislative obligation?
- Does this option meet the defined need of the case?

This approach ensures a comprehensive and practical analysis for informed assessment.

After screening for feasible options, we undertook a series of workshops for each enhancement case to identify and quantify benefits and units across the different options. This process aimed to determine where benefits varied or remained consistent across the options and why.

The workshops facilitated the following considerations:

- Measurability: The workshops focused on identifying measurable benefits associated with each option. This involved determining the metrics and indicators that could be used to quantify the benefits effectively. By establishing measurable parameters, the CBA could provide objective and reliable assessments of the options.
- Data Assessment: The workshops also involved evaluating the availability of relevant data for quantifying the benefits. This step included identifying the existing publicly available data sources and determining any additional data that needed to be collected or calculated.
- Performance Commitment Levels: Changes in performance commitment levels were considered when assessing the available data and calculating the benefits. This step involved examining the potential impact of the enhancement options on the performance commitments. By considering these changes, the CBA could capture the potential improvements or drawbacks in Thames Water performance resulting from the different options.
- Timing of Benefits: An assessment was made regarding when the benefits would be realised. This involved estimating the timeframes for the realisation of the quantifiable benefits associated with each option. By understanding the timing, decision-makers could prioritise options based on their expected short-term or long-term impacts over the 30-year forecast.
- Customer, community and environment: We assessed both the benefits and dis-benefits from the perspectives of customers, communities, and the environment. This broader perspective allowed for a comprehensive evaluation of the potential positive and negative impacts that each option could have on our stakeholders and the environment. By considering these different perspectives, the CBA aimed to assess the overall value and implications of the enhancement options in a holistic manner, aligning to the Thames Water LTDS and Public Value Framework.

During the CBA process, we recognised that certain benefits lacked a robust approach to estimate their quantified impact. As a result, only the benefits that could be quantified effectively by publicly available third-party sources or performance commitments were included in the analysis of each option. This approach ensured that the CBA focused on reliable and

measurable quantifiable benefits, allowing for a more accurate assessment and comparison of the options. Benefits that did not meet this criterion were excluded to maintain the integrity and validity of the analysis.

We conducted the above methodology when there was more than one feasible option to consider. A CBA is not necessary or meaningful in certain scenarios:

- Enhancement cases are development to meet statutory guidelines, requirements or legislation that are prescriptive on how Thames Water should address the need. Least cost was typically the deciding factor in the solution development.
- If options, or a 'do nothing' option, fail to meet statutory obligations, a CBA may not be meaningful in assessing the alternative.

Sources of evidence used to inform benefit impacts

We have followed Ofwat's hierarchy for sourcing robust marginal benefit values from ODI rate research to WINEP and then to other publicly available, robust valuations.

Table 1 sets out the relevant valuations and sources for our business plan aside from performance commitment marginal benefits. DfT TAG data book refers to the UK Department for Transport (DfT) TAG (Transport Analysis Guidance) Data Book.

Table 1 – Benefit references

Benefit	Value	Unit	Price base	2022/23 value	Benefit Source	Valuation Date
GHG, transport distribution	£2.11	Carbon dioxide emissions per litre of fuel burnt / kWh used (petrol)	2022/23	£2.11	DfT TAG data book	May 2023
GHG, transport collection	£2.52	Carbon dioxide emissions per litre of fuel burnt / kWh used (diesel)	2023/24	£2.52	DfT TAG data book	May 2023
GHG carbon, construction	£241.00	tCO2e	2020/21	£271.78	HM Treasury Green Book: Table 3	Nov 2022
Water quality Land-use area: wetland or floodplain	£350.00	£/ha	2010	£445.89	WINEP Wider Environmental Outcomes Metrics 2022	Feb 2011
GHG emissions (operational and embodied)	£248.00	tCO2e	2020	£279.68	UK Gov paper "Valuing greenhouse gas emissions in policy appraisal": Appendix A Common Data	Sep 2021
Traffic & transport disruption, A road	£14,891.00	£ / day (value of time travelled)	2010	£18,970.71	Road Traffic Estimates - Great Britain 2019	Sep 2020
Traffic & transport disruption, B road, non commuting	£1,942.00	£ / day (value of time travelled)	2010	£2,474.05	Road Traffic Estimates - Great Britain 2019	Sep 2020

Level of uncertainty and sensitivity

Where applicable, we have explained the uncertainty for each reporting line in the following table and in the respective enhancement case.

Application to each reporting line - CWW15 & CWW16

Data Table	Whole Table or Individual Line/s	Commentary Key Assumption underpinning the benefits and PV figures
CWW15 & CWW16	Whole Table	Best value equals least cost in each line in table CWW15, therefore the lines in CWW15 and CWW16 table lines match exactly, and the commentary in this table is common between both tables.
	CWW15.114, CWW15.125, CWW15.136,	WINEP: Storm Overflows • The AMP8 cost-benefit analysis has been identified for storm overflows.

	CWW15.147, CWW.15.169, CWW16.114, CWW16.125, CWW16.136, CWW16.147, CWW.16.169,	• The performance improvement from enhancement was annualized and entered in columns H - R. • The monetary impact is calculated using the ODI rates multiplied by the annualised benefit and entered into columns (W-AG).
	CWW15.45-88, CWW15.111-154, CWW15.166-176, CWW15.320-323 CWW16.45-88, CWW16.122-154, CWW16.166-176, CWW16.320-323	Enhancement case: WINEP • Excludes WINEP Storm Overflows line above. • The units of benefit table (columns H-S), to profile the unit's distribution, have been left blank in these lines as the benefits attributed are only in monetised form from the WINEP benefits assessment methodology. No non-monetised units have been provided. • The unit value is represented by 'see left' in this table to refer to the type of benefit. Only monetised values have been expressed per benefits, not unit. • For columns W-AH, we have conservatively assumed that benefits only accrue from Year 5 as the timing and prioritisation of the delivery profile will be defined after the EnvAct_INV4 investigations conclude and in line with the deadline for overflow improvements. It is expected that some benefits will start accruing sooner where we deliver improvements in earlier parts of the AMP. • We have followed the approaches set out in the WINEP Wider Environment Outcomes Metrics.
	CWW15.324 CWW16.324	WINEP: Microbiological treatment • AMP8 cost-benefit analysis has been identified for bathing waters. • The performance improvement from enhancement was annualized and entered into columns H - R. • The monetary impact is calculated using the ODI rates multiplied by the annualised benefit and entered into columns (W-AG).
	CWW15.542-543 / CWW16.542-543	Enhancement case: Sewage treatment growth • Four benefits could be monetised and used to determine a PV of benefits for each of the three option scenarios. • The values are negative as all benefits considered are dis-benefits, meaning that the benefits considered provide a negative value. When comparing options, the lowest negative number is considered to have the largest benefit, or smallest disbenefit. • The benefit options were compared on a site location basis for the three sites where there are viable alternative options to compare. • The sites where there is only one viable option were not included in the CBA, as the benefits are consistent and therefore do not materially impact the section criteria.

		• The options were grouped on a programme level, to include all 15 sites into the analysis, with the three options compared to consider the variable options
		• The case presented in this table is the best value (and least cost) option.
		• Benefit: Land-use, area of wetland or floodplain/ Water quality impacts & biodiversity,
		
		    • Current nature-based solution (NBS) capacity design profiled to meet requirements to 2055, to align with 30-year design life. Benefit is apportioned annually.
		    • Assumed that capacity of NBS will remain constant to meet population needs over design life.
		    • Assume construction complete mid-year 5 of AMP8, full benefits attributed in year after complete.
		
		• Benefit: Greenhouse gas emissions, construction
		
		    • Construction profile assumed based on engineering planning forecast.
		    • Assumed benefit to commence in full year (FY) after 100% of construction completed.
		
		• Benefit: Greenhouse gas emissions, whole of life operational
		
		    • Annual profile to commence in the FY after 100% construction commenced.
		    • Assumption that no further STW expansion to 2050
		
		• Benefit: Traffic or transport disruption. No quantitative change attributed.

	CWW15.544 CWW16.544	Growth at sewage treatment works (excluding sludge treatment). • The AMP8 cost-benefit analysis have been identified for discharge permit compliance. • The performance improvement from enhancement was annualized to enter columns H- R. • The monetary impact is calculated using the ODI rates multiplied by the annualised benefit and entered into columns (W-AG).
	CW15.553- CW15.554	Enhancement case: sewer flooding resilience • The AMP8 cost-benefit analysis has been identified for internal and external flooding. • The performance improvement from enhancement was annualized and entered into columns H- R. • The monetary impact is calculated using the ODI rates multiplied by the annualised benefit and entered into columns (W-AG).
	CWW15.564- 574 / CWW16.564- 574	First time sewerage • This line has intentionally been left blank • This item does not reference an enhancement case, but instead to a cost build-up based on evidence from previous planning cycles for this obligation.

		• This line has been determined on a least cost basis.
	CWW15.641-651 / CWW16.641-651	Enhancement case: Industrial emissions directive • This line has intentionally been left blank • This enhancement case has been determined on a least cost basis.
	CWW15.652-662 / CWW16.652-662	Document - AMP7 WINEP • This line has intentionally been left blank. • This line refers to funds required to close out the AMP7 WINEP programme, with the programme benefits, approach and funding agreed in the PR19 business plan.

	CWW15.663-673 / CWW16.663-673	Cost adjustment claim: Asset deficit
		
		• The AMP8 cost-benefit analysis has been identified across:
		    • Storm overflows
		    • Total pollution incidents
		    • Serious pollution incidents
		    • Sewer collapses
		• The performance improvement from enhancement was annualized and entered into columns H- R.
		• The monetary impact is calculated using the ODI rates multiplied by the annualised benefit and entered into columns (W-AG).

	CWW15.674-684 / CWW16.674-684	Enhancement case: Digital cyber • This line has internationally been left blank • No CBA was undertaken as this case is guided by compliance with the NCSC and the CIS control framework. • The framework is driven by levels of risk reduction, with the options selected based not on benefits, but on the risk reduction appetite of the business in compliance with the requirements.

Assumptions

- Table is focussed on projects starting in AMP8
- Investment in AMP8 will deliver benefits in both AMP8 and the early years of AMP9 as the projects are commissioned.
- We don't have information about benefits beyond the end of AMP9 but we can assume that although no new benefits are claimed, the existing benefits are maintained though on-going base investment.
- As data historical data has been extrapolated it has been classed as reliable band B.
- The PV is therefore based on the valuation of benefits forecast to be achieved during AMP8 and AMP9.

Benefits values were provided in the units at which they are measured (e.g. Nr Incidents of Sewer Flooding), and showing cumulative improvement.

These were then normalised to the same units as used for the Common Performance Commitments (e.g. 'Number of incidents per 10,000 sewer connections reported') and as reported on OUT5.

Finally they were converted to annual changes (rather than cumulative). This give the number of units of benefit, which are copied into the first block of columns (H-R) in table15.

	A	B	C	D	E	F	G	H	I	J	K
1											
2	AMP8 Enhancement Spend Benefits (cumula						2025-26	2026-27	2027-28	2028-29	2029-30
3	Internal sewer flooding					Nr incidents	0	1	3	4	5
4	Internal sewer flooding					Normalisation	6507	6602	6691	6776	6856
5	Internal sewer flooding	PR24_ISF	PR24_ISF_TMS	Number	2	Cumulative	0.00	0.00	0.00	0.01	0.01
6						Annual	0.00000	0.00151	0.00297	0.00142	0.00139

Each row is then multiplied by a valuation to give a benefit value (£m) for these units of benefit.

	£m	%	£m
Internal sewer flooding	26.756	70%	38.22
External sewer flooding	11.979	70%	17.11
Bathing water quality	0.339	70%	0.48
Customer contacts	26.183	70%	37.40
CRI	2.605	70%	3.72
Water supply interruptions	2.440	70%	3.49
Mains repairs	0.279	70%	0.40
Unplanned outage	4.143	70%	5.91
Sewer collapses	2.369	70%	3.39
Total pollution incidents	2.463	70%	3.52
Serious pollution incidents	1.138	70%	1.63
Discharge permit compliance	2.819	70%	4.03
Storm overflows	0.310	70%	0.44
Leakage	0.365	70%	0.52
PCC	3.751	70%	5.36
Business demand	0.365	70%	0.52
River water quality	0.00066		0.00094

They are based on the final values Ofwat issued in the ODI summary document (see appendix 3 of this [PR24: Using collaborative customer research to set outcome delivery incentive rates - Ofwat](#)).

Discounting is done via STPR as per the Green Book (3.5% for years 0 to 30). The base year (Y0) is assumed to be the PR24 base year of 22/23, meaning that year 1 of AMP8 (25/26) is Y3 for discounting purposes.

Each £m value across the 10 years of AMP8 + AMP9 are calculated as described above, and are discounted by the relevant amount each year.

	A	B	C	D	E	F	G	H	I	J	K
1	STPR Year	3	4	5	6	7	8	9	10	11	12
2	3.50%	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35
3	Discount Factor	=1/(1+A2)^B$1		0.841973	0.813501	0.785991	0.759412	0.733731	0.708919	0.684946	0.661783

The sum of the discounted values over the ten years is put into column AJ of table 15.

CWW17 - Accelerated programme expenditure - wastewater network+ and bioresources

This table is a Nil Return for Thames Water.

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

See Technical Appendix TMS20.

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

This table is a Nil Return for Thames Water.

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

Data Table	Whole Table or Individual Line/s	Commentary
CWW20	Line 13 - Cumulative shortfall in FFT addressed by WINEP / NEP schemes to increase STW capacity (l/s)	Additional detail: We have assumed that this line is concerned with reporting FFT increases as part of the AMP7 U_IMP5 programme, rather than drivers related to storm overflow reductions in AMP8. This assumption is due to the wording of the line i.e. the requirement to report the 'shortfall'.
	Line 19 - Total number of schemes with tightened / new P permits (met by biological treatment) Line 20 - Total number of schemes with tightened / new P permits (met by chemical treatment)	Detail Combined EBPR and chemical treatment: • Luton (East Hyde) STW – WINEP driver WFD_IMPm for P removal, delivery in 2027/28 • East Shefford STW – WINEP driver HD_IMP for P removal, delivery in 2023/24 • Fleet STW – WINEP driver WFD_IMPm for P removal, delivery in 2026/27

| Line 27 - Total number of schemes with new chemical dosing installations | Detail: | | | | | | | | |

	2022/	2023/	2024/	2025/	2026/	2027/	2028/	2029/
P Removal	0	2	43	15	4	3		
N removal	0							
Sanitary	0	2	2	1		1		
Chemicals	0							
Other	0							

Line 28 – Volume of chemical dosing installed

Detail:

	2022/	2023/24	2024/25	2025/26	2026/27	2027/28	2028/	2029/
P Removal		20	443	330	85	150		
N removal								
Sanitary		12.5	85	30		30		
Chemicals								
Other								

Line 29 - Total number of schemes with new tertiary solids removal

Detail:

	2022/	2023/	2024/	2025/	2026/	2027/	2028/	2029/
P Removal		2	34	10	4	3		
N removal								
Sanitary		4	1					
Chemicals								
Other								

Line 30 - Volume of water treated through tertiary solids removal

Detail:

	2022/	2023/24	2024/25	2025/26	2026/27	2027/28	2028/	2029/
P Removal		10368	231784	198188	75834	142358		
N removal								
Sanitary		55330	4908					
Chemicals								
Other								

Line 62 - Number of WINEP/NEP investigations - survey,

Detail:

	2022/	2023/	2024/	2025/	2026/	2027/	2028/	2029/

	WFD_MON_CHEM		5					

monitoring or simple modelling	
Line 63 - Number of WINEP/NEP investigations - multiple surveys and/or monitoring locations, and/or complex modelling	Detail: Table below

Detail:

	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	2029/30
U_INV	8							
EnvAct_INV4					152	302		
BW_INV1					1			

Line 13 - Cumulative shortfall in FFT addressed by WINEP / NEP schemes to increase STW capacity (l/s)	Consistency with APR23: We note in the Ofwat data table that CWW20.13 should be consistent with 'APR7D.26'. Since 7D.26 does not exist we assumed that this was error. Following audit it was discovered that Ofwat are likely to be referring to APR7E.9. This was discovered with insufficient time to edit our submission and therefore an inconsistency is present. 7E.9 reports 121.000 l/sec for 2022/23 whereas CWW20.13 reports 112.000 l/sec. This inconsistency relates to the difference in 'design' FFT increase (used for CWW20.13) and 'actual delivered' FFT increase (used for 7E.9).
Line 14 - Additional storm tank capacity provided at STWs – grey infrastructure	Consistency with APR23: We note in the Ofwat data table that no 'RAG 4 reference' is included for CWW20.14. Following audit it was discovered that a potential consistency should have been included with APR 7E.11 - Additional storm tank capacity provided at sewage treatment works (grey infrastructure). This was discovered with insufficient time to edit our submission and therefore an inconsistency is present. 7E.11 reports 816.400 m³ for 2022/23 whereas CWW20.13 reports 457.300 m³. This inconsistency relates to the difference in programmed project completion dates (used in CWW20.13) and project completion form sign-off dates (used in 7E.11).
Line 16 - Total number of STW sites where additional storage has	Consistency with APR23: We note in the Ofwat data table that no 'RAG 4 reference' is included for CWW20.16. Following audit it was discovered that a potential consistency should have been included with APR 7E.15 - Total number of sewage treatment works sites where additional storage has been delivered (grey

	been delivered	infrastructure). This was discovered with insufficient time to edit our submission and therefore an inconsistency is present. 7E.15 reports 4 for 2022/23 whereas CWW20.16 reports 0. This inconsistency is an error. CWW20.16 should link to CWW20.14. The correct value for CWW20.16 (2022/23) is 4.
	Line 17 - Number of STW sites where additional storage has been delivered with pumping	Consistency with APR23: We note in the Ofwat data table that no 'RAG 4 reference' is included for CWW20.17. Following audit it was discovered that a potential consistency should have been included with APR 7E.16 - Number of sewage treatment works sites where additional storage has been delivered with pumping (grey infrastructure). This was discovered with insufficient time to edit our submission and therefore an inconsistency is present. 7E.16 reports 4 for 2022/23 whereas CWW20.17 reports 0. This inconsistency is an error. CWW20.17 should link to CWW20.14 and CWW20.16. The correct value for CWW20.17 (2022/23) is 4.
	Line 41 - Surface water separation drainage area removed	Consistency with APR23: We note in the Ofwat data table that no 'RAG 4 reference' is included for CWW20.41. We assume that APR 7E.21 (Surface water separation drainage area removed) reports all projects where separation has occurred. The PR24 table guidance for CWW20.41 states that only separation delivered under WINEP storm overflow drivers should be reported. We have therefore reported 5,600.000 for 7E.21 (2022/23), as this was a non-WINEP driver and reported zero for CWW20.41 (2022/23).
	Line 23 - Total number of schemes with tightened/new sanitary parameter permits	Consistency with APR23: We note in the Ofwat data table that no 'RAG 4 reference' is included for CWW20.23. Following audit it was discovered that a potential consistency should have been included with APR 7E.22 Number of schemes delivered to meet tightened or new sanitary consents. This was discovered with insufficient time to edit our submission and therefore an inconsistency is present. 7E.22 reports 1 for 2022/23 whereas CWW20.23 reports 2. This inconsistency relates to the difference in programmed project completion dates (used in CWW20.23) and project completion form sign-off dates (used in 7E.22).
	Lines 9-77 excl 47	Data quality / confidence: • A1 – Sound records and high accuracy
	Line 1-8	Data quality / confidence: • A2 – Sound analysis (population forecast derived from externally produced data).
	Line 47	Data quality / confidence: • B2 –

CWW20a - Transition and accelerated programme - Wastewater network+ - Sewage treatment works population, capacity and network data

This table is a Nil Return for Thames Water.

CWW21 - Wastewater sewers; asset condition

As this is the initial utilization of the cohort analysis approach in our PR24 table submissions, it was not possible to use prior data for comparative analysis.

Data Inputs:

Collapse and Burst data:

Ofwat's requirements was to use data from a period of 5 years and if necessary, over 5 years. Thames Water (TW) has chosen to use 6 years of collapse data, as it improved the proportion of collapses that could be accurately linked to the responsible asset to enable cohort analysis. To align with AR data, we have used AMP6 method data for AR18, AR19 and AR20 and for AR21-23 we have used AMP7 methodology.

Our combined dataset totalled 2,400 collapses and bursts as per AR18 to AR23.

- AR23: 388
- AR22: 413
- AR21: 433
- AR20: 480
- AR19: 365
- AR18: 321

Asset Register (GIS):

Data infilling

Although TW's asset register contains fields for all the primary and some of the secondary variables, they have varying levels of completeness. For example, material is only recorded for 43.6% of the gravity sewers, whereas type is recorded for 99.9%

The poor data completeness for some of these variables, was leading to very large unknown cohorts.

To overcome these issues, some of the unknown values were infilled using surrogate data and the data infill process set out in the method statement.

For pressure mains (aka rising mains) the infill process that was recently developed for the Asset Health Insight project was utilised.

Ofwat's abbreviation codes didn't perfectly align to our asset register. So, it was necessary to match the OFWAT coding to the internal TW codes. For example, Thames Water's material code uPVCb was mapped to Ofwat's material code PVC.

The Asset register was filtered to only include live sewers and pressure mains that are maintained by Thames Water, based on an assumption that TW hasn't been repairing and reporting collapses on private assets.

Data Quality:

Sewer type	Accuracy band	Reliability band
"legacy" public sewers	3	B
S105A sewers	4	C
Sewage pumping mains	3	B

Length Uplift:

The asset register export used for this analysis contained 61,772km of gravity sewers. These were predominantly legacy sewers. To align to the annual reporting for sewer length under Table 7C Lines 16-22, and ensure cohorts had an accurate collapse rate, the same methodology was used to allocate the unmapped estimated lengths for ExS24 and S105a sewers.

This uplift was added proportionally based on the percentage of the total mapped length on each cohort. For example, if a particular cohorts accounted for 5% of the total mapped length, then it was apportioned 5% of the unmapped estimate.

Note that there is a significant uplift applied to the formerly private sewers (s105a) cohorts, as only 13% are currently mapped. This may affect the accuracy of the cohort analysis.

The 69km of S105a rising main that's currently mapped in TW asset register is normally applied to the 40,000km estimate for Table 7C Lines 22. In this analysis it was kept in the rising main cohorts. Therefore, the total rising main length in this analysis is 69km more than the 2,042km report under Table 7C Lines 19 for AR23.

Linking to asset:

A small number of unmatched bursts and failures couldn't be accurately matched to their responsible asset due to a lack of locational information collected during the failure and held in our records. It's likely that many of these failures occurred on Formerly private sewers (S105a) which haven't yet been mapped.

Of the total 2,400 records, 2,282 could be linked to their responsible assets to enable cohort analysis. The 118 (19.6 per year) that could not be linked consisted of 72 gravity sewer collapses and 46 rising mains bursts.

This will cause a slight divergence from the numbers reported for annual returns AR18-AR23 for table 7C lines 6-7 and the performance commitment CS02.

Asset Surveys:

As per Ofwat guidance we have used historic collapse and burst performance to grade sewers and have not used asset surveys such as CCTV.

In recent times, our survey programmes have been focussed on operational performance and sewers in the rail environment and so our latest CCTV data may not be representative of our complete sewer asset base.

Results Discussion:

Gravity sewers:

Ofwat's condition grading shifts almost every cohort into the grade 1. With very few cohorts average more than 12 collapses per 1,000km. This is to be expected, as TW has averaged a collapse rate of between 2.3-3.7 per 1,000km over the last 6 years.

Cumulative Avg Annual Collapses vs Cumulative Mains Length example
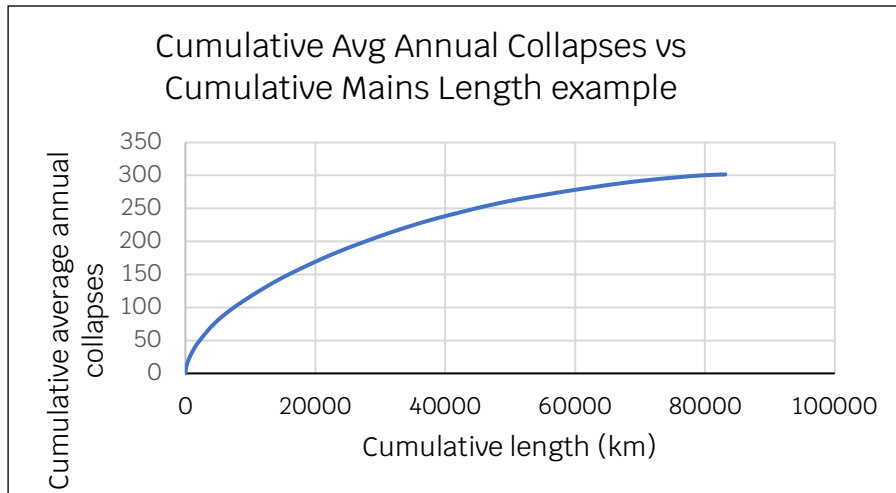
Pressure Main:

Ofwat's condition grading shifts almost every cohort into the grade 1. With very few cohorts average more than 125 burst per 1,000km. This is to be expected, as TW has averaged a burst rate of between 34 and 52 per 1,000km over the last 6 years.

Cumulative Avg Annual Bursts v Cumulative Mains Length example
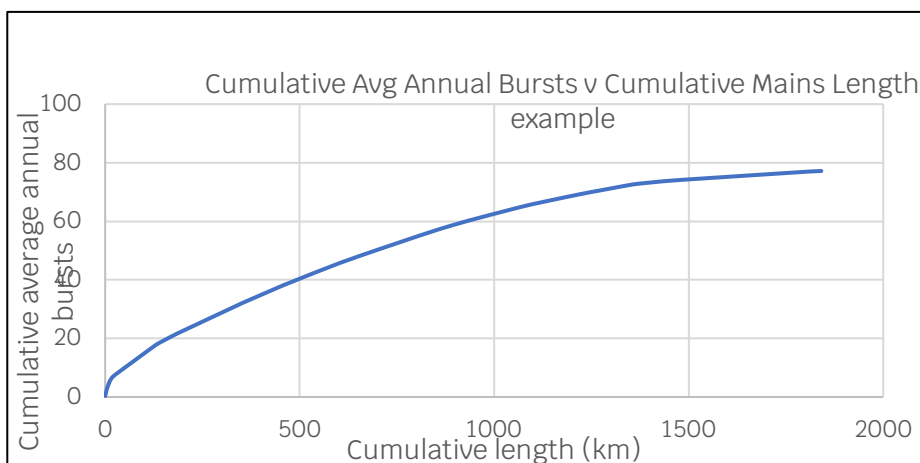
Bursts on rising mains can be more repetitive than gravity sewers as they are normally caused by a systemic mode of failure. As a result, there are small cohorts that have been pulled out of tolerance due to repeated failures on the same asset.

Primary Material	Primary Age	Secondary Age	Primary Pipe size	Secondary Pipe size	Sum of length (km)	Sum of bursts (over 6 year per)	Average annual bursts	Nominal expected bursts	Annual burst rate tolerance (+/-50% as f... as practical...)	Tolerance	Within tolerance	Average annual bursts 1000km	Grade	Rank
DI	1961 to 1980		320 to 450		18.6635099	11	1.83333333	1	-0.833333333	+/-50%	No	98.230898	1	10
PVC	1961 to 1980	1961 to 1970	smaller than 320	70 to 120	101.271863	35	5.83333333	2.5	-1.333333333	+/-50%	No	57.600731	1	24
GRP	1961 to 1980		larger than 610		3.006901249	10	1.66666667	1	-0.666666667	+/-50%	No	554.28048	4	2
Unknown	1961 to 1980	1961 to 1970	smaller than 320	70 to 120	71.67799956	42	7	2.5	-1.8	+/-50%	No	97.658975	1	11
Unknown	1961 to 1980	1961 to 1970	smaller than 320	120 to 160	131.2832636	49	8.16666667	2.5	-2.266666667	+/-50%	No	62.206457	1	22

Cohorts Outside of Tolerance:

These cohorts are related to re-occurring bursts which limits the option of creating another cohort to accommodate them within tolerance.

- DI: 7 out of 11 bursts are related to a series of failures caused by internal invert corrosion on the 450mm rising main serving London Road (Newbury) SPS.

- PVC: 16 of the 35 bursts occurred on the rising main serving Lower End (Caulcott) SPS.

- GRP: All 10 bursts occurred on the twin rising mains serving Store Road SPS.

- Unknown: 18 of the 42 bursts occurred on the rising main serving Wytham SPS.

- Unknown: Bursts on the small S105a rising main serving Brookside (Hoddesdon) SPS.

Soil Corrosivity/ Soil Fracture potential:

Soil corrosivity and soil fracture potential were not considered as variables in this analysis, and therefore, no data mapping was undertaken in relation to these factors in our methodology.

CWW22 - Wastewater - net zero enhancement schemes

Data Table	Whole Table or Individual Line/s	Commentary
CWW22	Whole Table	
	CWW22_1-7	The costs and operational GHG benefits of switching from CHP to biomethane production were evaluated using a bespoke in-house model. The model took into consideration the reduction in on-site electricity generation from CHP closure, the increase in biomethane production and export, process heating needs (either from biogas or electric heat pump) and the power demand of the biomethane plant. We have assumed that the Road Transport Fuel Obligation (RTFO) government incentive is not claimed because the Renewable Gas Guarantees of Origin (RGGOs) must be retained to meet the Performance Commitment. More detail is available in the Net Zero PR24 Bidding Case

	CWW22_8	Decarbonisation of life expired fleet. For this scheme the base costs of a like-for-like replacement of a fossil fuelled vehicle have been removed. For the purposes of the data tables, this scheme has been divided into a Water solution and a Waste solution and it has been assumed that should the bid be successful, then both solutions will be funded. Reductions in GHG emissions from this scheme were based on 2021/22 scope 1 and 3 transport emissions. The reduction in emissions was profiled in line with the capital spend for the project, which is based on the asset life expiry of existing vehicles, increases in electricity consumption from electric vehicles were considered. More detail is available in the Net Zero PR24 Bidding Case
	CWW22_9	The natural gas and electricity consumption changes from switching to hybrid heating solutions at the corporate offices was assessed by our facilities supplier and converted to GHG emissions using the CAW v17. For the low carbon heating solutions at site offices, a similar method was followed, but energy consumption data was scaled from a supplier quote. More detail is available in the Net Zero PR24 Bidding Case
	CWW22_10	The natural gas and electricity consumption changes from switching to hybrid heating solutions at the corporate offices was assessed by our facilities supplier and converted to GHG emissions using the CAW v17. For the low carbon heating solutions at site offices, a similar method was followed, but energy consumption data was scaled from a supplier quote. More detail is available in the Net Zero PR24 Bidding Case

Thames Water

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