Evidence against quality tests

Costs and efficiency

Right deal · Right now ·

South West Water

Bournemouth Water

Isles of Scilly Water

BRISTOL WATER

Contents

Introduction

This document summarises the approach we have taken to developing our cost proposals for our 2025-30 ('AMP8') business plan.

Our business plan is designed in conjunction with our customers to deliver improved outcomes which will benefit our customers and environment.

Extensive customer and stakeholder research and engagement has help us to develop outcomes focused across the following areas:

- Storm overflows and pollutions
- Drinking water quality and resilience
- Net Zero and environmental gains
- Customer affordability

These areas and associated targeted outcomes are set out in the Enhancement Business Cases which accompany this plan.

A key part of the development of our plan has been to ensure that our operations and outcomes are delivered efficiently and that they represent value for money for our customers. The more efficiently we run our operations and deliver our outcomes the lower we can keep customer bills.

Our costs are driven by both external market factors as well as operational activity driven factors:

- External market – the ongoing high levels of inflation that have been experienced across the country over the past 18 months also significantly influences our cost base. Whilst most costs have been impacted, some costs, notably energy, chemicals and certain construction material costs have increased at a significantly higher rate above general inflation.
- Operational activity – the ongoing operational needs of our business and the need for long term capital investment, driven by population growth in our region and the impact of tightening regulatory and legislative requirements designed to deliver environmental and service improvements for customers.

It is critical that we continue our drive to deliver operations and outcomes efficiently. We have included the expected cost reductions from the implementation of new innovations and best practice, including those derived from the integration of Bristol Water into South West Water.

In developing our plan, we have scrutinised our costs at several levels of aggregation, across the business, across the value chain, and on a cost specific basis. All elements of our plans and inputs (such as people costs, raw materials, third party contractors and energy) have been subjected to detailed challenge to ensure that they represent best value for our customers and for society as a whole. Our costs have been benchmarked against other companies based on Ofwat's cost models to ensure their efficiency and we have applied a significant forward looking productivity challenge related to new innovations and ways of working.

We have considered five key areas in putting together our plan to secure cost efficiency:

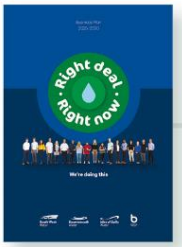
- our performance over 2020-25 ('AMP7'), both in absolute terms and benchmarked against our competitors;
- our forecast performance over AMP8, in particular the large investment plan which is necessary to meet the environmental challenges we face;
- cost adjustments specific to the South West Water and Bristol Water areas;
- affordability and deliverability; and
- best value for our customers, through internal and external benchmarking and third party challenge.

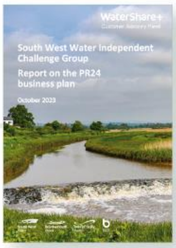
We believe that the costs included within our plan are at an efficient level and build on both the underlying efficiency delivered in the 2020-25 and the benefits of our decisions to reinvest those efficiencies back into the business. The efficiency targeted for 2025-30 equates to 4.5% per annum base cost reductions and 15% embedded efficiencies within the enhancement capital programme. Achieving these targets through innovation and synergies across our business will continue to ensure South West Water remains an efficient company through 2025-30.

What the base expenditure delivers is considered through our understanding of our own outcomes incentive performance and the "What Base Buys" industry analysis, with modelling undertaken for us by Oxera, which looks at industry performance trends on average and for the companies forming the upper quartile benchmark of efficiency. This analysis is set out in our *Outcomes* document. The analysis also considers the degree to which past industry enhancement affects the performance trends. We then link this to totex cost risk in the *Risk and Return* document.

Document Map

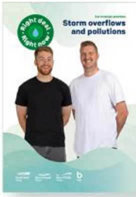
Level 1 • **Main documents**



Level 2 • **Our strategic priorities**

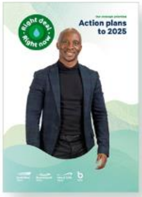
Water quality and resilience



Storm overflows and pollutions

Net zero and environmental gains

Addressing affordability and delivering for customers



Action plans to 2025

Level 3 • **Evidence against quality tests**

Risk and return

Outcomes

Long-term delivery strategy

Data, information and assurance

Costs and efficiency

Engagement and affordability

Track record of delivery

Level 4 • **Supporting documents and data table commentaries**

Deliverability and supply chain

Markets and competition

Enhancement business cases

What we have heard from customers and communities

Data table commentaries

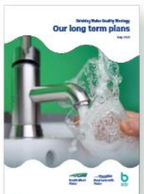
Strategic plans to 2050

Our Strategic Direction to 2050

South West Water Water Resources Management Plan

Bristol Water Water Resources Management Plan

South West Water Drainage and Wastewater Management Plan



Long-term Drinking Water Quality

Executive Summary

Key messages

- Our costs are relatively efficient overall. We have levels of performance equal to or better than our benchmarks in most areas. We have used detailed industry cost modelling to challenge forecasts across the value chain. Bottom-up evidence supports our forecast costs

- However, we are not complacent: where our performance falls behind the leading performers, we plan to improve our performance to benchmark, or better, over AMP8

- Our enhancement cost proposals have been developed in partnership with our supply chain, and we have used accelerated investment and transitional investment to ensure they are deliverable

- We have only made cost adjustment claims for atypical material costs only when supported by strong evidence

- We have confidence that the cost estimates are efficient and appropriate. We have identified the elements of enhancement that benefit base expenditure and adjusted our proposals. Most of our stretching outcomes are delivered from efficient base expenditure.

- We have undertaken an extensive Direct Procurement for Customers (DPC) assessment. The schemes we believe to be appropriate for DPC are the West Country Water Resource schemes, in particular Cheddar 2 reservoir where construction is planned to start in 2028 with operational use in 2035.

- We have realised synergy benefits from integration with Bristol Water. This will enhance further our efficiency position across wholesale water. Our industry-leading WaterShare+ mechanism is used for uncertain cost items

- Water sector costs have increased recently, due to input price inflation (such as energy), and also to meet challenging performance targets and improve our operational performance

Primary benefits of our plan

Our plan will:

- benefit the environment in our region. It will deliver vital improvements in storm overflows, will be consistent with our net zero commitments and has been tailored to conform to our WINEP, DWMP and WRMP. Further detail on our planned environmental improvements is contained in the sections on our capital expenditure programme below, especially those on our storm overflows, legislative obligations and net zero plans;
- be affordable. Despite our large capital investment programme, we are only projecting annual real term bill increases of c.£9 per month for South West Water area from 2024/25 to 2029/30 (c.£3 for Bristol and Bournemouth regions). We are also proposing significant additional help to customers having problems paying their bills;
- result in improved service, in line with expected price control targets. The investment we propose will enable us to improve further the quality of service we provide our customers. See our separate *Outcomes* document;
- build on the efficiency improvements achieved in AMP7 and achieve or exceed benchmark cost performance across the value chain by the end of AMP8. We are forecasting efficiency improvements in base expenditure of 4.5% per year and in the enhancement capital programme of 14% over AMP8. See our cost projections and the section on frontier shift below; and
- make our services more resilient. Our investment programmes to develop water resources and reduce our already low levels of leakage will make our services more reliable.

For more information see
Outcomes

Our plan is:

- consistent with feedback from our customers. We have undertaken an extremely extensive consultation programme, in which we have asked our customers what they want from us, and we have taken their feedback into account at every stage in the development of our cost proposals.
- forward-looking. Over AMP8, we plan to invest more than twice as much as we will invest over AMP7. We will continue this investment in the decades ahead to meet our Net Zero commitments, and ensure that customers have a reliable supply of high quality water and a clean environment;
- robust and efficient. We have subjected our cost proposals to rigorous internal and external assurance targeting benchmark performance, according to Ofwat's guidelines and best practice.

Investment summary

The table compares our forecast total expenditure ('totex') over AMP7 and AMP8.

Forecast gross wholesale totex over AMP8 compared to AMP7 – SWW

£bn	Base capex	Enhancement capex	Total capex	Opex	Totex	Base capex+opex
AMP 7	796.9	635.4	1,405.8	1,452.2	2,858.0	2,221.4
AMP 8	763.8	1,612.1	2,342.5	1,385.1	3,727.6	2,058.9
Difference	**(33.0)**	**976.7**	**936.7**	**(67.0)**	**869.7**	**(162.5)**

Forecast gross wholesale totex over AMP8 compared to AMP7 – Bristol Water

£bn	Base capex	Enhancement capex	Total capex	Opex	Totex	Base capex+ opex
AMP 7	178.6	49.9	228.5	373.6	602.1	549.8
AMP 8	223.1	187.3	410.4	394.3	804.7	611.4
Difference	**44.5**	**137.5**	**182.0**	**20.7**	**202.7**	**61.6**

NB The AMP7 and AMP8 capital expenditure totals include £52 million and £78 million respectively of accelerated Investment as agreed by Ofwat In June 2023. More Information on these projects Is contained in the section on accelerated Investment below.

Our enhancement capital expenditure programme for K9-12 is set out in detail in our Long-Term Delivery Strategy.

AMP8 to AMP9 investment programme

We undertook an investment optimisation exercise to determine which combinations of options, their scale and sequencing, are expected to meet our long-term targets for each ambition at least cost. To do this, we first identify the options and delivery profile needed to achieve our 'must-have' targets before allocating our residual investment allowance towards our remaining OPM targets. The output of this optimisation is our **least cost baseline plan**.

From the least cost baseline plan, we consider any incremental changes that we expect would realise wider benefits for customers, the environment and society as part of a 'best value' delivery approach.[1] This may reflect, for example, selecting delivery mechanisms which our stakeholders value most or bringing forwards options ahead of statutory requirements to realise benefits sooner. The outcome of this process is our **best value baseline plan**, which is then taken forwards for scenario testing.

Information on our best value and least cost plans, and the process for developing them, is contained in our document Long Term Delivery Strategy, which accompanies this document.

For more information see
Long-term delivery strategy

Having determined the least cost investment plan, we are considering any incremental changes that we expect would realise wider benefits for customers, the environment and society as part of a 'best value' delivery approach. The outcome of this process will produce options in the **best value enhancement plan**.

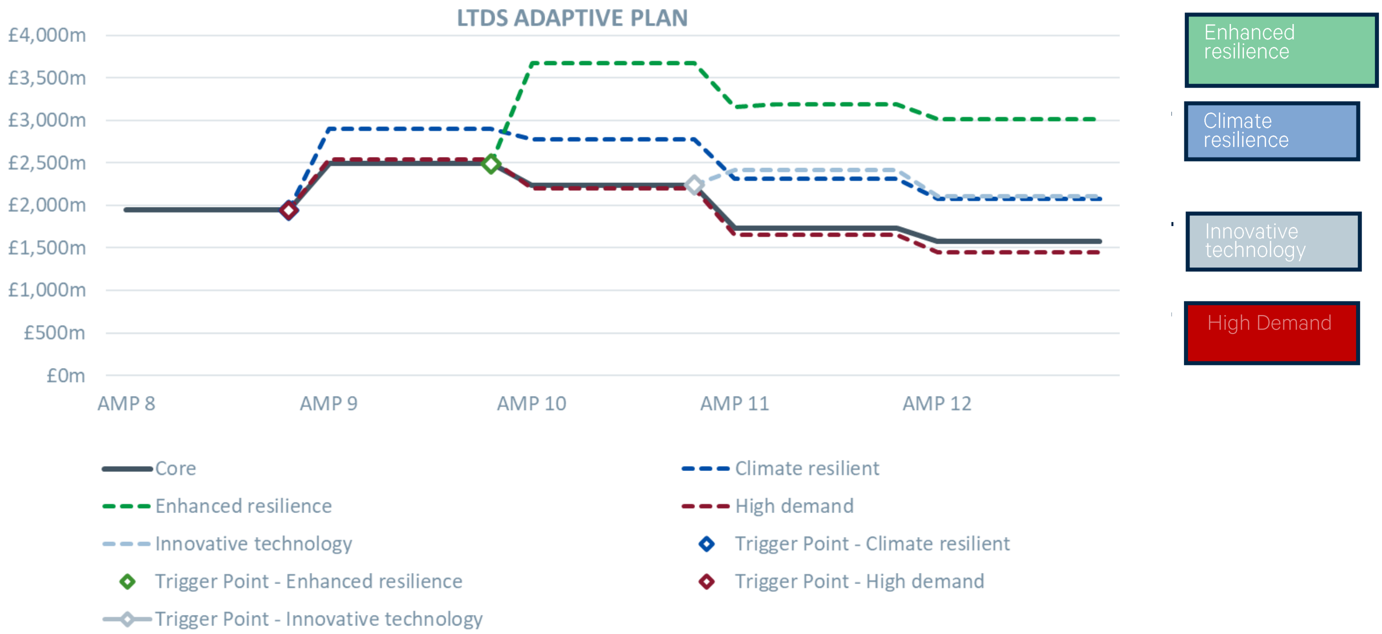
The core pathway

The core pathway is based on a 'most likely future' in which trends observed today continue out into the future, and it includes the investments that are most adaptable to plausible future states of the world (low/least regrets).

The core pathway shows the direction in the level of enhancements that will be required, and we forecast our core pathway to drive levels of enhancement investments in the region of £2.0bn per AMP, for the next fifteen years.

This is reflected in the step-up in enhancement investment in 2025-2030 and will continue over the long term to 2050. The earlier years of the long-term plan, up to 2040, are framed by the ambitions and obligations of government policies and of regulations. The latter years of the long-term plan, post 2040, offer scope for choice to be driven by future environmental plans and by changes in customers preferences.

[1] More detail on our best value planning framework may be found in our Long Term Delivery Strategy document which accompanies this business plan..



Cost confidence and efficiency

We can provide the most substantial assurance that the programme we present has been through a thorough review. That means that we understand the uncertainties surrounding the enhancement programme and are well placed to manage them through the delivery process.

We have also attempted to test the enhancement programme through analysis of:

- AMP7 cost and activity information within Annual Performance Reports and
- available information from WRMP and DWMP submissions.

Working with Oxera, we have looked for meaningful cost comparisons, though different circumstances between companies and the lack of AMP8 forecasts from other companies make such comparisons challenging. Where information has been available, it provides some additional confidence that our costs are efficient for the programme we face.

Linking cost to performance

We know that we need to ensure that we deliver lower costs through genuine efficiency, rather than at the expense of our level of service. As part of preparing for PR24 we have worked with Oxera to develop a more comprehensive "what base buys" methodology which we have used to understand performance trends for the industry and what our projected efficient costs will buy. More information on the improved outcomes which this increased expenditure will allow is contained in the *Delivering Outcomes for Customers* and *Risk and Return* components of our business plan.

Generally, we maintain our conclusion, supported by updated 2023 data as well as accounting for the impact of enhancement spend, that there is little scope for additional water performance improvements from historical levels of base expenditure. However, where there is evidence to support further stretch from base expenditure, we have included this in our targets before considering the overall outcomes risk balance and the impact from enhancement expenditure on performance commitments.

We agree with Ofwat that a 20 storm overflows average should be considered the base service level in 2024/25. We disagree with Ofwat that 0.4% mains replacement per annum is the correct base service level as this was based on a simple average – weighted by length of main across the industry suggests 0.3% p.a., which is also the level Bristol Water included at PR19, which formed part of the service level principle explored at the CMA. We therefore maintain this assumption as the level customers have funded historically. However, as we have lower mains length in PR19 than this level, we have not included in our cost projections.

We list the outcome levels we propose in our business plan in the Outcomes document of this plan. The chart below shows our high-level approach to establishing cost confidence.

Approach to cost confidence

Cost confidence

Systemised Approach

- Drawing on lessons learned from past projects and including avenues to challenge cost efficiency throughout delivery
- We have implemented a cost collection process since PR19 to gather elemental cost data to drive cost efficiency and elevate learning into future schemes
- Understanding regulatory drivers
- Reinstatement of the Concept Team
- Alignment of the processes and procedures between South West Water and Bristol Water

Culture

- Robust governance and controls
- Continuous improvement
- Cultural change
- Commercial acumen
- Innovation
- Technology
- Top-down review of overall work programme interdependencies and systems
- Bottom-up review of programme elements, sites, schemes, techniques, outcomes, costs, physical delivery

Governance

- Ground truthing – buildability and deliverability
- Investment leads reviewing interventions and utilising common template – CEDAR sheets
- Conncept team – challenging assessment of scope and outcome
- Costing methodologies – audited by KPMG – completed
- Deep-dive cost model audit – independent review through third party assurance process audited by KPMG – completed
- CEDAR = Cost Establishment and Data Acquisition Review

Benchmarking/Estimating

Hierarchy of cost data to be used as follows:

1. SWW Cost Models Process Level
2. SWW Cost Models Element Level
3. Rates, quotations or estimates from Framework Agreements
4. Other published cost data TR61 or data from cost managers' own systems
5. First principles estimating

Items 1&2 understanding the cost challenges of how these vary over time, inflation, disruption, loss of suppliers, BREXIT, Ukraine, etc.

Frontier shift of efficiency and real price effects

Frontier shift and real price effects are closely interlinked with each other. Forecasters generally base real wage growth projections on labour productivity growth. Overall, we are assuming a net ongoing efficiency improvement rate (frontier shift less RPE) of 0.5% per annum.

We have reviewed the evidence for the frontier shift of efficiency and believe it has a central estimate of 0.5%, within a central range of 0.3% to 0.7%.

We recognise that this frontier shift assumption is below the 1.0% p.a. that the CMA used in its redetermination of PR19. However, the CMA's redetermination also allowed for a labour RPE of 0.5%[2] (with a true up), resulting in a net ongoing efficiency assumption of 0.5%. Supporting evidence for this assumption is in the Economic Insight report [Productivity and Frontier Shift at PR24 – 5 April 2023].

We also recognise that we have not in this estimate made any explicit, additional assumptions for the benefits from the Innovation Fund. We believe our assumptions are appropriate and supported by evidence however, as there is currently no clear roll out from the innovation fund, and from our perspective the innovations we have identified are built into our base costs and are absorbing both base and enhancement delivery risk and cost pressures.

We have included a profile of energy costs within our cost projections, based on expert market forecasts, alongside a projection of 0% real growth above CPIH in labour costs. We propose in our Risk and Return plan that these assumptions are linked to adjustment mechanisms.

[2] Source: CMA PR19 appeal (paras 4.20, 4.655, 4.700-4.701): OBR wage forecast of 1.2% x 39% labour cost share = 0.468%

Table: Comparison of AMP8 forecast and modelled costs

% cost change p.a. 2025-2030 (above/below CPIH)	Low	Central	High
Energy	+3.5%	0% (average of profiled future cost changes)	-3.5%
Labour	-0.7%	0%	+2%
Chemicals	-0.2%	0%	+2%
Materials	-0.2%	0%	+1.5%
Frontier shift	0.1%	0.5%	0.9%

Summary of base cost efficiency evidence

The base costs in our plan have been tested against the upper quartile level of efficiency measured by updated efficiency modelling based on 2022/23 APR data. This analysis suggests our cost forecasts remain efficient overall. Cost efficiency and cost forecasts have been anchored on detailed operational and engineering need, benchmarked to external information wherever possible. This has then been further challenged based on top-down cost models. Our extensive consideration and rationalising of Cost Adjustment Claims formed part of this systematic process.

Table: Comparison of AMP8 forecast and modelled costs

Cost by service area (£m)	AMP8 forecast £m	AMP8 modelled costs £m
Water base costs (including network reinforcement)	1,192	1,292
Wastewater base costs (including network reinforcement, sewer flooding and STW growth)	759	785
Bioresources base costs	141	185
Residential retail	234	264
AMP8 total	**2,325**	**2,526**

We have also undertaken sensitivity testing based on the different model specifications that we have proposed through the response to the cost modelling consultation. We set out our views and the impact this has on cost estimates in Annex A.

The build up of our forecast of wholesale base efficiency assumes the following:

Cost item	AMP8 forecast (£m)	AMP8 modelled cost (£m)
Modelled Base allowance	2,223	2,406
Unmodelled costs	303	303
Our Cost adjustment claims	69	69
STW growth	33	50
AMP8 total	**2,628**	**2,828**

Our estimate of efficient total base cost allowances, including adjustments from cost adjustment claims and other Ofwat modelling, such as for STW growth, are shown above. The analysis suggests we will be c£200m efficient and at or better than the upper quartile level of efficiency in all expenditure areas.

We have updated our initial submission cost adjustment claims approach,[3] in addition updating the claims for 2022/23 APR data. The detail of these claims and the supporting evidence are in an Annex and supporting files that accompany this document. [PR24 Cost adjustment Claims – Final submission – October 2023]. The claims remain material and the basis of our claims and supporting evidence are substantially unchanged from the initial submission. The claims remain in summary:

- £11.5m for the canal purchase costs (BRL)
- £12.1m for base leakage costs beyond the upper quartile (BRL)
- £45.8m for raw liming, using two different ~~a~~ modelling approaches (SWB).

Unmodelled costs

We have forecast that our EA charges will remain constant in real terms over AMP8. Business rates costs will increase with the expected rates revaluations due in 2026 and 2029. We set this out later in this document.

Cost sharing rates

Our plan assumes:

- Wholesale totex cost sharing rates of 50%. We use 60% for the calculation of Price Control Deliverables as per Ofwat guidance, although we disagree with this assumption so also show the impact of using 50% for information
- A cost sharing rate on wholesale business rates and EA abstraction charges of 75%

More details are set out in our *Risk and Return* document.

For more information see
Risk and return

Strategic water resource costs

Our plan includes £63m for the progression of Cheddar 2, Poole and Mendip Quarries through the relevant Rapid gateway process and project development cost prior to DPC. £33m of this expenditure is on Cheddar 2, with the inclusion of costs relating to land, planning and procurement for Gate 4 in January 2026, planning and procurement ahead of construction commencing in 2030, and completion of the reservoir for operational use in 2032 to 2033. Consistency across the West Country Water Resources plan now sees the water entirely allocated to South West as a transfer between the Bristol and South West/Bournemouth areas.

Summary of enhancement opex

We forecast incurring £62.6m of enhancement opex over AMP8 relating to additional operating costs as a direct result of enhancement expenditure, for example additional chemical dosing where P removal consents become more stretching. See the section on operating expenditure below for a breakdown of our forecast enhancement expenditure, and the enhancement business cases for more detail on the enhancement opex forecast by project.

Third party funding

Sometimes water companies receive funding for investment or operating expenditure from third parties, such as government or voluntary organisations. Over AMP7, we received £10.1m in such funding for the Nature for Climate Peatland Grant Scheme in AMP7, of which £9m came from Defra. We are not currently assuming any such funding for AMP8, though we will seek out and pursue appropriate opportunities as they arise.

Summary of enhancement cost adjustment claims

For enhancement cost adjustment claims we provide an assessment of where enhancement costs are above historical levels used in base modelling in each enhancement cost business case, and where there is a best value rather than least cost approach during 2025-2030. We have not identified any such claims for AMP8. As we do not know what models Ofwat may use for enhancement modelling, and the scale of the enhancement investment programme across the industry is likely to be much higher than in recent reviews, it is possible that evidence for enhancement cost adjustment claims could arise later in the PR24 process.

3 Where appropriate we have also updated the proposed methodology to account for companies' responses to the base cost consultation, e.g. on the form of the bioresources modelling.

Summary of net zero investment

We include in our base costs projections for our cost of achieving net zero through base operations. Customers did not support funding base cost net zero investment, observing that despite the higher cost of electric vehicles, other companies were absorbing these increases through lower base operational costs. We make the same assumption (although note it is consistent with our assumption of a lower frontier shift of 0.5% vs 1.0% the CMA used at PR19).

We have not included any net zero enhancement schemes, as we do not have sufficient scale of opportunities within the framework Ofwat have set. We will consider instead commercial opportunities without recourse to customer funding, to meet our net zero objectives, at least for AMP8. We will achieve this by increasing our energy efficiency programme, championing renewables and exploring opportunities to reverse carbon emissions.

Bioresources cost and efficiency

SWW requires a transformational approach to its legacy bioresources asset base to meet the requirements of increased sludge yield and new regulations and meet the needs of a sustainable, resilient, efficient outlet for the next 25 years.

The investment case will support this approach and draw upon a number of different drivers:

- Base Investment to maintain the existing asset base and sludge throughput;
- Growth Investment to meet the needs of projected population growth;
- Quality Investment to meet the needs of the changes to legislation governing the recycling of sewage sludge to agriculture;
- Quality Investment to meet the needs of Increased sludge yields resulting from the WINEP Investment programme;
- Investment required to meet the needs of reducing the carbon emissions associated with the operation of SWW asset base; and
- Investment to unlock operational efficiency.

Developer services

Water network reinforcement in the South West area is expected to increase to c.£2m a year due to increased NAV activity.

In the Bristol area network reinforcement expenditure is expected to reduce as major NAV connections are happening during AMP7, with an ongoing run rate of c0.65m p.a.

Non-price control water requisitions in the Bristol area are expected to reduce by c.50% over AMP8 from AMP7 due to increased NAV activity and lower property connections in general. The South West area shows a smaller reduction due to lower NAV penetration and higher growth.

Network reinforcement on wastewater increases to a peak of c.£7m in in 2025/26 and is then stable at c£5m p.a.

Non-price control wastewater requisitions are stable at c.£4m p.a.

Retail costs and efficiency

We note that, based on our modelling:

- SWW is cost efficient on retail (ranking 1st)
- BRL has significantly improved its cost efficiency on retail. Its ranking has risen from 11th over the last five years to 5th over the last two years.

With relatively little scope for catch-up efficiency, we forecast that the costs of our retail business as a whole will increase slightly in real terms over AMP8.

Costs are increasing due to expected increases in doubtful debts as a result of higher bills mitigated by expansion of our affordability toolkit and social tariffs.

Forecasts for expenditure over AMP8

We forecast wholesale total expenditure of £4,298.8m billion over AMP8, and retail expenditure of £234m, disaggregated as shown in the table below:

Table: projected AMP8 gross total expenditure by price control

£m	2026	2027	2028	2029	2030	Total AMP8	Total AMP7	Difference
Water resources	40.9	37.6	42.9	62.3	71.3	255.0	241.2	13.8
Water network plus	251.4	248.5	249.7	253.5	229.3	1,232.5	1,159.0	73.5
Wastewater network+	307.4	350.1	408.2	381.9	394.6	1,842.3	1,177.0	665.2
Bioresources	48.8	62.1	43.2	40.7	33.2	227.9	126.2	101.7
Retail	46.3	46.1	46.5	47.0	47.7	233.6	212.4	21.2
Bristol water resources	16.5	16.9	16.4	16.5	16.6	82.8	81.0	1.8
Bristol water network+	120.0	132.4	143.1	131.5	131.3	658.3	463.3	195.0
Grand Total	**831.3**	**893.6**	**950.0**	**933.4**	**924.0**	**4,532.4**	**3,460.1**	**1,072.3**

Our investment plans

Our business plan will benefit from the underlying efficiencies delivered in AMP7. Following external benchmarking we are forecasting to deliver further efficiency in totex.

Overall, our operational costs for 2025-30 are consistent with our PR19 allowances and include specific uplifts for certain areas such as power and business rates where we have evidence of an expected change in cost level.

Given the size of our programme and its direct impact on bills, we are challenging ourselves to achieve cost efficiencies of around £600m over 2025-30 with £300m coming from our ongoing operational costs and around £300m from our elevated capital programme.

In addition, we have factored in a 0.5% frontier shift for further innovations and efficiencies compared to base cost assumptions used at PR19 (frontier shift less real price effect).

Whilst we continue to drive for more efficiency, there are inevitably cost pressures which arise from macro-economic factors, customer growth, changes in delivery or legislative requirements. When considering the factors to reflect within our business plan base operating costs, we have considered the timing, value and likelihood of these costs arising, and where necessary, have obtained third party evidence for the costs. These costs include:

- Costs associated with new capital schemes delivering outcomes and customer growth
- Energy costs, where we have seen particular volatility in global markets
- Price increases above inflation; business rates where valuations are happening every 3 years

We have identified certain costs which we believe are uncertain due to aspects, such as legislation or timing of implementation. We are identifying these to be included within the WaterShare mechanism for 2025-30.

Our approach to our cost proposals

Our high-level approach to our cost proposals has been to:

- engage with our customer base to determine their priorities and the best ways to deliver them;
- continue to seek to deliver ongoing total expenditure savings in AMP;
- focus on key initiatives such as:
- storm overflows, our largest single investment project over AMP8
- energy efficiency and renewable generation;
- optimising the structure and processes in our business to deliver an efficient service;
- promote innovative solutions for totex delivery; and
- exclude factors that are uncertain and consider whether uncertainty can be managed better through specific mechanisms such as WaterShare+, ensuring customers do not pay for these risk areas before they happen.

In developing our plans, we have scrutinised our costs at several levels of aggregation:

- across the business,
- across the value chain, and
- on a cost specific basis.

We have subjected all elements of our plans and inputs (such as manpower, raw materials, third party contractors and power) to rigorous challenge, and amended our forecasts as appropriate.

Historical Performance

During the first two years of the period South West Water delivered significant cost efficiencies covering both operational and capital expenditure. Like all companies the recent high levels of inflation particularly in energy, chemical and construction material costs has resulted in these early underlying efficiencies being eroded.

Despite these external market driven cost pressures, South West Water will continue to drive for efficiency in the remaining years of this period to ensure we start 2025-30 in an efficient place. Our key underlying efficiencies include:

- Our new strategic capital delivery alliances providing efficient and competitive delivery of our capital programme
- Integration benefits from the merger of South West Water and Bristol Water, including economy of scale and removing duplication
- Delivering continued operational improvements and efficiencies, in particular optimising chemical usage through enhanced site management and sharing best practice between Bristol and South West Water

SWB has had a leading efficiency position on water and this has remained broadly consistent over time. BRL has been improving on water service efficiency, and effectively the CMA determination (with the benefit of additional years of data and the service cost relationship established for leakage) found the AMP7 proposed costs to be at the upper quartile of efficiency. The historical inefficiency of BRL has improved and will continue to improve as less efficient years prior to AMP7 are removed. The merger also provides further efficiency and innovation impetus, the benefits of which we set out in the Risk and Return document.

Service levels have also overall been positive. Where there have been performance challenges, these are not outliers. We set out our extensive "what base buys" analysis in the Outcomes and Risk and Return documents. On the key aspects that matter to customers, leakage performance remains strong in both BRL and SWB. Supply interruptions see SWB as a consistent performer (excluding unavoidable third party events that would not be cost efficient to avoid), with the adverse peaks that historically affected BRL improving over time, with leading performance in some years. Most importantly customer response to the events has been resilient, even in adverse circumstances. On wastewater, SWB efficiency has been broadly stable and where there is an efficiency gap, we expect future cost changes and efficiencies to narrow any gap to the upper quartile. There are aspects of leading performance such as on internal flooding, and higher costs to recover environmental performance in this period is not something we repeat and expect customers to pay for. Therefore, we have every reason to believe our forward looking costs on all service aspects will be efficient at PR24. There are deliverable efficiencies set out in our plan consistent with this view.

The tables below summarise the current capital and operating cost assumptions, split between base and enhanced.

Table: total expenditure over AMP7 – SWW

£bn	Capex	Opex	Totex
AMP7 allowed	1,025.8	1,063.3	2,089.2
AMP7 forecast	1,405.8	1,452.2	2,858.0
Difference	**289.7**	**381.0**	**668.8**

Table: total expenditure over AMP7 – Bristol Water

£bn	Capex	Opex	Totex
AMP7 allowed	219.3	312.2	531.6

AMP7 forecast	228.5	373.6	602.1
Difference	**9.2**	**61.4**	**70.5**

Our projected totex over AMP7 is c.£340m higher than our AMP7 allowance. This is mostly driven by higher than expected energy prices, our response to the drought experienced in 2022/23 and additional commitments made to accelerate improvements to the environment through our WaterFit programme.

Efficiency

In our PR19 business plan, we committed to delivering efficiency savings in operating costs of 3% per annum over AMP7, compared with 2.5% in the PR14 control, and 5% in the operating costs of the capital programme over the same period, compared with 5.5% for PR14[4].

In the first two years of AMP7 alone, we have made £78.6 million[5] of efficiency savings over and above those allowed in the price control, representing about 6%[6] of allowed expenditure over this period.

Below we set out our recent cost efficiency performance in context, by examining our performance since the 2015-2019 period, which was the efficiency assessment period at the PR19 FD. We assess our efficiency over five-year periods as per Ofwat's cost assessment approach. In order to provide a profile over time we examine our performance using a rolling average.

Since AMP6, we have remained as efficient, or become more efficient on three of the four service areas, with the exception of wastewater, where our relative efficiency position has slightly deteriorated.

We are putting in place measures to address deterioration in this function, however, in two ways in particular. Firstly, through continuing to invest in technology: for example, we have monitoring coverage at 100% of our overflows and these EDMs are used to identify early insights into potential network issues and pollution risks. In a high technology future we see this technology investment continuing and we have assumed a 20% efficiency in long-term base maintenance costs from 2040 as a result. Conversely, where technology permits the industry to achieve a lower limit for Phosphorus reduction, we have assumed this would become a new driver under WINEP and we have estimated the investment needs accordingly from 2040. In a low technology future, which underpins our preferred plan, we assume the cost efficiency in network management is realised in 2045 and that technology does not advance sufficiently quickly enough to impose tighter treatment requirements before 2050.

The second main way in which we plan to increase our efficiency in wastewater is to improve our processes for procurement working closely with our existing and new partners to optimise delivery. More information on our plans in this area is contained in the section on deliverability below.

Water

Over the entire period, SWW is estimated as the third most efficient company on water services, being more efficient than the upper quartile. BRL's ranking has improved significantly in the last two years. The resultant improvement in cost efficiency is evident when examining BRL's performance over the period 2022-2023: BRL is assessed to be the upper quartile company, i.e. ranked 5th. Moreover, this ranking is a lower bound estimate as it is estimated prior to accounting for BRL's two CACs, CRT and leakage. We are planning to continue to drive further efficiency improvements over AMP8 with our planned spend being set below the prediction benchmark cost level.

Table: SWW and Bristol estimated efficiency ranking for water

	2015-19	2016-20	2017-21	2018-22	2019-23
SWW	3	3	3	3	3

[4] PR19 cost efficiency section, SWW business plan
[5] 21/22 APR table 4c lines 15.
[6] Allowed totex of about £1,400 million –.

Bristol	13	11	13	13	12

NB Bristol's performance has improved to 5th place in the last two years.

Retail

On retail, SWW's efficiency position has significantly improved, from being 9th to being the most efficient company to date. While BRL's position has worsened in a five-year efficiency window, this is again not representative of more recent expenditure and is entirely driven by poor performance in 2019 (investment in transforming long term customer services, now reflected in high C-MEX performance and the number one water company in the UK Customer Services Index in July 2023) and during the first year of COVID (bad debt provisioning). Indeed, if we look at BRL's efficiency position over the last two years only, as for water above, BRL is assessed to be the upper quartile company, i.e. ranked 5th.

The table below shows our estimated efficiency ranking for retail between 2015 and 2023.

Table: SWW and Bristol estimated efficiency ranking for retail

	2015-19	2016-20	2017-21	2018-22	2019-23
SWW	9	5	1	1	1
Bristol	5	8	10	10	11

NB Bristol ranked 5th 2022 and 2023

Wastewater

As mentioned above, while our efficiency position initially improved over 2016-2020 and 2017-2021 compared to the five-year period considered at the time of PR19 FD, this trend has reversed over the last two years. We have put in place a plan to improve efficiency in our wastewater operations. The additional expenditure in this period is not repeated in our forward cost projections as it reflects a recovery of performance in base expenditure.

Table: SWW estimated efficiency ranking for wastewater

	2015-19	2016-20	2017-21	2018-22	2019-23
SWW	6	4	4	5	8
Bristol	-	-	-	-	-

Bioresources

On bioresources, SWW has also improved over time, from the seventh to the fifth most efficiency company to date. However, as indicated in our initial and updated CAC report, this inefficiency is entirely driven by the non-consideration of our unique circumstances regarding the restricted choice of our sludge treatment technology. This is evident when raw liming/AD is accounted for in the modelling since we are then assessed as the second most efficient company.

Table: SWW estimated efficiency ranking for bioresources

	2015-19	2016-20	2017-21	2018-22	2019-23
SWW	7	7	6	6	5
Bristol	-	-	-	-	-

In summary, our focus on efficiency, including driving improvements through our merger with Bristol Water, has resulted in:

- SWW being consistently efficient on wholesale water (ranking 3rd) and efficient on retail (ranking 1st).
- BRL improving its efficiency on water and retail (while ranking 12th and 11th, respectively, over the last five years, its performance has improved more recently, as is evident in its rankings of 5th in both cases in the last two years).

We are not complacent, and we are aware that there is more work to be done in some areas. We plan to improve our performance in wastewater (8th), and bioresources (5th). The additional expenditure in this period reflects performance recovery and is not repeated in future cost projections. Business transformation to reduce costs is underway. See our investment plans for how we plan to improve in these areas.

We have updated our relative efficiency position in the PR19 enhancement models, where possible.

For water services, SWW's metering performance has improved from 16th to 13th. This reflects the efforts we have expended in increasing metering across the south west. Additionally, BRL's performance score has improved despite falling one rank to 6th (BRL's efficiency score is just 2% behind that of the UQ company).

In wastewater enhancement, SWB has maintained its industry leading performance in P-removal, ranking 1st. Our ranking has also been maintained in FFT at 4th, but with a significant efficiency improvement from 94% at PR19 to 66% based on AMP7 performance. Spill frequency is an area of continued focus with an efficiency ranking of 6th.[7] Although the existing performance in storm tanks suggests the current ranking is 11th, we believe this is due to the nature of the programme and based on the limited public available from the Drainage & Wastewater Management Plans (DWMPs), our forecast costs based on the significantly larger AMP8 programme appear to be efficient, confirming the results of our own benchmarking and cost confidence work. There is significant uncertainty as to how storm overflow enhancement efficiency will be assessed at PR24, given the mix of grey and nature-based solutions suggested. Given this we explore in our *Risk and Return* document how this uncertainty on efficiency assessment and delivery cost could be mitigated.

Forecast totex AMP8

Our business plan will benefit from the underlying efficiencies delivered in 2020-25. Following external benchmarking we are forecasting to deliver further efficiency in totex.

Overall, our operational costs for 2025-30 are consistent with our PR19 allowances and include specific uplifts for certain areas such as power and business rates where we have evidence of an expected change in cost level.

Given the size of our programme and its direct impact on bills, we are challenging ourselves to achieve cost efficiencies of around £600m over 2025-30 with £300m coming from our base costs and around £300m from our enhancement capital programme.

In addition, we have factored in a 0.5% frontier shift for further innovations and efficiencies compared to base cost assumptions used at PR19 (frontier shift less real price effect).

Whilst we continue to drive for more efficiency, there are inevitably cost pressures which arise from macro-economic factors, customer growth, changes in delivery or legislative requirements. When considering the factors to reflect within our business plan base operating costs, we have considered the timing, value and likelihood of these costs arising, and where necessary, have obtained third party evidence for the costs. These costs include:

- costs associated with new capital schemes delivering outcomes and customer growth
- energy costs, where we have seen particular volatility in global markets
- real price increases above inflation; business rates

We have identified certain costs which we believe are uncertain due to aspects such as legislation or timing of implementation. We are identifying these to be included within the WaterShare mechanism for 2025-30.

The table below compares our forecast total expenditure ('totex') over AMPs 7 and 8.

Table: wholesale totex over AMP8 compared to AMP7 forecast – SWW

£m	Base capex	Enhanced capex	Total capex	Opex	Totex	Base capex+ opex
AMP7 forecast	770.4	635.4	1,405.8	1,452.2	2,858.0	2,221.4
AMP8	730.4	1,612.1	2,342.5	1,385.1	3,727.6	2,058.9
Difference AMP7 f'cast vs AMP8	**(40.0)**	**976.7**	**936.7**	**(67.0)**	**869.7**	**(162.5)**

Table: wholesale totex over AMP8 compared to AMP7 forecast – Bristol Water

£m	Base capex	Enhanced capex	Total capex	Opex	Totex	Base capex+ opex
AMP7 forecast	178.6	49.9	228.5	373.6	602.1	549.8
AMP8	223.1	187.3	410.4	394.3	804.7	611.4

[7] Although this must be caveated as the data of two companies (HDD and TMS) is not available for comparison.

Difference AMP7 f'cast vs AMP8	44.5	137.5	182.0	20.7	202.7	61.6

Base capital expenditure, at approximately £0.95m forecasts in the same price base. The enhanced capital programme of around £1.8 billion for AMP8 is around three times the AMP7 forecast with detail in the section on our capital expenditure plans below.

The table below splits our projected AMP8 operating expenditure by price control.

Table: projected AMP8 gross operating expenditure by price control – total

	2026	2027	2028	2029	2030	AMP8
Water Resources	21.4	21.2	21.2	21.2	21.2	106.2
Water Network+	99.7	101.5	105.2	108.9	110.0	525.3
Wastewater Network+	93.4	91.6	90.5	89.9	97.4	462.8
Bioresources	24.2	23.9	24.4	24.2	24.2	120.9
Bristol Water Resources	12.3	12.8	13.1	13.4	13.5	65.0
Bristol Water Network+	51.9	52.5	53.1	54.1	54.0	265.7
Retail	46.3	46.1	46.5	47.0	47.7	233.6
Total	**349.3**	**349.6**	**353.9**	**358.7**	**368.0**	**1,779.4**

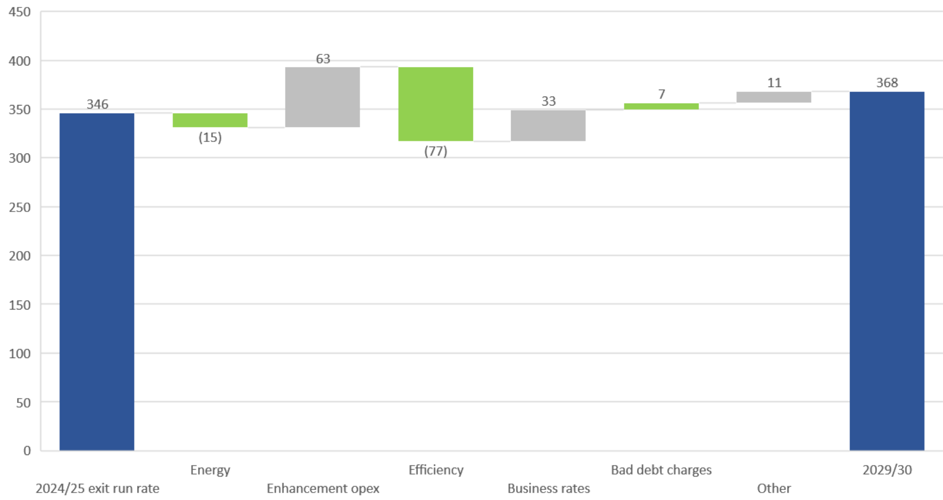
Table: projected AMP8 gross operating expenditure by price control – base

	2026	2027	2028	2029	2030	AMP8
Water Resources	21.4	21.2	21.2	21.2	21.1	106.1
Water Network+	97.3	98.7	101.6	104.8	105.5	507.9
Wastewater Network+	90.6	87.4	84.2	80.2	83.2	425.6
Bioresources	24.2	23.9	23.8	23.6	23.5	119.0
Bristol Water Resources	12.3	12.8	13.1	13.4	13.5	65.0
Bristol Water Network+	51.0	51.5	51.9	52.7	52.6	259.7
Retail	46.3	46.1	46.5	47.0	47.7	233.6
Total	**343.2**	**341.6**	**342.1**	**342.9**	**347.1**	**1,716.8**

Table: projected AMP8 gross operating expenditure by price control – enhancement

	2026	2027	2028	2029	2030	AMP8
Water Resources	0.0	0.0	0.0	0.0	0.1	0.1
Water Network+	2.4	2.8	3.6	4.1	4.5	17.4
Wastewater Network+	2.8	4.2	6.3	9.6	14.2	37.1
Bioresources	0.0	0.0	0.6	0.6	0.7	1.9
Bristol Water Resources	0.0	0.0	0.0	0.0	0.0	0.0
Bristol Water Network+	0.9	1.0	1.2	1.4	1.4	6.0
Retail	0.0	0.0	0.0	0.0	0.0	0.0
Total	**6.2**	**8.0**	**11.7**	**15.8**	**20.9**	**62.6**

The chart below shows the annual change in operating costs between 2024/25 and 2029/30. Specific increases reflect the real additional costs (in 2022/23 prices) before the impact of inflation.



Key movements are discussed in more detail below.

Energy

AMP8 energy consumption driver forecasts

The key drivers of changes in our energy consumption are outlined below, and summarised in the table below:

- **base consumption** – increasing due to population growth and assumed degradation of assets over time
- growth in energy consumption from **additional capital schemes**, the largest being desalination and the north Devon pipeline
- **renewables deployment** – roll out of SWW PV and other existing plans, not including the Pennon investment
- **energy efficiency projects** – including pump and blower replacement strategy over and above the current run rate.

Table: Projected energy consumption, 2023-2030

	Units	2023	2030	Change	%
Base consumption	Mwh	403.7	426.7	23.0	5.7%
Impact of capital schemes	Mwh	0	117.3	117.3	-
Renewables	Mwh	(16.8)	(58.7)	(41.9)	249.4%
Efficiency	Mwh	0	(21.2)	(21.2)	-
Total grid import consumption	**Mwh**	**386.8**	**464.1**	**77.2**	**20.0**

For energy price assumptions, we have used those set out in table below, based on BEIS forecasts.

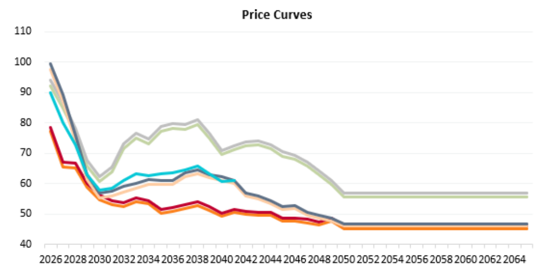
Table: Forecast energy price inflation, 2025-2030

	2025	2026	2027	2028	2029	2030
Energy price inflation	-11%	-11%	-5%	0%	1%	-1%

AMP8 Energy price forecasts

The chart below shows the forecast energy prices, based on an average from a range of external providers including Cornwall Insight and Baringa estimates between May and August 2023.

These show the combined wholesale and non-commodity price. The wholesale AMP8 assumption is approximately c.£80/MWH on average.



Business rates

Business rates are charged on non-domestic properties such as offices and factories. Cumulo rates refer to rates on land and buildings where operating assets are held (eg a water treatment works). Following Ofwat, we use the term business rates collectively to include both business rates and cumulo rates. Ofwat recognises that companies have limited control over their business rates, and therefore applies a 75:25 (customer:company) cost sharing factor to the allowances it sets.

The most recent review of business rates was implemented for the 2023/24 financial year, delayed because of the pandemic. The Government has signalled that the next revaluations will take effect in 2026 and 2029[8].

In order to develop the costs in our plan, we received advice from our external rating advisors and also considered the impact of the 2023 revaluation on our current rates bill. The two key factors which impact the rates bill are:

- the underlying universal business rate (UBR) was frozen between 2021 and 2024 but may increase by CPI in the future; and
- the assumed valuation of wastewater assets or changes in the approach to the water cumulo calculation could increase the rateable value and therefore the annual rates bill.

Water cumulo

The cost for rates for wholesale water and wastewater treatment properties is derived from a complex formula to reach a rateable value (RV) based on notional profitability for the water network with the universal business rate (UBR) then being applied to this value.

The estimated Rateable Values (using the inflated 2023 Tenant's Assets) for the 2026 and 2029 revaluation are set out in the attached spreadsheets. This estimate includes an updated divisible balance calculation, using the latest provided draft business plan figures, and a tenant's assets valuation based on the accepted 2023 revaluation inflated to the relevant valuation date. Please note, the business rates liability is calculated as the RV (set out below) multiplied by the relevant business rates multiplier (which is currently 51.2p)

Typically, the VOA has relied on the "split of assets" method, the results of which are set out in the table below.

Estimated RV	Agreed 2023 RV (£m)	Estimated 2026 RV (£m)	Estimated 2029 RV (£m)
SWW	33.4	68.0	79.8
BRL	9.6	23.7	31.8

At a high level, the increase from 2023 to 2026 is driven by the following two factors, aside from inflation, (i) the increased RoC figures included for PR24, and (ii) the additional tax owing to the increased earnings, lower capital allowances utilised for deduction and a higher tax rate of 25%.

Business rates projections

Our projection for our business rates costs is that they will increase due to the 2026 and 2029 rates revaluation from £17m SWB water in 2025 to £36m in 2030 to 2030, having fallen from £23m in 2022/23 with the 2023 revaluation. For BRL the increase is from £5m BRL water in 2025 to £12m in 2030, with the 2023 revaluation being a minor reduction. On wastewater the increase is from £8.5m to £11.5m. Given the uncertainty we propose a 75:25 cost sharing rate to protect customers and recognise this is substantially outside of water company control. In addition, we assume given the scale of the potential increases that transitional relief is re-commenced.

EA abstraction charges and licence costs

EA charges are largely outside of management control and impact both the water and wastewater revenue controls.

[8] Business rates: the 2023 revaluation, 2023, p.8

Wastewater EA costs are expected to increase as a result of known increases in the cost of discharge permits. This has been included in our base costs for cost assessment, however no allowance has been included for the potential cost changes from 'performance based regulation' which may be introduced before the end of AMP7. If changes arose these would be included in the WaterShare mechanism under new legislative obligations.

The water abstraction licensing system is subject to reform as part of a Strategic Review of Charges which has indicated potential increased costs to water companies. On balance, we believe there is a plausible risk of cost increases. However, given the uncertainty on both timing and impact of the change we have excluded this from our business plan and instead propose that this should be dealt with through a 75:25 cost sharing rate as at PR19.

Pensions

Pension costs are included within overall labour costs assumptions. The Group has two defined benefit schemes which is operates – the principal plan being the Pennon Group Pension Scheme (PGPS) and Bristol Water's membership of the Water Companies Pension Scheme ('WCPS'). Both schemes are closed to future accrual. The Bristol Water scheme is in surplus and the liabilities of the scheme are fully insured. The Group is in the process of finalising the buy-out and wind-up of this scheme and no further cash contributions are expected. The triennial actuarial valuation for PGPS on 31 March 2022 has been completed and recorded a technical provisions surplus of £7m, representing c.101% funding. No deficit recovery payments were required under the agreed valuation and accordingly the business plan assumes no deficit recovery payments for either of its defined benefit schemes. In any case we would not include deficit contributions on defined benefit schemes within cost allowance requests reflecting the Ofwat policy first applied at PR09. The next triennial valuation is due on 31 March 2025 and will be finalised in 2026.

The ongoing costs of pensions in the business plan therefore include the costs of employer contributions to defined contribution pension schemes and an amount for the ongoing administration of the defined benefit schemes.

Capital expenditure

We have projected capital expenditure of £2.8 billion over AMP8. The table below compares this planned total to the corresponding figures for AMP7: the final determinations and the latest forecast for the actual expenditure.

Table: SWB capital expenditure, AMP7 and AMP8, £m

	AMP7 Forecast	AMP8 Forecast
Capital expenditure – SWW	1,405.8	2,342.5
Capital expenditure – BRL	228.5	410.4
Total	**1,634.3**	**2,753.0**

The significant increase between the AMP7 and AMP8 forecasts reflects an increase in enhancement capex from £685 million to £1,800 million, due mainly to significant extra expenditure required for environmental improvements such as an increase in the storm overflows programme We project that our base expenditure will be stable overall.

Table: Split between projected base and enhancement wholesale capital expenditure over AMP8

£m	2026	2027	2028	2029	2030	Total
Base	194.3	200.7	203.6	179.3	175.6	953.5
Enhancement	287.7	343.3	392.5	395.5	380.4	1,799.5
Grand Total	**482.0**	**544.0**	**596.1**	**574.8**	**556.0**	**2,753.0**

The project by project description of our expenditure is set out in our enhancement business cases, alongside our overall strategic summary. These cases detail on the expenditure in each area, detail our costing confidence, efficiency and delivery plans. The four *Spotlight on our Priorities* documents provide the wider context and strategy for our investment. More information on our plans over the longer term to 2050 is contained in our Long-term Delivery Strategy.

Forecast capital expenditure by project

Our business plan for 2025-30 will build on full deployment of our 2020-25 spend allowances and £300 million of accelerated and additional investments we are currently delivering to 2025. This level of investment is focussed on delivering on our existing 2025 targets and in some Instances, such as in the case of storm overflows, delivering improvements beyond the 2020-25 business plan. The additional and accelerated investments Include:

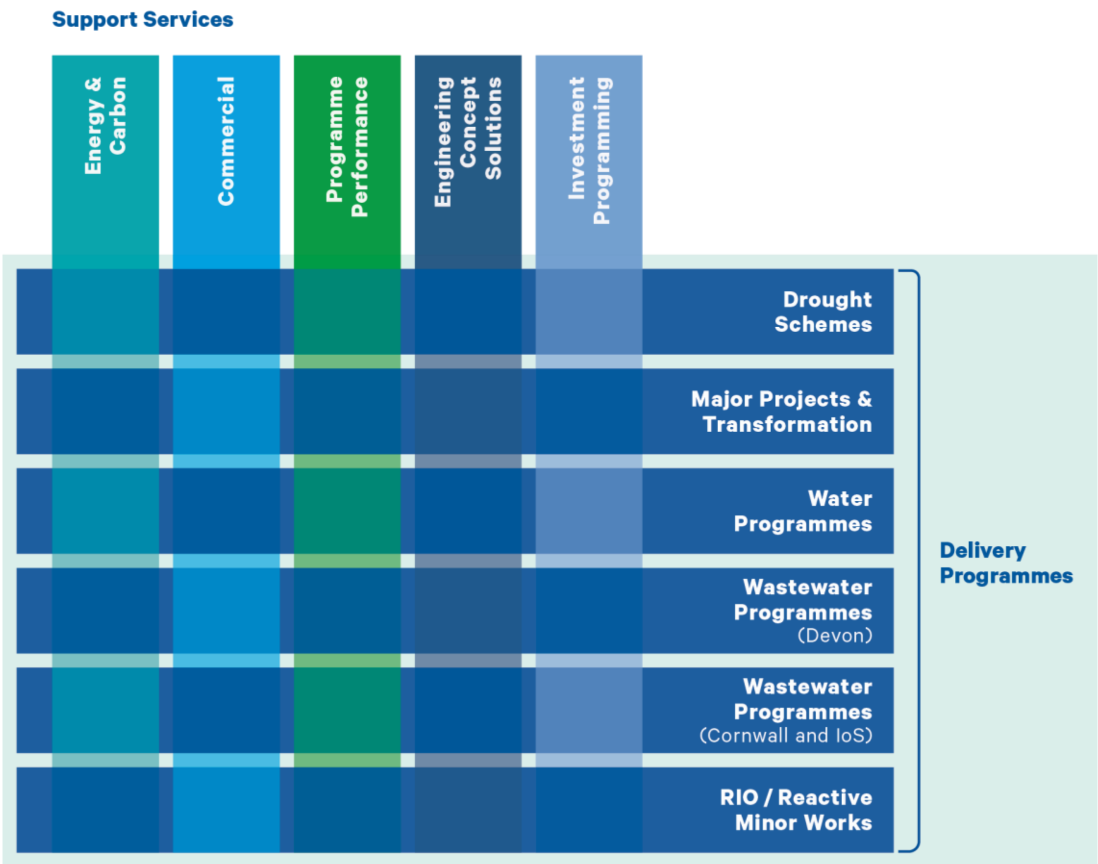
- £45 million Waterfit, includes our target to reduce average storm overflow releases to 20 by 2025
- £125m for Water resilience, to break the drought cycle
- £82m for Green Recovery
- £52m for Accelerated Infrastructure delivery

This investment profile to 2025 will ensure South West Water is well positioned to deliver for our new 2025-30 business plan in terms of performance measures when compared to the sector and momentum with our supply chain partners to make a fast start to deliver the 2025-30 capital programm

Ensuring capital expenditure efficiency

Our procurement strategy is already well underway in preparation for the transition to AMP8. We are one of the largest companies in our region and we have a mature and resilient supply chain that has its roots in Alliance partnering. Our delivery partners have been actively engaged throughout the development of our long-term strategic plans and they understand what is required to deliver these projects.

We also plan to improve the efficiency of our investment by re-organising internally and capitalising on the integration with Bristol Water. We are bolstering our Design and Build delivery model with an intelligent client capability that is aligned with AMP8 work projects and programmes.



Transitioning from an Alliance model to our current Design and Build framework in AMP7, we have gained more positive commercial tension. In response, our recently formed Engineering Concept Team is a fully integrated centre of excellence, made up of our employees and supply chain partners. The vision is for this to become an "alliance hub" that will be at the heart of engineering delivery, embedding best practice across all our programmes, implementing innovation, and driving our Net Zero agenda.

To improve our resilience, we are increasing our "self-delivery" capability having trialled this over the past 12 months and are looking to expand the number of suitable programmes that fit this delivery methodology.

We continue to develop a more integrated and agile delivery model that seeks to capitalise on the benefits of co-location and open architecture knowledge sharing, whilst maintaining commercial tension to ensure we get the best value for our customers and the environment.

In our preparation for transitioning to AMP8 we have been engaging with the market to understand how we ensure we incentivise investment in the water industry and secure the partners we need to meet the demand. Having conducted extensive market research during the early part of 2022, which included supply chain surveys, 1-2-1 interviews and workshops, we are implementing the following:

- 10-year frameworks to encourage investment in the region;
- Simplified and fairer contractual terms, with a more equitable share of risk; and
- Better foresight of the programme; including a more "programmatic" approach to contracting
- A more agile and intelligent client capability

We started this transformation with the selection and appointment of new Professional Services Frameworks. These appointments will significantly increase our consultant supply chain which will be in place by August 2023, enabling the business to start the development of projects and programmes for AMP8.

To enable the step change in delivery requires an increase in the Tier 1 (Civils) framework ahead of AMP8, for a period of not less than 10 years (currently the maximum possible term under Utilities Contract Regulations (2016)).

We have launched our formal market engagement event and have concluded the Expression of Interest (EOI) and have now issued the Request for Quotation (RFQ). We have modelled the type, scale, and complexity of our AMP8 capital programme and identified that we need a minimum of four Tier 1 Contractors to meet the demand, and they will be in place to begin work on any "accelerated" or "early start" capital programme by early Q4 2023/24.

Our MEICA frameworks are performing well, and the volume of schemes is stimulating growth for all our Tier 2 contractors. As such, we have extended our existing MEICA framework for another 18 months, whilst we focus on Tier 1 procurement, ahead of expanding our Tier 2 supply chain from 4 to not less than 6/8 partners ahead of AMP8.

To incentivise the industry, following our market engagement, we have reviewed our commercial model to balance the pain/gain share and reviewed the clauses in our contracts to make them as simple as possible.

We have engaged with the wider construction industry and listened to the feedback, and we envisage the way we are positioning our contracts will encourage reinvestment in the sector, to ensure we can rise to the challenge of AMP8.

Integrated delivery models and alliancing are often challenged for lacking in commercial tension; we intend to align our framework partners by geography, principally Devon (Bournemouth and Bristol)) and Cornwall (IoS). We will maintain our robust approach for the allocation of work but retain the option to compete elements of the programme through "mini competitions," with the potential for suppliers to bid for work in the lot they are not aligned to.

Impact of forecast AMP8 expenditure on performance commitments

We are currently meeting around 75% of our AMP7 performance commitments. The Outcomes document explains in detail our plans to sustain and improve our service quality performance during AMP8.

Base maintenance capex costs

Capital maintenance allows us to maintain the health and condition of our existing assets so that it maintains the capability to provide service to customers and ensures we can meet current regulatory and legal requirements. Any changes to regulatory or legal requirements are funded from enhancement investments – for example, investment to meet new water quality or wastewater quality standards.

Our investment proposal for base maintenance is based on a detailed analysis of what we consider it reasonable for customers to pay even when we estimate that we need to spend more. In developing our base and enhancement cases we have considered the benefits we can expect from enhancement programmes, mainly, storm overflows and leakage.

We are proposing to self-deliver the necessary efficiencies to manage increasing costs from external pressures, such as electric vehicles and the maintenance pressures of an increasing and more technologically advanced asset base. We have also ensured that the costs of transforming into a net zero business is not born by customers.

Our proposal to self-deliver the necessary efficiencies from base is particularly challenging. When setting our base maintenance investment plan we review a bottom up assessment of our maintenance needs, and we are challenging ourselves to deliver nearly £200m of efficiency from base capital maintenance, c. 20%. Examples of this include making no specific allowances for our £50m DWI transformation programme and excluding an uplift to leakage maintenance associated with maintaining new lower levels of leakage from 2024/25. Similarly, we have assumed £50m of maintenance efficiency from our storm overflows investment.

In the development of base costs we have followed a methodical process. We use asset health and performance data in our underlying whole life cost economic models. These economic models are detailed models that predict asset and service risk now and into the future under a range of scenarios. They are the key models used to assess the capital maintenance investment needs of our asset base. We have developed specific models for each asset group to forecast performance. They are typically statistical models that seek to represent a relationship between asset risk and performance and key attributes, i.e. material, age, size and condition of the asset. It is important to build the right modelling framework for each asset group and we have worked with industry and academic experts to get this right.

More detail is provided in our overview of base and enhancement cases.

Modelling efficient expenditure levels for the wholesale water activities

The purpose of Ofwat's base cost assessment models is to measure the efficiency of regulated companies by deriving an estimate for the companies' efficient base costs. Ofwat:

- uses econometrics to derive these estimates from cost driver data (such as customer numbers or the length of trunk mains), based on 2011-23 historical costs.
- compares this modelled cost estimate to company plans, and adjust for any specific cost adjustment claims they allow.
- makes some "top down" allowances for changes in future costs (at PR19 this was just for wage inflation), and a frontier shift in efficiency.
- undertakes separate modelling for enhancement costs.

The base cost efficiency position at PR24 is summarised in the table below. Based on the Ofwat models, our historical efficiency position is summarised in the table below. This is before taking into account any cost adjustment claims. Negative numbers mean that our costs have historically been below (better than) the upper quartile of efficiency.

Table: Base efficiency adjustments according to Ofwat models (amended as explained below)

Base efficiency adjustment	Ofwat models (before adjustments and special cost factors) - efficiency is allowance above or below (negative) actual cost				
	SWW		BRL		Combined
	Rank	Efficiency	Rank	Efficiency	Efficiency
Water (triangulated)	**3**	**-3%**	**12**	**11%**	**2%**
Wholesale water	4	-4%	12	7%	-1%
Treated water distribution	2	-20%	14	16%	-8%
Water resources plus	13	24%	10	16%	22%
Wastewater (triangulated)	**8**	**9%**	-	-	-
Sewage collection	9	17%	-	-	-
Sewage treatment	7	7%	-	-	-
Wastewater wholesale	9	8%	-	-	-
Bioresources	5	16%	-	-	-
Retail (triangulated)	**1**	**-14%**	**11**	**8%**	**-9%**
Retail total (75%)	1	-17%	10	8%	-11%
Retail bad debt (12.5%)	2	-19%	16	68%	-4%
Retail other costs (12.5%)	10	20%	5	0%	14%

Based on our historical costs, the largest efficiency gap appears to be in Bioresources. This gap is explained by our use of more the environmentally-friendly liming methodologies for treating waste, rather than anaerobic digestion, which is favoured by the rest of the industry, and which we believe should be offset through our cost adjustment claim.

Similarly, on wastewater, while we have an historical efficiency gap, our AMP8 plan is based on costs below the efficient cost prediction level.

Finally, on retail, our plan is to sustain South West Water's current high level of performance, while working to improve Bristol's relative efficiency.

Impact on base cost allowances

Following the publication of Ofwat's proposed models as part of the base cost consultation and the release of the 2023 APR, we have produced updated base expenditure forecasts for AMP8. While the total cost allowances are based on Ofwat's proposed models, we have refined the modelling suite to account for companies' responses to the base cost consultation and to the evidence available to date. Following the CMA's approach in its PR19 redetermination, the UQ is applied everywhere. Then a frontier shift of 0.5% p.a. is applied everywhere except on retail. No allowance is currently made Real Price Effects (at PR19 wage costs, and potentially at PR24 energy, chemical and material could also be considered).

Table: Efficient modelled costs by business unit

£m	Water	Wastewater	Bioresources	Retail
Bristol	422.1	-	-	72.8
South West	846.3	734.9	138.6	190.8
Total	**1268.4**	**734.9**	**138.6**	**263.6**

Water

Our latest efficient cost projections for AMP8 amount to £1268m (£422m for Bristol and £846m for SWW). Since a large majority of companies have expressed similar concerns to our base cost modelling response about the refined version of the PR19 density driver, WAD LAD from MSOA, we have adjusted the modelling suite accordingly and only used 16 models to estimate our cost allowances to date.

While we have not removed booster pumping stations from our analysis, we have already expressed our preference for the exclusive use of average pumping head to capture network topography as we do not think booster pumping stations is an appropriate cost driver for that. However, to be conservative, as part of this forecasting exercise of AMP8 allowances, we have kept an equal weighting between models with APH TWD and models with booster pumping stations per length of mains.

Wastewater

We estimate an allowance of £735m for SWW based on a refined version of Ofwat's proposed modelling suite in order better to account for companies' responses to the base cost consultation and the evidence available to date. In particular, and consistently with our base cost modelling response, we did not consider:

- SWC and WWNP models relying on urban rainfall because of the incorrect econometric specification of the models. We have already expressed our preference for total annual rainfall to avoid making erroneous combinations with arbitrary measures of urban areas that fail to capture the desired effect, i.e. the amount of rainfall that actually falls into companies' drainage systems. However, to be conservative in our estimate, we have not used total annual rainfall for our projections.
- The only SWC model relying on WAD LAD from MSOA as a density driver, for the same reasons stated above and in our consultation response.
- SWT and WWNP models relying on the refined version of the PR19 driver that intends to capture economies of scale in large STWs, i.e. the percentage of load treated in STWs of more than 100,000 people. This is consistent with companies' responses, since the WATS variable is clearly superior.[9]
- WWNP models that do not explicitly capture economies of scale. This is because the use of such models alongside more robust models capturing economies of scale artificially reduces the importance of economies of scale, which is counterintuitive.

Bioresources

We estimate an allowance of £139m for South West based on three of the four unit cost models proposed by Ofwat. In particular:

- There is no reason to use total cost models since the estimated relationship between the amount of sludge produced and bioresources cost suggests diseconomies of scale. This is counter-intuitive and spurious as it is driven by a single outlier, Northumbrian.
- Consistent with our water and wastewater modelling, we have removed WAD LAD from MSOA from the modelling suite.

Developer services

Water network reinforcement in the South West area is expected to increase to c£2m a year due to increased NAV activity.

In the Bristol area network reinforcement expenditure is expected to reduce as major NAV connections are happening during AMP7, with an ongoing run rate of c0.65m p.a.

Non-price control water requisitions in the Bristol area are expected to reduce by c50% over AMP8 from AMP7 due to increased NAV activity and lower property connections in general. The South West area shows a smaller reduction due to lower NAV penetration and higher growth.

Network reinforcement on wastewater increases to a peak of c£7m in in 2025/26 and then is stable at c£5m p.a.

[9] Although we expressed concerns with the deterioration of the statistical significance of the load treated in bands 1 to 3 in our BP pendix, this has been kept here.

Non-price control wastewater requisitions are stable at c£4m p.a.

More details are provided in the commentary to the Developer Services tables.

Retail

Our efficient retail cost projections for AMP8 amount to £264m (£191m for SWW and £73m for BRL). As for wastewater, it is counterintuitive to use models that do not explicitly capture economies of scale as there is clear evidence that these exists in retail as well.

Therefore, we removed these four models (one other cost model and three total cost models) to benefit from a more robust view of efficient cost allowances.

As indicated in both our modelling submission in January and in our base cost modelling response in May, we reiterate the importance of using a broad range of deprivation metrics, either through a composite measure or through several different models that are then triangulated with each other (as is currently the case in the proposed modelling suite).

Enhancement costs

Overview

We have applied a consistent and robust processes to develop the whole of the capital costs for our wholesale plan. We have continued to improve and develop our asset management approach by optimisation of solutions in consideration of long term Totex (Opex and Capex costs).

We use five principal methods to calculate the capital costs and construction values:

- Unit Cost Models & SWW Estimating System data
- Rates, Quotations or Estimates from Framework Agreements
- Historic published cost data or data from Cost Managers systems
- First Principles Estimating
- Industry Average Costs

We have utilised our industry leading unit cost database tools and investment modelling approaches so that we have confidence that we can accurately price alternative solutions to deliver the best solutions for customers at optimal long term cost and benefit. We have undertaken benchmarking activity to ensure Unit Cost Models & SWW Estimating System data accurately reflects costs.

Our improvements have enabled us to map the business plan components to the performance commitments so that their relationship with expenditure is understood and can be measured. It also allows us to prioritise sub-programmes with higher positive impacts on performance commitments.

All cost data is company-sourced, from current and recently completed projects and programmes of work. The detailed working has been extensive, and, throughout the entire process, all documentation and audit trails have been shared openly with our assurance providers.

Our costing process builds on the methodology and previous approaches developed for, and since the 2014 Price Review, and the submission for PR19 has continued to utilise the Engineering Estimating System (EES) following its introduction in the 2009 Price Review. We have developed costs models where relevant capital activity in 2020-25 is forecast and where reliable data exists.

Details of how we have developed efficient costs are included in each specific enhancement case. A three phased process of scoping, costing and assurance, is typically applied. Following which we can be sure that we have developed efficient and technically feasible solutions. Lastly, we have applied an overarching efficiency to all costs of c15%, c£300m. This will ensure we seek to innovative further between now and AMP8 and that we get more from the supply chain to maximise value for customers.

More detail is provided in our overview of base and enhancement cases and in the individual enhancement business cases, which are summarised below.

Water Quality

Quality Driven Mains Renewal

We have set ourselves a challenging target of reducing our consumer contacts per 1,000 population to 0.3 by 2050 across all operating areas. Our AMP8 target is a continued step (phase five) in our strategy which has delivered significant improvements since the early 2000s. Under this phase we move into the replacement of metallic mains and targeted flushing.

	AMP8 Totex £m
BRL Water Network +	10.3
SWB Water Network +	32.62
BRL+ SWB Total	42.92

Our costs are built up from our latest tendered rates and cost benchmarking.

Lead

We have set ourselves a challenging ambition to have a lead-free network no later than 2050. This means replacement of all lead pipes across our clean water network. This ambition does not stop at pipes we are responsible for. Building on our trials to date, we plan to support our customers in replacement of their own lead supply pipes.

Our strategy will be completed in the most cost-effective way. We recognise there are challenges in achieving the complete removal of lead supplies in our area and that doing so will require new and innovative approaches to ensure efficient delivery.

Therefore, our large-scale trials will be focused on understanding what synergistic benefits can be realised when replacements coincide with other major programmes of work, customer engagement and research to fully understand how to overcome the historic reluctance to engage and through the scale of our proposed programme we expect to encourage academia and the supply chain to collaborate in the further development and deployment of innovative technologies. Through this approach, combined with industry collaboration we hope to realise maximum benefits, minimise customer disruption, minimise our consumers exposure to lead and achieve 100% water quality compliance deliver the priorities of our customers effectively and efficiently.

	AMP8 £m
BRL Water Network +	21.6
SWB Water Network +	48.1
BRL+ SWB Total	**69.7**

The approach to costing and efficiency is set out in the enhancement business case for leakage.

Strategic Water Treatment Works

We are proposing substantive rebuilds, or new WTWs where it is more economic, at three sites across our operational area – two in Bristol and one in our South West region. This supports the continued and long term delivery of clean safe drinking water. This is our customers number one priority and ensuring that our consumers can trust the water we provide is at the heart of our business.

We will improve water quality and address future raw water deterioration by:

- **Rebuilding Stowey WTWs** in our mid- Bristol region (BRL)
- **Rebuilding Littleton WTWs** in our North-Bristol region (BRL)
- **Rebuilding (or potentially relocating) Bratton Fleming WTWs** in support of our wider North Devon (SWB) supply resilience strategy which is linked to our Green Recovery investment plans

	AMP8 £m
BRL Water Network +	116.04
SWB Water Network +	34.76
BRL+ SWB Total	**150.80**

As well as cost models, we applied additional third party cost assurance by submitting our costing sheets to an independent consultant to get a second view of potential costs. The full set of costs were then reviewed against needs and methodologies to confirm the correct scheme cost estimates.

Water Quality Upgrades at our Treatment Works

Our WTW process upgrades for BRL and SWB delivers the following investment by the end of AMP8. It is part of our overall £297m programme of treatment improvements planned for 17 water treatment works across our operating areas. Our overall programme of WTW investment includes: £151m Base, £146m enhancement (including water quality and resilience). From this enhancement investment £76m is planned for SWB and £70m BRL.

Substantial treatment upgrades at four sites to mitigate the risk of raw water deterioration and improve consumer acceptability: Greatwell, Dotton, Woodgreen and Cheddar WTWs.

1. Low cost, low regrets solutions at seven sites to mitigate the risk of deteriorating raw water quality impacting our ability to treat and supply water at Delank, St Cleer, Bastreet, Dousland, Prewley, Avon and Venford WTWs
2. Two cost effective chemical dosing upgrades to improve water appearance and reduce customer contacts at Allers and Pynes WTWs
3. Research, investigations and enhanced analytical capability for emerging contaminants and future potential chemical and biological risks to drinking water quality, such as PFAS ('forever chemicals'), endocrine disruptors, personal care products, disinfection by-products and microbiological pathogens.

In addition, we have the three substantive upgrades/rebuilds detailed within our 'New WTW' enhancement case at Littleton, Stowey and Bratton Fleming WTWs.

SWB	AMP8 Capex £m
CW3.91 – Improvements to taste, odour and colour (grey solutions)	27.646
CW3.97 – Addressing raw water quality deterioration (grey solutions)	32.755
Total	**60.401**

BRL	AMP8 Capex £m
CW3.91 – Improvements to taste, odour and colour (grey solutions)	10.610
CW3.97 – Addressing raw water quality deterioration (grey solutions)	7.468
Total	**18.078**

For each of the priority WTWs requiring upgrades, we explored several technically feasible options that would deliver a range of benefits. In the development of options we were supported by external technical experts to ensure we considered a wide range of options to meet the investment need and to ensure that our scopes are accurate and effective at meeting the need. An independent consultancy was also used to challenge and verify the options considered.

Against these scopes of work, our costing models were applied to produce the scheme cost estimate. These models are managed by an external consultancy who continually update these models with our out-turn costs for similar schemes to ensure our cost estimates are as accurate as possible. The management and development of our cost models is subject to third party assurance. Finally, a completely independent pricing exercise was completed to validate our pricing.

Water Resources WINEP

The scope of this case represents an investigation-focused enhancement case to proactively address long-term Environmental Destination drivers and national water security concerns. The aspiration is to more effectively understand the trajectory required to meet the National Framework for Water Resources in a way that protects our natural environment therefore delivering for people and nature.

Our water sources are predominantly surface water abstractions from rivers and reservoirs, locally some groundwater sources are also utilised. The scope of our enhancement case is as follows:

- 42 sustainable abstraction investigations (34 SWB, 8 BRL) which includes improving understanding of our licences and how to meet the long ambitions of Environmental Destination.
- 10 sustainability schemes (7 SWB, 3 BRL) implementing changes to meet objectives of protected sites such as SACs, SPAs and SSSIs, or meet water framework directive waterbody objectives.
- 23 environmental mitigation schemes and studies (21 SWB, 2 BRL) at catchments where our water resource assets are situated including flow naturalisation in catchments downstream of reservoirs, fish passage enhancements, riverine habitat enhancements and investigations that will inform future environmental mitigation needs.

	AMP8 £m
BRL Water Resources	5.18
SWB Water Resources	27.91
BRL+ SWB Total	**33.09**

Cost associated with investigations have been compiled using industry experience of the type and scale of work required to meet each requirement as detailed above and undergone appropriate levels of uplift proportionate to the need and scheme detail available for investigations

Biodiversity

Our biodiversity strategy is underpinned by statutory drivers in the WINEP programme derived from the legislative requirements. Delivery of this plan will ensure that BRL and SWB and are compliant with the relevant regulations concerning:

- Invasive Non-Native Species (INNS)
- Management of protected sites in company ownership to favourable condition
- Responsibilities for drinking water protection, biodiversity and nature recovery in the catchments we operate in beyond our land
- All sites requiring statutory screening or passage actions as per the Eels Regulations (2009).

The ambition within the plan goes beyond the statutory and regulatory outcomes and it includes ambitious targets for the protection and enhancement of catchments, habitats and species that contribute to delivery of:

- the Biodiversity Strategy
- Local Nature Recovery Strategies
- our commitments towards the new Ofwat Biodiversity Performance Commitment (PC)
- Our Long Term Delivery Strategy to deliver high quality water and a thriving environment in our region, by working with our partners and collaborators, which is a vision and approach we share with customers and communities.

The biodiversity Enhancement case also includes delivery for biodiversity and INNS outcomes at wastewater sites and assets. The plan focuses on AMP8 delivery. It is developed from a WINEP programme of:

- 33 Investigations
- 26 Improvement schemes
- 24 Non Deterioration schemes
- 3 Monitoring schemes

Additionally, it includes three non-WINEP programmes:

- Two programmes of biodiversity enhancements for BRL and SWW, to deliver the new biodiversity PC both on our landholdings and beyond furthering our ambitions in line with our biodiversity strategy, Local Nature Recovers Strategies and customer and stakeholder expectations.
- A BRL catchment management enhancement scheme for further water quality improvements in DWPAs.

	AMP8 Capex £m
Biodiversity	8.2
FISH/EEL	11.6
INNS	12.1
Catchment Management	13.0
Total	**44.9**

Water resources supply schemes

We will invest £114.4m Totex (22/23 prices post efficiency) within AMP8 to deliver 37.75Ml/d of water available for use (WAFU) through the construction of 7 new water supply schemes. Our best value modelling process has identified and driven the schedule of these schemes, which means that the WAFU benefit is not realised until AMP9 in every case. This is due in part to construction periods which are at least 4 years.

	AMP8 Capex £m
CW3.52 - Interconnectors	14.5
CW3.43 & 55 – Supply schemes delivering benefit from 2025 & from 2031	99.9
Total	**114.4**

For each scheme, we explored a range of feasible options to deliver a range of benefits. We were supported by external technical experts to ensure scopes were accurate and challenge applied to options considered.

Cost models were applied to produce scheme estimates. Models are held by an external consultancy who continually update them with out-turn costs to ensure estimates are as accurate as possible.

Leakage

We will invest £90.4M totex (22/23 prices) post-efficiency (£60.4m SWB, £29.73 BRL) within AMP8 to deliver a leakage reduction of 13.7% (13.6 Ml/d) SWB and 4.6% (1.48 Ml/d) BRL, by 2030. It will cover 319km of trunk main replacement and 20,549 comm pipe connections. This is in response to a projected supply deficit in many of our WRZs by the 2030's and in all WRZs by the 2050's and is required in both our South West Bournemouth (SWB) and Bristol Water (BRL) regions in combination with other demand side measures.

Leakage	Cost Allocation	AMP8 £m
BRL Water Resources	Capex	25.58
	Opex	4.15
	Totex	29.73
SWB Water Resources	Capex	54.52
	Opex	6.13
	Totex	60.65
BRL + SWB	**Totex**	**90.38**

The approach to costing and efficiency is set out in the enhancement business case for leakage.

Metering

We will invest £58.5m Totex (SWB) £21.2m Totex (BRL) (22/23 prices, post efficiency) within AMP8 to install new smart meters and upgrades to Advanced Metering Infrastructure (AMI) which will deliver a reduction in per capita consumption (PCC) of 3.64 l/p/d in SWB and 6.86 l/p/d in BRL. Our metering programme will also reduce leakage by 3.2% in SWB, and 3.6% in BRL in AMP8 by helping us identify and resolve more leaks quicker.

The need for this investment is driven by our WRMP statutory requirements and Governmental demand targets. Our dWRMP24 reflects our commitment to compulsory metering in Bournemouth in AMP8, and full smart meter rollout in our SWW and Bristol regions.

	AMP8 Totex £m
BRL Water Network +	21.2
SWB Water Network +	58.5
BRL+ SWB Total	79.7

Solution costs were developed from internal unit costs and use the latest costs from the Green Recovery Metering initiative in North Devon. This benefits from improved contract rates for delivering widescale meter replacement within discrete area. Additionally, unit costs for AMI meter costs are developed from procurement of services specifically for the Green Recovery area. Cost models were developed from completed projects and the Accelerated spend in Green Recovery and Colliford. The procurement exercise for green Recovery Healthier Smarter Homes effectively tested industry sector rates and solutions.

Our unit cost models are based upon actual costs and have been updated for PR24 planning purposes. The process is robust, assured and AMP7 efficiencies applied. We have compared these market tested rates with industry benchmarks and have had additional cost assurance provided by an external party, Artesia.

Water efficiency

Our water efficiency programme of interventions will contribute a 4.97 (l/p/h) reduction in PCC across the AMP (4.97 l/h/d in SWB and 3.62 Ml/d in BRL). A further 10.5 PCC reduction will be delivered via our metering programme (3.64 in SWB and 6.86 in BRL). This will ensure both SWB and BRL are on track to deliver the PCC target by 2050 (109.7 l/h/d forecast for SWB and 109.4 l/h/d for BRL). BRL are also on track to deliver the interim PCC target of 122 l/h/d by 2037/38, forecasting 119.8 l/h/d, however SWB will marginally miss this target, forecasting 125.8 l/h/d.

	AMP8 £m
BRL Water Resources	1.32
SWB Water Resources	4.0
BRL+ SWB Total	**5.32**

SWB uses unit cost database tools and investment modelling approaches to accurately price alternative solutions for customers, aiming for long-term cost-effectiveness. They have updated their cost data to reflect Bristol Water's costs and mapped business plan components to performance commitments, enabling measurement and prioritisation of sub-programs with higher positive impacts on performance.

Strategic Interconnectors

We will invest £71m Totex (22/23 prices, post efficiency) in 28 km of new potable water mains (excluding the Mayflower to Littlehempston scheme, which will only be partially built by the end of AMP8) to improve resilience by enabling the transfer of treated water from areas of surplus to areas of deficit when resources are short.

	AMP8 £m
Mayflower WTW to Littlehempston WTW	33.626
Brent Tor to Launceston	17.971
Roadford to Colliford via Saltash	2.559
Cranbrook to Honiton	14.260
Alderney – Knapp Mill pinch points	2.558
Total	**70.974**

For each scheme, we explored a range of technically feasible options to deliver a range of benefits. We were supported by external technical experts to ensure breadth and depth of options, and to ensure that scopes were accurate. An independent consultancy was also used to challenge and verify the options considered.

Our cost models were applied to these scopes to produce scheme cost estimates. These models are managed by an external consultancy who continually update them with outturn costs for similar schemes to ensure cost estimates are as accurate as possible. The management of our cost models is subject to third party assurance.

Wastewater Treatment WINEP

The Wastewater Treatment WINEP programme covers wastewater monitoring and treatment improvements and is part of our WINEP as part of the wholesale wastewater programme.

In particular, the elements covered are:

- Measurement and monitoring of emergency overflows and of storm overflows at wastewater treatment works and sewage pumping stations (U_MON3, U_MON4 and U_MON6)
- Nutrients removal from wastewater (HD_IMP_NN, WFD_IMP, HD_IMP)
- Removal of specific chemicals from wastewater (WFD_IMP_Chem, WFD_NDLS_Chem1, WFD_NDLS_Chem2)
- Urban Wastewater improvements (U_IMP1, U_IMP2 and U_IMP7)
- Investigations into nutrients loading, chemical impacts of wastewater and microplastics (WFD_INV, HD_INV, SSSI_INV, WFD_INV_CHEM, WFD_INV_MP and WFD_INV_N-Tal)

This will be achieved by investment into infrastructure within the network as well as at treatment works. The investment in terms of investigations will also increase the value of future enhancements by helping to gain a better understanding of the interactions between South West Water Wastewater assets and the environment.

These enhancements will improve the environment by reducing the loading of nutrients to the freshwater environment and the control of other chemicals. Improvements at wastewater treatment works to reflect growing population will also minimise the risk to the environment. Consistent and regulated monitoring of the use of storm overflows will enable better metrics to target future investigations and improvements to either mitigate or reduce the effects of the use of these critical assets.

Our Wastewater Compliance enhancement case will seek to minimise our impact on the water environment, protect rivers from eutrophication and pollution and enable us to better monitor the activity and use of our critical storm overflow assets.

We have used the industry leading unit cost database tools and investment modelling approaches so that we have confidence that we can accurately price alternative solutions to deliver the best solutions for customers at optimal long-term cost and benefit.

Description	Post – Efficiency CAPEX (£m)
Wastewater Flow Compliance	18.968
Wastewater Compliance (Nutrients)	124.052
Wastewater Compliance (Non-Nutrients)	14.636
Investigations	6.681
Other improvements (U_IMP1 & U_IMP7)	87.282
Total (£m)	**251.619**

Storm Overflows

Our AMP8 plans will improve 283 storm overflows and:

- Ensure 60% of storm overflows will meet new stringent standards by 2030.
- Halve the volume of spills discharged by 2030, based upon our AMP7 and AMP8 reductions.

- Reduce Bathing water spills to a third of their number from 2022. (300% reduction)
- All bathing waters and shellfish water overflows will meet new stringent standards of no more than 10 spills per annum by 2030.

We will deploy 245 monitors which will be 'Made to Measure' to continuously monitor the river quality and the potential impact that storm overflow discharges may have and carry out 10 estuarial investigations to identify suitable locations for monitor locations in estuaries in future.

We will complete investigations at 217 storm overflows to better understand risks at storm overflows discharging into or within 50m of a designated protected area, a chalk stream, or a eutrophic special area, or have the potential to have an adverse local ecological impact. These investigations will inform future investment to improve the local receiving waters, improve resilience with existing bathing water or shellfish water classifications or further improve bathing water classification, for example from 'good' to 'excellent'.

By 2040, our long term plans will have delivered spill reduction requirements of the Storm Overflow Discharge Reduction Plan ten years ahead of the required date. This will mean none of our 1,342 overflows will discharge more than ten times each year and only in unusually heavy rainfall events; this is 10 years ahead of Government targets. Table 1 provides an outline of our storm overflow improvements against the new regulatory targets.

Our asset improvements will be delivered through a blend of 'grey, blue and green' solutions. We define these solutions as:

- Grey – These are traditional engineering solutions such as tanks for storage of combined and foul flows or increasing the capacity of sewers.
- Blue – Creating infrastructure that manages water with the aim of removing it from the combined sewerage network in a nature-based approach where possible. Solutions include sustainable urban drainage systems, ponds, waterways, wet detention basins and wetlands.
- Green – Creating semi-natural spaces and assets that use ecologically driven processes to treat and slow or stop rainfall runoff. These solutions include creating green spaces or creating soakaways that slow the flow of water, enabling water to be naturally reabsorbed back into the environment. These enhance the urban environment, providing additional environmental and recreational benefits.

For storm overflows, we have undertaken an extensive review of the developed programme and have challenged and verified the cost of delivery of specifics schemes, both in terms of the scope and mix of activity and the proposed costs.

This has been undertaken through a layered approach of review and challenge of the programme and costs.

1. Review of feasibility approaches and alignment with SOAF investigations, alongside bathing water, and shellfish schemes
2. Cost assurance from our third party assurance providers Jacobs, who have reviewed the scope and cost assessments of the storm overflow programme.
3. Ground truthing exercise with operational and tactical asset management teams reviewing the AMP8 programme and schemes. Comparing with on the ground operational knowledge and asset performance.
4. Delivery partner reviews have been undertaken on the high priority 72 schemes which are expected to be delivered in the first few years of the programme. These have involved site visits, scope review and cost reappraisals based upon specific site conditions.

Each of these reviews has been undertaken and has compared the original modelled costs to the expected deliverable costs. Whilst the individual storm overflow costs have varied on a site by site basis, the overall programme in each case has not varied more than 5-10% for the programme with unit costs coming out similar on an average storm overflow cost. The outcomes of these exercises have provided surety that the developed costs are reflective of our best knowledge and information of the delivery costs of the programme.

Whilst we have used these exercises to build cost confidence for the programme, we have challenged the capital investment for all enhancement cases to ensure that the costs and proposals are robust and have had overlap with capital maintenance removed. We have also made reductions to reflect for past expenditure or operational solutions in AMP7 and where we are investing as a 'spend to save' or self-funding where it is relevant on a case-by-case basis.

We have benchmarked with public domain information published in DWMPs for the dominant activities of storage and removal of inflow, whilst recognising that there are limitations due to redaction and variations in Company approaches. Our costs were towards the more efficient end of those analysed.

AMP8 Storm Overflow Programme	Totex £M
Increase flow to full treatment	142

Increase storm tank capacity at STWs - grey solution	66
Increase storm system t on a STW - green solution	2
Storage schemes to reduce spill frequency at CSOs etc - grey solution	223
Storage to reduce spill frequency at CSOs etc - green solution	0.2
Storm overflow - discharge relocation	0.6
Storm overflow - source surface water separation	194
Storm overflow - infiltration management (including inflow)	102
Storm overflow - new / upgraded screens	7
Microbiological treatment - bathing waters, coastal and inland	6.5
Subtotal	744
River Water Quality Monitors	34
Investigations	10
Total	**787**

Wastewater Treatment Works Growth

We have assessed all 655 WWTW catchments for the impact of additional flow and load against the individual site WWTW permit requirements to 2050.

Our PR24 wastewater treatment growth programme is part of that long term plan and provides additional treatment capacity to accommodate growth and new development capacity required by 2030, preventing a deterioration in performance of

- WWTW flow compliance
- WWTW final effluent compliance
- WWTW Storm overflow discharge compliance

By enabling and supporting local development, our programme also supports local economic development in key catchments at Countess Wear, Ernesette (Plymouth) including Saltash and Cullompton.

	Cost Allocation	AMP8 £m
SWB Wastewater Network +	Capex	49.663
	Opex	7.762
	Totex	57.425
BRL+ SWB Total Totex		**57.425**

Solution costs were developed with external consultants, Chandler KBS for a range of options using site specific detail, unit costs and design criteria to Company standards for design and build options.

Solutions underwent internal peer challenge to identify those sites for zero cost operational solutions and least cost totex including capital options. In addition, a future opportunity efficiency challenge of £25m has been netted off the proposed enhancement investment.

Isles of Scilly First Time Sewerage

In April 2020 South West Water became the licensed water and wastewater service provider for the Isles of Scilly. There are limited wastewater networks on two of the five inhabited islands: St Marys and Tresco. In AMP7 we are renewing treatment facilities on Tresco and install new treatment and networks on St Marys in line with our PR19 Business Plan for the Isles of Scilly. We are also recording performance metrics and shadow reporting to EA and are monitoring storm overflows from the two pumping station overflows on St Marys and Tresco. Our capital investments are on track to deliver by 2030.

Bryher, St Agnes and St Martins islands do not have public wastewater networks, instead relying on local private systems and septic tanks.

South West Water conducted extensive surveys and investigations for the Isles of Scilly, working closely with regulators to develop a ten-year business plan for the islands, spanning AMP7 and AMP8.

Options including septic tanks were not progressed as they would not be compliant with urban wastewater treatment regulations.

The options assessed for all sites are based around an FRS scheme provision with secondary treatment suitable for discharge to a Marine Special Area of Conservation (SAC) such as Bio-Bubble package plant, Rotating Biological Contactors, (RBC), Submerged Aeration Filters (SAF) and Reedbeds.

We developed our PR24 programme via assessing each catchment on a case-by-case basis for number and location of properties, land availability and topography, given both first-time sewerage, wastewater treatment and new outfalls were required.

	AMP8 £m
SWB Wastewater Network +	33.575

Solution costs were developed, in line with the SWW costing methodology, with our external consultants, Chandler KBS, for a range of options using site specific detail, unit costs and design criteria to company standards for design and build options.

Solutions underwent internal peer challenge to identify the least cost totex solutions for these islands, including capital options. In addition, an opportunity efficiency challenge of £5m capex has been netted off the proposed enhancement investment.

Bioresources

Our Bioresources plan meets the needs of population growth, changes to standards and regulation, and the impacts of landbank competition through:

- **Increase in bioresources yield** – increase in population and improvements to quantity and quality of wastewater discharges driven by the Water Industry National Environment Programme (WINEP).
- **Prevention of diffuse water pollution** – limits of bioresources to land application in the autumn driven by DEFRAs Farming Rules for Water (FRfW).
- **Mitigation of emissions to air, water and land** - new standards on containment, odour control and storage driven by the Industrial Emissions Directive (IED), EA's Biological Waste Treatment: Appropriate Measures for Permitted Facilities (Appropriate Measures) and guidance including discharge activities from Environmental Permitting Regulations (EPR).
- **Landbank competition** - increased demand for landbank from organic materials recycling and other WaSCs requires increasing product quality from our treated products, as shown by obtaining Biosolids Assurance Scheme (BAS) certification.
- **Landbank loss** – potential for future loss of agricultural recycling route due to regulatory or public perception changes of stakeholder acceptability. This would have a significant impact on SWW and the industry as a whole.

In developing our plan, we have used the following key planning assumptions:

- Forecast of raw bioresources generated over AMP8/AMP9 periods and increases due to both population growth and WINEP treatment works improvements. Uncertainties in forecasting to be described (e.g., dependence on trade effluent, impact of sending less wastewater through storm overflows and more to treatment works).
- Estimated capital maintenance cost allowance in econometric models (to show how overlap with base is accounted for).
- Evidence of considering/approaching local market availability for bioresources treatment capacity and there being insufficient to provide for the immediate future needs.
- Landbank recycling of treated bioresources remains an option for the duration of AMP8, but that beyond this time period the risk of further restrictions or complete loss is a foreseeable future outcome.
- IED and appropriate measures compliance assumed to be aligned with the Ofwat response dated August 2023.

- In AMP8, we propose to move to a strategy that recovers energy from 100% of SWW bioresources through the delivery of AAD facilities on two sites (AMP8 option 3). This will treat dewatered bioresources transported from satellite wastewater treatment works, with appropriate capabilities. This investment on AAD within AMP8 is a modular investment, for future AMPs to increase capacities as the bioresources yield increases. By enabling future increases of AAD capacity this will allow progressive reduction of the volumes of bioresources to land and allow enhanced recovery of energy in the form of biomethane.
- Additionally, we have included investigations and investment to mitigate the potential, future landbank loss. Mitigation includes installing 10,000 tds/yr of Advanced Thermal Conversion (ATC) technology (e.g., pyrolysis) to reduce volumes and transform bioresources into value added by-products. This could take the form of two trial installations. This will be able to advise future strategy for bioresources destruction in the event of the significant reduction or complete closure of the landbank and our existing outlet of recycling bioresources to agricultural land. Furthermore, bioresources storage solutions, e.g., holding bioresources in a quarry, will be sought should landbank availability significantly drop to minimise disruption to STC activities.
- The AMP8 plan was selected as it delivers a significant transformation in bioresources management, whilst meeting all current and known future regulatory requirements. This includes addressing the additional costs associated with IED/appropriate measures, which would otherwise need to be addressed on our existing assets.
- In subsequent AMP periods, as a phased approach, we will continue research and deploy advanced innovative technologies to thermally convert or destroy bioresources to reduce the activity of bioresources land spreading due to increased landbank competition. This approach will also enable the generation of additional energy recovery in the form of syngas or electricity, and creation of a value-added char material that can be used as an alternative soil conditioner / aggregate material / solid fuel product.

The total bioresources strategy is expected to cost c£305m in AMP8, but only £230m is included in AMP8, including c£80m in enhancement expenditure including growth, with the remainder reflecting maintenance. However this, depends on further discussions on the treatment of IED appropriate measures costs.

SEMD

Our DWI SEMD plan is part of our overall security and cyber investment as part of wholesale water programme water network+ with a separate plan for Cyber and NIS.

Our plan will deliver enhancement via 2 schemes:

- Alternative Water Supply (AWS) Planning Enhancement – There has been a step change in SEMD 2022 to have "regard" for national reasonable worst-case scenarios, this was not previously required. Going beyond the minimum AWS compliance of 1.5% of domestic population for resilient services in both SWB and BRL, based on a national event, risks posed by supply interruptions, concurrent incidents and drought. In turn decreasing the impact posed to the customer and upskilling our colleagues. This investment will ensure we have AWS capacity for a national drought situation supporting alternative water supplies for up to 80k population for up to 30 days, against our current capacity of 40k population for 10 days maximum in SWB and to maintain the current BRL capacity of 30k population. This ensures that we are able to respond to concurrent events across the operational area and national events whilst offer the best service to our customers.
- Emergency Planning Enhancement – Heightened emergency response to an increased risk of major incidents out of our control such as national and rolling power outages, extreme weather events whilst also working in greater collaboration with our external partner agencies. This investment will ensure that we have sufficient alternative power supplies for all water treatment works and identified vulnerable pumping stations, maintaining water supplies to our customers and providing some extra resilience for our waste water treatment processes.

	AMP8 £m
BRL Water Network +	1.73
SWB Water Network +	3.47

Cyber and NIS Enhancement

Our cyber resilience plan is part of our overall Security and Cyber investment as part of wholesale water programme water network+ with a separate plan for physical security and emergency planning under the Security and Emergencies Measures Direction (SEMD).

Our plan will increase our capability to protect, detect and respond to suspicious cyber activity across the corporate IT and OT infrastructure and supports achieving the new NIS sector profile as set by DWI, enabling automated asset discovery and vulnerability management whilst detecting and alerting suspicious activity on the OT plant networks.

Our proposals will deliver improved cyber security across all 45 clean water treatment sites and meet DWI targets to comply with those NIS Contributing Outcomes required by 31 March 2028.

Table: Cyber and NIS Enhancement Totex Expenditure (Post efficiency)

	AMP8 £m
BRL Water Network +	3.63
SWB Water Network +	10.21
SWB Wastewater Network +	0

Consultants developed the costs for this bespoke area, alongside internal knowledge of our facilities.

The costs have been generated using a bottom-up exercise of activities needed to close out the NIS CAF indicators of good practice. This has ensured we target investment to specific area to improve our cyber resilience and NIS compliance with little wastage.

External assurance has been undertaken with an external cyber specialist to review the plan.

Long term delivery strategy

Our long term delivery strategy is covered in a separate document.

We have used our long-term planning tools to explore the sequencing and pace of investment over multiple AMPs, to meet targets, to reflect the urgency of improvements and the need to manage bill increases as much as possible by balancing intergenerational fairness, within a range of different future scenarios "futures".

The investment needs necessary to meet our challenges are significant. Which is why we have been especially challenging on ourselves through efficiency and phasing of non-statutory obligations – whilst maintaining compliance. In AMP8 this has helped us to reduce our investment programme by c£1bn when our base maintenance needs are considered as well. These principles have been applied out to 2050 which has helped smooth our investment programme in K9 and 10, due to overlapping commitments across the multiple planning frameworks.

We have thought carefully about when is the right time to invest, balancing the need to improve with the impact that this has on customers' bills and the deliverability of our programme. In addition, our best value planning approach to achieving our ambitions means that, in line with customer and stakeholder priorities, we first tackle the most valued changes, where wider benefits to society and the environment will be realised, and also where doing so gives us greater flexibility to deal with future uncertainty.

The main components of our strategy are to:

- front-load and optimise the value achieved from reducing the use of sewer overflows focusing initially where the impact on public health benefits are greatest;
- adopt alternative pathways to halving our leakage from its 2019 baseline;
- improve the inter-connectivity of our regions before making future decisions around more expensive new water sources;
- bring forward a roll-out of smart metering, enabling additional demand reductions and more progressive charging regimes that will improve the affordability of future investment programmes.
- programme our Net Zero investments so that they focus first on our own operational emissions to achieve Net Zero by 2030, before making further steps at a time when our supply chain has itself been making substantial steps towards decarbonisation. This will mean that our customers do not overpay (or pay too early) for a fully Net Zero outcome which we will achieve by 2045.
- increase investment to replace lead pipes from historical levels but doing so in smoothed but increasing profile over time to manage impacts on bills and supply chain deliverability, and whilst allow us to adapt to customers priorities should they change in the future
- phasing of our cast iron mains replacement to reduce discolouration risk in a sustainable way
- moving the installations of overflow screens until after 2040 means that we can achieve the spill reduction by 2040 in line with customer views but phase costs more whilst meeting screening 2050 targets – noting that it may in the future be found to be unreasonable to screen overflows that rarely spill, if at all
- we have profiled parts of the Nutrient programme within the WINEP into K9. We have also reprofiled K9 into K10 – whilst still meeting 2038 targets for 80% Phosphorous removal as set out in the Environment Act 2021

Cost adjustment claims

The nature of our Greater South West region, with its mix of dispersed population, lengthy coastline, hilly topography and limited groundwater reserves across Devon and Cornwall and more urban areas of Bristol and Bournemouth, has shaped the way in which the company operates as well as its cost base.

In addition, when comparing our costs with other companies, even after attempting a relative assessment by allowing for different number of customers and the differing size of the network, there are reasons why the relative level of costs incurred by South West Water may be higher.

As at PR19, the final cost assessment modelling should take account of key atypical cost factors which impact our cost base. There are some key items which we would propose be accounted for in the base cost assessment.

The factors which we have used to identify cost adjustment claims are:

- Unique characteristics
- Outside management control
- Material
- Not captured in Ofwat's modelling
- Robust estimation less implicit allowance
- Cost efficient.

Throughout, we have adhered to Ofwat's approach to cost adjustment claims, as modified by the CMA at PR19.

We started with twelve possible cost adjustment claims, but, after a process of rigorous analysis and challenge, we have narrowed the list down to three, reflecting additional but necessary expenditure on:

- purchases of water from the Canal and River Trust (CRT), which Ofwat and the CMA endorsed in PR19;
- reducing leakage, given our exceptional performance in these areas; and
- treatment of sludge using liming, which is more environmentally friendly, but more expensive, than alternative methodologies used by other companies.

As at PR19, the final cost assessment modelling should take account of key atypical cost factors which impact our cost base. There are some key items which we would propose be accounted for in the totex assessment.

The factors which we have used to identify cost adjustment claims are:

- cost variations because of factors specific to the region we serve
- outside reasonable management control
- not reflected in a variable used industry wide in efficiency modelling
- materiality levels
- uncertainty, including cost, output or timing estimation

Throughout, we have adhered to Ofwat's approach to cost adjustment claims, as modified by the CMA at PR19.

We started with twelve possible cost adjustment claims, but, after a process of rigorous analysis and challenge, we have narrowed the list down to three, reflecting additional but necessary expenditure on:

- purchases of water from the Canal and River Trust (CRT), which Ofwat and the CMA endorsed in PR19;
- reducing leakage, given our exceptional performance in these areas; and
- treatment of sludge using liming, which is more environmentally friendly, but more expensive, than alternative methodologies used by other companies.

For full analysis and argumentation on cost adjustments, see our separate cost adjustment claims Annex *PR24 Cost Adjustment Claims Final Submission – October 2023.*

Canal and River Trust CAC

In 1962, the management of Bristol Water decided to purchase water from the Gloucester and Sharpness Canal. This has since provided nearly half the company's distribution input. Without this supply, we would not be able to meet our Bristol Water area customers' demand and management has not identified a more cost-efficient supply to replace it.

There is an established precedent for a CAC based on payments to the Canal & River Trust (CRT), confirmed by previous Final Determinations by Ofwat and redeterminations by the CMA.

More than 97% of CRT costs are not directly accounted for in Ofwat's base cost modelling due to the absence of relevant cost drivers. We have therefore deducted the 3% included from our gross claim. Contractual payments made to the CRT for this abstraction are significant. While these costs are included in the costs modelled by Ofwat, no cost driver available to Ofwat can capture this third-party water trading activity. The net additional costs for this CAC are included in the table below, and amount to £11.5 million over AMP8.

Table: Net cost of the CRT cost adjustment claim (£m)

	2026	2027	2028	2029	2030	Total
CRT CAC – Bristol	2.3	2.3	2.3	2.3	2.4	11.5
CRT CAC – SWW	-	-	-	-	-	-
CRT CAC – Total	**2.3**	**2.3**	**2.3**	**2.3**	**2.3**	**11.5**

Leakage

Leakage expenditure represented around 40% of treated water distribution costs over the period 2018-2022. Leakage performance is affected both by management decisions and 'by regional differences that may include some favourable operating conditions or adoption of new assets in response to growth. Low starting levels of leakage may also reflect previous levels of investment'.[10]

In PR19, Ofwat provided AWS with an additional base cost allowance for maintaining leading leakage levels. Following the appeal of PR19, in its final determination, the CMA decided that companies should receive an additional allowance for leakage performance above upper quartile levels, based on the percentage outperformance multiplied by the company projections of efficient future base expenditure needs.

Bristol Water consistently performs above the upper quartile on leakage, incurring extra costs in doing so. When measured by the geometric mean of leakage per length of mains and leakage per property, it ranks first in the industry over the period 2019–22. As such, Bristol holds a unique position concerning the costs it faces as a result of its leading levels of leakage.

The impact of leakage performance on costs is not taken into account in any of the proposed TWD models, despite the significant share of expenditure represented. This concerns the use of either direct performance indicators, or of exogenous factors that may impact the leakage performance. As a consequence, given the high costs required for companies to maintain leading levels of leakage, the base cost allowances calculated in the proposed models are not sufficient.

The claims are material after the deduction of an implicit allowance, calculated according to the CMA's methodology, and have been cross-checked using several separate methodologies.

Table: Net cost of the leakage cost adjustment claim (£m)

	2026	2027	2028	2029	2030	Total
Leakage CAC – Bristol	2.4	2.4	2.4	2.4	2.4	12.1
Leakage CAC – SWW	-	-	-	-	-	-
Leakage CAC – Total	**2.4**	**2.4**	**2.4**	**2.4**	**2.4**	**12.1**

The estimated adjustment over AMP8 is £12.1 million for Bristol Water and £0 million for South West Water, using the PR19 methodology. In our separate cost adjustment claims document, a symmetrical adjustment is presented as an alternative for Ofwat to consider.

This estimate is further corroborated through additional cross-checks, using three new, alternative regression based approaches.

We have been significantly improving our leakage performance in SWW. As the leakage performance in the CMA's approach is based on a three year average, this improvement has yet to move SWW into the upper quartile. However, we would anticipate that 2023/24 data will be available to update the value of this claim. This suggests that an adjustment, using this methodology, may also apply to SWB, and therefore this claim anticipates this outcome (the cross-checks also support such an adjustment for SWB may be appropriate, depending on the final model cost data and leakage performance for the industry).

[10] CMA (2021), Anglian Water Services Limited, Bristol Water plc, Northumbrian Water Limited and Yorkshire Water Services Limited price determinations – Final report, para. 8.72.

Bioresources

The South West Water peninsula limits the opportunities for advanced anaerobic digestion, and the nature of the land bank and maintenance of a farming disposal route means that liming is the preferred technology. This is outside of management control to the extent that it requires regulatory approval through WINEP to obtain enhancement funding for alternative disposal routes, and the lead time would be around 10 years. Therefore, for AMP8, a cost adjustment claim for bioresources remains. We expect that in the future enhancement investment will remove the need for this claim, but this is dependent on DEFRA's eventual technology decision and this has been phased to K9 at the earliest. Whilst we plan to invest the delivery timeframe means that the CAC remains valid in respect of historical costs and our plan needs in the bioresources control.

Environmental legislation does not specifically mandate liming over other methodologies for waste treatment, and indeed SWW uses different technologies for treating a small proportion of its waste. However, our choice of liming for approximately 70% of our wastewater disposal is dictated by other considerations, in particular:

- the relatively acidic soils in our catchment area;
- the high proportion of grassland;
- the agreed WINEP which covers AMP8 (see next paragraph); and
- our need to comply with the Biosolids Assurance Scheme (BAS) incorporating the requirements of the Safe Sludge Matrix and Sludge (Use in Agriculture) (1989) (SuIA) standards.

None of Ofwat's proposed models for PR24 capture the higher costs we have to incur regarding our sludge treatment process. The proposed base cost models would leave us insufficiently funded for AMP8 as we have estimated that our additional efficient costs related to raw liming to amount to about 20% of our projected bioresources costs.

To estimate the cost impact of liming we have examined a number of econometric models, extending Ofwat's bioresources models. The econometric results supporting the claim are reliable and robust and have been derived using different scenarios in order to ensure the accuracy and consistency of the estimates across all approaches and assumptions considered.

An upper quartile efficiency challenge has been applied to our predicted allowances to make sure that the costs presented are efficient. We estimate that, once allowance is made for our choice of a different methodology for treating wastewater, we are assessed to be the second most efficient company.

We consider that our base cost allowances should therefore be increased. While we have derived four different scenarios here, to fill the associated Excel template we have retained the average net claim value, £45.8m.

Table: Net cost of the liming and bioresources cost adjustment claim (£m)

	2026	2027	2028	2029	2030	Total
Bioresources CAC – Bristol	-	-	-	-	-	-
Bioresources CAC – SWW	8.6	8.9	9.2	9.4	9.7	45.8
Bioresources CAC – Total	**8.6**	**8.9**	**9.2**	**9.4**	**9.7**	**45.8**

Real price effects

Allowances for Real (or Relative – to CPIH) Price Effects should be applied to the outcome of the base cost models (irrespective of whether a time trend is included).

Real price effects are applied based on the cost split set out on table SUP11 as below. The splits of cost varies with activity. Energy has increased from c10% to 15-25% of base operating cost in recent years. The impact on liming on bioresources chemical costs can be seen. Other costs include contractors, rates and charges. Labour costs have fallen with increases in energy and other costs. We have broken down our projected AMP8 operating costs as shown in Table below.

Base RPE split	South West Water Wholesale water base	South West Water Wastewater N+ base	South West Water bioresources base	Bristol Water
Labour	28.5%	43.1%	29.6%	20.2%
Energy	24.2%	26.1%	16.7%	17.2%
Chemicals	4.0%	1.7%	21.1%	16.1%
Materials, plant and equipment	2.4%	3.5%	1.5%	1.3%
Other	41.1%	25.6%	31.2%	45.1%
Total	100%	100%	100%	100%

Enhancement costs are similar overall to base, with a higher weighting to Labour and lower to Other.

Enhancement RPE split	South West Water Wholesale water	South West Water Wastewater N+	South West Water bioresources	Bristol Water
Labour	34.1%	45.1%	28.9%	20.2%
Energy	24.9%	29.0%	15.7%	17.2%
Chemicals	3.1%	2.2%	20.0%	16.1%
Materials, plant and equipment	2.8%	3.7%	1.5%	1.3%
Other	35.1%	20.0%	34.0%	45.1%
Total	100%	100%	100%	100%

Retail costs are dominated by IT, contract and debt costs.

Retail RPE split	South West Water Wholesale water	Bristol Water
Labour	12.3%	13.7%
Energy	0.2%	0.1%
Chemicals	0.0%	0.0%
Materials, plant and equipment	2.3%	0.5%
Other	85.2%	85.7%
Total	100%	100%
Total	100%	100%

There are a number of different indices that can be used for considering whether to index industry wholesale costs. We consider the following to be the most appropriate:

- labour costs – the ONS' average weekly earning index for the electricity, gas and water supply industry (K57Y);
- electricity costs – BEIS' electricity price index for the industrial sector, including climate change levy;
- chemicals costs – the ONS's chemicals and chemical products producer prices index (G6SV);
- materials costs – (i) BEIS' all work construction materials price index and (ii) the ONS' machinery and equipment NEC producer prices index (G6VG)

This suggests a persistent above inflation input price factor since PR19. However, the picture is fairly flat (except for electricity) compared to CPIH in 2019/20 and 2020/21. In 2021/22 and 2022/23, however, electricity and chemicals costs increase significantly relative to inflation. See Table below.

Table: Annual rate of input price inflation, 2019/20 to 2022/23

	Labour	Electricity	Chemicals	Construction materials	Machinery and Equipment
2019/20	3.0%	12.5%	(2.1%)	0.8%	1.7%
2020/21	1.9%	3.5%	1.3%	0.6%	0.8%
2021/22	3.2%	14.7%	14.4%	4.4%	3.7%
2022/23 (to date)	4.1%	39.9%	26.9%	12.8%	9.1%

Source: First Economics

Table below combines the data in the table above into estimates of aggregate nominal and real input price inflation.

Table: Ofwat's outturn real price input inflation allowance, 2019/20 to 2022/23

	Aggregate nominal price input changes (A)	CPIH inflation (B)	Real input price inflation (C) = (A) – (B)	Percentage weight for indentifiable inputs (D)	Allowance for real input price inflation (E) = (C) x (D)
2019/20	3.7%	1.7%	2.0%	70%	1.4%
2020/21	2.0%	0.8%	1.2%	70%	0.8%
2021/22	7.5%	3.7%	3.8%	70%	2.7%
2022/23 (to date)	13.3%	9.1%	4.2%	70%	2.9%

Source: First Economics

As shown above the labour cost adjustment would be negative for 2022-23 (i.e. CPIH allows for a greater increase in labour cost than is actually occurring). This is however offset by energy and materials costs.

At PR19, wage inflation was assumed to increase by around 1.3% above CPIH inflation, with labour assumed to be 38.6% of industry costs. This meant that an additional cost allowance for labour inflation of around 0.45% was included in cost projections. This was linked to the ASHE manufacturing wage growth index, which has increased by less than the sector specific ONS index suggested above. ASHE was 1% ahead of the ONS forecast used up to the end of 2021/22, but the acceleration of CPIH inflation is likely to have more than reversed this impact.

Since PR19, the labour index was overall in line with CPIH, meaning the additional wage allowance will end up being returned to customers (i.e. 1.3% above CPIH inflation, around 0.5% overall), however in 2022/23 up to Q3, wages had fallen behind inflation. Therefore, for labour costs it is reasonable to assume that historical labour costs inflate in line with CPIH.

Energy

While energy prices have shown a positive "wedge" for increases above CPIH, forecasts (from the OBR) currently suggest deflation in energy prices over the early part of AMP8.

The tables below show past and forecast values for the difference between the annual changes in energy prices and in CPIH.

Table: Energy prices wedge over CPI

	Difference in increase over CPI	5-year rolling average wedge
Last 28 years (1995-2022)	3.00%	2.2%
Last 20 years (2003-2022)	6.70%	4.9%
Last 10 years (2013-2022)	5.20%	2.2%
Last 5 years (2018-2022)	9.80%	3.4%

Last 2 years (2020-2022)	14.80%	4.7%
Last 2 quarters (2022, Q2 & Q3)	32.20%	8.2%
Last quarter (2022, Q3)	29.00%	9.0%

Source: BEIS, ONS via Oxera

Table: Forecast energy price wedge over CPI

	2023	2024	2025	2026	2027	Is the wedge different from zero?	Is the wedge positive?	Is the wedge negative?
Wedge	-3.51%	-7.53%	-4.34%	-5.54%	-3.31%	Yes	No	Yes

Source: BEIS, ONS via Oxera

This suggests that in the long run there is a small, above CPIH wedge of cost, but this is not material overall to industry costs. The priority therefore is to reflect current base costs for energy within industry allowances.

There is a choice whether to include a price wedge for energy (and index future risk), or to accept that this can be managed. Including an energy price forecast and indexation will suggest allowances should be lower for base costs, helping to reduce the impact of bill inflation.

Using historical average costs therefore is not necessarily incorrect – the 5% p.a. wedge over the past two years is expected to more than reverse. Looking at the 2011-22 modelling period, the wedge is 2.2% p.a. (ie 22%, which then reverses with expected energy price reductions compared to CPIH). Therefore, we assume no energy price reduction on historical allowances is necessary i.e. current higher costs than allowed will reverse through energy price reductions over the next few years.

Labour

Labour costs have broadly been in line with, but slightly above, CPIH up to 2022. Historically, real wage growth is broadly in line with labour productivity improvements over the long term. While recently the UK has experienced negative real wage growth, current forecasts suggest an increase of around 1% per annum over AMP8. However, there is significant uncertainty around these forecasts and, as such, we would suggest a continuation of Ofwat's true up mechanism, with allowances based on a wedge over CPIH similar to historical levels – i.e. around 1% p.a., lower than the 1.4% assumed at PR19.

Table: Labour cost wedge against CPIH

	Wedge	5-year rolling average wedge
Average weekly earnings (AWE)		
Last 17 years (2006-2022)	0.30%	0.2%
Last 10 years (2013-2022)	0.40%	0.2%
Last 5 years (2018-2022)	-0.10%	-0.7%
Last 2 years (2020-2022)	-0.90%	0.6%
Supervision in Civil Engineering (PAFI) index		
Last 20 years (2003-2022)	1.30%	2%
Last 10 years (2013-2022)	0.50%	0.4%
Last 5 years (2018-2022)	-0.20%	1.1%
Last 2 years (2020-2022)	-2.10%	0.8%

Source ONS and BIS data

Chemicals

Historical trends for chemicals have been slightly in excess of CPIH, but with a recent increasing trend. This reflects post Brexit scarcity challenges and the impact of increasing energy costs. Given the forecast of energy price deflation – there is one scenario that the current wedge carries on and an alternative that CPIH will reflect the best future proxy. We assume the latter (see Table below).

Table: chemicals cost inflation over selected time periods

	Wedge over CPI	5-year rolling average wedge
Last 10 years (2013-2022)	1.2%	-0.2%
Last 5 years (2018-2022)	4.6%	0.9%
Last 2 years (2020-2022)	10.2%	1.9%
Last 2 **quarters (2022, Q2 & Q3)**	17.4%	4.3%
Last quarter (Q3 2022)	16.9%	4.6%

Source: ONS

Materials

Materials costs do not show significant difference when compared to CPIH, particularly when considering ONS indices for the water sector. See Table below. Hence, we have assumed that they continue to align with CPIH over AMP8.

Table: Materials cost inflation compared to CPIH

	Wedge	5-year rolling average wedge
Materials cost index (BCIS)		
20 years (2001-2020)	2.00%	0.9%
10 years (2011-2020)	2.10%	0.5%
5 years (2015-2020)	5.00%	0.7%
2 years (2018-2020)	12.10%	1.5%
Inputs for water collection, treatment and supply (ONS)		
15 years (2005-2020)	1.4%	0.4%
7 years (2013-2020)	-0.1%	0.2%
2 years (2018-2020)	-0.7%	-0.1%
Machinery and Equipment products' PPI (ONS)		
9 years (2014-2022)	0.3%	0.0%
2 years (2020-2022)	1.0%	-0.3%
2 quarters (2022, Q2 & Q3)	4.0%	0.0%

Source: ONS, BCIS

Efficiency frontier shift

The future movement in industry cost compared to CPIH is taken into account through the application of a frontier shift in expenditure. If 2022/23 costs are taken as a base year, then the frontier shift should be applied from the following year (2023/24).

Given the productivity shortfalls and lack of growth in the UK economy, however, it is questionable why the water sector should continue achieve a significant uplift on productivity compared to the economy as a whole.

We have participated in a project with other water companies, carried out by Economic Insight, which has provided evidence for what the relative efficiency opportunities are for equivalent sectors to water (such as manufacturing and construction). The report suggests that for the total water value chain with respect to three estimated ranges:

- there is a 'plausible range' is 0.3%-0.8%
- a 'PR24 focused range' is 0.3%-0.7%; and
- a 'sensitivity analysis range' is 0.1%-1.1% (this shows what frontier shift could be, under alternative sets of comparators and time periods to those that Economic Insight recommend). In addition, for water retail specifically, we derive a 'plausible range' of 0.3%-0.6%.

Therefore, from this data, we suggest an overall assumption of 0.5% p.a. (the central estimate of the PR24 focused range).

We have only applied this to base capital and maintenance costs from 2025. For enhancement cost the frontier shift is incorporated within our efficiency challenge of 15% on enhancement costs, reflecting the commitment necessary to the supply chain on the deliverability of this programme – there is no potential for efficiency compared to other sectors of the economy inherent in CPIH based on the scale of the programme, given the level of innovation assumed in this efficiency challenge.

Affordability and vulnerability

Affordability over AMP7

Our record on affordability over AMP7 is excellent. Both South West Water and Bristol Water are currently meeting their performance commitments in this area. In addition, Ofwat described our five-year 'New Deal' plan for 2020-25 as setting "a new standard for the sector".

To fulfil our commitment to keeping bills affordable, in 2023/24 alone, South West Water:

- is keeping increases to its average household bill for water and wastewater services for 2023/24 well below inflation, alongside record levels of investment. The average bill will be increasing by less than £5, to ensure they remain affordable during the cost-of-living crisis. The average household bill for water and wastewater services for 2023/24 will be £476, compared to £472 last year;
- has supported customers with £68 million of benefits,
- is providing a range of support measures for customers struggling to pay their bills and vulnerable customers, with over 79,000 customers expected to access financial support between April 2020 and April 2023.

In direct response to the cost-of-living crisis, South West Water's parent company, Pennon, accelerated the release of its second WaterShare+ issuance, with customers further able to benefit a bill reduction or the opportunity to take a stake in the business, giving them a greater say in their local water company.

By April 2023, 42,000 customers had been taken out of water poverty through South West Water's support tariffs as part of its industry-leading ambition to eradicate water poverty by 2025. Customers will also continue to benefit from the £50 Government Contribution in 2023/24.

A feature of the New Deal is WaterShare+, our unique scheme which shares our success with customers and gives them a greater say in our business. Thanks to our performance between 2015 and 2020 we were able to share approximately £20 million with customers across the Pennon group under WaterShare+ for the second time last year, meaning that each eligible customer received £13 from us as either a reduction in their bill, or as shares in our parent company, Pennon.

In December 2022, in a first of its kind customer incentive scheme, we gave every household customer in Cornwall £30 off their bill after coming together to help Stop the Drop in reservoir levels and saving water to allow Colliford Reservoir to recharge to 30% storage capacity by 31 December 2022.

From April 2023, SWW and BRL have joined a two-way data share with the two principal energy network operators. This is an important first step in achieving Ofwat's and CCW's vision of joined up vulnerability data across both sectors. We can expect the number and percentage of customers in receipt of extra support (PSR) to continue to grow perhaps reaching 10% this year.

To mitigate the potential impact of AMP8 bill increases, alongside our progressive charges work, we are undertaking the following major initiatives:

- we are actively working to increase our data sharing networks with councils building on the data share that Bristol Water has with North Somerset and South Gloucestershire council;
- we are working with the CCW to bolster support for local authority data shares at a more national level with the Local Government Association;
- our affordability modelling is allowing us to predict where problems might arise, and manage them proactively; and
- we are able to auto-enrole customers on social tariffs.

Bad and doubtful debts

Over AMP7, we pursued a significant efficiency challenge by targeting a reduction by 2025 in the annual charge to £11.6m, a reduction of around 20% from the 2020 level within the South West Water region.

Despite the challenging economic environment, we are comfortably exceeding this projection, having reduced our bad debt provision to £8.5 million in 2023. Bristol Water has reduced its provision by the same amount, from £4.8 million to £3.8 million over the same time period.

The South West Water allowances represented a significant uplift from the base average cost to serve reflecting the size of bill and the levels of deprivation in the South West Water region, as identified through the econometric modelling of the efficient level of bad debt charges for the South West Water region.

Over AMP7, we worked hard to deliver improvements in cash collection (focusing on debt collections) but also ensuring customers are on the correct tariff. Specific actions to improve debt collection activities and mitigate debt include:

- Delivering significant improvements to debt collections systems and processes through the replacement of the debt recovery system enhancing recovery and leading to a more seamless customer focused debt journey
- Improved case resolution of high value debtors, including those with large volume issues
- Increased enforcement activity, increasing engagement and payments of those hardened debtors with the means to pay
- Increasing staff capacity, capability and retention through up-skilling, promoting ownership and fostering a more motivating environment
- Bespoke communications to high value debtors, including customers post litigation activity, 'Here to Help' trials and a pre court action letter
- Reduction of previous occupier debt using third parties to trace customers.

As well as robustly driving collections we have also increased the level of support given to those customers who struggle to pay which includes:

- Introduction of doorstep visits earlier in the debt process with a focus on the customers' circumstances to identify those 'can't pay' customers
- Supporting customer benefit entitlement checks (WaterCare+) to increase the income to the household
- Promoting the benefits of metering and the potential savings
- Offering a range of affordability initiatives alongside our social tariff such as ReStart and Freshstart.

These targeted activities have resulted in a 24% reduction in bad and doubtful debt costs for South West Water since 2020, and a 21% reduction for Bristol Water over the same time period. See Table below.

Table: Actual/forecast doubtful AMP7 debt P&L charges by year (nominal prices)

	2020	2021	2022	2023	2024 (f'cast)	2025 (f'cast)
SWW	10.5	7.6	7.9	8.5	8.7	8.7
Bristol Water	4.8	4.9	2.7	3.8	4.3	4.5
Total	**15.3**	**12.5**	**10.6**	**12.3**	**13.0**	**13.2**

For AMP8, South West Water will continue to focus on maintaining a leading performance. The absolute charge is expected to increase due to the impact of real bill increases, but mitigated through expanding our affordability tool kit. Oxera's analysis of our doubtful debt charges shows that SWW's historical levels are within the Upper Quartile, but that Bristol has not been.

Complementing our affordability initiatives the key areas of focus will be:

- Leveraging a new Customer Experience Platform to better identify customers that require help, engaging in the soonest and most appropriate manner to drive positive payment outcomes.
- Using our data-driven Water Poverty model to identify all customers set to be in Water Poverty and proactively engage with them to offer support through our Affordability Toolkit.
- Partnerships with Housing Associations and Councils will be advanced to progress data sharing capabilities to help customers receive affordability support in a timely manner.
- Cross skilling of staff will aid adaptability and enable the practical use of resource availability across multiple departments.
- Under the Digital Economy Act (DEA), utility companies have a unique opportunity to engage with Department for Work & Pensions (DWP) for data sharing purposes. A data sharing agreement between the DWP and us has been implemented with the concentration of customers in receipt of support directly aligning to our own analysis. This allows us to further validate our data and target our affordability toolkit and, allows us to auto-renew customers on our tariffs, removing the barriers to reapply.

The Digital Economy Act allows information sharing between water and sewerage undertakers and public authorities. This will benefit our customers by helping to reduce water and sewerage costs, improving water efficiency and financial well-being for our customers resulting in reduced doubtful debt charges.

These activities are expected to deliver savings over AMP8 as profiled below and are expected to be within the efficient level when considered in the residential retail cost assessment:

Table: Forecast doubtful debt P&L charges by year (nominal prices)

£m	2026	2027	2028	2029	2030
SWW	11.1	11.2	11.5	11.9	12.3
Bristol Water	5.6	5.6	5.8	5.9	6.2
Total	**16.7**	**16.8**	**17.3**	**17.8**	**18.5**

Direct procurement for customers

Ofwat established Direct Procurement for Customers (DPC) at PR19 as an alternative delivery approach for large capital schemes. It involves the procurement of a Competitively Appointed Provider (CAP) to Design, Build, Finance, Operate and Maintain (DBFOM) the required infrastructure.

DPC currently applies to large, discrete projects in the water and wastewater wholesale value chain. Bioresources is excluded from DPC for PR24.

To determine a project or programme's eligibility for DPC, Appointees must apply a series of tests. For PR24, Ofwat has revised its approach to the identification of DPC projects used at PR19 – modifying the size threshold and the discreteness tests, and not requiring the value for money test. Projects identified at PR24 which exceed the size threshold and are considered discrete will be considered "DPC-by-default" (see Table below).

Table: Direct procurement for customers criteria

DPC test	Criteria	Requirement at PR24?
Size test	Is the project or programme's whole life totex >£200m?	Yes
Discreteness tests	Programme scalability test Construction risk test Operations and maintenance test	Yes

Value for Money test	Comparison of NPVs between the DPC (Factual) and in-house (Counterfactual) cases, using Ofwat's standard DPC assumptions.	No

Source: Ofwat

In this section we set out the DPC assessment we have undertaken. The summary of the results is included in business plan tables SUP12, with separate tables for both SWB and BRL.

The conclusion of this assessment is that we do not have any projects or programmes of work that are suitable for DPC at PR24 except for the three Strategic Water Resource schemes that are progressing through the RAPID gateway process. These schemes are being developed by West Country Water Resources and are aligned to the final South West Water Water Resource Management Plan. These three schemes that are DPC by default are:

- Cheddar 2 – a new strategic regional reservoir with treatment works and connection from Bickham Moo to Wimbleball. This benefits South West water resources and is planned to be commissioned in 2033 and fully operational in 2034/35. The resilience to Wessex and Bristol areas provide additional benefits, with the operational use date driven by the connection to the South West area.
- Poole Water Recycling and transfer – recycling and transfer to supplement water resources as part of the environmental destination In the Wessex / Bournemouth Water area, with planned operational use In 2035
- Mendip Quarries – a new strategic regional reservoir and refill abstractions with planned operational use In 2042.

Although Cheddar 2 Is In the Bristol Water area and has been a Bristol Water / Wessex (and originally Southern Water) SRO during PR19, the scheme now features In the SWW final WRMP and this position Is reflected In the final West Country Water Resources regional plan.

Only the Cheddar 2 scheme has construction costs starting In AMP8. All three have project development costs that are Included on SUP12 and CW3 tables, with the Cheddar 2 preparatory construction and planning costs assuming a CAP Is appointed and the ARP assumed from 2033.

We set out further detail on the DPC assessment for SROs after the description our full DPC screening approach.

DPC scheme assessment

We Identified all schemes with totex above £20m within our Investment programme. Whilst we could have gone to a more granular level of detail, and we reviewed our project list below this level to ensure the unlikely circumstances of more than 10 small projects being suitable for DPC. In many cases smaller projects are bundled for Investment planning processes so we also assessed at a bundled project level, and then considered what the largest project was In order to ensure the DPC assessment was as thorough as possible.

For all project / programme groups above £20m AMP8 totex we considered:

- The size test – we considered the estimated Whole Life Cost. Where this was not available we assumed a 5% ongoing cost over 25 years for the purposes of screening of the size test, which Is higher than Is likely to be the case If a more thorough assessment was triggered.
- For the Programme scalability test we assessed:
  - Whether there were other projects with similar characteristics
  - Whether there were multiple AMP programmes that for the same project/projects with similar characteristics extended beyond AMP8
  - Whether the nature of the project was suitable for bundling
  - Whether the timescales made the programme suitable for DPC
- We then considered whether there were any construction risk reasons, noting Ofwat's guidance that these generally can be overcome
- We then considered the operational and maintenance risks, and considered how these could be overcome through DPC.

We reached an overall conclusion:

- If the size test Is not met – did the programme scalability test provide other projects that could be Included
- If so did the construction risk or operational and maintenance risk mean that DPC was not advisable, Informed by the Ofwat technical guidance document.
- We considered this In the round, having undertaken a systematic assessment.

We list in the table below the projects and the assessment. These are the project names within SUP12 where the control and other Information Is contained.

Table: SWW DPC candidate projects

Project / Project Group	AMP8 Capex £m	25 year WLC £m	Size test	Programme scalability test	Construction risk test	Operations and maintenance test	Suitable for DPC conclusion	Comment
IN00002413-N2V0116 New WTW Littleton capex (BRL)	52	117	No	No, Single scheme	Existing partial site upgrade	Existing site upgrade	No	WQ DWI scheme
IN2V0114 New WTW Stowey (BRL)	25	57	No	No, Single scheme, multi AMP	Existing incremental site upgrade	Existing site upgrade	No	WQ DWI scheme
IN3L00012A – WRMP – Leakage	62	139	No	No, Network activity	No, existing assets	No, across whole network	No	Consistent with Ofwat policy
IN1M0055A – Mayflower WTW to Littlehempston WTW	34	76	No	Yes, group resilience schemes, although different types and locations	No, mix of upgrades and new pipework	No, integral to water quality and resources with existing network	No	Cumulative resilience schemes £169m
IN1M0048A – WRMP – WIM18 – Cheddar 2 to Bickham Moor – New strategic regional reservoir and transfer	33	693	Yes	Yes, AMP8 and K9 scheme	Suitable for DPC	Discrete assets – suitable for DPC	Yes	
IN3L0007A – Quality driven mains renewal	33	74	No	No	No, existing network upgrade	No, existing network	No	Programme of small interventions mostly <£5k
IN1M0046A – WRMP – ROA17 – Littlehempston WTW – Dual supply main	29	66	No	Yes, group resilience schemes, although different types and locations	No, mix of upgrades and new pipework	No, integral to water quality and resources with existing network	No	Cumulative resilience schemes £169m
IN1M0026A – COL15 – Restormel WTW	29	65	No	No, single site upgrade	No, increased size of existing site	No, site upgrade	No	
IN8L0013A – WRMP – Metering Smart by 2035	22	49	No	No, short asset life	No	No	No	Consistent with Ofwat technical guidance
N3L0006 Lead pipe replacement medium	21	47	No	No	No, customer assets	No, customer assets	No	
IN1M0023A – Pynes to Allers (Cranbrook to Honiton)	20	46	No	Yes, group resilience schemes, although different types and locations	No, mix of upgrades and new pipework	No, integral to water quality and resources with existing network	No	Cumulative resilience schemes £169m
IN1M0056A – Brent Tor to Launceston (COL25)	18	41	No	Yes, group resilience schemes, although different types and locations	No, mix of upgrades and new pipework	No, integral to water quality and resources with existing network	No	Cumulative resilience schemes £169m

Project / Project Group	AMP8 Capex £m	25 year WLC £m	Size test	Programme scalability test	Construction risk test	Operations and maintenance test	Suitable for DPC conclusion	Comment
IN00002471-N4B4012 Storage schemes to reduce spill frequency at CSOs etc – grey solution; (WINEP/NEP) wastewater capex	226	508	No, individual schemes average £3k – £5k	Yes, but storm overflows vary in type of activity and location	No, modelled output so difficult to define construction risk	No, integral to network and inappropriate ODI risk in contracting	No	Consistent with Ofwat technical guidance
IN00002481-N4B4017 Storm overflow – source surface water separation; (WINEP/NEP) wastewater capex	129	290	No, individual schemes average £3k – £5k	Yes, but storm overflows vary in type of activity and location	No, modelled output so difficult to define construction risk	No, integral to network and inappropriate ODI risk in contracting	No	Consistent with Ofwat technical guidance
IN00002151-IN6F0021 Bioresources	127	285	Yes	Multi AMP, but timeframe does not allow DPX	Yes	Yes	No	Ofwat policy. Emerging IED requirements means alternative financing instead of DPC currently not viable
IN00002483-IN4B4018 Storm overflow – infiltration management: wastewater capex	226	508	No, individual schemes average £3k – £5k	Yes, but storm overflows vary in type of activity and location	No, modelled output so difficult to define construction risk	No, integral to network and inappropriate ODI risk in contracting	No	Consistent with Ofwat technical guidance
IN00002526-IN4F448 Nutrients (Phosphorus removal by chemicals)	91	205	No, highest site Menagwins £23m	Yes, but different upgrades required at different sites	No, existing sites	No, existing sites	No	
IN00002467-IN4B4010 Increase storm tank capacity at STWs – grey solution; (WINEP/NEP) wastewater capex	65	146	No	Yes, largest site £59m	No, modelled output so difficult to define construction risk	No, integral to network and inappropriate ODI risk in contracting	No	Consistent with Ofwat technical guidance
IN00002532-IN4F453 WINEP / NEP ~ Reduction of sanitary parameters – UWWTR	42	95	No	No	No, existing site upgrade	No, WINEP programme requirement	No	
IN00002493-IN4F432 Storage schemes to reduce spill frequency at CSOs etc – grey solution; (WINEP/NEP) wastewater capex BW	40	89	No	Yes, but storm overflows vary in type of activity and location	No, modelled output so difficult to define construction risk	No, integral to network and inappropriate ODI risk in contracting	No	Consistent with Ofwat technical guidance
IN00002284-IN6T0001 STF all sites S10	28	62	No	No, Growth	No, Existing assets	No, Existing assets	No	
IN00002149-IN4B408 River Monitors	26	59	No	No, collective project, asset life less than 25 years	Yes	Yes	No	Consistent with Ofwat technical guidance
IN00002495-N4F433 Storm overflow – source surface water separation; (WINEP/NEP) wastewater capex BW	26	58	No	Yes, but storm overflows vary in type of activity and location	No, modelled output so difficult to define construction risk	No, integral to network and inappropriate ODI risk in contracting	No	Consistent with Ofwat technical guidance

Project / Project Group	AMP8 Capex £m	25 year WLC £m	Size test	Programme scalability test	Construction risk test	Operations and maintenance test	Suitable for DPC conclusion	Comment
IN00002507-N4F439 Storm overflow – source surface water separation; (WINEP/NEP) wastewater capex SW	23	52	No	Yes, but storm overflows vary in type of activity and location	No, modelled output so difficult to define construction risk	No, integral to network and inappropriate ODI risk in contracting	No	Consistent with Ofwat technical guidance
IN00002497-IN4F434 Storm overflow – infiltration management: wastewater capex BW	22	50	No	Yes, but storm overflows vary in type of activity and location	No, modelled output so difficult to define construction risk	No, integral to network and inappropriate ODI risk in contracting	No	Consistent with Ofwat technical guidance
IN1M0050A – WRMP – BNW8 – Mendips Quarry – 30 Ml/d scheme option – raw water transfer and augmentation of the River Stour	14	1576	Yes	Yes, K9 and K10 scheme	Suitable for DPC	Discrete assets – suitable for DPC	Yes	
IN00002554-IN1M0049A – WRMP – BNW7 – Poole Harbour FE-reuse	10	281.4	Yes	Yes, K9 and K10 scheme	Suitable for DPC	Discrete assets – suitable for DPC	Yes	

West Country Water Resources Strategic Reservoirs

Summary

In response to calls from government and regulators, and in recognition of the long lead-in time and challenges of developing new strategic water resources, at PR19 Ofwat allocated £469m nationally for companies to investigate and develop 17 strategic water resource solutions (SRO) during 2020-25.

In the West Country there were three water resource solutions that were funded to follow a gated process to be overseen by a new regulatory alliance called RAPID.

All of the West Country SROs have now passed through gate two. There have been a number of refinements of the portfolio of schemes and scope of the solutions during the process:

- The draft regional water resources plan for the West Country showed that the region faced deficits over the planning horizon, mainly due to new requirements to reduce abstractions from groundwater aquifers and sensitive rivers. Although the original concept at PR19 was that the strategic water resource solutions would provide new water resources for transfer to neighbouring regions it was agreed that the water was required in-region.
- In recognition of the growing need for additional water resources in the West Country a potential new solution, Mendip quarries, was added into the process as a new solution following a later timeline.

Collaboration between the solution partners and all the water companies involved in the national programme has been key to the success of the projects to date.

The three schemes now progressing towards gate three are:

- Cheddar two source and transfer, comprising construction of the second reservoir at Cheddar, water treatment and transfers south to provide resilience to Wessex Water in Somerset and enable a bulk transfer to South West Water's Devon area.
- Poole water recycling and transfer. This scheme includes effluent recycling from Poole wastewater treatment works, and diversion of flow to the River Stour after advanced treatment and subsequent re-abstraction to provide a shared resource between Wessex Water and Bournemouth Water.
- Mendip quarries, an innovative solution to repurpose a quarry in the Mendips at the end of its mineral extraction life as a water storage reservoir. Associated infrastructure includes water abstraction from the River Avon downstream of Bath and water treatment. Two conveyance transfers have been investigated to date with refinements expected following the development of an integrated regional water resources simulator.

The solution partners are Wessex Water, South West Water and Bristol Water. Southern Water ceased as a partner following the change to in-region solutions in 2022.

The forecast cost for the three SROs in AMP7 is £23.5m, which compares with the total allowances provided at PR19 of £17.0m for the three original schemes. The increase is primarily due to the addition of a new solution (Mendip quarries).

For the next AMP the forecast cost (the total across the West Country Water Resources) through to the schemes being 'construction ready' comprises £36.4m for development plus £78.4m for land and pre-construction capex. The South West Water share of development costs Is Included In our PR24 plan.

Development of the Strategic Resource Programme in the West Country

This section describes the development of the strategic resource option programme from the PR19 proposals in 2019 through to the current position and the proposals for AMP8. It covers:

- The PR19 final determination proposals
- A new solution that has entered into the process
- The gated process and the changes that have occurred as the projects have developed
- The current proposal for the remainder of AMP7 and the next AMP.

PR19

In response to a request from Defra and regulators in the summer of 2019, the water company partners of the West Country Water Resources Group (WCWRG) prepared a joint proposal for the investigation of new water resources and inter-regional transfers. The proposals were focussed on the opportunities to provide a bulk transfer to Southern Water which was deemed to be the most pressing need at the time.

Ofwat's final determination in December 2019 allocated £469m nationally for companies to investigate and develop strategic water resource solutions during AMP7, which is described in detail in their appendix to the final determination: pr19-final-determinations-strategic-regional-water-resource-solutions-appendix

In summary the final determination included:

- Allowances for three strategic resource options (SROs) in the West Country
- The setting up of RAPID, an alliance of three regulators (Ofwat, Environment Agency and the Drinking water inspectorate) to oversee the work
- A gated process with a description of the activities to be undertaken at each gate and the timetable for the gates
- A requirement to accelerate the development of solutions wherever possible, such that the solutions were construction ready in the period 2025-30.

The three schemes in our region were:

- West Country North sources & transfers, comprising construction of a second reservoir at Cheddar and transfer of the water across the Wessex Water area to Southern Water. This scheme was put on the accelerated timeline.
- West Country South sources & transfers. This scheme included two resource components: pumped storage at Roadford reservoir in Devon and effluent recycling from Poole wastewater treatment works, along with the necessary transfers across the region.
- West Country – Southern Water transfer. This scheme was dependent on the West Country South sources & transfers scheme and included the additional bulk transmission systems required to transfer the water to Southern Water's Hampshire zone. The aim was to assist in alleviating the deficits in the Hampshire zone caused by abstraction licence reductions on the Rivers Test and Itchen.

New solutions

The PR19 final determination appendix and RAPID's subsequent guidance documents provided a facility to enter new solutions during the process. In recognition of the growing need for additional water resources in the West Country a potential new solution was identified in 2021. At our instigation the new solution was also highlighted in a gap analysis undertaken for RAPID in 2020. Following positive dialogue with RAPID it was agreed that the new solution would enter the gated process with a gate one submission in December 2021.

The new solution is Mendip quarries, which is an innovative solution to repurpose a quarry in the Mendips at the end of its mineral extraction life as a water storage reservoir. Associated infrastructure includes water abstraction from the River Avon downstream of Bath, water treatment and two conveyance transfers: a raw water transfer to augment the River Stour for abstraction by Bournemouth Water, and potable transfer to Wessex Water.

Gated process

All of the SROs have now passed through gate two and are progressing towards gate three. The gate submissions and RAPID decision documents for each gate are all published on RAPID's website: the-rapid-gated-process.

The table below summarises the dates of our submissions and decisions from RAPID:

Table: Gate submissions and RAPID decisions

SRO	Gate one		Gate two		Gate three	Gate four
	Sub-mission	Final decision from RAPID	Sub-mission	Final decision from RAPID	Proposed sub-mission	Proposed sub-mission
West Country North sources & transfers	Sept 2020	Jan 2021	Nov 2022	July 2023	Mar 2025	June 2026
West Country South sources & transfers	July 2021	Dec 2021	Nov 2022	July 2023	Mar 2025	June 2026
West Country – Southern Water transfer	July 2021	Dec 2021	Ceased	Ceased	n/a	n/a
Mendip quarries – new solution	Dec 2021	May 2022	July 2023	Draft due Oct 2023, final Jan 2024	June 2028	Sept 2029

There have been several changes to the scope of the solutions, their purpose and timelines.

The draft regional plan for the West Country, that was issued as an emerging plan in January 2022 and a draft plan in 2023, showed that the region faced deficits over the planning horizon to 2050, mainly due to new requirements to reduce abstractions from groundwater aquifers and sensitive rivers. Although the original concept of the strategic water resource solutions at PR19 was that they would provide new water resources for transfer to neighbouring regions, in our case to Water Resources South East (WRSE), it became apparent that the water was required in-region.

In addition the draft regional water resource plan for WRSE identified better value options and did not select the West Country options. Therefore it was agreed with RAPID that the scope of the schemes should be changed to address in-region needs only.

The scheme specific changes that have been agreed during the gated process are set out below:

West Country North sources & transfers, now renamed Cheddar two source and transfer

- The scheme was renamed at gate one as Cheddar two source and transfer.
- At gate one it was agreed that the scheme could not be delivered by 2027, which was Southern Water's deadline for a solution for their Hampshire zone, and the scheme was moved from the accelerated timeline to the standard timeline.
- In April 2022 during the gate two period the WCRWG provided evidence to RAPID that the water provided by the scheme was required in-region and that further work on the potential transfer to Southern Water should cease. This was agreed by RAPID in May 2022. The subsequent gate two submission concentrated on an in-region option to transfer the water to Wessex Water, as an option to be assessed in Wessex Water's WRMP decision making.
- However the scheme was not selected in Wessex Water's draft WRMP. The gate two work was also caried out prior to the drought in South West Water during summer 2022. Subsequently it has been identified that the scheme will have a role in providing additional supplies to the Devon area.

West Country South sources & transfers, now renamed Poole water recycling and transfer

- In July 2021 South West Water received approval to progress the Roadford pumped storage scheme under their Green recovery initiative. Furthermore, the gate one report showed that transferring the water from Roadford in Devon to Southern Water was not viable. Therefore at gate one the Roadford element and its associated transfer was stopped.
- The scheme was renamed at gate one as Poole effluent recycling and transfer.
- As part of the same package as for the Cheddar scheme mentioned above, in April 2022 the WCRWG provided evidence to RAPID that the water provided by the scheme was required in-region and that further work on the potential transfer to Southern water should cease. This was agreed by RAPID in May 2022. The subsequent gate two submission concentrated on a shared in-region option to transfer the water to Wessex Water and Bournemouth Water.

- The Poole scheme was selected as a shared scheme in both Wessex Water's and South West Water's draft WRMPs.

West Country – Southern Water transfer – ceased at gate one

- As noted above, this scheme was dependent on the West Country South sources & transfers scheme.
- At the gate one decision point the Roadford transfer component was removed from the scope, and the remaining part of the scheme was merged with the West Country South sources & transfers, and renamed Poole effluent recycling and transfer.
- As part of the same package as for the Cheddar scheme mentioned above, in April 2022 the WCRWG provided evidence to RAPID that the water provided by the scheme was required in region and that further work on the potential transfer to Southern water should cease. This was agreed by RAPID in May 2022.

Mendip quarries

- There have not been any changes to the scope of the project. The core scheme presented in the gate two submission in July 2023 is for an in-region use. Potential transfers out of region are treated as future opportunities only.

Current proposals

All three strategic resource option scheme have reached gate two. Two schemes, Cheddar two source and transfer and Poole water recycling and transfer, have received the final decisions from RAPID and are now progressing towards gate three.

RAPID's draft decision on the Mendip quarries scheme is expected by 12 October 2023, which is after the submission date for PR24 business plans. The final decision is scheduled to follow by 18 January 2024. The gate two submission recommended that the scheme should progress to gate three. In June 2023 prior to submission of the gate two reports a detailed presentation was given to RAPID covering the scope, conclusions and recommendations, which was well received. There have been six post-submission queries which have all been responded to without major issues. Therefore, at the time of writing there is no reason to consider that RAPID will not approve the scheme for progression to the next gate, subject to various recommendations and actions for gate three.

The work to gate two has shown that the schemes are technically feasible and deliverable subject to resolving outstanding risk and environmental concerns. The parallel WRMPs have also identified the need for new water resources in the region. The objectives of the further phases of work in gate three and gate four are to reach a point where construction can commence. The principal activities required include: further technical development, environmental monitoring and assessment, pre-planning activities in the run up to planning applications, obtaining consents, land acquisition and running a DPC procurement exercise.

The three schemes now progressing towards gate three are:

- Cheddar two source and transfer, comprising construction of a second reservoir at Cheddar, water treatment and transfers to the south-west to provide resilience to Wessex Water in Somerset and enable a bulk transfer to South West Water's Devon area (to Bickham Moor and Wimbleball).
- Poole water recycling and transfer. This scheme includes effluent recycling from Poole wastewater treatment works, and diversion of flow to the River Stour after advanced treatment and subsequent re-abstraction to provide a shared resource for Wessex Water and Bournemouth Water.
- Mendip quarries, an innovative solution to repurpose a quarry in the Mendips at the end of its mineral extraction life as a water storage reservoir. Associated infrastructure includes water abstraction from the River Avon downstream of Bath and water treatment. Two conveyance transfers have been investigated to date with refinements expected following the development of an integrated regional water resources simulator.

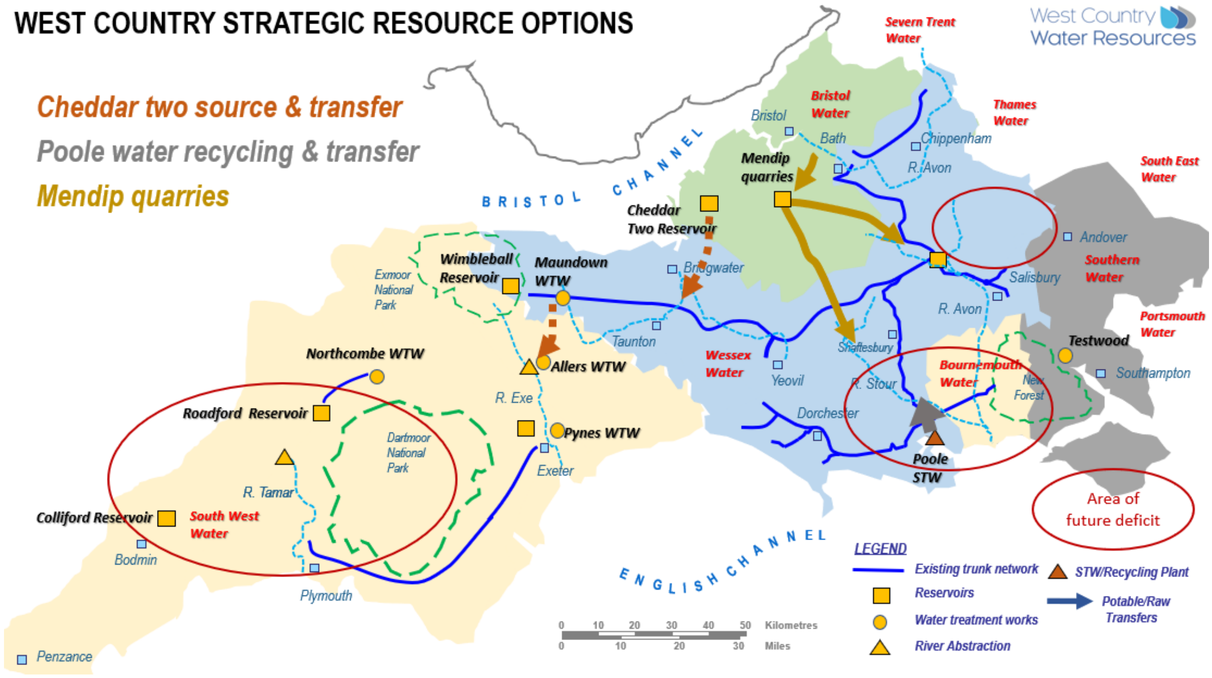
The current proposals for each of the schemes are summarised in the table below. The figure below shows the schemes diagrammatically.

Table: Summary of current Strategic resources options

SRO	Yield Ml/d		Scope	Need
	Average	Peak		

Cheddar two source and transfer	14	36	• Construction of second reservoir at Cheddar (9,000 Ml) • Water treatment works • A transfer to South West Water (SWW) by displacement comprising: o Potable water bulk transfer to Wessex Water in the Taunton area o Network reinforcement in Wessex Water's Somerset area o A bulk transfer from Maundown into SWW's Wimbleball water resource zone during droughts • Following the construction of inter-zonal connections by SWW (as proposed elsewhere) it would be possible to transfer some of the benefit to the Roadford and Colliford zones by displacement. Relevant interconnections that are required in any case feature in our PR24 plan.	To provide additional drought resilience to South West Water's Devon and Cornwall area as identified in their revised draft WRMP. It would also bring additional resilience benefits to Wessex Water's West Somerset area.
Poole water recycling and transfer	12.5	25	As gate two report • Pumping station and raw water pipeline • Water recycling plant • Wetland prior to discharge to River Stour • 15 km environmental buffer • River intake at Longham.	A shared resource. For Bournemouth Water it will facilitate a reduction in abstraction from the River Avon. For Wessex Water it will offset a proposed reduction in abstraction from the groundwater sources at Sturminster Marshall and Corfe Mullen in the River Stour catchment.
Mendip quarries	46	106	As gate two report • Repurposing a quarry in the Mendips (28.500 Ml) • Abstraction from River Avon downstream of Bath • Pipelines and water treatment works • A potable transfer to Wessex Water • A raw transfer to augment the River Stour • Abstraction at Longham and transfer to Knapp Mill WTW.	A shared resource to provide peak supplies to Wessex Water and Bournemouth Water. The scheme is selected in the preferred plan for Bournemouth Water area. The scheme is not selected in Wessex Water's preferred plan but is part of the adaptive plan.
Total	73	167		

Figure: Overall diagram of the SROs



The specific Cheddar 2 project is:

- Abstraction from river Exe and Cheddar springs
- Transfer of raw water to newly constructed reservoir "Cheddar 2"
- Transfer of raw water to newly constructed Honeyhurst WTW
- Transfer of treated water to Danesborough from Honeyhurst WTW
- Transfer of treated water to Farringdon from Danesborough
- Transfer of treated water to Willett from Farringdon
- Transfer of treated water from Maundown WTW to Bickham Moor

With additional options for transfer from Maundown to Parsonage and Prewley.

Summary of financial position

This section provides a summary of the financial position to supplement the commentaries to the business plan tables. It covers:

- The original allowances at PR19
- Changes during AMP7
- The position at the end of gate two
- Share percentages
- The forecasts for gate three and PR24
- A summary of overall position.

PR19 allowances

At PR19 Ofwat made allowances for three strategic resource options (SROs) to follow a gated process overseen by RAPID, with four solution partners, as follows:

The schemes were:

- West Country North sources & transfers
- West Country South sources & transfers
- West Country – Southern Water transfer

And the partners were:

- Wessex Water (WSX)
- South West Water (SWB)
- Bristol Water (BRL)
- Southern Water (SRN)

A total of £14.4m (@ 2017/18 prices) was allocated, equivalent to £17.0m (@ 2022/23 prices).

Each SRO had three partners with different share percentages.

The original intention was that the SROs would be construction ready by 2025-30 with all gates completed within the AMP. Each gate was allocated a percentage of the total allowance for the SRO i.e. gate one 10% , gate two 15% etc.

Changes during AMP7

All the SROs have now passed gate two. In addition to the technical changes described above there were changes to the funding arrangements during the process are summarised below.

Gate 1

- The West Country South sources & transfers and the West Country – Southern Water transfer SROs were merged at the gate one decision point and renamed as Poole effluent recycling & transfers. The gate two allowances were revised by adding the previous allowances and multiplying by 50%.
- Mendip quarries SRO was added into the process after a gate one submission. As a new entrant it does not receive a gate one allowance.

Gate 2

- For the Cheddar two source and transfer and Poole effluent recycling & transfers SROs it was agreed that Southern Water would cease as a solution partner as of 31 March 2022. Their share percentage was pro rated to the remaining partners, applicable from 1 April 2022.
- It was agreed that underspend from previous gates can be carried forward to the next gate.
- In the final decision documents from Ofwat for the Cheddar two source and transfer and Poole effluent recycling & transfers SROs it has been agreed that the allowances for gate three are increased.
- The timelines for all the SROs are now extended so that one of the gate three dates and all of the gate four dates are in AMP8.

Position at end of gate two as at August 2023

As at August 2023 the current position is that:

- Two SROs – Cheddar two source and transfer and Poole water recycling & transfers – have received their final gate two decision. In both cases the expenditure at gate two was considered to be efficient and allowed in full.
- The Mendips quarries SRO submitted its gate two reports on 17 July 2023. The draft and final decisions are expected from RAPID on 12 October 2023 and 18 January 2024 respectively. It is expected that RAPID will allow the expenditure in full, subject to providing an updated of the actual expenditure at the time of representations on the draft decision.

The table below summarises the position at the end of gate two.

Table: Financial summary at end of gate two

SRO	Gate one + Gate two @ 2022/23 prices

	Allowance	Actual expenditure	Variance
Original three SROs allowed at PR19:			
Cheddar two source and transfer, formerly West Country North sources & transfers	1.53	1.39	0.13
Poole water recycling & transfers, formerly West Country South sources & transfers	1.59	1.45	0.14
West Country – Southern Water transfer – ceased at gate one	0.47	0.33	0.13
Total	3.58	3.18	0.40
New solution:			
Mendips quarries	5.92	2.48	3.43
Grand total	9.50	5.67	3.83

Share percentages

As mentioned above there have been some changes to the company share percentages as the schemes have progressed. The table below sets out the position.

Table: Solution partner shares

SRO	SWB	WSX	SRN	BRL	Comments
Gate one					
West Country North sources & transfers	-	29.6%	29.6%	40.9%	As PR19 FD
West Country South sources & transfers	47.3%	26.4%	26.4%	-	As PR19 FD
West Country – Southern Water transfer	33.3%	33.3%	33.3%	-	As PR19 FD
Gate two to 31 March 2022					
West Country North sources & transfers	-	29.6%	29.6%	40.9%	As original %s
Poole water recycling and transfer	41.1%	29.5%	29.5%	-	Revised following merging of 2 SROs as agreed with RAPID
West Country – Southern Water transfer	n/a	n/a	n/a	n/a	Ceased
Mendip quarries	50%	50%	-	-	New solution
Gate two revised from 1 April 2022					
Cheddar two source and transfer	-	42.0%	-	58.0%	SRN dropped out, pro rata balance
Poole water recycling and transfer	58.2%	41.8%	-	-	SRN dropped out, pro rata balance
West Country – Southern Water transfer	n/a	n/a	n/a	n/a	Ceased
Mendip quarries	50%	50%	-	-	New solution
Gate three and four					
Cheddar two source and transfer	-	42.0%	-	58.0%	
Poole effluent recycling and transfer	58.2%	41.8%	-	-	
Mendip quarries	50%	50%	-	-	

Forecasts for gates three and four and for AMP8

This section includes tables setting out the allowances and forecasts for the remainder of this AMP and for PR14. The allowances for each of the SROs for gates three and four are summarised in the table below. The allowances for the next gate are reviewed at each gate decision point.

Table: Gate development allowances (£m @ 2022/23 prices)

SRO	Gate three	Gate four	Source
Cheddar two source and transfer	7.1	2.3	Gate three allowances from gate two decision document; Gate four allowance provisional
Poole water recycling & transfers	7.3	2.2	Gate three allowances from gate two decision document; Gate four allowance provisional
Mendips quarries	13.8	15.8	Provisional pending gate two decision
Total	28.2	20.3	

The forecasts for each of the future gates and the split between AMPs is provided below.

Table: Gate development forecasts (£m @ 2022/23 prices)

SRO	Gate three		Gate four	Total
	AMP7	AMP8	AMP8	
Cheddar two source and transfer	7.1	0.0	4.7	11.9
Poole water recycling & transfers	7.3	0.0	5.5	12.8
Mendips quarries	3.5	10.4	15.8	29.6
Total	17.9	10.4	26.0	54.3

The allowances provided at PR19 and the subsequent changes agreed by RAPID are for development costs only, that is to say the costs required to obtain planning permission, consents, and to run a DPC procurement exercise etc. so that the scheme is construction ready by the required date.

Therefore these allowances exclude other costs that may be required before commencement of construction. Such pre-construction costs include:

- Land acquisition including option agreements
- Early construction/enabling works such as:
    - Utility diversions
    - Advance landscaping
    - Advance environmental mitigation
    - Highways modifications.

The table below provides an estimate of the additional costs required for land and advance capex, arising in AMP8.

Table: Additional pre-construction costs (£m)

SRO	Land	Advance capex	Total
	AMP8	AMP8	
Cheddar two source and transfer	19.4	38.6	58.0
Poole water recycling & transfers	5.4	9.1	14.5
Mendips quarries	5.9	0.0	5.9
Total	**30.7**	**47.7**	**78.4**

The development costs and pre-construction costs will be shared between the partners in accordance with the share percentages, which are currently as set out in the last three rows of Table 4 above.

Our share of this expenditure is shown in table SUP12, which is £33m for Cheddar 2, £13.7m for Mendip Reservoirs and £10m for Poole.

Overall position

Based on the tables above the overall position can be summarised as follows:

- The actual cost to reach the gate two is £5.7m in total, compared with a PR19 allowance for gates one and two of only £3.6m. The increase is primarily due to the addition of a new solution (Mendip quarries).
- The forecast costs for the three SROs for the remainder of AMP7 are £17.9m, giving a total cost for the AMP of £23.5m. This compares with the total allowances provided at PR19 of £17.0m for the three original schemes.
- The increase in cost compared with the original allowances is partly due to the addition of a new solution (Mendip quarries) and partly due to increased costs for delivery of gates three. This increase in AMP7 costs will be reconciled through PR24 reconciliation model.
- For the next AMP the forecast cost through to the schemes being 'construction ready' comprises £36.4m for development plus and £78.4m for land and pre-construction capex.
- Thus the grand total is approx. £138m for the three schemes.

Expenditure and performance commitments

Deliverability

We recognise that the best plans are no use unless we can deliver them. We will maintain our strong focus on deliverability over AMP8, building and improving on our good performance in most areas over AMP7.

Deliverability over AMP7: A strong track record

We are on track to deliver our AMP7 commitments with 70-80% of our performance commitments for South West Water and Bristol Water region on track, with a focus on areas where performance falls short of the targets.

We are delivering our largest environmental programme for 15 years. We have committed significant additional expenditure beyond our AMP7 business plan including:

- Investing £82m as part of Green Recovery programme to accelerate programmes focused on public health, protecting the environment, and addressing climate change.
- Re-Investing efficiencies so that we can deliver £330m in our wastewater programme to 2025 through our WaterFit programme which was launched earlier this year to accelerate healthy rivers and seas.
- Additional investment through our Cornwall Resilience programme to boost resilience in the region through repurposing disused quarries and trialling desalination.

More information on our record on, and plans for, deliverability can be found In our Deliverability and Supply Chain document which accompanies this business plan.

Deliverability over PR24

We know that we cannot be complacent. We will need integrated delivery to enable our plan to be efficient. The scale of expenditure for the whole sector will mean that the availability of skills and resources will be at a premium. Working at catchment-scale with our interventions makes sense for both the environment and affordability for our customers.

Deliverability is a key consideration in the development of our WINEP, which will be the largest environmental programme we will have delivered since the clean sweep programme. It is important that the way we deliver the programme looks for opportunities to reduce cost whilst delivering value for customers and delivering sustainable environmental outcomes. It is essential that we get the right balance between quality, cost and sustainability whilst delivering the benefits with momentum and pace.

Supply chain

Our vision for AMP8 and beyond is to have a fully integrated supply chain for the delivery of South West Water's Capital Programme where we co-design, innovate, contract and deliver in a collaborative environment. We will be co-located with our partners as a fully integrated delivery organisation, identifiable by our partnership brand, with a collective approach to problem solving, to co-create value as single delivery community. Due to the scale and complexity of AMP8, and the opportunity to deliver an accelerated programme, we have already initiated our transformation programme to building upon the success of our H5O Alliance, to create a best-in-class delivery model.

We have recently made significant changes to our client-side capability, capitalising on the merger with Bristol Water. We have strengthened our engineering senior leadership team and appointed six heads of delivery across Clean Water, Waste Water Devon, Waste Water Cornwall (and Isles of Scilly), Reactive Maintenance, Drought and Resilience, and Major Projects and Transformation.

Furthermore, we have expanded our delivery support services to enhance our PMO capability and strengthened our Asset Management team, insourcing wastewater modelling ahead of DWMP delivery, as well as growing our Energy and Carbon capability to ensure we are seizing every opportunity to reduce carbon emissions and remain on track to meet our "Promise to the Planet".

Our integrated delivery model will enable a more effective approach to risk management, ensuring a clear understanding of risk ownership, impact, and the cost of transferring risks to the supply chain.

In our preparation for transitioning to AMP8 we have been engaging with the market to understand how we ensure incentivise investment in the water industry and secure the partners we need to meet the demand. Having conducted extensive market research during the early part of 2022, which included supply chain surveys, 1-2-1 interviews and workshops, we are implementing the following:

- longer frameworks to encourage investment in the region
- simplified and fairer contractual terms, with a more equitable share of risk
- better foresight of the programme; including a more "programmatic" approach to contracting
- a more agile and intelligent internal client capability

To incentivise the industry, following our market engagement, we have reviewed our commercial model to balance the pain/gain share and we are reviewing the clauses in our contracts to make them as simple as possible. We are engaging with the wider construction industry and listening to the feedback, and we envisage the way we are positioning our contracts will encourage reinvestment in the sector, to ensure we can rise to the challenge of AMP8. Integrated delivery models and alliancing are often challenged for lacking in commercial tension; we intend to align our framework partners by geography, principally Devon (Bournemouth and Bristol)) and Cornwall (IoS).

Agility and Efficiency – The End-to-End Delivery Model

Our current delivery model was adopted off the back of our H5O Alliance and has been refined and refreshed to ensure we optimise the business benefits from our existing contracting frameworks. This model is being refined further, to simplify the delivery runways and expedite project governance to enable delivery at pace, in-step with our transition to AMP8, and in the spirit of an a fully integrated delivery model.

Our contracting partners will be embedded at every stage; from assisting with the definition of the problem statement, to accelerating optioneering in the Concept Team to deliver buildable solutions, through to post project reviews.

We are already getting projects into delivery sooner by allocating Programme and Project ownership early, right from the point by which a problem statement is defined, with accelerated optioneering through the introduction of the Concept Team.

We will build upon our experience and lessons learnt from our AMP7 regarding innovation and experimentation, specifically in the nature and catchment-based solutions. We will continue to work closely with stakeholders, including our Upstream Thinking Partners, universities, and colleges to procure a supply chain that will make us market leaders in this area of the industry.

Partnering to co-create value

Our recently formed Engineering Concept Team is a fully integrated centre of excellence, made up of South West Water/Bristol Water employees and supply chain partners. The vision is for this to become an "alliance hub" that will be at the heart of engineering delivery, embedding best practice across all our programmes, implementing innovation, and driving our Net Zero agenda. Our contracting partners are already embedded in our main office, in and amongst the Engineering Directorate.

We are also growing our "self-delivery" capability having trialled this over the past 12 months and we will look to expand the number of suitable programmes that fit this delivery methodology.

We continue to develop a more integrated and agile delivery model that seeks to capitalise on the benefits of co-location and open architecture knowledge sharing, whilst maintaining commercial tension to ensure we get the best value for our customers and the environment.

Accelerated investment

Ofwat has assessed companies' submission for early PR24 scheme delivery as part of Defra's 'Accelerated Delivery' process. Accelerated investment provides early certainty on 2023-25 additional investment ahead of PR24 that delivers over the remainder of AMP7 and AMP8.

We had two weeks in October 2022 to create an accelerated investment programme – this amounted to additional expenditure of £98m in AMP7 and an additional £158m in AMP8. Ofwat allowed £52m in AMP7 and an additional £78m in AMP8. Accelerated schemes will be funded through the transition expenditure programme at PR24. Expenditure incurred on the schemes in 2023-24 and 2024-25 will be considered as expenditure over 2025-30, adjusted for the time value of money from when it is incurred. Ofwat's assessment of efficient cost will be as a "midnight" adjustment to the RCV at 31 March 2025. Any variation in actual spend to that allowed will be at the PR19 cost sharing rates (SWW 50%, BRL 45%).

The schemes approved for accelerated investment by Ofwat are listed in the table below:

Table: Investment schemes for accelerated investment and transitional funding

	£m investment submitted			
	2024	2025	AMP7 total	AMP8 total
DWMP Delivery Acceleration – Storm Overflows	9.75	13.25	23.00	47.05
DWMP Delivery Acceleration – Nutrient Neutrality	4.29	7.73	12.02	16.05
Colliford smart metering and water efficiency	2.79	2.86	5.65	15.34
Free customer leak replacements	4.25	4.25	8.51	0.00

Bristol Area supply pipe leak replacements	0.49	0.49	0.98	0.00
Bristol Area lead free supplies	0.86	0.86	1.72	0.00
Total	**22.43**	**29.44**	**51.87**	**78.44**

For accelerated investment, the early delivery is reflected in AMP8 Performance Commitment targets. For AMP7 the delivery is recorded separately to the existing PC and therefore represents an additional delivery requirement.

Table: Impact of accelerated investment

Scheme	2024	2025	2026	2027	2028
Storm overflow spill reduction	0	0	110	220	330
Colliford smart meters – AMI for AMR replacements	4,477	4,477			
AMI for basic replacements	15,580	15,580			
Colliford flow regulators	14,933	14,933			
Colliford free customer supply leak replacements	4,254	4,254			
Colliford PCC reduction (l/h/d)	0.1	0.2	0.4	0.4	0.4
Colliford leakage reduction (Ml/d)	0.125	0.25	0.25	0.25	0.25
Free customer supply pipe replacements	4,845	4,835			
SWW customer leak replacement (Ml/d)	0.8	1.6	1.6	1.6	1.6
SWW total leakage reduction (Ml/d)	0.925	1.85	1.85	1.85	1.85
Bristol water leakage reduction	0.13	0.25	0.25	0.25	0.25
Bristol Customer supply pipe replacements	500	500			
Bristol external lead pipes replaced	250	250			
Bristol internal lead pipes replaced	125	125			

Information on our ODI targets is available in the Delivering Outcomes for Customers component of our business plan.

Ofwat's Quality and Ambition Assessment

This document is part of the overall business plan providing key information about our proposals and how it answers the quality and ambition expectations associated with the business plan incentive assessment.

The expectations relevant to this document are summarised in the table below. The location of our responses to these expectations within this document are also referenced in the table.

Assessment	Test areas	Expectations	Summary of how we meet these expectations	Document Reference
Quality	Cost	The business plan sets out the benefits of the company's proposals, specifically: • the performance levels delivered through base for all performance commitments; • impacts of enhancement expenditure on performance commitments for 2025-30 and the longer term (ie to at least 2050); • the primary benefits of its proposals. Wherever appropriate it reflects these benefits in performance commitments and price control deliverables; and the additional benefits of its proposals. Wherever appropriate it reflects these benefits in performance commitments and price control deliverables.	The performance levels to be delivered through base and enhancement expenditure are set out in the plan ODI tables and accompany commentary: ODI current and forecast performance under base and enhancement expenditure over PR24. We set out a summary of the primary benefits of our proposals in the *Enhancement Business case documents* Price Control Deliverables are set out in the *Risk and Return document*	Outcomes document and tables CW15 and CWW15
Quality	Cost	The business plan and long-term delivery strategy are consistent with the achievement of statutory requirements and relevant government targets. For Welsh water companies this includes demonstrating how they have taken into account the outputs of the collaborative approach	We demonstrate our commitment to meeting legislative requirements in our main narrative, which shows how we will meet legislative requirements on: wastewater treatment; drinking water quality; bathing and shellfish waters and water abstraction. We set out this information in our *Spotlight on our priorities documents* and out to 2050 in our *Long Term Delivery Strategy*	Spotlight on our priorities Long term delivery strategy
Quality	Cost	The business plan and long-term delivery strategy include investment options which are consistent with the company's finalised water resources management plan, final WINEP/NEP submission and, if applicable, drainage and wastewater management plan, having adequately addressed any feedback previously provided on these. We expect compelling evidence on the need for variations from final plans, if relevant. We will take into account the reasons for any variations in assessing whether minimum expectations have been met.	We confirm that the plan is consistent with our DWI programme, WRMP, WINEP and DWMP. We set out this information in our *Spotlight on our priorities documents*. Consistency with the long-term delivery strategy is demonstrated in the Long Term Delivery Strategy section.	Enhancement Business cases Long Term Delivery Strategy
Quality	Cost	The company proposes to use direct procurement for customers (DPC) to deliver eligible schemes, in line with our 'DPC by default' approach.	We show consistency with Ofwat's DPC framework, and, in particular, the 'DPC by default' approach in the section on Direct Procurement for Customers in this document	This document
Quality	Cost	The company provides sufficient and convincing evidence that the investment proposals within its PR24 business plan are deliverable. This should take into account delivery in the 2020-2025 period and any measures the company has put in place.	We provide evidence on our approach to ensuring that we will deliver our investment programme in the separate *Deliverability and Supply* chain document and in the *Enhancement Business cases*. Our *Outcomes* document sets out how we will deliver each of the Performance Commitments.,	

The table below summarises our evidence against Ofwat's ambition assessment. Appendix One to this document contains a full demonstration of our position with respect to each of Ofwat's requirements.

Table: Summary of SWW performance against Ofwat's ambition assessment

Criterion	See:
Benefits of the proposals	Enhancement business cases, Spotlight on our priorities
Consistency with the achievement of government targets and statutory requirements	Main plan Narrative, Spotlight on our priorities
Consistency with the company's WRMP, WINEP/NEP submission and DWMP	Spotlight on our priorities
Direct procurement for customers (DPC)	Direct Procurement for Customers (this document).
Deliverability of investment proposals	Deliverability and Supply Chain Document
Affordability	Engagement & Affordability Evidence Against Quality Test section of the business plan.
Customer views	Engagement & Affordability Evidence Against Quality Test section of our business plan.
Non-duplication of enhancement investment	The Board's role in this process is discussed in the governance section of our Assurance document. This document describes the allocation to existing base expenditure identified through enhancement investment programmes, and the efficiencies made as a result.

Assurance

The information provided in this report has been produced in accordance with our overall governance and assurance plan. Our justification for our forecast costs is explained in our line by line commentaries to our business planning tables.

We have not considered costs in one area in isolation of others and have considered costs across the whole business taking a rounded approach to cost assessment and efficiency. Our well justified business plan details our overall strategy with respect to the management of our assets. This recognises the trade-off between different asset maintenance techniques such as replacement, refurbishment, or inspections and maintenance.

Our rounded approach has resulted in only three atypical cost adjustment claims in respect of the Canal and Rivers Trust water purchases, leakage, and bioresources, subject to other company specific cost factor drivers being adequately factored into the Ofwat model.

Our cost models have been prepared:

- Independently of other water and sewerage companies
- Top-down from target cost, final actual cost, or bottom-up from estimating procedures and framework supplier rates
- To comply exactly with the reporting requirements and line definitions, including adjustments, exclusions, additions and assumptions.

From a data assurance perspective our forecast cost reporting is prepared by a dedicated team involved in preparing the information. Information is sourced from the business and is subject to a detailed review process by the central PR24 team. This information is then approved by the relevant Senior Manager and Director prior to submission.

This is reviewed by relevant Senior Managers, Directors and authorised at South West Water Board. Both the compilation and the review at Director level are undertaken by a regulatory expert, who understands the details of the business plan and Ofwat's requirements.

Data tables are subject to audit procedures from our core financial assurers, KPMG, or our core technical assurers, Jacobs and Turner & Townsend. These procedures are described in more detail alongside assurance across the business plan in our 'Data, Information and Assurance' document.

The table below lists the elements of our proposals which we have developed using significant input from third parties, the name of the third party and a description of the information or analysis we have used.

Table: Third party input into elements of the cost proposals

Element	Third party providing input	Input provided
Cost adjustment claims	Oxera	Oxera has undertaken significant economic modelling to provide us with the analysis required to submit our cost adjustment claims
Real price effects	First Economics	Analysis of historical inflation rates for components of operating expenditure
Frontier shift efficiency	Economic Insight	Analysis of productivity and frontier shift efficiency trends and implications for the PR24 review
Cost efficiency modelling	Oxera	Oxera has undertaken econometric modelling to attempt to project Ofwat's benchmarking approach to PR24

We have also commissioned Fingleton, the regulatory consultancy, to review this section of the business plan. Fingleton concluded that the document was in "good shape" and gave some suggestions for improvement. We have taken those suggestions into account and acted on them in finalising the document.

Third Party Credentials

Oxera

Oxera is a leading independent economics consultancy. They advise companies, policymakers, regulators and lawyers on any economic issue connected with competition, finance or regulation. They have been doing this for more than three decades, gathering deep and wide-ranging knowledge as they expand into new sectors. They have a reputation for credibility and integrity among those they advise, and among key decision-makers, such as policymakers, regulators and courts. Today they have offices in Oxford, Berlin, Brussels, London and Rome and are able to advise international clients in a highly flexible way, including providing advice in several other languages.

KPMG

KPMG is a leading provider of professional services, including audit and advisory solutions integrating innovative approaches and deep expertise to deliver real results. They have extensive water industry experience.

They have worked with South West Water over a number of years. Their team has a unique combination of financial analysis skills, combined with regulatory finance and corporate finance expertise; with experience of advising on financial structuring, financial strategy and financial resilience.

Economic Insight

Economic Insight are at the forefront of economic regulation, advising companies and regulators across the water, energy, telecoms, and transport sectors. Their specialisms include cost assessment and efficiency benchmarking and risk analysis.

First Economics

First Economics is an economic consultancy formed in 2004. They specialise in assisting companies, investors, regulators and government across the full range of economic and financial issues that are encountered in regulation. The principal areas of expertise are price control formulation, incentive design, cost of capital estimation, financial modelling, efficiency analysis and competition analysis.

Annexes

Annex A: Comments on Cost models and Cost Adjustment Claims

This document, published alongside our business plan, highlights some of the key points of the base cost modelling at PR24. While reiterating part of the evidence that we have already provided in our base cost consultation response in May, we add additional key elements further to the publication of companies' responses to the consultation.[11] We also assess the strengths and weaknesses of companies' symmetrical cost adjustment claims (CACs).[12]

Our response is structured as follows:

A. Water modelling

B. Wastewater and bioresources modelling

C. General points on wholesale modelling

D. Retail modelling

Water modelling

Density variables

In our base cost consultation response we expressed our preference for the use of both WAD from MSOA and properties per length of mains as density variables. We note that the large majority of the industry is aligned with our position in this regard. Indeed, only five companies support the continuation of the refined version of the PR19 density driver in the modelling, WAD LAD from MSOA. However, we find the different arguments for WAD LAD from MSOA quite weak and therefore we consider that there is no robust reason to keep this variable in the modelling suite.

Among the companies' responses in favour of WAD LAD from MSOA, one of the main arguments mentioned was the consistency with PR19. While not disagreeing, in principle, that consistency should be considered wherever appropriate, it is not a valid argument in this context since it should not prevent Ofwat from developing and using more robust alternative density drivers to improve the accuracy of the model and better capture the link between density and costs. Indeed, there are a number of areas where Ofwat has developed its PR19 models in order to improve their robustness.

One other point, made by United Utilities, was the better ability of WAD LAD from MSOA to capture the U-shape relationship between density and TWD costs, though this does not apply to the other two cost aggregations, at the water resources or the wholesale water level. However, it also notes at the same time the 'strong relationship between density [WAD from MSOA] and treated water distribution (TWD) botex'.[13] Indeed the relationship between density and botex is stronger with WAD from MSOA than with WAD LAD from MSOA.

Related to consistency with the PR19 models, the main push back against the use of WAD from MSOA has been about the large changes in efficiency scores produced for some companies. Similar to our response on the consistency point above, this is not a valid argument either since the underlying changes in estimated efficiency can be simply explained by the weaknesses of the PR19 density driver which gave biased results.

We also note that WAD from MSOA does not depend on changes of LAD boundaries over time and relies on more granular data by mapping directly the population density data to company boundaries, rather than artificially aggregating density at the LAD level like WAD LAD from MSOA, which is not supported from an engineering perspective. Indeed, it is not clear why an aggregation at a LAD level would be appropriate and be able to better capture companies' costs related to density.

[11] Available here: https://www.ofwat.gov.uk/consultation/pr24-econometric-base-cost-models-consultation/#Responses.
[12] Ofwat (2023), 'Symmetrical CACs summary', June.
[13] UUW (2023), 'UUW response – Consultation on econometric base cost models for PR24', April, p. 11.

There is no reason to consider that the PR19 model outcome is closer to a 'correct' answer, which focusing on changes in efficiency scores is effectively doing. The greater granularity of WAD from MSOA represents an improvement in capturing density in the model and means that it is automatically superior to WAD LAD from MSOA. The focus should be on the construction of the density variable and on the associated economic rationale, not on the changes in efficiency scores. As rightly pointed out by Welsh Water in its base cost consultation response, the WAD from MSOA variable 'also has the advantage that the areas are of a more uniform size compared to the LAD areas which vary between c2,000 and 1.1m population'.[14]

As previously mentioned, while acknowledging that properties per length of mains does not necessarily capture intra-zonal variations or the presence of sparse and dense sub-areas within a company's supply area,[15] we think its different density measurement is equally valuable since it captures sparsity linked to network configuration and where the assets are. It is a useful alternative perspective to the MSOA data and consistent with the PR19 approach on wastewater.

We do not give credit to arguments pointing out the endogeneity of properties per length of mains as they are automatically undermined by the use of properties and length of mains as scale variables in the modelling. The number of properties remains outside company control and the length of mains in the network is driven by the location of properties and any extension implies considerable investment, which makes the likelihood of artificially laying mains beyond the level required with the aim of 'playing' with the model close to zero.

Finally, we agree with Welsh and Yorkshire on the fact that an equal weighting should be given to WAD measures and properties per length of mains. At the moment Ofwat's approach places two thirds of the weight to WAD measures,[16] which is not justified. Removing WAD LAD from MSOA from the modelling suite will solve the issue and give an equal weighting to both properties per length of mains and WAD from MSOA.

Network topography

Among the four cost adjustments related to network topography and pumping requirements, the following proposals have been made:

- Remove booster pumping stations per length of mains (BPS/L) from the modelling suite and rely on APH TWD instead as the only topography driver (Anglian and South Staffs). We note that this is perfectly aligned with the position expressed in our base cost consultation.
- Use APH (TWD or total) and BPS/L in the same models rather than in different models (Severn Trent).
- Include APH WRP in WRP models and rely on total APH in WW models instead of APH TWD (Severn Trent and SES).

As highlighted previously, we consider that the quality of the APH data is high enough to be relied upon. We acknowledge the concerns highlighted by Northumbrian and Affinity about the presence of outliers in terms of the min-max range of reported values of APH TWD between 2011/12 and 2021/22 but do not consider it to be an issue. Since the degree of confidence on the 2021/22 and 2022/23 data is very high, as this data fully incorporates Ofwat's updated reporting guidance for APH, if Ofwat have concern on a few atypical values that may not be justified operationally, those values could simply be replaced by the 2021/22 and/or 2022/23 or any historical year deemed to be more representative.

We insist on the clear superiority of APH TWD to explain TWD costs, as rightly pointed out by CEPA in its modelling report: 'we would expect APH to be most relevant for explaining TWD costs'.[17]

We therefore reiterate our position about the fact that BPS/L is not an appropriate cost driver to account for network topography.

1. It is completely uncorrelated with energy requirements, as rightly pointed out by Anglian in the appendix of its base cost modelling response.[18] Indeed, the R2 of a simple linear model between BPS/L and power costs related to the distribution network is close to zero, 0.02, as opposed to 0.27 for APH TWD, i.e. about 13 times higher. Similarly, when compared to total energy consumption to remove the impact of prices, the gap in explanatory power between APH TWD and BPS/L is five times higher, 0.41 vs 0.08.

[14] Welsh Water (2023), 'WSH-Econometric-base-cost-models-for-PR24-response-template-WSH.xlsx', May, Q3.3.
[15] Arguments made by Southern and Thames Water.
[16] Although we acknowledge that this does not necessarily represent Ofwat's intention, since the purpose was to consult the industry on a wide variety of density measures.
[17] CEPA (2023), 'PR24 Wholesale Base Cost Modelling', April, p. 23.
[18] Anglian Water (2023), 'Anglian Water: Base modelling consultation Response Appendix', pp. 7-11.

The statistical significance of APH TWD is greater than BPS/L in every model. While the difference in TWD models is marginal (0.000 vs 0.002), the gap is higher in WW models, as shown in Table 0.1 below. Unlike APH TWD, BPS/L is correlated with density which, aside the lack of clarity of its role in the modelling, raises additional concerns on the validity of the models. BPS/L is more than three times correlated with density than APH TWD.

Table 0.1 P-values of the estimated coefficients of APH TWD and BPS/L in WW models

Models with APH TWD				
APH TWD	0.003	0.004	0.022	0.032
Models with BPS/L				
BPS/L	0.006	0.004	0.049	0.045

Table 0.2 Correlation of APH TWD and BPS/L with density drivers

	Ln(WAD from MSOA)	Ln(Properties per length of mains)
Ln(APH TWD)	-0.181	-0.198
Ln(BPS/L)	-0.609	-0.679

2. It is not a topography driver.

3. While a normalisation of a variable by the scale driver is generally valid and appropriate, in this context it translates into an approximation of the desired effect which is to capture the relationship between BPS and treated water distribution costs. SES made a good point in this regard in its base cost consultation response : 'If mains length increases below the necessity for building an extra booster pumping station (meaning the number of boosters remains the same while the mains length keeps growing), the value of booster per km of mains will decline – but this should not be taken to mean that the overall cost of operating the network has in fact fallen'.[19] Since we benefit from a more robust alternative with APH TWD, BPS/L can simply be dismissed.

For the reasons stated above we do not consider it appropriate to keep BPS/L in the modelling suite.

Severn Trent's proposal to use both APH and BPS/L in the same models is not appropriate either. Moreover, we note that it is not valid to include two cost drivers in the same models while they are supposed to capture the same effect, here, network topography. Similarly, Ofwat does not rely on the weighted average composite (wac) variable and on the percentage of water treated in bands 3-6 (pctwater36) in the models, since both are supposed to reflect network complexity. The statistical significance of both BPS/L and APH TWD in the models is mainly due to the fact that the former is highly correlated with density. Indeed, this can clearly be observed in the decrease of the magnitude of the estimated coefficient of the two density variables between a model with APH TWD and a model with BPS/L, i.e. a reduced importance of the density variable due to the fact that it is already captured in the presumed 'topography' variable BPS/L.

Table 0.3 Estimated coefficients of APH TWD and BPS/L in both TWD and WW models

	TWD models with APH TWD	TWD models with BPS/L	WW models with APH TWD (average value)	WW models with BPS/L (average value)

[19] SES (2023), 'Base cost consultation response'.

Models with WAD from MSOA				
Ln(WAD from MSOA)	-6.680	-5.755	-6.185	-4.634
Ln(WAD from MSOA)²	0.455	0.406	0.387	0.298
Models with properties/mains				
Ln(properties/mains)	-17.005	-15.366	-12.551	-10.958
Ln(properties/mains))²	2.102	1.951	2.886	1.280

We also disagree with Severn Trent and SES's suggestion to use APH WRP in WRP models. As mentioned by Turner and Townsend in its 2022 report on the data quality improvement of APH , the quality of the APH data in water treatment is not yet robust enough to be included in the models.[20] Moreover, we agree with Ofwat that the most appropriate proxy for treatment complexity are the consideration of complexity bands, through the wac or the pctwater36, but not APH. This is confirmed by the assessment of SES and Severn Trent to include APH WRP in WRP models, as the associated estimated coefficient is statistically significant at the 10% level in only one of the four models and insignificant in the other models.

Table 0.4 P-values of the estimated coefficients of APH WRP in WRP models

	WRP3	WRP4	WRP5	WRP6
Ln(APH WRP)	0.175	0.131	0.113	0.077

Therefore, Severn Trent and SES' proposals to rely on APH WRP should be dismissed. If a variable is not retained in any of the bottom-up model, then it is not appropriate to use it in top-down models either. Indeed, in this context APH WRP is not able to explain TWD costs and, therefore, it would not make sense to use it in WW models if its explanatory power of WRP costs is not high enough.

Economies of scale at water treatment works

SEW argues that the PR24 cost drivers fail to properly account for economies of scale associated with water treatment works (WTWs). SEW reports that it operates the second largest number of water treatment works (WTWs) per property (as an indication that it operates, on average, smaller WTWs than the rest of the industry)[21] For this reason, SEW states that it cannot benefit from the same economies of scale as the rest of the industry.

However, as summarised below, we find that the model amendments suggested by SEW contain some weaknesses.

SEW argues that Ofwat's proposed models for PR24 do not include variables that could explicitly capture WTW-level economies of scale, but this view does not reflect the state of the current modelling suite as economies of scale are captured via the correlation with other variables included in the models. Ofwat has made the same argument as a reason for not including regional wages,22 due to its correlation with density (see section on the regional wages CAC of AFW and SRN). Ofwat includes cost drivers that effectively capture the economies of scale at WTWs, such as density variables, the weighted average treatment complexity (wac) variable and the percentage of water treated in bands 3 to 6.[23]

[20] Turner & Townsend and WRc, 'Average Pumping Head: data quality improvement', 2022.
[21] SEW reports the average number of WTWs per property over the period 2017/18-2021/22 and it shows that it has the second highest value in the industry interpreting this as an evidence for the fact the SEW operates with smaller WTWs.

[22] Ofwat (2023), 'Econometric base cost models for PR24', April, p. 30. This is also developed in the regional wages section of this appendix.
[23] At first sight this appears similar to the reasons for including economies of scale measures in wastewater treatment models, however, in those models there are no measures of density which could capture this issue. In WRP models, the combination of both treatment complexity and density capture the effect of economies of scale.

While SEW presents correlation analyses between economies of scale variables and these different cost drivers, showing that WTWs economies of scale measures are correlated with density and water treatment complexity drivers, it argues that such analysis does not account for multiple drivers simultaneously and is therefore only a partial analysis. We disagree. SEW's proposed measures to capture economies of scale at WTWs, mainly WTWs per property and WTWs per treated volume, are indeed highly correlated with water treatment complexity drivers with a negative coefficient lying from 0.50 to 0.77 as well as with density drivers (though to a lesser extent), whether WAD from MSOA or properties per length of mains, as we can see in

Table 0.5 below.[24]

There is, therefore, strong evidence than economies of scale at WTWs are captured by the current cost drivers already included in the modelling suite.

Table 0.5 Correlation between suggested cost drivers by SEW and PR24 cost drivers

	Ln(WTWs per property)	Ln(WTWs per treated volume)
Ln(wac)	-0.50	-0.54
Water treated in size bands 3–6 (%)	-0.60	-0.62
Ln(WAD from MSOA)	-0.36	-0.40
Ln(properties per length of mains)	-0.36	-0.38

To estimate the relationship between costs and treatment plant size, one of the methodology used by SEW relies on data on SEW's power and chemical costs only. However, this relationship is then assumed to be valid for other companies and assumed to be valid for the remaining components of WRP BOTEX which further undermines the validity of this CAC as there is no evidence provided that economies of scale can be inferred to exist for the remaining and more substantial elements of BOTEX.

In summary, the changes suggested by SEW related to WTWs economies of scale are not viable and should not be considered as possible additions to PR24 cost models given the associated correlation with current cost drivers.

Reservoir maintenance

We provide below our comments on UUW's CAC covering the costs related to reservoirs maintenance that it considers are not accounted for in the modelling.

Summary of our position at the base cost consultation

First, as indicated in our base cost consultation response,25 we are not convinced of Ofwat's intention to collect data based on number, as opposed to capacity of reservoirs. It is not clear how this would prove to be more statistically robust, as the minimum size threshold covers virtually all of the relevant reservoirs and we reasonably expect costs to increase with size.

[24] Here and throughout this appendix, we do not assess WAD LAD from MSOA given the clear superiority of the other two density drivers.

[25] South West Water (2023), 'SWB-BRL PR24 base cost consultation template', Q3.4.

Second, we highlight the complexity of engineering and econometric modelling concerning water sources. The availability of water resources is largely exogenous, and in each location there are many non-cost factors that can affect the choice of where capacity exists. Costs are then sunk for water resources investment, with OPEX and maintenance optimised across a wider cost base that includes treatment and distribution. In such a context, adding a variable controlling for only for one of the possible water sources appears both to be an oversimplification and to introduce omission biases related to the other sources. Moreover, as maintenance costs have been incurred historically, they have been consistently picked up in the past modelled allowances.

Critique of operational rationale

UUW presents the operational challenges related to operating and maintaining reservoirs as opposed to those related to sourcing primarily from boreholes. However, there is no singular trade-off between the cost of operating reservoirs compared to boreholes. Indeed, the cost trade-off between the use of reservoirs and boreholes is not as direct as described by UUW. If there were no clear cost disadvantage for companies carrying out additional pumping activities (since it is, according to UUW, offset by lower reservoir maintenance expenditures), we should not find significant and positive coefficients on pumping variables.

In particular, emphasis is placed on the introduction of pumping activity variables by Ofwat (APH TWD and BPS/L), which, according to UUW, should reflect the additional costs to companies who predominantly rely on groundwater. In its claim, UUW argues that the WRP models do not reflect the extra costs of dam maintenance for those companies which have a higher than average number of reservoir sources compared to boreholes, thus leading to unfair outcomes.

However, similar narratives could be proposed for any water source. In our response to the base cost consultation we emphasised the costs related to river abstraction. For example, reservoir water may be cheaper than river-abstracted water, as multiple reservoirs can be associated with common treatment works, whilst each individual river water abstraction requires a nearby separate treatment works. Moreover, some river abstractions have characteristics (such as bankside storage or canal) that make the associated assets similar to a reservoir in terms of maintenance and investment needs. The relationship with treatment complexity is therefore complex, as river-abstracted water could require more or less treatment complexity than a reservoir. Furthermore, water is more likely to be available from a reservoir than a river at peak drought times, although at increasing treatment risk as reservoir levels reduce.

We present below a number of issues with UUW's CAC.

Critique of econometric analysis

UUW's proposed addition of the number of reservoirs as an independent variable only concerns the water resources plus models. However, Ofwat generally requires a variable to be statistically significant across all models including the relevant costs. In the case of water resources, these are included both in the WRP and in the WW models. In this regard, we find that the number of reservoirs fails to be consistently statistically significant in the WW models.

We expect that a trade-off in costs between different water sources should be identifiable at the aggregate level. However, in the WW models, the number of reservoirs is only significant when used alongside APH TWD, and not when the variable proxying pumping activity is the BPS/L.

By further investigating into the relationship between these variables, we note that APH TWD is negatively correlated with the number of reservoirs, while there is a strong positive correlation with BPS/L. Critically, the positive correlation goes against UUW's narrative of a trade-off between pumping and reservoir costs and hence weakens the operational rational presented as the basis of this claim.

Critique of UUW's uniqueness

Although we agree that UUW operates the largest number of reservoirs in the country and may have been particularly impacted by the issue of reservoir maintenance, we believe these figures need to be scaled to relative terms. Indeed, UUW ranks third in terms of number of reservoirs per property, behind HDD and WSH and on a comparable level with YKY, although UUW was the only company to present a claim on the issue. The lack of similar CACs weakens the arguments presented by UUW.

Critique of proposed adjustment calculations

We find UUW's proposal of a combination of econometric and unit cost approaches in estimating the symmetric adjustment to be excessively complex and prone to volatility and robustness issues.

In particular, the use of non-econometric models leads to numerous problems, as the estimates are based solely on UUW historical data, which cannot be assumed to apply to the entire industry. Moreover, companies' adjustments are heavily influenced by changes in other companies' allowances, which further exacerbates issues related to data reliability.

The use of a purely econometric model would enable a significant simplification of the approach, for example by removing the need to separately calculate implicit allowances both for pumping and maintenance costs. However, as highlighted above we note that the coefficients on the proposed reservoirs variable are not consistently statistically significant in the WW models.

B. Wastewater and bioresources modelling

Economies of scale at sewage treatment works

It is important to take account of economies of scale at sewage treatment works (STWs). On this issue, there is a large consensus within the industry about the superiority of the weighted average treatment size (WATS) variable over the percentage of load treated in bands 1 to 3 (pctbands13) and the percentage of load treated in STWs with a population equivalent of 100,00 and above (pctload100k).

When comparing pctload100k with WATS, it is clear that the former is unable to reflect the continuous decrease in unit costs as the size of STWs increases. Indeed, it is incorrect to assume that the unit cost to operate in a STW with a population equivalent (p.e.) of 100,000 is the same as the one in a STW of a p.e. of 500,000 or 1,000,000. There is substantial evidence that this is not the case. This has, for example, been clearly demonstrated by Anglian in its CAC,[26] where it was shown that the average unit cost is continuously decreasing. Indeed the unit costs for each company's highest band are significantly lower than within STWs of a p.e. of 25,000-125,000.

In addition, there is also the issue of the choice of the arbitrary threshold and it is not clear why alternative thresholds would not be more appropriate. In any case, to the extent possible, we should avoid relying on any arbitrary thresholds.

The superiority of the WATS variable compared to pctload100k is confirmed by the statistical results of WWWNP models.[27]

Table 0.6 P-values of the estimated coefficients of WATS, pctload100k and pctbands13

	SWT1	SWT2	SWT3	WWWNP2	WWWNP3	WWWNP4
Ln(WATS)	NA	NA	0.000	NA	NA	0.005
Pctload100k	NA	0.002	NA	NA	0.067	NA
Pctbands13	0.258	NA	NA	0.022	NA	NA

While supported the PR19 driver, pctbands13, in our base cost consultation response, the statistical performance in the SWT model appears to have significantly worsened since then, from a p-value of 0.21 at the time to 0.26 with the updated data set, which is concerning. While we thought that the decrease in explanatory power compared to PR19 was transitory, this does not seem to be the case. One of the issues faced by this variable is the arbitrary thresholds determining bands 1-3 and the assumption of a tipping point beyond which diseconomies of scale cease to apply. One of the issues is that, unlike large STWs, we do not benefit from disaggregated data for smaller STWs, so it is difficult to not define arbitrary thresholds in some way. Consequently, we would recommend to either work on an alternative similar cost driver, which is able to better capture the higher costs arising from the operation in small STWs, or, if not possible, to only rely on the WATS variable.

Last, it is critical to not use any top-down WWWNP models that do not explicitly capture economies of scale, as is currently the case with WWWNP models 1 and 5. This is consistent with our position on retail, where we do not think that other cost and total cost models without any scale variable are appropriate. Indeed, there is clear evidence that there are economies of scale at sewage treatment works, so it is not aligned with the operational rationale to use models that do not capture such a relationship. These models should not be used at PR24, at all, as they decrease the weight given to economies of scale and will overfund companies with large SWTs and underfund those with small SWTs.

[26] Anglian Water (2023), 'Cost Adjustment Claim: Absence of Large Water Recycling Works ANH CAC 2.1', June, p. 7.
[27] We have updated the SWT and WWWNP models with the 2022/23 APR data, but we have not updated the computations of the WATS or the pctload100k. For these two variables we used the 2021/22 values. In any case, we would not expect the 2022/23 values to change the statistical results and the conclusions.

Coastal population and network complexity

We welcome Ofwat's initiative to consult the industry on the appropriateness of building sewage treatment models that recognise the higher costs related to wastewater companies operating near the coast. Obviously, the percentage of the population living at or near the cost is not within management control. Its consideration in the models can help to recognise the additional costs related to UV and total nitrogen consents that these companies face. It can also help to capture the larger network capacity that coastal companies have to accommodate with summer peak load due to tourism. As rightly pointed out by Southern, this results in additional maintenance and operation cost, both during peak and off-peak periods.

The saline environment is also an issue since assets need to be replaced more frequently due to corrosion.

We are, therefore, supportive of Southern's proposal to add the percentage of coastal population as an additional cost driver. Based on our response above in section 0, we would expect the percentage of coastal population to be used alongside the WATS and potentially alongside a refined version of the percentage of load in bands 1 to 3 (as its current statistical significance is not satisfactory).

We note the strong performance of the percentage of coastal population in the modelling, with the estimated coefficient being always statistically significant at the 5% level. One concern raised by Ofwat at the consultation phase was the counterintuitive negative sign of the coastal population driver in the SWT model relying on the percentage of load in bands 1 to 3 once Southern is removed from the analysis. We note that this is still the case with the inclusion of the 2022/23 data, though only marginally (-0.001). Given the continuous and accentuated poor performance of the percentage of load in bands 1 to 3 in the SWT modelling, we would recommend Ofwat to not make any early conclusions on this basis, since it is likely due to the reduced statistical performance of this cost driver compared to PR19.

Indeed, this issue does not occur when the percentage of coastal population is used alongside the WATS variable, which is our preferred cost driver for capturing economies of scale for the reasons stated above. This confirms the appropriateness of the consideration of the coastal population in the modelling.

Finally, we would encourage Ofwat to consider alternative WWWNP models relying on coastal population. For example, pumping capacity could be replaced by Southern's proposed cost driver in a subset of models. This would help to also recognise the higher costs associated with operating coastal areas and provide a more complete view of the relationship with wastewater network plus costs.

Growth at sewage treatment works

We have considered the different proposed methods by which an allowance for growth at sewage treatment works costs (STW growth costs) could be determined, namely reincluding these costs within the base cost modelling suite or using a standalone econometric model with different cost drivers.

We welcome Ofwat's proposal to develop a separate econometric model and believe there are some merits to the modelling suite proposed by Arup.[28] We note that the most robust specification is Model 2, which uses the change in population equivalent served and the proportion of load receiving tertiary treatment. Both of these cost drivers make intuitive sense as drivers of STW growth costs and are statistically significant.

While we consider that the proposed models have some merit, we note that there are some issues with them, and the models could be revised and improved upon to solve these issues.

- The models currently omit any driver that captures the capacity headroom at sewage treatment works. A measure of capacity headroom would capture a main driver of spending on growth at STWs, which is whether those works are running out of treatment capacity due to increases in load or tightened treatment consents. This was noted by both Severn Trent in their CAC, and by Arup in their original report for Ofwat.[29] Currently, this is a key driver that the models are omitting, and including a measure for this should make the model perform better, and also allow for more granular prediction of the lumpy nature of STW growth costs.
- Given the lumpy nature of STW growth costs, Arup's model aggregated companies' spending and drivers into ten year totals, reducing the number of data points in the model to 10. Such a small number of data points reduces the statistical validity of the models, and so finding a way that individual years' expenditure can be modelled (such as a moving average) would likely improve the models.

[28] Arup (2022), 'Assessment of growth-related costs at PR24', May, p. 42.

[29] Arup (2022), 'Ofwat: Assessment of growth-related costs at PR24: Final Report', May, p.39; Severn Trent (2023), 'PR24 Cost Adjustment Claims', June, p.27.

- Finally, we also consider that there are other drivers related to tightened or changing discharge permits which need to be included in the models. This was also noted by both Severn Trent and Wessex in their respective CACs.[30] These changing consents are often a main driver of company decisions to invest in expanding or improving sewage treatment work capacity, and thus a measure capturing this would likely improve the models.

In summary, we support the development of a separate econometric model to determine allowances for STW growth costs but recognise the limitations of current modelling options. We believe that regardless of the approach to modelling these costs, this process should be supplemented with a deep dive into companies' plans for specific projects and investments. Where these projects are deemed to be required and efficient, they should be sufficiently funded regardless of the aggregate determined allowances.

Combined sewers and urban rainfall

In this section we analyse the econometric and operational rationale of YKY[31] and UUW's[32] CACs on the introduction of a combined sewers driver in the wastewater econometric models. Given its close link to combined sewers, we also present additional evidence against the use of urban rainfall as an independent variable.

Summary of our position at the base cost consultation

In our response to the base cost consultation,[33] we expressed our disagreement with the inclusion of urban rainfall in both sewage collection and wastewater network plus models.

Urban rainfall is defined by Ofwat as the annual rainfall in the company's region (in mm) multiplied by the urban area in the company's region (in sq km).

The first issue that we highlighted in relation to urban rainfall was the high correlation with the density measures in the models, which is expected given its construction from the urban area. Indeed the correlation between the urban area and WAD from MSOA or properties per sewer length is respectively 0.51 and 0.63. Given such a high correlation and, in line with Ofwat and the CMA's modelling principles,[34][35] the variable should not be included in the models where density is already captured, either directly or indirectly. This was, for example, the main reason for Ofwat not including a density variable in the SWT models, as dense areas tend to have large STWs and vice-versa.[36]

In addition, we highlighted that Ofwat's proposed model involves adding β1ln(urban area x rainfall) into the model specification, which is equivalent to adding two variables into the model with the same coefficient, namely, β1ln(urban area) + β1ln(rainfall). That is, in addition to adding annual rainfall, the model simply adds the urban area to the model, with a coefficient restriction, which is superfluous. Given the inclusion of density variables in the models, it is inappropriate to add a second density driver with a lower explanatory power.

As an alternative, we proposed relying on total annual rainfall, as it represents a more robust metric for taking into account the volume of inflows into drainage and sewerage networks, and the resultant impact on the network. Ofwat dismissed this variable by arguing that "rural rainfall is less likely to drain into the sewerage network".[37] However, urban rainfall does not truly represented rainfall that occurs only in urban areas, as it is simply constructed as the product of two variables, one of which itself is total annual rainfall, which Ofwat dismisses. Moreover, the sensitivity of highway and surface water runoff into rural sewers is not necessarily less than in urban areas.

In addition to their base cost consultation responses, two of the companies in favour of urban rainfall (YKY and UUW) have proposed the inclusion of a variable controlling for the share of combined sewers in the SWC and WWWNP models, which we turn to next.

[30] Wessex Water (2023), 'WSX09 – Annexes – Base cost adjustment claims', June, p.4; Severn Trent (2023), 'PR24 Cost Adjustment Claims', June, p.22.
[31] Yorkshire Water (2023), "Combined sewers CAC", June, available here.
[32] United Utilities (2023), "CAC_002 – Drainage Cost Adjustment Claim", June, available here.
[33] South West Water (2023), 'SWB-BRL PR24 base cost consultation template', May, Q4.5.
[34] For example, Ofwat stated that a reason not to include the proportion of dual customers in the total cost models was due to a high correlation with average bill size, and a reason not to include regional wages in the water modelling was due to a high correlation with density variables. See: Ofwat (2023), 'Econometric base cost models for PR24', April, pp. 30 and 49.
[35] CMA (2021), 'Anglian Water Services Limited, Bristol Water plc, Northumbrian Water Limited and Yorkshire Water Services Limited price determinations', March, para. 4.57.
[36] Ofwat (2023), 'Econometric base cost models for PR24', April, pp. 38 and 40.
[37] Ofwat (2023), 'Econometric base cost models for PR24', April, p. 45.

YKY's and UUW's proposal to combined sewers and urban rainfall

The justification provided by both YKY and UUW in support of introducing a combined sewers variable is that combined sewers leads to increased sewer flooding events in case of heavy rainfall, which in turn cause additional costs and worsen the company's performance. Since asset replacement activities concern limited sections of the network at a time and not the replacement of an entire combined sewer, they do not lead to a progressive reduction in the share of such assets in the network. Clearly, much larger upfront investments would be required in converting combined sewers. As a consequence, the claims by YKY and UUW aim at recovering the additional base costs associated with combined sewers, rather than replacing the combined sewers with separate ones.

Both UUW and YKY's claims support the joint use of the urban rainfall and combined sewers variables. In particular:

- **YKY proposes including the percentage of combined sewers as an additional independent variable alongside urban rainfall;**
- **UUW proposes the creation of an interaction term, constructed as the product of combined sewers and urban rainfall.**

We have two main criticisms of these proposals

First, among Ofwat' requirements for the submission of CACs, is the indication of a material link between the claim's object and the incurred costs. However, YKY's claim lacks such evidence. While, in its CAC, UUW demonstrates that it spent more than any other company on managing flood risk ("reducing flood risk for properties") in AMP7, the same does not hold for YKY, which spent the lowest amount in the entire industry.38 The inability to identify a cost areas that is impacted as a consequence of combined sewers strongly undermines the validity of YKY's claim.

Second, as already mentioned above and in our response to the base cost consultation, we consider that urban rainfall is not an appropriate cost driver. Both YKY and UUW's claims rely on the inclusion of urban rainfall, so we consider them to be inappropriate. However, instead of a combination of combined sewers and UR, we believe that an alternative would be to introduce only combined sewers into the regression models. While intense rainfall can increase the likelihood of sewer flooding events, this would not cause such events if not in the presence of combined sewers. It thus seems more appropriate to use a measure, such as combined sewers, that indicates the percentage of the network exposed to such risk.

Form of the bioresources modelling

While four companies are in favour of total cost models (Severn Trent, Thames, Welsh and Anglian), the evidence provided is not convincing as it does not provide any evidence on the instability and unreliability of the estimated coefficient of sludge produced in these models.

There is clear evidence that the diseconomies of scale estimated in total cost models are completely spurious. Intuitively, it does not make any engineering sense to see such a relationship between the total amount of sludge produced and bioresources costs and this result is likely to be driven by outliers. This is corroborated by a sensitivity examined by Yorkshire in its modelling response, where Northumbrian, a significant outlier with an efficiency score of c. 50%, is removed from the regression analysis. With the removal of Northumbrian, economies of scale are estimated. With the inclusion of the 2022/23 data we find an estimated coefficient of 1.06-1.20 over the whole historical sample but of 0.84-0.90 once we exclude Northumbrian. This confirms the low reliability and non-appropriateness of total cost models that should be dismissed on this sole basis.

We also note that unit cost models are more aligned with the form of the bioresources.

We have then logically updated our CAC by deriving the estimate on the sole basis of unit cost models.

[38] See Figure 1 in United Utilities (2023), "UUW_CAC_002", June, p. 7, available here.

Density variables (wastewater and bioresources)

As already mentioned in our base cost consultation response, we think Ofwat should aim to achieve consistency across the three service areas. We would therefore expect Ofwat to rely on the same density variable(s) in the wastewater and bioresources modelling as in the water modelling. Given the clear inferiority of WAD LAD from MSOA compared to WAD from MSOA and properties per sewer length (or properties per STWs), we recommend that Ofwat simply dismiss WAD LAD from MSOA and rely equally on WAD from MSOA and properties/scale driver in all cases.

C. General points on wholesale modelling

Regional wages and labour costs (water and wastewater)

AFW and SRN claim that the cost of labour in the London and South East regions is markedly higher than in the rest of the country. Moreover, they argue that this difference in input costs is material and outside of management control, and as such qualifies for an adjustment to modelled allowances.

The two companies presented two separate, although closely related approached to deriving the cost impact of wage differences.

In AFW's case, the CAC value is calculated as the average of two separate figures:

1. The first is derived by including a wage index (in the form of "ln of weekly wages") as an additional independent variable in the regression models.
2. The second estimate is calculated as the product of each company's local TWD labour costs, multiplied by the gap between a company's wage level in the region where it operates and the industry mean.

SRN's proposed figure is derived using a similar approach to AFW's second approach, that is, by applying each company's wage gap to the industry mean as a percentage reduction over the labour component of the AMP8 BOTEX allowance, both across water and wastewater.

Review and assessment of operational narrative

a. Non-uniqueness of AFW and SRN's situations

AFW and SRN do not present any element in support of the uniqueness of their position.

AFW based its calculations on weekly wages data for all employee jobs (ONS ASHE Table 8.1a), as opposed to Ofwat's decision at PR19 to use hourly wages for RPEs (Table 8.5a). AFW claims that weekly figures better match the labour cost they incur, as it mostly consists of employees, rather than external staff contracted on an hourly basis. However, hourly wages could be considered to represent a more accurate measure, as they represent the exact cost of a single unit of labour, whereas weekly aggregates are contaminated by differences in hours worked.

AFW ranks third in the industry in terms of weekly wages, and fourth in terms of hourly wages. Similarly, SRN ranks respectively 8th and 9th out of 17 water companies, i.e. around average. Moreover, using hourly data (Figure A below) reduces the skewness of the distribution (Figure B, taken from the CAC). It is clear that there are no noticeable jumps in the data which could justify the uniqueness of AFW's position.

In contrast, SRN proposes to base the adjustment on sectoral wages from the manufacturing sector, as it considers that estimates from the water sector are more easily influenceable by regulated companies. Manufacturing wages were also used by Ofwat as part of its labour RPE true-up process in PR19. In terms of manufacturing wages, SRN ranks third in the industry, and AFW only sixth.

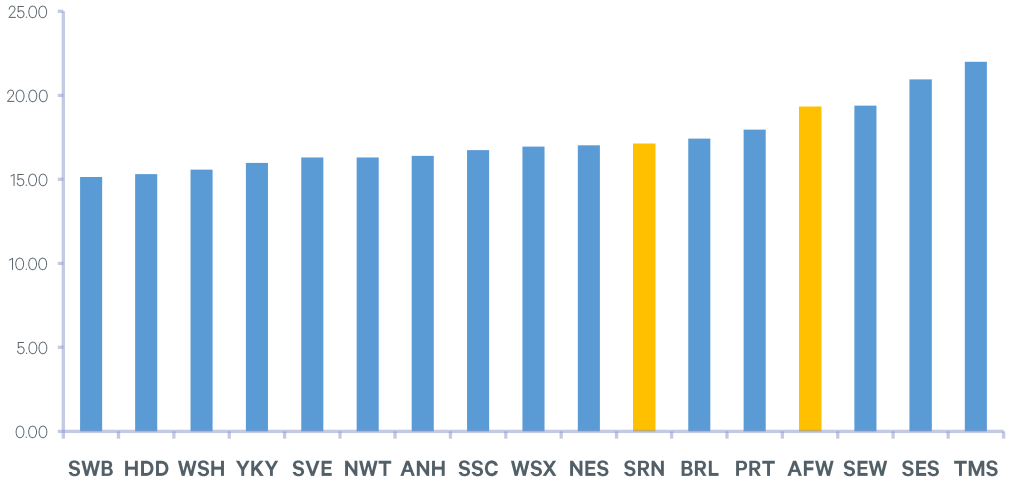
There are clearly differences depending on the metric used, with SRN only around average on the basis of regional wages for all employees and AFW only sixth on the basis on manufacturing wages. Neither of these demonstrate any uniquely high regional wage pressures.

Based on regional wages in the water sector, AFW is ranked only 11th. Although SRN argues that endogeneity may be an issue, this issue can be overstated[39] and regional wages in the water sector do provide a good indicator of the non-uniqueness of AFW's situation in the water sector.

It is also important to notice how none of the companies characterised by higher regional wages (in particular TMS and SES) presented a CAC. The latter was also one of Ofwat's arguments at PR19 used to dismiss a regional wages CAC.

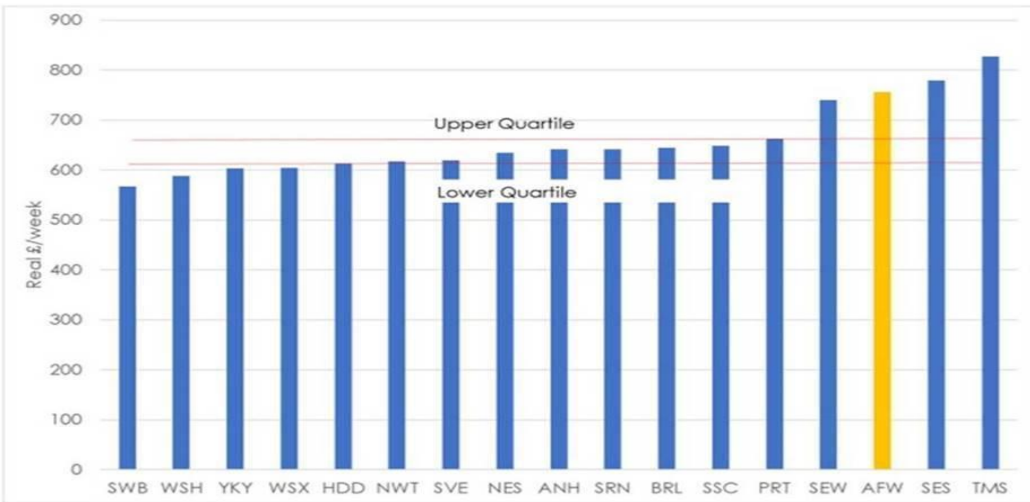
[39] For example, regional water sector wages represent the outcome of regional labour market pressures in the industry and companies are incentivised to minimise costs through the regulatory regime (so are extremely unlikely to pay above the market rate). Moreover, this wage index has not been used previously by Ofwat so this also limits any possible issue of endogeneity.

Figure 0.1 Hourly wages for all employee jobs (2011/12-2021/22)



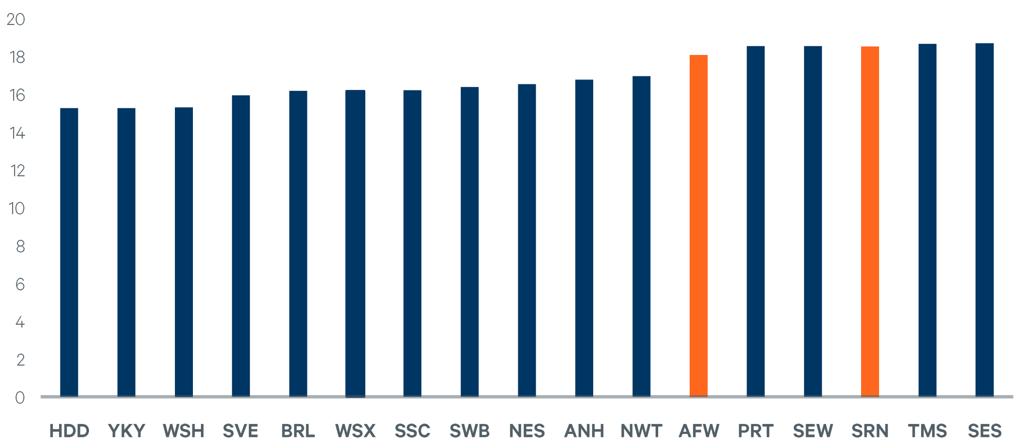
Source: SWW, based on ONS data.

Figure 0.2 Weekly wages for all employee jobs (2011/12-2021/22)



Source: Affinity Water (2023), 'PR24 Cost Adjustment Claims', June, p. 5.

Figure 0.3 Manufacturing wages (2014-22)



Source: SWW based on ONS data.

b. Clear regulatory precedents

We note that AFW quotes Ofgem's use of a pre-model adjustment at ED2. However, this was only applied to the three companies incurring higher labour costs (corresponding to the regions of London and the South East). We note that AFW only ranks 4th, when using manufacturing wages as per Ofwat's precedent, and would thus fall outside of Ofgem's approach of applying an adjustment for the top three companies. Moreover, in the energy distribution sector there is a material gap in wage levels between the top three companies and the rest of the industry, which justifies the decision to apply the adjustment to only a subset of the companies. As already shown in Figure A, this is not the case in the water sector.

c. Management control

AFW states that, due to the cost pressure arising from regional wages, it has undertaken steps to reduce costs. Specifically: "In Table App24 of PR19 business plans we reported that 26% of our network plus costs were labour. This is below the industry average, 31% and also below Ofwat's PR19 cost reconciliation labour cost share, 38%.".[40] This statement demonstrates that, despite purportedly higher input costs, labour represents a lower share of costs. This demonstrates that the company is not actually incurring higher costs, as it is able to contain them to a level below the industry mean.

Review and assessment of AFW estimation approach

a. Regression coefficients are counterintuitive

The use of wage levels in the Ofwat cost models leads to strongly counterintuitive results, as the coefficient on the wage index in greater than 1. Labour costs as a proportion of total costs is much smaller than 1 (0.31 as stated by AFW). As such, the cost elasticity of labour should also be much smaller than 1, that is, we clearly expect a coefficient on wage levels to be significantly below 1. However, AFW's results range from 0.8 to 1.3. These counterintuitive results are also acknowledged by AFW in its CAC.

Moreover, while AFW's results range from 0.8 to 1.3, in our replication of AFW's analysis our estimated coefficients on wage levels are in the range from 1.1 to 1.8. This additional finding further weakens the operational arguments at the core of the CAC, as in none of the model specifications do we find the coefficient to be below 1.

b. Correlation with density variables

At PR19 one of the Ofwat's arguments against the introduction of a regional wages adjustment was the high correlation with the density variables, which were already included in the model (0.70 to 0.72, according to SRN's CAC).[41] AFW argues in its CAC that the correlation coefficient between the log of weekly wages of all employees and the log of the three density measures is below the (arbitrary) 0.75 threshold, and broadly in the 0.5 to 0.6 range.

However, in our review of the models we find different results. First, since the wage and density measures are only used in logs in the first of AFW's methodologies and not in AFW's second approach or SRN's approach, it is more appropriate to compare the correlation of the non-logged variables. This correlation between wages of all employees and density ranges between 0.68 and 0.69, depending on which of the three density variables is considered.

Furthermore, using hourly wages of all employees instead of weekly wages slightly increases the correlation to 0.68-0.70. This correlation is very similar to that present at PR19. Thus, the results confirm the rationale of a high correlation as the basis of the exclusion of wage adjustments. That is, a key argument for not considering regional wages by Ofwat in PR19 remains as relevant now as it did in PR19.

c. Large inconsistencies in data sources

While AFW relies on wage statistics for all employee jobs (Table 8.1a by ONS) in constructing the additional regression variable for the first of the two approaches proposed, it appears to change the proposed data source for the second. In particular, the latter appears to be based on sectoral wage data ("E&W data"), which is not available at LAD level. This change clearly constitutes an inconsistency.

According to sectoral data, wages for E&W employees in AFW's area are 1.141 times the national average (i.e. 14% higher). This contrasts with a gap of ca. 10%-11% when using hourly or weekly wage levels for all employee jobs. This represents a 28% reduction in the gap to the industry average.

In terms of modelling impact the difference in the resulting allowances is proportional to the change in the gap to the industry mean due to the different data source, and as such appears to be unjustified.

[40] Affinity Water (2023), 'PR24 Cost Adjustment Claims', June, p. 7.
[41] Southern Water (2023), "Regional labour costs cost adjustment claim", June, p. 6, available here.

d. Divergence of estimated adjustments

The results from the two methodologies present widely different figures: £85.4m for the first approach and £21.1m for the second approach. Simply taking the average of the two adjustments does not provide any guarantee on the robustness of these estimates. Indeed, it highlights the inconsistencies of the different methodologies/sources used to capture the presumed impact between wages and costs. These two methodologies clearly demonstrate the unreliability of the estimates as it is counterintuitive to see such a difference between two methodologies that are supposed to capture the same thing.

Review and assessment of SRN estimation approach

a. Correlation with density drivers

According to SRN's CAC, the correlation coefficient between manufacturing wages and the density measures ranges between 0.42 and 0.49 for water, and this is too low to justify the exclusion of a regional wage adjustment.

However, replicating the results both for the manufacturing sector and for the other sectors proposed by SRN, we find the following ranges:

- Manufacturing wages: 0.59-0.62;
- Construction wages: 0.65-0.68;
- Architecture and engineering wages: 0.51-0.56.

Although lower than the correlation with wages of all employees, these correlation levels are still comparable to the results at PR19. Moreover, the wage variables proposed by AFW have even higher correlations of 0.68-0.70.

Comparison of results across wage indices/CACs

Our review of the CACs covered six different metrics for regional wages, coming from two separate ASHE datasets (Tables 5.1 for SRN and 8.1 for AFW). The summary table below shows how widely the wage gap to the industry average and the ranking change depending on the variable used.

Table 0.7 Comparison of wage indices

	SIC wage used:	**SRN**	**AFW**
Gap %	Architecture and eng.	8.2%	10.5%
	Manufacturing	9.5%	6.8%
	Water	13.6%	-0.1%
	Construction	8.1%	12.8%
	Weekly	-3.9%	10.8%
	Hourly	-2.4%	10.2%
Rank	Architecture and eng.	4	3
	Manufacturing	3	6
	Water	1	11
	Construction	4	3
	Weekly	8	4
	Hourly	7	4

Note: 0% indicates the industry average.

Source: SWW, based on ONS data.

Despite the similar rationales and approaches used in selecting the appropriate wage variable, SRN and AFW experience both negative and positive adjustments, depending on the measure used. This result is particularly concerning when considering that all the data comes from the same source, namely ONS ASHE datasets.

Moreover, it is difficult to objectively demonstrate which of the six variables (and of the many other alternatives) represents a superior measure. For example, the SIC data proposed by SRN is more accurate at a sectoral level, but is not available at LAD-level, and is thus less geographically granular. Similar issues also concern the correlations with other variables and operational considerations as to which variable better proxies water-sector wages.

In conclusion, the main takeaway from our review of the CACs on regional wages is that demonstrate the volatility and inconsistency of the different estimates derived from the various proposed models, with no metric proving to be superior.

Network reinforcement (water and wastewater)

We are in favour of a mechanism similar to that introduced at PR19 with a growth unit cost adjustment based on the difference between the ONS forecast growth rate and the average industry historical growth rate for each company. This will ensure that all companies receive an appropriate funding that is in line with the expected properties' growth over AMP8. The exact and more appropriate methodology is yet to be defined but we are not expecting it to be overly complex.

D. General points on wholesale modelling

Overarching comments on retail model performance

As discussed in our base cost consultation response in May, we agree with Ofwat's approach to modelling bad debt costs. However, we have material concerns regarding the other – and total cost models' performance (as least in their proposed forms at the consultation).

As we have maintained since our base cost model submissions in January, the appropriate form of the other- and total retail cost models would:

1. Only consider the subset of models that explicitly model economies of scale; and
2. Consider transience and metering penetration alongside scale, based on (i) these drivers' respective strong economic and operational rationale and (ii) the resulting improved statistical performance of the relevant models.

In addition, we note that Ofwat's relative weighting of 25% given to the bottom up at PR19 (relative to 75% for top down models) should not increase, given the continued poor performance of the other cost models. Even the relatively lower weighting of 25% given to the bottom-up models at PR19 may be too high.

The other cost models have always been constructed as an incoherent miscellaneous (or 'other') category, and had materially less explanatory power relative to the bad debt and total cost models (as shown in the table below). However, at PR24 the proposed other cost models now also have much fewer cost drivers remaining to explain the variation in this bucket of 'other' costs (that is, only two explanatory variables remain after the removal of transience and metering penetration as cost drivers in Ofwat's proposed models).

The poor performance of the other cost models also reduces the robustness of the bottom up models overall.[42] The relative performance of the bottom up models, considered collectively, is worse than the top down models at PR24. As shown in the table below, an average adjusted R-squared across the bottom up models are significantly lower (less than two thirds) than Ofwat's proposed total cost models.

Table 0.8 Average adjusted R-squared of bottom up and top down models, PR19 and PR24

Model/Cost category	PR19 (FD)	PR24 (consultation)
Bad debt cost	0.78	0.67
Other cost	0.14	0.12
Bottom up (average)	0.46	0.40
Top down, total (average)	0.69	0.66

We have thus made several proposals to improve the performance of the modelling suite (and the other cost models in particular, as discussed below). However, even when the appropriate set of cost drivers for the other cost models are considered, these models still perform comparatively poorly and are still incoherent as a cost subcategory.

It would thus not be appropriate for Ofwat to increase the weighting of the bottom-up models, and at the very least the PR19 weighting should be maintained. Alternatively, Ofwat may consider it more appropriate to base its cost determinations only on the subset of appropriate top down models (as proposed below), and retain the bottom up models purely for cost driver validation.

[42] We do note, however, that the bad debt models' (and by extension also the total cost models')PR24 performance needs to be reassessed as and when actual data on the deprivation metrics for the most recent modelling years becomes available. Currently the deprivation metrics are based on rolling forward the most recent historical values, which means that the regression results may change if the updated, actual values differ meaningfully relative to the historical proxy values.

Economies of scale and related CAC

In our base cost consultation response we highlighted that the inclusion of economies of scale as a cost driver is an empirical question, and that Ofwat's own modelling results clearly indicate increasing economies of scale in retail services. There is thus no need to consider an additional and poorer performing subset of models that assumes constant returns to scale.

Whilst Ofwat did not include an explicit question on economies of scale as part of its consultation, we note that two of the smaller companies (SES and Welsh Water have reiterated the same concern). SES Water has also made a CAC on this basis (discussed below)

The models containing economies of scale have slightly more explanatory power[43], and in each case the coefficient on the economies of scale cost drivers are of expected sign, magnitude and generally high levels of significance (most clearly in total cost models RTC1–RTC3, but also in the relevant other cost model ROC2).[44] The results are also in line with operational intuition: that the unit costs of retail services (per household) should decrease as the size of the customer base increases, all other things being equal.[45]

We note that SES have submitted a symmetrical CAC on the basis of its small scale operation, which it argues would be underfunded if Ofwat inappropriately considers the additional subset of other cost models and total cost models that do not explicitly model economies of scale.46 SES base the net value of their claim on the difference between the triangulated efficient cost allowance implied by only the three top-down models including economies of scale (RTC1 to RTC3) and Ofwat's total suite of consultation models (in the latter case assuming the same weighting across bottom up and top down that Ofwat considered at PR19).

We completely agree with SES that Ofwat should only consider the subset of models that consider economies of scale, but this should not have to be dealt with outside the base cost modelling. We believe it would be more appropriate for Ofwat to consider only the subset of models that include economies of scale within its modelling framework (as discussed above and below), and so removing the need for symmetrical CAC adjustments post modelling.

We also note that SES base the gross value of their claim only on a subset of total cost models, based on the view that the other cost models are not robust (such that the bottom-up models do not provide a reliable basis for cost determinations).[47] This echoes our point above that the relative weighting of the bottom up models should, at the very least, remain at no more than 25% for the purposes of the retail cost determination.

In sum, if Ofwat were to consider the entire set of models proposed in the base cost consultation, it would base retail revenue determinations on what is effectively two sets of otherwise identical models – those modelling economies of scale and those that assume constant economies of scale (ROC1 and RTC4 – RTC6) – but where the latter clearly performs worse from both a statistical and operational/economic perspective. This unjustified assumption on constant returns to scale is not consistent Ofwat's empirical results and would result in a less robust overall set of models used as basis for the cost determinations.

Furthermore, if Ofwat were to consider what we submit is the more appropriate specification for retail cost models (also considering transience and the metering penetration), it would find that the estimated coefficient on economies of scale is also intuitive and highly significant across the entire subset of aforementioned models. This was discussed in both our initial base cost model submissions in January and consultation response in May[48], and is summarised again below.

[43] The adjusted R-squared of the other- and total cost models with economies of scale is 0.13 (for ROC2) and 0.67 (average for RTC3), respectively. This is higher than the adjusted R-squared of 0.12 for ROC1 and 0.64 on average for RTC4 to RTC6.

[44] In Ofwat's consultation models, the economies of scale variable is highly significant in all the total cost models (at the p<0.01 level in total costs models RTC1 and RTC2 and at the p<0.05 level in RTC3). In the other cost model ROC2 the p-value on the economies of scale variable is 0.139 – in line with what Ofwat has considered acceptable levels for cost drivers that it believes to have strong operational, engineering and/or economic rationale in models for other service areas (e.g., weighted average treatment complexity in the wholesale water models). The coefficient on the economies of scale variable is in each case negative, indicating increasing returns to scale (such that a 1% increase in the number of households connected results in reduction in unit costs ranging from 5% to 12%, depending on the model considered). See Ofwat (2023), 'Econometric base cost models for PR24, April, pp. 91-94.

[45] That is, the number of staff- and other overhead costs required to manage customer accounts, deal with client contacts and send out technical staff to customer homes (to inspect complaints, do meter readings, etc), does not increase linearly with the number of households served.

[46] SES (2023), 'PR24 Early Cost Adjustment Claim: Retail Scale', 9 June.

[47] SES argues that the bottom up models should only be retained for cost driver verification, in the case of bad debt models, or discarded completely in the case of other cost models – see SES (2023), 'Response to the consultation on PR24 econometric base cost models', May and SES (2023), 'PR24 Early Cost Adjustment Claim:
Retail Scale', 9 June, p. 6.

[48] For ease of reference, our previous modelling added metering penetration and transience cost drivers to the appropriate subset of other- and total retail costs models (those modelling economies of scale, ROC2 and RTC1 to RTC 3). The estimated coefficient of the economies of scale variable is in each case intuitive and highly significant (at the 1% level).

Metering and related renewal CACs (with link to the water modelling)

We maintain our position from the base cost consultation and January model submission that metering penetration should be included in both the other cost and total cost models. It is clear from company responses (discussed below) that the majority of industry shares our position that the operational rationale for the cost driver remains strong and that it should be retained (its retention also helps to maintain the regulatory incentive for continued meter rollout). As detailed in our previous submissions, the statistical performance of metering also remains at acceptable levels when included in the appropriate set of models (alongside transience and economies of scale).

In our May consultation response we reiterated our earlier modelling submission results that the inclusion of metering penetration improves the general statistical performance of the models and performs well when included in the appropriate set of other- and total cost models (alongside transience and economies of scale in both cases). That is, the coefficient on the variable is consistently of the expected sign, magnitude and generally has acceptable levels of significance. [49]

Based on the May consultation responses, the majority of the industry shares our position that meter penetration continues to have a strong operational and economic rationale, as ten of the 14 companies disagreed with Ofwat's proposal to remove the cost driver from the relevant models. Building on the arguments that we made in May, the industry highlights three broad arguments why metering penetration should be used as a cost driver:

1. There are higher costs from meter reading and increased contacts from metered customers[50;]
2. There continues to exist a variation in levels of meter penetration between companies[51], and thus an expected variation in costs (as noted in 1); and thus also
3. It is important to retain the driver to incentivise further meter rollout, given the policy and broader societal benefits of increased metering penetration[52] (and as to not disadvantage companies that already have high metering levels).

We note that findings of an independent Price Waterhouse Coopers (PwC) report for Ofwat (on the efficiency of retail services) also seems generally consistent with the arguments made by industry (above). In particular, PwC also notes: (i) increased metering penetration is likely to lead to higher customer service costs (from increased contacts);[53] and (ii) the broader policy and customer benefits of increased metering, including enhanced leakage detection and consumption reduction (thus supporting the regulatory incentive for retaining the cost driver).[54]

In contrast, for the minority of companies (four) that agreed with Ofwat that metering penetration should be excluded as a cost driver, the main reason for doing so was the cost driver's poor statistical performance in Ofwat's proposed models. However, this concern would be addressed if metering were to be reintroduced alongside transience in the other and total cost models, while also explicitly modelling economies of scale (as discussed above).

Outside of the scope of the costs covered by the retail models, we note that two companies have submitted what Ofwat considers to be symmetrical CACs for meter replacement/renewal costs.[55] Both SEW and SRN have submitted CACs on the basis that costs associated with meter renewal/replacement activity are not explicitly modelled in the base cost modelling[56] (here with reference to the costs modelled in the Water Network Plus models).[57]

Whilst the detail of their respective calculations differ to some extent, we note that both companies follow the same high level approach: they base the net value of their claims on a measure of the efficient meter replacement unit costs (determined based on historical industry or company data), multiplied by a measure of the extent to which their expected levels of meter replacement activity over AMP8 is greater than what is implicitly funded by the models.

[49] Including metering (alongside transience) in Ofwat's proposed models at the consultation sees the coefficient on the variable remain positive throughout (ranging between 0.002 and 0.005) when included in the subset of models with economies of scale (ROC2 and RTC1 to RTC3). The level of significance of the coefficient is also within acceptable levels on average, based on what Ofwat has regarded as acceptable elsewhere in its proposed base cost modelling suite: the p value when included in the modified versions of ROC2, RTC1, RTC2 and RTC3 are 0.13, 0.13, 0.57 and 0.16 respectively.

[50] For example, Thames Water (TMS) indicate that contacts per customer are 52% higher for metered customers (relative to non-metered customers), with billing and charging complaints similarly 119% higher. TMS (2023), 'Response to Econometric Base Cost Models for PR24 Consultation', May, p. 58.

[51] Anglian Water (ANH) note in their consultation response that meter penetration ranged between 47% and 90% in 2021/22. ANH (2023), 'Consultation on econometric base cost models for PR24', May, response to question 6.5 [Excel].

[52] See for example the arguments by SES and South East Water's (SEW) in their respective consultation responses, who note the same broader benefits from metering in their consultation (e.g. SES notes that metered consumers consume 15% less per capita than unmetered customers).

[53] PwC (2022), 'Retail services efficiency review 2022. Report for Ofwat.' December, p. 48.

[54] PwC (2022), 'Retail services efficiency review 2022. Report for Ofwat.' December, pp. 48-50.

[55] We note that whilst SRN did not submit its CAC on a symmetrical basis, Ofwat has stated that it would consider the CAC to be at least in part symmetrical. Ofwat (2023), 'Cost adjustment claim summary – August 2023.

[56] Note that whilst the CACs differ to some extent in their content, we use the terms replacement/renewal interchangeably here.

[57] See Oxera (2023), 'A review of cost adjustment claims for PR24. Prepared for South East Water', 9 June, section 2 and SRN (2023), 'Meter replacement cost adjustment claim', 9 June.

We have not attempted to assess the respective CAC calculations in detail, but we note that the most pertinent differences in the two calculations are in SRN and SEW's estimates of: (i) the applicable meter renewal rates implicit in the base cost models; and (ii) efficient meter replacement unit costs, as detailed below (and summarised in the table):

- For SRN, the implicit allowance from Ofwat's models is calculated based on the industry average metering penetration levels (of 51.4%) multiplied by their customer base, to be replaced in line with the industry average historical replacement rate of 3.4% or 3.3% for households and non-households respectively. Both these parameters are estimated as the industry average over 2012 to 2022.[58] SRN use the industry median unit cost over 2020/21 and 2021/22 as the measure of efficient unit costs, estimating efficient unit costs of £105.80 for household meters and £220.67 for non-household meter (all in 2022/23 prices).[59]
- SEW estimates that the industry is implicitly funded for a meter renewal rate of 2.09% p.a. This estimate is based on an average industry renewal rate of 1.40% p.a. over 2017/18 to 2021/22, uplifted to account for correlations between meter penetration and existing cost drivers in the Water Network Plus models.[60] SEW estimates the efficient unit cost of (household) meter renewal to be £150.38 per meter (seemingly based on its own internal estimates).[61]

Table 0.9 Differences in main parameter estimates used in SRN and SEW CACs

	SRN	**SEW**
Industry average replacement/ renewal rate (households)	3.4%	2.09%
Unit costs (household meter, 2022/23 prices)	£105.80	£150.38

Having reviewed these CACs, we do not find them to be sufficiently justified, especially regarding the uniqueness of meter replacement relative to other assets. Aside from metering penetration rates (where SEW and SRN are ranked first and second over the last five years), neither company explain why meter replacement is different from other assets that require ongoing replacement (but are not necessarily captured as explicit cost drivers in the base models). The base cost models should in theory allow companies a rate of replacement across all their assets, and it is up to companies how they manage these allowances across their respective portfolio of assets. Neither SRN nor SEW have provided sufficient evidence to illustrate that a higher, meter-specific allowance would not result in an overfunding across their broader portfolio of assets.

Furthermore, a review of the calculations shows that the parameters chosen to estimate the value of the claim are inflated and overestimate the value of the CAC. For example, SRN has used the industry median unit cost as it estimate of efficient unit costs, instead of the upper quartile (UQ). The UQ costs will be significantly lower and more reflective of efficient meter replacement costs. It is not clear how SEW estimated the unit cost of £150.38 per meter, but it is significantly higher than what would be suggested by SRN's industry data. We also note that the meter renewal rate estimated by SEW is much lower than what is estimated by SEW.[62]

[58] SRN (2023), 'Meter replacement cost adjustment claim', 9 June, pp. 6-7.
[59] SRN (2023), 'Meter replacement cost adjustment claim', 9 June, p. 9.
[60] Oxera (2023), 'A review of cost adjustment claims for PR24. Prepared for South East Water', 9 June, pp. 6-7.
[61] Oxera (2023), 'A review of cost adjustment claims for PR24. Prepared for South East Water', 9 June, p. 8.

[62] **According to SRN's series of historical household meter replacement rates (published in an appendix to its claim),the industry-level average replacement rate over 2017/18-2021/22 would be 2.6% p.a. (significantly higher than the 1.4%, subsequently uplifted to 2.09%, cited by SEW). See SRN (2023), 'Meter replacement cost adjustment claim', 9 June., p. 19 (the average of meter replacement rates over 2018-2022 in table A2.1).**

Transience

As noted in our May consultation response, we provisionally agreed with the removal of transience from bad debt models, given its poor statistical significance at the time of the consultation. However, we noted that this should be reviewed when more data becomes available given the cost driver's continued alignment with operational insight. Indeed, we also noted that the variable's poor performance in this subset of models is potentially due to the temporary distorting impact of COVID19 on migration patterns (since reiterated by evidence presented in the consultation responses and CACs made by TMS and AFW – discussed below). Transience's inclusion in bad debt models should thus be reassessed as at the time of draft- and final determinations.

However, we do not agree with the exclusion of transience as a cost driver from the total cost models – where it performs well in the appropriate subset of models (RTC1 to RTC3, alongside economies of scale and with its performance further enhanced by the addition of metering).

As we have maintained throughout in our previous submissions, the inclusion of the cost driver can still be justified on a bottom-up basis through its inclusion in the other cost models. That is, the same, strong operational rationale for transience's inclusion applies across all retail costs (be it bad debt or other costs) – but its statistical performance is strongest at this point the other cost models. Alternatively, as noted above, Ofwat may wish to consider only the total cost models for its cost determinations (and use the bottom-up retail models only for cost driver validation).[63]

For ease of reference, we summarise the main arguments that we have presented for retaining transience as a cost driver again below (from both an operational and statistical perspective):

- Operationally, there is a higher cost to service an area with greater transience (requiring more frequent contacts, account management and updating customer details, etc).64 This is a standard feature of any retail business, with retail companies generally seeking to avoid high levels of customer churn. Transience also varies for exogenous factors (e.g. student population density, international migration, local housing market, etc).
- The coefficient on transience is of the expected sign, magnitude and highly significant in all the appropriately considered other- and total costs models (those including economies of scale – as summarised in the table below replicating Ofwat's consultation models, but with the relevant cost drives added). The levels of significance on the transience coefficient improves further when meter penetration is also included into the relevant models, as shown in the third and fourth rows of the table.

Table 0.10 Estimated coefficients (and p-values) on transience in the appropriate other- and total cost models

	ROC2	RTC1	RTC2	RTC2
Transience (added, alone)	0.042***	0.022*	0.027**	0.036***
	{0.003}	{0.051}	{0.032}	{0.009}
Transience (added alongside metering)	0.058***	0.027**	0.032**	0.052***
	{0.000}	{0.016}	{0.022}	{0.003}

Notes: (i) p-values in brackets below coefficient estimates, (ii) *, **, and *indicate significance at p=0.1, 0.05 and 0.01 levels respectively.**

[63] Contingent on the respective bad debt and total cost models' relative performance when updated with the full series of data at the time of the final determinations (when, most notably, the current proxy values for the respective deprivation metrics in the most recent years will be replaced with actual values), for the most recent modelling years becomes available.

[64] We note that the same business rational and broader costs of transience are also noted in the independent report accompanying TMS and AFW's consultation responses and related CACs. See Economic Insight (2023), 'Cost adjustment claim to fund additional retail costs from transience. A report for Thames Water.', 9 June, section 2C.

We have also noted Ofwat's practical concern that the ONS has discontinued the international migration dataset, which is used, in part, to construct the total migration variable (alongside the internal migration component – which we understand will still be available in future). However, this is not sufficient basis for excluding the variable, as it would come at the cost of: (i) significantly worsening model performance; (ii) unfairly disadvantaging companies with higher levels of transience; and (iii) potentially biasing the estimates on the remaining cost drivers.

Furthermore, as both ourselves and TMS and AFW have noted in our respective consultation responses, there are various simple ways in which the discontinuation of a subcomponent of the data series can be dealt with (which would only apply to the remaining years of AMP7 where the data subseries is not available):

- Use the recent historical average / smoothed version as a proxy for future migration, or
- Hold international migration levels constant at 2020 rates (similar to what has done for deprivation metrics in the past); or
- Extrapolate future values of this subcomponent based on its historical growth rate.[65]

We note that TMS and AFW have provided empirical evidence on the adverse impacts of COVID 19 on the performance of transience variable in bad debt models[66,] alongside an extensive report on the statistical and operational evidence for retaining the cost driver in a subset of bad debt and total cost models at PR24.[67] The same evidence has also been used as a basis for the provisional cost adjustment claims submitted by the companies, should Ofwat not reintroduce the variable into the retail cost models.[68]

We see no need to reiterate all the evidence and arguments presented by TMS/AFW again here, but note that we agree that the cost driver should be reincluded to the retail models where appropriate. At this point in time, the cost driver performs well statistically in the other- and total cost models, but it should also be reincluded where it performs well in the bad debt models.

Furthermore, we believe that variance in costs resulting from the different levels of consumer transience faced by companies can most easily and appropriately be dealt with within the base cost modelling framework. We thus do not believe it is necessary or appropriate for transience to be considered under the symmetrical CAC process.

Last, we note that other companies generally agreed with Ofwat that the cost driver no longer works due to its poor statistical performance (with, at times, counterintuitive sign and statistical insignificance). However, the consultation focussed on the cost driver's performance in: (i) the bad debt models; and (ii) the total cost models (where transience does not perform well in the inappropriate subset of models without economies of scale, RTC4 to RTC6). Furthermore, the industry's concerns were purely statistical, with no company disagreeing with the continued operational and economic rationale for the cost driver's inclusion.

Our recommendations on the more appropriate forms of the other- and total cost model are thus not inconsistent with the rest of the industry's view. Furthermore, the evidence presented in our submissions (above and elsewhere), alongside the evidence presented by TMS and AFW, shows how the statistical concerns raised by Ofwat and others in the industry can be overcome – without unduly excluding a common sense and necessary cost driver from the modelling.

Deprivation

We agree with Ofwat's approach to modelling deprivation, on the assumption that Ofwat will triangulate across the respective bad debt- and total cost models with the different deprivation metrics (as stated in our May response). Such a triangulation approach is consistent with our model submissions in January, where we proposed the use of composite deprivation metrics (to avoid cherry picking and multicollinearity issues).

Ofwat's proposed triangulation approach should be appropriate, if the correct subset of deprivation variables is considered in the modelling. We thus reiterate that the specific deprivation variables considered should be reconsidered closer to the final determinations – when Ofwat benefits from an up-to-date and full series of data across the different deprivation metrics.

[65] See our May consultation response and TMS (2023), 'Response to Econometric Base Cost Models for PR24 Consultation', May, p. 57.
[66] For example, see figure 1 in TMS (2023), 'Response to Econometric Base Cost Models for PR24 Consultation', May, p. 55.
[67] See Economic Insight (2023), 'Cost adjustment claim to fund additional retail costs from transience. A report for Thames Water.', 9 June, section 2C and TMS (2023), 'Response to Econometric Base Cost Models for PR24 Consultation', May, pp. 55-58.
[68] TMS (2023), 'Cost adjustment claim to fund additional retail costs from transience.', 9 June.

COVID19 dummies

In line with the majority of the industry, we also agree with the inclusion of the COVID-19 dummy variables in the bad debt and total cost models.

We also agree with Ofwat's suggestion that the COVID dummies' inclusion will need to be reconsidered, when 2022/23[69] and 2023/24 outturn data is available. This may be particularly relevant for the reconsideration of the 2020/21 dummy variable, in particular, which we note did not perform as well as the 2019/20 dummy in the consultation models.

[69] And 2021/22, as the last year of actual data for deprivation metrics is 2020/21.

Evidence against quality tests

Appendix: Summary of enhancement cases, base maintenance and our asset management processes

South West Water
Bournemouth Water
Isles of Scilly Water
BRISTOL WATER

Contents

Introduction

This document is an appendix to the document: Costs and Efficiency.

It provides more information on the base and enhancement capital expenditure included within our business plan, and how this maps to the price controls.

We explains that due to our investment planning processes we can develop efficient base and enhancement costs, that underpin our investment cases and overall business plan.

Additional information is contained in our enhancement expenditure business cases and the costing methodology document.

Our Capability to Assess Investment

We can only develop robust estimates of base and enhancement investment if we have a good capability in place to assess risks, performance and costs, along with the ability to optimise to select the best combination and sequence of solutions to meet our customer and community needs in the short, medium and long term.

Our investment planning capabilities

We have already provided to Ofwat through the Asset Management Maturity Assessment (AMMA) assessment in 2021 a very detailed summary of our asset management capability and future ambitions. This has been the basis of our PR24 plans.

As evidenced in the assessment, we have upper quartile asset management capability, and have many examples of best practice. We excelled for example in 'strategy and planning' and 'decision making' which are fundamentals of a price review – particularly one with a focus on the long-term.

Since then, we have looked to build our insights further – important as there was useful feedback that all water companies can continue to improve their asset management maturity, particularly around employee competency and data management, which we are acting on.

We have merged with Bristol Water, which has brought together the best of the best. We have also since been accredited with ISO55001 Asset Management standard in March 2022 – and this has helped us continue to develop our capability, alongside the findings of the AMMA.

Best value planning

As we look to respond to the changing environment and rising expectation of our customers and communities, it is all the more essential that we can assess efficient levels of base and enhancement investment.

Our decision making capability is at the core based around being able to assess what are the efficient costs. In particular, it is core capability to be able to always understand how we:

1. Meet targets and obligations at least cost – such as maintaining current levels of performance into the future, or the achieving new levels of performance.
2. Deliver best value to customers and communities – recognising that the lowest cost solutions are not always the best way to deliver for our customers and communities

The cornerstone of our approach to totex planning and delivery is to optimise and balance investment strategies and plans – so that we know the costs and benefits of achieving different levels of service or outcomes, ensuring we deliver maximum benefit from our expenditure, understanding the efficiency challenge we face, and how bes to meet legal and regulatory obligations – whilst keeping bills as low as possible.

We have been developing this capability over many years as we have evolved our dynamic risk assessment tools and capability. And our suite of tools can help us to understand a range of scenarios from understanding what is the right level of base to maintain service over the next five years, through to what is "optimal" sequence of investment to achieve long term targets given the uncertain risks we face.

Assessing performance

We measure risk and performance are articulated through a set of KPIs that captures aspects of the services we provide: water, wastewater, environmental impacts, customer service, health and safety, and wider societal impacts such as carbon. By using a consistent set of KPIs we can look at trends over time, where we are now, and what could happen in the future.

For any assets or works or locations or catchments – we use KPIs to articulate risk and performance, today and in the future – such as the risk of supply interruptions, pollution, flooding or overflow discharges today and over time if we do not intervene and if we invest. Without investment risks increase and performance deteriorates, and using the same KPIs we can see what happens if we intervene – such as if we replace water mains, sewers or treatment works with new and upgraded assets that do not have those risks associated with it.

We use many methods to assess risks – ranging from statistical deterioration models, condition assessments, hydraulic catchment models, reliability assessments etc. We use historic data and the best information available about the changing environment such as climate change trends and growth to assess what could happen in the future. We work hard to validate our assessments with experts – such as industry specialists and our operational teams.

We have some of the best tools in the industry to allow us to assess risks. This is important when there is a large asset base, or when the risk of an asset failure or external events occurring (reliability/resistance) has complex consequential impact of failure on service such as when there is redundancy and standby in our asset base, and a rapid ability to respond and recover when something goes wrong.

Assessing costs and values

We have a costing methodology that is essential to build up the estimates of what solutions costs. We use a range of techniques from statistical models for things we do a lot, to getting quotes for the most bespoke, larger projects. Either way – getting costs right is essential and we work with partners and have high levels of assurance to ensure that we get costs right.

Equally important is the ability to value changes in risk and performance – so that we can see if changes in risk are worth the cost and if we should go above and beyond the minimum costs to meet targets and objectives.

The monetisation of risk allows us to compare asset groups consistently when balancing our plan and develop best value plans. We have for over 10 years maintained a full and robust set of valuations based on customer evidence that are set for each of these KPIs – so we can understand the value to customers and communities of a change in risk and performance.

We use this to assess our plans, understand what is cost beneficial, and what matters most to customers. Combined with customer priorities, customer valuations are powerful in understanding what matters most to customers.

Optimisation approaches

We have an optimisation system and approaches that allow us to assess the costs and benefits of base and enhancement programmes by allowing us to run multiple optimisation scenarios across our entire portfolio of assets.

For example, in assessing our storm overflow investment we estimated a number of programme level options for our plan. This included the cost of meeting our legal obligations at least cost, to options that would see us go above and beyond to tackle high spillers, or those causing RNAGS, or those at sensitive locations, or those at beaches – or combinations thereof. We assessed the costs and benefits of each of these programme options as we looked to develop our plans – and show the value add of go further and faster, and addressing all the beaches by 2030.

We have a system level optimiser Portfolio Risk Manager (PRM) which is part of our wider AROS investment planning system. PRM is an end-to-end system which performs investment optimisation by linking investments in assets to corporate priorities, customer values and performance targets. PRM facilitates consistent, informed and comparable investment decisions across business areas and has been in use – albeit evolving over time – in South West Water since 2011. By ensuring that we use this for all our investments, we can be sure that we are being consistent – in how we assess risk, value, cost and carbon.

PRM lets us use customer valuation and social cost evidence (such as carbon costs) combined with our understanding of efficient costs of delivery to assess the full costs and benefits associated with current and alternative levels of service. We use optimisation processes and tools to find the most efficient and valuable way to deliver differing levels of performance, from a minimum reactive level of performance to the maximum attainable improvement deliverable in a five-year period.

PRM has been used throughout as we have looked to develop and balance the overall business plan. It identifies solutions that are value for money and allows the best mix of solutions to be picked to maximise customer value, whilst applying constraints around legal compliance, regulatory commitments, affordability and service levels targets. This ensures the best results for any given investment budget, or other constraints.

Whole life totex costs

Our investment plans have been developed with the principle of minimising whole life costs under a totex methodology. We always look for the least cost way of delivering our outcomes and do not favour capex over opex, replacement over repair, or asset over non-asset solutions.

Opex is often an alternative to less cost effective capex solutions. Examples include our sewerage assets where additional operational sewer cleansing, root cutting and site inspections are planned rather than major sewer replacements; and our DOMs strategy where we are extending our successful operational flushing and water mains conditioning programmes and investment in water networks where operational techniques to reduce supply interruptions is being targeted.

Developing our PR24 investment plan

Stretching ourselves to deliver more

As we have used our capability to assess the costs of delivering base and enhanced levels of service, we have still gone further and set stretching targets – as we have in the past.

We know our PR24 business plan will be challenging. We have set ourselves stretching targets to meet from efficiencies across all areas of our plan.

- 15% efficiency in enhancement capex
- 17% efficiency in enhancement opex
- 20% efficiency in base capex

These figures have been based on what is a challenging target but also a genuine assessment of what is only right and fair to ask customers to support.

We have not shied away from these challenges in the past and we are positioning our business to deliver on these challenges for AMP8. We have also not relaxed our performance commitments – we are committed to delivering more for our customers in AMP8 than ever before and have set challenging but achievable targets to 2030.

Base maintenance capex costs

Base or capital maintenance allows us to maintain the health and condition of our existing assets, so that we can continue to maintain the capability to provide service to customers – and in doing so we can meet current regulatory and legal requirements.

When we have changes to regulatory or legal requirements, these are classed as enhancement investments – for example, investment to meet new water quality or wastewater quality standards.

Our capital maintenance requirements for 2025-30 represent c.£960m. This is comparable to our AMP7FD in the same price base and it is lower than our current forecast expenditure for AMP7 – recognising that we will strive to be more efficient and reflecting that it is not always appropriate to ask customers to pay for things that we need to do.

Our investment proposal for base maintenance is based on a detailed analysis of what we need to spend to maintain performance, combined with a fair assessment of what is reasonable for customers to pay - even when we estimate that we need to spend more.

In developing our base and enhancement cases we have considered the synergy benefits between base and enhancement – especially for our large programmes relating to storm overflows and leakage.

We are also proposing to self-fund the necessary efficiencies to manage the costs to reach Net Zero, such as the transition to electric vehicles, low carbon technologies and starting to address process emissions. We recognise that this stage of our transformation to a net zero business is not born by customers.

It is fair to say that the efficiencies that we have set ourselves from base are particularly challenging. When setting our base maintenance investment plan we developed bottom up assessments of maintenance needs – yet we are challenging ourselves to deliver nearly £200m of efficiency from base, c. 20%.

For example, we have not made any allowances for the c.£50m continuation of the DWI transformation programme despite the investment being to address legacy issues that customers have not previously paid for, and we have excluded the uplift to leakage maintenance associated with maintaining new lower levels of leakage from 2024/25 recognising that it is important that we make steps up in performance from base so that customers are not paying any inefficiencies in our delivery in the past. And we have also assessed the overlap between base and enhancement for storm overflows and we have applied £100m of maintenance efficiency to from our storm overflows investment even though our analyses show there to be little overall between base and enhancement.

Bottom up assessment

In the development of base costs we have first started with a methodical process to look at costs bottom up.

We use asset health and performance data in our underlying whole life cost economic models. These economic models are detailed models that predict asset and service risk now and into the future under a range of scenarios. They are the key models used to assess the capital maintenance investment needs of our asset base.

We have developed specific models for each asset group to forecast performance. They are typically statistical models that seek to represent a relationship between asset risk and performance and key attributes, i.e. material, age, size and condition of the asset. It is important to build the right modelling framework for each asset group and we have worked with industry and academic experts to get this right.

Broadly speaking our process are set out below:

Understanding risks and needs

- Monitor trends in asset health and resilience measures and project future trends to inform decision-making
- Condition assessment to inform and update our models
- Deterioration modelling using condition and asset failure data
- Consequence of failure assessment mapped to service impacts and customer willingness to pay
- Risk optimisation

Costing

- Integration of cost models into our asset modelling tools

Assurance and governance

- Review and challenge of preferred option – typically a cross cutting process involving: asset management, engineering and operations
- Independent technical review and challenge

Base benefits

We have looked to see what base has contributed to improvements historically. This is data that has been submitted to Ofwat via its *what base buys* requests.

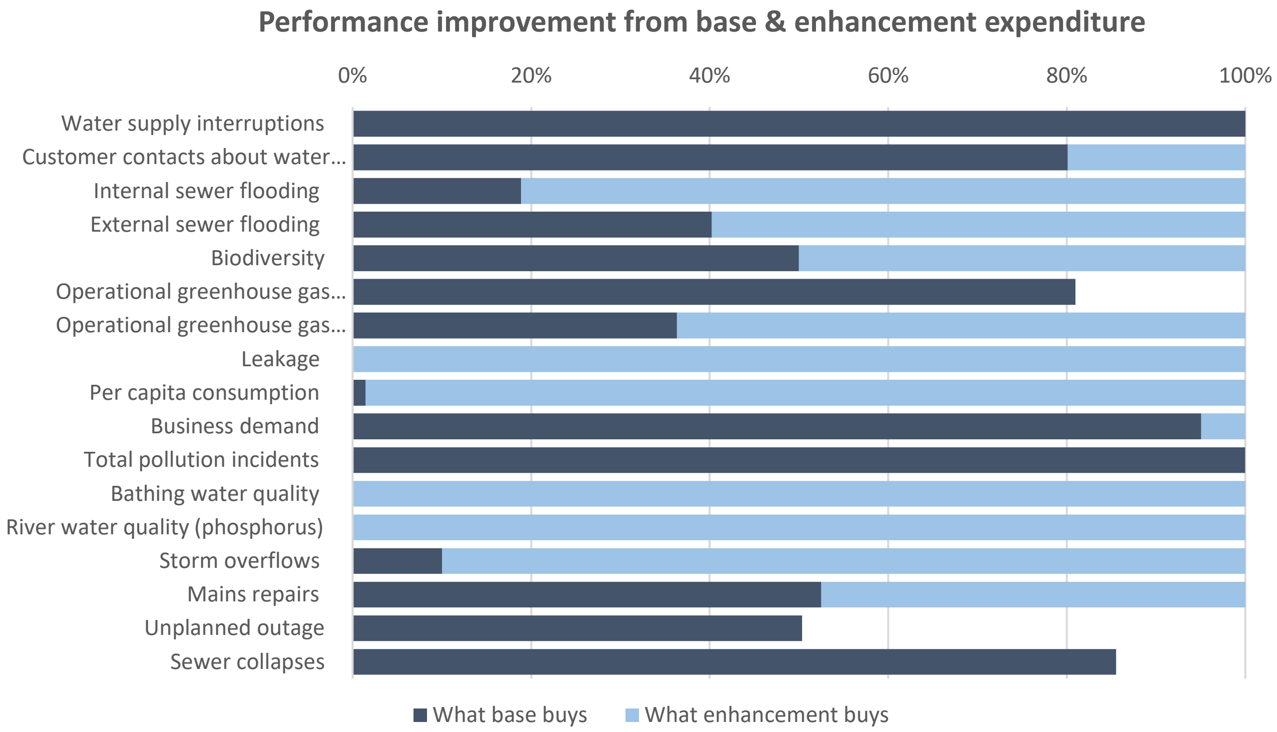
We have used this same data to stretch ourselves in what we can achieve against performance outcomes from being more efficient in how we deliver base maintenance.

Summarised below is a view of the performance measures in AMP8 and the contribution that base and enhancement expenditure achieves.

It shows that gains in performance are driven approximately 50/50 from base and enhancement expenditure – with some areas where base is more powerful in driving change than others.

The primary measures where we have challenged ourselves to achieve the majority of our performance improvement from base maintenance are: supply interruptions, water quality contacts, business demand, pollutions and our asset health measures (mains repairs, unplanned outage and sewer collapses). Whereas for newer obligations, such as storm overflows, river water quality and continuing to drive bathing water quality – we have identified that we need enhancement investment to achieve our new targets.

For leakage, our current level of allowed base investment will be used to maintain 2025 lower levels of leakage (15% lower than 2019/20 baseline) at no extra cost to customers despite it costing us nearly 2.5 times what was assumed was the cost in PR19 (£125m actual v £50m allowed) – we will make up this gap without costing more for customers. However, as we look to reducing leakage even further beyond 2024/25 levels, there is the need for additional enhancement investment – hence 100% of the performance improvement is from enhancement expenditure.



Enhancement capex costs

We have applied a consistent and robust processes to develop the whole of the capital costs for our wholesale plan. We have continued to improve and develop our asset management approach by optimisation of solutions in consideration of long term Totex (Opex and Capex costs).

The wholesale plan uses five principal methods to calculate the capital costs and construction values:

- Unit Cost Models & SWW Estimating System data
- Rates, Quotations or Estimates from Framework Agreements
- Historic published cost data or data from Cost Managers systems
- First Principles Estimating
- Industry Average Costs

We have utilised our industry leading unit cost database tools and investment modelling approaches so that we have confidence that we can accurately price alternative solutions to deliver the best solutions for customers at optimal long term cost and benefit. We have undertaken benchmarking activity to ensure Unit Cost Models & SWW Estimating System data accurately reflects costs.

Our improvements have enabled us to map the business plan components to the performance commitments so that their relationship with expenditure is understood and can be measured. It also allows us to prioritise sub-programmes with higher positive impacts on performance commitments. All cost data is company-sourced, from current and recently completed projects and programmes of work. The detailed working has been extensive, and, throughout the entire process, all documentation and audit trails have been shared openly with our assurance providers.

Our costing process builds on the methodology and previous approaches developed for, and since the 2014 Price Review, and the submission for PR19 has continued to utilise the Engineering Estimating System (EES) following its introduction in the 2009 Price Review. We have developed costs models where relevant capital activity in 2020-25 is forecast and where reliable data exists.

Details of how we have developed efficient costs are included in each specific enhancement case. A three phased process of scoping, costing and assurance, is typically applied. Following which we can be sure that we have developed efficient and technically feasible solutions. Lastly, we have applied an overarching efficiency to all costs of c15%, c£300m. This will ensure we seek to innovative further between now and AMP8 and that we get more from the supply chain to maximise value for customers.

Scoping
Monitoring and review of risks and investment needs
Site visit or desktop modelling to determine options and validate the investment need
Development of options into outline solutions
Challenge, review and acceptability of options – typically a cross cutting process involving: asset management, engineering and operations
Independent review of options providing further opportunities to identify new technologies and innovations. It also provides assurance that our considered options are technical suitable to meet the investment need / desired outcome
Selection of preferred option (informed following costings and evaluation of whole-life costs and benefits below)
Review and challenge of preferred option – typically a cross cutting process involving: asset management, engineering and operations

Costing
Development of scopes including bill of quantities for pricing
Pricing against scopes using cost models
Independent third party costings using alternative cost models to validate pricing

Assurance and governance
Where necessary dedicated steer groups are established to oversee a programme of activity and/or specific submissions. For example, a water quality steering group was established to oversee the development of our Annex B submissions to the DWI in March 2023
Assurance of costs models by KPMG

Our PR24 Plan: Expenditure summary

A company level summary

Table 1 – SBB Expenditure summary

2022/23 prices	Water resources £m	Water network plus £m	Wastewater network plus £m	Bioresources £m	Retail	Total £m
Base capex	27.4	536.5	367.5	22.2	0.0	953.5
Enhancement capex	139.2	563.4	1012.0	84.8	0.0	1799.5
Total	**166.6**	**1099.9**	**1379.5**	**107.0**	**0.0**	**2753.0**

SWB - South West Water & Bournemouth

A summary of our investment plan for Devon, Cornwall, Bournemouth and the Isle of Scilly is provide below.

Table 2 – SWB Expenditure summary

	Water resources £m	Water network plus £m	Wastewater network plus £m	Bioresources £m	Total £m
Base	16.0	324.7	367.5	22.2	730.4
Enhancement	132.8	382.5	1012.0	84.8	1612.1
	148.8	**707.2**	**1379.5**	**107.0**	**2342.5**

BRL - Bristol Water

Table 3 – BRL Expenditure summary

	Water resources £m	Water network plus £m	Total £m
Base	11.4	**211.8**	**223.1**
Enhancement	6.4	**180.9**	**187.3**
	17.8	**392.7**	**410.4**

Water resources

Overview

Our Water Resources Management Plan (WRMP) sets out our strategy for how the company plans to maintain the balance between water supply and demand for a minimum planning period of 25 years. Changes to licence capping means that we can defer c.£60m of new sources.

In addition to our base maintenance needs which ensure our existing water resources are well maintained, we produced a long list of options that increase supply volumes to help determine our optimum strategy for future supply options. These options were developed through detailed engineering, environmental, and deliverability assessments. Options were identified using UKWIR planning tools, WRMP19 options, and through external stakeholder engagement. The aim has been to identify credible options which provide Water Available For Use (WAFU).

Supplementing our supply schemes which will be delivered and have their benefits realised in AMP8, we are developing three strategic supply schemes: Cheddar 2, Poole Harbour and Mendip Quarry. These schemes will deliver an additional c.32 megalitres a day of available water through two new resources and a water re-use scheme.

Our water resources WINEP is a key delivery mechanism to ensure that our water sources are resilient to both current and future challenges. The programme also seeks to ensure that abstraction is environmentally sustainable to promote water dependent habitats and wildlife. Our programme spans all our regions and consists of three primary investments:

- Environmental investigations
- The delivery of 11 water resource sustainability schemes delivering against the findings of prior investigations
- Investigations into future requirements for, or delivery of, environmental enhancements linked to our water resources assets, .i.e., fish passage and eel screens

Whilst the strategy for metering and leakage are developed from our WRMP, these are described and financed from the water network plus price control.

Base maintenance capex costs

Our base maintenance investment is necessary to ensure that our statutory inspections, and associated remedials, are delivered in accordance statutory regulations (Reservoir Act, 1975). Our maintenance activity under this price control also ensures for that our water resources assets, including raw water transport mains, are appropriately maintained to ensure the availability and quality of our water sources.

Table 4 – Water resources base maintenance capex

	SWB £m	BRL £m	SWB Total £m
Dams and impounding reservoirs	5.0	7.8	12.8
Water resource assets	9.1	1.2	10.3
Raw water mains	2.9	2.0	4.6
	17	**11**	**28**

Enhancement capex costs

Alongside our base maintenance investment, we have Identified the need for additional supply schemes to provide additional resource capacity in our South West and Bournemouth regions in AMP8.

Table 5 – Water resources enhancement capex

	SWB £m	BRL £m	SWB Total £m
Supply schemes*	61.4	1.3	114.4
Water resources WINEP	27.9	5.2	33.1
Water efficiency	-	4.6	4.6
	89	**11**	**152**

** this enhancement case for supply schemes includes investment that is allocated in the water network plus price control. The total value of the investment case is £114m of which £52m is water network plus*

Supply schemes

We will invest £114.4m Totex (22/23 prices post efficiency) within AMP8 to deliver 50Ml/d of water available for use (WAFU) through the development of new water supply schemes. Our best value modelling process has identified and driven the schedule of these schemes, which means that the WAFU benefit is not realised until AMP9 in every case. This is due in part to construction periods which are at least 4 years.

This investment is only needed in our South West Bournemouth (SWB) region, with Bristol Water (BRL) is able to manage supply-demand balance using only demand measures.

Our strategy is to invest in demand reduction in AMP8 and beyond, to meet targets for leakage and PCC, only implementing supply schemes when additional WAFU is needed above our demand measures in certain zones. In parallel we will invest in engineering assessments so that we are able to implement additional supply schemes to react to changes in our plan, for example if demand reduction measures are not as effective as planned.

Water resources WINEP

Our Water resources WINEP programme is part of our BRL and SWB Wholesale Water WINEP programme for the water resources price control. It is a key delivery mechanism to ensure that our water resource sources are resilient to both current and future challenges, and the programme also seeks to ensure that abstraction is environmentally sustainable to promote water dependent habitats and wildlife. We have developed our WR WINEP programme in conjunction with our BRL and SWB Biodiversity programme. This delivers synergistic environmental enhancements including catchment management improvements, environmental compliance work for our assets (i.e., eel regulations compliance, fish passage) and biodiversity improvements to our land holdings.

Water efficiency

The need to invest in water efficiency is aligned with our dWRMPs. Our programme of initiatives is an integral part of our overall strategy and will contribute to addressing the supply / demand challenges and meet government targets by contributing to a reduction in demand.

This case is specific to our plans to reduce water efficiency, it should be noted that the cases for supply, metering, and leakage are interrelated, and have been evaluated collectively through our dWRMP and LTDS planning process to provide a set of blended and complementary outcomes that deliver best value.

In addition to the demand-side needs and benefits for supply and environmental resilience, our enhanced water efficiency programme will also address socio-economic needs of fairer pricing and support for vulnerable customers dealing with water poverty.

Additional operating expenses

Primarily we will deliver water efficiency through our base operating costs. However, this investment need recognises the need to go above and beyond normal business practise of delivering water efficiency services across our household and non-household customer base. For this reason it is positioned as an enhancement opex investment.

Water network plus

Overview

Our customer's top priority remains a reliable safe clean water supply that looks and taste good to drink. To enable us to achieve safe 100% compliance with water quality standards and to ensure we have the correct systems in place to deliver clean, safe, pleasant water now and in the long term we need to invest in our water treatment works.

Our treatment processes and networks need to continue being upgraded to mitigate population growth and changing nature of the water sources in our regions. The presence of legacy lead pipes in domestic properties and the impact of emerging contaminants in the water sources which we rely on so much for drinking water supplies are also now key areas we focus on now to ensure a safe and sustainable supply for generations to come.

Alongside these Improvements and risk mitigations, we will maintain our existing treatment capability and upgrade treatment processes where necessary.

Our plans will focus on:

- Ensuring every customers gets a secure supply of water – every drop supplied looks great and tastes great – whatever the water is used for and wherever they are in the region
- Ensuring world class drinking water that meets stringent water quality standards
- Progressively addressing emerging risks

Base maintenance capex costs

Our base maintenance in the water network plus price control encompasses our investment across our water treatment works and our water distribution systems. This includes our reservoirs, pumps and ancillary assets like valves. The investment encompasses both our planned and reactive investment needs.

Supply and demand investment needs are also addressed from this investment. Our supply and demand investment will enable a further 22,600 and 44,167 new connections to our existing BRL and SWB water networks, respectively, whilst maintaining adequate levels of service to both new and existing customers.

We have set ourselves a stretching base maintenance plan, where we are maintaining our lower levels of leakage at no extra cost. Similarly, we are not asking customers to pay for our DWI transformation programme which will include the cleaning and remediation of treated water storage facilities. In some cases, new by-pass arrangements or additional storage tanks are required to facilitate this.

Table 6 – Water network plus base maintenance capex

	SWB £m	BRL £m	SWB Total £m
Water treatment and storage	70.0	32.8	102.8
Water network	122.6	51.0	173.6
Leakage	35.0	21.7	56.7
Metering	19.8	5.0	24.8
Supply and demand	35.6	9.0	44.6
	283	**120**	**403**

Our base investment has considerable overlaps with the enhancement cases below – as we look to reduce CRI, leakage, mains repairs, supply interruptions, unplanned outages, and water quality contacts. Leakage will be maintained using the same allowances in PR19, despite our costs being 2.5 times what was allowed.

Enhancement capex costs

Our strategy to 2050 is to improve drinking water quality and customer confidence by reducing water quality risks from source to tap. This requires enhancement investment to deliver improvements to our asset base, typically through the addition of new processes or upgrades at our WTWs. Across the network we are also investing in the replacement of assets that are causing discolouration or lead exposure risks.

Leakage and metering are key components of our demand management strategy in WRMP and are included within the water network plus price control.

Table 7 – Water network plus enhancement capex

	SWB £m	BRL £m	SWB Total £m
Strategic Water Treatment Works	15.9	75.7	91.6
Water Quality upgrades at our water treatment works	60.4	18.9	79.3
Quality Driven Mains Renewal & DOMS	32.6	10.3	42.9
Source-to-Tap Lead Management	41.3	18.6	59.9
Resilience inter-connectors	50.6	0	50.6
Leakage	61.8	25.8	87.6
Metering	58.4	21.2	79.6
	321*	**171**	**492**

** an additional investment of 52m is included in the water network plus price control. This investment is an allocation from Supply schemes enhancement business case.*

Strategic Water Treatment Works

Our strategy to 2050 is to improve drinking water quality and customer confidence by reducing water quality risks from source to tap. We will upgrade our water treatment works to ensure that we reduce water quality risks in the face of a changing climate which is impacting raw water deterioration.

We are proposing substantive rebuilds at three sites across our operational area – two in Bristol and one in our South West region. This supports the continued and long term delivery of clean safe drinking water. This is our customers number one priority and ensuring that our consumers can trust the water we provide is at the heart of our business.

The proposed schemes are being formalised into statutory notices following receipt of formal letters of support from the DWI. These legal instruments provide protection for customers against non-delivery, in addition to our performance commitments for Compliance Risk Index (CRI) and Consumer Water Quality Contacts.

For Bournemouth customers our investment in AMP8 is much lower. This reflects the significant investment we are making in AMP7 to modernise Alderney and Knapp Mill WTW which supply 320,000 customers (two thirds of the population served in Bournemouth) at a cost of c£180m.

Water Quality upgrades at our water treatment works

This investment alongside our upstream thinking programmes will also help us manage any deterioration in our raw water quality. Specifically, this case delivers our WTW Upgrades programme through:

- Substantial treatment upgrades at four sites to mitigate the risk of raw water deterioration and improve consumer acceptability: Greatwell, Dotton, Woodgreen and Cheddar WTWs
- Low cost, low regrets solutions at seven sites to mitigate the risk of deteriorating raw water quality impacting our ability to treat and supply water at Delank, St Cleer, Bastreet, Dousland, Prewley, Avon and Venford WTWs
- Two cost effective chemical dosing upgrades to improve water appearance and reduce customer contacts at Allers and Pynes WTWs
- Research, investigations and enhanced analytical capability for emerging contaminants and future potential chemical and biological risks to drinking water quality, such as PFAS ('forever chemicals'), endocrine disruptors, personal care products, disinfection by-products and microbiological pathogens.

Quality Driven Mains Renewal & DOMS

Alongside our lead programme we have a strategy to manage water quality contacts, most notably, discoloured water contacts. Our strategy has been in implementation since early 2000s and has delivered a ten-fold improvement in our water quality contact rate. In AMP8 we will move into phase five of this strategy which includes the investment of a balance programme of targeted mains replacement (aimed at older metallic pipework) and flushing

Source-to-Tap Lead Management

Whilst we are currently taking measures to minimise the level of risk to customers, and failures against lead standards are rare, we recognise the need to be proactive and ambitious in removing lead from our network entirely. A long-term programme of replacement provides a deliverable and affordable strategy to meet our lead-free ambition by 2050. In removing lead from our network, we are also cognisant of our net zero commitments and will reduce and report on embodied carbon associated with pipe replacements and network upgrades.

This investment case covers the full source to tap investment needed to effectively manage lead. It seeks to: 1. Minimise lead in source water through blending and catchment management initiatives; 2. Optimise and innovate our water treatment processes to remove lead and other metals; and 3. Continue our proactive programme of removing lead supplies across our regions, prioritising areas for removal based on risks and affordability. The first two investment areas will be delivered solely from base maintenance. Where-as the replacement of lead pipes is considered enhancement expenditure – particularly where intervening on customer owned assets.

Leakage

To meet our WRMP and future leakage 2050 targets, we need to go further than our PR19 investment takes us to 2024/25. There are challenging government targets around leakage which mean that we need to reduce leakage by 50% by 2050 relative to 2018 levels – we are committed to meeting these government targets.

We need to be proactive and ambitious to reduce leakage across our network and to meet the commitments made. In our South West Water region we have investment plans that deliver a 15 Ml/d reduction by 2030 and in Bristol the equivalent is c.2 Ml/d – maintaining sector leading levels of leakage.

Metering

This enhancement case articulates the need for £80m totex within AMP8 to deliver new installations and upgrades of Advanced Metering Infrastructure (AMI) smart meters across the South West Bournemouth and Bristol regions to achieve reductions in PCC and leakage from the 2018 baseline.

Wastewater network plus

Overview

Our assets, 655 wastewater treatment works, c. 1,200 pumping stations and 23,000 km of network, enough to go to Australia and back, are largely interspersed in and around the coastline, in part testament to the legacy of the Clean Sweep programme, where we invested heavily in ensuring that world class wastewater services were put in place for the first time.

Prior to this, water quality in the region barely got above 30%, and it was right to call our bathing waters the dirty man of Europe. Since Clean Sweep ended in 2007, we have seen flows in the network increase by 25% as businesses, developers, highways and local authorities have the automatic right to connect to our networks, and increasing the amount of road and surface run off that enters our system. The storm overflows design is used worldwide, but we have installed monitors on all our overflows so we can see when and for how long they are operating.

We are focussed on reducing the use of storm overflows to eliminate risks to river and coastal water quality, reducing nutrient levels at nutrient neutrality sites, providing first time sewage to customers in the Isles of Scilly and meeting the wastewater treatment needs of new customers.

Base maintenance capex costs

Our base maintenance in the wastewater network plus price control encompasses investment across our wastewater treatment works and our wastewater collection system. This includes our pumping stations, storm overflows and ancillary assets like valves. The investment encompasses both our planned and reactive activity.

Table 8 – Wastewater network plus base maintenance capex

	SWB £m
Wastewater treatment	99.1
Wastewater networks	111.9
Supply and demand	80.1
Bioresources	22.2
	313

Our base investment delivers the following areas of performance, which can overlap with enhancement expenditure:

- Internal and external sewer flooding
- Discharge permit compliance
- Pollution incidents
- Bathing water quality
- River water quality
- Sewer collapses

Enhancement capex costs

Our enhancement case covers investment in DWMP – namely our wastewater and bioresources programmes.

Table 9 – Water network plus enhancement capex

	SWB £m
Storm overflows	761
Wastewater treatment WINEP	252
Isles of Scilly	36
Bioresources	80
	1,124

Storm overflows

In response to the evolving needs and expectations of our customers and the changing environmental landscape in the South West region, we are committed to taking proactive steps to address wastewater management challenges. With 99.8% of residents living within two miles of our 1,342 storm overflows, we recognize the importance of this issue to our communities.

We have already made significant progress, achieving 100% bathing water quality across all beaches for two consecutive years and reducing overflows by 30% on average at each location in the past year – albeit in part due to a dry year and in part due to 50 interventions. We have delivered a 50% reduction in pollutions over the last two years.

Looking ahead to 2050, our strategic direction is guided by our purpose: to support the lives of people and the places they care about. One of our core ambitions over the next 25 years is to control and manage wastewater flows, reducing our reliance on storm overflows and minimizing pollution incidents.

To achieve this, we have outlined a comprehensive plan that includes:

- Evolving our water recycling and sewerage system to accommodate larger flows.
- Enhancing sustainable drainage to mitigate flooding and pollution risks.
- Creating resilient smart wastewater networks with real-time monitoring and control capabilities.
- Prioritizing improvements in bathing waters and shellfish waters, aligning with customer preferences.

Hence, we have optimized our program to be more affordable for customers, with a total of £761m capex and £781m totex, which represents a 26% reduction from the initial cost estimate of £1bn.

From our assessed costs of £1bn, we have applied stretching efficiencies and recognised the overlap with base.

Wastewater treatment WINEP

Our wastewater service is vital for public health, the local environment, and our regional economy. Our 2050 vision is driven by our commitment to delivering long-term value for customers and communities. Trusted by 1.5 million residents and up to 10 million annual visitors in Devon, Cornwall, and the Isles of Scilly, we have outlined key objectives in our Long-Term Delivery Strategy:

- Enhance wastewater effluent quality to reduce river nutrients.
- Improve transparency and performance.
- Safeguard rivers and seas from pathogens, nutrients, and sediment.
- Prioritize natural infrastructure for flood and pollution risk reduction.
- Invest in monitoring, including real-time flow monitoring at emergency overflow sites.

Over the next 25 years, we will contribute to national targets, including an 80% reduction in phosphorus loadings from treated wastewater by 2038 and the restoration of 75% of water bodies to good ecological status.

The proposed AMP8 investment for this Enhancement Case is £252m capex and £240m opex. This represents a substantial increase from AMP7 due to the legally required investment that we must make to meet the Water Framework Directive (WFD), challenging phosphorus targets, and regulatory changes in monitoring emergency overflows. This investment encompasses 998 schemes, investigations, and monitoring outcomes, reflecting our commitment to environmental improvement and customer satisfaction.

Supply and demand growth

Official forecasts indicate that an additional 300,000 people will be living across Devon and Cornwall, by 2050, adding to the 1.8m customers for whom we provide wastewater services.

The total proposed investment in AMP8 is £57.43m Totex a 25% increase from AMP7 primarily due to specific local development needs. All Investment is within the South West Water region.

In addition, six WWTW have been assessed as able to accommodate growth to 2035 via operational interventions, with zero additional opex, deferring more significant investment into AMP9.

We have considered the benefits from base maintenance, identifying a base overlap of £16.223m, which was netted off the enhancement investment proposed.

The proposed investment was selected due to as the least cost and best value plan, which to address critical compliance issues and imminent local development at the three WWTW selected, whilst avoiding abortive costs from requirement for subsequent upgrade of the same processes at each WWTW in AMP9.

Isles of Scilly

In April 2020, we became the wastewater provider for the Isles of Scilly, taking over limited public wastewater networks on two of the five inhabited islands. This responsibility was mandated under the Water Industry Act Section 101A due to environmental concerns arising from domestic sewage.

To contextualize our investment programme for PR24, we engaged extensively with 30,000 customers and over 1000 stakeholders, gathering valuable insights. Notable findings include the recognition of the importance of improving services for remote communities, the Isles of Scilly's integration into the South West region, and the willingness to share costs to keep services affordable.

The benefit to customers is the provision of a first-time public wastewater network, including treatment and disposal and the removal of the need to manage and maintain private septic tanks.

Our proposed investment in AMP8 for the Isles of Scilly amounts to £68.40m in totex marking a 67% increase from AMP7. This increase is primarily due to the expansion of the First Time Sewerage (FRS) network and the provision of new wastewater treatment facilities and sea outfalls. The plan aligns with regulatory requirements and environmental goals, ensuring the protection of groundwater reserves and harmonizing service standards between the Isles of Scilly and the mainland.

Bioresources

Only with careful management will our existing asset base meet the demands of AMP8, the current treatment facilities are approaching end of life and do not meet the new upcoming standards. Will require material investment to update them, far above the long-run capital maintenance expenditure we undertake. Our Bioresources plan covers our entire service area, offering benefits such as addressing emissions, enhancing service quality, reducing disposal volumes, lowering energy use, and achieving compliant bioresources disposal.
To achieve these goals, our plan includes:

- Increased Bioresources Yield: Meeting population growth and quality standards.
- Preventing Water Pollution: Complying with land application limits.
- Emissions Mitigation: Meeting new containment and odour control standards.
- Landbank Competition: Improving product quality for organic material recycling.
- Landbank Loss Mitigation: Addressing potential regulatory changes.

The investment in the Enhancement programme is £207.9m capex and £305.4m totex, delivering the best value for our customers and the environment. The need to invest has led to an assessment of all strategic options which concludes that the best approach is to adopt a transformational approach to the SWW Bioresources asset base that will embrace proven technology and allow for an adaptive approach to future regulatory changes.

Cross cutting investments

Overview

Some of our investments don't neatly fit into price controls as they span across multiple areas of business. It is right that we consider these investments as business wide initiatives because they impact the full spectrum of our operations.

Base maintenance capex costs

We have challenged ourselves to deliver net zero expenditure and increased transport costs within our existing base allowance, this is a significant undertaking from base.

Table 10 – Cross cutting investment in base maintenance capex

	SWB £m	BRL £m	SBB Total £m
IT & Customer	50.5	16.5	67
Net Zero	7.6	3.4	11
Transport	11.0	7.5	18.5
Facilities & HSS	32.5	12.2	44.7
Management of the capital programme and other	56.4	9.8	66.2
	158	**49**	**207**

Enhancement capex costs

Table 11 – Cross cutting investment in base maintenance capex

	SWB £m	BRL £m	SBB Total £m
IT & Customer	14.0	2.9	16.9
Facilities & HSS	3.5	1.7	5.2
	18	**5**	**22**

IT & Customer – Cyber security

Our plan will increase our capability to protect, detect and respond to suspicious cyber activity across the corporate IT and OT infrastructure and supports achieving the new NIS sector profile as set by DWI, enabling automated asset discovery and vulnerability management whilst detecting and alerting suspicious activity on the OT plant networks.

Facilities & HSS – SEMD

Our plan will deliver enhancement via 2 schemes: Alternative Water Supply (AWS) Planning Enhancement – There has been a step change in SEMD 2022 to have "regard" for national reasonable worst case scenarios, this was not previously required.

Emergency Planning Enhancement – Heightened emergency response to an increased risk of major incidents out of our control such as national and rolling power outages, extreme weather events whilst also working in greater collaboration with our external partner agencies.

Summary

Our investment plan has been developed in line with the feedback received from customers and stakeholders. We have undertaken our largest and most diverse programme of customer engagement and research, using the findings to continually update and refine the plan to reflect customer and stakeholder preferences in respect of the levels of investment and performance commitments, whilst ensuring full compliance with our legislative obligations.

We have used the principles of best value planning to assess the levels of investment and performance improvements in the business plan as we strive to deliver a value for money, affordable plan. Our business plan and associated outcomes and performance commitments have received the input and scrutiny of the independent WaterShare+ Customer Advisory Panel.

The investment programme is a key building block of our business plan and has been developed using asset management processes and techniques that we believe align with best practice across the utility sector.

We have scoped different solutions and options for consideration in our business plan. Our suite of asset management and investment planning models and techniques has enabled us to create a diverse range of investment and outcomes scenarios which each represent a unique combination of these solutions and futures. We have used customer evidence and stakeholder views to appraise each scenario and develop best value plans. Our iterative process of acceptability testing and plan updates has ensured that an appropriate balance has been established between the needs of customers, stakeholders and the business itself.

Our final investment plan represents a culmination of the planning process which has taken account of all relevant factors, including unit cost assessment, review and benchmarking.

With customer and legal obligations aligned, 100% of what is required is in our plans, and over 90% of our plan is least cost.

PR24 Cost adjustment claims

Final submission

October 2023

Contents

Table of Contents

1. Introduction

1.1 Approach

This document sets out the cost adjustment claims (CACs) that are required for inclusion in the PR24 cost assessment process, to reflect the unique cost drivers for Bristol Water (BRL) and South West Water (SWW) that are currently inadequately captured within the econometric models.

These CACs have been identified through a systematic selection process, defined in section 2, which began with a longlist of potential claims and was cut down to a shortlist that meets Ofwat's criteria. The process reviewed the potential need for adjustments from both a top-down econometric perspective and a bottom-up assessment of our cost drivers.

We have closely followed the requirements for this submission, as set out in Ofwat's PR24 Final Methodology,[1] and especially Annex 1 of Appendix 9, which defines the assessment criteria for CACs.

The analysis has drawn on research into CACs at PR19, especially those of SWW and BRL, and the subsequent appeals to the Competition and Markets Authority (CMA) and its final decisions. SWW and BRL have also engaged with Ofwat through the Cost Assessment Working Group and in company-specific meetings to provide their views on key cost drivers (in particular through the January cost model submission and our May 2023 response to the base econometric cost model consultation) and the implications for CACs. We were supported by the economics consultancy Oxera Consulting LLP (Oxera) in the identification and shortlisting of potential claims.

There are no changes in CACs and no material changes to calculation approach from our initial submission in June 2023.

Throughout the CAC identification process, we have sought to identify any areas where a downward adjustment would be applicable to our costs due to favourable operating conditions. We have not identified any such factors that met the relevant materiality thresholds. This is consistent with the nature of the operating areas and the very specific cost adjustment claims that we have identified.

We have also calculated symmetric impacts / implicit allowances where relevant, for example with the leakage claim.

These are provisional initial claims and, as requested by Ofwat, are based on the Ofwat models as proposed in the base cost econometric model consultation. We believe other CACs are likely as part of enhancement cases, depending on the form of the PR24 enhancement cost assessment for which there are currently no details available. The canal cost (CRT) and leakage claims are highly unlikely to vary depending on Ofwat's final selection of base econometric models. The bioresources claim would not be required if our position on the bioresources unit cost models was reflected in the final model suite. These claims are also based on assuming that other characteristics of our operating environments are correctly accounted for in Ofwat's final selection of base econometric models. However, depending on Ofwat's final selection, we may have additional claims to make (for example, if APH is not used as the sole driver of topography and some weight

[1] Ofwat (2022), 'Creating tomorrow, together: Our final methodology for PR24', December.

is placed on models using number of pumping stations, then we would consider that there would be need for an additional claim).

The CRT claim reflects a factor for the BRL area that was accepted at previous reviews, and the proposed methodology reflects the PR19 approach. The leakage claim reflects the service-cost relationship approach taken by BRL and the CMA at PR19, and is consistent with the development of the approach we set out towards the PR24 methodology consultations. Therefore, these claims have significant regulatory precedent for their consideration as the factual circumstances have ostensibly not changed.

Where possible, we have updated our initial CAC estimates in light of the 2023 data. Where shared data is not available for 2023 then we retain the calculation approach based on previous data. This does not make a material difference to the validity of our claims.

Based on the Ofwat consultation models, we have not identified any Retail Cost Adjustment Claims. We have considered BRL and SWW jointly in line with the expected approach for PR24, which meant that potential CACs (e.g. transience in the Bristol area) are not expected to be material across the wider region.

The CACs are summarised in the tables in section 1.2 below.

1.2 Overview of claims

This section summarises the robustness of the three CACs submitted for PR24, including cross-references to the Ofwat CAC template.

The CRT CAC has a gross value of £12.7m and a net value of £11.5m; its basis is summarised in the table below.

Table 1.1 Canal Cost (CRT) CAC

Name of Claim	Canal cost	Section 3
Unique circumstances		
Is there compelling evidence that the company has unique circumstances that warrant a separate cost adjustment?	Yes. BRL has to source around half of its distribution input from a single source and has limited scope to find alternative sources of similar reliability. The CRT costs are additional to the abstraction costs paid by all companies.	Section 3.1
Is there compelling evidence that the company faces higher efficient costs in the round compared to its peers?	Yes. Prices are negotiated periodically and subject to arbitration. An examination of the claim by the CMA after the PR19 final determination accepted that the higher costs faced by BRL were efficient.	Section 3.2
Is there compelling evidence of alternative options being considered, where relevant?	Yes. Explanations of alternative solutions and their unsuitability are presented in this claim and none is practical.	Section 3.4.1
Management control		

Is the investment driven by factors outside of management control?	There is no investment involved in this CAC (it is OPEX only).	N/A
Have steps been taken to control costs and have potential cost savings (e.g. spend to save) been accounted for?	Yes. There are periodic negotiations with recourse to arbitration. These negotiations are also used to obtain commitments to maintenance to ensure continuity of supply.	Section 3.4.2
Materiality		
Is there compelling evidence that the factor is a material driver of expenditure with a clear engineering / economic rationale?	Yes. Materiality exceeds the threshold (see below) and the rationale is based on ensuring security of water supply at the lowest practicable cost.	Section 3.4.3
Is there compelling quantitative evidence of how the factor impacts the company's expenditure?	Yes. Materiality is 8.7% of water resources TOTEX, above the threshold of 6%.	Section 3.4.3
Adjustment to allowances (including implicit allowances)		
Is there compelling evidence that the cost claim is not included in our modelled baseline? Is there compelling evidence that the factor is not covered by one or more cost drivers included in the cost models?	Yes. CRT costs are not directly accounted for in the base cost modelling due to the absence of relevant cost drivers. Only a tiny fraction of these costs are captured in the models—less than 3%, which we have deducted from the gross claim as an implicit allowance.	Section 3.4.4
Is the claim material after deduction of an implicit allowance? Has the company considered a range of estimates for the implicit allowance?	Yes. Calculation of implicit allowance was discussed in the CMA decision and subsequent work has built on that.	Section 3.4.4
Has the company accounted for cost savings and/or benefits from offsetting circumstances, where relevant?	No cost savings were identified.	Section 3.4.4
Is it clear the cost allowances would, in the round, be insufficient to accommodate the factor without a claim?	The need for a claim was accepted by Ofwat in PR19 and by the CMA—the disagreements with the company focused on the implicit allowances.	Section 3.4.4
Has the company taken a long-term view of the allowance and balanced expenditure requirements between multiple regulatory periods? Has the company considered whether our long-term allowance provides sufficient funding?	Yes. The triggering of price reviews is contractually defined and this is the basis of the forecasts.	Section 3.4.1
If an alternative explanatory variable is used to calculate the cost adjustment, why is it superior to the explanatory variables in Ofwat's cost models?	No alternative explanatory variable is used to support the claim.	N/A
Cost efficiency		
Is there compelling evidence that the cost estimates are efficient (for example similar scheme outturn data, industry and/or external cost benchmarking, testing a range of cost models)?	The gross costs are set by negotiation and arbitration and external comparison formed part of that process. The efficiency of the CRT costs was acknowledged by the CMA decision at PR19.	Section 3.5

Does the company clearly explain how it arrived at the cost estimate? Can the analysis be replicated? Is there supporting evidence for any key statements or assumptions?	Yes. The gross claim reflects forecasts based on contractual obligations for the period until the next renegotiation in the final years of the regulatory period. The net claim is the gross less the implicit allowance, whose calculation is explained. The analysis can be easily replicated.	Section 3.4.4
Does the company provide third-party assurance for the robustness of the cost estimates?	This claim closely follows the CMA's final decision, where the claim was supported subject to a recalculation of the implicit allowance. More recently, Turner & Townsend has provided technical assurance on the claim and its data sources. The final submission table has been reviewed by KPMG as part of our wider business plan assurance.	Section 3.5

Source: South West Water.

The leakage CAC has a gross value of £12.7m and a net value of £12.1m; its basis is summarised in the table below.

.

Table 1.2 Leakage CAC

Name of Claim	Leakage	Section 4
Unique circumstances		
Is there compelling evidence that the company has unique circumstances that warrant a separate cost adjustment?	Yes. BRL performs consistently at the industry frontier, thus incurring unique levels of expenditure to maintain low leakage volumes. SWW also performs above the industry median. Moreover, leakage is largely affected by exogenous factors, either regional or company-specific, and as such each company's performance is to be considered unique.	Section 4.3.1
Is there compelling evidence that the company faces higher efficient costs in the round compared to its peers?	Yes. Several econometric methodologies are presented supporting the existence of higher costs related to the maintenance of lower levels of leakage.	Section 4.2
Is there compelling evidence of alternative options being considered, where relevant?	Water resource management plans and Government targets (including for the environment) require companies to improve leakage performance. At lower levels of leakage, it is accepted that there will be higher costs of maintaining leakage at that level, which for ongoing costs (as this claim can be made symmetrically) is a base efficiency factor outside of management control.	Section 4.3.2
Management control		

Is the investment driven by factors outside of management control?	Water resource management plans and Government targets (including for the environment) require companies to improve leakage performance. At lower levels of leakage, it is accepted that there will be higher costs of maintaining leakage at that level, which for ongoing costs (as this claim can be made symmetrically) is a base efficiency factor outside of management control.	Section 4.3.2
Have steps been taken to control costs and have potential cost savings (e.g. spend to save) been accounted for?	Bristol changed its operating and contracting approach to leakage in 2019, which included the in-house control of leakage detection, planning and scheduling. There is also a smart leakage network that allows effective identification and monitoring of leaks. The Isle Utility report also provides evidence of approach. As this claim is about the higher costs of better performance, this claim does not adversely affect cost saving incentives, given long term company specific targets for leakage reduction.	Section 4.3.3
Materiality		
Is there compelling evidence that the factor is a material driver of expenditure with a clear engineering / economic rationale?	Yes, several econometric approaches rooted in operational rationale show adjustments consistently greater than 1% of WNP costs. The claim is currently estimated at 3.33% for BRL.	Section 4.2
Is there compelling quantitative evidence of how the factor impacts the company's expenditure?	Yes. Three separate econometric approaches are presented, all pointing to similar and consistent results.	Section 4.2
Adjustment to allowances (including implicit allowances)		
Is there compelling evidence that the cost claim is not included in our modelled baseline? Is there compelling evidence that the factor is not covered by one or more cost drivers included in the cost models?	Yes. No variables included in the current models take into account the impact of leakage reduction and maintenance on base costs, despite it representing a significant share of costs. This is correct from an efficiency model perspective, but for company base costs should reflect the service cost relationship, particularly at lower levels of leakage.	Section 4.2
Is the claim material after deduction of an implicit allowance? Has the company considered a range of estimates for the implicit allowance?	Yes, the claims consistently pass the 1% threshold of materiality.	Section 4.2
Has the company accounted for cost savings and/or benefits from offsetting circumstances, where relevant?	This is a standard and potentially symmetrical claim, based on performance against the industry upper quartile. Therefore offsetting circumstances are inherent within the claim,	Section 4.2
Is it clear the cost allowances would, in the round, be insufficient to accommodate the factor without a claim?	It is accepted that there is a higher base cost necessary to maintain lower levels of leakage, once these are achieved through enhancement. Therefore as the CMA found on the service/cost relationship, for leakage an allowance is required.	Section 4.1

Has the company taken a long-term view of the allowance and balanced expenditure requirements between multiple regulatory periods? Has the company considered whether our long-term allowance provides sufficient funding?	Yes, as the 50% long term reduction from 2017 levels is company specific, and therefore (although subject to recalculation) the principle of the claim is long-term.	Section 4.5
If an alternative explanatory variable is used to calculate the cost adjustment, why is it superior to the explanatory variables in our cost models?	No variable inherent to the cost adjustment is currently included into the model. We agree that it is not appropriate to include leakage as a variable within cost models, but an adjustment should either be made to modelled costs or efficiency results – we show both alternatives. As such, the proposed alternative are necessary for controlling for leakage performance.	Section 4.2
Cost efficiency		
Is there compelling evidence that the cost estimates are efficient (e.g. similar scheme outturn data, industry and/or external cost benchmarking, testing a range of cost models)?	Yes. A number of alternative cost models were tested, all providing similar and consistent results.	Section 4.4
Does the company clearly explain how it arrived at the cost estimate? Can the analysis be replicated? Is there supporting evidence for any key statements or assumptions?	Yes. Further detail is provided in the methodological annex. The underlying data consists exclusively of the latest versions of datasets published by Ofwat, and as such the entire analysis can be fully replicated. Assumptions are stated clearly and consistently tested against possible alternatives.	Section 4.2
Does the company provide third-party assurance for the robustness of the cost estimates?	Yes, the analysis was performed by Oxera, and also replicated using the BRL approach that was adopted by the CMA at PR19. As part of the internal assurance process, Turner & Townsend provided technical assurance on the claim against the guidance and the data sources	Section 4.6

Source: South West Water.

The Liming & Bioresources CAC is summarised below.

Table 1.3 Liming & bioresources CAC

Name of Claim	Liming & Bioresources	Section 5
Unique circumstances		Section 0
Is there compelling evidence that the company has unique circumstances that warrant a separate cost adjustment?	Yes. The average percentage of sludge treated by raw liming in the industry is 6%, while on average this amounts to up to 72% for SWW. The exogenous driver is the peninsula nature of the region and farming disposal route requires a highly limed product to maintain the land back. Alternative disposal methods require regulator enhancement support, with implementation lead times.	

Is there compelling evidence that the company faces higher efficient costs in the round compared to its peers?	Yes. Although Ofwat's current modelling suite estimates SWW's costs to be 16% higher than the upper quartile, we are placed among the two most efficient companies once raw liming is accounted for. This clearly demonstrates that our costs are efficient.	
Is there compelling evidence of alternative options being considered, where relevant?	Alternative options have been considered for AMP8 enhancement through WINEP, but do not for AMP8 avoid the higher base costs. Past proposals for additional storage have not received regulatory or planning support.	
Management control		Section 0
Is the investment driven by factors outside of management control?	The choice of sludge treatment technology results from the operating area of the company (e.g. topography and sparsity), the external farming environment, and environmental legislation and oversight.	
Have steps been taken to control costs and have potential cost savings (e.g. spend to save) been accounted for?	Trials of alternative options have been considered at previous reviews but none have fundamentally allowed for better options for disposal route for the region. AMP8 WINEP proposals for an alternative is a EA choice of driver.	
Materiality		Section 0
Is there compelling evidence that the factor is a material driver of expenditure with a clear engineering / economic rationale?	Yes, raw liming is a material driver of bioresources expenditure as this sludge treatment technology is much more expensive than alternative AD technologies. This is perfectly in line with the economic rationale and confirmed by the econometric modelling. This accounts for 19% of our projected TOTEX for bioresources in AMP8, thereby significantly exceeding Ofwat's materiality threshold for the bioresources price control (6%).	
Is there compelling quantitative evidence of how the factor impacts the company's expenditure?	Yes, the impact of raw liming on companies' costs has been robustly quantified econometrically. It has been estimated that it increased costs significantly across various models. Raw liming/AD is always statistically significant at the 1% level, which means that the estimated impact is robust and accurate.	
Adjustment to allowances (including implicit allowances)		Section 0
Is there compelling evidence that the cost claim is not included in our modelled baseline? Is there compelling evidence that the factor is not covered by one or more cost drivers included in the cost models?	Raw liming is not covered by any of the cost drivers included in Ofwat's cost models.	

Is the claim material after deduction of an implicit allowance? Has the company considered a range of estimates for the implicit allowance?	After the deduction of the implicit allowance, which in that this case is simply the modelled costs under Ofwat's proposed modelling suite for PR24, the claim is material as it accounts for 16% (in a range of 14 – 18%) of projected TOTEX for AMP8. We have also considered a range of estimates and run different scenarios to cross-check the accuracy of our initial estimate based on our January submission (see Section 0 for the details of these different models).	
Has the company accounted for cost savings and/or benefits from offsetting circumstances, where relevant?	There are no offsetting cost savings – this is a model driver as an outlying factor which is clear from the model options.	
Is it clear the cost allowances would, in the round, be insufficient to accommodate the factor without a claim?	It is clear that none of Ofwat's proposed models for PR24 are able to capture the higher costs we have to incur regarding the sludge treatment process. Therefore if no adjustments were made, this would leave SWW insufficiently funded for AMP8.	
Has the company taken a long-term view of the allowance and balanced expenditure requirements between multiple regulatory periods? Has the company considered whether our long-term allowance provides sufficient funding?	This question is more appropriate for enhancement rather than base claims. The whole life cost could be lowered in the long term but this would require regulator support for the enhancement investment and change of disposal route, which is not currently in place under WINEP priorities.	
If an alternative explanatory variable is used to calculate the cost adjustment, why is it superior to the explanatory variables in our cost models?	While the additional explanatory variable might not be necessary or immaterial for an average company, its inclusion is required to account for the specific circumstances that SWW is facing as the company is a clear outlier in terms of sludge treatment technology.	
Cost efficiency		Section 0
Is there compelling evidence that the cost estimates are efficient (e.g. similar scheme outturn data, industry and/or external cost benchmarking, testing a range of cost models)?	Yes, there is strong evidence that the cost estimates presented are efficient. First, they have been estimated based on Ofwat's proposed modelling suite for PR24 with an additional explanatory variable, which means that they have been subject to a robust benchmarking exercise within the industry (12 years of data for the whole industry, i.e. 120 observations). Second, the resulting econometrics models are robust and can be relied on (see Appendix 0 for the statistical results). Third, as per Ofwat's own guidance, cost estimates have been subject to a catch-up efficiency challenge (based on the upper quartile, consistent with the CMA decision at PR19), which we note is more stringent with the inclusion of the additional explanatory variable.	

Does the company clearly explain how it arrived at the cost estimate? Can the analysis be replicated? Is there supporting evidence for any key statements or assumptions?	Yes, the whole process can easily be replicated and all of the different steps are detailed in section 5. It simply consisted of adding an additional explanatory variable to Ofwat's proposed modelling suite for PR24. Our January submission, as well as Anglian's, can be used as a starting point for the definition of the additional explanatory variable (raw liming in our case and AD treatment for Anglian's submission). Alongside this document, we are also providing an Excel workbook with all of the results.
Does the company provide third-party assurance for the robustness of the cost estimates?	As part of the internal assurance process, Turner & Townsend provided technical assurance on the claim against the guidance and the data sources. The final submission table has been reviewed by KPMG as part of our wider business plan assurance.

Source: South West Water.

2. CACs selection process

2.1 Introduction

The relatively small number of CACs (only three) being submitted is the result of a rigorous selection process that began with over a dozen potential claims. This section describes the selection process used and what factors were considered.

2.2 Initial longlist

An initial longlist was drawn up from:

- claims submitted in PR19, in case they might still be valid;
- corporate perceptions within the company of how the company's region's topographic and demographic characteristics incur additional cost;
- a consideration of whether some exogenous characteristics might result in lower costs.

It was established that a number of the PR19 claims were no longer relevant, mostly because investments had been made with the intended effect or they were not estimated to pass the PR24 materiality threshold. No characteristics that could lower costs were identified.

An additional exercise was then commissioned for Oxera to examine every CAC submitted by all companies in PR19; this was to identify if any potential CACs had been missed by the previous process. However, this exercise did not produce any additional topics for a claim and therefore did not extend the longlist.

2.3 Subsequent elimination

The next stage was to consider the availability of evidence to support the subjective view of higher costs. In some cases, these views—for example, a belief that the capacity to support a transient summer population logically leads to higher costs—could not be supported due to lack of available industry-wide data. However, there is evidence emerging in this case (in particular from smart metering) that will allow this evidence to be reconsidered and explored further. For now, the structure of the PR24 proposed models do not suggest that material claims are likely, but we continue to review this (noting a significantly higher bar for claims not evaluated at this stage). In our view, this factor will need to be considered across enhancement (capacity) and base costs in order to meet the CAC tests, which we cannot achieve at this stage without PR24 enhancement models.

In other cases, it was accepted that factors such as topography, which could lead to higher costs, were already being considered within the econometric models.

This process of elimination led to four possible CACs:

- Canal cost;
- liming & bioresources;
- leakage;
- coastal works and complexity (and in particular UV treatment).

In all cases, we considered there to be a valid claim, based on the econometric evidence; however, a UV treatment may fall short of the materiality requirements, although this may be sensitive to the final form of Ofwat PR24 models given that coastal works are being considered in that consultation. Given that UV is not the only factor, a composite complexity measure, as set out in our base econometric model consultation response, would appear to provide the best way forward. This is because a symmetrical UV claim may revert to the modelling we have proposed. We may revisit whether this claim becomes material in light of 2022/23 data and the final model selection, noting our view above on a composite complexity claim.

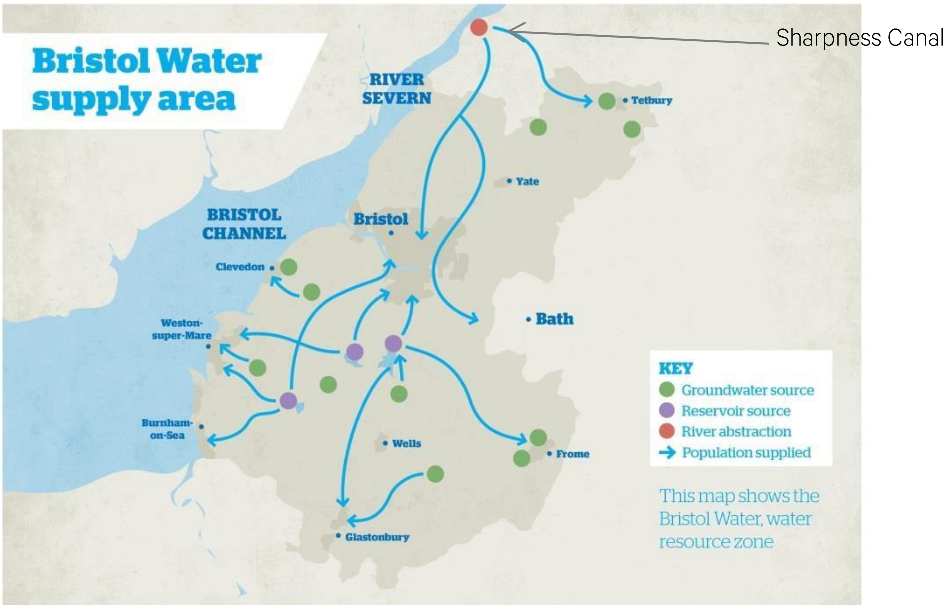
Eliminating this claim for the time being left us with three claims at the end of the selection process: CRT, leakage, and liming & bioresources. These three claims are now presented, in turn, in the following sections.

3. Canal cost (CRT) CAC

3.1 Contractual background

The Gloucester and Sharpness Canal is owned and operated by the CRT. Water levels in the canal are sustained by the River Severn. Since 1962, there has been a long-term contractual agreement with the CRT charity to allow the purchase of water from the Gloucester and Sharpness Canal, which is outside of the area of appointment. The agreement permits unrestricted abstraction for an annual average of 210Ml/d with a maximum daily abstraction of 245 Ml/d, although in river regulation (dry) and high tide periods this can be limited to 195Ml/d. The water is abstracted close to Sharpness docks, outside of our supply area to the north, to supply our water treatment works at Purton and Littleton (as illustrated in the figure below).

Figure 3.1 BRL supply area



Source: Bristol Water.

In this agreement, BRL makes an annual payment to the CRT charity to cover the cost associated with the purchase of water, which would otherwise be used in the canal network and the maintenance of the canal system to facilitate abstraction; and provisions to cover any emergency situations preventing abstraction. The CRT explains that such 'water sales are contracts we enter into with third parties to sell our surplus water (typically this is water that is surplus to the amount needed to meet the level of service).'[2] The water abstracted represents about half of BRL's Distribution Input. The size of the payment is contractual—it has a fixed and a variable cost component, both of which are inflated by RPI from 1998 (reflecting the latest terms):

- **fixed cost:** BRL can abstract up to 57,000Ml per annum at a cost of £1m inflated by RPI;
- **variable cost:** BRL can abstract between 57,000Ml and 76,650Ml per annum, at an additional cost of £20/Ml inflated by RPI.

[2] CRT (2015), 'Putting the water into waterways: Water Resources Strategy 2015–2020', p. 17, https://canalrivertrust.org.uk/refresh/media/thumbnail/24335-water-resources-strategy.pdf.

The agreement runs to 2055, and the price can be reviewed every ten years after 1 April 2008, providing either party gives notice for a review in the two years prior to this. Therefore, the next review date trigger is 1 April 2028. A review was not triggered in 2008, but was triggered in 2018 by the CRT, which requested an increase from c. £1.8m p.a. to as much as £17.5m p.a., based on a 'market value of water'.

There then followed a process of arbitration, with the arbitrator rejecting the CRT's market value for water arguments but, based on the potential future expenditure and maintenance needs (driven by climate change and the need to protect the structure of the canal), allowing a £300,000 p.a. increase in costs payable by BRL. The new total (c. £2.1m p.a.) continues to be inflated by RPI. The £20/Ml excess volumetric charge remains unaltered (and has not been triggered in recent years).

Given the arbitrator's findings, the only relevant factor should be the future maintenance and operational needs of the canal, and therefore given the arbitrator's confirmation that the contract is clear about the "cost" basis of the agreement, there is reasonable certainty as to the future costs for 2025-2030. The contract is at the same basis as structured for PR99, when Ofwat allowed an initial lump of cost to secure the resilience of the canal for Bristol supplies, rather than the development of alternative sources, emphasising this is a strategic water resource.

Ahead of the 2028 potential charges review (which can be triggered from 1 April 2026), BRL will emphasise to the CRT that it is in both parties' interests that the CRT engage with BRL on its current and anticipated costs in relation to the canal. The actual cost of the canal should be informative. Should the CRT not do so, and the matter proceed to arbitration again, the CRT's failure to engage on costs would likely be damaging to itself (in terms of both the outcome of the arbitration itself and any costs award). The CAC is necessary to protect customers from similar elevated future claims from CRT as in 2018, as suggesting that there are alternative sources to that historically agreed and that the sourcing decision is inside of management control could undermine the principle that Bristol Water customers water customers have contributed to the assets water supply use and maintenance (including the wider scheme for the River Severn in the 1960s), and that the contract should reflect these ongoing costs rather than a market value of water approach being appropriate.

These water purchase costs are in addition to the costs that all companies pay to the Environment Agency for abstraction licensing. The abstraction licence held by the CRT for abstracting at Gloucester Docks specifies the purposes as being for public water supply abstraction at Purton, and is paid for as a separate transaction by BRL. In the reporting of the wholesale cost data, BRL's payments to the CRT are allocated to the line 'Other Operating Expenditure excluding renewals', with a portion (approximately 5%) allocated to 'Third Party Services' in the Water Resource price control, to reflect the volume proportion charged to Wessex under the agreement for treated water supply at Newton Meadows (11 Ml/d maximum). Payments to the CRT for the purchase of water therefore represent an additional water resource cost included in Ofwat's base cost modelling that we incur compared to other companies.[3]

3.2 Regulatory background

There is an established precedent for a CAC based on payments to the CRT, confirmed by previous Final Determinations by Ofwat and redeterminations by the CMA.

[3] This is separate and additional to the CRT maintenance charges as incurred by some companies (including BRL).

At PR14, BRL submitted a CAC and sought £8.1m to cover the estimated payments to the CRT over the five-year period (2014/15 to 2019/20). Ofwat, in its final determination allowed £6.3m, reflecting a downward adjustment to the claim value to account for what it considered was already presumably accounted for in the models and an upper quartile efficiency challenge. In the redetermination, the CMA assessed that there was 'no basis to use a figure for the adjustment that differed from Bristol Water's claim of £8.1 million'[4] and therefore allowed the claim in full.

In comparison to the PR14 CAC submission, for PR19, BRL proposed that payments to the CRT for the purchase of water formed a cost exclusion case because:

- Ofwat had sought to exclude abstraction charges and discharge consents from its models published in the cost model consultation;[5]
- Ofwat had sought to exclude third-party costs from its models published in the cost model consultation[6] (which accounted for c. 5% of BRL's payments to the CRT);
- there was a lack of cost drivers collated at an industry level, which would capture the activity of buying and selling raw water from third parties (i.e. water trading).

At PR19, the CMA did not determine that a cost exclusion approach should be used but again allowed the CAC, albeit with a calculation of the Implicit Allowance based on a method proposed by Ofwat (which was not substantially different in quantum from the approach and cross-check on this approach proposed by BRL). The CMA decision is reproduced below.[7]

[4] CMA (2015), 'Bristol Water plc: A reference under section 12(3)(a) of the Water Industry Act 1991: Appendices 1.1 – 4.3', A4(3)–5, https://assets.publishing.service.gov.uk/media/5627995aed915d101e000001/Appendices_1.1_-_4.3.pdf.

[5] Ofwat (2018), 'Cost assessment for PR19: a consultation on econometric cost modelling', March, p. 15, https://www.ofwat.gov.uk/wp-content/uploads/2018/03/Cost-assessment-for-PR19-A-consultation-on-econometric-cost-modelling.pdf.

[6] Ofwat (2018), 'Cost assessment for PR19: a consultation on econometric cost modelling', March, p. 15, https://www.ofwat.gov.uk/wp-content/uploads/2018/03/Cost-assessment-for-PR19-A-consultation-on-econometric-cost-modelling.pdf.

[7] CMA (2021), 'Anglian Water Services Limited, Bristol Water plc, Northumbrian Water Limited and Yorkshire Water Services Limited price determinations: Final report'.

4.1021 It is clear that Bristol bears additional costs in relation to purchasing water from the G&S canal and that management has limited influence over the level of these costs. We are not persuaded on the one hand that Bristol makes offsetting savings elsewhere from this arrangement, nor on the other hand that Bristol's costs for treatment of water from the G&S canal are atypical and not adequately provided for by base costs. In considering the cost adjustment claim, the key issue is then the level of implicit allowance Bristol already receives from base costs and deduct this from the allowance provided.

4.1022 Calculating implicit allowances within base costs is problematic due to the aggregated nature of how modelled costs are produced. However, whilst none of the methods either party has provided is without flaws, we conclude that Ofwat's Approach One is reasonable.

Source: CMA (2021) Anglian Water Services Limited, Bristol Water plc, Northumbrian Water Limited and Yorkshire Water Services Limited price determinations: Final report'.

Ofwat's Approach One is summarised as follows (emphasis added).

4.1007 In Approach One, Ofwat removed all of the bulk supply costs from the historical modelled base costs (dependent variable of the base models) and re-calculated the modelled base costs allowance for Bristol by re-running the base models.

Source: CMA (2021) Anglian Water Services Limited, Bristol Water plc, Northumbrian Water Limited and Yorkshire Water Services Limited price determinations: Final report'.

BRL has adopted Ofwat's Approach One, with one modification, namely it is excluding *raw water bulk supply costs only* as these are most relevant to the CRT provision. This appears to calculate the approach that the CRT undertook and is appropriate for a water resources CAC.

Reflecting the continued arrangement with the CRT, this claim is required for the business planning period 2025/26 to 2029/30. Due to the long-term arrangement with the CRT, payments for the purchase of water are included in historical costs as reported to Ofwat, and are therefore likely to be included in the costs to be modelled in Ofwat's PR24 econometrics.[8] No assumption is made concerning a contract price change following possible renegotiation in 2028.

In summary, on this basis we propose that the costs associated with the purchase of water from the CRT continue to be accounted for as a CAC.

[8] Except the c. 5% of the CRT costs related to third-party services.

3.3 Quantification of the claim

The quantification of the claim requires a three-stage process.

1. Reporting of historical costs from 2010/11 to 2022/23 (in 2022/23 real CPIH terms) and estimation of forecast costs out to 2029/30, based on an RPI-based indexation that assumes constant real prices in RPI terms.
2. Deduction of an implicit allowance using a method defined in section 3.4.4.
3. Calculation of the net claim by deducting the allowance from the gross claim.

The outcome of this process is a gross claim of £12.7m (2022/23 CPIH constant prices), an implicit allowance of £1.1m, and a net allowance of £11.5m. These calculations exclude 5% of the costs of third-party services to Wessex.

Claim calculations

Supporting calculations for the submission template are provided in a separate Excel file (CAC CRT revised.xlsx). A brief explanation of each individual line of the associated submitted template is provided below.

Line (row)	Description
CW18.1	Description of claim is Canal & River Trust
CW18.2	This claim reflects Regional Operating Circumstances
CW18.3	The claim is non-symmetrical, as the adjustments through the implicit allowance are not significant enough to merit a symmetrical adjustment
CW18.8	The historical expenditure reflects that reported each year (which is already net of the 5% allocated to Wessex for the bulk supply at Newton Meadows). This has been converted to 2022/23 prices using CPIH (see Note 1 below). The entire amount is allocated to water resources.
CW18.5	The future contract costs are taken to outturn prices using forecast RPI, and then deflated to CPIH using forecast CPIH (both average year. The 5% deduction is then made (see Note 2).
CW18.6	The implicit allowance of £1.136m has been calculated based on forecast cost drivers as shown in table 3.1. The details can be found in the supporting file 'CAC CRT revised.xlsx', sheet 'Implicit Allowance', cells B53:G55.
CW18.9	Estimated control TOTEX of £88m has been included only for the purposes of indicating expected materiality. This is based on initial internal modelling in April 2023.

Note 1: Historical CRT data

	Original reported data	CPIH average index (2022/23 123.04)	CW18.8 value (after 5% bulk supply)
2010/11	£1.461m	90.91	£1.879m
2011/12	£1.541m	94.31	£1.910m

	Original reported data	CPIH average index (2022/23 123.04)	CW18.8 value (after 5% bulk supply)
2012/13	£1.629m	96.58	£1.971m
2013/14	£1.669m	98.60	£1.979m
2014/15	£1.676m	99.73	£1.965m
2015/16	£1.711m	100.17	£1.997m
2016/17	£1.734m	101.54	£1.996m
2017/18	£1.790m	104.22	£2.008m
2018/19	£1.854m	106.43	£2.037m
2019/20	£1.900m	108.24	£2.051m
2020/21	£2.869m	109.11	£3.073m[9]
2021/22	£2.298m	113.12	£2.375m

Note 2: Forecast CRT data

Year	CRT payment (nominal – forecast inflated by RPI)	Average RPI index (short term BoE forecast and 3% from 2025/26)	Average CPIH index (short term BoE forecast and 2% from 2025/26)	Total after 5% bulk supply deduction (2022/23 CPIH deflated)
2022/23 (actual)	£2.481m	351.22	123.04	£2.357m
2023/24	£2.649m	375.04	128.15	£2.417m
2024/25	£2.755m	390.04	130.84	£2.462m
2025/26	£2.838m	401.75	133.45	£2.486m
2026/27	£2.923m	413.80	136.12	£2.510m
2027/28	£3.011m	426.21	138.84	£2.535m
2028/29	£3.101m	439.00	141.62	£2.560m
2029/30	£3.194m	452.17	144.45	£2.585m

Annual figures are presented in the business model template. We now present the evidence to support this claim.

3,4 Need for the claim

Ofwat's evidence requirements for demonstrating that a cost adjustment is necessary are defined as:

- unique circumstances;
- management control;
- materiality;
- adjustment to allowances (including implicit allowance).

Each is now considered in turn.

3.4.1 Unique circumstances

[9] 2020/21 include back payment of the £0.3m p.a. increased charge to 2018 which was the outcome of the arbitration.

Regarding unique circumstances, there are three tests, as follows.[10]

- Is there compelling evidence that the company has unique circumstances that warrant a separate cost adjustment?
- Is there compelling evidence that the company faces higher efficient costs in the round compared to its peers (considering, where relevant, circumstances that drive higher costs for other companies that the company does not face)?
- Is there compelling evidence of alternative options being considered, where relevant?

The situation where about half of the Distribution Input for raw water is obtained from a third party from a single source is exceptional, and, in correspondence with the CRT, it commented 'that this [BRL arrangement] is one of the largest raw water transfers in the country', adding elsewhere in the same correspondence that the CRT's 'most recent large raw water contracts to the Utilities sector have attracted charges of £200/Ml'.[11] Comparing the current charges charging arrangement we have to the £200/Ml quoted by the CRT, suggests that the third-party payments made by BRL are much lower.

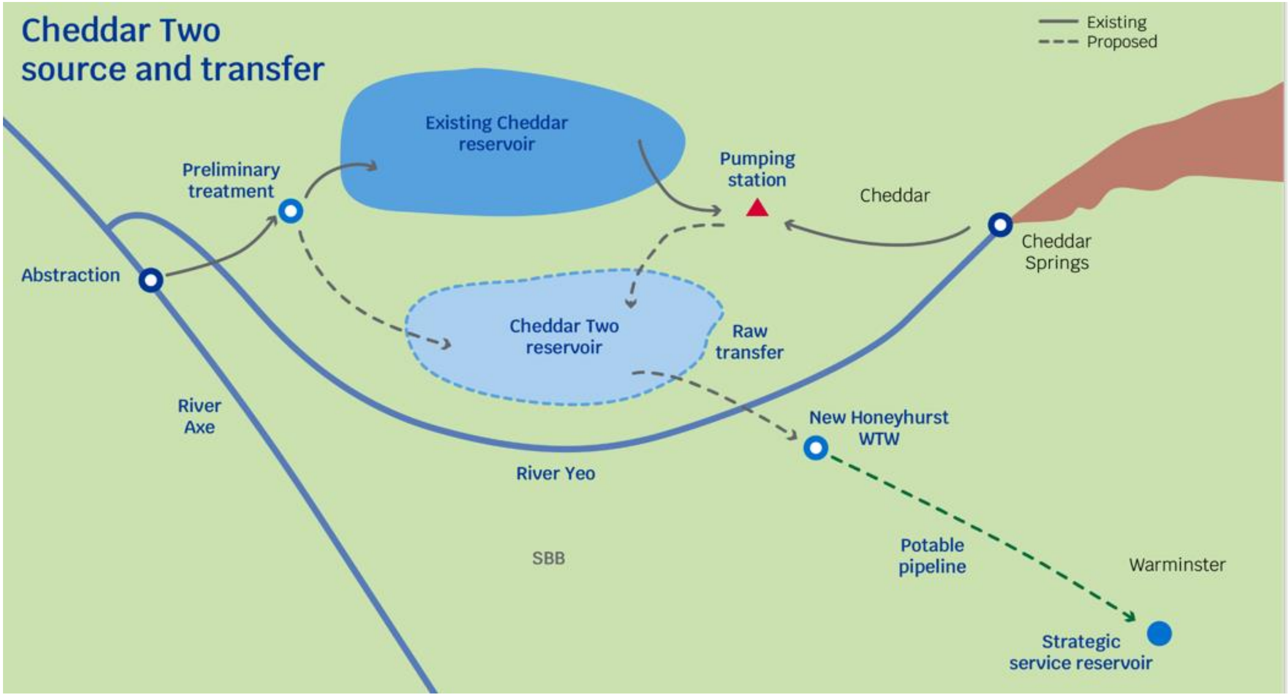
A more in-depth examination of alternative options is presented below and shows that it is not possible to provide the 210Ml/d or 130Ml/d from alternative sources.

Alternative options

Even if the largest potential options were pursued (e.g. a second reservoir at Cheddar, no transfer to Wessex, 10Ml/d purchased water from a third party, and 6.5Ml/d of leakage reduction), just over half (66Ml/d) of the average water and one third of the maximum that BRL currently sources from the Sharpness Canal could be resourced from alternative options. The capital cost alone of delivering these options is estimated to be over £300m[12] equivalent to the cost of 135 years of continued water sales from the CRT in 2022/23 prices). Furthermore, examination of wider water resource options in the West of England suggests that existing sources could not provide this volume of water. The Cheddar 2 source is now expected to be required to supplement West Country Water Resource future supplies including Bournemouth and South West.

---

[10] Appendix 9, Annex 1.2, PR24 Final Methodology
[11] BRL correspondence with the CRT charity, dated 2017.
[12] From Cheddar 2 SRO gateway 2 submission, excluding transfer costs.



Source: Ofwat

Other theoretically plausible options could include construction of a water main that takes water from the Severn at Gloucester, thereby bypassing the canal or a water trading option in relation to the River Severn or the sources that feed the canal. This is a less feasible option than at PR19 as the use of the Severn and canal system is a potential SRO option for the Severn to Thames transfer.

Source: Ofwat

These alternatives demonstrate that BRL has not been complacent in accepting the status quo and is justified in viewing the current arrangement as the best-value option. Ofwat and Environment Agency feedback on the draft Water Resources Master Plan (WRMP) considers that sufficient options have been considered. The options appraisal in the draft WRMP are at a far lower yield than available from the Gloucester and Sharpness Canal.

Table 12-4: Yield and AIC of supply-side options.

ID	Short description	Estimated yield (Ml/d)	AIC (p/m^3)
P08	Increased production at WTW	7	1
R014	Direct Effluent Re-use	10	2
P06	Catchment Management to manage outage risk from algal blooms	0.7	6
R016	Internal transfer	20	6
R007	Pumped refill of reservoir	25	14
P01-02	Increase performance of existing sources to increase deployable output to near licensed volume	1.59	15
R24	Revive existing groundwater source	2.4	12
P01-01	Increase performance of existing sources to increase deployable output to near licensed volume	0.7	17
R005	New reservoir	13.5	59
R08-03	New river water source	1.1	60
R08-02	New river water source	1.4	65

Source: BRL Draft WRMP

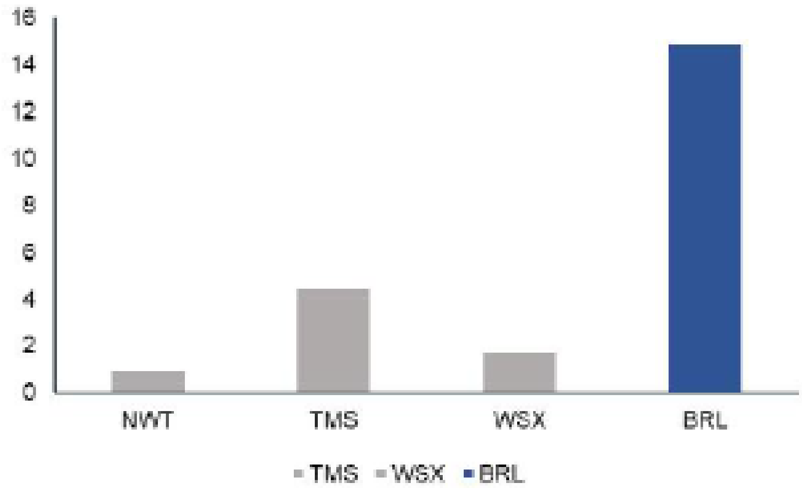
It is also relevant that, in the history of purchasing water from the CRT, the Gloucester and Sharpness Canal has proved a reliable source of water, providing uninterrupted supply with the exception of one event—in June 1990, the canal burst its banks and this was the only time that the supply failed. Since this event, BRL has funded the CRT for emergency standby cover that will enable it to supply a minimum of 100Ml/d to the Purton abstraction point, even in the event of canal failure.

Ensuring that the cost of water purchased from the CRT is fair and cost-reflective is important to BRL, reflecting commitment to delivering value for money to our customers and security of supply.

Evidence that other companies do not face a similar cost was covered in the NERA review for Bristol Water at PR19[13].

[13] NERA (23 August 2019): Review of Ofwat's PR19 Draft Determination on Bristol Water's Special Factor on Canal and River Trust Payments; prepared for Bristol Water

Figure C15 – Payments to the Canal and River Trust (£ per property)[295]



Source: NERA analysis of Ofwat data.

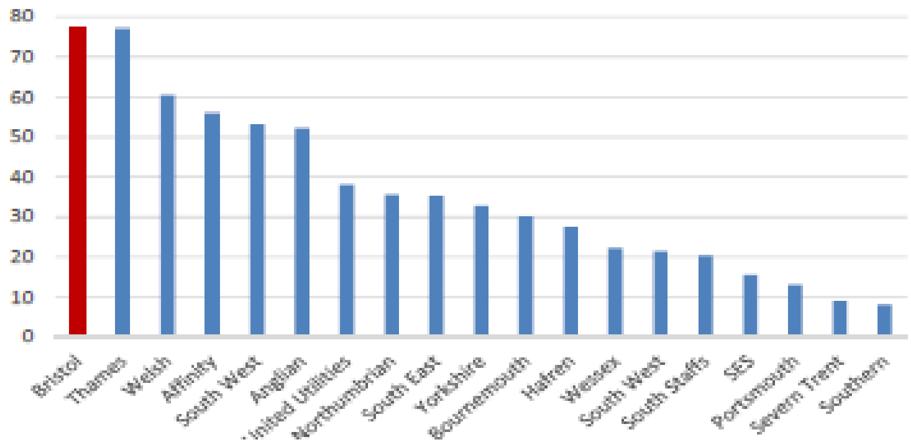
Source: NERA report for Bristol Water

In this analysis, we sought to identify examples of other companies making similar payments and commissioned a report by NERA which compared our costs to other companies that undertake water trading and purchase water from the CRT. The latter showed that our payments are significantly greater than other companies in the sector, again demonstrating the uniqueness of our circumstances. We did not agree with Ofwat that there are other examples that are comparable, but in terms of Ofwat's efficiency modelling used for Elan Valley in an attempt to calculate a generous estimate (as we have imperfect knowledge of all arrangements that may exist).

However, we have analysed the APR bulk supply data that is now available (from 2020/21) in our calculation of the implicit allowance, which allows us to improve on the PR19 calculation of data available at the time. Further details on this calculation are available in section 3.4.4.

Similarly, our calculation at PR19 of complexity treatment was informative in both a water treatment (immaterial ultimately) complexity claim and in evidencing that CRT costs did not have offsetting cost savings. We do not repeat the PR19 analysis in this initial claim as we assume it is now accepted following the PR19 CMA redetermination that the implicit allowance calculation is a sufficient methodology for this claim.

Figure C16 – Average proportion of water treated at complexity levels 5 and 6 (2012-2019)[310]



Source: NERA report for Bristol Water

3.4.2 Management control

Ofwat's evidence requirements for demonstrating that the claim is beyond management control are:[14]

- is the investment driven by factors outside of management control?
- have steps been taken to control costs and have potential cost savings been made (e.g. spend to save)?

As mentioned above, since 1962 BRL has maintained a contractual arrangement with the CRT to purchase water from the Gloucester and Sharpness Canal (as part of a collaboration with both public and private users of water from the River Severn). In this respect, therefore, the purchase of water from the CRT, like any other third-party water trading arrangement, is a decision that is theoretically within management's control.

However, in the absence of this arrangement, BRL would not be able to provide half of the Distribution Input that the Gloucester and Sharpness Canal can otherwise provide. Therefore, from a resilience and security of supply perspective, the decision to purchase water from the CRT is now beyond the control of management and in the short term more generally (2024/25–2029/30). Delivering half of the Distribution Input from alternative sources would require a more long-term solution, if indeed such alternatives were cost-beneficial and commercially viable.

As regards steps to contain costs, the description of the contractual arrangements in section **Error! Reference source not found.** includes details of the periodic negotiation prices with the assistance of an independent arbitrator.

3.4.3 Materiality

The claim represents 8.7% of BRL's Water Resources TOTEX, thereby passing Ofwat's materiality threshold for the Water Resource price control of 6%.

[14] Appendix 9, Annex 1.2, PR24 Final Methodology.

3.4.4 Adjustment to allowances

A key element in the calculation of the claim is the implicit allowance. In the past, this has been the main area of contention between BRL and Ofwat. In the previous redetermination, as noted above, Ofwat proposed two approaches, as did BRL. As noted in section 0, we have followed Ofwat's Approach One, as used by the CMA, with the slight refinement that this claim is based on removing the costs for raw water only, not total water.

The rationale for removing raw water costs only seems to be that the costs associated with the supply of raw water differ from that of treatment and ready-treated water (the other components of total water). The use of total water costs by the CMA might have reflected the availability of data at the time.

We have identified raw water costs from APRs, mapping them to the following items: water resources, raw water distribution and storage costs of line 4J.3 of the last three APRs (2020/21, 2021/22 and 2022/23), abstraction licensees, raw water abstraction, transport and storage costs of line 4D.4 of the 2015/16–2019/20 APRs, water resources bulk supply imports (including raw water distribution) of line A7 of 2012/13–2014/15 APRs, raw water distribution and water resources costs (related to bulk supply) of line T21 for the 2011/12 APR.[15] The amount subtracted for each company and each year is reported in Appendix 0.

Once raw water costs have been subtracted from companies' water resources plus BOTEX and wholesale water BOTEX plus, we have re-run Ofwat's PR24 modelling suite and compared the outcome with models using the entirety of BOTEX figures. In both cases, we have used our cost driver projections for AMP8 (detailed in Appendix A1.2) to derive final allowances.

The implicit allowance is then simply the difference in BRL's modelled costs under the two different scenarios: total BOTEX and BOTEX minus raw water costs. The outcome is summarised in the table below.

Table 3.1 Calculation of the implicit allowance (£m, 2022/23 prices)

BRL's modelled costs (total BOTEX)	BRL's modelled costs (BOTEX minus raw water costs)	Implicit allowance
421.87	420.73	1.14

Note: For the reasons outlined in section 3.5, modelled costs have not been subject to a catch-up efficiency challenge.
Source: South West Water analysis from Ofwat's PR24 modelling suite and 2011/12–2022/23 APRs.

3.5 Cost efficiency

Ofwat's evidence requirements for demonstrating that a CAC is efficient are: [16]

- is there compelling evidence that the cost estimates are efficient (e.g. similar scheme outturn data, industry and/or external cost benchmarking, testing a range of cost models)?
- does the company clearly explain how it arrived at the cost estimate? Can the analysis be replicated? Is there supporting evidence for any key statements or assumptions?
- does the company provide third-party assurance for the robustness of the cost estimates?

[15] Since water resources and treatment costs are aggregated together in 2011/12, we have kept constant the 2012/13 split with the aim of excluding treatment costs as per all other years.
[16] Appendix 9, Annex 1.2, PR24 Final Methodology.

The costs incurred for this activity are efficient, as evidenced through our current engagement in a contractual price negotiation process with the CRT and an independent arbitrator, and a comparison of our costs incurred with the next best alternative source of supply. This was acknowledged by the CMA in its decision.[17]

> 4.1023 […] Further, since the Ofwat Final determination, it has been confirmed that the costs Bristol will pay CRT have increased by £300k per annum, effective from 1 April 2018.
>
> 4.1024 Consequently, we make the following adjustments to Bristol's cost adjustment claim of £8.6m: […]
> (c) We add £1.4m to reflect a CRT cost increase (£300k over 5 years less 5% for third party water sales).
>
> Source CMA (2021), 'Anglian Water Services Limited, Bristol Water plc, Northumbrian Water Limited and Yorkshire Water Services Limited price determinations: Final report'.

To support our view with benchmarking would be desirable, although it must be acknowledged that benchmarking of our water purchase costs from the CRT with similar arrangements held between the CRT and other water companies is not possible, as this information is not available in the public domain. We do not have access to the breakdown in order to better assess the efficiency of these costs beyond the analysis presented above.

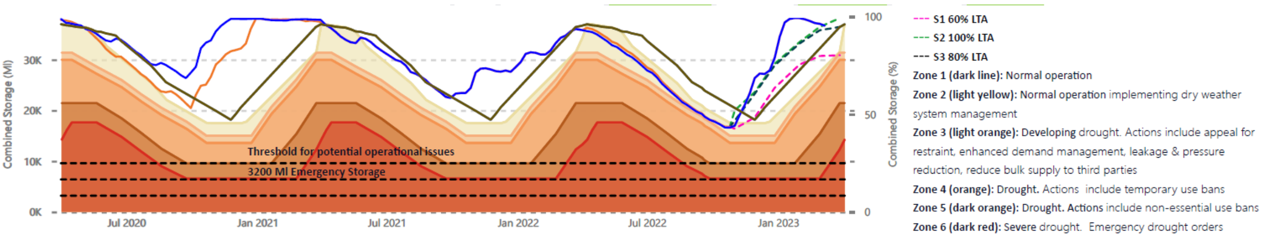
Consistent with the CMA's approach, we have therefore not included an efficiency challenge adjustment in the forecasting of this CAC. Equally, we have not included adjustments for input price pressures above inflation for payments to the CRT claim; this is because the main pressure influencing prices is the contractual agreement, not the input price pressures per se, although this does influence the prices set by the CRT.

For this provisional claim, we have not repeated the evidence we provided that there were no offsetting water treatment savings, as this approach did not ultimately inform the PR19 decisions. Additional evidence is available from the experience of the 2022 drought. The Bristol area was one of only two areas in England not to reach the first stage of drought. The additional cost of maintaining this resilience is through the Gloucester and Sharpness Canal supply, the energy and chemicals used at Purton Treatment Works, and the additional pumping around the network (including through the Southern Resilience Scheme) to the south of the region.

The volume used by Purton during 2022/23 was therefore much higher than in previous years, which had less exceptional weather (provisionally a c. 1-in-30-years weather event). However, the higher treatment and distribution costs than in the cheaper Mendip reservoirs is clear from 2022/23 cost information. Although this requires a number of assumptions based on cost allocation and reflects one overall integrated network (and therefore is only indicative), the costs for the Purton/Littleton system were c. £261/Ml in 2022/23 compared to £109/Ml for other sources.

[17] CMA (2021), 'Anglian Water Services Limited, Bristol Water plc, Northumbrian Water Limited and Yorkshire Water Services Limited price determinations: Final report'.

As seen below, the shape of the total reservoir storage curve between 2021 and 2022 is similar, which is due to maximising use of the Mendip reservoirs (minimise cost mode) in 2021 and 'save water' mode in 2022 by maximising use of the canal supply / Purton to protect water in the Mendip reservoirs. The Mendip reservoirs ultimately refilled to 100% by January 2023, broadly remaining at that level through to May 2023. This emphasises that there is not a specific cost saving for equivalent resilience, as reflected in the drought plan for the Bristol area—drought actions including temporary use bans, drought permits and drought orders were avoided and this evidences that the canal reflects part of this system rather than something where cheaper alternatives should be considered more efficient.



Source: South West Water

3.6`Customer perspective

We consider that the current arrangement is the best option for customers because of the resilience of supply it has offered. It sources around half of its Distribution Input from the Gloucester and Sharpness Canal (typically c45% - 46% in 2022/23, reflecting actions taken to avoid drought plan measures being required). The purchase of this water from the CRT therefore provides security of supply to BRL's customer base and BRL has not experienced a problem with long-term resource availability from the Sharpness Canal in the history of the arrangement. As the draft WRMP demonstrates, looking at the Bristol area in isolation, the core pathway does not require new water resources before 2050, and the options for Cheddar 2 are being considered from a West Country Water Resource regional plan perspective.

Our customers have separately expressed that it is of high importance to them for BRL to provide a regular and reliable supply. In Bristol Water's Annual Customer Survey 2022[18] and 2023[19], customers rated [providing] a regular and reliable supply as the highest importance to them. In both surveys, customers also rated BRL as having a high performance in providing this service, which demonstrates the supply resilience the Gloucester and Sharpness Canal brings to our customers.

In our Customer Forum for Drought Management[20] held in November 2022, customers evidenced that the lack of restrictions in Bristol compared to other parts of the country was a testament to Bristol's water supply resilience. Some positive comments include "I assumed the heat wave was handled well because I didn't hear about any disruptions. I didn't know about any issues from other people either. No news is good news." and "I thought they handled [it] very well, no hosepipe bans, no mass panic, they showed they had a lot of forward planning - it was quite calming."

3.7 Summary of evidence

[18] Bristol Water Customer Survey 2022 Final Report prepared by Future Focus Research.
[19] Bristol Water Customer Survey 2023 Final Report prepared by Future Focus Research.
[20] Bristol Water Customer Forum: Drought management (November 2022) facilitated by Traverse

This section has demonstrated the need for the CRT claim, that the claim is beyond management's control, and that the costs are efficient. It is not considered appropriate to provide evidence of the need for investment or that the investment represents the best option for customers, as the claim seeks an adjustment to baseline BOTEX costs only. The claim does not relate to a capital project involving strategic options appraisal where customer protection to ensure performance improvements are delivered, therefore this is not considered here. The table below assesses the evidence presented in this section against Ofwat's requirements as stated in the annex to Appendix 9. We have already detailed how the CAC meets Ofwat's sub-criteria (see Table 3.2).

Our assurance review supported by Turner & Townsend found the claim to be logically structured and responding clearly to the criteria. They noted the source from SAP of the historical records and consistency with previous claims. The review identified a few minor changes in historical APR lines (including raw water storage and transport in with bulk supply water resource abstraction from raw water) which we reflected in the final calculation of the implicit allowance.

Table 3.2 Summary of evidence presented in this section

Evidence	Assessment	Comments
Unique circumstances	Passed	Ofwat does not collect data that could capture the activity of taking water from the Gloucester and Sharpness Canal (i.e. water sales). We propose that this be treated as a cost adjustment.
Management control	Passed	In the absence of this arrangement, BRL would not be able to source half of the Distribution Input on a long-term basis, without developing an alternative source.
Materiality	Passed	Above threshold at c. 8.7%
Adjustments	Passed	Adopted CMA approach (based on Ofwat's method).
Cost efficiency	Passed	The claim reflects the actual level of payments made to the CRT, as reflected by the CMA decision (see section 3.5). Comparison with alternative sources of supply suggests that costs represent value for money.
Need for investment	N/A	The claim does not relate to an investment, therefore no cost–benefit analysis of options is required; the claim seeks an adjustment to baseline BOTEX costs only.
Best option for customers	Passed	Ensures continuity of supply without significant CAPEX. No WRMP suggestion or feedback that the supply should be replaced with an alternative Strategic Resource Option.
Customer protection	N/A	Customer protection in the event that the project is cancelled is not applicable, as the case is not an investment project.

Source: South West Water.

3.8 Conclusion

We make payments to the CRT charity for the purchase of water from the Gloucester and Sharpness Canal (water sales). This activity is in addition to Environment Agency abstraction licensing, and is therefore unlikely to be captured by the cost drivers included in Ofwat's PR24 cost models. Calculated according to the contract, we forecast that this will cost £11.54m (net over the PR24 period). This is an existing claim and, naturally in this case, the circumstances cannot have been expected to materially change since PR19.

4. Leakage CAC

4.1 Background

Leakage expenditure represents c.40% of treated water distribution costs[21] over the period 2018–22. Leakage performance is affected both by management decisions and 'by regional differences that may include some favourable operating conditions or adoption of new assets in response to growth. Low starting levels of leakage may also reflect previous levels of investment'.[22]

In PR19, Ofwat provided AWS with an additional base cost allowance for maintaining leading leakage levels. This would have also applied to BRL, except there was one of the six additional models used for testing allowances (not one of the two which directly related to leakage) that showed lower, rather than higher, allowances. Following the appeal of PR19, in its final determination, the CMA decided that companies should receive an additional allowance for leakage performance above upper quartile levels, based on the percentage outperformance multiplied by the company projections of efficient future base expenditure needs. This followed the approach proposed by BRL, in taking the geometric mean of the two scaled leakage performance metrics (per km of mains and per property), establishing the gap to the upper quartile level of performance, then applying this to estimate an additional cost allowance to reflect that there was a service/cost relationship between lower levels of leakage and ongoing base costs than were reflected in base cost allowances.[23]

For BRL, the CMA calculated an additional base cost allowance of £4.1m in respect of its leading leakage performance. [24] However, the CMA also considered that this additional allowance was not required as 'Bristol's TOTEX gap is already largely covered by our calculation of base cost allowances, meaning its overall allowance is almost in line with its view of the efficient costs needed in AMP7'. [25]

This merely reflected that the CMA agreed with BRL's position that there were a range of adjustments that together suggested that BRL's plan (draft determination response) was an efficient level of base costs, but the relief BRL sought was merely to reflect the TOTEX allowance, plan and outcome levels and incentives as a package. As this was the request of the company, the CMA did not apply this allowance as it would have gone beyond the TOTEX we believed to be efficient. However, the CMA accepted the basis for the calculation and that it should apply to all upper quartile companies, including BRL.

[21] The industry's leakage expenditure over the period 2018-22 was £4,070m, as opposed to £10,652m of TWD expenditures over the same period. Source : "PR24 Cost Assessment master Dataset, Wholesale Water Base Costs v4" and "Ofwat Leakage Dataset following the April 2022 Data Request".

[22] CMA (2021), Anglian Water Services Limited, Bristol Water plc, Northumbrian Water Limited and Yorkshire Water Services Limited price determinations - Final report, para. 8.72.

[23] CMA (2021), Anglian Water Services Limited, Bristol Water plc, Northumbrian Water Limited and Yorkshire Water Services Limited price determinations - Final report, paras 8.73–8.74.

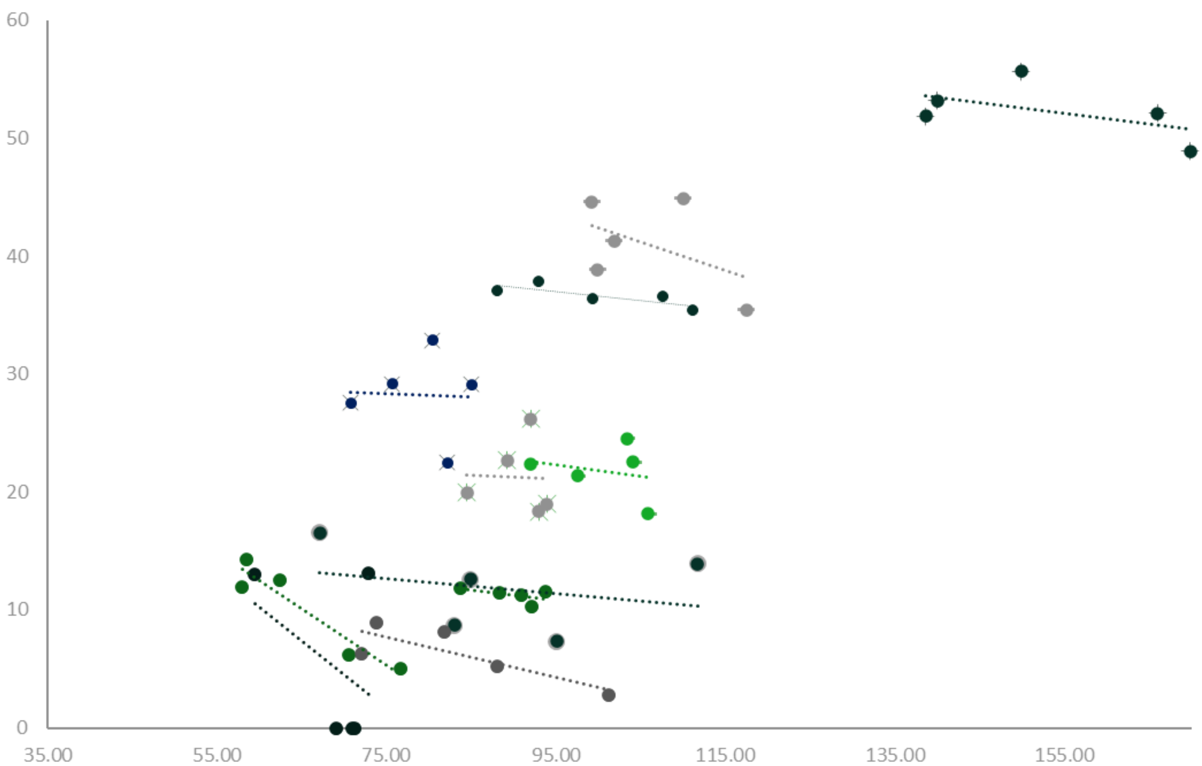
[24] CMA (2021), Anglian Water Services Limited, Bristol Water plc, Northumbrian Water Limited and Yorkshire Water Services Limited price determinations - Final report, para. 8.79.

[25] CMA (2021), Anglian Water Services Limited, Bristol Water plc, Northumbrian Water Limited and Yorkshire Water Services Limited price determinations - Final report, para. 8.81.

While the CMA accepted that 'marginal costs of leakage control rise as lower leakage levels are reached',[26] the current suite of proposed base cost models does not control for this relationship. We queried the treatment of this in our PR24 draft methodology consultation response as it was ambiguous whether this approach would be considered as part of 'what base buys' analysis or should be considered as part of a CAC. Given that Ofwat stated to the CMA at PR19 that BRL should have put the case forward as a CAC (although not unique circumstances, and the common leakage definition data was not available until draft determination), we have followed this approach to PR24.

A simple scatter plot of leakage per property against leakage base costs seems to indicate that costs are increasing with poor leakage performance. However, this ignores important regional effects and the panel nature of the data, that is the fact that we have data on different companies over time. As shown in Figure 4.1 Leakage base expenditure vs level, by companyFigure 4.1, when taking this into account, the relationship between leakage volumes and expenditure is negative for a majority of companies (11 out of 17). That is, at the company level, base costs increase as leakage levels are reduced. This is consistent with the CMA's determination and Ofwat's provision of an additional base cost allowance in acknowledgment of the additional costs associated with maintaining leading leakage levels.

Figure 4.1 Leakage base expenditure vs level, by company



Note: For presentational clarity, the chart shows only the 11 companies (out of 17) that present a negative relationship between leakage levels and expenditure.
Source: Oxera, based on Ofwat data.

[26] CMA (2021), Anglian Water Services Limited, Bristol Water plc, Northumbrian Water Limited and Yorkshire Water Services Limited price determinations - Final report, para. 8.72.

4.2 Quantification of the claim

We first quantify the impact of leading leakage performance on base costs using the methodology used by the CMA at PR19. In addition to the CMA's methodology, we have undertaken a number of alternative approaches as a cross-check, so as to increase the robustness of the estimates.

The CMA approach involves first calculating outperformance of the industry upper quartile on leakage. The selected measure is the geometric mean of leakage per km of mains and leakage per property[27], calculated over the last three years of available data. The CMA's estimates presented in its final determination hence refer to 2017–20, while more recent estimates are based on 2019–22 data. The resulting outperformance is then applied to the companies' forecast leakage costs.

These results can then be applied to all companies in the form of a symmetrical adjustment based on historical leakage performance. Symmetry would require the benchmark to be set with reference to the median, rather than the upper quartile.

Based on the data from the Ofwat service delivery report for 2021/22 and the 2023 APR, we have calculated the following update to the calculation.

Table 4.1 Leakage performance by company (2020/21–2022/23)

leak/km	2021-23	rank	leak/prop	2021-23	rank	Geometric mean	2021-23	rank	Symm. Adj. 21-23
AFW	9.39	15	AFW	102.85	8	AFW	31.08	12	-15.3%
ANH	4.61	1	ANH	79.67	3	ANH	19.16	2	37.4%
BRL	5.32	2	BRL	66.76	1	BRL	18.85	1	39.7%
HDD	5.43	3	HDD	134.53	16	HDD	27.03	10	-2.6%
NES	7.21	10	NES	91.92	6	NES	25.75	8	2.3%
PRT	8.15	11	PRT	85.01	4	PRT	26.33	9	0.0%
SES	6.52	7	SES	77.22	2	SES	22.44	3	17.3%
SEW	6.33	6	SEW	97.74	7	SEW	24.87	5	5.9%
SRN	7.17	9	SRN	87.49	5	SRN	25.04	6	5.2%
SSC	9.25	14	SSC	106.94	11	SSC	31.46	13	-16.3%
SVE	9.14	13	SVE	116.78	12	SVE	32.67	14	-19.4%
SWB	6.11	5	SWB	104.41	9	SWB	25.25	7	4.3%
TMS	18.92	17	TMS	150.85	17	TMS	53.42	17	-50.7%
NWT	9.83	16	NWT	122.68	14	NWT	34.73	16	-24.2%
WSH	6.88	8	WSH	130.57	15	WSH	29.96	11	-12.1%
WSX	5.50	4	WSX	105.18	10	WSX	24.06	4	9.4%
YKY	8.88	12	YKY	120.80	13	YKY	32.75	15	-19.6%
BRL UQ outperformance	9.1%			29.2%			29.8%		

Source: SWW, based on Ofwat data.

[27] Total number of properties equals the sum of "Total household connected properties at year end" (BN2161) and "Total non-household connected properties at year end" (BN2221).

Based on the Ofwat leakage data for 2019/20 to 2022/23, SWW underperforms the upper quartile, as it ranks between the upper quartile and the median company, while BRL outperforms it by 29.8%.

BRL base costs (in 2022/23 CPIH) amount to a five-year total of £40.02m, which produces an upper quartile adjustment of **£12.1m**. The symmetrical adjustment for each company in percentage terms is also shown in Table 4.1. This would be calculated on an equivalent basis using the leakage maintenance (LK1) data table collected by Ofwat. The calculation for the LK1 data is included within our audit trail for all companies. For BRL, the data is shown in the table below.

	LK1 line maintenance expenditure (6D:22 2022/23)	CPIH index – 2022/23 123.04	BRL Leakage maintenance (2022/23 CPIH prices)	Average
2019/20	£6.877m	108.24	£7.817m	
2020/21	£7.908m	109.11	£8.918m	
2021/22	£6.690m	113.12	£7.277m	
2022/23	£8.240m	123.04	£8.240m	
Average				£8.004m (£8.145m 2020/21 to 2022/23

leak/km	**2021-23**	**rank**	**leak/prop**	**2021-23**	**rank**	**Geometric mean**	**2021-23**	**rank**	**Symm. Adj. 21-23**
AFW	9.39	15	**AFW**	102.85	8	**AFW**	31.08	12	-15.3%
ANH	4.61	1	**ANH**	79.67	3	**ANH**	19.16	2	37.4%
BRL	5.32	2	**BRL**	66.76	1	**BRL**	18.85	1	39.7%
HDD	5.43	3	**HDD**	134.53	16	**HDD**	27.03	10	-2.6%
NES	7.21	10	**NES**	91.92	6	**NES**	25.75	8	2.3%
PRT	8.15	11	**PRT**	85.01	4	**PRT**	26.33	9	0.0%
SES	6.52	7	**SES**	77.22	2	**SES**	22.44	3	17.3%
SEW	6.33	6	**SEW**	97.74	7	**SEW**	24.87	5	5.9%
SRN	7.17	9	**SRN**	87.49	5	**SRN**	25.04	6	5.2%
SSC	9.25	14	**SSC**	106.94	11	**SSC**	31.46	13	-16.3%
SVE	9.14	13	**SVE**	116.78	12	**SVE**	32.67	14	-19.4%
SWB	6.11	5	**SWB**	104.41	9	**SWB**	25.25	7	4.3%
TMS	18.92	17	**TMS**	150.85	17	**TMS**	53.42	17	-50.7%
NWT	9.83	16	**NWT**	122.68	14	**NWT**	34.73	16	-24.2%
WSH	6.88	8	**WSH**	130.57	15	**WSH**	29.96	11	-12.1%
WSX	5.50	4	**WSX**	105.18	10	**WSX**	24.06	4	9.4%
YKY	8.88	12	**YKY**	120.80	13	**YKY**	32.75	15	-19.6%
BRL UQ outperformance	9.1%			29.2%			29.8%		

	LK1 line maintenance expenditure (6D:22 2022/23)	CPIH index – 2022/23 123.04	BRL Leakage maintenance (2022/23 CPIH prices)	Average
5-year				£40.021m (£40.725m updated for 2022/23)

The equivalent calculation for SWW is a five-year total of £99.190m. The other company data can be used to make a pre-model symmetrical adjustment, rather than the CMA approach to upper quartile post-model adjustments.

As an additional cross-check, we have tried three new, alternative approaches based on data from 2017/18 to 2021/22. The results have not been updated with the 2023 data, as most of them require additional data from Ofwat's leakage dataset which is not yet publicly available. These approaches would not impact our CAC estimate since it is entirely based on the CMA approach.

As a first alternative, we tested adding leakage measures as independent variables into both the TWD and the WW models. Using leakage per km of mains, we can estimate an allowance increase of **£12.6m**, or 2.1%, for BRL, and **£19.5m**, or 1.8%, for SWW. Increases in allowances are also material when using the geometric mean of leakage per km of mains and property, consistent with the CMA's approach, with similar results also in terms of model quality.

Second, given the operational difference in drivers determining the various components of TWD expenditures, we also performed a similar analysis at a more disaggregated level. In particular, we separated the leakage and non-leakage-related costs of TWD, applying to each only the relevant cost drivers. In the case of non-leakage TWD, we maintained the original cost drivers proposed by Ofwat, whereas for leakage TWD, we replaced the pumping variables with leakage per km of mains. In this case, we estimate again an allowance increase of **£8.6m**, or 1.4%, for BRL, and **£10.8m**, or 1.0%, for SWW.

On average, the impact of the various model specifications adding leakage per km of mains and leakage per property as an independent variable leads to a **£9.3m** allowance increase for BRL (in line with the estimate obtained through the CMA approach benchmarked against the upper quartile), and **£11.9m** for SWW.

Third, we separately estimated the additional costs linked to lower leakage by performing an out-of-sample prediction. In particular, we forecast the companies' costs in case they were maintaining a level of leakage equal to the industry's median and compared it with the forecasts derived with the previous approaches. The resulting additional costs due to above-median performance are **£10.4m**, or 1.7%, for BRL and **£24.1m**, or 2.2% for SWW when using leakage per km of mains, and are similarly material with other measures.

These econometric approaches allow the trade-off between costs and leakage to be explicitly modelled before then applying an efficiency challenge. The use of the industry median as a benchmark is necessary in order to ensure that the trade-off between cost efficiency and leakage performance is correctly accounted for. This is achieved by estimating the additional costs incurred because of above-median leakage performance, before then applying an upper quartile efficiency challenge. Applying an upper quartile leakage benchmark ahead of the catch-up efficiency challenge, also based on the upper quartile, would impose an inappropriate double-challenge.

In the case of the methodologies presented above, we performed the Durbin–Wu–Hausman test to ensure that endogeneity was not undermining the validity of the results—the results show that endogeneity is not an issue. Moreover, as set out in section 0 and in the discussion around **Error! Reference source not found.**, w hile management can improve leakage levels over time, 'starting' leakage levels are largely outside of company control, being driven by regional factors (when regressing leakage per km of mains against a group of regional and company-specific factors, the deriving model has an R^2 of over 72%).[28]

Nevertheless, we recognise the concerns in relation to endogeneity expressed by the CMA and others of including leakage variables within the econometric models. Therefore we focus on the CMA approach and use the alternatives as cross-checks.

There is no specific guidance in the PR24 final methodology of how symmetrical adjustments should be presented in data tables, and therefore we set out a view of how this should be considered, as an alternative to the company specific cost adjustment claim presented above.

Supporting calculations for the submission template are provided in a separate Excel file

Line (row)	Description
CW18.11	Description of claim is Leakage
CW18.12	This claim reflects Regional Operating Circumstances
CW18.13	The claim is can be symmetrical although could also be presented as a company specific cost adjustment claim. We categorise as symmetrical consistent with the methodology.
CW18.18	The historical expenditure is the 2017/18 prices treated water distribution expenditure for BRL taken from the Ofwat cost modelling .do file. This has been updated to 2022/23 prices using 18.06%, reflecting the 2022/23 average CPIH index of 123.04 and 2017/18 of 104.22
CW18.15	The future TWD costs are taken using the 6 PR24 Ofwat models from the Ofwat .do files. See Note 1. The projected model output costs (triangulated equally as clarified in May 2023 email) is then repriced from 2017/18 prices to 2022/23 prices as above.

[28] Furthermore, excluding the impact of leakage on base costs would result in omitted variable bias, thus its inclusion in the base cost models improves that aspect of the model robustness.

CW18.16 The cost post the cost adjustment claim is the relevant value from CW18.5, plus 29.8% of the BRL base annual leakage cost of £8.240m, based on the gap in geometric leakage performance to the upper quartile (£2.426m in 2022/23 prices). This includes the higher base cost of leakage reductions beyond the three year leakage total to 2022/23. We would propose this CAC is updated using the methodology once 2023/24 industry data is available.

The alternative adjustment of a symmetrical adjustment to the median as a pre-model adjustment is not shown in the CW18 table, but is included in the audit trail and in

leak/km	2021-23	rank	leak/prop	2021-23	rank	Geometric mean	2021-23	rank	Symm. Adj. 21-23
AFW	9.39	15	AFW	102.85	8	AFW	31.08	12	-15.3%
ANH	4.61	1	ANH	79.67	3	ANH	19.16	2	37.4%
BRL	5.32	2	BRL	66.76	1	BRL	18.85	1	39.7%
HDD	5.43	3	HDD	134.53	16	HDD	27.03	10	-2.6%
NES	7.21	10	NES	91.92	6	NES	25.75	8	2.3%
PRT	8.15	11	PRT	85.01	4	PRT	26.33	9	0.0%
SES	6.52	7	SES	77.22	2	SES	22.44	3	17.3%
SEW	6.33	6	SEW	97.74	7	SEW	24.87	5	5.9%
SRN	7.17	9	SRN	87.49	5	SRN	25.04	6	5.2%
SSC	9.25	14	SSC	106.94	11	SSC	31.46	13	-16.3%
SVE	9.14	13	SVE	116.78	12	SVE	32.67	14	-19.4%
SWB	6.11	5	SWB	104.41	9	SWB	25.25	7	4.3%
TMS	18.92	17	TMS	150.85	17	TMS	53.42	17	-50.7%
NWT	9.83	16	NWT	122.68	14	NWT	34.73	16	-24.2%
WSH	6.88	8	WSH	130.57	15	WSH	29.96	11	-12.1%
WSX	5.50	4	WSX	105.18	10	WSX	24.06	4	9.4%
YKY	8.88	12	YKY	120.80	13	YKY	32.75	15	-19.6%

Line (row)	Description			
	BRL UQ outperformance 9.1%	29.2%	29.8%	
	Table 4.1 above.			
CW18.9	Control TOTEX of £658m has been included only for the purposes of indicating expected materiality.			

Note 1: Calculation of CW18:5 and CW18:6

BRL adjustment to UQ basis	2023	2024	2025	2026	2027	2028	2029	2030
mod9	42.7	43.1	43.5	43.9	44.4	44.9	45.3	45.8
mod10	37.5	37.9	38.3	38.7	39.1	39.5	39.9	40.3
mod11	42.1	42.5	42.9	43.3	43.8	44.2	44.6	45.1
mod12	36.5	36.9	37.3	37.7	38.1	38.5	38.9	39.2
2017/18 prices	39.7	40.1	40.5	40.9	41.3	41.8	42.2	42.6
2022/23 prices (IA)	46.9	47.4	47.8	48.3	48.8	49.305	49.8	50.3
Gross CAC	49.3	49.8	50.2	50.7	51.2	51.7	52.2	52.7

Source: SWW and Oxera calculation from audit trail.

4.3 Need for the claim

4.3.1 Unique circumstances

While different metrics can be used to assess a company's performance in terms of leakage, it is clear that BRL consistently performs above the upper quartile. When measured by the geometric mean of leakage per length of mains and leakage per property, it ranks first in the industry over the period 2019–22. As such, BRL holds a unique position concerning the costs it faces as a result of its leading levels of leakage.

4.3.2 Management control

As already mentioned, the level of leakage can partly be considered to be within company management's control in the long term but not in terms of base cost once the profile of reduction to long-term government targets have been set. In particular, in regard to improving its leakage (and maintaining a leading leakage performance) over time, the higher efficient cost of lower leakage is outside of management control. At PR19 all companies were given a target to reduce their leakage by at least 15%, and a company's 'starting level of leakage' is also largely affected by regional and company-specific factors (see Figure 4.1). These range from completely exogenous factors, such as the soil type and the amount of rainfall, to network features, such as the pipe age and material, or the level of metering penetration.

In particular, as shown in Table 4.2, when regressing leakage per km of mains against a group of regional and company-specific factors, the deriving model has an R^2 of over 72%. This result indicates how 'starting' leakage levels are largely outside of company control. The variables included in this regression model are either completely outside of management control (such as property density, soil type and rainfall) or are company-specific and represent 'legacy' features of the network that cannot easily be altered (such as pipe material or metering penetration).

Table 4.2 Regressing leakage performance against regional and company-specific factors

	Rationale	Lnleak_km
Ln property per km of mains	Density	-8.63**
Square of ln property per km of mains	Density (quadratic)	1.11**
% shrink-swell soil	Soil type	0.34
% iron pipes	Asset material	0.31
Nr days with >10mm rainfall	Rainfall	0.065
2022 metering penetration	Metering	-0.39
Constant		11.49
R^2		**0.723**

Source: South West Water, based on Ofwat data. The results cover the period 2018-2022 and have not been updated with 2023 data.

These results are consistent with the rationale highlighted in Figure 4.1: **while companies can actively reduce the level of leakage by incurring additional costs, factors outside of management control widely contribute to determining each company's 'starting level' of leakage.**

Moreover, improvements in levels of leakage being associated with higher costs (and providing additional allowance to cover those costs) was also accepted by the CMA.[29]

> 8.59 In order to maintain their current level of performance, these high performing companies would be expected to incur costs that exceed the implicit allowance for leakage costs that is included in the base cost allowance.
>
> **Source: CMA (2021) Anglian Water Services Limited, Bristol Water plc, Northumbrian Water Limited and Yorkshire Water Services Limited price determinations: Final report'.**

These costs are associated with both higher intensity of preventive and control activities and greater technical difficulties, thus determining an intrinsically increasing nature of marginal costs.

As a consequence, for the dynamics relevant to the setting of a cost adjustment, we can consider leakage expenditures to be outside of management control.

[29] For example, CMA para. 8.52. 8.59 (8.72 not nec. accepts higher MC) 8.74, see CMA (2021), "Anglian Water Services Limited, Bristol Water plc, Northumbrian Water Limited and Yorkshire Water Services Limited price determinations – final report", March 17.

Lastly, and somewhat irrespective of analytical results, the WRMP process in deciding future levels of leakage and phasing to meet government targets does not negate the need to recognise a service-cost relationship for leakage, where the evidence is stronger than for a range of other performance metrics in terms of base spend once the lower level of leakage has been achieved.

4.3.3 Materiality

The various methodologies presented indicate an average adjustment of between 1% and 3% of BRL and SWW's Water Network plus TOTEX, thereby passing Ofwat's materiality threshold for the Water Resource price control of 1%.

4.3.4 Adjustment to allowances

The impact of leakage performance is not taken into account in any of the proposed TWD models, despite the significant share of expenditures represented. This concerns the use of either direct performance indicators, or of exogenous factors that may affect the leakage performance.

As a consequence, given the high costs required for companies to maintain leading levels of leakage, the base allowances calculated in the proposed models are not sufficient.

The claims are material after the deduction of an implicit allowance, calculated according to the CMA's methodology, and have been estimated following several separate methodologies.

4.4 Cost efficiency

There is evidence that the cost estimates are efficient since we have tested them across a number of models and over the entire industry. The analysis can easily be replicated and the supporting files shared if needed.

The process and the different steps undertaken are outlined below.

- Run the different models by using the leakage per length of mains as an additional cost driver in Ofwat's proposed models for PR24. Alternatively, perform the same analysis by separately assessing the leakage and non-leakage component of TWD, both under a total cost and a unit cost approach. The analysis period was restricted to 2018–22 due to the limited availability of leakage data collected by Ofwat following the April 2022 'Leakage data request'. This has improved the assessment approach since the CMA PR19 modelling, which in itself was hampered by the common definition of leakage at the earlier stages of PR19.
- Calculate an upper quartile efficiency challenge for each of the four scenarios, based on the last five years of data as per Ofwat in PR19.
- Produce AMP8 forecasts[30] for the relevant cost drivers, namely: the length of mains, the WAD LAD from MSOA and the WAD MSOA, number of properties, APH TWD, number of booster pumping stations, WAC, percentage of water treated in bands 3 to 6 as well as leakage level. While all of them have been part of an internal specific bottom-up forecasting process, the two WAD measures as well as leakage have been derived following a simple extrapolation of the compound annual growth rate observed over 2011/12–2021/22.
- Calculate AMP8 predicted costs for each scenario, using the estimated coefficients derived in the first step. and cost driver forecasts derived in the previous step. We have followed the same

[30] Note that these forecasts have now been corrected and adjusted since our initial submission.

triangulation process as Ofwat, i.e. first derive modelled costs for each sub-model and then average them.

- Apply the historical upper quartile efficiency challenge calculated in the second step to AMP8 predicted costs to get the final allowances and the gross value of the claim.
- Restart the whole process based on Ofwat's models (i.e. without using the first two total cost models) to get the final allowances and the implicit allowance.
- Deduct the implicit allowance from the gross value of the claim to get the net value of the claim.
- Convert it to 2022/23 prices.

Moreover, independent efficiency of company operations for BRL was demonstrated at PR19 through the report from Isle Utilities 'Bristol Water Leakage Management Review' (October 2020).

Isle concluded as follows.

> Isle surmises that BW is the leading leakage performer in the UK based on 19/20 data when normalised for properties (4th when normalised for mains length). In addition, when comparing water companies, the different operating environments which they face are significant factors in higher base cost and marginal cost of future reductions. A recent leakage management benchmarking programme (LMBP) undertaken by Isle compared these factors. As a result, BW can demonstrate it's starting position in relation to pipe age and material, soil conditions, urban density, network configuration and topography and metering penetration give it a more challenging environment in which to operate than other companies that are upper quartile and this environment has an impact on their base and incremental costs. The Infrastructure Leakage Index ILI, arose from work carried out by the International Water Association in 1999. The Index allows a comparison of company performances, where companies have disparate, systems and connection densities. Enabling within country and global performance comparisons between companies. The system can compare whole and sub systems. Generally, a system in the range of 1 to 2 can be considered very well managed while systems with no active leakage management programme and poor asset condition can have ILI's greater than 10. Bristol Water has the lowest Infrastructure Leakage Index (ILI) amongst the UK water companies that took part in Isle's LMBP, with an ILI value of 1.22. Their unit cost to achieve leakage reduction is low compared to the rest of the industry.

In terms of use of technology, Isle concluded as follows.

'Isle have questioned the leakage options selected by BW, in context of technology options that are adopted in other parts of England and Wales, to understand if greater efficiency could be made by a different investment strategy or adoption of newer technologies. Isle finds BW's leakage approach to be based around strong foundational techniques that include well developed District Metered Areas combined with widespread pressure management and active leak control through an in-house Leakage Technician team. We conclude that BW's AMP7 strategy for managing leakage is to use approaches that - at high-level - appear to be least cost when compared to other options available. Some newer technology options (satellite leak detection and permanent acoustic logger deployment) should have the potential to enable BW to reduce leakage even further but BW's own trials of these technologies appear to show high investment costs to do so and so we agree that BW's strategy for reducing leakage (more active leakage control, and more pressure reduction) would not be more efficient with adoption of newer technologies'

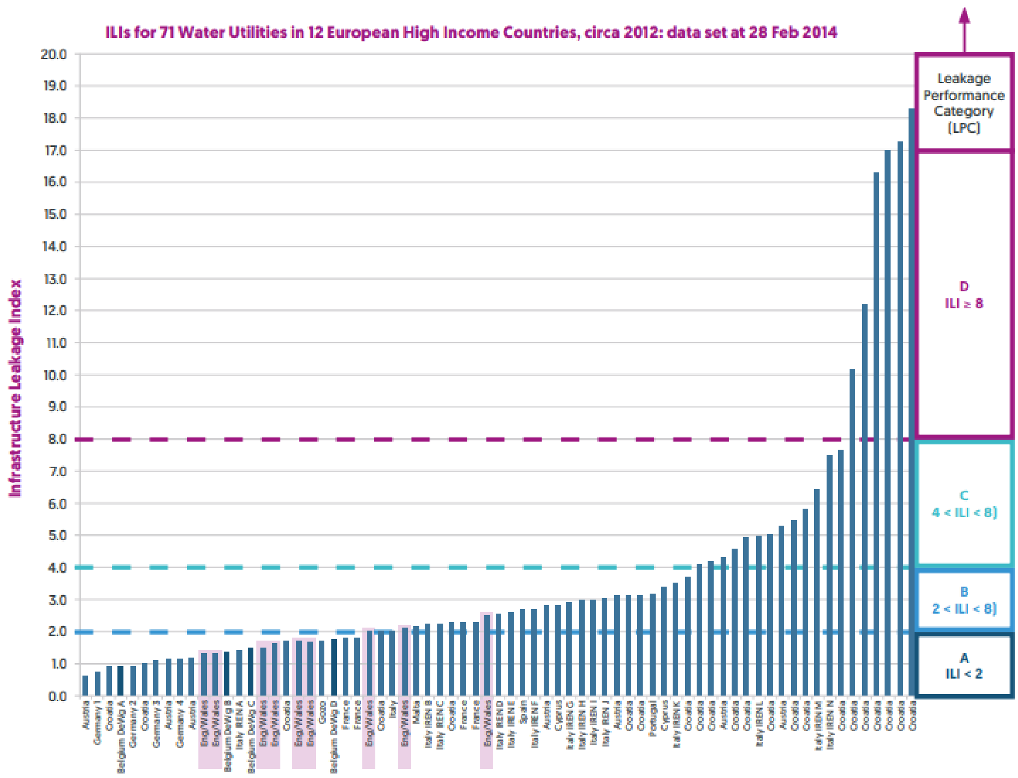
4.5 Customer perspective

In March 2022, the Leakage Routemap to 2050[31] was published, which provides a framework for water companies to triple the rate of leakage reduction by 2030 and halve leakage by 2050. The 2030 target was set out in the 2019 Public Interest Commitment while the 2050 pledge has been endorsed by the National Infrastructure Committee. This recognised Bristol Water as the only company that had already met the Water UK 2030 commitment.

The Water UK report also highlighted the relevance of the Infrastructure Leakage Index and supports the efficient and effective leakage management approach that Isle Utility confirmed.

Figure 4.2 Infrastructure Leakage Index seen across Europe

[31] A Leakage Routemap to 2050 | Water UK



Source: Water UK., Routemap to Net Zero 2030

Our customer research has shown that customers similarly share this government priority. In our Customer Forum for Drought Management held in November 2022,[32] customers felt that it is very important for leaks to be controlled and suggested 'Leakline' should be advertised all-year round instead of just in times of dry weather. This sentiment is echoed in our PR24 Customer Priorities Report[33] where SWW, Bournemouth and BRL customers all consider reducing leakage a high priority for investment, as they consider improving infrastructure as a key area for us to focus on in the long term. These investments are valued as leaks are perceived to negatively affect customers e.g. in the form of higher bills, lower pressure and lower supply.

In our customer research work performed under the West Country Water Resource Group[34], reducing leakage was one of the two most supported demands options to encourage reductions in water usage. Leakage was consistently highlighted as a high priority by participants, with many considering it as wasteful. Some comments include 'The more leaks that are fixed, the less is actually getting wasted, so I was just thinking fix all the leaks and the water builds up itself.'

In the re-run report[35] for SWW, customers believed that reducing leakage protects and improves the environment, with 77% of the respondents agreeing that fixing leaks is the best way to reduce the amount of water taken from the environment. Reducing leaks was seen as a priority and 80% customers stated that leaks should be fixed even if that causes significant disruption to local communities, and 77% felt that leaks should be minimised regardless of the cost.

[32] Bristol Water Customer Forum: Drought management (November 2022) facilitated by Traverse
[33] South West Water PR24 Customer Priorities (February 2023)
[34] WCWRG Deliberative Research Report (September 2021)
[35] Customer Research to inform the best value Water Resource Plan for the South West (February 2023)

4.6 Summary of evidence

As presented in the previous sections, the evidence in support of a CAC for leakage performance meets the outlined requirements.

The review with Turner & Townsend confirmed that the CAC narrative was structured logically, clearly responding to each claim criteria and sub-criteria. The review checked that the calculation from the source data had been reflected in the Impact Assessment modelling.

Table 4.3 Summary of evidence presented in this section

Evidence	Assessment	Comments
Unique circumstances	Passed	Uniqueness is shown both in company's own performance (BRL) and in the unique impact of regional and company-specific factors.
Management control	Passed	Both the specific level of leakage and the corresponding level of expenditures incurred are to be considered largely outside of management control.
Materiality	Passed	Above 1% of WNP costs threshold.
Adjustments	Passed	Adopted CMA approach (based on Ofwat's method).
Cost efficiency	Passed	Several alternative econometric models present similar and consistent results in terms of cost adjustment.
Need for investment	N/A	The claim does not relate to an investment, therefore no cost–benefit analysis of options is required; the claim seeks an adjustment to baseline BOTEX costs only.
Customer protection	Not Applicable	The service-cost relationship established for leakage and ODI incentives provide suitable customer protection, and this case is merely to ensure accurate base cost allowances with a symmetrical leakage level adjustment, outside of the model variables

Source: South West Water.

4.7 Conclusion

The lack of adequate cost drivers in the current models, combined with the uniqueness of each company's performance due to the impact of regional and company-specific effects, means that frontier performance in leakage levels is unlikely to be captured by the cost drivers included in Ofwat's PR24 cost models. The estimated adjustment is **£12.1m** for BRL and **£0m** for SWW, using the PR19 methodology. A symmetrical adjustment is presented as an alternative for Ofwat to consider. We would anticipate that 2023/24 data will be available to update the value of this claim. This suggests that an adjustment, using this methodology, may also apply to SWW, and therefore this claim anticipates this outcome (the cross-checks also support such an adjustment for SWW may be appropriate, depending on the final model cost data and leakage performance for the industry).

5. Liming & bioresources CAC

5.1 Background

The SWW peninsula limits the opportunities for advanced anaerobic digestion, and the nature of the land bank and maintenance of a farming disposal route means that liming is the preferred technology. This is outside of management control to the extent that it requires regulatory approval through WINEP to obtain enhancement funding for alternative disposal routes, and the lead time would be c.10 years. Therefore, for AMP8 a cost adjustment claim for bioresources remains.

5.2 Quantification of the claim

The quantification of the claim requires a four-stage process.

1. Production of AMP8 forecasts for the relevant cost drivers (see Appendix 0), namely: the total amount of sludge produced, the number of connected properties, the number of sewage treatment works, the percentage of load treated in bands 1 to 3, the percentage of sludge treated by raw sludge liming (or the percentage of sludge treated by conventional/advanced AD and the WAD MSOA. While most of them have been part of an internal specific bottom-up forecasting process, the WAD measure has been derived following a simple extrapolation of the compound annual growth rate observed over 2011/12–2021/22.
2. Calculation of AMP8 bioresources allowances by using the percentage of sludge treated by raw sludge liming as an additional cost driver (as per our January submission) in Ofwat's proposed models for PR24. As a sensitivity check, we also derived alternative models based on Anglian's proposal to rely on the percentage of sludge treated by conventional/advanced AD as an additional explanatory variable. The whole process is detailed in section 0.
3. Deduction of an implicit allowance using a method defined in section 0.
4. Calculation of the net claim by deducting the allowance from the gross claim.

The outcome of this process is a gross claim of £181.0m–£191.9m, an implicit allowance of £140.7m, and a net claim of £40.4m–£51.2m. All of the modelling results and the associated statistical tests or robustness checks are included in Appendix 0.

5.3 Need for the claim

5.3.1 Unique circumstances

Historically, the average percentage of sludge treated by raw liming in the industry over 2011/12–2022/23 is 6%, while on average this amounts up to 72% in SWW's case, which is more than ten times higher than a 'typical' company. In 2023, after SWW, Wessex is the company with the largest percentage of raw liming but this only represents 17%, as opposed to 64% in our case. We are a clear outlier within the industry and while Ofwat's models would work quite well to estimate the baseline expenditure required for the rest of the industry, they fail to consider the specific circumstances we are facing.

Unless raw liming (or conventional/advanced AD) is accounted for, it is clear, from Ofwat's modelling, that we face higher costs compared to the industry, as our costs are estimated as being 16% higher than the upper quartile. In contrast, once raw liming (or conventional/advanced AD) is accounted for, we are placed among the two most efficient companies. Neither the estimated coefficient of the additional explanatory variable included in the model nor its magnitude are sensitive to the removal of SWW from the analysis. This shows that the model is robust as it is not influenced by us as an outlier in terms of sludge treatment technology. Indeed, the estimated coefficient of raw liming is in line with operational insight, always stable (0.010), and highly significant at the 1% level. Our modelling results also indicate that our costs incurred with raw liming are lower than an average company since the estimated coefficient of raw liming is higher, by c.40%, when SWW is excluded from the analysis. This means that the results can be relied upon and that our estimated efficiency is robust.

5.3.2 Management control

The choice of sludge treatment technology results from the operating area of the company (e.g. topography and sparsity), the external farming environment, and environmental legislation and oversight.

Environmental legislation does not specifically mandate liming over other methodologies for waste treatment, and indeed SWW uses different technologies for treating a small proportion of its waste. However, our choice of liming for approximately 65% of our wastewater disposal is dictated through other considerations, in particular:

- the relatively acidic soils in our catchment area;
- the high proportion of grassland;
- the agreed WINEP which covers AMP8 (see next paragraph);
- our need to comply with the Biosolids Assurance Scheme (BAS) incorporating the requirements of the Safe Sludge Matrix and Sludge (Use in Agriculture) (1989) (SuIA) standards.

While the land bank remains the disposal route for the South West, liming remains the *exogenous* technology choice because to get the sludge to land requires the alkalinity that liming adds. While we are proposing enhancement expenditure on alternative treatment technology to reduce reliance on liming, this requires the proposed costs being included in our WINEP programme and subsequently accepted. As such, the treatment route remains exogenous *within* an AMP. SWW also effectively acts as a waste 'supplier of last resort' in Devon & Cornwall for tankered waste with the closure of third-party facilities that cannot comply with regulations. This affects the bioresources options.

As stated above, we implement rigorous cost control measures, consistent with best practice and affordability, to ensure that customers benefit from environmentally friendly methods of treating sludge at low cost. In particular, we:

- monitor technological developments in this area constantly; and
- assess individual capital expenditure programs for value for money, according to best practice.

We note that, once allowance is made for our choice of a different methodology for treating wastewater, we are upper quartile in our efficiency compared to other companies.

5.3.3 Materiality

Raw sludge liming is a material driver of our bioresources expenditure and the fact that Ofwat does not consider it at all in its modelling suite would leave us underfunded for the next price control. The claim represents 14.5–18.3% (16.4% triangulated over the two approaches we take) of our forecast bioresources TOTEX, thereby significantly exceeding Ofwat's materiality threshold for the bioresources price control (6%).

5.3.4 Adjustment to allowances

Liming is not covered by any of the cost drivers included in Ofwat's cost models, which justifies the need for an adjustment.

As mentioned above, to ensure the robustness of our quantification, we have considered a range of estimates for the implicit allowance, using two different scenarios, namely:

1. unit cost models with the percentage of sludge treated by raw sludge liming as an additional cost driver;
2. unit cost models with the percentage of sludge treated by conventional/advanced AD as an additional cost driver.

While we consider that the impact of liming should be captured directly within the base cost model (as per our submitted model in January) and therefore symmetrical adjustments automatically derived, if it is not included in the model or its impact calculated using such a model, then the alternative is a non-symmetrical claim.

We have revised our initial methodology in line with companies' responses to the base cost consultation and the updated performance of the models with the inclusion of the 2022/23 data. This is why we do not rely anymore on total cost models as they are strictly inferior to unit cost models, both in terms of statistical performance and in terms of economic intuition (as it is not clear why there would be diseconomies of scale). On the latter we note that if Northumbrian is removed from the analysis then the estimated coefficient of sludge produced is below 1 (i.e. lying between 0.8 and 0.9, implying economies of scale) which further reinforces the low reliability of total cost models. Unit cost models are also more appropriate given the form of the bioresources price control. Finally, we have also removed the second unit cost model relying on WAD LAD from MSOA as a density driver because there seems to be a consensus within the industry on the superiority of WAD from MSOA (given the higher granularity and its independency to LAD boundaries).

In each case we have ensured that the models and the estimated coefficients are robust (see Appendix 0 for all of the details, including the results of modelling sensitivities where SWW is excluded from the analysis as a supplementary robustness check).

The different steps to get to the final estimate of the claim are outlined in Table 5.1 below.

To make sure an efficiency target was applied to our AMP8 predicted costs, we have adjusted the predictions based on an upper quartile efficiency challenge, ranging from 89% to 90% depending on the scenario considered. In each case, the catch-up efficiency challenge was more stringent under our amended models accounting for raw liming/AD than under Ofwat's proposed unit cost models.[36] The exact range of efficiency scores under each scenario is displayed in Appendix 0.

[36] Excluding the second unit cost model relying on WAD LAD from MSOA, as indicated above.

Table 5.1 Net CAC under a unit cost approach (£m, 2022/23 prices)

	Implicit allowance (Ofwat's scenario)	Liming as an additional explanatory variable	AD as an additional explanatory variable
Modelled costs (pre upper quartile efficiency challenge)	155.7	216.1	201.6
Upper quartile	90.34%	88.80%	89.81%
Modelled costs (post upper quartile efficiency challenge)	140.7	191.9	181.0
Net CAC	**N/A**	**51.2**	**40.4**

Source: South West Water analysis from Ofwat's PR24 modelling suite.

Given that this cost claim accounts for about 20% of our projected AMP8 TOTEX on bioresources, it is clear that the base cost allowances would be significantly insufficient to undertake our sludge treatment process if no adjustments were made. This would of course apply to AMP8 but also to our long-term allowance.

We do not see any circumstances in this area which offset the considerations set out above. We act as a supplier of last resort to other disposal routes in order to protect the wider environment, and given the sensitive nature of the location we serve, our past attempts to gain support for other options and storage/disposal opportunities have not been supported.

Using an additional explanatory variable to account for disposal routes and treatment options is strongly supported by econometric evidence and allows the modelling to account for the specific circumstances we are facing. While sludge treatment technologies might be largely under management control for some companies, this is not the case for SWW for the reasons discussed above, and our amended models clearly show that Ofwat's proposed models are not adequate to reflect the higher unit costs we have to incur compared to the rest of the industry given our operating area.

5.4 Cost efficiency

There is evidence that the cost estimates are efficient since we have tested them across both a large range of models and over the entire industry.

In addition to not being sensitive to the removal of SWW from the analysis, they are also not sensitive to the form of the modelling (unit cost vs total cost assessment)[37] or to the choice of the cost driver retained (the percentage of sludge treated by raw sludge liming or the percentage of sludge treated by conventional/advanced AD).

The analysis is summarised in the supporting file and can easily be replicated. We have also undertaken third-party assurance to make sure of the robustness and the accuracy of the cost estimates.

The whole process and the different steps undertaken are outlined below.

[37] Although we do not rely on total cost models, for completeness we keep the statistical results in the Appendix with data up to 2021/22.

- Run the different models by using the percentage of sludge treated by raw sludge liming (or the percentage of sludge treated by conventional/advanced AD) as an additional cost driver in Ofwat's proposed unit cost models for PR24. In addition to the removal of WAD LAD from MSOA as a density driver, another adjustment we have made is the removal of the load treated in bands 1 to 3 as a cost driver in the first unit cost model as the coefficient became marginally negative.[38] This means that we use Ofwat Unit cost models 1,3 and 4. These references are used in Appendix 3 and in the supporting files. Although our claim is only based on these three unit cost models, the Stata outputs of all the models in terms of OLS and Random effects outputs are shown in Appendix (with the Random effects used as per the Ofwat cost model consultation). Methodology 1 supporting outputs file shows liming, and methodology 2 shows AD.
- Calculate an upper quartile efficiency challenge for each four scenarios, based on the last five years of data as per Ofwat in PR19.
- Produce AMP8 forecasts for the relevant cost drivers, namely: the total amount of sludge produced, the number of connected properties, the number of sewage treatment works, the percentage of load treated in bands 1 to 3, the percentage of sludge treated by raw sludge liming (or the percentage of sludge treated by conventional/advanced AD), and the WAD MSOA. While most of them have been part of an internal specific bottom-up forecasting process, the WAD measure has been derived following a simple extrapolation of the compound annual growth rate observed over 2011/12–2021/22 (0.32%). They are displayed in Appendix 0
- Calculate AMP8 predicted costs for each scenario, using the estimated coefficients derived in the first step and cost driver forecasts derived in the third step. We have followed the same triangulation process as Ofwat, i.e. first derive modelled costs for each sub-model and then average them
- Apply the historical upper quartile efficiency challenge calculated in the second step to AMP8 predicted costs to get the final allowances and the gross value of the claim.
- Restart the whole process based on Ofwat's unit cost models 1,2 and 4, to get the final allowances and the implicit allowance.
- Deduce the implicit allowance to the gross value of the claim to get the net value of the claim.
- Convert it into 2022/23 prices.

Supporting calculations for the submission template are provided in separate Excel files (Template BIO revised.xlsx, CAC liming revised methodology 1.xlsx, CAC liming revised methodology 2.xlsx). In all cases, the entire amount is allocated to sludge treatment.

The cost model drivers for 2025-2030 are based on current business projections. Increased loads reflect current view of increased nutrient removal from enhancement treatment and population growth. These assumptions will be updated to be consistent with business plan data tables.

Line (row)	Description
CWW18.1	Description of claim is Liming & bioresources

[38] This is explained by two effects: first this cost driver is usually not very stable and depends on the model specification (low p-value in a few wastewater models) and second we would expect the treatment technology to have a much higher impact on costs that the percentage on load treated in smaller bands. However an estimated negative sign does not arise when we use AD as a cost driver so we have kept it in that case.

Line (row)	Description
CWW18.2	This claim reflects Regional Operating Circumstances
CWW18.3	The claim is assumed not to be symmetrical as the use of lime is region specific, and implicit allowance adjustment is made. If the alternative approach of using models that reflect this (as opposed to the consultation proposed models), then this claim is not required, and is the equivalent to a symmetrical adjustment being made for this factor.
CWW18.8	The historical expenditure is the difference for each year between the average gross claim and the calculation of the implicit allowance (based on PR24 Ofwat bioresources models).[39] As data is not available for 2010/11, we have used the average of the following four years of AMP5. The calculation is summarised in Note 1 (relevant cells highlighted in green).
CWW18.5	The gross claim is the average of the two approaches we have used (liming and AD), together with the forecast model variables. As required by Ofwat, the gross claim has been subject to a catch-up efficiency challenge (here, an upper quartile). See extract of calculation in green cells highlighted in Note 1.
CWW18.6	The implicit allowance reflects three of the four unit cost models proposed by Ofwat[39] (simple average) after the application of an upper quartile efficiency challenge, using the forecast cost drivers. See extract of calculation in green cells highlighted in Note 1.
CWW18.9	Total control TOTEX of £246m has been included only for the purposes of calculating materiality.

Note 1: The calculation of lines CWW18.5, CWW18.6 and CWW18.8 is available in the supporting file 'Template BIO revised.xlsx'. The outcome is summarised in the table below, with the green cells being used in the final submitted template. Additional explanations on the retained methodology are provided below.

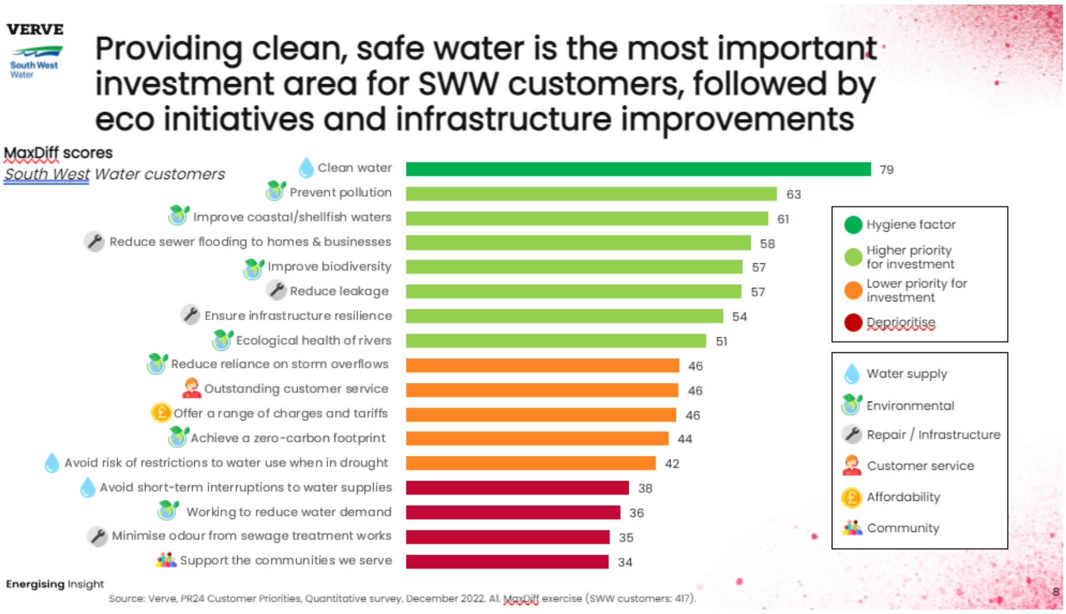
Average gross claim (22/23 prices) (CWW18.5)	IA (22/23 prices) (CWW18.6)	Historical data and net claim, 22/23 prices (CWW18.8)
43.258	30.557	12.701
40.914	29.198	11.716
37.644	27.317	10.327
38.605	26.684	11.920
34.829	24.411	10.418
35.473	25.408	10.064
34.899	24.975	9.924
33.576	24.298	9.278
35.089	25.373	9.716
37.951	27.216	10.735
38.759	26.967	11.792
36.175	27.959	8.216
37.632	28.616	9.016
39.308	29.196	10.112
35.576	26.999	8.577
36.424	27.565	8.858
37.373	28.203	9.170
38.117	28.693	9.424
38.963	29.220	9.743

[39] Based on unit cost models 1,2 and 4, as explained above.

- The historical total expenditure between 2011/12 and 2021/22 results from the average difference between the modelled costs of the three unit cost models with an additional explanatory variables accounting for liming/AD and the same three models under Ofwat's approach. The same process has been retained for 2022/23, 2023/24 and 2024/25 forecasts. As these years are prior to AMP8, the costs have not been subject to a catch-up efficiency challenge.
- The historical total expenditure for the year 2010/11 has been set to the average of the last four years of AMP5.
- Both the gross claim and the implicit allowance have been estimated by taking the average modelled costs of the two approaches, under their respective model specifications (with and without the additional explanatory variable). The second and the third columns above (CWW18.5 and CWW18.6) indicate modelled costs after the application of a UQ efficiency challenge, as per Ofwat's guidance.

5.5 Customer perspective

This question is believed to be more appropriate to enhancement cost adjustment claims. The liming approach and maintaining land disposal route through farming forms part of an overall bioresources and pollution prevention strategy, which are both reflected in customer priorities. Odour is a relatively low priority and therefore the sludge facilities / land disposal route remains a preferred customer option overall.



5.6 Summary of evidence

This section has demonstrated the need for the sludge treatment claim given that this is mostly beyond management control and driven by the particular characteristics of our operating area, the external farming environment, and environmental legislation and oversight.

The econometric results supporting the claim are reliable and robust and have been derived using different scenarios in order to ensure the accuracy and consistency of the estimates across all approaches and assumptions considered.

An upper quartile efficiency challenge has been applied to our predicted allowances to make sure that the costs presented are efficient.

The materiality bar is easily reached since the net claim is more than three times higher than Ofwat's materiality threshold of 6% of the bioresources TOTEX for AMP8.

It is not considered appropriate to provide evidence of the need for investment or that the investment represents the best option for customers as the claim seeks an adjustment to baseline BOTEX costs only and to costs that have already been incurred historically. The claim does not relate to a capital project involving strategic options appraisal where customer protection to ensure performance improvements are delivered, therefore this is not considered here. The table below presents an assessment of the evidence presented in this section to Ofwat's requirements.

Our review with Turner & Townsend helped us to identify improvements that we made to the description of the claim calculations and links to the supporting audit trail. We highlight in our commentary where data that will emerge during the PR24 process would be used to update the calculation of this claim, given that it is based on modelling. We have not duplicated points made in the cost model consultation response which provide evidence of the alternative to the cost adjustment claim and options for bioresources, which are being considered separately through the WINEP programme, which are highlighted in the early claim but may be clarified in our business plan.

Table 5.2 Summary of evidence presented in this section

Evidence	Assessment	Comments
Unique circumstances	Passed	The average percentage sludge treatment with raw liming for the rest of the industry is less than 3% in 2023 with a maximum of 17% for Wessex, while this amounts to 64% in our case. This warrants an adjustment since the modelling is not able to capture the higher costs faced by a single outlier.
Management control	Passed	The choice of sludge treatment technology results from the operating area of the company (e.g. topography and sparsity), the external farming environment, and environmental legislation and oversight.
Materiality	Passed	Well above threshold at 19.4%

Evidence	Assessment	Comments
Adjustments	Passed	We used Ofwat's guidance to make adjustments and calculate the implicit allowance. We simply added an additional explanatory variable to the models and compared the projected final allowances with and without it.
Cost efficiency	Passed	As required by Ofwat, a catch-up efficiency challenge has been applied in both cases.
Need for investment	N/A	The claim does not relate to an investment but to costs that have been incurred historically and will continue going forward over AMP8.
Best option for customers	N/A	This claim does not relate to investment but ongoing costs. Customer priorities are broadly consistent with maintaining the current land disposal route until alternative technologies can present an alternative option.
Customer protection	N/A	Customer protection in the event that the project is cancelled is not applicable, as the case is not an investment project.

5.7 Conclusion

It is clear that none of Ofwat's proposed models for PR24 are able to capture the higher costs we have to incur regarding our sludge treatment process. The proposed base cost models will leave us insufficiently funded for AMP8 as we have estimated our additional efficient costs related to raw liming to amount to about 20% of our projected bioresources. There is then a need to make an adjustment to our base cost allowances. While we have derived two different scenarios here, to fill the associated Excel template we have retained the average net claim value, **£47.8m.**

A1 Canal cost (CRT)

A1.1 Raw water costs subtracted from WRP BOTEX and WW BOTEX plus (£m, nominal prices)

Company code	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
AFW	0.00	0.00	0.00	0.00	0.00	1.18	1.27	1.15	0.84	1.44	1.47	2.05
ANH	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BRL	0.20	0.20	0.20	0.20	0.13	0.02	0.02	0.02	0.15	0.02	0.01	0.01
HDD	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.36	0.49	0.56	0.55	0.62
NES	2.00	2.00	2.30	2.20	2.75	1.01	1.00	0.98	0.92	1.08	0.93	1.22
NWT	1.50	1.50	1.60	1.60	0.00	0.00	0.00	0.00	0.00	0.14	0.13	0.09
PRT	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SES	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SEW	0.60	0.60	0.56	0.53	0.61	0.74	1.32	1.04	0.94	1.04	1.03	1.45
SRN	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SSC	0.01	0.00	0.00	0.02	0.02	0.02	0.01	0.01	0.00	0.01	0.01	0.03
SVE								8.20	8.00	6.52	7.70	8.64
SWB	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TMS	0.01	0.00	0.10	0.20	0.00	2.22	2.58	4.26	4.78	4.40	4.08	4.89
WSH	0.87	0.87	0.77	1.07	0.51	-1.12	0.16	0.14	0.14	0.15	0.17	0.20
WSX	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
YKY	3.80	3.80	3.94	4.00	3.85	3.79	3.80	3.87	3.80	3.89	3.98	4.08
DVW	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SVT	7.00	7.00	7.20	7.40	7.59	7.99	8.97	0.00	0.00	0.00	0.00	0.00

Source: SWW analysis based on APR data on bulk supply costs.

A1.2 Preliminary cost drivers forecasts for AMP8

BRL					
Cost driver	2026	2027	2028	2029	2030
Number of connected properties	572859	577412	581963	586424	590992
Length of mains	7053	7079	7105	7131	7156
Water treated in bands 3-6	99.54	99.54	99.54	99.54	99.54
Number of booster pumping stations	111	111	111	111	111
APH TWD	94.67	94.67	94.67	94.67	94.67
WAC	5.77	5.77	5.77	5.77	5.77
WAD MSOA	3664.07	3694.89	3725.98	3757.33	3788.94
WAD LAD from MSOA	1964.68	1982.24	1999.95	2017.83	2035.86

Source: South West Water.

A2 Leakage

A2.1 Modelling results of WW models including leakage per mains length as an additional explanatory variable (2017/18–2021/22)

Cost driver	Explanatory variable	WW1	WW2	WW3	WW4	WW5	WW6	WW7	WW8	WW9	WW10	WW11	WW12
Scale	Connected properties (log)	1.080*** {0.000}	1.061*** {0.000}	1.061*** {0.000}	1.049*** {0.000}	1.034*** {0.000}	1.017*** {0.000}	1.065*** {0.000}	1.050*** {0.000}	1.051*** {0.000}	1.043*** {0.000}	1.024*** {0.000}	1.011*** {0.000}
Complexity	Water treated at complexity levels 3 to 6 (%)	0.005* {0.096}		0.003 {0.356}		0.004 {0.356}		0.004** {0.042}		0.002 {0.507}		0.003 {0.423}	
	Weighted average treatment complexity (log)		0.655* {0.059}		0.454 {0.296}		0.546 {0.304}		0.574** {0.035}		0.285 {0.460}		0.443 {0.378}
Topography	Booster pumping stations per length of mains (log)	0.328*** {0.001}	0.288*** {0.001}	0.343*** {0.000}	0.320*** {0.001}	0.243 {0.234}	0.228 {0.241}						
	Average pumping head (log)							0.278*** {0.008}	0.247** {0.018}	0.299** {0.010}	0.281** {0.016}	0.173 {0.366}	0.153 {0.414}
Density	Weighted average density - LAD from MSOA (log)	-2.436*** {0.000}	-2.242*** {0.000}					-2.496*** {0.000}	-2.325*** {0.000}				
	Weighted average density - LAD from MSOA (log) squared	0.170*** {0.000}	0.154*** {0.000}					0.169*** {0.000}	0.155*** {0.000}				
	Weighted average density – MSOA (log)			-5.947*** {0.000}	-5.540*** {0.000}					-6.834*** {0.000}	-6.526*** {0.000}		
	Weighted average density – MSOA (log) squared			0.375*** {0.000}	0.347*** {0.000}					0.424*** {0.000}	0.403*** {0.000}		
	Properties per length (log)					-4.831 {0.176}	-3.549 {0.352}					-5.038 {0.118}	-4.049 {0.237}
	Properties per length (log) squared					0.567 {0.184}	0.41 {0.371}					0.572 {0.144}	0.451 {0.278}
Leakage	Leakage per km of mains	-0.093 {0.326}	-0.049 {0.632}	-0.092 {0.310}	-0.068 {0.497}	-0.058 {0.583}	-0.029 {0.793}	-0.06 {0.569}	-0.026 {0.811}	-0.092 {0.385}	-0.075 {0.502}	-0.048 {0.653}	-0.025 {0.823}
Constant	Constant	-0.928 {0.498}	-1.794 {0.235}	14.454*** {0.001}	12.708*** {0.006}	1.279 {0.859}	-1.569 {0.843}	-2.570* {0.078}	-3.142** {0.039}	15.919*** {0.000}	14.733*** {0.005}	0.564 {0.937}	-1.526 {0.839}
Model robustness tests and additional information													
Statistical diagnostic tests	R-squared	0.975	0.974	0.971	0.970	0.961	0.960	0.973	0.972	0.969	0.967	0.959	0.958
	RESET test	0.872	0.964	0.962	0.988	0.947	0.770	0.508	0.656	0.364	0.425	0.806	0.816
Model information	Estimation method	RE	RE	RE	RE	RE	RE	RE	RE	RE	RE	RE	RE
	Observations	85	85	85	85	85	85	85	85	85	85	85	85
	Dependent variable	Wholesale water botex plus network reinforcement						Wholesale water botex plus network reinforcement					

Source: SWW based on Ofwat's modelling suite. The results have not been updated with 2023 data.

A2.2 Modelling results of TWD models including leakage per mains length as an additional explanatory variable (2017/18–2021/22)

Cost driver	Explanatory variable	TWD1	TWD2	TWD3	TWD4	TWD5	TWD6
Scale	Length of mains (log)	1.104*** {0.000}	1.049*** {0.000}	1.092*** {0.000}	1.096*** {0.000}	1.045*** {0.000}	1.081*** {0.000}
Topography	Booster pumping stations per length of mains (log)	0.331*** {0.000}	0.308*** {0.001}	0.307 {0.109}			
	Average pumping head TWD (log)				0.338*** {0.000}	0.393*** {0.000}	0.319*** {0.005}
Density	Weighted average density - LAD from MSOA (log)	-3.199*** {0.000}			-3.292*** {0.000}		
	Weighted average density - LAD from MSOA (log) squared	0.251*** {0.000}			0.252*** {0.000}		
	Weighted average density – MSOA (log)		-6.378*** {0.000}			-7.065*** {0.000}	
	Weighted average density – MSOA (log) squared		0.440*** {0.000}			0.478*** {0.000}	
	Properties per length of mains (log)			-15.610*** {0.000}			-15.934*** {0.000}
	Properties per length of mains (log) squared			1.969*** {0.000}			1.985*** {0.000}
Leakage	Leakage per km of mains (log)	-0.165 {0.211}	-0.095 {0.494}	-0.145 {0.299}	-0.136 {0.273}	-0.091 {0.425}	-0.142 {0.283}
Constant	Constant	4.227*** {0.004}	17.984*** {0.000}	25.109*** {0.000}	2.216 {0.148}	18.117*** {0.000}	23.652*** {0.000}
Model robustness tests and additional information							
Statistical diagnostic tests	Adjusted R-squared	0.965	0.961	0.968	0.970	0.972	0.975
	RESET test	0.661	0.985	0.674	0.179	0.155	0.288

Source: SWW based on Ofwat's modelling suite. The results have not been updated with 2023 data.

A2.3 Modelling results of leakage-related TWD models including leakage per mains length as an additional explanatory variable (2017/18–2021/22)

Cost driver	Explanatory variable	TWD1	TWD2	TWD3
Scale	Length of mains (log)	1.532*** {0.000}	1.440*** {0.000}	1.450*** {0.000}
Density	Weighted average density - LAD from MSOA (log)	-6.685*** {0.000}		
	Weighted average density - LAD from MSOA (log) squared	0.493*** {0.000}		
	Weighted average density – MSOA (log)		-13.514*** {0.000}	
	Weighted average density – MSOA (log) squared		0.885*** {0.000}	
	Properties per length of mains (log)			-11.828 {0.116}
	Properties per length of mains (log) squared			1.560* {0.098}
Leakage	Leakage per km of mains (log)	-0.419 {0.394}	-0.365 {0.421}	-0.455 {0.330}
Constant	Constant	8.516** {0.012}	38.742*** {0.001}	8.8 {0.477}
Model robustness tests and additional information				
Statistical diagnostic tests	Adjusted R-squared	0.921	0.9	0.873
	RESET test	0.598	0.901	0.494

Source: SWW based on Ofwat's modelling suite. The results have not been updated with 2023 data.

A3 Liming & bioresources

A3.1 Modelling results under Ofwat's approach on a unit cost basis

Cost driver	Explanatory variable	BR1	BR3	BR4
Economies of scale in sludge treatment, and location of STWs relative to sludge treatment centres	Load treated in bands 1-3 (%)	0.052*** {0.000}		
	Weighted average density - LAD from MSOA (log)			
	Weighted average density - MSOA (log)		-0.317 {0.122}	
	Number of STWs per property (log)			0.179* {0.087}
Constant	Constant	-1.042*** {0.000}	1.658 {0.297}	0.623 {0.457}
Model robustness tests and additional information				
Statistical diagnostic tests	Adjusted R-squared	0.158	0.062	0.072
	RESET test	0.662	0.066	0.522
	VIF (max)	1	1	1
	Pooling / Chow Test	0.551	0.505	0.57
	LM test (Pooled OLS vs RE)	0	0	0
	Normality of model residuals	0	0	0
	Heteroskedasticity of model residual	0.063	0.795	0.528
Model information	Estimation method	RE	RE	RE
	Observations	120	120	120
	Dependent variable	Bioresources botex including growth enhancement divided by		
Efficiency score distribution	Minimum	0.52	0.49	0.48
	Maximum	1.37	1.30	1.34
	Range	0.85	0.82	0.86
Sensitivity tests	Removal most efficient company	G	G	G
	Removal least efficient company	G	G	A
	Removal first year	G	G	G
	Removal last year	G	G	G

Source: This includes the 2022/23 data. SWW analysis based on Ofwat's PR24 modelling suite.

Company code	Company	Triangulated
ANH	Anglian Water	1.20
NES	Northumbrian Water	0.49
NWT	United Utilities	0.87
SRN	Southern Water	1.00
SVH	Severn Trent Water + Hafren Dyfrdw	0.85
SWB	South West Water	1.05
TMS	Thames Water	1.09
WSH	Dŵr Cymru	1.34
WSX	Wessex Water	1.22
YKY	Yorkshire Water	1.18
	Upper quartile	**0.9034**

Source: This includes the 2022/23 data. SWW analysis based on Ofwat's PR24 modelling suite.

A3.3 Modelling results on a total cost basis, including the percentage of sludge treated by raw liming as an additional explanatory variable

Cost driver	Explanatory variable	BR3	BR4	BR5	BR6
Scale	Sludge produced (log)	1.175*** {0.000}	1.071*** {0.000}	1.243*** {0.000}	1.152*** {0.000}
Economies of scale in sludge treatment, and location of STWs relative to sludge treatment centres	Load treated in bands 1-3 (%)		0.011 {0.767}		
	Weighted average density - LAD from MSOA (log)			-0.294** {0.019}	
	Weighted average density - MSOA (log)				-0.242 {0.270}
	Number of STWs per property (log)	0.15 {0.353}			
Sludge treatment	Sludge treated by raw liming (%)	0.008*** {0.003}	0.008** {0.013}	0.009*** {0.001}	0.009*** {0.002}
Constant	Constant	-0.524 {0.402}	-1.291* {0.075}	0.031 {0.954}	0.262 {0.796}
Model robustness tests and additional information					
Statistical diagnostic tests	Adjusted R-squared	0.806	0.800	0.832	0.810
	RESET test	0.008	0.027	0.158	0.049
	VIF (max)	3.568	4.814	3.317	2.956
	Pooling / Chow Test	0.941	0.772	0.773	0.92
	LM test (Pooled OLS vs RE)	0	0	0	0
	Normality of model residuals	0.144	0.12	0.421	0.21
	Heteroskedasticity of model residuals	0.54	0.181	0.589	0.569
Model information	Estimation method	RE	RE	RE	RE
	Observations	110	110	110	110
	Dependent variable	Bioresources botex including growth enhancement			
Efficiency score distribution	Minimum	0.69	0.68	0.74	0.70
	Maximum	1.71	1.77	1.56	1.68
	Range	1.01	1.09	0.83	0.98
Sensitivity tests	Removal most efficient company	A	R	A	A
	Removal least efficient company	A	A	A	A
	Removal first year	G	A	G	G
	Removal last year	G	A	G	G

Source: This does not include the 2022/23 data (as these models are not used anymore to derive the net value of the claim). SWW analysis based on Ofwat's PR24 modelling suite.

Company code	Company	Triangulated
ANH	Anglian Water	1.20
NES	Northumbrian Water	0.70
NWT	United Utilities	0.83
SRN	Southern Water	1.01
SVH	Severn Trent Water + Hafren Dyfrdwy	0.92
SWB	South West Water	0.84
TMS	Thames Water	0.96
WSH	Dŵr Cymru	1.67
WSX	Wessex Water	1.21
YKY	Yorkshire Water	1.39
	Upper quartile	**0.8592**

Source: This does not include the 2022/23 data (as these models are not used anymore to derive the net value of the claim). SWW analysis based on Ofwat's PR24 modelling suite.

A3.4 Modelling results on a unit cost basis, including the percentage of sludge treated by raw liming as an additional explanatory variable

Cost driver	Explanatory variable	BR1	BR3	BR4
Economies of scale in sludge treatment, and location of STWs relative to sludge treatment centres	Weighted average density - MSOA (log)		-0.078 {0.613}	
	Number of STWs per property (log)			-0.007 {0.938}
Sludge treatment	Sludge treated by raw liming (%)	0.010*** {0.003}	0.010*** {0.010}	0.010** {0.011}
Constant	Constant	-0.970*** {0.000}	-0.354 {0.779}	-1.032 {0.219}
Model robustness tests and additional information				
Statistical diagnostic tests	Adjusted R-squared	0.147	0.155	0.146
	RESET test	0.189	0.363	0.160
	VIF (max)	1	1.177	1.48
	Pooling / Chow Test	0.593	0.749	0.699
	LM test (Pooled OLS vs RE)	0	0	0
	Normality of model residuals	0	0	0
	Heteroskedasticity of model residual	0.003	0.017	0.016
Model information	Estimation method	RE	RE	RE
	Observations	120	120	120
	Dependent variable	Bioresources botex including growth enhancement divided by		
Efficiency score distribution	Minimum	0.56	0.55	0.56
	Maximum	1.61	1.55	1.62
	Range	1.06	1.00	1.06
Sensitivity tests	Removal most efficient company	G	G	R
	Removal least efficient company	G	G	G
	Removal first year	G	G	G
	Removal last year	G	G	R

Source: This includes the 2022/23 data. SWW analysis based on Ofwat's PR24 modelling suite.

Company code	Company	Triangulated
ANH	Anglian Water	1.38
NES	Northumbrian Water	0.56
NWT	United Utilities	0.88
SRN	Southern Water	1.07
SVH	Severn Trent Water + Hafren Dyfrdw	0.92
SWB	South West Water	0.74
TMS	Thames Water	0.97
WSH	Dŵr Cymru	1.60
WSX	Wessex Water	1.24
YKY	Yorkshire Water	1.30
	Upper quartile	**0.8880**

Source: This includes the 2022/23 data. SWW analysis based on Ofwat's PR24 modelling suite.

A3.5 Modelling results on a unit cost basis, including the percentage of sludge treated by conventional and advanced AD as an additional explanatory variable

Cost driver	Explanatory variable	BR1	BR3	BR4
Economies of scale in sludge treatment, and location of STWs relative to sludge treatment centres	Weighted average density - MSOA (log)		-0.151 {0.252}	
	Number of STWs per property (log)			0.048 {0.492}
	Load treated in bands 1-3 (%)	0.002 {0.912}		
Sludge treatment	Sludge treated by conventional/advanced AD (%)	-0.009*** {0.001}	-0.008*** {0.001}	-0.008*** {0.001}
Constant	Constant	-0.16 {0.473}	1.014 {0.332}	0.229 {0.690}
Model robustness tests and additional information				
Statistical diagnostic tests	Adjusted R-squared	0.206	0.226	0.212
	RESET test	0.054	0.082	0.085
	VIF (max)	1.706	1.048	1.182
	Pooling / Chow Test	0.744	0.694	0.666
	LM test (Pooled OLS vs RE)	0	0	0
	Normality of model residuals	0	0	0
	Heteroskedasticity of model residual	0.009	0.01	0.008
Model information	Estimation method	RE	RE	RE
	Observations	120	120	120
	Dependent variable	Bioresources botex including growth enhancement divided by		
Efficiency score distribution	Minimum	0.58	0.57	0.57
	Maximum	1.66	1.55	1.61
	Range	1.08	0.98	1.04
Sensitivity tests	Removal most efficient company	G	G	G
	Removal least efficient company	R	G	G
	Removal first year	R	G	G
	Removal last year	G	G	G

Source: This includes the 2022/23 data. SWW analysis based on Ofwat's PR24 modelling suite.

Company code	Company	Triangulated
ANH	Anglian Water	1.41
NES	Northumbrian Water	0.57
NWT	United Utilities	0.88
SRN	Southern Water	1.12
SVH	Severn Trent Water + Hafren Dyfrdw	0.96
SWB	South West Water	0.79
TMS	Thames Water	0.98
WSH	Dŵr Cymru	1.60
WSX	Wessex Water	1.27
YKY	Yorkshire Water	1.27
	Upper quartile	**0.8981**

Source: This includes the 2022/23 data. SWW analysis based on Ofwat's PR24 modelling suite.

A3.6 Modelling results on a total cost basis, including the percentage of sludge treated by conventional and advanced AD as an additional explanatory variable

Cost driver	Explanatory variable	BR3	BR4	BR5	BR6
Scale	Sludge produced (log)	1.117*** {0.000}	1.038*** {0.000}	1.171*** {0.000}	1.093*** {0.000}
Economies of scale in sludge treatment, and location of STWs relative to sludge treatment centres	Load treated in bands 1-3 (%)		0.019 {0.533}		
	Weighted average density - LAD from MSOA (log)			-0.289*** {0.009}	
	Weighted average density - MSOA (log)				-0.265 {0.223}
	Number of STWs per property (log)	0.159 {0.307}			
Sludge treatment	Sludge treated by conventional/advanced AD (%)	-0.007*** {0.000}	-0.007*** {0.000}	-0.007*** {0.000}	-0.007*** {0.000}
Constant	Constant	0.475 {0.404}	-0.532 {0.425}	1.058** {0.039}	1.397 {0.238}
Model robustness tests and additional information					
Statistical diagnostic tests	Adjusted R-squared	0.829	0.824	0.850	0.834
	RESET test	0.033	0.076	0.051	0.048
	VIF (max)	3.423	3.632	2.66	2.618
	Pooling / Chow Test	0.764	0.724	0.25	0.593
	LM test (Pooled OLS vs RE)	0	0	0.007	0
	Normality of model residuals	0.117	0.085	0.332	0.212
	Heteroskedasticity of model residuals	0.125	0.047	0.165	0.158
Model information	Estimation method	RE	RE	RE	RE
	Observations	110	110	110	110
	Dependent variable	Bioresources botex including growth enhancement			
Efficiency score distribution	Minimum	0.69	0.69	0.73	0.69
	Maximum	1.70	1.76	1.57	1.66
	Range	1.02	1.07	0.84	0.97
Sensitivity tests	Removal most efficient company	G	R	A	G
	Removal least efficient company	G	G	A	G
	Removal first year	G	G	G	G
	Removal last year	A	A	G	G

Source: This does not include the 2022/23 data (as these models are not used anymore to derive the net value of the claim). SWW analysis based on Ofwat's PR24 modelling suite.

Company code	Company	Triangulated
ANH	Anglian Water	1.25
NES	Northumbrian Water	0.70
NWT	United Utilities	0.85
SRN	Southern Water	1.04
SVH	Severn Trent Water + Hafren Dyfrdwy	0.98
SWB	South West Water	0.86
TMS	Thames Water	0.99
WSH	Dŵr Cymru	1.67
WSX	Wessex Water	1.16
YKY	Yorkshire Water	1.32
	Upper quartile	**0.8942**

Source: This does not include the 2022/23 data (as these models are not used anymore to derive the net value of the claim). SWW analysis based on Ofwat's PR24 modelling suite.

A3.7 Modelling results, including the percentage of sludge treated by raw liming as an additional explanatory variable but excluding South West Water from the analysis

Cost driver	Explanatory variable	BR3	BR4	BR5	BR6
Scale	Sludge produced (log)	1.173*** {0.000}	1.099*** {0.000}	1.238*** {0.000}	1.130*** {0.000}
Economies of scale in sludge treatment, and location of STWs relative to sludge treatment centres	Load treated in bands 1-3 (%)		0.041 {0.323}		
	Weighted average density - LAD from MSOA (log)			-0.294** {0.015}	
	Weighted average density - MSOA (log)				-0.241 {0.247}
	Number of STWs per property (log)	0.189 {0.248}			
Sludge treatment	Sludge treated by raw liming (%)	0.010*** {0.002}	0.010*** {0.005}	0.010*** {0.001}	0.010*** {0.002}
Constant	Constant	-0.184 {0.759}	-1.522** {0.031}	0.05 {0.926}	0.365 {0.705}
Model robustness tests and additional information					
Statistical diagnostic tests	Adjusted R-squared	0.790	0.798	0.811	0.790
	RESET test	0.000	0.074	0.133	0.016
	VIF (max)	2.5	1.893	2.386	2.083
	Pooling / Chow Test	0.725	0.718	0.551	0.703
	LM test (Pooled OLS vs RE)	0	0	0	0
	Normality of model residuals	0.324	0.19	0.629	0.381
	Heteroskedasticity of model residuals	0.192	0.045	0.225	0.195
Model information	Estimation method	RE	RE	RE	RE
	Observations	99	99	99	99
	Dependent variable	Bioresources botex including growth enhancement			
Efficiency score distribution	Minimum	0.68	0.70	0.73	0.69
	Maximum	1.62	1.62	1.55	1.63
	Range	0.94	0.92	0.81	0.94

Source: This does not include the 2022/23 data (as these models are not used anymore to derive the net value of the claim). SWW analysis from Ofwat's PR24 modelling suite.

Cost driver	Explanatory variable	BR1	BR3	BR4
Economies of scale in sludge treatment, and location of STWs relative to sludge treatment centres	Weighted average density - MSOA (log)		0.061 {0.480}	
	Number of STWs per property (log)			0.061 {0.480}
Sludge treatment	Sludge treated by raw liming (%)	0.014*** {0.001}	0.014*** {0.002}	0.014*** {0.002}
Constant	Constant	- 0.972*** {0.000}	0.031 {0.979}	-0.467 {0.534}
Model robustness tests and additional information				
Statistical diagnostic tests	Adjusted R-squared	0.103	0.115	0.109
	RESET test	0.096	0.757	0.662
	VIF (max)	1	1.037	1.042
	Pooling / Chow Test	0.073	0.297	0.247
	LM test (Pooled OLS vs RE)	0	0	0
	Normality of model residuals	0	0	0
	Heteroskedasticity of model residuals	0.037	0.098	0.127
Model information	Estimation method	RE	RE	RE
	Observations	108	108	108
	Dependent variable	Bioresources botex including growth enhancement divided by sludge produced		

Source: This includes the 2022/23 data. SWW analysis from Ofwat's PR24 modelling suite.

A3.8 Modelling results, including the percentage of sludge treated by conventional and advanced AD as an additional explanatory variable but excluding South West Water from the analysis

Cost driver	Explanatory variable	BR3	BR4	BR5	BR6
Scale	Sludge produced (log)	1.118*** {0.000}	1.134*** {0.000}	1.173*** {0.000}	1.085*** {0.000}
Economies of scale in sludge treatment, and location of STWs relative to sludge treatment centres	Load treated in bands 1-3 (%)		0.097*** {0.000}		
	Weighted average density - LAD from MSOA (log)			-0.296*** {0.008}	
	Weighted average density - MSOA (log)				-0.302 {0.133}
	Number of STWs per property (log)	0.208 {0.152}			
Sludge treatment	Sludge treated by conventional/advanced AD (%)	-0.008*** {0.001}	-0.009*** {0.000}	-0.008*** {0.000}	-0.008*** {0.000}
Constant	Constant	0.996 {0.118}	-1.038*** {0.001}	1.144** {0.026}	1.825 {0.106}
Model robustness tests and additional information					
Statistical diagnostic tests	Adjusted R-squared	0.817	0.843	0.833	0.819
	RESET test	0.000	0.124	0.026	0.002
	VIF (max)	2.455	1.792	2.353	2.042
	Pooling / Chow Test	0.199	0.149	0.102	0.155
	LM test (Pooled OLS vs RE)	0	0.453	0.022	0.002
	Normality of model residuals	0.194	0.324	0.381	0.294
	Heteroskedasticity of model residuals	0.038	0.005	0.051	0.051
Model information	Estimation method	RE	RE	RE	RE
	Observations	99	99	99	99
	Dependent variable	Bioresources botex including growth enhancement			
Efficiency score distribution	Minimum	0.68	0.78	0.73	0.69
	Maximum	1.62	1.49	1.56	1.62
	Range	0.94	0.71	0.83	0.93

Source: This does not include the 2022/23 data (as these models are not used anymore to derive the net value of the claim). SWW analysis from Ofwat's PR24 modelling suite.

Cost driver	Explanatory variable	BR1	BR3	BR4
Economies of scale in sludge treatment, and location of STWs relative to sludge treatment centres	Weighted average density – MSOA (log)		-0.223* {0.089}	
	Number of STWs per property (log)			0.121 {0.106}
	Load treated in bands 1-3 (%)	0.063*** {0.001}		
Sludge treatment	Sludge treated by conventional/advanced AD (%)	– 0.011*** {0.000}	– 0.010*** {0.001}	– 0.010*** {0.001}
Constant	Constant	-0.15 {0.481}	1.785 {0.101}	1.019 {0.122}
Model robustness tests and additional information				
Statistical diagnostic tests	Adjusted R-squared	0.260	0.211	0.198
	RESET test	0.377	0.423	0.504
	VIF (max)	1.002	1.018	1.016
	Pooling / Chow Test	0.056	0.075	0.098
	LM test (Pooled OLS vs RE)	0	0	0
	Normality of model residuals	0	0	0
	Heteroskedasticity of model residuals	0.018	0.049	0.095
Model information	Estimation method	RE	RE	RE
	Observations	108	108	108
	Dependent variable	Bioresources botex including growth enhancement divided by sludge produced		

Source: This includes the 2022/23 data. SWW analysis from Ofwat's PR24 modelling suite.

A3.9 Preliminary cost driver forecasts for AMP8

Cost driver (SWW)	2026	2027	2028	2029	2030
Sludge produced	47.45	48.59	49.87	50.87	52.01
Number of connected properties	821297	832310	842557	851989	860900
Number of STWs	654	654	654	654	653
Percentage of sludge treated by raw liming	67.0%	67.0%	67.0%	67.0%	67.0%
WAD MSOA	1847.92	1853.79	1859.67	1865.58	1871.50
Percentage of sludge treated by conventional/advanced AD	30.0%	30.0%	30.0%	30.0%	30.0%
Percentage of load treated in bands 1-3	10.0%	9.9%	9.8%	9.7%	9.6%

Source: South West Water.

A4 Log of supporting files

File	Description
Canal costs	
CRT Audit Trail 2	Calculation file for data table – from source Abstraction costs and modelling in CRT early submission file through to completed CAC template
CAC CRT revised	Implicit allowance calculation – output from modelling and raw water data summarised
CRT Raw Water data_updated	Data source for raw water bulk supply data
Do file water – amended BOTEX for the CRT CAC	Stata file for implicit allowance calculation
Customer Forum Drought Management report	Support for section 3.6
BW128 Review of Ofwats PR19 Draft Determination on Bristol Waters Special Cost Factor on Canal and River Trust Payments NERA	Support for section 3.4.1
A5d Annual Customer Survey	Support for section 3.6
CRT-early submission	Historical reported data from PR19 Cost Adjustment Claim
Abstraction costs	Source records and calculation of contract costs
Leakage	
Leakage econometrics – audit trail	Outputs from alternative econometric models
1.3 2022 March BRL Customer Survey Report Final 21-22	Support for section 4.5
2.2 WCWRG Deliberative Research Report 2021 September	Support for section 4.5
2.8 South West Water WCWRG Re-Run Summary Report Draft February 2023	Support for section 4.5
Industry LK1 Collated_IMN2223	Source of base leakage data for UQ calculations
Isle_BW_Leakage_Review_FINAL	Section 4.4
Leakage Audit Trail revised	Calculation file of upper quartile with data linked through to CAC template
Intermediate data	Data file to and from Stata for alternative models
Oxera SWW econometric audit do file	Stata do file for econometric alternative models. Includes instructions on how to link to modified input/output data file
Leakage_data	Stata data file from Ofwat WW4 data for alternative models
Bioresources	

Do file bioresources – AD approach	Stata file for bioresources modelling
Do file bioresources – liming approach	Stata file for bioresources modelling
CAC liming revised methodology 1	Outputs from liming methodology 1
CAC liming revised methodology 2	Outputs from AD methodology 2 and summary of both approaches
Liming audit trail including template_IM update	Summary of source data and link into submission template
Template BIO revised	Summary of allowances from the source modelling to the template – see section 5.4

South West Water

Bournemouth Water

South West Water Limited, Peninsula House, Rydon Lane, Exeter EX2 7HR, Registered in England No 02366665

This document is available in different formats.