Wessex Water

PR24 CMA Redetermination

Statement of Case

21 March 2025

CONTENTS

1 Foreword

From Ruth Jefferson, CEO of Wessex Water

At Wessex Water, our customers, communities, and environment are central to all we do. We are consistently rated by our regulators and our customers, as one of the top-performing water and sewerage companies in England and Wales.

The great majority of our 2,800 employees live in our region and are customers of Wessex Water. We are proud of the important role we play, and believe that it goes beyond providing an essential public service.

We aim to support the communities we serve, help tackle the climate and nature emergencies and, as part of the YTL Group, contribute to the economic growth of our region and the country. These aims form the core of our long-term commitment to build a sustainable future with the support and partnership of our customers, communities, employees and stakeholders. This is what motivates our people to come to work every day.

We agree with our customers that there are urgent improvements to be made, which requires upgrading and building new infrastructure as well as harnessing nature to safeguard water quality. The level of investment built into our business plan is a response to a growing population, higher environmental standards, and the impacts of climate change. It will deliver long-term resilience.

And it needs a step change. Getting it right for customers and the environment requires necessary investment. We have one chance to do that, which we are committed to, and this is why we requested the levels of funding we did.

We must ensure that our customers can afford the cost of water. Our business plan included measures to keep real bill increases below 30%, and we continue that approach in this Statement of Case. We recognise that any increase in bills in unwelcome and so we have also committed to ensuring everyone has the support they need to afford our essential service.

Ofwat's Final Determination has set our expenditure at £4.3 billion, which we believe is insufficient to meet our obligations and deliver the outcomes our customers expect. We also consider the allowed return is too low. This shortfall in funding leads us to seek a redetermination from the Competition and Markets Authority.

We believe we have a strong case to put to you for the additional allowances we need to continue delivering a water and sewerage system fit for the future.

2 Executive summary

Wessex Water and our track record

2.1 Wessex Water serves 2.9 million sewerage customers and 1.4 million water supply customers across the South West of England. Despite the water industry's crisis of public confidence, we are judged by our regulators to be consistently one of the leading performers across the water and sewerage companies. Beyond providing essential services well, we aim to support the communities we serve, help tackle the climate and nature emergencies and contribute to the growth of the UK economy, forming a long-term commitment to build a sustainable future.

2.2 This ambition was reflected in our business plan for PR24, which proposed a doubling of investment to meet legal and regulatory requirements in the manner that most appropriately meets the needs of customers and the environment. We also emphasised the need to balance: (a) securing investment; (b) ensuring affordability; and (c) being confident of successful delivery.[1]

Why we have sought a redetermination

2.3 Ofwat's Final Determination did not represent the right short- or long-term outcome for customers. As we set out in chapters 5 to 10, this results in Wessex Water being underfunded to meet its statutory obligations; and in an overall package where the expected outcome for an efficient company is not consistent with it being able to finance its functions on a reasonable basis.

2.4 For Wessex Water, these areas can be broadly split into two categories.

2.5 First, two cost areas: **New disinfection at water treatment centres** (please see chapter 6 for further information) and **New bioresources health and safety requirements** (please see chapter 7 for further information) are not funded by Ofwat's base cost models in its Final Determination.

2.6 Second, in a number of areas Ofwat's assessment of efficiency is beyond what is achievable, even for an efficient company. Whilst we acknowledge there are difficulties and uncertainties in estimating the level of costs and performance appropriate for an efficient company, Ofwat has repeatedly selected values at the lower end of plausible distributions. This leads to an overall package where the expected outcome for an

[1] For example, please see *WSX01 - Striking the Balance (Executive Summary)* (provided as SoC Appendix A009) and *WSX-M02 - Summary of WSX response to Ofwat's PR24 DD* (provided as SoC Appendix A140) which provide a summary of our original and updated (Draft Determination Response) business plans.

efficient company is not consistent with it being able to finance its functions on a reasonable basis. These areas are:

(a) **Wholesale water base costs** – As set out in chapter 8, have concerns with Ofwat's econometric modelling and regulatory framework. Consistent with the approach we advocated to Ofwat, as part of our business plan we submitted considerable bottom-up engineering evidence on our base costs, which were not fully considered by Ofwat in its Final Determination. We also have concerns regarding the calibration and scope of Ofwat's mains renewal Price Control Deliverable ("PCD"), and ongoing efficiency challenge.

(b) **Phosphorus removal costs** – As set out in chapter 9, two-thirds of Ofwat's challenge to our proposed wastewater enhancement programme results from the mechanical application of a single suite of four models for phosphorus removal, each with an R-squared value in the range 0.299-0.530. Our focus is on those schemes where the cost allowance is determined by the models.

(c) **The allowed return** – As set out in chapter 10, in our view, Ofwat's approach to risk and return has not achieved the right alignment. In particular, it systematically underestimates the appropriate allowed cost of capital.

2.7 As a result, we do not consider the Final Determination meets Ofwat's duties. As set out in chapter 5, we consider the customer duty, financing duty, functions duty, and resilience duty are so intrinsically linked that we refer to them collectively as the Duties.

2.8 It is on this basis we are seeking a redetermination.

Our focused approach to the redetermination

2.9 We have taken a targeted approach to our Statement of Case. We think that it is in the interests of all parties to focus the limited time available in the redetermination on the areas where Ofwat's Final Determination, in our view, has not met its Duties.

2.10 This will allow us all to concentrate on the most critical aspects of the determination where we believe the regulatory methodology requires significant revision. Therefore, we have not focused on areas where Ofwat has already identified a workable way forward for the provision of services in our region.

2.11 This approach recognises the practical limitations of the redetermination process and acknowledges that relitigating every point would neither be productive, nor in the best interests of stakeholders. It is also a reflection of our commitment to engage constructively with the regulatory process and focus only on those areas where we believe material improvements are essential.

2.12 In taking this approach, we aim to facilitate an efficient and effective review process that addresses the most critical issues while maintaining the stability and predictability for the rest of the business that is essential for long-term planning and investment in the sector.

2.13 This balance between continuing the work on specific aspects of the determination and carrying over other aspects of Ofwat's decision represents a practical and constructive approach to regulatory engagement that serves the interests of all stakeholders.

Areas of focus

2.14 Two areas of investment are not funded by Ofwat's base cost models in its Final Determination.

New disinfection at water treatment centres

2.15 Obligations specific to Wessex Water relating to new disinfection at water treatment centres have not been accounted for in the setting of base cost allowances.

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2.18 Further information is set out in chapter 6 and Annex A7.

New bioresources health and safety requirements

2.19 The way in which bioresources base costs have been determined in the Final Determination does not account for new health and safety obligations facing Wessex Water arising from the Health and Safety Executive (HSE) investigation into the incident at our Avonmouth Water Recycling Centre in December 2020.

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2.22 Further information is set out in chapter 7 and Annex A8.

Areas of focus: Costs where Ofwat's assessment of efficiency is beyond what is actually achievable, even for an efficient company

2.23 As we set out in chapter 5, in setting its Final Determination, Ofwat has to determine ex-ante the costs (i.e. expenditure allowances, and the cost of capital) that are appropriate for an efficient company in meeting its statutory and non-statutory obligations. The actual company is then incentivised to meet this "efficiency challenge".

2.24 The efficient costs cannot be measured directly, they must be estimated by the regulator. Ofwat employs a number of different methodologies across the price control to do this. Across these methodologies, there is a considerable degree of uncertainty as to the right level to set efficient costs, and therefore significant scope for measurement error.

2.25 We use measurement error to refer to the risk of incorrectly estimating the true efficient costs when identifying the efficient company. Such error can create substantial discrepancies between the estimated and actual efficient costs in a given area. Furthermore, these errors can compound and amplify one another. Therefore, the potential for measurement error must be understood in relation to any method used to estimate the efficient company.

2.26 In defining the efficient company and then setting our Final Determination, Ofwat has repeatedly and without sufficient justification selected point estimates at the lower end of the range suggested by the evidence. In particular, it has not properly considered the scope for and extent of measurement error in its estimates.

2.27 Each of the measurement errors identified in this Statement of Case represent methodological flaws that go beyond an appropriate efficiency challenge. The combination of these methodological choices has led to an overall determination that is beyond what a reasonable regulator could consider to be efficiency, and is significantly (and unreasonably) skewed to the downside.

Wholesale water base costs

2.28 As we set out in chapter 8, since the PR19 determinations and redeterminations, there has been a significant increase in the debate as to whether the sector's capital maintenance expenditure and resilience are at the optimal levels. In our view, the regulatory model does not provide adequate allowances for companies to invest in the long-term resilience of their assets.

2.29 Wessex Water has argued for regulatory reform specifically in how costs are set. We are concerned that the regulatory approach does not sufficiently focus on identifying the optimal level of capital maintenance activity that companies should undertake, or indeed ensure that companies are undertaking this optimal level. This is because Ofwat (through its econometric modelling) identifies lower spend as "the right outcome" (i.e. efficient), and as something that should be replicated by other companies (i.e. in its allowances).

2.30 As such, companies are not incentivised to deliver the optimal level of capital maintenance, and instead face incentives to achieve rewards through capital maintenance deferral. This has led to structural underspending of capital maintenance budgets across the sector. However, as a responsible asset manager, Wessex Water has consistently put such incentives to one side and spent its capital maintenance allowances in full.

2.31 The under-spending resulting from the deficiencies in Ofwat's benchmarking has been compounded by the incentives that companies face when they produce business plans.

Specifically, under Ofwat's QAA framework for assessing the "quality" and "ambition" in plans (and the equivalent processes from previous price reviews) companies are incentivised not to ask for additional allowances wherever such allowances are not expressly provided for in Ofwat's starting price review methodology. For example, at PR24 a company's quality and ambition score depended in part on the level of base costs requested, and whether Ofwat considered this was efficient.

2.32 The framework therefore produces outcomes in which base cost allowances are set considering only historical outturn spend and therefore bakes-in the underspend resulting from such incentives.

2.33 Within the regulatory framework, we also have concerns with Ofwat's approach to econometric benchmarking. As we set out in chapter 8, Ofwat's models are subject to significant measurement error, and set allowances on the basis of an artificially low efficiency frontier. As a result, the efficient company is underfunded.

2.34 Reflecting our concerns and the suggested approach advocated to Ofwat, we submitted as part of our business plan considerable bottom-up engineering evidence on our base costs. This was intended to ensure, in the context of our concerns regarding the likely historical underfunding, that the asset management and engineering expertise of the companies was appropriately reflected in the cost allowances. For example, we modelled capital maintenance needs based on site and asset specific needs, lifespans, and efficient costs (i.e. market data).

2.35 However, in the Final Determination our cost adjustment claim, which was based on our bottom-up engineering evidence, was rejected with limited evidence of a substantive review.

2.36 We ask the CMA to determine an allowance using a mixed methodology that meets its duties. We did this in our business plan and therefore ask for these costs as originally submitted (with minor updates due to new information) to be allowed in our redetermination. This funding could be accompanied by appropriate customer protections (e.g. sharing rates) determined by the CMA.

Phosphorus removal

2.37 As we set out in chapter 9, Ofwat's approach to enhancement, and specifically phosphorus removal (P-removal), underfunds the efficient company to deliver its legal and statutory requirements.

2.38 Two-thirds of Ofwat's challenge to our proposed wastewater enhancement programme results from the mechanical application of a single suite of four models for P-removal, each with an R-squared value in the range 0.299-0.530.

2.39 In relying on only this flawed suite of models to assess these schemes, Ofwat ignores its own views on the efficiency implied by our specific engineering evidence.

2.40 For example, the mechanical application of Ofwat models results in a 35% challenge to 93% of our schemes; whilst those sites assessed outside of the model, and with reference to our engineering evidence, see a much lower overall challenge of 12%.

2.41 There are a number of different approaches Ofwat could have taken, all of which would have led to a significantly increased expenditure allowance.

2.42 We ask the CMA to determine an allowance using a mixed methodology that meets its duties. We did this in our Draft Determination Response and so ask for our full Draft Determination Response cost.

Allowed return

2.43 As set out in chapter 10, in our view, Ofwat's approach to risk and return has not achieved the right alignment. First, it systematically underestimates the appropriate allowed return. Second, as we set out in paragraphs 2.28 to 2.42 above, it results in considerable downside risk for the efficient company, such that it cannot expect to earn it. The allowed return is too low, and the expected return is lower still.

2.44 We are therefore concerned that the regulatory determination in its current form will not allow us to attract or retain the investment needed to meet our statutory obligations, nor deliver the quality of service our customers want.

Areas not included in our focused Statement of Case

2.45 There are a number of further areas in the Final Determination with which we disagree and could also be redetermined. However, given the time constraints in the process, the number of other water companies requesting a redetermination (including in respect of certain of these further areas), and the need to continue to deliver for customers and the environment, we consider it appropriate not to focus our Statement of Case on these areas.

2.46 In the event that the CMA opts to take a detailed look at any of these (or other) areas as part of its overall redetermination, we reserve the right to make such submissions as we consider necessary and for the CMA to consider the appropriate redetermination for Wessex Water.

2.47 A summary is provided in Table 1 below, and more detail can be found in Annex A5.

Table 1 – Areas not included in our focused Statement of Case where we reserve the right to make submissions as we consider necessary

Area	Summary of our position
Base costs – wholesale wastewater	Many of the issues that affect Ofwat's approach to setting base costs for wholesale water are also relevant for wholesale wastewater. However, we do not consider the difference between our own and Ofwat's assessments to be sufficiently material to be prioritised for a redetermination.
Enhancement costs – WRC growth	Ofwat's modelling approach does not produce robust estimates of efficient cost allowances, particularly for large WRC growth schemes. Notwithstanding this, Ofwat has confirmed that our cost allowances should be higher, as a result of an unambiguous error highlighted in the query process. Taking this into account, we do not consider the overall difference between our own and Ofwat's (revised) cost allowance to be sufficiently material to be prioritised for a redetermination. We do however ask the CMA to directly make the relevant adjustments in our revenue allowances to correct for the error.[2]
Enhancement costs - IED	Ofwat's modelling approach does not explain the variation in companies' efficient IED costs and does not therefore produce robust cost allowances. However, we do not consider the overall difference between our own and Ofwat's cost allowances to be sufficiently material to be prioritised for a redetermination.
Enhancement costs – leakage	Ofwat's unit cost benchmarking approach in these areas does not capture the key drivers of leakage expenditure and supply side schemes that will affect a given company's efficient cost. However, we do not consider the overall difference between our own and Ofwat's cost allowances to be sufficiently material to be prioritised for a redetermination.
Enhancement costs – supply side schemes	
Enhancement costs – resilience funding	Ofwat's approach to providing an uplift on base allowances to fund resilience investment does not reflect the specific requirements of each company and the relevant bottom-up evidence provided. However, we do not consider the overall difference between our own and Ofwat's cost allowances to be sufficiently material to be prioritised for a redetermination.

2 See *Ofwat query OFW-FD-WSX-012* (provided as SoC Appendix A195).

Area	Summary of our position
Retail costs	While we have accepted Ofwat's retail price control allowance in the round, we consider there are flaws in the methodology used to derive allowances, specifically in relation to the estimate of bad debt allowances. We also consider the price control should be indexed by inflation in line with wholesale price controls.
Outcomes – performance targets	In the round, we have accepted Ofwat's performance commitment targets. However, we consider that some of these targets have been set at a level that makes underperformance more likely than outperformance for an, for the allowed level of funding. In other areas, we note the targets serve to create perverse incentives for companies, for example to make inefficient investments (unplanned outage); to restrict regional growth (business demand); and to limit cost-beneficial network interventions (mains repairs). Ofwat's Outturn Adjustment Mechanism (OAM) partly mitigates the impact of these methodological flaws on the overall balance of risk and return, though it does not address the source of these issues.
Outcomes – Outcome Delivery Incentive (ODI) rates	To appropriately incentivise companies to deliver economically efficient outcomes, ODI rates should reflect the marginal value of the relevant outcome to customers and the environment. However, many of Ofwat's ODI rates are not underpinned by marginal benefits and do not therefore send the right incentives to companies in respect of investment and performance.
Price Control Deliverables (PCD)	The design of Ofwat's PCD framework, which was only set out in its Draft Determination, materially restricts companies' flexibility to deliver customer outcomes in the most efficient way – particularly for programmes where there is a high degree of uncertainty in AMP8. Furthermore, the way in which PCD payments are applied materially increases the delivery risk that companies face in AMP8, in a way that Ofwat's wider framework does not acknowledge.
Delayed Delivery Cashflow Mechanism	This mechanism could restrict companies' ability to optimise investment programmes across AMP8, while duplicating other mechanisms that already exist to protect customers against under-delivery.
Scope of uncertainty	Ofwat's framework, while updated from PR19 in certain places, has not evolved to reflect the unprecedented increase in uncertainty that companies are facing in AMP8. This increases risks and ultimately costs to investors and customers.
RoRE	Several of the issues highlighted above mean there remains a significant downside skew in the overall RoRE range, which is not addressed in the allowed return. While we have chosen to focus on the most material drivers of this downside skew, a fully balanced package would need to address the source of other issues.

2.48 Additionally, there are a number of areas in the Final Determination we are willing to accept in the round. Again, we would be happy to make further submissions on these points if that would assist the CMA.

2.49 A summary is provided in Table 2, and more detail can be found in Annex A6.

Table 2 – Areas we are willing to accept in the round

Area	Summary of our position
Enhancement costs – deep dives	Where enhancement programmes are company-specific and comprise bespoke schemes with individual characteristics, we agree that efficient cost allowances should be informed by the bottom-up evidence on costs. We support Ofwat's use of this 'deep dive' approach in such areas (e.g. nitrogen-removal).
Enhancement costs – shallow dives	For less material enhancement investment lines, we recognise that it may not be proportionate to carry out deeper dives into companies' plans. For these areas, Ofwat's shallow dive approach – where the efficiency challenge is based on companies' efficiency scores in the rest of its enhancement programme, up to an appropriate cap – is a pragmatic solution to balancing Ofwat's considerations.
Cost sharing rates	We support the use of cost-sharing as a way of incentivising efficient delivery while providing some protection against risks. We agree that different cost sharing rates should be applied to enhancement costs and in other areas such as business rates, where the exogenous risks that companies face are different.
Outcomes – deadbands, caps and collars	We support the use of deadbands, caps and collars in limiting the extent of financial rewards or penalties for underperformance or outperformance. These ensure a better balance of risk between companies and customers.
Measures of experience	While we have some concerns with the specifics of each methodology (e.g. the use of the UKCSI for C-MeX), we support the overarching framework for incentivising companies to deliver an excellent customer experience.

Requests to the CMA

2.50 Our detailed requests to the CMA are provided in chapters 6 to 10, and summarised below.

2.51 We request that the CMA:

(a) allows the cost allowances of £47m required for us to deliver the disinfection improvements at our rural water treatment works, in line with new requirements from the DWI and WHO; and

(b) allows the cost allowances of £178m required for us to deliver the new improvements at our bioresources centres.

2.52 Recognising the measurement error in Ofwat's approach, we ask that the CMA takes an appropriate and triangulated approach to its view of the appropriate efficiency in relation to wholesale water base costs, P-removal costs, and the allowed return. In our view, given the flaws in Ofwat's approach and the evidence available the most appropriate approach would be to:

(a) Allow our view of the efficient wholesale water base costs of £892m, which represents a £244m increase on Ofwat's Final Determination. This funding would ensure:

(i) our base capital maintenance allowance is set with regard to the bottom-up evidence presented in our business plan and included in Annex A9; and

(ii) our base opex allowances are set with regard to current rates of expenditure, recognising our track record of efficiency, with consideration of expected changes to costs, such as business rates.

(b) Redetermine the size of the base cost adjustment for mains renewals, and set PCDs on base only in relation to uplifts to base expenditure.

(c) Apply an evidence-based ongoing efficiency challenge as appropriate.

(d) Consider the alternative perspectives to Ofwat's models for P-removal, and determine an allowance using a mixed methodology that meets its duties. This is consistent with the approach we took in our Draft Determination Response, and therefore we request our Draft Determination Response costs of £717m, which represents a £254m increase on Ofwat's final determination.

(e) Consider the range of evidence that demonstrates a clear need for a higher allowed return for the sector. We ask the CMA to scrutinise each metric in detail, and based on sound economic principles take a balanced assessment of the base return allowance in the round. We ask that this is done in parallel with the requests presented above, which are intended to reduce the scope for measurement error in our cost allowances, and increase the likelihood that the efficient company can earn the allowed return.

Impact on bills

2.53 Consistent with our business plan, our Board is committed to a maximum bill rise, in real terms, of less than 30% by 2030, providing this is financeable.[3]

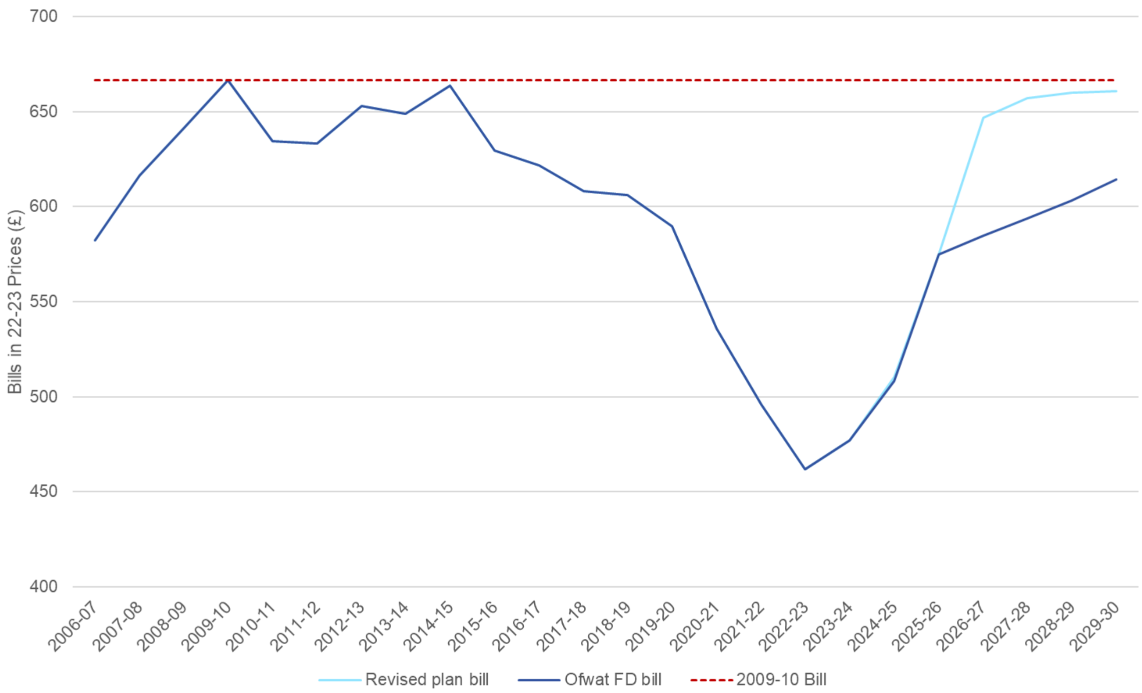
2.54 Without any adjustment for the affordability of our charges, the requested changes to Ofwat's Final Determination set out in this Statement of Case would mean that the natural rise in bills by 2030 would be 38%. We then limit the actual rise requested to less than 30% by applying the affordability levers that we set out in our Draft Determination Response.[4]

2.55 If the CMA takes a different view on the efficient expenditure allowances to those set out in this Statement of Case then, to the extent that this results in a natural bill rise above 30%, we ask that the CMA applies these affordability levers to keep the bill increase below 30%. Meanwhile, if the natural bill rise resulting from the CMA's redetermination was to be below 30% then, by definition, no adjustment would be needed to keep the bill increase below 30%.

[3] Set out in full in Draft Determination Response document *WSX-R01 - Risk and return* (provided as SoC Appendix A152).
[4] See in full in *WSX-R01 - Risk and return* (provided as SoC Appendix A152).

2.56 In Figure 1 below, we provide a summary of our proposed bill profile, in the context of Ofwat's Final Determination[5] and our historical bills.

Figure 1 – Comparison of Ofwat Final Determination bill profile with proposed bill profile



2.57 Furthermore, we remain committed to our industry-leading social tariffs, offering up to 90% discount to assist those in financial hardship.

Statement of Case structure

2.58 The remainder of this document is structured as below.

(a) Chapter 3, **Wessex Water**, provides an overview of the company, including its appointment, ownership, and performance.

(b) Chapter 4, **Our Performance**, demonstrates Wessex Water's long-term performance, investment, and efficiency.

(c) Chapter 5, **Ofwat Regulation and Duties**, sets out Ofwat's regulatory framework and duties, explaining where the Final Determination does not meet these duties.

(d) Chapter 6, **New Disinfection at Water Treatment Centres**, provides further information in relation to investment at Water Treatment Centres where Ofwat has said it would support the case for an adjustment.

5 On a like-for-like assessment using Ofwat's financial model and RR14 data.

(e) Chapter 7, **New Bioresources Health and Safety Requirements**, provides further information in relation to investment at bioresources sites where Ofwat has said it would support the case for an adjustment.

(f) Chapter 8, **Wholesale Water Base Costs**, discusses the concerns with Ofwat's approach to setting wholesale water base costs, and provides an alternative view aimed at ensuring optimal levels of expenditure.

(g) Chapter 9, **Phosphorus Removal**, discuses concerns with Ofwat's approach to setting phosphorus removal costs where these are determined with its suite of econometric models.

(h) Chapter 10, **The Allowed Return**, highlights the concerns with Ofwat's approach to the allowed return and the need for a balanced assessment.

(i) Chapter 11, **Conclusion**, summarises our key points and requests to the CMA.

2.59 These chapters are supported by the following Annexes.

(a) A1, Table of redactions

(b) A2, List of tables and figures

(c) A3, Table of new evidence provided

(d) A4, Index of supporting material

(e) A5, Areas we reserve the right to make further submissions on as necessary

(f) A6, Areas we are willing to accept in the round

(g) A7, Further information on disinfection at water treatment centres

(h) A8, Further information on bioresources health and safety requirements

(i) A9, Further information on wholesale water base costs

(j) A10, Addressing Ofwat's concern with our base cost adjustment claim

(k) A11, The regulatory drivers of phosphorus removal

(l) A12, An overview of the treatment processes for phosphorus removal

(m) A13, Examples of Wessex Water's sites that require phosphorus removal

(n) A14, How the Ofwat phosphorus removal model works

(o) A15, Supplementary phosphorus removal analysis

3 Wessex Water

Overview

3.1 Wessex Water is a licensed regional water and sewerage business serving 2.9 million sewerage customers and 1.4 million water supply customers across the South West of England, including Dorset, Somerset, Bristol, most of Wiltshire and parts of Gloucestershire and Hampshire.

3.2 At a time when the water industry faces a crisis of public confidence, and customers expect more from their water companies, we are judged by our regulators to be consistently one of the leading group of water and sewerage companies in England and Wales, as we set out in chapter 4.

3.3 We are committed to playing a critical role that goes beyond providing an essential public service well. We aim to support the communities we serve, help tackle the climate and nature emergencies, and contribute to the growth of the UK economy. These aims form the core of our long-term commitment to build a sustainable future with the support of, and on behalf of, our customers, communities, employees and other stakeholders.

3.4 For example, we are working together with the Green Alliance, Rivers Trust, RSPB, Wildlife Trusts, Sustainability First, CIWEM, and Water UK on championing a new approach for environmental regulation to deliver better outcomes for customers, the environment and water users under a new coalition “Sustainable Solutions for Water and Nature (SSWAN)”.[6]

3.5 Our water supply services are provided by a network of 231 water sources and treatment centres, 310 service reservoirs and water towers, and more than 12,000 km of water mains, providing our customers with around 270 million litres of water every day.

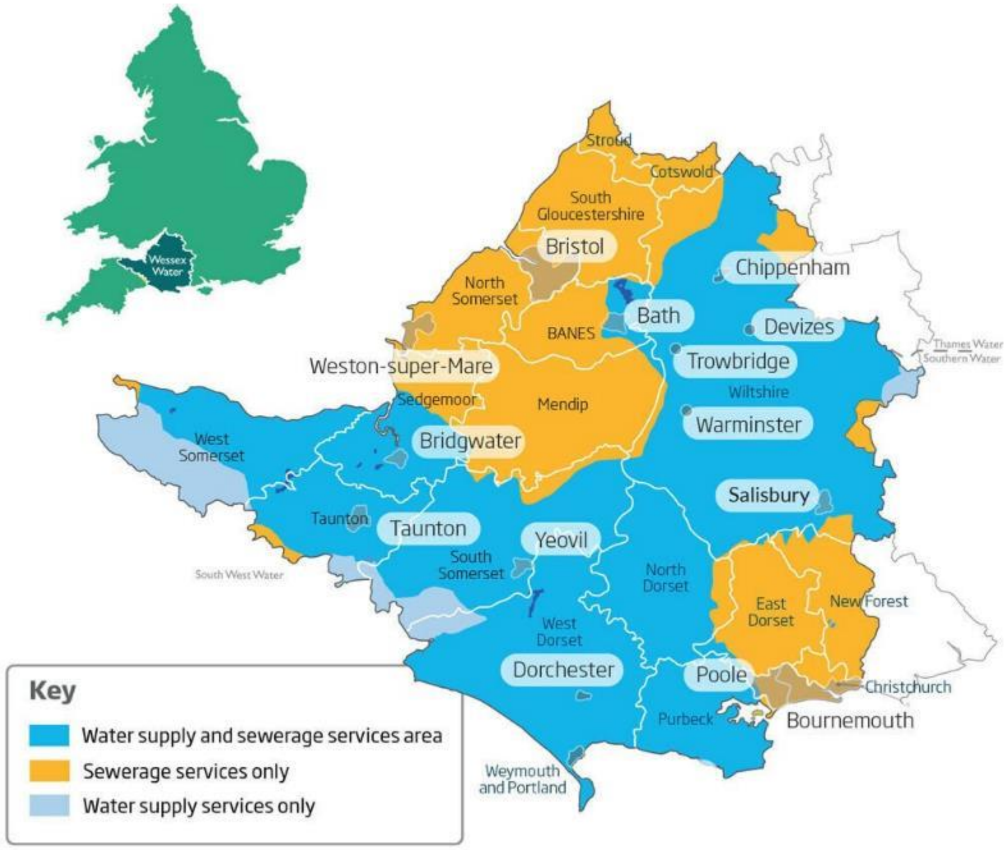
3.6 Our wastewater services are provided by a network of 398 water recycling centres, 2,172 pumping stations, and more than 35,000 km of sewers, taking away and treating around 470 million litres of wastewater every day.

3.7 As illustrated in Figure 2 below, within different parts of our region we provide, variously, water supply and sewerage services, sewerage services only, and water supply services only. In particular, the conurbations of Bristol and Bournemouth are also served by water-only companies (and receive only sewerage services from Wessex Water). This means that our supply area is the most rural of any of the water companies operating in England, with a population density of 181 customers per square kilometre

6 SSWAN - Sustainable Solutions for Water and Nature Copy provided in *SoC Appendix A224.*

compared to the average across all companies of 500. We discuss this further in chapter 8.

Figure 2 – Map of the Wessex Water Region



Note – Darker shading indicates urban areas

Appointment

3.8 Wessex Water holds an Instrument of Appointment to supply clean water within, and treat and dispose of wastewater from, a specified area in the South West of England. The Appointment was granted by the Secretary of State in August 1989, effective from 1 September 1989, under sections 11 and 14 of the Water Act 1989 (now sections 6 and 11 of the Water Industry Act 1991, as amended by subsequent UK legislation, including the Competition and Service (Utilities) Act 1992, the Water Industry Act 1999, the Water Act 2003 and the Water Act 2014).

3.9 Wessex Water's duties include specific duties that relate to water supply, the sewerage system, customer service, environmental responsibility, and connection management.

3.10 The Appointment requires that Wessex Water's Board has sufficient independent membership. The 2019 guidance from Ofwat on Board leadership, transparency and governance requires that independent non-executive directors constitute the single largest group on the Board.

Ownership

3.11 In May 2002, YTL Power International Berhad ("YTL") of Malaysia acquired Wessex Water and continues as its sole owner today, the longest duration single-owner in the sector.

3.12 YTL, founded in 1955, is a family-led business, based in Kuala Lumpur. It operates in Asia, Europe, China and Australia across a range of activities including housing, construction, cement, power, rail, water, telecommunications, retail centres, hotels and, more recently, data centres and super-computing.

3.13 YTL is a significant investor in the UK and the Wessex Water region, including the Wessex Water Group; the Brabazon new town development of 6,500 homes north of Bristol; and the YTL entertainment arena, set to be the fourth largest in the UK, as well as hotels in London, Edinburgh, Bath and Bray.

3.14 YTL takes a long-term stewardship approach to ownership, demonstrated by:

(a) the duration of its ownership of Wessex Water;

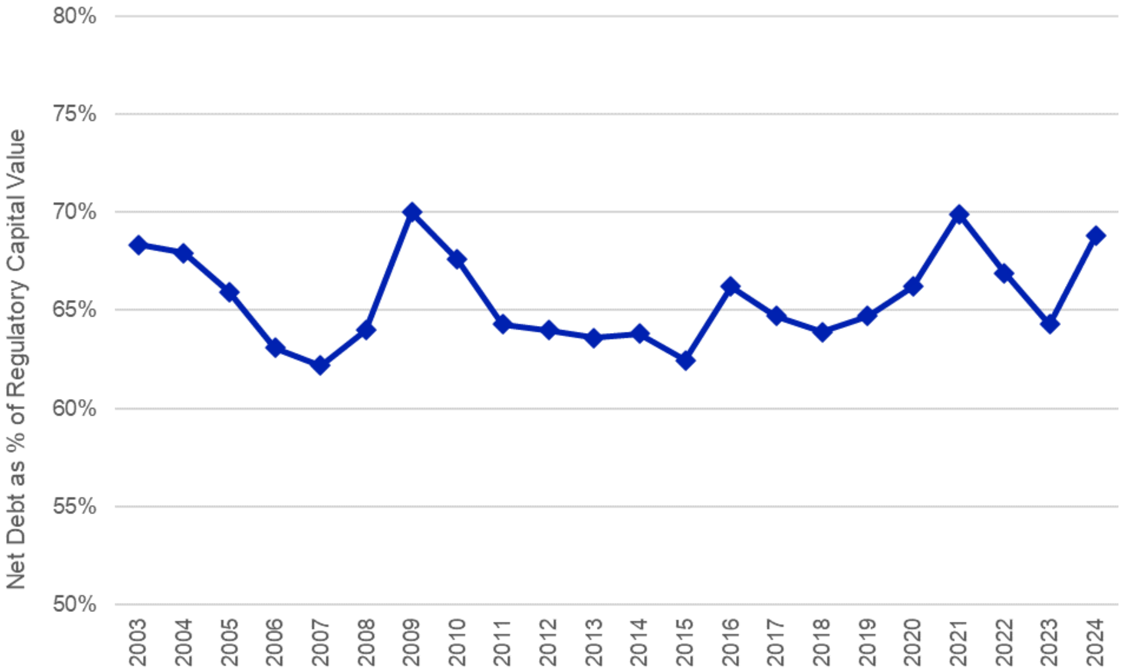
(b) its track-record of investment in the business, as set out in chapter 4 below;

(c) providing the support and the shareholder-level direction to facilitate Wessex Water's industry-leading performance to date, also as set out in chapter 4 below; and

(d) encouraging long-term tenure in senior management positions.

3.15 On acquisition of Wessex Water in 2002, YTL resisted proposals to increase returns by whole-business securitisation and high levels of gearing. Instead, YTL adopted a straightforward financial structure geared at around 70%. It has maintained that structure ever since, as shown in Figure 3 below.

Figure 3 – Wessex Water gearing at 31 March each year



3.16 YTL has avoided complex taxation structures and the Company maintains an open and transparent relationship with HMRC. We are categorised by HMRC as "low risk" in its Business Risk Review Assessment, the lowest of its four risk categories.

3.17 In summary, we consider that YTL's long-term ownership and continued commitment has allowed us to take a long-term view of our performance, which is critical given the long-term nature of the assets in the water industry.

4 Our performance

Introduction

4.1 Wessex Water has an enduring record of being efficient, on both cost and quality. We don't always get everything right, but the focus of the business is on correcting where we fall below expected standards.

4.2 This chapter sets out a factual demonstration of our long-term performance and efficiency.

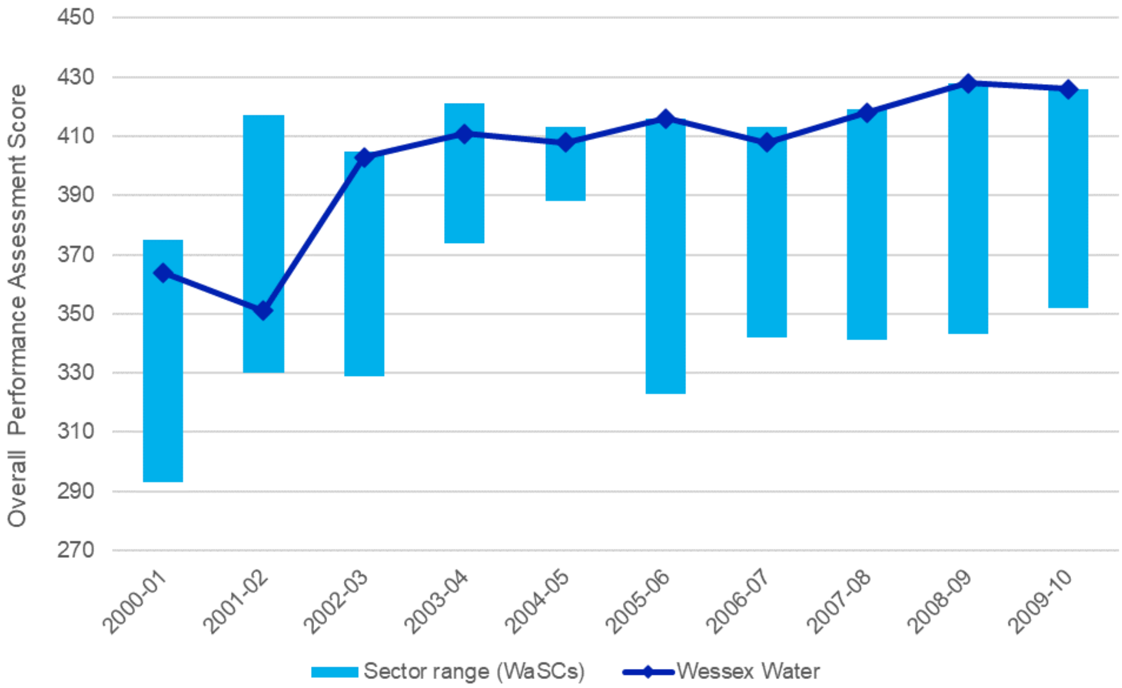
Long-term performance

4.3 During the first two price control periods following privatisation, water company operational performance was assessed via a series of nine "Director General" (DG) measures. These focused on individual aspects of performance, for example DG2 being low pressure and DG5 being flooding incidents.

4.4 From 2000, Ofwat introduced a combined measure of company operational performance known as the Overall Performance Assessment (OPA), covering measures across water supply, sewerage service, customer service and environmental performance. (Measures relating to sewerage services applied only to those companies that provide both water and sewerage services.) The OPA score was calculated each year and provided a comparative overview of company performance.

4.5 The OPA ran until 2010, and Wessex Water was an upper quartile performer in all years except one, as set out in Figure 4 below.

Figure 4 – Wessex Water comparative performance (OPA) 2000-2010



4.6 Wessex Water was not in the upper quartile for 2001-02. This was the last year before YTL took over the business. On acquisition, YTL made it clear that they expected Wessex Water to return to the top of the table, and to retain that position thereafter.

4.7 The OPA was discontinued in 2010, after which performance was monitored by regulators in four key areas:

(a) customer service, measured prior to 2020 by the Service Incentive Mechanism (SIM) and since 2020 by the Customer Measure of Experience (C-MeX), overseen by Ofwat;

(b) drinking water quality, measured prior to 2018 by Mean Zonal Compliance (MZC) and since 2018 by the Compliance Risk Index (CRI), overseen by the Drinking Water Inspectorate;

(c) environmental performance, measured by the Environmental Performance Assessment (EPA), overseen by the Environment Agency; and

(d) customer complaints, measured by complaint numbers per 10,000 customers, overseen by the Consumer Council for Water.

4.8 In each of these league tables, we have been an upper quartile performer in a majority of years since 2010, as set out in the charts below.

Figure 5 – Wessex Water customer service performance 2010-2024

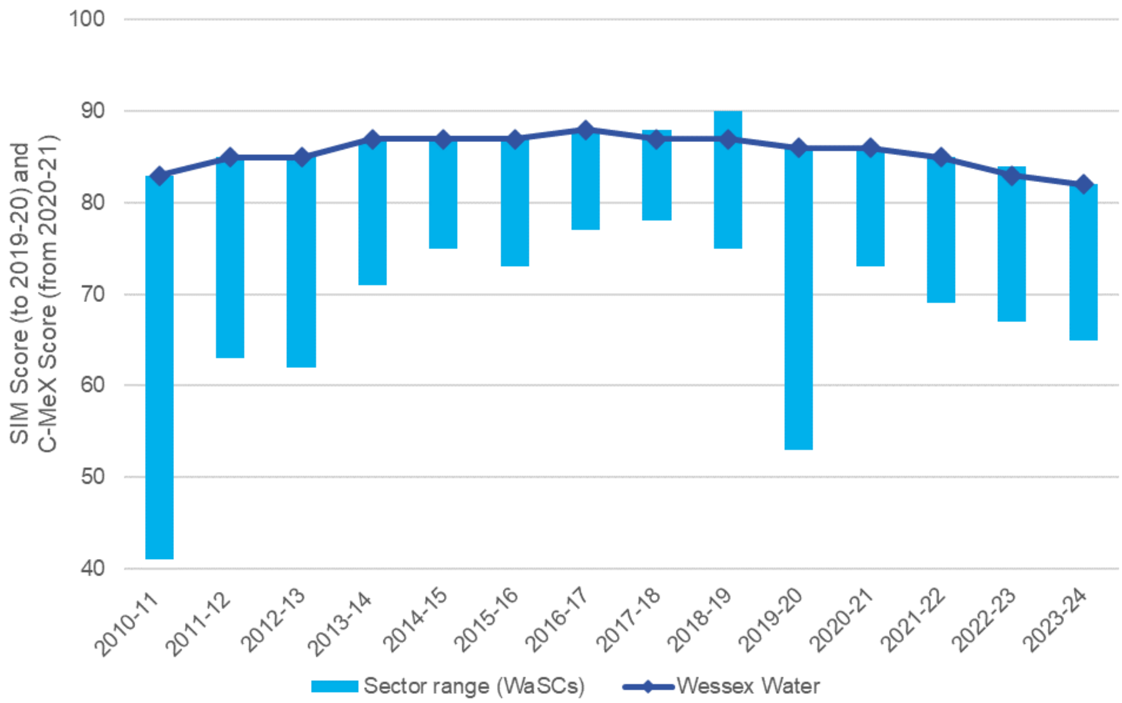


Figure 6 – Wessex Water drinking water quality 2010-2023

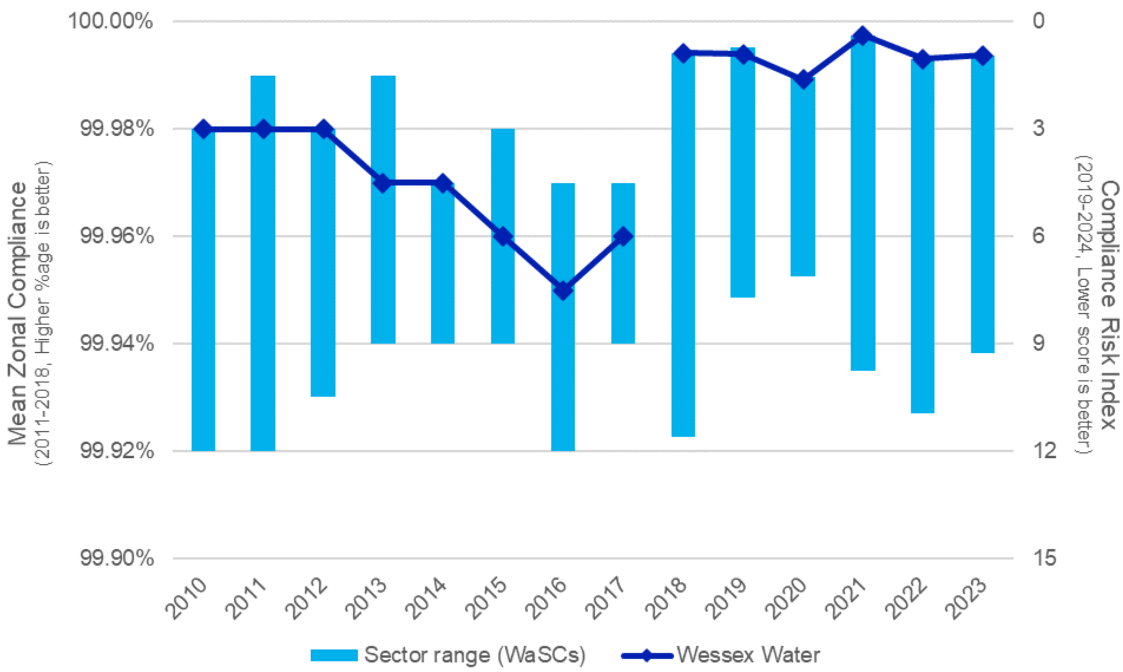
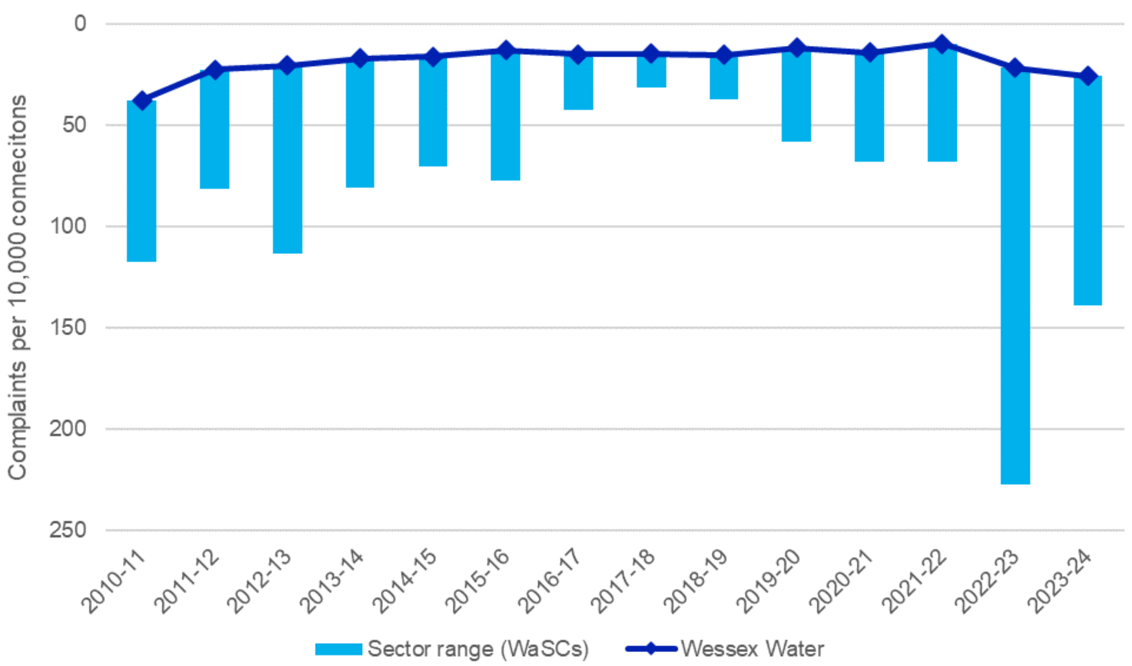


Figure 7 – Wessex Water environmental performance 2010-2023

Figure 8 – Wessex Water customer complaints 2010-2024



4.9 Wessex Water also performs well on wider cross-sectoral measures of performance. We held the Institute of Customer Service's ServiceMark with Distinction for six consecutive years to 2024. We now use TrustPilot where we are rated as "Excellent" with a score of 4.6 out of 5 from nearly 12,000 reviews.

4.10 Morningstar's Sustainalytics ranks Wessex Water in the top 10% of the 647 utilities it has rated globally. Sustainable Fitch rates Wessex Water as '2' on its 5-point scale (where '1' is best and '5' worst) noting our "*low gender pay gap and high levels of customer satisfaction, reflecting the company's commitment to fairness and quality in its services.*" [7] Over the past two decades, we have also received three Queen's Awards for Sustainable Development, acknowledging our long-term commitment to sustainability.

4.11 We are also recognised more generally by regulators and other stakeholders as a well performing company, as evidenced by the statements below.

4.12 David Black, Ofwat CEO, identified us as one of the better performing companies when giving oral evidence to the EFRA Committee in November 2024:

> *"Jenny Riddell-Carpenter: Which are the better companies?*
>
> *David Black: The better performers that we have seen in the current period are companies like Wessex Water, Severn Trent, United Utilities in some of its performance."*

4.13 Emma Clancy, former Chief Executive of the Consumer Council for Water praised Wessex Water's approach to resolving complaints in CCW's 2021 Complaints Report, stating:

> *"Wessex Water has developed an impressive culture of empowering its staff to secure good outcomes for its customers so that complaints can be resolved quickly and without needing to be escalated."*

4.14 Joanna Lewis, Chief Executive of the Wiltshire Wildlife Trust, in discussion of the Sustainable Solutions for Water and Nature (SSWAN) coalition referenced in chapter 3, commented that:

> *"Wessex Water – our water company here in Wiltshire – has been a consistent advocate for nature-based solutions and for removing the perverse regulatory barriers that still stand in their way."*

4.15 While we have performed well in many areas, we recognise that there are still areas for improvement. For example, we are subject to investigation by Ofwat and the Environment Agency (EA) for flow compliance[8] and have recently been prosecuted by the EA for pollutions at two sites in 2018[9]. Our rating under the EA's Environmental Performance Assessment, recorded in Figure 7 above, also indicates that we need to do better to meet our customers' expectations and regulatory standards.

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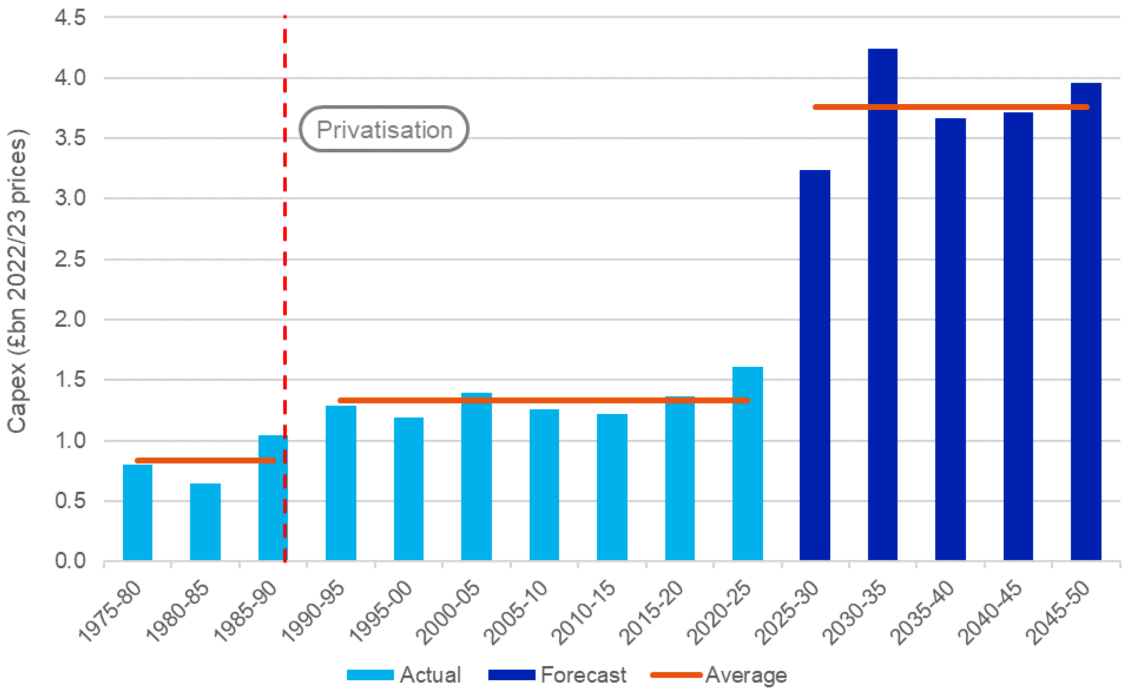
7 Sustainable Fitch (2024) *Wessex Water ESG rating press release.* Provided as SoC Appendix A237.
8 Ofwat (2024) *Investigation into sewage treatment works and sewerage networks*. Copy provided as SoC Appendix A259.
9 Environment Agency (2024) *Wessex Water fined £500,000 for sewage killing thousands of fish* Copy provided as SoC Appendix A258.

Investment and efficiency

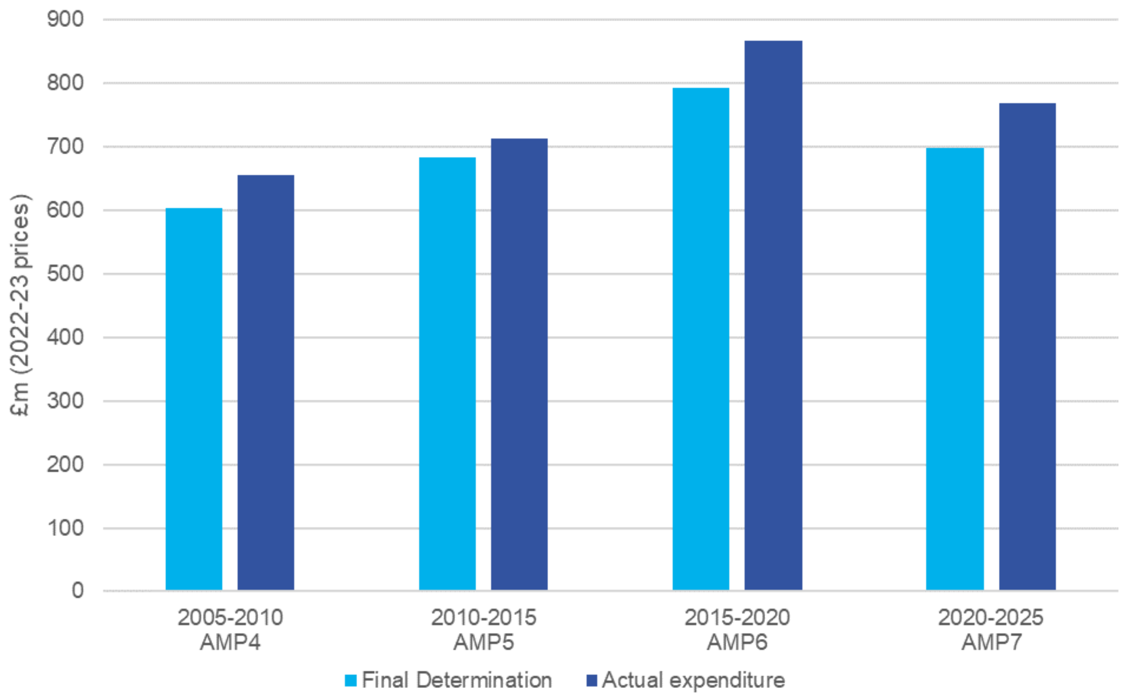
4.16 We have delivered this strong performance by investing in our business. Our capital investment has totalled more than £9 billion since 1990 to improve service and benefit the environment. Investment has been two-thirds higher than pre-privatisation levels. However, a much more significant step-change now applies from 2025, with a more than doubling of the post-privatisation level of investment. This higher level is expected to be sustained beyond 2030, as shown in Figure 9 below.

Figure 9 – Wessex Water actual and forecast investment 1975-2050



4.17 Ensuring the long-term serviceability of our assets is key to delivering a sustainable water and sewerage service. Under YTL's ownership our capital maintenance expenditure has always exceeded our allowances to mitigate the historical underfunding in this area, as shown in Figure 10.

Figure 10 – Wessex Water capital maintenance expenditure 2005-2025



4.18 Expenditure has also been efficiently targeted. Wessex Water has historically been efficient on cost models, as evidenced by Ofwat's assessments.

4.19 Figure 11 and Figure 12 below summarise Ofwat's assessments of our operating efficiency over the two decades 2000-2020. In the earlier years these assessments were made annually and have been summarised into the period 2000-2005. Thereafter, the assessments were made at successive price reviews. The values in the charts for 2005-10 relate to the 2009 Price Review, those for 2010-15 to the 2014 Price Review and those for 2015-20 to the 2019 Price Review. We discuss this further in chapter 8.

Figure 11 – Wessex Water comparative efficiency – water supply (operating and capital maintenance expenditure)

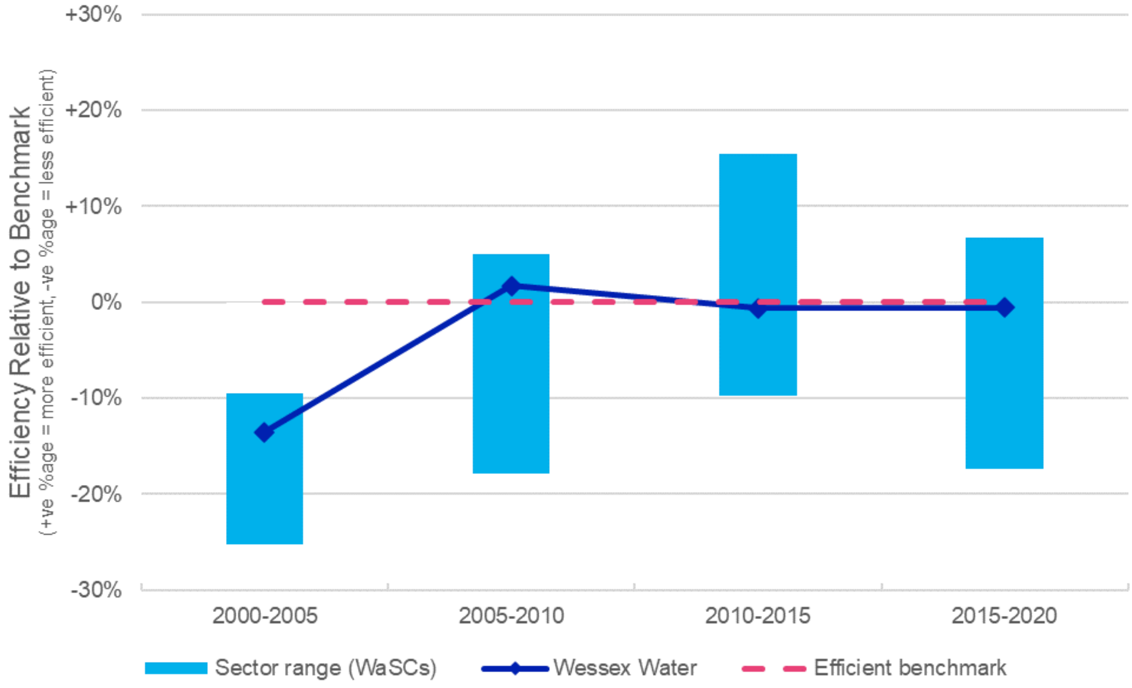
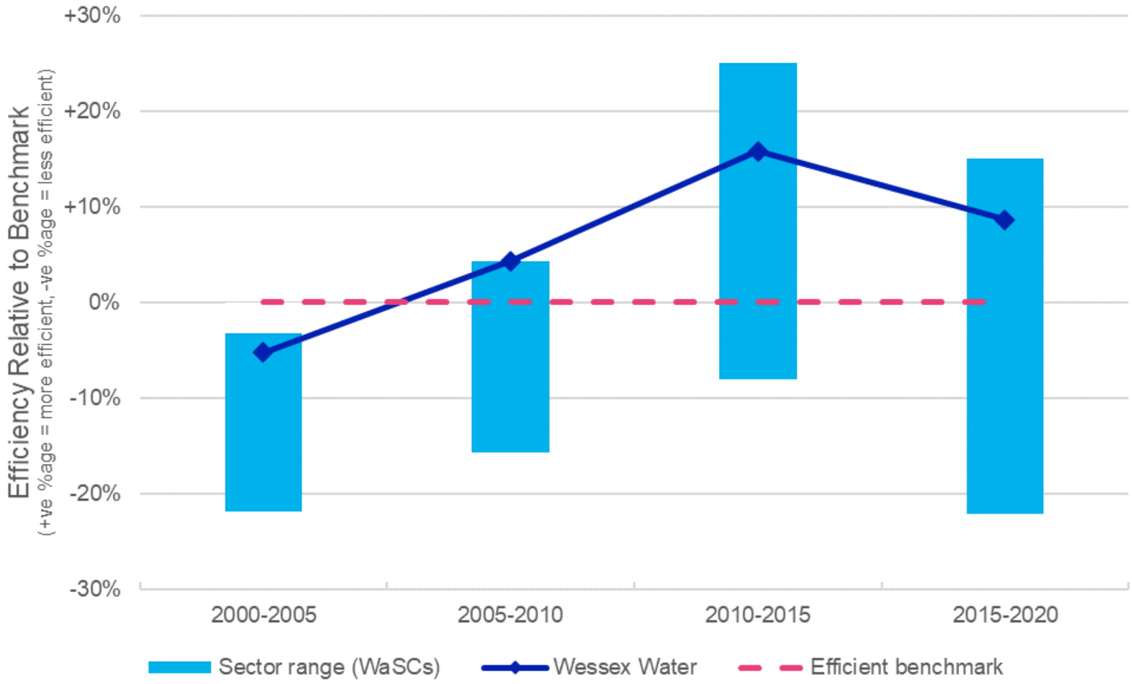


Figure 12 – Wessex Water comparative efficiency – wastewater (operating and capital maintenance expenditure)



4.20 In keeping with our operational performance, Wessex Water is found to be an upper quartile performer on efficiency in the majority of assessment periods.

4.21 In summary, Wessex Water has a long track-record of leading operational performance and efficient operation. However, we acknowledge the need for continued investment and improvement, particularly in areas such as environmental performance, to meet the evolving expectations of our customers and stakeholders.

5 Ofwat regulation and duties

Ofwat regulation

5.1 This chapter sets out the key principles and objectives of the regulatory regime. It outlines Ofwat's duties, how they are to be interpreted and applied, and where the Final Determination does not meet them. This is important, as the CMA is to decide the redetermination in accordance with the same statutory duties that apply to Ofwat.[10]

5.2 For further context on the water sector, and Ofwat's regulation, we refer the CMA to the following documents enclosed with our Statement of Case:

(a) a report by Frontier Economics for Water UK on the sector and its regulation[11]; and

(b) a guide by John Earwaker that provides an introduction to Economic Regulation[12].

Ofwat's duties

5.3 Ofwat has a number of general statutory duties under the Water Industry Act 1991 (WIA91). These are split into primary and secondary duties (together, the "**Duties**").

5.4 The primary duties are set out in section 2(2A) WIA91 and require Ofwat to exercise the powers and duties in a manner which it considers is best calculated:

> *(a) to further the consumer objective ("**Consumer duty**");*[13]
>
> *(b) to secure that the functions of a water undertaker and of a sewerage undertaker are properly carried out as respects every area of England and Wales ("**Functions duty**");*
>
> *(c) to secure that companies holding instruments of appointment as relevant undertakers are able (in particular, by securing reasonable returns on their capital) to finance the proper carrying out of those functions ("**Financing duty**");*
>
> *(d) to secure that the activities authorised by the licence of a water supply licensee or sewerage licensee and any statutory functions imposed on it in consequence of the licence are properly carried out ("**Licence duty**"); and*

10 Water Industry Act (1991), section 12(3)(b), provided as SoC Appendix A231.
11 Frontier Economics (2025) *Background material for CMA*, provided as SoC Appendix A238.
12 John Earwaker (2025) *Guide to Economic Regulation*, provided as SoC Appendix A2239.
13 The Consumer Objective requires Ofwat to exercise and perform its functions in a manner best calculated to: "*protect the interests of consumers, wherever appropriate by promoting effective competition between persons engaged in, or in commercial activities connected with, the provision of water and sewerage services.*" For these purposes, the WIA91 specifically defines consumers to include "*both existing and future consumers*". It is therefore clear that Ofwat must take into consideration the long-term interests of consumers and inter-generational equity.

*(e) to further the resilience objective ("**Resilience duty**").*[14]

5.5 There is no hierarchy of the primary duties. Consistent with this, the CMA has previously set out (in its PR14, and PR19 redeterminations) that the primary duties are equally important, intended to complement one another, and that they should not be applied in isolation.[15] Taken together, they are intended to create mechanisms that drive the water sector toward the same outcomes as those that would emerge under perfect competition – efficient operations, returns that reflect the capital risk faced by investors, fair prices, and high-quality service. The process Ofwat uses is set out in the Frontier Economics report on the sector and its regulation[16].

5.6 In line with this intended outcome, when setting price determinations, Ofwat seeks to define an "efficient company", this is a hypothetical company that would exist were the market competitive, efficiency refers to both costs (including an efficient capital structure), and quality of outcomes. This is to ensure that its regulatory framework is not compensating inefficient behaviour. Ofwat specifically refers to both the efficient and notional company in its PR24 documentation.[17] For simplicity throughout, we refer to the "efficient company".

5.7 The secondary duties are set out in section 2(3) WIA91 and, in effect, require Ofwat to exercise the primary duties in a manner which it considers is best calculated to:

(a) promote economy and efficiency on the part of companies holding instruments of appointment ("**Efficiency duty**");

(b) secure that no undue preference (including for the relevant body itself) or undue discrimination is shown in the fixing of water or drainage charges;

(c) secure that no undue preference (including for itself) is shown and that there is no undue discrimination in the doing by a water company of things which relate to the provision of services by itself or another company or things as relate to the provision of services by a water supply or sewerage licensee;

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14 The resilience objective is defined in WIA, section 2DA as securing both (i) "*the long-term resilience of water undertakers' supply systems and sewerage undertakers' sewerage systems as regards environmental pressures, population growth and changes in consumer behaviour*" and (ii) *"that undertakers take steps for the purpose of enabling them to meet, in the long term, the need for the supply of water and the provision of sewerage services to consumers*", in each case including by promoting "*(a) appropriate long-term planning and investment by relevant undertakers, and (b) the taking by them of a range of measures to manage water resources in sustainable ways, and to increase efficiency in the use of water and reduce demand for water so as to reduce pressure on water resources*".

15 CMA (March 2021) *Anglian Water, Bristol Water and Yorkshire Water price determinations final report.* Paragraph 2.84. Provided as SoC Appendix A215.

16 Frontier Economics (2025) *Background material for CMA*, provided as SoC Appendix A238.

17 Indeed, across the various documents submitted by the companies and the regulator the CMA may see references to the concepts of: the hypothetical efficient firm; the efficient firm; the notional firm; the notionally efficient firm to explain how Ofwat interprets its duties with respect to a (hypothetically) efficient firm.

(d) secure that consumers are protected as regards benefits that could be secured for them from the proceeds of any disposal of a company's protected land;

(e) ensure that consumers are protected as regards any activities of a company which are not attributable to the exercise of its functions under the WIA91, in particular by ensuring that any transactions are carried out at arms-length and that in the exercise of their functions companies maintain and present themselves in a suitable form and manner; and

(f) contribute to the achievement of sustainable development ("**Sustainability duty**").

5.8 Since May 2024, Ofwat also has a duty to have regard to the desirability of promoting economic growth when carrying out its work.[18]

5.9 In exercising its powers and performing its duties, Ofwat is required to have regard to the principles of best regulatory practice, including the principles under which regulatory activities should be transparent, accountable, proportionate, consistent and targeted only at cases in which action is needed (as set out in section 2(4) WIA91).

5.10 Ofwat must also carry out its functions in accordance with the Strategic Policy Statement (SPS) published by Defra, which sets out the government's priorities for Ofwat's regulation of the water industry in England. The current SPS[19] is comprehensive but not prescriptive, containing more than 50 specific expectations for Ofwat, covering areas such as environmental protection, customer service, resilience, and long-term investment planning.

5.11 However, of particular note in the present context is the government's expectation that (consistent with Ofwat's resilience objective) the industry should, "*plan, invest and operate to meet the needs of current and future customers. The industry should do so in a way which delivers value to customers, the environment and wider society* ***over the long-term****. This will require water companies to shift towards long-term adaptive planning*" (emphasis added).[20] This is important because, in its redetermination, the CMA must therefore reflect both the Duties and the SPS in balancing short-term consumer interests with long-term resilience imperatives.[21]

Ofwat has not met its duties

5.12 There are a number of areas where Ofwat's Final Determination does not represent the right outcome for customers in both the short and long term. For Wessex Water these areas can be broadly defined as follows: (i) costs Ofwat has agreed are not funded and

[18] Ofwat (2025) Our duties, provided as SoC Appendix A206. This duty is set out in section 108 of the Deregulation Act 2015, which is provided as SoC Appendix A216.
[19] DEFRA (2022) The government's strategic priorities for Ofwat. Provided as SoC Appendix A217.
[20] DEFRA (2022) The government's strategic priorities for Ofwat. Provided as SoC Appendix A217.
[21] Consistent with its approach in PR19. See for example CMA (March 2021) *Anglian Water, Bristol Water and Yorkshire Water price determinations final report*, paragraph 3, provided as SoC Appendix A215.

that there is a case for adjusting allowances; and (ii) costs not funded as a result of error in the measurement of efficiency.

5.13 Together, these result in Wessex Water being underfunded to meet its statutory obligations, and an overall package where the expected outcome for an efficient company is not consistent with it being able to finance its functions on a reasonable basis.

5.14 This is because, first the package systematically underestimates the appropriate allowed return; and, second, as we set out below, the amount of costs funded results in considerable expected overspend for the efficient company, such that it cannot expect to earn it. The allowed return is too low, and the expected return is lower still. As a result, we do not consider the Final Determination meets Ofwat's Duties.

5.15 It is on this basis we are seeking a redetermination. In the following subsections, we provide further detail.

5.16

5.17

Costs not funded as a result of error in the measurement of efficiency

5.18 There are a number of areas where Ofwat's view of efficiency is beyond what is actually achievable for the actual, or efficient company. This is because, as we set out below it is challenging to estimate the costs (i.e. expenditure allowances, and the cost of capital) relevant to an efficient company, and in the context of this uncertainty Ofwat has repeatedly selected values in the lower end of plausible distributions.

Scope for measurement error, imprecision and uncertainty

5.19 As set out in John Earwaker's *Guide to Economic Regulation*[22], the efficient company cannot be observed and is instead a function of modelling that relies on a range of assumptions. Such modelling is subject to a considerable degree of uncertainty and there is substantial potential for measurement error within it.

5.20 The risk of measurement error varies by each price control component, as some uncertainties can be readily identified and quantified, whilst others are more conceptually challenging. Given the complexity of modelling water companies, it is therefore not surprising that some models are poor predictors of cost and include considerable measurement error (as set out in detail in chapters 8 to 10 below).

5.21 Given these limitations, it is critical to mitigate measurement error and related uncertainty by considering all the relevant indicators of what the true efficient level may be.

22 John Earwaker (2025) *Guide to Economic Regulation*, provided as SoC Appendix A239.

5.22 The impact of any measurement error will be amplified by how different assumptions interact. When Ofwat makes individual assumptions about the efficient company (such as its target credit rating, debt-to-equity ratio, cost of debt, efficiency requirements, and allowed returns), these might not create a coherent picture when combined. Even small errors in these individual components can lead to incorrect conclusions about whether the efficient company can actually finance its operations. For example, all else equal, a reduction in notional gearing (i.e. assuming the efficient company has more equity) 'boosts' the financial ratios used to assess whether the efficient company is able to finance its debt on a reasonable basis. In other words, setting gearing below the true efficient level may inadvertently lead to a conclusion that the efficient company is able to finance its functions on a reasonable basis, when it is not.

5.23 These issues mean that without properly accounting for measurement error, we risk drawing incorrect or unreasonable conclusions about what constitutes an efficient company and whether it is able to finance its functions on a reasonable basis. In the context of the Duties, such an approach calls into question not only consistency with the Duties (most directly, the Financing duty and the Resilience duty) but also whether regulatory best practice had been appropriately applied.

Consequences of measurement error, imprecision and uncertainty on meeting the Duties

5.24 In the context of the difficulties in estimating the efficient company, and therefore the scope for measurement error, we consider there are a number of necessary but not sufficient conditions to determining whether the Duties have been met, which we set out below.

(a) Customers are protected from paying for inefficiency, inferior service or investment that has already been funded, and instead are contributing to the efficient delivery of their (collective) current and future needs.

(b) The company is appropriately funded to meet statutory obligations, including those relating to long-term resilience.

(c) The expected return for debt and equity investors is commensurate with the risk associated with their investment, which in turn depends on both the allowed cost of capital, and overall risk and return balance in the determination.

(d) An investment grade credit rating is secured, such that the company can raise debt finance on reasonable terms.

5.25 These necessary but not sufficient conditions are not delivered by the Final Determination. Ofwat has repeatedly selected point estimates for the efficient company towards the ‘more challenging’ ends of plausible distributions (i.e. low ends of possible ranges for efficient costs, high ends of possible ranges for deliverability and service performance). This gives rise not only to errors as regards the calculation of relevant price control components but also to an overall package where the expected outcome for an efficient company is not consistent with it being able to finance its functions on a reasonable basis.

5.26 In particular, Ofwat has set its Final Determination for Wessex Water at a level that does not allow Wessex Water to earn a reasonable rate of return to finance its assets and investments in a manner consistent with long-term resilience. Ofwat's approach and methodology – as set out in more detail below – negatively impacts both our ability to invest sustainably in a manner that would allow us to properly carry out our functions and, over the long run, consumer welfare, in breach of the Duties.

5.27 Chapters 8 to 10 consider the Final Determination's measurement errors resulting in the underfunding of the efficient company in respect of each of our main areas of focus: wholesale water base costs, phosphorous removal, and allowed returns.

5.28 In each case, we explain the criticality of the issue and the importance of coming to the right answer, including the obligations we are under to deliver in that area. We then consider the scope for measurement error and uncertainty, before setting out Ofwat's approach and the limitations we observe. Alternative perspectives to estimating efficiency are described, as well as any changes we have made since our response to the Draft Determination to account for new information. Each chapter ends with requests to the CMA that would remedy the issue and enable a new determination to meet the Duties.

6 New disinfection at water treatment centres

6.1 Obligations specific to Wessex Water relating to new disinfection at water treatment centres have not been accounted for in the setting of base cost allowances.

6.2

6.3

6.4

Overview

6.5 As we noted in our business plan, “*Our proposed maintenance expenditure for AMP8 is more than AMP7 and is based on a combination of an increase in our BAU maintenance as well as our disinfection improvement programme*”.[23]

6.6 The disinfection improvement programme includes upgrades across a significant number of sites to meet new DWI expectations. Specifically, Wessex Water has a number of treatment sites where a change in the agreed risk appetite, as assessed by both us and the DWI, requires an increase in disinfection. In general, larger sites already have disinfection in place. Therefore, these costs relate to our small, rural, groundwater treatment sites.

6.7 We welcome the acknowledgment by Ofwat in its Final Determination, via the acceptance of cost adjustment claims, of the issues with economies of scale at water treatment centres (WTCs) not being reflected in modelled costs. However, we also note that, of the companies where an adjustment has been made through a cost adjustment claim, we have significantly more water treated at simple sites (complexity less than band 3) – i.e. small sites that require disinfection improvements – and that the associated cost is not funded in the base cost models. For more information see *Annex A7 – Further information on disinfection at water treatment centres.*

Proposed expenditure

6.8 We work together with the DWI to safeguard public health and to ensure the water we supply is always wholesome. Our previous disinfection policy was based on a raw water categorisation system using a range of biological and chemical parameters, which

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[23] See *WSX10 - Maintaining our services commentary and analysis* from our original business plan submission, provided as SoC Appendix A018.

determined the disinfection requirement (Chlorination and/or UV). This system has served us well for many years and allowed for simple marginal chlorination[24] for pristine groundwater sites.

6.9 However, following changes in WHO guidance and ongoing engagement with the DWI, we must now change our disinfection policy, raw water categorisation and disinfection requirements.

6.10 Specifically, we have been directed to adopt the approach recommended by the WHO, which categorises raw water solely on the concentration of *E. coli* risk, which in turn then informs the disinfection treatment required. As a result, our source waters will be allocated into two categories (A and B) and the resultant disinfection requirement will be met using the most appropriate choice of chlorine and/or UV disinfection. Marginal chlorination is not supported by the updated WHO guidance. Instead, the guidance requires a specified amount of time for the chlorine to be in contact with the water (Effective Contact Time or ECT) to ensure that viruses are properly reduced.

6.11 The DWI has been supportive of the move away from marginal chlorination and we have actively engaged with the DWI about our plans over the last two years. We presented our plans to the DWI in June 2023 and set out our intention to upgrade eight sites in AMP8. There were subsequent meetings in April 2024 in which we went through our plans in more detail, and we have provided regular updates at our liaison meetings.

6.12 We have been encouraged by the supportive conversations we have had with the DWI on our plans for improving disinfection. The DWI has rightly challenged us to work at pace to deliver these improvements and we are committed to this too. Furthermore, in the quarter three report for 2023 by the Chief Inspector of Drinking Water (published March 2024) [25], it states:

> *"The Inspectorate made a recommendation to Wessex Water that it completes its investigations and improvements, and makes the necessary improvements to the control and verification of disinfection so that it meets the company's new improved defined contact time policy."*

6.13 The enclosed letter from our Compliance Director[26] reiterates the engagement we have had with the DWI, as set out above. The letter has been shared with the DWI. The DWI has confirmed it is comfortable with the letter and for us to include it with our Statement of Case.

6.14 This is a significant change from our current approach as we currently undertake marginal chlorination at 34 of our sites, which would not achieve the required minimum ECT or equivalent. A substantial expenditure programme based on risk over a number

[24] Marginal chlorination is a disinfection process where only the amount of chlorine needed to achieve the desired chlorine residual is added to the water. This method is typically used for source water with a low organic load, such as water from an aquifer or other groundwater sources.

[25] DWI (2024) *Drinking Water Quality Report - Quarter 3 - by the Chief Inspector of Drinking Water*, provided as SoC Appendix A260.

[26] Wessex Water (2025) *Letter to CMA re DWI disinfection support*, provided as SoC Appendix A257.

of regulatory cycles will be needed to achieve full compliance with the proposed disinfection policy.

6.15 The proposed totex expenditure (post frontier shift and RPEs) during AMP8 is £47m. Annex A7 sets out the eight sites this expenditure relates to and provides an overview of the works proposed at each.

How costs were developed

6.16 We reviewed all our sites that will not be compliant with our new disinfection policy and looked to prioritise those sites to be upgraded first considering the public health risks. These eight sites were identified for implementation in the next five-year period, recognising we may see raw water deterioration at other sites which would mean we must reprioritise and defer one of these sites to enable another to be brought forward.

6.17 The eight sites were assessed by our engineering team. They developed a conceptual design for each to make the necessary improvements based on our agreed approach of installing UV for primary disinfection. This includes associated monitoring, run-to-waste improvements, and modification of existing chlorination facilities to provide a chlorine residual for the onwards treated water distribution network.

6.18 These designs were then processed through our PR24 cost estimating team to provide the cost estimates using industry standard approaches. Costs have been developed through a bottom-up approach based on previous similar work and we believe our estimates fairly reflect the true cost of the schemes.

6.19 Annex A7 also includes a detailed cost breakdown for a number of our sites.

Omission from Ofwat's modelled costs

6.20 Under the current specifications and forecast variables, Ofwat's econometric cost models do not (and cannot be expected to) accurately reflect these efficient costs for several reasons, as set out below.

(a) First, the forecasts of water treatment complexity used in setting the base cost allowances are based on the average of the last two years and so do not account for the expected change in treatment complexity. This methodological choice is intended to avoid double-counting of new activities, such as this one of new disinfection.

(b) Then, were the forecasts to be updated, it would not be sufficient to fund the necessary expenditure. This reflects the fact that the models cannot account for the new costs that a company will incur if it moves sites between complexity bands. Rather, the models more closely reflect the ongoing cost increase associated with these sites once they are in the new complexity band. Updating the forecast of explanatory variables to align with the impact of these improvements only increases modelled costs by c.£5m, which is far less than the capital costs of making the upgrades.

(c) Lastly, at each site we incur substantial design, on-costs and monitoring that does not scale with site size. That is, these improvements are all at small sites where our capital investment is subject to diseconomies of scale. This conceptual argument has been recognised, in general terms, through the allowance of the cost adjustment claim for diseconomies of scale at water treatment works. However, we do not believe that this cost adjustment claim adequately captures the underlying additional costs at small sites.

Requests to the CMA

6.21 We request that the CMA allows the expenditure of £47m required for us to deliver the disinfection improvements at our rural water treatment works, in line with new requirements from the DWI and WHO.

7 New bioresources health and safety requirements

✄

8 Wholesale water base costs

Introduction

8.1 Since the PR19 determinations and redeterminations, there has been a significant increase in the debate as to whether the sector's capital maintenance expenditure and resilience are at optimal levels. In our view, the regulatory model does not provide adequate allowances for companies to invest in the long-term resilience of their assets.

8.2 In this context, and as set out in chapter 5, a necessary but not sufficient condition for the regulator to meet its Duties is to ensure that the efficient company has sufficient allowances to deliver its ongoing core services (i.e. base activities) in a manner that ensures long-term resilience of these assets.

8.3 Ofwat's Final Determination does not achieve this. Whilst we consider there are issues with Ofwat's approach to setting base costs more broadly, in our Statement of Case we focus only on wholesale water base costs.[27] This is because the difference between us and Ofwat has the most material and immediate impact in relation to these costs.[28]

8.4 Wessex Water is a champion of the need for reform in relation to how the sector is regulated. This includes how base costs are set and we will continue to engage with Ofwat, Defra and others on this ahead of PR29.[29]

8.5 Below we provide a summary of our concerns with the overall regulatory framework in relation to setting efficient base costs, and the impact of its application. For further information we refer the CMA to our Business Plan[30] and Draft Determination Response.[31] To support our Statement of Case, we also commissioned an independent report from Economic Insight which provides further context to these and other issues in more detail.[32] In summary:

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27 Furthermore, as set out in chapter 7, we have provided further information regarding new requirements for New bioresources health and safety requirements.

28 For example, in Ofwat's Final Determination the cost gap to our Draft Determination Response is -0.8% in relation to wastewater network base costs (before frontier shift and RPEs), and -22.1% in relation to wholesale water base costs.

29 For example, we will continue to engage positively with Ofwat on its Roadmap to enhancing asset health (2024)

30 The key documents that set out our maintenance strategy in our original October 2023 submission are:
WSX10 - Maintaining our services commentary and analysis (see SoC Appendix A018)
WSX11 - Annexes - Maintaining our services (see SoC Appendix A019)
WSX12 - Water resources strategy and investment (see SoC Appendix A020)
WSX14 - Water networks plus strategy and investment (see SoC Appendix A021)
WSX15 - Annexes - Water networks plus strategy and investment (see SoC Appendix A022)
WSX47 - Outcomes tables commentary (see SoC Appendix A052)
WSX09 - Annexes - Base cost adjustment claims (see SoC Appendix A017)

31 *WSX-C01 - Step up in capital maintenance and base costs*, provided as SoC Appendix A098.

32 Economic Insight (2025) *A balanced approach to ensuring long-term asset resilience*, provided as SoC Appendix A222.

(a) The regulatory approach does not sufficiently focus on identifying the optimal level of capital maintenance activity that companies should undertake, or ensure that companies are undertaking this optimal level. This is because Ofwat (through its econometric modelling) identifies lower spend as "the right outcome" (i.e. efficient), and as something that should be replicated by other companies.

(b) As such, companies are not incentivised to deliver the optimal level of long term capital maintenance activity. Indeed, the regulatory package pushes companies to do the opposite, as it is set up to reward underspend against a given allowance, which may be achieved through capital maintenance deferral, and so requires responsible companies to act in a way that runs contrary to regulatory incentives.[33]

(c) Further, various business plan assessment mechanisms incentivise companies not to ask for additional allowances. For example, at PR24 a company's score on Ofwat's QAA[34] depended in part on the level of base costs requested, and whether Ofwat considered this was efficient.[35]

(d) Within this framework, base cost allowances are set focusing primarily on historical outturn spend and will therefore bake-in the underspend resulting from such incentives (even where that spend represents overspend against the settlement). The greater the number of price controls in which such an approach is adopted, the further the allowances are likely to be from the optimal level.

8.6 Within the regulatory framework, we also have concerns with Ofwat's approach to econometric benchmarking. There are several problems with its approach which we set out in paragraphs 8.30 to 8.36 below. More specifically, through using these models and as a result of inherent imprecisions and measurement error, Ofwat's Final Determination has defined, and set allowances on the basis of, an artificially low efficiency frontier.

8.7 At PR24, Ofwat introduced a number of mechanisms which appear to be aimed at addressing some of the above issues. For example, it introduced industry-wide cost adjustment claims and PCDs. However, these do not solve the problem and, in fact, risk making it worse as we set out in paragraphs 8.30 to 8.36 below.

8.8 In this context at PR24, we therefore advocated for change in the way that base cost allowances are set. This is reinforced by the remedies proposed by Economic Insight in its asset resilience report[36], which suggest Ofwat sets base cost allowances in a way that:

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[33] As set out in chapter 4, Wessex Water has always spent in full, or exceeded, its capital maintenance allowance.

[34] At PR24, Ofwat conducted a quality and ambition assessment (QAA) on companies' business plans and applied strong rewards and penalties based on this assessment.

[35] Ofwat (2024) PR24-draft-determinations-Quality-and-ambition-assessment-summary.pdf, provided as SoC Appendix A207.

[36] Economic Insight (2025) *A balanced approach to ensuring long-term asset resilience*, provided as SoC Appendix A222.

(a) identifies, funds and promotes an optimal level of base expenditure, including capital maintenance;

(b) preserves companies' flexibility to determine how best to deliver this expenditure consistent with its totex and outcomes regime;

(c) accounts for (and, where necessary, compensates for) historical underfunding; and

(d) draws on a wider set of evidence (beyond econometric benchmarking of historical data), as it is necessary to achieve the above. For example, further consideration of asset lives, or asset deterioration modelling.

8.9 Reflecting our concerns and the suggested approach advocated to Ofwat, we developed and submitted as part of our business plan considerable bottom-up engineering evidence on our base costs.[37] This was intended to ensure, in the context of our concerns regarding systematic underfunding, that the asset management and engineering expertise of the company was appropriately reflected in the cost allowances. For further information on the results of this analysis, and our proposed investment we refer the CMA to Table 4 (later in this chapter) and Annex A9.

8.10 In its Draft Determination, Ofwat rejected our base cost request; and set a condition in its QAA for us to move out of the inadequate category as follows: "*revisit the scale and efficiency of its cost requests or provide significantly improved evidence to demonstrate why the cost requests are needed, efficient and reasonable*."[38]

8.11 Given our view that these costs represented the appropriate approach to long-term resilience and asset health, our response was aimed at improving our evidence. The Draft Determination did not provide us with sufficient feedback to do this, and so we sought guidance from Ofwat on how to improve our evidence in our company call;[39] and through the query process.[40] Despite active engagement, for example Ofwat suggested we submit a cost adjustment claim,[41] we received no further clarity on Ofwat's concerns with our evidence.

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37 The key documents that set out our maintenance strategy in our original October 2023 submission are:
WSX10 - Maintaining our services commentary and analysis (see SoC Appendix A018*)*
WSX11 - Annexes - Maintaining our services (see SoC Appendix A019)
WSX12 - Water resources strategy and investment (see SoC Appendix A020)
WSX14 - Water networks plus strategy and investment (see SoC Appendix A021)
WSX15 - Annexes - Water networks plus strategy and investment (see SoC Appendix A022)
WSX47 - Outcomes tables commentary (see SoC Appendix A052)
WSX09 - Annexes - Base cost adjustment claims (see SoC Appendix A017)

38 Page 2 of PR24-draft-determinations-Quality-and-ambition-assessment-summary.pdf, provided as SoC Appendix A207.

39 Meeting between Wessex Water and Ofwat, Monday 22 July 2024.

40 See Ofwat query *OFW-IBQ-WSX-027* in full, provided as SoC Appendix A203.

41 See Ofwat query *OFW-IBQ-WSX-027*, page 2, provided as SoC Appendix A203.

8.12 We were committed to meeting Ofwat's QAA conditions and, given the uncertainty regarding Ofwat's concerns with our evidence, in our response to the Draft Determination we therefore:

(a) provided further evidence and information in *WSX-C01 - Step up in capital maintenance and base costs* [42] (i.e. to demonstrate why the costs requested were needed, efficient and reasonable);

(b) reduced our requested wholesale water base costs by deferring some expenditure into AMP9 (i.e. to reduce the scale of the costs); and

(c) submitted a cost adjustment claim for the difference between our view of efficient costs and Ofwat's.

8.13 However, in the Final Determination our costs were once again rejected. Ofwat's review of our bottom-up evidence was limited to one paragraph.[43] This listed some concerns with our evidence, all of which we would have been happy to engage with via the query process. However, we consider Ofwat provides insufficient justification to conclude that our evidence should be zero weighted in its assessment. We address Ofwat's concerns with our evidence in Annex A10.

8.14 We ask the CMA to engage with our bottom-up estimates and allow these. This could be allowed with appropriate customer protections (e.g. sharing rates) determined by the CMA.

Criticality of the issue

8.15 Recognising the importance of ensuring the long-term serviceability of our assets, under YTL's ownership our capital maintenance expenditure has always exceeded our allowances (as we set out in chapter 4).

8.16 However, in our view the water sector is suffering from historical underinvestment. This is due in part to the regulatory model not providing adequate allowances for companies to invest in the long-term resilience of their assets; and the gap between allowed and optimal levels has widened significantly over successive price controls.[44]

8.17 We have previously raised concerns with Ofwat's approach to determining base cost allowances; and highlighted that there is increasing evidence that there has been

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[42] See *WSX-C01 - Step up in capital maintenance and base costs,* provided as SoC Appendix A098.

[43] "*The company presented a bottom-up cost estimate of base expenditure requirements in its PR24 business plan. But the company has provided limited detail on how the costs were developed and if they are efficient. The company mentions that it has worked closely with an external consultant to benchmark its cost models. But it is not clear how or if external benchmarking has been used to provide assurance that its proposed costs are efficient, or if this consultant has provided third party assurance of the company's proposed costs*." See Column D, Tab: WSX_CAC1 of Ofwat (2024) PR24-FD-CA19-Base-cost-adjustment-claim-feeder-model-–-Wessex-Water.xlsx

[44] For example, see in full our Draft Determination Response document *WSX-C01 - Step up in capital maintenance and base costs,* which is provided as SoC Appendix A098.

underinvestment in the sector as a whole.[45] For further information we refer the CMA to our business plan and Draft Determination Response[46] and Economic Insight's (March 2025) Report: A balanced approach to ensuring long-term asset resilience.

(a) In its report on the water sector, the House of Lords highlighted that investment had not kept pace with the demand to meet pressures on the sewer network, or ensuring future supply. The report highlights that pressures on the sewage network have increased substantially over time due to population growth, property development, and climate change, and that levels of investment have not risen to match these demands.[47]

(b) The National Infrastructure Commission (NIC) has indicated that significant additional investment is required to ensure that assets are resilient and can deliver for customers and the environment in the long-term. For example, the NIC's Second National Infrastructure Assessment mentions the need for increased investment to improve resilience and support long-term infrastructure needs.[48]

(c) In 2024, the Government launched a commission into the sector which has a number of objectives including to "Ensure the water industry regulatory framework delivers long-term stability and enables the privatised water industry to attract investment, maintain resilient finances and contribute to economic growth."[49]

(d) Ofwat's PR24 Final Determination included a "Roadmap for enhancing Asset Health" which includes its plans to improve asset health ahead of PR29.[50]

(e) The Water Industry Commission for Scotland (WICS) took the view in its SRC21 Final Determination that Scottish Water, which is a water company operating in a similar environment to companies in England and Wales, had been underinvesting in the replacement of its assets in the past. To address this, it increased spending by 80%-123% compared to historical levels.[51]

8.18 In contrast to the above, we appreciate that in the PR19 redeterminations, the CMA did consider that its models (which were largely based on Ofwat's own) provided adequate

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45 For example, see in full our Draft Determination Response document *WSX-C01 - Step up in capital maintenance and base costs,* which is provided as SoC Appendix A098.

46 As referenced in the preceding section.

47 House of Lords – Industry and Regulators Committee (2023) The affluent and the effluent: cleaning up failures in water and sewage regulation, provided as SoC Appendix A218.

48 National Infrastructure Commission (2023) Second National Infrastructure Assessment, provided as SoC Appendix A219.

49 DEFRA (2024) Independent commission on the water sector regulatory system: terms of reference, provided as SoC Appendix A220.

50 Ofwat (2024) PR24-final-determinations-Roadmap-for-enhancing-asset-health-understanding-in-the-water-sector.pdf

51 WICS (2020) Final Determination - Strategic review of charges 2021-27, provided as SoC Appendix A221.

funding for capital maintenance costs[52], and would not lead to systematic underfunding in the long run.[53]

8.19 However, we also note that the CMA acknowledged some scope for risks in setting base costs allowances. For example, it acknowledged that there is a risk that cost benchmark modelling underestimates the correct level of costs; [54] and that Ofwat's approach is backward looking and potential issues with capital maintenance may be forward looking.[55]

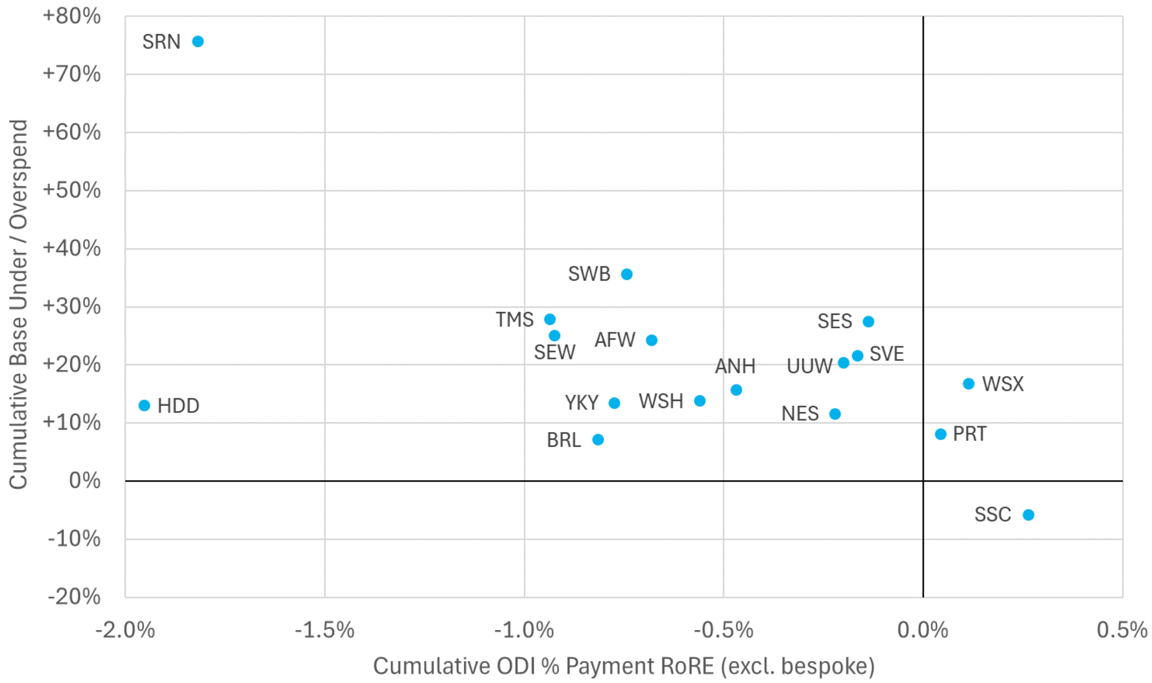
8.20 The CMA also suggested that Ofwat consider developing indicators to track this issue in order to enhance its analysis with forward-looking elements, and to triangulate results from its econometric modelling of historic costs.[56] In our view, Ofwat's approach at PR24 (e.g. to introduce industry wide cost adjustment claims (CACs)), does not address the CMA's concerns fully, and indeed risks exacerbating our concerns (as we set out in the following section).

8.21 Whilst we understand the CMA's previous position, as part of this redetermination we consider it is important that the CMA looks again at its previous conclusions in light of the further information and commentary that was not available at the time (as referenced above in paragraph 8.17).

8.22 To this end, in Figure 13 below we provide a summary of company outturn spend against PR19 Final Determination base allowances; and overall performance on the ODI framework. As shown, all companies but one have overspent base allowances in the current AMP, and many significantly so. For further information on industry performance in this AMP we refer the CMA to Ofwat's latest annual performance report for the sector.[57]

52 See 4.282 in CMA (March 2021) *Anglian Water, Bristol Water and Yorkshire Water price determinations final report.* Provided as SoC Appendix A215.
53 See 4.282 in CMA (March 2021) *Anglian Water, Bristol Water and Yorkshire Water price determinations final report.* Provided as SoC Appendix A215.
54 See 10.74(b) in CMA (March 2021) *Anglian Water, Bristol Water and Yorkshire Water price determinations final report.* Provided as SoC Appendix A215.
55 See 4.293 in CMA (March 2021) *Anglian Water, Bristol Water and Yorkshire Water price determinations final report.* Provided as SoC Appendix A215.
56 See 4.293 in CMA (March 2021) *Anglian Water, Bristol Water and Yorkshire Water price determinations final report.* Provided as SoC Appendix A215.
57 Ofwat (2024) *Water Company Performance Report 2023-24*, provided as SoC Appendix A208.

Figure 13 – Cumulative Base cost spend and ODI performance (RoRE) 2020/21 to 2023/24



Scope for measurement error, imprecision and uncertainty

8.23 There is significant uncertainty, and therefore scope for imprecision and measurement error, in identifying both the appropriate level of base operating costs, capital maintenance and asset replacement activity, and therefore also the efficient level of base costs to fund them. This is because the long lifespan of water assets, as well as the variation in the profile of the type and age of assets between different companies, leads to inherent variation around the level of maintenance each company's assets require over time.

8.24 Furthermore, the long life of assets in the water sector means there can be significant lags between capital maintenance expenditure and changes in asset performance and subsequent service levels. This is especially true after periods of significant enhancement expenditure where many new assets are introduced that do not immediately require substantial capital maintenance.

8.25 This uncertainty is further compounded by our concerns regarding underfunding highlighted in the preceding sections and in and Economic Insight's (March 2025) Report: A balanced approach to ensuring long-term asset resilience.

8.26 To meet the Duties, in any determination it is essential to ensure that the efficient company has sufficient allowances to deliver its ongoing core services (i.e. base activities) in a manner that ensures long-term resilience of these assets.

8.27 However, the context of PR24 (i.e. the likely historical underfunding) means that there is greater uncertainty of the optimal level, and how it can be determined. This points to a greater need than in previous price controls to consider other views on, and methodologies for calculating, such optimal levels, and to control very carefully for the potential deficiencies in an econometrics or benchmarking-led approach.

Ofwat's approach

8.28 Ofwat uses a suite of 24 models to set efficient wholesale water cost allowances. These control for differences in size, profiles of treatment works, density, and network configuration. For each driver they consider different specifications of the variable to triangulate across a range of different approaches.

8.29 Further details of the models used are set out in Ofwat's Final Determination[58] and Economic Insight's (March 2025) Report: A balanced approach to ensuring long-term asset resilience.

Concerns with Ofwat's approach

Ofwat's models

8.30 Ofwat's benchmarking models are defined by a number of limitations that undermine their effectiveness as a regulatory tool. These constraints relate to both the theoretical considerations and practical application of the approach. The issues in Ofwat's approach are further detailed in Economic Insight's report detailed in paragraph 8.29. We refer the CMA to that report, and provide a summary of key issues below.

8.31 First, as with any model, the base cost benchmarking models are assumption-led; rely on a limited set of cost drivers that fail to capture the full complexity of water company operations; and are highly sensitive to the choice of specification.

(a) These issues have been variously presented by companies, and their independent advisors, in the submission of their business plans and responses to the Draft Determination. For further information we refer the CMA to Ofwat's Final Determination.[59]

(b) We also refer the CMA to modelling we have done since the Final Determination which illustrates the sensitivity of modelled allowances to the various assumptions and specifications, and that Ofwat's choice within this range is at the lower end.[60]

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58 Ofwat (2024) PR24 Final Determinations: Expenditure allowances - base cost modelling decision appendix

59 For example, a partial summary is provided in Ofwat (2024) PR24 Final Determinations: Expenditure allowances - base cost modelling decision appendix

60 Wessex Water (2025) *Alternative approaches to the base cost models*, provided as SoC Appendix A240.

8.32 Second, and as referenced in the preceding sections, the modelling approach risks underfunding the industry over time. This is because the models determine allowances based on historical cost data (i.e., what companies actually spent). The use of such historical data does not account for:

(a) historical reductions in costs which may have occurred as a result of deferring capital maintenance expenditure in addition to achieving efficiencies (which is especially applicable given companies are incentivised to outperform their settlements);

(b) upward pressures on costs over time, for example:

(i) increases in base costs over time to support improvements in performance captured by PCs and subject to financial incentives via ODIs;

(ii) increases in base-plus costs over time because of the ongoing operational and capital maintenance associated with past enhancement expenditure; and

(iii) increases in base-plus costs over time from broader sets of increasing regulatory requirements.

(c) external drivers that mean future asset investment and maintenance activity (and therefore expenditure) needs to increase, for example climate change resilience.

8.33 The combination of these limitations can result in costs that are unachievable, even for an efficient company. That is, Ofwat can define, and set allowances on the basis of, an artificially low efficiency frontier.

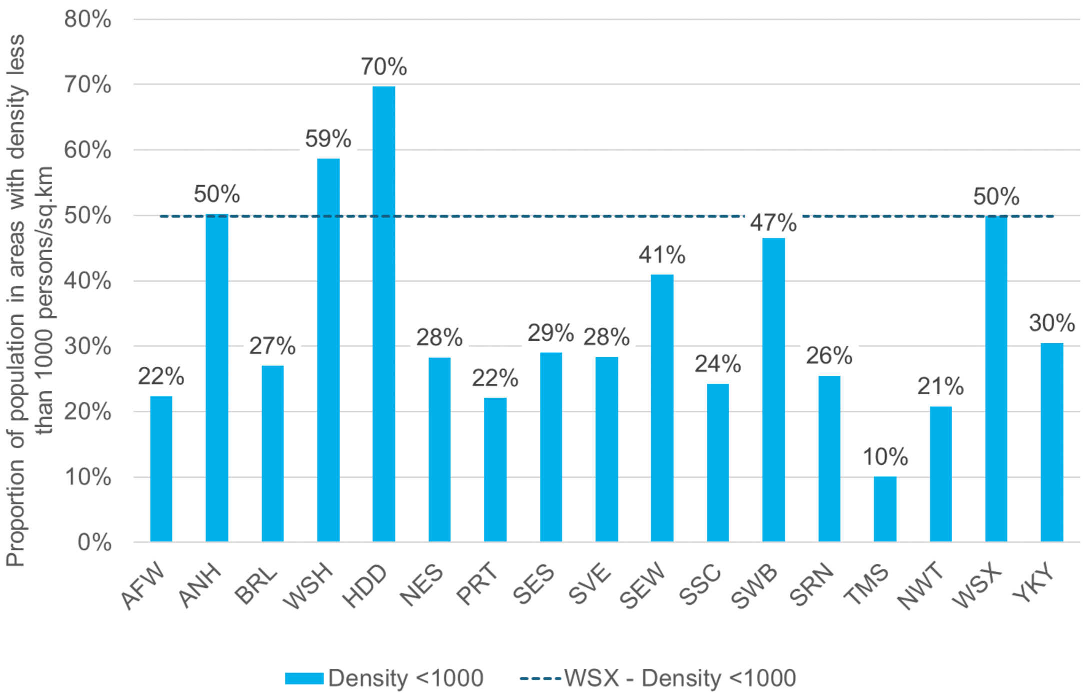
8.34 In our opinion, in PR24 this artificial frontier is so far from the optimal level in relation to our wholesale water base costs that Ofwat has not ensured the funding necessary for resilience, and not met its Duties.

8.35 This measurement error is occurring for a number of reasons, which are ultimately a reflection of the limitations of econometric modelling more generally (i.e. in addition to, or in combination with, the issues with historical data). We provide a summary of key considerations most relevant to Wessex Water below.

(a) The limited set of models capture only a narrow way of assessing costs and the differences between companies. As such, they are unlikely to reflect the unique features of our region. As a result, we consider the models are inherently limited in their ability to fully capture the rural nature of our region.

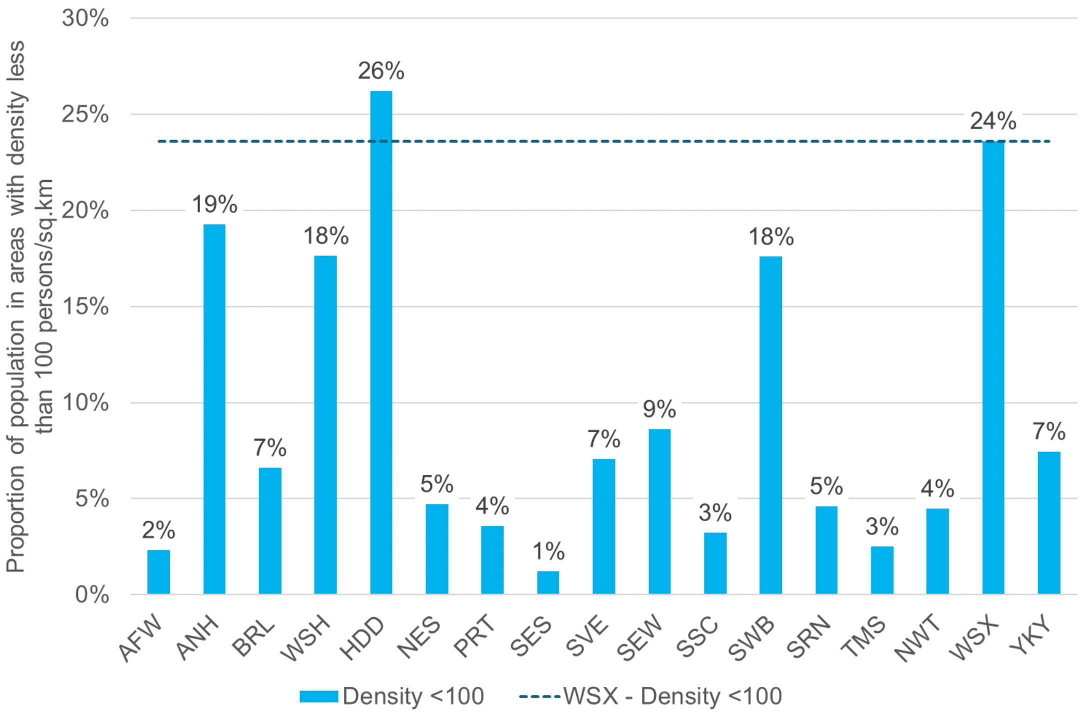
(i) For example, only three companies have a higher proportion of their population than Wessex Water at an average density below 1,000 persons/sq.km (and Anglian is only fractionally higher), as shown in Figure 14 below.

Figure 14 – Proportion of population in areas with density less than 1000 persons/sq.km



(ii) Moving further to the extremes of sparsity, the difference between companies becomes more stark. Wessex Water has 24% of its population at average density below 100 persons/sq.km, second only to HDD, as shown in Figure 15 below.

Figure 15 – Proportion of population in areas with density less than 100 persons/sq.km



(b) The models do not account for our relative asset health (i.e. the modelling is conducted without reference to outcomes, including those relating to asset health). Whilst we appreciate the challenges in measuring asset health, we consider that a deterioration in this for the sake of modelled efficiency would not be in the interests of customers.

(c) Similarly, the models do not account for our performance on Ofwat's outcome delivery framework, i.e. performance on a given metric, or in aggregate, is not considered in Ofwat's assessment of efficiency.

8.36 More generally, we consider the models lead to a number of counterintuitive outcomes which further point to the presence of measurement error in Ofwat's approach. We provide examples below.

(a) The efficiency challenge on the wholesale water models at PR24 has widened markedly at PR24, as demonstrated in Figure 17 below. Whilst some variations, or trends, may be expected over time, the extent of change has not been observed in any previous period, nor has it been observed in the wastewater models, which have been comparatively more stable over time, as shown in Figure 18. Most significantly for Wessex Water, Ofwat's modelling assessed us as being at the benchmark for water supply efficiency at each of PR09, PR14 and PR19, but has now found us to be 30% inefficient at PR24. This is despite our wholesale supply base costs moving broadly in line with the industry over the past ten years.[61]

[61] Based on the movement in the wholesale water supply costs used in Ofwat's modelling relative to 2013-14 for Wessex Water and for the industry as a whole.

Figure 16 – Wessex Water comparative efficiency – water supply (operating and capital maintenance expenditure)

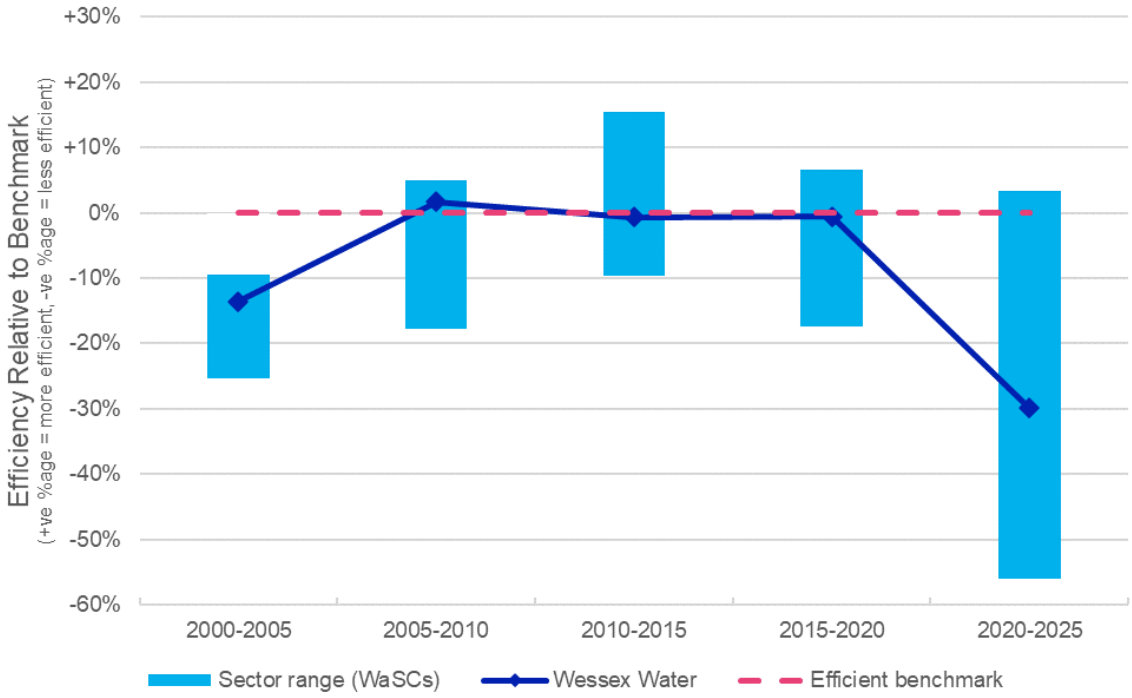
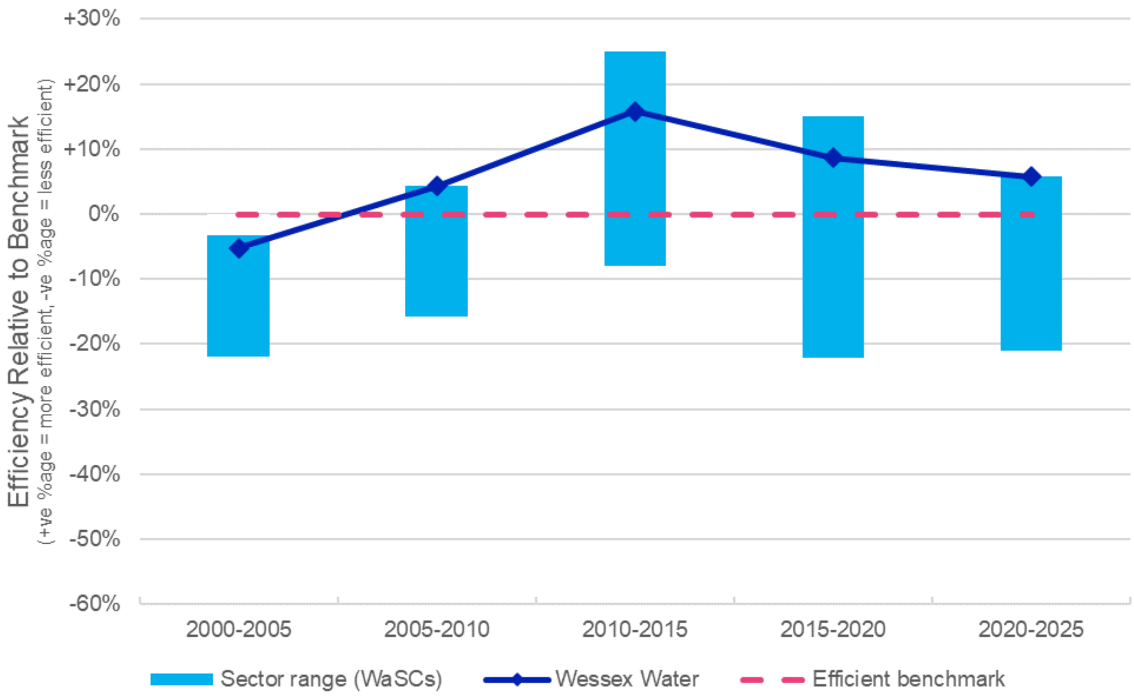


Figure 17 – Wessex Water comparative efficiency – wastewater (operating and capital maintenance expenditure)



(b) The differences in efficiency found across different models are not intuitive.

(i) The efficiency challenge implied for a given company across price controls at PR24 varies considerably. For example, Ofwat finds that we are 6% better than the efficiency benchmark in wastewater, but 30% behind it in water supply.[62] This is despite Wessex Water running both parts of the business in the same way, with the same ownership, and until last year with the same CEO in place for over 30 years. We note this divergence in Ofwat's view was not present to the same extent in the period 2000 to 2020, with the difference in efficiency to the benchmark between water supply and wastewater being less than 10% in each five-year period except for 2010-15 when it was 17% and, even then, was still well below the 36% difference found at PR24.

(ii) The efficiency challenge implied by Ofwat's sub-models varies considerably, and this is observed most acutely in relation to the wholesale water models. For example, the range implied by individual models is 23% of overall allowances in wholesale water compared with 7% and 6% in wastewater network plus and bioresources respectively. [63]

(c) Small changes in the models' specification and input variables can have a significant impact on a company's efficiency score, and ultimate allowances. For example, Wessex Water has been the most significantly negatively impacted by the model specification changes since PR19 which result in an 8.1%[64] reduction in allowances comparatively.[65]

(d) As set out in Table 3 below, the straight modelled allowance Ofwat has set for our wholesale water costs is 39% below our current spend rate before the application of frontier shift and RPEs.

(i) Our 5-year base opex for modelled costs (i.e. excluding items that are not modelled such as business rates) would be £383m at current run rates (we are spending £76.6m on modelled costs in 2023-24). On a like-for-like basis Ofwat has allowed £275m (after RPEs and frontier shift, and before new obligations). Therefore, for current expenditure levels alone, we are underfunded on base opex by £108m.

(ii) On capital maintenance, over the past five years we have spent £313m. On a like-for-like basis (removing Ofwat's RPEs and CACs for items such as the step-change in mains replacement), Ofwat has allowed £226m. Therefore,

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62 Calculated as the difference between cells R40 and E6 in tab "Efficiency" of Ofwat PR24-FD-CA08-Base-costs-wastewater-model-3-Network-Plus.xlsx; and as the difference between cells U57 and E6 in tab "Efficiency" of Ofwat PR24-FD-CA05-Base-costs-water-model-3.xlsx.

63 See Table 6 in Economic Insight (March 2025) *A balanced approach to ensuring long-term asset resilience*, provided as SoC Appendix A222.

64 See Figure 59 in Economic Insight (March 2025) *A balanced approach to ensuring long-term asset resilience*, provided as SoC Appendix A222.

65 We note this in addition to the impact driven by updating the allocation of Poole in the weighted average density calculation, which is set out in *Wessex Water - April 2023 - PR19 density query* provided as SoC Appendix 198.

for current expenditure levels alone, we are underfunded on capital maintenance by £87m.

(iii) Given Wessex Water has a demonstrated history of being an efficient company, it is unlikely that such a challenge can represent an appropriate efficiency challenge.

Table 3 – Comparison of Ofwat Final Determination base cost allowances to current expenditure

£m (22-23 prices)	Final Determination allowed 5-year spend	Actual 5-year spend at current run-rate[66]	Underfunding compared to current expenditure
Operating costs	274.8	383.2 (+39%)	108.4
Capital maintenance	225.9	312.8 (+38%)	87.0
Total modelled costs "like-for-like"	**500.6**	**696.0 (+39%)**	**195.4**

Other adjustments

Frontier shift

8.37 Ofwat applies a frontier shift of 1.0% pa, which is based on long run data. We consider this does not align with recent, but persistent, trends in UK productivity. Our consideration of the appropriate level of frontier shift is set out in our Draft Determination Response.[67]

Price control deliverables (PCDs)

8.38 At PR24, Ofwat introduced various mechanisms aimed at addressing some of the issues raised above in relation to underinvestment in the sector. These are detailed in the Economic Insight report.[68]

8.39 The most material is a sector-wide adjustment for companies to deliver specified lengths of mains renewals over AMP8. Failure to meet these renewal rates will result in non-delivery or late delivery payments to customers, reducing the earned return.

8.40 However, these mechanisms do not solve the problem and risk making it worse.

(a) The prescriptive nature of the output-based measure runs counter to the purpose of Ofwat's totex and outcomes framework and restricts the ability of companies to

66 Equals five years of 2023-24 actual operating cost spend (£77.6m), plus the actual capital maintenance spend over the past five years from 2019-20 to 2023-24 (£312.8m).

67 Please see in full our Draft Determination Response document *WSX-C22 - Frontier shift*, which is provided as SoC Appendix A119.

68 See Section 6 in Economic Insight (March 2025) *A balanced approach to ensuring long-term asset resilience*, provided as SoC Appendix A222.

make investment decisions efficiently.[69] For example, the base PCDs at in the Final Determination "ring fence" 34%[70] of our wholesale water capital maintenance allowances to deliver specific outputs.

(b) Additionally, there are errors in Ofwat's approach, such as overestimating the implicitly funded level for mains renewal and underestimating the AMP8 expenditure requirements for an efficient company.

8.41 While customer protections may be necessary with uplifted allowances, we propose that the CMA considers a "use it or lose it PCD", or adjusted cost-sharing rates, to ensure any underspend in capital maintenance is returned to customers.

Alternative perspectives

8.42 In our business plan, to ensure appropriate levels of base spending in AMP8, we developed and submitted considerable bottom-up engineering evidence on our base costs. This was intended to ensure that the asset management, engineering, and financial expertise of the company was reflected in the cost allowances.

8.43 Asset deterioration modelling was used to inform the investment plans for our above-ground assets, and this was supplemented with detailed bottom-up costing for large expenditure items and schemes.[71] For our below-ground assets, we performed a bottom-up assessment, extrapolating AMP7 costs to meet the requirements of our AMP8 network programme.

8.44 The modelling activities for above-ground assets identified significantly higher levels of required investment than we have included in our plans. Due to the size of our enhancement programme and the potential impact on customer bills, we took a risk-based approach to constrain the overall investment to a deliverable and affordable level profiling expenditure out to 2035.

8.45 The proposed expenditure is set out by asset class in Annex A9. A summary is provided in Table 4 below which sets out what we consider we need to prioritise in terms of expenditure in AMP8 and how we have developed the cost estimates. We also include reference to the performance commitment trajectory (as included in our Draft Determination Response)[72] that this expenditure is intended to support.

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69 See Draft Determination Response document *WSX-C04 - Retrospective nature of draft determination*, provided as SoC Appendix A101.

70 See Table 7 in Economic Insight (March 2025) *A balanced approach to ensuring long-term asset resilience*, provided as SoC Appendix A222.

71 For further information please see the following business plan documents:
WSX10 - Maintaining our services commentary and analysis (see Appendix A018)
WSX11 - Annexes - Maintaining our services (see Appendix A019).

72 For a summary of our proposed performance commitment trajectories please see Draft Determination Response document *WSX-O01 - Performance and outcomes*, provided as SoC Appendix A148.

8.46 The expenditure included would go some way to addressing historical underfunding by improving asset health and delivering the resilient service our customers have told us they want.

Table 4 – Proposed PR24 wholesale water expenditure (totex)

Spend area and proposed expenditure (£m)		Summary of outputs (For a full description and further references please see Annex A9)	Performance commitment impacted / benefits delivered by expenditure	Assessment approach
Capital Maintenance	**361.9**			
Supply Distribution System	161.6	Increase mains replacement rate to 0.4%pa which equates to 44km/yr. Lead pipe replacement and leakage reductions.	Mains Replacement target, Water quality contacts, and Leakage. Address DWI discolouration notice.	Deterioration modelling & historical analysis.
Water Treatment Works	87.9	Across our Water Treatment and distribution sites we will replace c.12,000 life-expired assets including c.6,000 Instruments, c.1,300 Pumps and c.1,200 Electrical distribution and control assets.	CRI, and increased resilience	A combination of deterioration modelling, bottom up capital expenditure assessment, asset performance data and risk assessments used to generate AMP8 spend and forecast longer term trends.
Revenue Meters	22.4	Proactive replacement of c.180,000 basic revenue meters with smart meters	Maintain resilience of existing asset base and supports all water performance commitments.	Reactive replacement on failure and proactive replacement in synergy with smart metering strategy.
Service reservoirs	18.0	Deliver established plan in service reservoirs programme including but not limited to replacement and refurbishment of modelled civil & EMI assets.	CRI.	Bottom up assessment based on individual asset performance data, surveys and risk assessments.

Spend area and proposed expenditure (£m)		Summary of outputs (For a full description and further references please see Annex A9)	Performance commitment impacted / benefits delivered by expenditure	Assessment approach
Boreholes and springs	13.0	Replace Mechanical, Electrical, Instrumentation, Control and Automation (MEICA) type assets. Plus - Investigate yield and quality issues, utilise more intensive rehabilitation measures, drilling new production boreholes to replace redundant/damaged assets, and deal with legacy issues such as decommissioning redundant assets.	Improve water available for use (WAFU).	Deterioration modelling used for MEICA assets but not appropriate for structures. Bottom up assessment based on detailed inspection data.
Raw water pumping stations and mains	4.2	Ongoing maintenance of ✂	Abstraction resilience.	Bottom up assessment based on detailed asset and condition data, asset performance data and risk assessments.
Dams and impounding reservoirs	2.9	Increase in supervision circa £0.1m/yr. One off repair cost to deal with legacy issues in AMP8 estimated at circa £1.5m. Inspections of 17 structures and the required remedial works.	Maintain statutory compliance.	Bottom up assessment based on detailed inspection data.
Pumping stations	1.6	Replacement and refurbishment of Civil and electrical, mechanical, and instrumentation (EMI) assets	Maintain resilience of existing asset base.	A combination of deterioration modelling, bottom up capital expenditure assessment, asset performance data and risk assessments used to generate AMP8 spend and forecast longer term trends
Raw Water Transport & Storage	0.1	Asset refurbishments	Maintain WAFU.	Deterioration modelling not appropriate. Bottom up assessment based on individual asset performance data and risk assessments.

Spend area and proposed expenditure (£m)		Summary of outputs (For a full description and further references please see Annex A9)	Performance commitment impacted / benefits delivered by expenditure	Assessment approach
Shared assets used principally by water price controls	50.4	Ensure systems, vehicles and places of work enable us to provide excellent services.	Indirectly supports all water performance commitments.	A combination of deterioration modelling, bottom up capital expenditure assessment and risk assessments used to generate AMP8 spend and forecast longer term trends.
Operational Costs	529.9			
Direct Labour & Subcontract work	136.6	Maintain operation of sites.	CRI, Water supply interruptions, and other operational targets.	Continuation of current activity levels
Local Authority Rates	95.1	Legal requirement to pay taxes	Meets legal obligation.	Bottom-up assessment based on Valuation office draft valuation.
Power and chemicals	91.0	Maintain operation of sites and networks.	CRI, Water supply interruptions, and other operational targets.	Based on current run rate & consumption, accounting for RPEs.
Infra Renewals	59.9	Expensed portion of increased mains replacement and other network related activities.	Maintain Leakage and improve asset health.	See distribution system above.
Leakage activities	43.4	Continuation of increase levels of activities to deliver wholesale leakage targets. Including both mains distribution system and customer side leaks.	Maintain Leakage.	Continuation of current, elevated, activity levels.
Other	32.3	Maintain operation of sites.	CRI, Water supply interruptions, and other operational targets.	Continuation of current activity levels.
Lab costs	28.2	Undertake required drinking water quality testing.	Ensures drinking water is meeting statutory standards.	Continuation of current, elevated, activity levels.
Service Charges	13.3	Legal requirement to pay EA charges.	Meets legal obligation.	Continuation of current activity levels.

Spend area and proposed expenditure (£m)		Summary of outputs (For a full description and further references please see Annex A9)	Performance commitment impacted / benefits delivered by expenditure	Assessment approach
Additional FTEs	12.0	Deliver increased levels of inspections and proactive maintenance on our assets and support the increase in activities relating to permitting at our Water Treatment sites.	CRI	Bottom-up assessment of required needs to align to best practice.
Employers NI changes	11.1	Legal requirement to pay taxes.	Meets legal obligation.	Bottom-up assessment based on current staffing levels.
Catchment Solutions	7.1	Continue current catchment solutions funded from enhancement, focusing on nitrate and pesticide removal.	CRI.	Continuation of current activity levels.

8.47 However, we appreciate this is only one of a number of ways in which base costs could be considered in the context of PR24 as an appropriate alternative to the limited models For example, the following could also be considered in any triangulation aimed at calculating the optimal level.

(a) The underlying asset base and current cost depreciation to ensure a link to the underlying stock of the industry. This can be approached either using fixed asset registers and accounting depreciation, or regulatory depreciation (RCV run-off). For example, it was acknowledged in the draft methodology for PR24 that capital maintenance is lagging behind RCV run-off.[73] Given the lag of new assets requiring maintenance this may be expected, but over the longer term these should converge on the appropriate levels for the given asset base.

(b) Areas of expenditure that are not implicitly or explicitly within the historical data set. The move to a totex regime gave companies flexibility of investment to meet the immediate needs. Retrospective assessments of what should be funded runs counter to this philosophical change. Therefore, where companies are proposing step changes for new investment it should be considered in addition to the modelled allowances.

(c) The approach taken by WICS which set allowances on the basis of Scottish Water's understanding of its assets and a forward-looking programme. The commission concluded as follows:

73 Page 32 in Ofwat (2022) Appendix-10-Aligning-risk-and-return, provided as SoC Appendix A209.

> *"In common with other asset intensive businesses, Scottish Water cannot predict exactly when assets will fail. As such, it is clearly in the customer interest that it is able to act prudently – particularly with regard to those assets that are critical to the performance that its customers and, more broadly, society value.*
>
> *In coming to its decisions, the Commission wants to ensure that Scottish Water is able to manage its investment programme effectively and efficiently. The Commission recognises that investment will need to be prioritised and, as set out in 2018 Decision Paper 3, welcomes Scottish Water's agreement to create a multi-stakeholder investment planning and prioritisation group to achieve this. The Commission is clear that this process should ensure that all investment that is both urgent and important should be progressed expeditiously. In the Commission's view, such an approach should ensure that customers' bills remain as low as practicable over the long-term."*[74]

(d) A wider range of econometrics that control for differences in more ways and include variables capturing changes in costs over time.

(e) The speed and scale at which efficiency challenges are appropriate, and setting glide paths to the determined efficient frontier.

Changes since Draft Determination Response

8.48 As explained in our introduction, our Draft Determination Response contained a lower request for wholesale base cost allowances compared to our initial Business Plan submission. This change was made in response to one of Ofwat's conditions for moving out of the "inadequate" category in the QAA.[75]

8.49 This change was achieved by deferring some expenditure (for example proactive replacement of boreholes and water mains) into AMP9. The Draft Determination therefore represented an increased level of risk compared to our initial Business Plan. We do not think that this is the appropriate approach to long-term resilience and asset health. Therefore, we consider our original bottom-up capital maintenance plan to be more appropriate.

8.50 Furthermore, in our business plan and Draft Determination Response, our base costs included expenditure in relation to new disinfection at water treatment centres at eight simple and rural water treatment works as a result of new obligations. Ofwat has agreed to engage further on this and this expenditure is now included in chapter 6.

8.51 Our approach to opex remains as set out in the business plan and Draft Determination Response. However, this have been updated to reflect more recent information in

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74 See page 3 in WICS (2019) *Decision paper - asset replacement*, provided in SoC Appendix A223.

75 See, in full, Ofwat (2024) PR24 draft determinations Wessex Water Quality and Ambition appendix, provided as SoC Appendix A207.

relation to our draft valuation of supply business rates and required national insurance contributions.[76]

8.52 Therefore, our view of the appropriate level of funding required for wholesale water base costs is £892m which, as above, reflects:

(a) the capital maintenance requested in our business plan, less the amount relating to new disinfection at water treatment centres; and

(b) our latest view of operating costs, which have changed only due to decisions by government offices.

8.53 This could be allowed as a base cost adjustment claim, as we requested in our response to the Draft Determination.

Requests to the CMA

8.54 Our request to the CMA is to fund us to meet our statutory obligations, including those in relation to ensuring resilience. Whilst we recognise that the CMA only has a small proportion of the time that Ofwat had available to make its redetermination, we consider there is scope to reconsider the evidence provided, and reach an appropriate conclusion regarding our efficient base cost needs.

8.55 Historical expenditure benchmarking can provide valuable information but should not be relied upon exclusively. Indeed, given our view regarding historical underfunding at PR24, it should be given limited weight. A balanced assessment incorporating forward-looking needs and alternative methodologies is required, particularly given the counterintuitive results observed when considering the wholesale water models.

8.56 We acknowledge the CMA redetermination is not the appropriate forum for wholesale reform to the way base costs are calculated. However, we consider it could be used to fund well-evidenced costs with appropriate customer protections (e.g. sharing rates) applied.

8.57 We therefore ask that:

(a) Our revised bottom-up costs of £892m (which represents a £244m increase on Ofwat's Final Determination) are accepted and allowed such that:

(i) our base capital maintenance allowance is set with regard to our bottom-up evidence; and

(ii) our base opex allowances reflect current expenditure rates, recognising our efficiency track record, with consideration of expected cost changes.

(b) An evidence-based ongoing efficiency challenge is applied.

[76] Please see Annex A9 for full details and further references.

(c) Should the CMA maintain the base cost adjustment for mains renewals, that it recalibrates it with an appropriately determined implicitly funded renewal rate, or employs an approach consistent with our bottom-up proposals.

(d) The CMA reconsiders PCDs relating to base expenditure, applying customer protections only to specifically funded elements rather than creating additional constraints on base expenditure.

9 Phosphorus removal

Introduction

9.1 Assessing efficient enhancement costs is complicated by enhancement schemes being highly idiosyncratic, with no two schemes being identical. As schemes can involve developing new or existing assets, the cost profile of enhancement is also 'lumpy' and, unlike base costs, is driven by a requirement to meet new or future needs or obligations.

9.2 These features were recognised by the CMA at PR19, which commented: *"enhancement costs are more irregular in nature than base costs, and may involve many possible solutions to the requirements driving the underlying need, which are sometimes new."*[77]

9.3 A consequence of these features is that there are inherent limitations in the scope to reliably compare (benchmark) company costs for such schemes. This was also noted by the CMA at PR19: *"there is less opportunity* [relative to base costs] *to compare the cost of required enhancement solutions between companies."*[78]

9.4 Ofwat's approach at PR24 to enhancement, and specifically phosphorus removal (P-removal), underfunds the efficient company to deliver legal and statutory requirements, because it fails to adequately consider the detailed characteristics of companies' individual P-removal schemes. Specifically, Ofwat's approach is overly reliant on a suite of four econometric models, which are inherently limited in their ability to reflect the idiosyncratic nature of the schemes.

(a) With regard to Ofwat's reliance on the models, 77% of our P-removal allowances at the Final Determinations were set using them.

(b) With regard to the inherent limitation of such models, this is reflected by the fact that they are able to explain only a relatively limited amount of variation in scheme-level costs, with an R-squared range of 0.299 to 0.530 for the four models used.

9.5 In relying primarily on these models to assess the efficient costs of our P-removal schemes, Ofwat also ignores its own assessment of our efficiency derived from engineering evidence. For example, the mechanical application of Ofwat's models results in a 35% challenge to 113 of our 122 schemes. In contrast, Ofwat has applied an overall efficiency challenge of only 12% to those sites for which efficiency was assessed by Ofwat using engineering evidence, rather than solely relying on the models. This

[77] See paragraph 5.6 in CMA (March 2021) *Anglian Water, Bristol Water and Yorkshire Water price determinations final report.* Provided as SoC Appendix A215.
[78] See paragraph 5.6 in CMA (March 2021) *Anglian Water, Bristol Water and Yorkshire Water price determinations final report.* Provided as SoC Appendix A215.

clearly suggests that the models alone are an inappropriately blunt instrument for robustly assessing efficiency in this context.

9.6 In its PR19 report, in relation to determining enhancement costs, the CMA said:

> *"[We] consider it appropriate to use Ofwat's assessment as a starting point and then to apply the following two criteria:*
>
> *(a) Is there evidence of insufficient weight having been given to a material factor?*
>
> *(b) Has an alternative approach been identified that can be expected to perform better?"*
>
> *"This approach recognises that there is unlikely to be a single 'best' approach to modelling that should be applied – without adjustment – across all companies, and is consistent with other parts of the Final Determination where a range of company-specific adjustments in modelled allowances are included. In line with this, we have considered what different model results, and other relevant considerations, imply for the modelled allowances that should be determined for each of the Disputing WASCs."*
>
> *"Given the limitations of determining allowances on the basis of benchmarking forecast costs, we considered whether the introduction of any additional safeguards may be merited. As we set out in paragraphs 5.103 to 5.105, we recommend that Ofwat considers introducing a mechanism for PR24 to provide a more effective basis for ex-post reporting on how actual P-removal costs compare to the levels companies had forecast and to the allowances that are set, and on what underpins the identified differences."*[79]

9.7 The lack of the above suggested mechanism, combined with the idiosyncratic nature of P-removal schemes, means that Ofwat's overall approach (which primarily relies on econometric models with low explanatory power) fails to meet both of the CMA's previous criteria above.

9.8 We consider it important that the approach to determining appropriate cost allowances for P-removal should:

(a) be a 'mixed method' one, under which material weight is placed on bottom-up evidence;

(b) only retain econometric modelling (as part of the evidence mix) where it is robust;

(c) allow for company-specific adjustments to allowed costs; and

(d) place most weight on forward-looking evidence, combined with measures to mitigate information asymmetry risk.

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79 See paragraphs 5.69–5.72 in CMA (March 2021) *Anglian Water, Bristol Water and Yorkshire Water price determinations final report.* Provided as SoC Appendix A215.

9.9 This will ensure we are not significantly underfunded for the efficient costs of P-removal, by addressing three material factors that are insufficiently considered under the PR24 Final Determinations. Specifically, it will:

(a) better reflect the idiosyncratic nature of P-removal schemes;

(b) ensure that allowances better reflect the true relationship between cost drivers and (efficient) P-removal costs; and

(c) ensure that allowed costs accurately reflect what companies are tasked with delivering over PR24, rather than what they delivered, and the costs they incurred, historically.

9.10 This is the approach we have taken in preparing our costs, and so we ask the CMA to allow the costs presented in our Draft Determination Response.

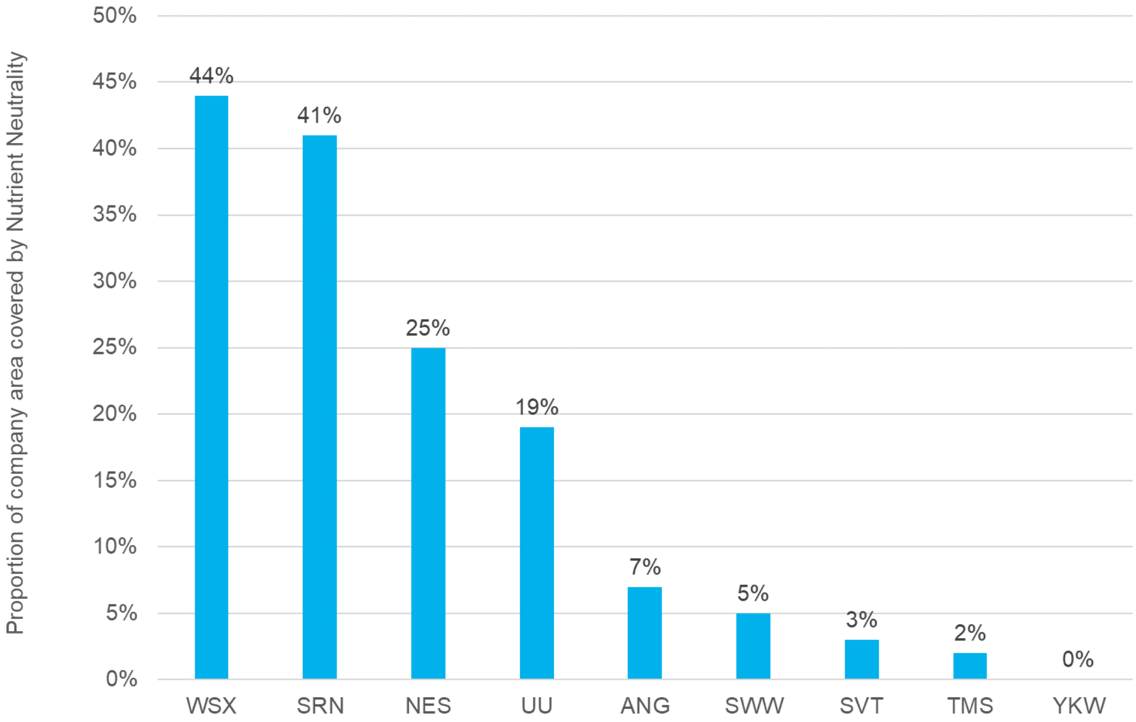
Criticality of the issue

9.11 Our plan includes £916.4m to deliver P-removal schemes arising from statutory obligations under the: Urban Wastewater Treatment Regulations, Habitats Regulations, Nutrient Neutrality under the Levelling Up and Regeneration Act (LURA), the Environment Act, and the Water Framework Directive.

9.12 These obligations are intended to further improve river health. This is because increased concentrations of nutrients, including phosphorus and nitrogen, can lead to eutrophication, which causes excessive algae growth and can damage the ecology of our rivers.

9.13 A significant proportion of the Wessex Water region has some form of environmental designation. Our assessment of nutrient neutrality catchments shows that almost half of Wessex Water's area is affected by designated areas within the LURA, which is more than any other company and significantly more than most of the rest of the industry (Figure 18).

Figure 18 – Proportion of company area covered by nutrient neutrality under the LURA



Source – Wessex Water analysis of GIS mapping data

9.14 Significant further information relating to the above is available in section 6.2 of our Business plan document *WSX16 – Waste water networks plus strategy and investment*[80] and the associated document *WSX17 - Annexes – Waste water networks plus strategy and investment*[81].

9.15 The result of these requirements is that we have the second largest P-removal programme in the industry, despite being one of the smallest WaSCs in terms of connected properties. Given the scale of this programme as a proportion of our overall investment (36% of our total enhancement programme) and its importance to delivering environmental improvement, it is imperative that allowances are set at a level that allows us to recover our efficient costs. The impact on us of erring with regard to setting P-removal allowances will likely be more material than for any other company, including on whether we are financeable.

Scope for measurement error, imprecision and uncertainty

9.16 Assessing efficient enhancement costs is complicated by enhancement schemes being highly idiosyncratic.

80 Provided as SoC Appendix A023.
81 Provided as SoC Appendix A024.

9.17 By this, we mean no two P-removal enhancement schemes are the same. Whilst, at a high level, schemes may share similar characteristics, at a more granular level, they can differ considerably. For example, differences may include but are not limited to:

(a) historical consent levels;

(b) enhanced consent levels;

(c) size (population equivalent);

(d) groundwater flows;

(e) site topography;

(f) geology;

(g) land availability;

(h) planning and environmental constraints;

(i) urbanity / rurality;

(j) flood risk;

(k) existing infrastructure;

(l) the nature of neighbouring sites;

(m) the receiving watercourse; and

(n) site accessibility.

9.18 As a result, the (efficient) costs of delivering two superficially similar schemes can vary enormously because, in reality, they differ in significant ways.

9.19 Across-industry econometric modelling[82] is only designed to capture cost drivers that explain variation in scheme level costs 'on average' and 'for the industry'. It is therefore inherently limited in its ability to adequately account for the individual nature of schemes. For example, if the impact of a cost driver on efficient costs varies materially across schemes or companies, so that it affects some, but not all, schemes or companies, it is unlikely to be statistically significant in an across-industry model. Therefore, an over reliance on such models substantially increases the likelihood of measurement error.[83]

9.20 In summary, because no two P-removal enhancement schemes are the same, it is likely that each will have its own rich set of features that affect the efficient costs incurred, but which will be challenging to capture in an industry-wide model alone.

82 Which could include scheme-level modelling for all schemes of all companies, or company-level modelling, for all companies.

83 This is a matter of degree. A factor could affect all schemes (companies), but only affect them materially for a sub-set; this might also not be identified in an econometric model.

9.21 By way of example, Ofwat's models effectively treat our two P-removal schemes, Wookey and Beckington, as identical, resulting in the same £1.7m cost allowance for each. This is because both have a similar PE Served and are subject to the same new permit. Our bottom-up estimates, however, show that the costs for Beckington (£2.2m) are 30% higher than for Wookey (£1.7m).

9.22 The additional costs at Beckington are due to factors including: (a) larger, more expensive chemical dosing equipment required due to it being a filter works only site, therefore requiring increased operational and maintenance costs; and (b) site access constraints resulting in higher construction costs from the reinforcement of a track for construction vehicles. As Ofwat's models do not account for this richer set of factors, they risk under-estimating the true efficient costs of sites such as Beckington. We present further examples of such sites as case studies in Annex A13.

9.23 To further illustrate the variation in cost for supposedly 'similar' schemes, Figure 19 shows box and whisker diagrams of the total cost of completed P-removal schemes (from PR19) with:

(a) the same historical consent;

(b) the same enhanced consent; and

(c) similar levels of population equivalent (PE) served (defined as schemes having PE served within the same 1,000 'band').

9.24 Historical consent, enhanced consent and PE served are cost drivers included in Ofwat's econometric models used to determine allowed P-removal enhancement costs at the PR24 Final Determinations. Therefore, from a PR24 Final Determination modelling perspective, these schemes are considered to be similar. However, as can be seen, the total costs of these apparently similar schemes vary considerably. For instance:

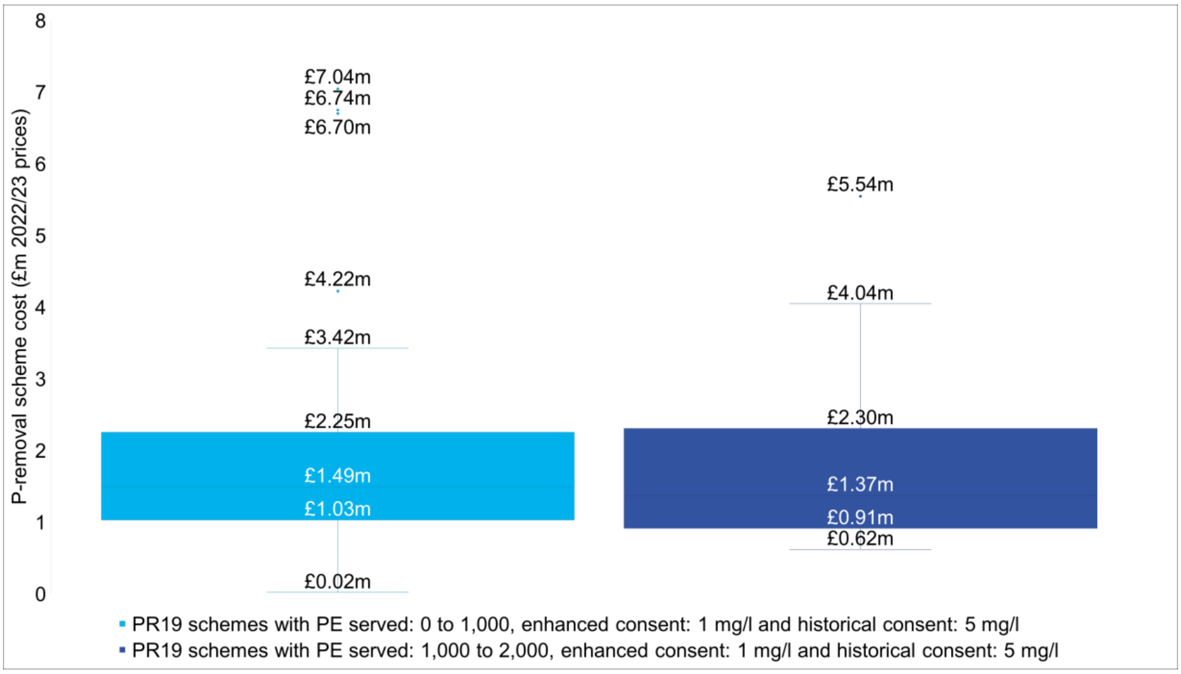
(a) for schemes with a PE served of between 0 and 1,000, and enhanced consent of 1mg/l and historical consent of 5mg/l, the highest cost scheme has a cost of over 350 times that of the lowest cost scheme with the same characteristics (note, this demonstrates issues with individual schemes; excluding the cheapest scheme in this band reduces the ratio to 7x).

(b) for schemes in the next size band (with a PE served of between 1,000 and 2,000), and enhanced consent of 1mg/l and historical consent of 5mg/l, the highest cost scheme has a cost more than 9 times that of the lowest cost scheme with the same characteristics.

9.25 Whilst some of this variation will relate to differences in scheme size (as measured by PE served) within each size band we have used in the figure, the extent of the variation is too large for this to plausibly be the sole explanation and will therefore lead to measurement error. This pattern is repeated at different size bands and different permit levels.

9.26 First, as per the Wessex Water specific example above, for which PE is essentially 'the same', we find significant cost variation. Second, Ofwat's econometric models suggest that additional costs from PE Served alone (for the range considered in the figure) is relatively small – an increase in PE Served of 1,000 results in, at most, around £0.2m of additional scheme costs.

Figure 19 – Variation in total P-removal scheme costs for schemes with the same enhanced and historical consent levels and with PE served falling within the same interval of 1,000



Source – Analysis of company historical data used in PR24 Final Determination models

Note – We firstly split the data into PE bands of 1,000, so as to identify schemes of a 'similar' size. We then identified the four most common combinations of PE band; historical consent; and enhanced consent and identified the distribution of scheme costs for each. This is provided as a means of illustrating the variation in the data and we recognise that any choice of segmentation is arbitrary. In this analysis, we have sought to balance: (i) similarity of schemes (the narrower the bands of PE, the more similar schemes are); against (ii) number of observations in each band to make the analysis feasible.

9.27 The above issue can be further understood by considering enhancement activities and costs beyond the water sector, where idiosyncratic variations are also a material feature. In many industries, when 'new' things are required, including to deliver enhanced service levels, it is often the case that new assets must be developed or built and/or that existing assets must themselves be modified. Accordingly, outside of the water industry, one can similarly observe a high degree of variation in construction costs for apparently similar assets.

9.28 By way of illustration, Figure 20 shows the variation in total construction project costs relating to: (i) 15 surgeries, health and medical centres; and (ii) 20 sports hall & centres and gymnasia, using Barbour ABI data.

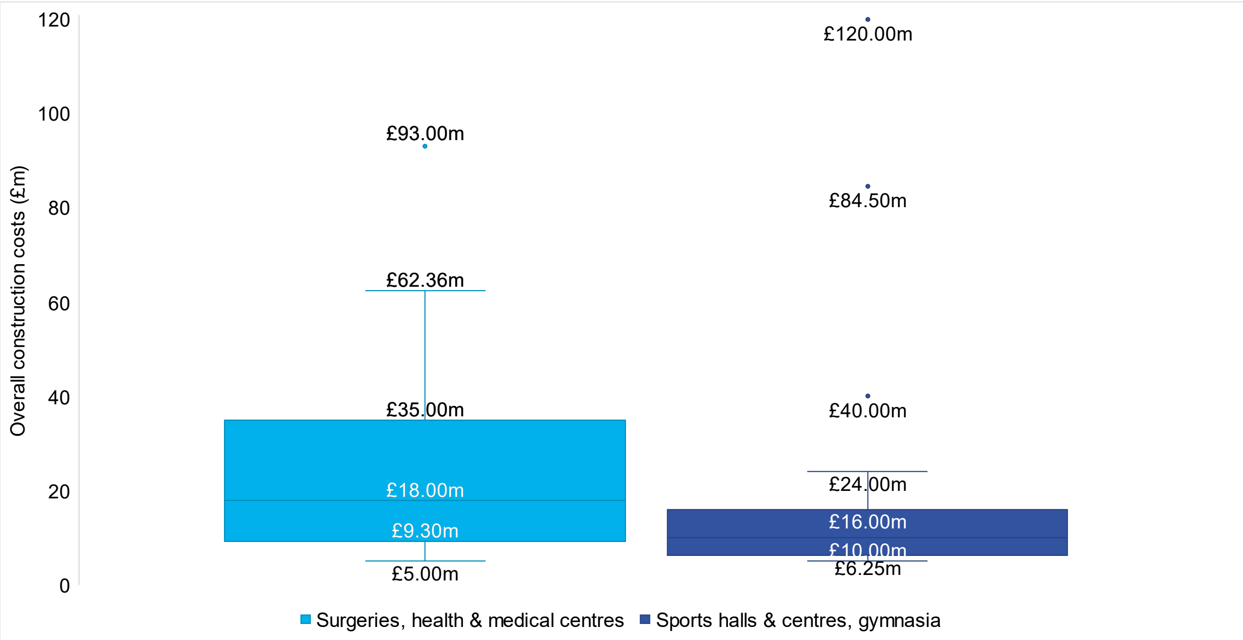
9.29 To examine how costs may vary for apparently ‘similar’ projects within each of the above two categories, for each we have further selected observations that have similar characteristics, based on the data descriptions. Specifically, we have included projects with the same/similar:

(a) development type (only ‘new builds’ are included); and

(b) project duration (only projects with a duration of 36 months or less are included).

9.30 As can be seen, within each category, we observe wide variation in total costs, even when we only include projects with similar characteristics. For surgeries, health & medical centres, we find that the highest cost project has costs around £88m higher than the (apparently similar) lowest cost project, with an interquartile range of around £26m.

Figure 20 – Variation in total construction project costs beyond the water industry, by category and for projects with similar characteristics

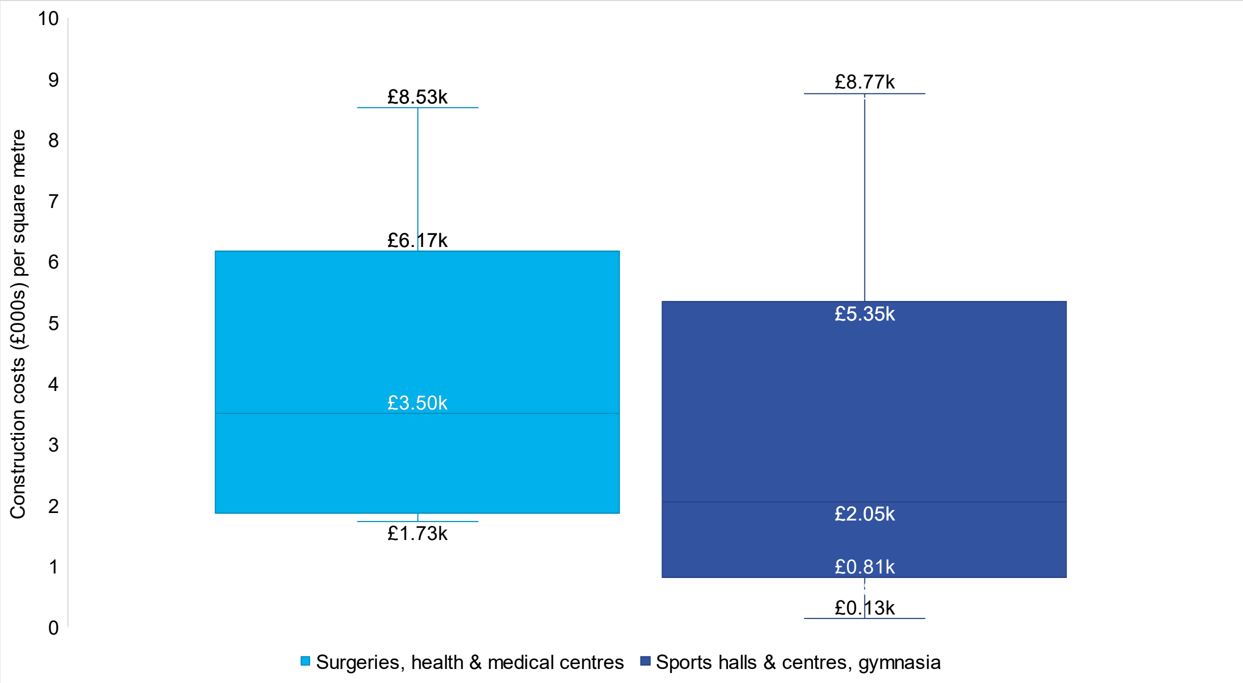


Source – Analysis of Barbour ABI data

9.31 Figure 21 shows the same analysis as above, but where the cost variation is shown on a ‘per sq metre’ basis, to account for variation in project costs due to differences in size.

9.32 On this basis, we continue to observe large cost variation across projects. For example, the cost for sports halls/centres and gymnasia range from £0.13k per sq metre, up to £8.77k per sq metre (i.e., the most expensive project is 67 times more expensive than the least expensive one, on a per sq metre basis).

Figure 21 – Variation in per sq metre construction project costs beyond the water industry, by category and for projects with similar characteristics



Source – Analysis of Barbour ABI data

Ofwat's approach

9.33 To determine companies' enhancement cost allowances for P-removal, Ofwat sets scheme level allowances using a combination of three main components that we list below and discuss in detail in Annex A14.

(a) Econometric benchmarking modelling – Ofwat uses a set of four econometric models to set enhancement cost allowances for what it refers to as *"modelled schemes".*

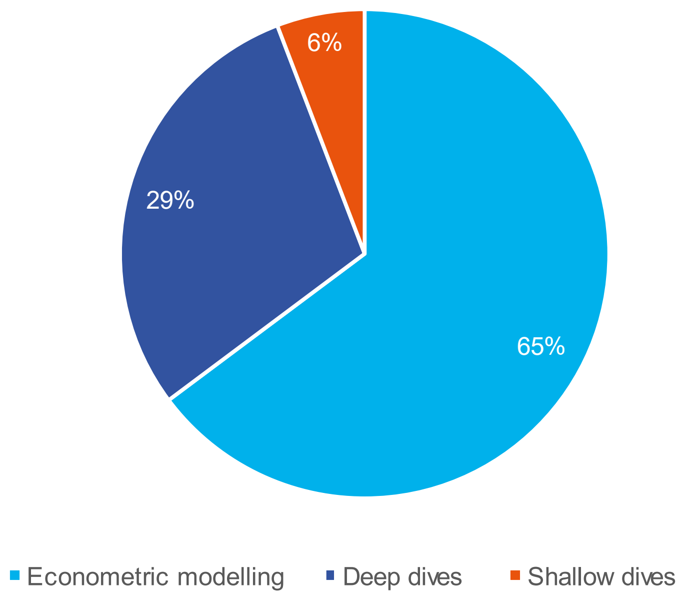
(b) Deep dives – Ofwat undertakes detailed reviews of the evidence provided by companies supporting their proposed costs. It adopts this approach for schemes where Ofwat deems their costs to be 'material' and/or where the need for the investment is deemed 'uncertain'.

(c) Shallow dives – Under this component, Ofwat applies an average company level P-removal efficiency challenge[46] (as estimated using its econometric models) to individual P-removal schemes (up to a capped % efficiency challenge). This approach is used for schemes that have not been assessed under either of the above two approaches.

9.34 Ofwat separately identifies a subset of schemes (including those it refers to as statistical and engineering outliers) for which the exact process for determining allowed costs varies from the above general approach. These are described in Annex A14.

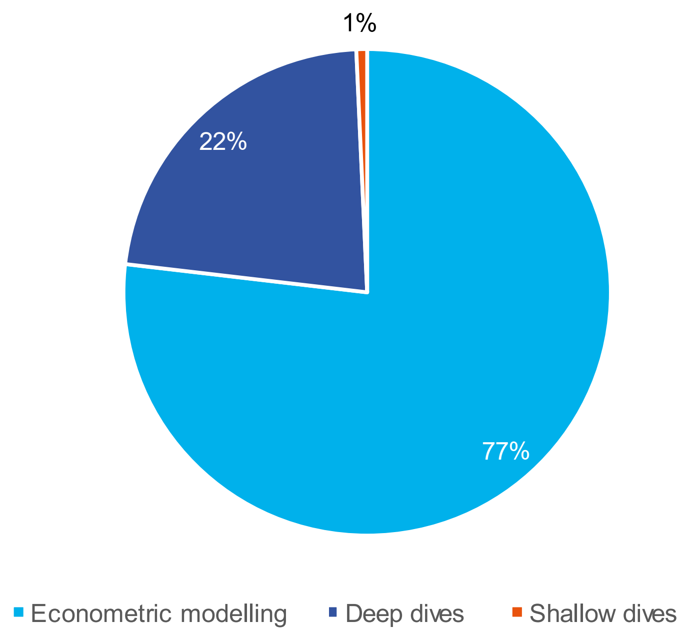
9.35 Figure 22 and Figure 23 set out two pie charts, showing the proportion of P-removal allowances at the PR24 Final Determinations, as determined using: (i) econometric modelling; (ii) deep dives; and (iii) shallow dives, both at an industry level and for Wessex Water specifically.

Figure 22 – Proportion of industry-wide allowed P-removal costs determined using each of Ofwat's main three components



Source – Analysis of Ofwat feeder model spreadsheets

Figure 23 – Proportion of Wessex Water allowed P-removal costs determined using each of Ofwat's main three components.



Source – Analysis of Ofwat feeder model spreadsheets

Note (to Figures 23 and 24) – Econometric modelling includes totex for both upgrade and transfer schemes. Deep dives include totex for engineering and statistical outliers. Shallow dives include totex set for schemes dropped from the econometric models, as well as optimisation schemes. To enable comparison, numbers are pre-frontier shift and RPE, and not updated for Wessex Water-specific changes.

9.36 As can be seen, the majority (65%) of industry P-removal enhancement cost allowances are determined using econometric models and, in Wessex Water's case, the proportion is higher, at 77%.

9.37 Under Ofwat's approach, total cost allowances for P-removal are calculated by summing a company's individual scheme level cost allowances. The company level allowance is then multiplied by Ofwat's reconciliation adjustment factor (the ratio of a company's total forecast P-removal enhancement costs to the sum of its forecast scheme level costs).

9.38 Of the £887.5m[84] we proposed for our P-removal schemes, Ofwat allowed £609.1m in its Final Determination. Of this:

(a) 113 schemes costing £717.1m (81% of our proposed total costs) are assessed via Ofwat's main suite of econometric models, which results in allowances of £462.7m (a 35% efficiency challenge);

(b) four schemes costing £153.5m (17% of our proposed total costs) are identified by Ofwat in the models as outliers, which overall see an efficiency challenge of 8%:

(i) Poole WRC, our largest P-removal site, was assessed via a deep dive assessment of our engineering evidence and received a 10% efficiency challenge (and due to its categorisation as a large scheme, 25:25 sharing rates);

(ii) Dorchester WRC was also assessed by a deep dive and received a 17% efficiency challenge; and

(iii) Holdenhurst WRC and Yeovil WRC are deemed to be efficient outliers and received no cost efficiency challenge;

(c) one scheme, costing £10.6m, (1% of our total costs) is assessed under the Transfers model, which results in an allowance of £4.6m (a 57% efficiency challenge); and

(d) four schemes costing £6.3m (1% of our total costs) are assessed under the >=2mg/l model, which results in an allowance of £4.4m (a 31% efficiency challenge).

9.39 A full breakdown is available in Annex A14.

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84 Note – costs and associated calculations in this section are post-frontier shift and RPEs, and account for changes to our WINEP (numbers are therefore intentionally different to those in Figures 23 and 24 and associated commentary).

Concerns with Ofwat's approach

9.40 Important limitations in Ofwat's approach result in an overall efficiency challenge for P-removal that primarily represents measurement error, and which therefore does not allow costs for P-removal that are achievable for the efficient company.

9.41 We identify three concerns (material factors that are not adequately weighted), being:

(a) scheme idiosyncrasies;

(b) ensuring allowances reflect the true relationship between cost drivers and efficient costs; and

(c) ensuring allowed costs reflect what companies must deliver over PR24.

9.42 We provide further supporting evidence and detail relating to each of the above in Annex A15 and summarise them below.

Insufficiently weighted material factors: scheme idiosyncrasies

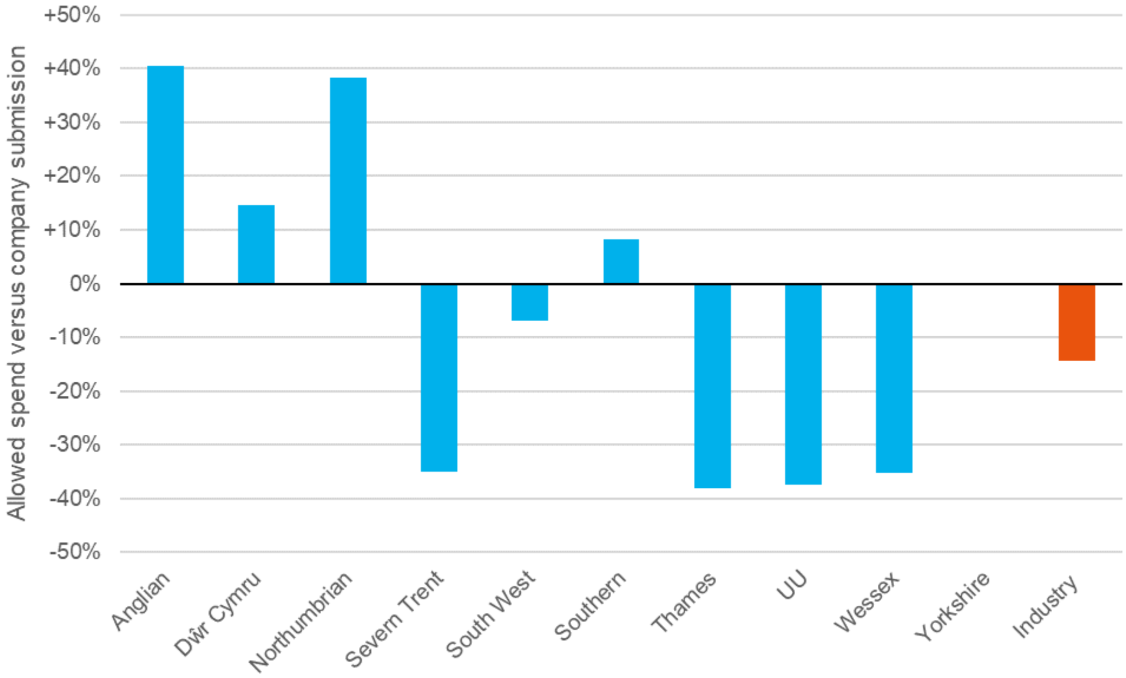
9.43 The main concern with Ofwat's approach (as highlighted above) is that it does not sufficiently account for the idiosyncratic nature of enhancement schemes (especially P-removal schemes). This is a material factor under the CMA's previous criteria at PR19. Specifically, and as noted above, Ofwat is unduly reliant on its suite of four econometric models to determine the majority of P-removal cost allowances. These models, which are new for PR24, have been developed at the scheme level and are inherently limited in their ability to identify efficient costs for these schemes for the reasons previously explained at paragraph 9.19.

9.44 This is reflected both by the wide variation in the efficiency challenge applied by Ofwat at the individual company and scheme level, and in the statistical performance of the models.

9.45 In relation to the former, the models result in differences between requested and allowed costs of +41% to -38% at a company level (excluding Hafren, which has less than £1m of expenditure assessed via the P-models), as shown in Figure 24 below, and of +35,140% to -75%[85] at a scheme level. Ofwat assumes that these differences are due to efficiency or inefficiency. We consider the extent of these differences to be too large for that to be plausible, and it is more likely that the variation is due to a material degree of measurement error.

85 Source: Ofwat PR24 P-removal feeder model; Efficiency (total), excluding any schemes listed as outliers.

Figure 24 – Change in allowed company-level spend due to P-removal model suite



Source: Ofwat PR24 P-removal feeder model

9.46 In relation to the latter, the R-squared values of the models (which measure the proportion of variation in scheme level costs that the models can explain) are low. Specifically, the models can only explain between 30% and 53% of the variation in scheme level costs, as shown in Table 5. This raises questions about the extent to which they should be relied upon for the purpose of setting an important and significant element of company allowed costs. The low explanatory power does not necessarily imply other technical deficiencies in Ofwat's modelling, when evaluated on its own terms. However, it may also be consistent with the models themselves potentially omitting material factors that may determine the efficient costs companies incur in P-removal, which we discuss in the following subsections and more fully in Annex A15.

9.47 Ofwat has itself identified the R-squared value as one of its key tests for assessing modelling robustness. It says that failure of this test would raise serious concerns about using the model and that "*if a model failed to explain a significant share of the costs of the industry, it would be inappropriate to use it for the estimation of costs*"[86].

[86] Table 9 in Ofwat (2024) PR24 Final Determinations Expenditure allowances - Base cost modelling decision appendix.

Table 5 – Low explanatory power across Ofwat's P-removal models

Model	Uses forecast or historical data?	R-squared	Interpretation
Model PR1	Forecast	0.530	Model explains 53% of the variation in company scheme level costs
Model PR2	Forecast	0.526	Model explains 53% of the variation in company scheme level costs
Model PR3	Historical	0.310	Model explains 31% of the variation in company scheme level costs
Model PR4	Historical	0.299	Model explains 30% of the variation in company scheme level costs

Source – Ofwat, PR24 Final Determinations: Expenditure allowances - Enhancement cost modelling appendix

9.48 A failure to adequately consider or weight the idiosyncrasies of P-removal schemes (including through an over-reliance on the above models) will generally result in a high degree of measurement error with respect to setting efficient costs.

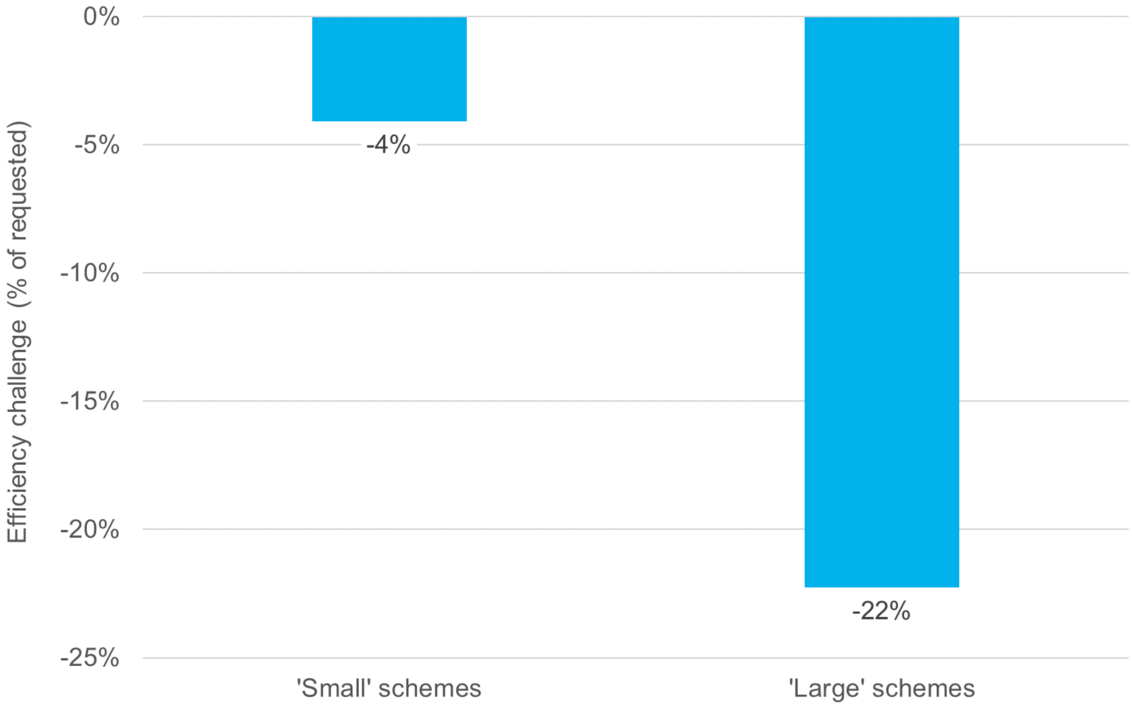
9.49 We are disproportionately impacted by the models' limitations. Whilst we are one of four companies with a 35%-40% modelled efficiency challenge, the £254m cut in our expenditure in relation to modelled P-removal schemes represents half the total cut applied to the whole industry. This is because, despite only having 5% of the wastewater customers, we have 20% of the forecast industry spend.

Insufficiently weighted material factors: ensuring allowances reflect the true relationship between cost drivers and efficient costs

The relationship between scheme size and efficient costs

9.50 When examining allowed P-removal costs at PR24 Final Determinations, we observe that smaller sized schemes appear significantly more efficient than larger schemes. Specifically, and as shown in Figure 25, we can see that for the 441 smallest schemes (Band 1, with a PE served of between 0 and 5,000), allowed costs as determined by the Final Determination econometric models, were (on average) just 4% lower than the costs companies requested; whereas for the remaining 244 larger schemes, the modelled costs were 22% lower than the requested costs (i.e. the efficiency challenge is materially higher for larger sized schemes, under Ofwat's models).

Figure 25 – Industry efficiency challenge (% of requested) for 'small' and 'large' P-removal schemes



Source: Ofwat PR24 Final Determinations

9.51 In addition to the above being true for the industry as a whole, we find that the pattern is systematic, holding true across most individual companies. This is set out in detail in Annex A15.

9.52 The systematic nature of this finding indicates the P-removal econometric models relied upon at the PR24 Final Determinations are either:

(a) omitting relevant variables relating to (or correlated with) the size of scheme; and/or

(b) that the existing size related variables (PE served) included in the models are mis-specified.

9.53 The above means that companies with a greater proportion of large sites will be especially impacted by this issue.

The existing models largely assume a continuous relationship between permit level and cost

9.54 The P-removal econometric models relied upon at the PR24 Final Determinations take into account the fact that the permit level of P-concentration that companies have to achieve affects the efficient costs they incur. The models capture this through the following variables.

(a) Historical permit – The maximum allowed P-concentration in wastewater, as previously required in the WINEP/NEP before regulations were tightened. This is intended to reflect the fact that the 'change' in the 'tightness' of permitted phosphorus will affect costs incurred (i.e. the greater the required change, the more upgrades etc. are likely to be needed, leading to higher costs).

(b) Enhanced permit – The maximum allowed P-concentration in wastewater, as now required in the WINEP/NEP. This is intended to capture the fact that (notwithstanding historical permitted P-concentration) current permitted P-concentration affects treatment complexity required; with more complex treatment leading to higher costs.

(c) Enhanced permit squared – The square of the enhanced permit. This is intended to capture how, as the permit level tightens, the marginal cost of further P-removal increases.

(d) Beyond Technically Achievable Limit (TAL) dummy – A variable equal to 1 if the enhanced permit is less than 0.25mg/l, and 0 otherwise. This is intended to capture how costs could rise sharply, when reducing P-concentration beyond the TAL.

9.55 The inclusion of these variables differs across the four models used at the Final Determinations. However, in the main, the models assume a broadly continuous relationship between P-tightness and costs (both linear and non-linear). Models PR2 and PR4 assume a single discontinuity in the relationship, due to their inclusion of the beyond-TAL dummy (i.e. those two models assume a 'breakpoint' in costs at <0.25mg/l of P). We show this graphically in Annex A15.

9.56 In practice, there are reasons to suppose there could be (potentially multiple) discontinuities in the P-concentration/cost relationship, which we discuss further in Annex A15. This includes:

(a) Engineering intuition – From an engineering perspective, there may be thresholds of certain levels of P-concentration, beyond which a change in treatment approach and/or technological solution is required. Where this occurs, intuitively one may expect a 'step change' (a discontinuity) in the P-concentration/cost relationship.

(b) Company evidence submitted as part of the PR24 process – All the companies who made submissions relevant to this provided information consistent with the existence of a non-continuous relationship between P-tightness and costs. We set out further details in Annex A15.

(c) Ofwat's previous position at PR19, at which Ofwat found a breakpoint at ≤0.5mg/l. It is unclear why, in light of that, at PR24 Ofwat did not consider: (i) that the breakpoint it now finds at <0.25mg/l might be in addition to the one it previously found; and (ii) that this more generally indicates a possibility of multiple breakpoints, which should be explored.

(d) The CMA's approach at the PR19 redeterminations – this was also consistent with multiple discontinuities (including ≤0.5mg/l and ≤1.0mg/l).

(e) Our preliminary analyses of company submitted data, which is also consistent with multiple breakpoints, as outlined in Annex A15.

9.57 The above statements are not intended to strongly suggest we would expect there to be discontinuities (singular or multiple), per se. Rather, that there are good reasons that this possibility should be considered and tested with evidence, to ensure the overall approach to setting P-removal enhancement costs is robust.

9.58 To the extent that there are discontinuities in the relationship between efficient P-removal costs and permit tightness, an approach that does not properly reflect this will not robustly identify the appropriate amounts of P-removal enhancement costs across the industry. Moreover, companies with a higher proportion of schemes that 'just' cross any breakpoints will be particularly adversely affected by this issue (because their allowed costs for any schemes 'just' over a discontinuity will be based on a continual smooth line, rather than reflecting the 'step change' in cost that actually occurs).

Possible impact of regulatory drivers on efficient P-removal costs

9.59 P-removal schemes are undertaken to comply with various regulations. These include the:

(a) Conservation of Habitats and Species Regulations;

(b) Environment Act;

(c) Levelling Up and Regeneration Act;

(d) National Sites of Special Scientific Interest legislation;

(e) Urban Waste Water Treatment Regulations; and

(f) Water Framework Directive.

9.60 The way in which the above regulations function, and the implications for regulated water companies, are set out in Annex A13. In general terms, the most direct impact of the regulations is that they collectively influence or determine the level of P-concentration companies must achieve. However, their impacts may not be limited to this and in Annex A15 we explain how they might also drive issues with Ofwat's econometric modelling approach.

Insufficiently weighted material factors: ensuring allowed costs reflect what companies must deliver over PR24

9.61 In the following we explain that:

(a) the approach at PR24 Final Determinations placed equal weight on historical and forecast data;

(b) there are good reasons to expect future efficient costs to differ from historical efficient costs;

(c) forecast econometric models perform better, statistically, than historical models; and

(d) concerns that placing more weight on forecast models may confer an information asymmetry advantage on companies are not supported by evidence (and can be mitigated).

The existing approach places equal weight on historical and forecast data

9.62 For P-removal cost allowances determined under the econometric model component of Ofwat's overall method, equal weight is attached to historical and forecast data. That is, of the four models used, two make use of historical data; two use forecast data; and Ofwat provides equal weight to the four models.

There are good reasons, and evidence, to suggest future costs will differ materially from historical costs

9.63 For enhancement costs in general, there is a strong intuitive reason to place most (if not all) weight on forward looking cost evidence. This is because, by their nature, such schemes are mainly driven by statutory and other obligations, which change over time (both in terms of their scope and implied service levels companies must achieve). Ofwat recognised this in its PR24 Final Determinations, where it stated:

> *"the 2024 price review (PR24) has seen a significant increase in the scope of enhancement expenditure activities compared to PR19. This includes an increase in investment to improve the environment from the Water Industry National Environmental Programme (WINEP) for England and the National Environmental Programme (NEP) for Wales, particularly in relation to water companies' wastewater activities."*[87]

9.64 The above means that historical cost information may be a poor guide as to future efficient costs. Consistent with this, at PR19 Ofwat relied entirely on forecast data when determining P-removal enhancement costs.[88] The CMA, in its PR19 redeterminations, similarly relied only on forecast data when determining P-removal costs, for the same reasons:

> *"There are some significant differences between the wastewater enhancements that had been undertaken in AMP6 (and prior to that), and those that companies are required to deliver in AMP7. For P-removal, Ofwat highlighted that the*

[87] Page 2 of Ofwat (2024) PR24 Final Determinations - Expenditure allowances – Enhancement cost modelling appendix

[88] Page 54 of Ofwat (2020) PR19 Final Determinations: Securing cost efficiency technical appendix, provided as SoC Appendix A210.

> *consents companies had to meet in AMP7 could be significantly tighter than those that had to be met in AMP6."*[89]

9.65 The same considerations that led to Ofwat and the CMA relying solely on forecast data at PR19 hold equally true at PR24. As summarised in Table 6, PR24 requires a large increase in the number of schemes; an increase in the number of tighter permits; and a large change in the mix of schemes undertaken. These changes are as material as those which occurred at PR19, which suggests greater weight should be given to forecast information. Specifically, at AMP8 there will be a fundamental shift to improvements at smaller sites, serving tighter permits, across the sector. All else equal, this increases the likelihood of needing tertiary solids removal at smaller PE sites relative to AMP7 (which in turn significantly increases the scope of work required to meet permit consent levels, as compared to AMP7).

Table 6 – Large change in P-removal related requirements at PR24

Metric	PR19	PR24	Change between PR19 and PR24
Number of schemes	761	996	+30.9%
% of small (Band 1) schemes out of total schemes	55.7%	64.0%	+8.2pp
No. of schemes at TAL (≤0.25mg/l)	131	465	255.0%
% of schemes at TAL (≤0.25mg/l).	17.2%	46.7%	+29.5pp

Source – Analysis of PR24 Final Determinations p removal-enhancement expenditure appendix

Note – We define 'small' schemes as those with a PE served less than 5,000

<u>Econometric models using forecast data perform notably better than the historical models</u>

9.66 In Table 5 we previously highlighted that Ofwat's econometric models for P-removal generally have poor explanatory power. Additionally, in the context of the above discussion, this is especially the case in relation to the models that rely on historical data, which explain only 31% of the variation in scheme level costs. In our view, R-squared values that low likely indicate models that are not sufficiently reliable for the purpose of making important regulatory cost determination decisions.

9.67 We again highlight Ofwat's own identification of the R-squared as one of its key tests for assessing modelling robustness; and that a failure of this test would raise serious concerns about using a model, stating that *"if a model failed to explain a significant*

[89] See paragraph 5.64 in CMA (March 2021) *Anglian Water, Bristol Water and Yorkshire Water price determinations final report.* Provided as SoC Appendix A215.

share of the costs of the industry, it would be inappropriate to use it for the estimation of costs"[90].

Information asymmetry concerns are understandable, but are not borne out by evidence (and can be mitigated in any event)

9.68 An important reason cited by Ofwat for placing weight on models using historical data is the possibility of information asymmetry. Ofwat explains that using historical data for determining P-removal enhancement costs *"helps us to identify inefficient forecast costs by comparing historical and forecast efficiency scores for each company"*[91] and *"companies have submitted higher business plan cost forecasts, which may be due to cost uncertainty, expected cost increases, or an attempt to obtain a higher allowance under the assumption we will use these costs to set efficient cost allowances"*[92] [emphasis added].

9.69 At the PR19 redeterminations, the CMA also mentioned this concern, stating: *"companies can face weak incentives to identify and reveal efficiencies in their forecasts, as such revelation can result in lower allowances than may otherwise apply"*[93] (although ultimately the CMA chose to rely on forecast data, due to it being more concerned that historical costs were not reliable for informing forward-looking efficient costs).

9.70 Related to the above, Ofwat also notes that the accuracy of company forecasts is likely a function of their experience: *"most companies have more experience with phosphorus removal upgrades compared to other enhancement areas due to the large PR19 enhancement programme. Therefore, companies should be able to forecast PR24 enhancement totex requirements more precisely."*[94] This should be borne in mind but has not been accounted for. We consider this issue further in Annex A15.

Evidence that the asymmetry concern is not borne out

9.71 Keeping in mind that price determinations are set 'in the round' and that companies are set overall amounts of allowed revenues (rather than ring-fenced pools of allowed costs), we highlight that the industry has not substantively and persistently out-earned the WACC historically. That is not consistent with the companies benefitting from information asymmetry advantages in general.

9.72 Indeed, the repeated nature of price controls in the UK makes it difficult to conceive of how companies could consistently benefit from such an advantage. Suppose

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90 Table 9 in Ofwat (2024) PR24 Final Determinations Expenditure allowances - Base cost modelling decision appendix.
91 Page 79 of Ofwat (2024) PR24 Final Determinations - Expenditure allowances – Enhancement cost modelling appendix.
92 Page 84 of Ofwat (2024) PR24 Final Determinations - Expenditure allowances – Enhancement cost modelling appendix.
93 See paragraph 5.103 in CMA (March 2021) *Anglian Water, Bristol Water and Yorkshire Water price determinations final report.* Provided as SoC Appendix A215.
94 Page 84 of Ofwat (2024) PR24 Final Determinations - Expenditure allowances – Enhancement cost modelling appendix.

companies did have an advantage and exercised this by submitting 'too high' cost data, in turn allowing them to outperform (earning profits above the WACC) over a price control. The regulator would readily observe this and then adapt its approach at the next price control, setting more stretching cost efficiency challenges.

9.73 So, for companies to consistently benefit from an information advantage, one would have to suppose that the regulator would not observe, or respond to, the presence of persistent excess returns, which is difficult to conceive.[95]

<u>Mitigations for information asymmetry should there be a concern that it exists</u>

9.74 The overall implication of the above is that, to ensure there is no downwards bias in efficient P-removal enhancement cost allowances, considerable weight should be placed on forward-looking evidence.

9.75 To the extent that the CMA may still be concerned about information asymmetry risk when relying on forecast data, it could consider developing options under its redetermination method that would mitigate these, including the following.

(a) Consider how PR24 differs from PR19 with respect to the scope and nature of P-removal related requirements that are placed on companies, and the extent of those differences.

(b) Consider how one can best distinguish between these real differences and the possibility of companies benefitting from an information asymmetry advantage.

(c) To inform the above, the CMA should consider what metrics/indicators exist that might inform its assessment of the likelihood of companies' forecasts being accurate.

(d) To the extent that the CMA considers there is some information asymmetry risk under the use of forecast data (which might lead to companies overstating efficient P-removal enhancement costs), it should consider how this is balanced against the risk that historical data will understate efficient costs at PR24. To inform this, the CMA could consider the relative likelihood, size, and impact of these risks.

Summary of considerations for the CMA

9.76 Regarding the evidence set out in the preceding sections relating to material factors we believe have not been sufficiently weighted under the PR24 Final Determinations, the CMA may wish to give consideration to the following.

(a) How one might account for the idiosyncratic nature of P-removal schemes to recognise the differences in schemes due to areas including, but not limited to:

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[95] We recognise that companies might alternatively benefit by not earning excess profits (i.e. ROCE = WACC), but instead accrue the benefit through "management taking an easier life" (i.e. do not try as hard to drive cost efficiencies). However, monopoly firms have an incentive to cost minimise and incentive regulation is primarily intended to address the allocative inefficiency of monopoly.

groundwater flows; site topography; geology; land availability; planning and environmental constraints; urbanity / rurality; flood risk; existing infrastructure; the nature of neighbouring sites; the receiving watercourse; site accessibility; and others.

(b) What the explanations might be for the systematic pattern for the PR24 Final Determination econometric models to allow relatively more costs for smaller schemes, and relatively less costs for larger schemes.

(c) Whether the relationship between efficient P-removal costs and the level of (or change in) permit tightness might be subject to discontinuities. To the extent any discontinuities are established, one should consider what methods can be used to ensure P-removal enhancement cost allowances appropriately reflect them (including for the individual companies for which they arise, if the discontinuities vary by company).

(d) Whether regulatory drivers or associated factors might affect the efficient costs of P-removal.

(e) Whether, and to what extent, the use of historical data is likely to be a reliable source of evidence for predicting future efficient P-removal costs over PR24, given the material changes in company P-removal programmes, as compared to PR19.

Alternative perspectives

9.77 As previously outlined, Ofwat's overall method is one that is heavily reliant on its suite of econometric models. In its Final Determinations, Ofwat explains that:

> *"benchmarking is our preferred approach, as it allows us to compare historical and forecast costs across companies to estimate what an efficient cost for enhancement investment is. Where the investment area does not lend itself to benchmarking, we rely more on the assessment of evidence provided by companies in their business plans."*[96]

9.78 In our view, given the limitations present in benchmarking this area, it is appropriate to rely on a wider mix of alternative evidence – and in particular, to place more weight on bottom-up cost estimates.

9.79 In the following sections, we briefly set out what these alternatives are and why (especially when considered under a mixed method approach) they may be expected to perform better than the method used at the PR24 Final Determinations. The options we set out are not exhaustive at this stage, but are presented to assist the CMA in its early considerations of their respective merits. In turn, we summarise the following options:

(a) deep dive reviews of company bottom-up cost evidence;

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96 Page 96 of Ofwat (2024) PR24 Final Determinations - Expenditure allowances – Enhancement cost modelling appendix.

(b) making use of newer engineering evidence;

(c) shallow dives; and

(d) cost adjustments.

Deep dive reviews of company bottom-up cost evidence

9.80 The main alternative to top-down (across industry) econometric benchmarking models are bottom-up methods. Under these, companies (including Wessex Water), estimate the efficient costs of P-removal schemes by identifying the activities and materials required to implement them, and then cost each element. In turn, the regulator (or the CMA) can then assess the efficiency of those costs, by scrutinising the evidence provided by companies (including, for example, by drawing on engineering or other technical expertise, as appropriate). This is effectively the ‘deep dive’ method under Ofwat’s Final Determinations.

9.81 Intuitively, there are good reasons to suppose the ‘deep dive’ method can better reflect (i) idiosyncrasies across schemes that may affect their efficient costs; and (ii) the ‘true’ nature of cost driver / cost relationships. For example, suppose a scheme has to be developed on a particular site, whereby the characteristics of the land affect costs. A bottom-up approach can reflect this, because the individual putting the costing together has access to that information and so can adjust assumptions about the associated activities and costs that are impacted by those characteristics.

9.82 However, we also recognise that regulators (including the CMA) may be concerned that bottom-up methods might: (i) not be any more accurate than top-down econometric methods; and/or (ii) be subject to information asymmetries that advantage companies.

9.83 To explore issue (i) above, we have undertaken an analysis that compares the costs Wessex Water originally estimated for the subset of its now completed PR19 P-removal schemes, where a bottom-up costing method was used.

9.84 Table 7 shows the results of this analysis. As can be seen, the bottom-up (engineering-led) cost estimates for our PR19 P-removal schemes are very close to our actual (outturn) costs for those same schemes (a 3% margin of error).

Table 7 – Margin of error in predicting PR19 scheme costs between Wessex Water original bottom-up estimates and outturn costs

	Total cost across all schemes (£m 22/23 prices)	Percentage diff. from actual cost (%)
Actual PR19 completed scheme costs	£113m	-
WSX original PR19 bottom-up estimate	£110m	3%

9.85 The above analysis is also relevant to issue (ii) above – the possibility of information asymmetries that may advantage companies, under bottom-up methods. Here, the information asymmetry concern would be that companies may have the ability (when using bottom-up methods in particular) to overstate submitted costs, knowing they can outperform them. However, the above shows that, in Wessex Water's case at least, this did not occur at PR19. In fact, our bottom-up cost estimates were close to, and slightly below, the actual costs we incurred.

9.86 We provided significant engineering evidence to Ofwat through the query process[97] on a number of our sites where there is the largest absolute difference between our own and Ofwat's view of efficient costs. Further information is available in Annex A13, Table A13-1.

9.87 As previously highlighted, whilst Ofwat's econometric models result in a 35% challenge on our costs, when conducting deep dives, Ofwat finds a 12% challenge overall is most appropriate. That is, the challenge implied by the models (in isolation) is materially larger than that deemed appropriate by Ofwat when assessing schemes based on the quality of our engineering evidence.

9.88 The 12% challenge is more consistent with Ofwat's broader approach. For example, its approach to:

(a) two P-removal sites (which are found to be efficient Cook's Distance outliers) where it allows the amount requested (that is, it makes a 0% challenge);

(b) comparison at industry level of deep dives, which collectively see an 8% challenge;

(c) our largest P-removal scheme, Poole (which forms part of the 12%), which sees a 10% challenge;

(d) our Nitrogen-removal schemes, which Ofwat assesses by way of a deep dive (i.e. review of the engineering evidence) and applies a 13% challenge; and

(e) the shallow dive assessment on other enhancement areas – which is capped at a 10% challenge.

Newer engineering evidence

9.89 Since work began on PR24 P-removal schemes, we have been conducting bottom-up costing for a representative sample of our P-removal schemes, which has been used to inform costs for the remaining schemes along with AMP7 outturn costs where applicable. This approach considers all factors that drive scheme-level costs, including site specific information. This detailed bottom-up costing provides a more accurate picture of the true cost of delivering the programme.

97 We provided information in our response to *Ofwat query OFW-OBQ-WSX-184*, provided as SoC Appendix A205.

9.90 As part of our AMP8 delivery programme, we have continued to develop our solutions and costs for our P-removal programme since our business plan submission. This has resulted in some changes to scope and costs (as is expected for the next stage of feasibility assessments and options development for any given investment).

9.91 We have continued our design process, including our WRC performance assessment and solution development process, which is more in-depth than the process followed for PR24, representing an improvement on certainty of scope and costs. At the end of this stage, an updated scope is established for the main capital delivery elements for each WRC, based on the more in-depth analysis of its specific requirements and constraints. This scope is used to determine a new upgraded cost estimate.

9.92 This more up-to-date engineering evidence, which can also be made use of, is also likely to be more accurate than econometric modelling.

Shallow dives

9.93 Whilst typically only used on less material investment lines, shallow dive efficiency challenges are capped at 10% under Ofwat's method. As Ofwat states, *"This avoids potentially disproportionate interventions for companies where we have not examined costs in detail."*[98]

9.94 Whilst the scale of investment at a programme level is higher than Ofwat might typically consider for a shallow dive, the individual schemes have not had costs examined in detail and are typically below Ofwat's £10m threshold and so, one could consider applying a shallow dive to individual schemes where idiosyncrasies are identified.

9.95 This is a reasonable proposal to make, particularly at a scheme level where the model can be seen to predict a wide variation from requested costs, as part of a mixed method approach to estimating efficient costs for schemes that are not subject to deep dives.

Company specific cost adjustments

9.96 From our preliminary analyses of the evidence, we highlighted that a number of factors (the site size/cost relationship; potential discontinuities in the P-concentration/cost relationship; and the impact of regulatory drivers) require careful consideration, to ensure P-removal allowances are appropriate. We further noted that the impact of these may vary by company and/or across schemes.

9.97 Following from the above, it may be appropriate to allow for company specific cost adjustments under a mixed method approach, particularly if econometric modelling is retained to some degree.

[98] Page 108 of Ofwat (2024) PR24 Final Determinations - Expenditure allowances – Enhancement cost modelling appendix.

9.98 For example, suppose econometric modelling is retained for certain schemes, and suppose those models continue to assume a largely continuous relationship between permit level and cost. In that case, if a company provided good evidence that it experienced discontinuities in its permit level/cost relationship, and that this reflected an efficient cost structure, in principle it would be appropriate to quantify the impact of that and then make an adjustment to that individual company's cost allowances to reflect this.

9.99 This reflects our position in 9.85, where we note that we provided significant engineering evidence to Ofwat through the query process that could be used to set a company-specific adjustment. Further information is available in Annex A13, Table A13-1.

Changes since Draft Determination Response

9.100 Two schemes at Charlton Horethorne and Sparkford are no longer in our PR24 WINEP and so have been excluded from our programme.

Requests to the CMA

9.101 Developing an approach to ensure efficient P-removal enhancement costs are robustly determined is not straightforward. There are inherent challenges in doing so and we recognise that the CMA will wish to carefully consider and evaluate the various related issues, before considering how it wishes to approach the setting of allowances in this area. However, based on our own review of the evidence and consideration of the topics addressed above, we consider that an appropriate cost assessment methodology should have the following dimensions:

(a) **Adopt a 'mixed method' approach, under which material weight is placed on bottom-up evidence,** as this is more likely to be able to reflect the underlying idiosyncrasies that could account for a material proportion of variation in P-removal enhancement scheme costs.

(b) **Only retain econometric modelling (as part of the evidence mix) where it is robust.** That is, where it can be shown to accurately reflect the relationships between cost drivers and efficient costs. It may be the case, for instance, that modelling small, simple sites could lead to better results.

(c) **Allow for company-specific (rather than across industry/scheme modelling) adjustments.** This is to reflect the fact that certain factors may affect some companies (or schemes) more than the industry on average.

(d) **Make more use of forward-looking evidence, combined with measures to mitigate information asymmetry risk.** This is to ensure that cost allowances are not downwards biased by the material differences in P-removal requirements at PR24, as compared to PR19.

9.102 Overall, the CMA should therefore apply similar tests to those it used at PR19:

(a) is there evidence of insufficient weight having been given to a material factor?; and

(b) has an alternative approach been identified that can be expected to perform better?

9.103 It should then consider the alternative perspectives we set out above and determine an allowance that meets its duties.

9.104 This is the approach we have taken in preparing our costs and so we ask the CMA to allow the costs presented in our Draft Determination Response for those schemes for which Ofwat has used its modelling approach.

9.105 Specifically, for the 113 modelled schemes, we ask the CMA to allow £717m, rather than the Final Determination scheme allowance (post frontier shift and RPE) of £463m.

10 The allowed return

Introduction

10.1 In our view, Ofwat's Final Determination underestimates the appropriate allowed return. This makes it harder for us to attract or retain the financial capital that we need to meet our statutory obligations and deliver the quality of service our customers want. On this basis, we consider the regulator has failed to meet its Duties.

10.2 We therefore ask the CMA to determine an appropriate cost of capital in line with sound economic theory and appropriate cross-checking with alternative approaches, commensurate with the level of risk facing the efficient company.

10.3 To assist the CMA, in this chapter we provide a summary of the key limitations in Ofwat's approach to setting the allowed return; and refer to a range of our own and third-party documents that provide further discussion of these issues.

Criticality of the issue

10.4 The water sector faces significant investment requirements to meet core and new legal obligations, improve resilience and environmental outcomes, and maintain service standards. Across the sector, this will require companies to raise new equity at scale, and much more than in previous regulatory periods.

10.5 This continuation of, and step-up in, capital requirements must be properly supported through the setting of appropriate allowed returns that reflect market conditions and risk.

10.6 This requires, first of all, consideration of the appropriate risk and return balance. It then requires the regulator to calibrate a return in exchange for bearing the chosen level of risk that is commensurate with the returns that investors can obtain by investing in other industries with a similar risk profile.

10.7 Where this is not achieved, or where there is uncertainty as to whether this has been achieved, there is a risk that the actual and efficient company will not be able to finance its functions.

Scope for measurement error, imprecision and uncertainty

10.8 There is considerable uncertainty regarding the measurement of the required return, and specifically the cost of equity, which is often reflected in the use of a range, by both companies and the regulator. This was previously acknowledged by the CMA.[99]

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[99] See 10.73(a) in CMA (March 2021) *Anglian Water, Bristol Water and Yorkshire Water price determinations final report.* Provided as SoC Appendix A215.

10.9 In particular, there is uncertainty regarding how to measure and estimate each of the constituent parts. Many acknowledge the theoretical limitations of the CAPM itself, and so the need to cross-check the results with alternative approaches is accepted. However, even with CAPM, there are uncertainties. For example: there is no single 'right' way of estimating the risk-free rate and the expected market return varies significantly, depending on methodological choices including time periods and averaging approaches; and, in water specifically, estimating the appropriate beta is complicated by the limited number of comparator listed companies.

Ofwat's approach

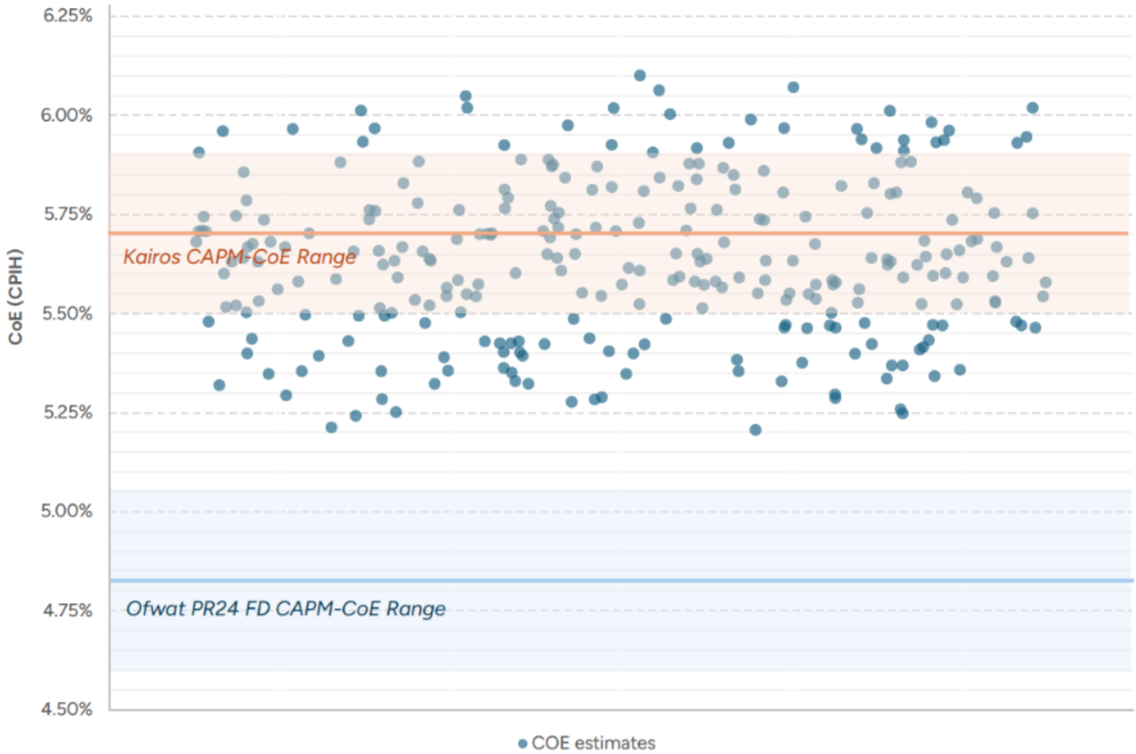
10.10 Ofwat's approach to the cost of capital is set out in its Final Determination[100] and results in a weighted average allowed return at an appointee level of 4.03% (real). This comprises a cost of debt of 3.15% and a cost of equity of 5.10%, weighted at a notional capital structure with 55% gearing. A retail margin of 1.50% is also included within the appointee allowed return.

Concerns with Ofwat's approach

10.11 In the context of the uncertainty inherent in estimating the cost of capital, there are a number of limitations in Ofwat's method for setting allowed returns, which together systematically produce an estimate that is too low. This is illustrated in the results of reports from KPMG and Kairos Economics[101] which show that, across the parameters used to set the allowed return, Ofwat's methodological choices and point estimates result in an overall value of the cost of capital that is at the lower end of the possible range indicated by corporate finance theory, as illustrated in Figure 26 below.

[100] Ofwat (2024) PR24-final-determinations-Aligning-risk-and-return-1.pdf
[101] See Variant 2, page 15, in KPMG (2025), *Assessing the balance of evidence in PR24 FD CoE estimates*, provided as SoC Appendix A226, and Figure 6, page 76 in Kairos Economics (2025) *Setting the Allowed Return on Equity for PR24*, provided as SoC Appendix A225.

Figure 26 – The range of estimates for the CAPM-CoE under different parameter estimates for the RFR, TMR and beta, before addition of aiming-up adjustment



10.12 We provide a summary of the key issues in Ofwat's approach below, and refer the CMA to our Draft Determination Response and the Kairos Economics report for further information on these and their possible remedies.[102]

(a) Risk-free Rate (RFR): Ofwat's risk-free rate was based solely on readings of index-linked gilt yields (ILGs). Whilst this is a valid source of evidence, the CMA found in PR19 that relying exclusively on ILGs will likely understate the true risk-free rate. At the PR19 redeterminations, the CMA therefore placed equal weight on ILG yields and the yield on AAA-rated corporate bonds.

(b) Total market return (TMR): Ofwat's ex ante estimate under its Fama-French approach relies on an interpretation of the trailing 'dividend yield', which results in its overall TMR estimate being 9 bp below the long-run average. In addition, no weight was given to the possibility that the TMR has moved higher in response to the emergence of 'higher-for-longer' interest rates.

(c) Beta: The beta estimate in Ofwat's Final Determination was below the betas that both Ofwat and the CMA determined at PR19. This is despite changes to the risk facing the sector, as may be seen in the regulatory and political environment,[103]

[102] See our Draft Determination Response document *WSX-R01 - Risk and return* (provided in Appendix A152) and the independent reports appended to this; and Kairos Economics (2025) *Setting the Allowed Return on Equity for PR24*, provided as SoC Appendix A225.

[103] See, for example, recent commentary (2024) by Moody's and S&P ratings agencies, provided in SoC Appendices A227 and A228 respectively.

and the increasing scale of investment which increases systematic risk[104]. Ofwat's mistaken reduction in beta was due to:

(i) placing no weight on Pennon, despite best practice UKRN guidance and other evidence suggesting it can be included[105], this has the risk of setting a beta estimate that is not the middle of the range for the sector, but instead is based on relatively stronger performers;

(ii) making no adjustment for the material distorting effect of Covid-19; and

(iii) placing no weight on short term beta estimates or adjusting for forward looking risk to reflect the change in the investment environment.

(d) Limited use of cross checks: No weight was placed on cross checks such as debt-equity premia or multi-factor models, which both show that the proposed CAPM cost of equity is below market expectations as noted in our Draft Determination Response and additionally shown in the Kairos Economics report[106].

(e) Cost of debt: As set by PR24, the PR24 cost of debt allowance currently excludes efficient financing instruments (swaps) and makes adjustments for an 'actual-notional' method. We also consider that the estimates for additional debt costs (cost to carry, basis risk) is currently set lower than the robust bottom-up evidence suggests, as noted in our Draft Determination Response[107].

(f) Retail margin: There are minor errors and inconsistencies in the calculation of the retail margin raised, acknowledged by Ofwat through the query process[108].

(g) Notional gearing level: Ofwat's decision to reduce the level of notional gearing to 55% rests on the assumption that an efficient water company would (i) be able to attract more equity to finance the investment required at PR24; and (ii) naturally aim to finance more of its capital structure through equity at PR24 than at PR19. Moreover, Ofwat does not appear to have considered whether a gearing of 55% is, in fact, efficient, nor whether it is consistent with the other assumptions it makes regarding the efficient company, including the cost of debt (for example) under its Final Determinations.[109]

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[104] See our Draft Determination Response document *WSX-R01 - Risk and return* (provided as SoC Appendix A152) and the independent reports appended to this; and Economic Insight (2024) *The basis for increased systematic risk at PR24* (provided as SoC Appendix A263).

[105] Page 23 and footnote 65 in UK Regulators Network (2023) *Setting the cost of capital*, provided as SoC Appendix A248, and Section 4.4 in Kairos Economics (2025) *Setting the Allowed Return on Equity for PR24*, provided as SoC Appendix A225.

[106] Kairos Economics (2025) *Setting the Allowed Return on Equity for PR24*, provided as SoC Appendix A225.

[107] See our Draft Determination Response document *WSX-R01 - Risk and return* (provided in Appendix A152) and the independent reports appended to this.

[108] Please see *Ofwat (2025) - PR24 FD inbound queries publication - no. 88 and 89* (provided in Appendix A204)

[109] For further discussion of notional gearing, we refer the CMA to work by Economic Insight (2024) *Evaluating the case for a gearing incentive mechanism*, provided as SoC Appendix *A232.*

Alternative perspectives

10.13 Alternative evidence on the cost of capital has been variously presented by companies, and their independent advisors, in the submission of their business plans and responses to the draft determination. As an example, we used our own view of the cost of capital in our business plan submission (4.45% real) rather than Ofwat's early view (3.29% real) despite the risk of failing Ofwat's Quality and Ambition Assessment and being labelled inadequate. This is because we considered Ofwat's early view was too low and would both understate the impact of our proposed plan on customer bills and also result in a plan that was not financeable.

10.14 Given the scale of uncertainty and scope for measurement error in calculating the allowed return, and cost of equity, it is also useful to consider both: (i) alternative methods to that deployed by Ofwat for determining the WACC and cost of equity (CAPM); and (ii) other indicators as to what the appropriate level of the WACC should be.

10.15 In relation to alternative methods the CMA could consider the following.

(a) Other methodologies and cross-checks, for example multi-factor modelling. We refer the CMA to a number of independent reports on these submitted by companies in their business plans and Draft Determination Responses and again in the Kairos Economics report.[110]

(b) Adopting a method that can reflect increased forward-looking risk within the allowed equity return.

(c) The impact on systematic risk of the size of the capital programme, which is doubling in the coming period under our forecast, and the associated significant growth of the regulated capital value.

(d) Addressing the other issues identified in the preceding section.

10.16 In relation to other indicators, we would ask the CMA to consider with care what wider indicators suggest as to the intuitive plausibility of the appropriate level of WACC. These wider 'cross-checks' on the allowed return and cost of equity could include the following.

(a) The returns earned by investors in water companies on their alternative infrastructure investments (e.g. energy companies in the UK, electricity networks in Germany, water networks in the US, etc.).

(b) The returns implied in other infrastructure companies in competitive markets.

[110] See our Draft Determination Response document *WSX-R01 - Risk and return* (provided in Appendix A152) and the independent reports appended to this; and Kairos Economics (2025) *Setting the Allowed Return on Equity for PR24*, provided as SoC Appendix A225.

(c) The cost of equity implied by the application of approaches used by other authorities (e.g. the CMA's approach at PR19, Ofgem's approach at RIIO-3, etc.). As with other cross-checks, this will need to carefully consider specific circumstances in the water sector, e.g. the size of capital programme at PR24 is materially different than at PR19.

(d) Any relevant outturn data on returns, e.g. return on debt issuances by water companies, traded yields on water companies' debt, the return on the recent rights issuances by Pennon Group, etc.

(e) The results from investor surveys, e.g. Moody's, Barclays, Oxera, etc. For instance, the investor survey conducted by Oxera suggested that a minimum cost of equity in the water sector would be 9-9.5% (nominal).[111]

Changes since Draft Determination Response

10.17 Market movements subsequent to the Draft Determination Response should properly be taken into account in the CMA's redetermination and we would therefore expect a contemporaneous cut-off date for market evidence.

Requests to the CMA

10.18 The evidence shows a clear need for higher allowed returns for the sector. We ask the CMA to scrutinise each component part of the WACC calculation in detail and, applying economic logic, take a balanced assessment of the required return in the round.

[111] Oxera (2024) *PR24 Investor Engagement Report*, provided as SoC Appendix *A233.*

11 Conclusion

11.1 In conclusion, Wessex Water's Statement of Case for the PR24 CMA Redetermination highlights several critical areas where Ofwat's Final Determination falls short of meeting the necessary regulatory duties. Our focused approach to the redetermination process is designed to address these key issues efficiently and effectively, ensuring that the most critical aspects of the determination receive the attention they require.

11.2 We have demonstrated that the Final Determination underfunds Wessex Water in several areas, including new disinfection at water treatment centres, new bioresources health and safety requirements, wholesale water base costs, and phosphorus removal. These underfunded areas are essential for us to meet our statutory obligations and deliver the quality of service our customers expect and deserve.

11.3 Our request to the CMA is to allow the necessary cost allowances to address these underfunded areas, ensuring that Wessex Water can continue to operate efficiently and effectively. Specifically, we request the following.

(a) New Disinfection at Water Treatment Centres: An allowance of £47m to deliver the disinfection improvements required by the DWI and WHO.

(b) New Bioresources Health and Safety Requirements: An allowance of £178m to meet new health and safety obligations at our bioresources centres.

(c) Wholesale Water Base Costs: An allowance of £892m, representing a £244m increase on Ofwat’s Final Determination, to ensure our base capital maintenance and operating costs are adequately funded.

(d) Phosphorus Removal: An allowance of £717m for the 113 modelled schemes, rather than the FD scheme allowance of £463m.

(e) Allowed Return: Ensure it is set at a level that reflects the true cost of capital, enabling us to attract and retain the necessary financial capital to meet our obligations and deliver high-quality services.

11.4 In the event the CMA opts to take a detailed look at any of the other areas we identified issues with as part of its overall redetermination, we reserve the right to make such submissions as we consider necessary and for the CMA to consider the appropriate redetermination for Wessex Water.

11.5 By addressing these critical areas, the CMA can ensure that Wessex Water is adequately funded to meet its obligations, deliver long-term resilience, and provide the high-quality service our customers expect at an affordable level.

11.6 We are committed to working constructively with the CMA, and with all relevant parties and stakeholders, throughout this process to achieve a fair and balanced outcome that serves the best interests of our customers, the environment, and the wider community.

Wessex Water

PR24 CMA Redetermination

Annex A1 – Table of redactions

1 Table of redactions

1.1 Table A1-1 summarises each of the sections of our Statement of Case and associated attached annexes we request redactions for.

1.2 The redacted text is highlighted in blue (or with a blue background as per this paragraph for substantial sections/whole chapters to aid readability) in the confidential version (with ‘Confidential’ in the header) that has been sent to the CMA. This version can be shared with Ofwat.

1.3 A second redacted version has then been submitted. This is the version that can be shared with other water companies and published. Redacted text is marked with a ✄ symbol.

Table A1-1 – Redactions within our Statement of Case and attached annexes

Section	Title/Theme	Reason for redaction
Chapter 7	New bioresources health and safety requirements	This chapter is redacted due to it containing sensitive health and safety information.
Annex A8	Further information on Bioresources health and safety requirements	This chapter is redacted due to it containing sensitive health and safety information.
Chapter 8	Wholesale water base costs	DWI guidance states that specific water supply site and scheme locations and names should not be placed in the public domain. We have therefore redacted all names. This includes the annexes to this document, which present correspondence with the DWI about specific sites in question.
Annex A9	Further information on wholesale water base costs	DWI guidance states that specific water supply site and scheme locations and names should not be placed in the public domain. We have therefore redacted all names. This includes the annexes to this document, which present correspondence with the DWI about specific sites in question.
Annex A7	Further information on disinfection at water treatment centres	DWI guidance states that specific water supply site and scheme locations and names should not be placed in the public domain. We have therefore redacted all names.
Small references throughout the main Statement of Case	✄	

1.4 Table A1-2 then contains a summary of the documents in our appendices that should not be published. This table aligns with the redacted versions that were sent to Ofwat as part of our October 2023 Business Plan submission and our August 2024 Draft Determination Response.

Table A1-2 – Redactions within the appendices submitted alongside our Statement of Case

Document	Section	Theme	Reasoning
October 2023 business plan submission			
A010 - WSX02 - An overview of our business plan	Section 1.11	Cyber security overview	This section has been redacted as our cyber security strategy is confidential for reasons of security.
A011 - WSX03 - Long term delivery strategy	Section 3.10.1	Cyber security overview	This section has been redacted as our cyber security strategy is confidential for reasons of security.
A017 - WSX09 - Annexes - Base cost adjustment claims	Sections A6, A8, A9, A10	Energy costs	These sections are redacted for reasons of commercial confidentiality and the reports produced by third parties
A018 - WSX10 - Maintaining our services commentary and analysis	Sections 3.2.1 / 3.3.1 / 3.3.4 – 3.3.6 Sections 4.2 and 4.3.3 Figure 7	Supply side information	DWI guidance states that specific water supply site and scheme locations and names should not be placed in the public domain. We also have redacted specific investment information related to these areas.
A020 - WSX12 - Water resources strategy and investment	Various sections	Supply side information	DWI guidance states that specific water supply site and scheme locations and names should not be placed in the public domain.
A021 - WSX14 - Water networks plus strategy and investment	Various sections	Supply side information	DWI guidance states that specific water supply site and scheme locations and names should not be placed in the public domain.
A022 - WSX15 - Annexes - Water networks plus strategy and investment	Sections A1 and A3	Supply side information	DWI guidance states that specific water supply site and scheme locations and names should not be placed in the public domain.
A032 - WSX26 - Price control deliverables (PCDs)	Tables 17 and 18	Cyber security proposals	This section has been redacted as our cyber security strategy is confidential for reasons of security.
A037 - WSX32 - Annexes - Risk and return	Section A1	Debt report produced by 3rd party	This has been redacted for reasons of commercial confidentially.
A051 - WSX46 - Data tables	Table RR22	Analysis of debt table	This has been redacted for reasons of commercial confidentially.
A054 - WSX49 - Costs wholesale water tables commentary	Section 4.5.3	Supply side information	DWI guidance states that specific water supply site and scheme locations and names should not be placed in the public domain.
A059 - WSX54 - Long term strategies tables commentary	Sections 3.4 and 4.4	Supply side information	DWI guidance states that specific water supply site and scheme locations and names should not be placed in the public domain.
August 2024 Draft Determination Response			
A144 - WSX-M06 - Long-Term Delivery Strategy	Resilience / SEMD	Discussion of future cyber security requirements and costs	This section has been redacted as our cyber security strategy is confidential for reasons of security. This includes information on future costs and requirements, which we consider could be used be threat actors to infer the status of our cyber security programme and target our approach.
A143 -WSX-M05 - Quality and Ambition Assessment	Annex 2 - Transition and Deliverability	Information on contractual arrangements, supply chain engagement and risk management	This information has been redacted as it is commercially sensitive; our supply chain will only be briefed on these details through a coordinated comms plan in Sept/October. Our Board saw the assessment of risk as specifically sensitive given we will be seeking to progress various mitigations that could involve the supply chain, and third party stakeholders and again we are seeking to progress these in a coordinated way to the benefit of efficient delivery and therefore our customers.

Document	Section	Theme	Reasoning
A098 - WSX-C01 - Step up in capital maintenance and base costs	Figure 10 Table 4	Labour rates and opex information	These figures contain granular cost information provided by other companies as part of an industry benchmarking exercise. We are not aware that this information has been shared publicly so we have redacted the specific information.
A100 - WSX-C03 - Overall approach to costing	Sections 1.3.1, 1.6 and 1.7	Procurement processes Outturn costs	Section 1.3.1 contains detailed information on our internal procurement processes, including details of contract numbers and orders. We do not consider it appropriate for this to be in the public domain.
A102 - WSX-C05 - Enhancement costs - Water quality improvements	Various sections All annexes	Water supply site and scheme locations	DWI guidance states that specific water supply site and scheme locations and names should not be placed in the public domain. We have therefore redacted all names. This includes the annexes to this document, which present correspondence with the DWI about specific sites in question.
A105 - WSX-C08 - Enhancement costs - Supply schemes	Various sections	Water supply site and scheme locations	DWI guidance states that specific water supply site and scheme locations and names should not be placed in the public domain. We have therefore redacted all names.
A106 - WSX-C09 - Enhancement costs - Wastewater treatment	Tables 6 and 28	Specific cost benchmarking information	These tables contain cost information for specific schemes / solutions. We consider this to be confidential for commercial reasons, as disclosing this information could prejudice future discussions with suppliers. We have therefore redacted these figures.
A109 - WSX-C12 - Enhancement costs - Pollutions	Figures in Sections 1.3, 2.2 and 2.3	Granular cost information on pollution reduction activities	The figures contain a breakdown of costs which is based on information from external suppliers. These reflect commercial negotiations and agreements which we would consider to be confidential.
A110 - WSX-C13 - Enhancement costs - Resilience	Sections 1.1 and 2 Annexes 1 and 2	Information on cyber security requirements and costs DWI Regulation 17 Notice underpinning these requirements Cyber security maturity assessment	These sections have been redacted as our cyber security strategy is confidential for reasons of security. The redacted sections contain information pertaining to our critical national infrastructure. Disclosing this information could flag to any threat actors that there could be a potential weakness in our technologies. This includes information on how our costs have been derived, which we consider could be used be threat actors to infer the status of our cyber security programme and target our approach.
A113 - WSX-C16 - Wastewater investigations	Annexes 2, 3 and 5	Supplier cost information (Annexes 2 and 3) Storm overflow flowchart (Annex 5)	Annexes 2 and 3 contain a breakdown of modelling / AI service provision costs from external suppliers. These reflect commercial negotiations and agreements which we would consider to be confidential. Annex 5 sets out a flowchart from the Environment Agency. We are not aware this has been shared publicly so have redacted this flowchart.
A148 - WSX-O01 - Performance and Outcomes	Section 6.3	Information on business demand requirements for a specific user	A piece of information in this section is drawn from confidential discussions with a specific potential user. While this user has not been named, we consider it would not be appropriate to disclose this information.

Document	Section	Theme	Reasoning
A149 - WSX-O02 - Price Control Deliverables	Section 3.1.1	Information on smart meter SLAs	This information is drawn from confidential discussions with smart meter suppliers. While suppliers have not been named, we consider that stating this information publicly could prejudice these discussions and so it would not be appropriate to do so.
A127 - WSX-D03 - Commentary on data table changes - Costs wholesale water	Sections 5.5 and 18.5	Discussion of cyber security costs	These sections have been redacted as our cyber security strategy is confidential for reasons of security. This includes information on how our costs have been derived, which we consider could be used be threat actors to infer the status of our cyber security programme and target our approach.
Wider appendices that are redacted			
A226 - KPMG - March 2020 - Assessing the balance of evidence in PR24 Final Determination CoE estimates	Whole report	Cost of Equity	Redacted for commercial reasons in producing the report
A241 - Valuation Office Agency - February 2025 - Draft valuation letter - Revaluation 2026 - Wessex Water	Whole	Valuation for the water supply network	This contains commercially sensitive information and would require permission from the Valuation Office Agency to publish.
A234 – [redacted] WTC concept design – Confidential	Whole appendix	WTC design	DWI guidance states that specific water supply site and scheme locations and names as well as treatment process information should not be placed in the public domain.
A235 - Detailed cost estimate for [redacted] – Confidential	Whole appendix	WTC cost of design	DWI guidance states that specific water supply site and scheme locations and names as well as treatment process information should not be placed in the public domain. Costing information contains design/treatment information so we have redacted this document.
[redacted]			
[redacted]			
A267 - Chapter 7 - New bioresources health and safety requirements data sources - CONFIDENTIAL.xlsx	[redacted]		

1.5 We have sent the CMA the confidential versions of these documents as we understand that they will not be shared or published. If at any point the CMA wishes to share a copy of these documents we can submit a redacted version. We have not provided these at this point in time to avoid confusion.

1.6 All documents that have redacted versions have 'Confidential' at the end of the title.

Wessex Water

PR24 CMA Redetermination

Annex A2 – List of tables and figures

1 Tables and figures in the main Statement of Case

Tables

Figures

2 Tables and figures in the annexes

Annex A1 – Table of redactions

Figures – None

Annex A2 – List of tables and figures

Tables – None

Figures – None

Annex A3 – Table of new evidence provided

Figures – None

Annex A4 – Index of supporting material

Annex A5 – Areas we reserve the right to make further submissions on as necessary

Annex A6 – Areas we are willing to accept in the round

Annex A7 – Further information on disinfection at water treatment centres

Annex A8 – Further information on bioresources health and safety requirements

Annex A9 – Further information on wholesale water base costs

Annex A10 – Addressing Ofwat's concern with our base cost adjustment claim

Annex A11 – The regulatory drivers of phosphorus removal

Annex A12 – An overview of the treatment processes for phosphorus removal

Annex A13 – Examples of Wessex Water's sites that require phosphorus removal

Annex A14 – How the Ofwat phosphorus removal model works

Annex A15 – Supplementary phosphorus removal analysis

Annex A16 – Glossary

Wessex Water

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Annex A3 – Table of new evidence provided

1 New areas raised in our Statement of Case

1.1 Table A3-1 details each of the chapters and annexes within our main Statement of Case (SoC) submission and whether there is new information subsequent to our October 2023 business plan submission, Draft Determination and responses to Ofwat queries.

Table A3-1 – Areas of new information raised in our Statement of Case

SoC chapter/annex	Details of new information provided
Foreword	No new evidence
Executive Summary	No new evidence
Wessex Water	No new evidence
Our performance	No new evidence
Ofwat's regulation and duties	No new evidence
New disinfection at water treatment centres – chapter and annex	Further information is provided in relation to our Draft Determination Response.
New bioresources health and safety requirements – chapter and annex	Further information is provided in relation to our Draft Determination Response.
Wholesale water base costs – chapter and annex	Further analysis and review of Ofwat's models (as per its Final Determination) has been provided.
Phosphorus removal	Further analysis and review of Ofwat's models (as per its Final Determination) has been provided.
Allowed return	No new evidence
Conclusion	No new evidence
Table of redactions	No new evidence
List of tables and figures	No new evidence
Table of new evidence provided	No new evidence
Index of supporting material	No new evidence
Areas we reserve the right to make further submissions on as necessary	No new evidence
Areas we are willing to accept in the round	No new evidence
Assessing Ofwat's concern with our base cost adjustment claim	Further information is provided in relation to our proposed expenditure. This is, in part, in response to concerns raised by Ofwat in its Final Determination.
The regulatory drivers of phosphorus removal	No new evidence
An overview of the treatment processes for phosphorus removal	No new evidence

SoC chapter/annex	Details of new information provided
Examples of Wessex Water's sites that require phosphorus removal	Further information is provided in relation to our proposed expenditure. This is, in part, in response to concerns raised by Ofwat in its Final Determination.
How the Ofwat phosphorus removal model works	Not applicable.
Alternative approaches to the phosphorus removal model	Further analysis and review of Ofwat's models (as per its Final Determination) has been provided.

1.2 Table A3-2**Error! Reference source not found.** highlights any material in the appendices submitted alongside this Statement of Case that is new.

Table A3-2 – Appendices with new information since Ofwat's Final Determination

SoC appendix	Details of new information provided
A195 - OFW-FD-WSX-012 - response.docx	Query raised querying the error in the Ofwat Final Determination growth model. However, we note this information has been shared with Ofwat since its Final Determination
A204 - Ofwat - March 2025 - PR24 FD inbound queries publication - no. 88 and 89.docx	Queries that were raised by other companies during the Final Determination query process. This information is not new to Ofwat.
A222 - Economic Insight - March 2025 - A balanced approach to ensuring long-term asset resilience.pdf	Independent consultancy report, commissioned in response to Ofwat's Final Determination.
A225 - Kairos Economics - March 2025 - PR24 Allowed Return on Equity Report.pdf	Independent consultancy report, commissioned in response to Ofwat's Final Determination.
A226 - KPMG - March 2025 - Assessing the balance of evidence in PR24 FD CoE estimates - Confidential.pdf	Independent consultancy report, commissioned in response to Ofwat's Final Determination.
A229 - Economic Insight - March 2025 - Evidence on overall company returns in the water industry.pdf	Independent consultancy report, commissioned in response to Ofwat's Final Determination.
A230 - Economic Insight - March 2025 - List of figures and tables for two March reports (A223 and A230).pdf	Independent consultancy report, commissioned in response to Ofwat's Final Determination. Please note the associated excel files (A278 – A297) are listed within this document

SoC appendix	Details of new information provided
A234 - Wessex Water - March 2025 – [redacted] WTC concept design - Confidential.pptx	Further information is provided in relation to our Draft Determination Response. [redacted]
A235 - Wessex Water - March 2025 - Detailed cost estimate for [redacted] - Confidential.pdf	Further information is provided in relation to our Draft Determination Response. [redacted]
A238 - Frontier Economics - March 2025 - Background material for CMA.pptx	This information has been created since the Final Determination. However, it is a summary of the industry provided for the CMA rather than new evidence.
A240 - Wessex Water - March 2025 - Alternative approaches to the base cost models.docx	Internal analysis of Ofwat's base costs models, produced in response to Ofwat's Final Determination.
A241 - Valuation Office Agency - February 2025 - Draft valuation letter - Revaluation 2026 - Wessex Water - Confidetial.pdf	This is provided as additional evidence of the draft valuation for supply business rates.
A257 - Wessex Water - March 2025 - Letter to CMA re DWI disinfection support.pdf	Letter to the CMA providing further information on new disinfection at water treatment centres.
A263 - Economic Insight - December 2024 - The basis for increased systematic risk at PR24.pdf	Independent consultancy report, commissioned in response to Ofwat's Draft Determination.

Wessex Water

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Annex A4 – Index of supporting material

1.1 Table A4-1 provides a full list of documents referred to within our Statement of Case.

1.2 For ease of reference it is split into sections covering:

(a) Introductory videos and webinars produced for the CMA

(b) Our October 2023 Business Plan submission

(c) Our August 2024 Draft Determination Response submission

(d) Historic APRs provided for information

(e) Ofwat queries raised as part of the PR24 process that are referenced

(f) Ofwat documents excluding the Final Determination

(g) Any wider documents we refer to

(h) Excel files of supporting data

1.3 The document dates are given as accurately as possible:

(a) Where the creation/publication date is known, the exact date is given (e.g. 7 July 2024)

(b) When only the month is known, the first day of the month is given (e.g. 1 July 2024)

(c) When only the year is known, the last day of the year is given (e.g. 31 December 2024)

(d) Where applicable, such as for websites or where no date is given, the access date when the copy was taken is given (e.g. 18 March 2025).

1.4 Those marked with 'Confidential' will have redacted elements in any publicly shared version, such as those on our website.

Table A4-1 – Index of appendices to Wessex Water's Statement of Case

Name	Date	Context	Position
Video files			
A001 - Introduction to Wessex Water.mp4	19 March 2025	Provided as background information for the CMA team	Produced for CMA submission; latest position
A002 - How we treat your waste water.mp4	01 March 2025	Provided as background information for the CMA team	Produced for CMA submission; latest position
A003 - How we treat your water.mp4	01 November 2024	Provided as background information for the CMA team	Produced for CMA submission; latest position
A004 - A8 - New bioresources health and safety requirements webinar.mp4	17 March 2025	Provided as background information for the CMA team	Produced for CMA submission; latest position

Name	Date	Context	Position
A005 - A9 - Further information on wholesale water base costs.mp4	18 March 2025	Provided as background information for the CMA team	Produced for CMA submission; latest position
A006 - A11 - The regulatory drivers of phosphorus removal.mp4	17 March 2025	Provided as background information for the CMA team	Produced for CMA submission; latest position
A007 - A12 - An overview of treatment processes for phosphorus removal.mp4	17 March 2025	Provided as background information for the CMA team	Produced for CMA submission; latest position
PR24 Business Plan submission documents – October 2023			
A008 - WSX00 - Navigation document.pdf	02 October 2023	Several of our Business Plan documents are referenced in our Statement of Case. Full October 2023 submission provided for ease.	Business Plan submission
A009 - WSX01 - Striking the Balance (Executive Summary).pdf	02 October 2023	Several of our Business Plan documents are referenced in our Statement of Case. Full October 2023 submission provided for ease.	Business Plan submission
A010 - WSX02 - an overview of our business plan - CONFIDENTIAL.pdf	02 October 2023	Several of our Business Plan documents are referenced in our Statement of Case. Full October 2023 submission provided for ease.	Business Plan submission
A011 - WSX03 - Long term delivery strategy - CONFIDENTIAL.pdf	02 October 2023	Several of our Business Plan documents are referenced in our Statement of Case. Full October 2023 submission provided for ease.	Business Plan submission
A012 - WSX04 - A summary of our customer research.pdf	02 October 2023	Several of our Business Plan documents are referenced in our Statement of Case. Full October 2023 submission provided for ease.	Business Plan submission

Name	Date	Context	Position
A013 - WSX05 - Affordability and acceptability testing.pdf	02 October 2023	Several of our Business Plan documents are referenced in our Statement of Case. Full October 2023 submission provided for ease.	Business Plan submission
A014 - WSX06 - Customer research triangulation.pdf	02 October 2023	Several of our Business Plan documents are referenced in our Statement of Case. Full October 2023 submission provided for ease.	Business Plan submission
A015 - WSX07 - You said, we did.pdf	02 October 2023	Several of our Business Plan documents are referenced in our Statement of Case. Full October 2023 submission provided for ease.	Business Plan submission
A016 - WSX08 - Base cost assessment commentary and analysis.pdf	02 October 2023	Several of our Business Plan documents are referenced in our Statement of Case. Full October 2023 submission provided for ease.	Business Plan submission
A017 - WSX09 - Annexes - Base cost adjustment claims - CONFIDENTIAL.pdf	02 October 2023	Several of our Business Plan documents are referenced in our Statement of Case. Full October 2023 submission provided for ease.	Business Plan submission
A018 - WSX10 - Maintaining our services commentary and analysis - CONFIDENTIAL.pdf	02 October 2023	Several of our Business Plan documents are referenced in our Statement of Case. Full October 2023 submission provided for ease.	Business Plan submission
A019 - WSX11 - Annexes - Maintaining our services.pdf	02 October 2023	Several of our Business Plan documents are referenced in our Statement of Case. Full October 2023 submission provided for ease.	Business Plan submission

Name	Date	Context	Position
A020 - WSX12 - Water resources strategy and investment - CONFIDENTIAL.pdf	02 October 2023	Several of our Business Plan documents are referenced in our Statement of Case. Full October 2023 submission provided for ease.	Business Plan submission
A021 - WSX14 - Water networks plus strategy and investment - CONFIDENTIAL.pdf	02 October 2023	Several of our Business Plan documents are referenced in our Statement of Case. Full October 2023 submission provided for ease.	Business Plan submission
A022 - WSX15 - Annexes - Water networks plus strategy and investment - CONFIDENTIAL.pdf	02 October 2023	Several of our Business Plan documents are referenced in our Statement of Case. Full October 2023 submission provided for ease.	Business Plan submission
A023 - WSX16 - Waste water networks plus strategy and investment.pdf	02 October 2023	Several of our Business Plan documents are referenced in our Statement of Case. Full October 2023 submission provided for ease.	Business Plan submission
A024 - WSX17 - Annexes - Wastewater networks plus strategy and investment.pdf	02 October 2023	Several of our Business Plan documents are referenced in our Statement of Case. Full October 2023 submission provided for ease.	Business Plan submission
A025 - WSX18 - Bioresources strategy and investment.pdf	02 October 2023	Several of our Business Plan documents are referenced in our Statement of Case. Full October 2023 submission provided for ease.	Business Plan submission
A026 - WSX19 - Annexes - Bioresources strategy and investment.pdf	02 October 2023	Several of our Business Plan documents are referenced in our Statement of Case. Full October 2023 submission provided for ease.	Business Plan submission

Name	Date	Context	Position
A027 - WSX20 - Residential retail strategy and analysis.pdf	02 October 2023	Several of our Business Plan documents are referenced in our Statement of Case. Full October 2023 submission provided for ease.	Business Plan submission
A028 - WSX21 - Annexes - Residential retail.pdf	02 October 2023	Several of our Business Plan documents are referenced in our Statement of Case. Full October 2023 submission provided for ease.	Business Plan submission
A029 - WSX22 - Developer services strategy and analysis.pdf	02 October 2023	Several of our Business Plan documents are referenced in our Statement of Case. Full October 2023 submission provided for ease.	Business Plan submission
A030 - WSX23 - Our route to net zero.pdf	02 October 2023	Several of our Business Plan documents are referenced in our Statement of Case. Full October 2023 submission provided for ease.	Business Plan submission
A031 - WSX25 - Improving biodiversity.pdf	02 October 2023	Several of our Business Plan documents are referenced in our Statement of Case. Full October 2023 submission provided for ease.	Business Plan submission
A032 - WSX26 - Price control deliverables (PCDs) – CONFIDENTIAL.pdf	02 October 2023	Several of our Business Plan documents are referenced in our Statement of Case. Full October 2023 submission provided for ease.	Business Plan submission
A033 - WSX27 - PCD modelling spreadsheet.xlsx	02 October 2023	Several of our Business Plan documents are referenced in our Statement of Case. Full October 2023 submission provided for ease.	Business Plan submission

Name	Date	Context	Position
A034 - WSX29 - Transition and Delivery.pdf	02 October 2023	Several of our Business Plan documents are referenced in our Statement of Case. Full October 2023 submission provided for ease.	Business Plan submission
A035 - WSX30 - Direct Procurement for Customers assessment.pdf	02 October 2023	Several of our Business Plan documents are referenced in our Statement of Case. Full October 2023 submission provided for ease.	Business Plan submission
A036 - WSX31 - Risk and return.pdf	02 October 2023	Several of our Business Plan documents are referenced in our Statement of Case. Full October 2023 submission provided for ease.	Business Plan submission
A037 - WSX32 - Annexes - Risk and return - CONFIDENTIAL.pdf	02 October 2023	Several of our Business Plan documents are referenced in our Statement of Case. Full October 2023 submission provided for ease.	Business Plan submission
A038 - WSX33 - Financial resilience and financeability.pdf	02 October 2023	Several of our Business Plan documents are referenced in our Statement of Case. Full October 2023 submission provided for ease.	Business Plan submission
A039 - WSX34 - Annexes - Financial resilience and financeability.pdf	02 October 2023	Several of our Business Plan documents are referenced in our Statement of Case. Full October 2023 submission provided for ease.	Business Plan submission
A040 - WSX35 - Financial assumptions underpinning the plan.pdf	02 October 2023	Several of our Business Plan documents are referenced in our Statement of Case. Full October 2023 submission provided for ease.	Business Plan submission

Name	Date	Context	Position
A041 - WSX36 - Annexes - Financial assumptions underpinning the plan.pdf	02 October 2023	Several of our Business Plan documents are referenced in our Statement of Case. Full October 2023 submission provided for ease.	Business Plan submission
A042 - WSX37 - Resilience and decision making framework.pdf	02 October 2023	Several of our Business Plan documents are referenced in our Statement of Case. Full October 2023 submission provided for ease.	Business Plan submission
A043 - WSX38 - Annexes - resilience and decision making framework.pdf	02 October 2023	Several of our Business Plan documents are referenced in our Statement of Case. Full October 2023 submission provided for ease.	Business Plan submission
A044 - WSX39 - Estimating the cost of equity for PR24 - report by KPMG.pdf	02 October 2023	Several of our Business Plan documents are referenced in our Statement of Case. Full October 2023 submission provided for ease.	Business Plan submission
A045 - WSX40 - Inference analysis as a cross-check on allowed returns - report by KPMG.pdf	02 October 2023	Several of our Business Plan documents are referenced in our Statement of Case. Full October 2023 submission provided for ease.	Business Plan submission
A046 - WSX41 - RORE commentary and analysis.pdf	02 October 2023	Several of our Business Plan documents are referenced in our Statement of Case. Full October 2023 submission provided for ease.	Business Plan submission
A047 - WSX42 - RORE modelling.xlsx	02 October 2023	Several of our Business Plan documents are referenced in our Statement of Case. Full October 2023 submission provided for ease.	Business Plan submission

Name	Date	Context	Position
A048 - WSX43 - Annexes - RORE commentary and analysis.pdf	02 October 2023	Several of our Business Plan documents are referenced in our Statement of Case. Full October 2023 submission provided for ease.	Business Plan submission
A049 - WSX44 - Our assurance strategy and assurance statements.pdf	02 October 2023	Several of our Business Plan documents are referenced in our Statement of Case. Full October 2023 submission provided for ease.	Business Plan submission
A050 - WSX45 - Annexes - Assurance reports.pdf	02 October 2023	Several of our Business Plan documents are referenced in our Statement of Case. Full October 2023 submission provided for ease.	Business Plan submission
A051 - WSX46 - Data tables - CONFIDENTIAL.xlsb	02 October 2023	Several of our Business Plan documents are referenced in our Statement of Case. Full October 2023 submission provided for ease.	Business Plan submission
A052 - WSX47 - Outcomes tables commentary.pdf	02 October 2023	Several of our Business Plan documents are referenced in our Statement of Case. Full October 2023 submission provided for ease.	Business Plan submission
A053 - WSX48 - Risk and return tables commentary.pdf	02 October 2023	Several of our Business Plan documents are referenced in our Statement of Case. Full October 2023 submission provided for ease.	Business Plan submission
A054 - WSX49 - Costs wholesale water tables commentary.pdf	02 October 2023	Several of our Business Plan documents are referenced in our Statement of Case. Full October 2023 submission provided for ease.	Business Plan submission

Name	Date	Context	Position
A055 - WSX50 - Costs wholesale waste water tables commentary.pdf	02 October 2023	Several of our Business Plan documents are referenced in our Statement of Case. Full October 2023 submission provided for ease.	Business Plan submission
A056 - WSX51 - Water resources tables commentary.pdf	02 October 2023	Several of our Business Plan documents are referenced in our Statement of Case. Full October 2023 submission provided for ease.	Business Plan submission
A057 - WSX52 - Bioresources tables commentary.pdf	02 October 2023	Several of our Business Plan documents are referenced in our Statement of Case. Full October 2023 submission provided for ease.	Business Plan submission
A058 - WSX53 - Retail tables commentary.pdf	02 October 2023	Several of our Business Plan documents are referenced in our Statement of Case. Full October 2023 submission provided for ease.	Business Plan submission
A059 - WSX54 - Long term strategies tables commentary.pdf	02 October 2023	Several of our Business Plan documents are referenced in our Statement of Case. Full October 2023 submission provided for ease.	Business Plan submission
A060 - WSX55 - Developers services tables commentary.pdf	02 October 2023	Several of our Business Plan documents are referenced in our Statement of Case. Full October 2023 submission provided for ease.	Business Plan submission
A061 - WSX56 - Supplementary tables commentary.pdf	02 October 2023	Several of our Business Plan documents are referenced in our Statement of Case. Full October 2023 submission provided for ease.	Business Plan submission

Name	Date	Context	Position
A062 - WSX57 - Summary for board presentation tables commentary.pdf	02 October 2023	Several of our Business Plan documents are referenced in our Statement of Case. Full October 2023 submission provided for ease.	Business Plan submission
A063 - WSX58 - Past delivery tables commentary.pdf	02 October 2023	Several of our Business Plan documents are referenced in our Statement of Case. Full October 2023 submission provided for ease.	Business Plan submission
A064 - WSX59 - Our strategic direction statement - Water - a new direction.pdf	02 October 2023	Several of our Business Plan documents are referenced in our Statement of Case. Full October 2023 submission provided for ease.	Business Plan submission
A065 - WSX60 - Our drainage and wastewater management plan.pdf	02 October 2023	Several of our Business Plan documents are referenced in our Statement of Case. Full October 2023 submission provided for ease.	Business Plan submission
A066 - WSX61 - Our water resources management plan.pdf	02 October 2023	Several of our Business Plan documents are referenced in our Statement of Case. Full October 2023 submission provided for ease.	Business Plan submission
A067 - WSX63 - Vulnerability strategy - Every customer matters.pdf	02 October 2023	Several of our Business Plan documents are referenced in our Statement of Case. Full October 2023 submission provided for ease.	Business Plan submission
A068 - WSX64 - Wessex Water Customer Challenge Group report.pdf	02 October 2023	Several of our Business Plan documents are referenced in our Statement of Case. Full October 2023 submission provided for ease.	Business Plan submission

Name	Date	Context	Position
A069 - WSX65 - Continuous customer feedback and insight.pdf	02 October 2023	Several of our Business Plan documents are referenced in our Statement of Case. Full October 2023 submission provided for ease.	Business Plan submission
A070 - WSX66 - Signposting document for quality and ambition assessment.xlsx	02 October 2023	Several of our Business Plan documents are referenced in our Statement of Case. Full October 2023 submission provided for ease.	Business Plan submission
A071 - WSX67 - Redaction policy.pdf	02 October 2023	Several of our Business Plan documents are referenced in our Statement of Case. Full October 2023 submission provided for ease.	Business Plan submission
A072 - WSX68 - PR19 Innovation funding reconciliation model.xlsm	02 October 2023	Several of our Business Plan documents are referenced in our Statement of Case. Full October 2023 submission provided for ease.	Business Plan submission
A073 - WSX69 - Ofwat financial model - Ofwat view on notional structure and cost of capital.xlsx	02 October 2023	Several of our Business Plan documents are referenced in our Statement of Case. Full October 2023 submission provided for ease.	Business Plan submission
A074 - WSX70 - Ofwat financial model - Wessex Water view on notional structure and cost of capital.xlsx	02 October 2023	Several of our Business Plan documents are referenced in our Statement of Case. Full October 2023 submission provided for ease.	Business Plan submission
A075 - WSX71 - Bill waterfall model.xlsx	02 October 2023	Several of our Business Plan documents are referenced in our Statement of Case. Full October 2023 submission provided for ease.	Business Plan submission

Name	Date	Context	Position
A076 - WSX72 - Revenue reconciliation model.xlsx	02 October 2023	Several of our Business Plan documents are referenced in our Statement of Case. Full October 2023 submission provided for ease.	Business Plan submission
A077 - WSX73 - RCV reconciliation model.xlsx	02 October 2023	Several of our Business Plan documents are referenced in our Statement of Case. Full October 2023 submission provided for ease.	Business Plan submission
A078 - WSX74 - Revenue forecasting incentive model.xlsb	02 October 2023	Several of our Business Plan documents are referenced in our Statement of Case. Full October 2023 submission provided for ease.	Business Plan submission
A079 - WSX75 - Bilateral entry adjustment (BEA) model.xlsx	02 October 2023	Several of our Business Plan documents are referenced in our Statement of Case. Full October 2023 submission provided for ease.	Business Plan submission
A080 - WSX76 - 2023-24 ODI performance model for use in PR24 business plan.xlsx	02 October 2023	Several of our Business Plan documents are referenced in our Statement of Case. Full October 2023 submission provided for ease.	Business Plan submission
A081 - WSX77 - 2024-25 ODI performance model for use in PR24 business plan.xlsx	02 October 2023	Several of our Business Plan documents are referenced in our Statement of Case. Full October 2023 submission provided for ease.	Business Plan submission
A082 - WSX78 - Residential retail reconciliation model.xlsx	02 October 2023	Several of our Business Plan documents are referenced in our Statement of Case. Full October 2023 submission provided for ease.	Business Plan submission

Name	Date	Context	Position
A083 - WSX79 - PR19 Water trading incentive model .xlsx	02 October 2023	Several of our Business Plan documents are referenced in our Statement of Case. Full October 2023 submission provided for ease.	Business Plan submission
A084 - WSX80 - Developer services model.xlsx	02 October 2023	Several of our Business Plan documents are referenced in our Statement of Case. Full October 2023 submission provided for ease.	Business Plan submission
A085 - WSX81 - Water industry national environment programme (WINEP) reconciliation model.xlsm	02 October 2023	Several of our Business Plan documents are referenced in our Statement of Case. Full October 2023 submission provided for ease.	Business Plan submission
A086 - WSX82 - Cost of new debt reconciliation model.xlsm	02 October 2023	Several of our Business Plan documents are referenced in our Statement of Case. Full October 2023 submission provided for ease.	Business Plan submission
A087 - WSX83 - Gearing outperformance sharing mechanism model.xlsm	02 October 2023	Several of our Business Plan documents are referenced in our Statement of Case. Full October 2023 submission provided for ease.	Business Plan submission
A088 - WSX84 - Cost reconciliations model.xlsm	02 October 2023	Several of our Business Plan documents are referenced in our Statement of Case. Full October 2023 submission provided for ease.	Business Plan submission
A089 - WSX85 - Tax reconciliation model.xlsb	02 October 2023	Several of our Business Plan documents are referenced in our Statement of Case. Full October 2023 submission provided for ease.	Business Plan submission

Name	Date	Context	Position
A090 - WSX86 - Land sales model.xlsx	02 October 2023	Several of our Business Plan documents are referenced in our Statement of Case. Full October 2023 submission provided for ease.	Business Plan submission
A091 - WSX87 - RPI-CPIH Wedge True Up model.xlsx	02 October 2023	Several of our Business Plan documents are referenced in our Statement of Case. Full October 2023 submission provided for ease.	Business Plan submission
A092 - WSX88 - Strategic regional water resources reconciliation model - West Country north sources and transfers (Cheddar two) .xlsx	02 October 2023	Several of our Business Plan documents are referenced in our Statement of Case. Full October 2023 submission provided for ease.	Business Plan submission
A093 - WSX89 - Strategic regional water resources reconciliation model - West Country southern water transfer (Poole) and Mendip Quarries.xlsx	02 October 2023	Several of our Business Plan documents are referenced in our Statement of Case. Full October 2023 submission provided for ease.	Business Plan submission
A094 - WSX90 - Strategic regional water resources reconciliation model - West Country south sources and transfers.xlsx	02 October 2023	Several of our Business Plan documents are referenced in our Statement of Case. Full October 2023 submission provided for ease.	Business Plan submission
PR24 Draft Determination Response documents – August 2024			
A095 - An update on our 2025-30 business plan - August 2024.pdf	28 August 2024	Several of our Draft Determination Response documents are referenced in our Statement of Case. Full August 2024 submission provided for ease.	Draft Determination Response submission

Name	Date	Context	Position
A096 - WSX-A01 - Board assurance statement.pdf	28 August 2024	Several of our Draft Determination Response documents are referenced in our Statement of Case. Full August 2024 submission provided for ease.	Draft Determination Response submission
A097 - WSX-A02 - Assurance reports.pdf	28 August 2024	Several of our Draft Determination Response documents are referenced in our Statement of Case. Full August 2024 submission provided for ease.	Draft Determination Response submission
A098 - WSX-C01 - Step up in capital maintenance and base costs - SUBMISSION version - CONFIDENTIAL.pdf	28 August 2024	Several of our Draft Determination Response documents are referenced in our Statement of Case. Full August 2024 submission provided for ease.	Draft Determination Response submission
A099 - WSX-C02 - Enhancement costs.pdf	28 August 2024	Several of our Draft Determination Response documents are referenced in our Statement of Case. Full August 2024 submission provided for ease.	Draft Determination Response submission
A100 - WSX-C03 - Overall approach to costing - SUBMISSION VERSION - CONFIDENTIAL.pdf	28 August 2024	Several of our Draft Determination Response documents are referenced in our Statement of Case. Full August 2024 submission provided for ease.	Draft Determination Response submission
A101 - WSX-C04 - Retrospective nature of draft determination.pdf	28 August 2024	Several of our Draft Determination Response documents are referenced in our Statement of Case. Full August 2024 submission provided for ease.	Draft Determination Response submission

Name	Date	Context	Position
A102 - WSX-C05 - Enhancement costs - water quality improvements - SUBMISSION version - CONFIDENTIAL.pdf	28 August 2024	Several of our Draft Determination Response documents are referenced in our Statement of Case. Full August 2024 submission provided for ease.	Draft Determination Response submission
A103 - WSX-C06 - Enhancement costs - Strategic Resource Options (SROs).pdf	28 August 2024	Several of our Draft Determination Response documents are referenced in our Statement of Case. Full August 2024 submission provided for ease.	Draft Determination Response submission
A104 - WSX-C07 - Enhancement costs - leakage and smart metering.pdf	28 August 2024	Several of our Draft Determination Response documents are referenced in our Statement of Case. Full August 2024 submission provided for ease.	Draft Determination Response submission
A105 - WSX-C08 - Enhancement costs - supply schemes - SUBMISSION VERSION - CONFIDENTIAL.pdf	28 August 2024	Several of our Draft Determination Response documents are referenced in our Statement of Case. Full August 2024 submission provided for ease.	Draft Determination Response submission
A106 - WSX-C09 - Enhancement costs - wastewater treatment - SUBMISSION version - CONFIDENTIAL.pdf	28 August 2024	Several of our Draft Determination Response documents are referenced in our Statement of Case. Full August 2024 submission provided for ease.	Draft Determination Response submission
A107 - WSX-C10 - Enhancement costs - Water Recycling Centre (WRC) growth.pdf	28 August 2024	Several of our Draft Determination Response documents are referenced in our Statement of Case. Full August 2024 submission provided for ease.	Draft Determination Response submission

Name	Date	Context	Position
A108 - WSX-C11 - Enhancement costs - storm overflows.pdf	28 August 2024	Several of our Draft Determination Response documents are referenced in our Statement of Case. Full August 2024 submission provided for ease.	Draft Determination Response submission
A109 - WSX-C12 - Enhancement costs - pollutions - SUBMISSION version - CONFIDENTIAL.pdf	28 August 2024	Several of our Draft Determination Response documents are referenced in our Statement of Case. Full August 2024 submission provided for ease.	Draft Determination Response submission
A110 - WSX-C13 - Enhancement costs - resilience - SUBMISSION version - CONFIDENTIAL.pdf	28 August 2024	Several of our Draft Determination Response documents are referenced in our Statement of Case. Full August 2024 submission provided for ease.	Draft Determination Response submission
A111 - WSX-C14 - Enhancement costs - greenhouse gas emissions.pdf	28 August 2024	Several of our Draft Determination Response documents are referenced in our Statement of Case. Full August 2024 submission provided for ease.	Draft Determination Response submission
A112 - WSX-C15 - Enhancement costs - water investigations.pdf	28 August 2024	Several of our Draft Determination Response documents are referenced in our Statement of Case. Full August 2024 submission provided for ease.	Draft Determination Response submission
A113 - WSX-C16 - Enhancement costs - wastewater investigations - SUBMISSION VERSION - CONFIDENTIAL.pdf	28 August 2024	Several of our Draft Determination Response documents are referenced in our Statement of Case. Full August 2024 submission provided for ease.	Draft Determination Response submission

Name	Date	Context	Position
A114 - WSX-C17 - Enhancement costs - biodiversity and conservation.pdf	28 August 2024	Several of our Draft Determination Response documents are referenced in our Statement of Case. Full August 2024 submission provided for ease.	Draft Determination Response submission
A115 - WSX-C18 - Bioresources and the Industrial Emissions Directive (IED).pdf	28 August 2024	Several of our Draft Determination Response documents are referenced in our Statement of Case. Full August 2024 submission provided for ease.	Draft Determination Response submission
A116 - WSX-C19 - Retail costs.pdf	28 August 2024	Several of our Draft Determination Response documents are referenced in our Statement of Case. Full August 2024 submission provided for ease.	Draft Determination Response submission
A117 - WSX-C20 - Cost adjustment claims.pdf	28 August 2024	Several of our Draft Determination Response documents are referenced in our Statement of Case. Full August 2024 submission provided for ease.	Draft Determination Response submission
A118 - WSX-C21 - Real price effects.pdf	28 August 2024	Several of our Draft Determination Response documents are referenced in our Statement of Case. Full August 2024 submission provided for ease.	Draft Determination Response submission
A119 - WSX-C22 - Frontier shift.pdf	28 August 2024	Several of our Draft Determination Response documents are referenced in our Statement of Case. Full August 2024 submission provided for ease.	Draft Determination Response submission

Name	Date	Context	Position
A120 - WSX-C23 - Appendix - Business Rates Model.xlsx	28 August 2024	Several of our Draft Determination Response documents are referenced in our Statement of Case. Full August 2024 submission provided for ease.	Draft Determination Response submission
A121 - WSX-C23 - Business rates.pdf	28 August 2024	Several of our Draft Determination Response documents are referenced in our Statement of Case. Full August 2024 submission provided for ease.	Draft Determination Response submission
A122 - WSX-D00a – August 2024 data tables.xlsb	28 August 2024	Several of our Draft Determination Response documents are referenced in our Statement of Case. Full August 2024 submission provided for ease.	Draft Determination Response submission
A123 - WSX-D00b - ADD1-21 data tables.xlsx	28 August 2024	Several of our Draft Determination Response documents are referenced in our Statement of Case. Full August 2024 submission provided for ease.	Draft Determination Response submission
A124 - WSX-D00c - ADD24 data table.xlsx	28 August 2024	Several of our Draft Determination Response documents are referenced in our Statement of Case. Full August 2024 submission provided for ease.	Draft Determination Response submission
A125 - WSX-D01 - Commentary on data table changes - Outcomes.pdf	28 August 2024	Several of our Draft Determination Response documents are referenced in our Statement of Case. Full August 2024 submission provided for ease.	Draft Determination Response submission

Name	Date	Context	Position
A126 - WSX-D02 - Commentary on data table changes - Risk and return.pdf	28 August 2024	Several of our Draft Determination Response documents are referenced in our Statement of Case. Full August 2024 submission provided for ease.	Draft Determination Response submission
A127 - WSX-D03 - Commentary on data table changes - Costs wholesale water - SUBMISSION VERSION - CONFIDENTIAL.pdf	28 August 2024	Several of our Draft Determination Response documents are referenced in our Statement of Case. Full August 2024 submission provided for ease.	Draft Determination Response submission
A128 - WSX-D04 - Commentary on data table changes - Costs wholesale wastewater.pdf	28 August 2024	Several of our Draft Determination Response documents are referenced in our Statement of Case. Full August 2024 submission provided for ease.	Draft Determination Response submission
A129 - WSX-D05 - Commentary on data table changes - Water resources.pdf	28 August 2024	Several of our Draft Determination Response documents are referenced in our Statement of Case. Full August 2024 submission provided for ease.	Draft Determination Response submission
A130 - WSX-D06 - Commentary on data table changes - Bioresources.pdf	28 August 2024	Several of our Draft Determination Response documents are referenced in our Statement of Case. Full August 2024 submission provided for ease.	Draft Determination Response submission
A131 - WSX-D07 - Commentary on data table changes - Retail.pdf	28 August 2024	Several of our Draft Determination Response documents are referenced in our Statement of Case. Full August 2024 submission provided for ease.	Draft Determination Response submission

Name	Date	Context	Position
A132 - WSX-D08 - Commentary on data table changes - Developer services.pdf	28 August 2024	Several of our Draft Determination Response documents are referenced in our Statement of Case. Full August 2024 submission provided for ease.	Draft Determination Response submission
A133 - WSX-D09 - Commentary on data table changes - Long-term strategies.pdf	28 August 2024	Several of our Draft Determination Response documents are referenced in our Statement of Case. Full August 2024 submission provided for ease.	Draft Determination Response submission
A134 - WSX-D10 - Commentary on data table changes - Supplementary tables.pdf	28 August 2024	Several of our Draft Determination Response documents are referenced in our Statement of Case. Full August 2024 submission provided for ease.	Draft Determination Response submission
A135 - WSX-D11 - Commentary on data table changes - Summary tables.pdf	28 August 2024	Several of our Draft Determination Response documents are referenced in our Statement of Case. Full August 2024 submission provided for ease.	Draft Determination Response submission
A136 - WSX-D12 - Commentary on data table changes - Past delivery.pdf	28 August 2024	Several of our Draft Determination Response documents are referenced in our Statement of Case. Full August 2024 submission provided for ease.	Draft Determination Response submission
A137 - WSX-D13 - Data tables commentary - Additional tables.pdf	28 August 2024	Several of our Draft Determination Response documents are referenced in our Statement of Case. Full August 2024 submission provided for ease.	Draft Determination Response submission

Name	Date	Context	Position
A138 - WSX-D14 - Data tables summary - company response.xlsx	28 August 2024	Several of our Draft Determination Response documents are referenced in our Statement of Case. Full August 2024 submission provided for ease.	Draft Determination Response submission
A139 - WSX-M01 - Cover letter.pdf	28 August 2024	Several of our Draft Determination Response documents are referenced in our Statement of Case. Full August 2024 submission provided for ease.	Draft Determination Response submission
A140 - WSX-M02 - Summary of WSX response to Ofwat's PR24 DD.pdf	28 August 2024	Several of our Draft Determination Response documents are referenced in our Statement of Case. Full August 2024 submission provided for ease.	Draft Determination Response submission
A141 - WSX-M03 - Guide to reading representations.pdf	28 August 2024	Several of our Draft Determination Response documents are referenced in our Statement of Case. Full August 2024 submission provided for ease.	Draft Determination Response submission
A142 - WSX-M04 - Company representation pro forma.xlsx	28 August 2024	Several of our Draft Determination Response documents are referenced in our Statement of Case. Full August 2024 submission provided for ease.	Draft Determination Response submission
A143 - WSX-M05 - Quality and ambition assessment.pdf	28 August 2024	Several of our Draft Determination Response documents are referenced in our Statement of Case. Full August 2024 submission provided for ease.	Draft Determination Response submission

Name	Date	Context	Position
A144 - WSX-M06 - Long term delivery strategy - CONFIDENTIAL.pdf	28 August 2024	Several of our Draft Determination Response documents are referenced in our Statement of Case. Full August 2024 submission provided for ease.	Draft Determination Response submission
A145 - WSX-M07 - Uncertainty mechanism.pdf	28 August 2024	Several of our Draft Determination Response documents are referenced in our Statement of Case. Full August 2024 submission provided for ease.	Draft Determination Response submission
A146 - WSX-M08 - Briefing document for company representation meeting - REVISED.pdf	28 August 2024	Several of our Draft Determination Response documents are referenced in our Statement of Case. Full August 2024 submission provided for ease.	Draft Determination Response submission
A147 – NOT USED			
A148 - WSX-O01 - Performance and outcomes - CONFIDENTIAL.pdf	28 August 2024	Several of our Draft Determination Response documents are referenced in our Statement of Case. Full August 2024 submission provided for ease.	Draft Determination Response submission
A149 - WSX-O02 - Price Control Deliverables - SUBMISSION VERSION - CONFIDENTIAL.pdf	28 August 2024	Several of our Draft Determination Response documents are referenced in our Statement of Case. Full August 2024 submission provided for ease.	Draft Determination Response submission
A150 - WSX-O03 - Measures of experience.pdf	28 August 2024	Several of our Draft Determination Response documents are referenced in our Statement of Case. Full August 2024 submission provided for ease.	Draft Determination Response submission

Name	Date	Context	Position
A151 - WSX-O04 - Ofwat's reporting and assurance proposals.pdf	28 August 2024	Several of our Draft Determination Response documents are referenced in our Statement of Case. Full August 2024 submission provided for ease.	Draft Determination Response submission
A152 - WSX-R01 - Risk and return.pdf	28 August 2024	Several of our Draft Determination Response documents are referenced in our Statement of Case. Full August 2024 submission provided for ease.	Draft Determination Response submission
A153 - WSX-R02 - RoRE modelling.pdf	28 August 2024	Several of our Draft Determination Response documents are referenced in our Statement of Case. Full August 2024 submission provided for ease.	Draft Determination Response submission
A154 - WSX-R03 - Ofwat's proposed gearing cap.pdf	28 August 2024	Several of our Draft Determination Response documents are referenced in our Statement of Case. Full August 2024 submission provided for ease.	Draft Determination Response submission
A155 - WSX-R04 - Consultation on equity listing mechanism.pdf	28 August 2024	Several of our Draft Determination Response documents are referenced in our Statement of Case. Full August 2024 submission provided for ease.	Draft Determination Response submission
A156 - WSX-R05 - Financeability and financial resilience.pdf	28 August 2024	Several of our Draft Determination Response documents are referenced in our Statement of Case. Full August 2024 submission provided for ease.	Draft Determination Response submission

Name	Date	Context	Position
A157 - WSX-R06 - Affordability.pdf	28 August 2024	Several of our Draft Determination Response documents are referenced in our Statement of Case. Full August 2024 submission provided for ease.	Draft Determination Response submission
A158 - WSX-R06 - Appendix - Table SUP15.xlsx	28 August 2024	Several of our Draft Determination Response documents are referenced in our Statement of Case. Full August 2024 submission provided for ease.	Draft Determination Response submission
A159 - WSX-R07 - Appendix - RCV Run-off Rate Model.xlsx	28 August 2024	Several of our Draft Determination Response documents are referenced in our Statement of Case. Full August 2024 submission provided for ease.	Draft Determination Response submission
A160 - WSX-R07 - Cost recovery plan.pdf	28 August 2024	Several of our Draft Determination Response documents are referenced in our Statement of Case. Full August 2024 submission provided for ease.	Draft Determination Response submission
A161 - WSX-T01 - Financial Model - Draft Determination response.xlsx	28 August 2024	Several of our Draft Determination Response documents are referenced in our Statement of Case. Full August 2024 submission provided for ease.	Draft Determination Response submission
A162 - WSX-T02 - Revenue reconciliation model.xlsx	28 August 2024	Several of our Draft Determination Response documents are referenced in our Statement of Case. Full August 2024 submission provided for ease.	Draft Determination Response submission

Name	Date	Context	Position
A163 - WSX-T03 - RCV reconciliation model.xlsx	28 August 2024	Several of our Draft Determination Response documents are referenced in our Statement of Case. Full August 2024 submission provided for ease.	Draft Determination Response submission
A164 - WSX-T04 - Revenue forecasting incentive model.xlsx	28 August 2024	Several of our Draft Determination Response documents are referenced in our Statement of Case. Full August 2024 submission provided for ease.	Draft Determination Response submission
A165 - WSX-T05 - ODI performance model 2023-24.xlsx	28 August 2024	Several of our Draft Determination Response documents are referenced in our Statement of Case. Full August 2024 submission provided for ease.	Draft Determination Response submission
A166 - WSX-T06 - ODI performance model 2024-25.xlsx	28 August 2024	Several of our Draft Determination Response documents are referenced in our Statement of Case. Full August 2024 submission provided for ease.	Draft Determination Response submission
A167 - WSX-T07 - Residential retail reconciliation model.xlsx	28 August 2024	Several of our Draft Determination Response documents are referenced in our Statement of Case. Full August 2024 submission provided for ease.	Draft Determination Response submission
A168 - WSX-T08 - Developer services reconciliation model.xlsx	28 August 2024	Several of our Draft Determination Response documents are referenced in our Statement of Case. Full August 2024 submission provided for ease.	Draft Determination Response submission

Name	Date	Context	Position
A169 - WSX-T09 - WINEP reconciliation model.xlsm	28 August 2024	Several of our Draft Determination Response documents are referenced in our Statement of Case. Full August 2024 submission provided for ease.	Draft Determination Response submission
A170 - WSX-T10 - Cost of new debt reconcilation model.xlsm	28 August 2024	Several of our Draft Determination Response documents are referenced in our Statement of Case. Full August 2024 submission provided for ease.	Draft Determination Response submission
A171 - WSX-T11 - Cost reconcilation model.xlsm	28 August 2024	Several of our Draft Determination Response documents are referenced in our Statement of Case. Full August 2024 submission provided for ease.	Draft Determination Response submission
A172 - WSX-T12 Tax reconciliation model.xlsm	28 August 2024	Several of our Draft Determination Response documents are referenced in our Statement of Case. Full August 2024 submission provided for ease.	Draft Determination Response submission
A173 - WSX-T13 - Land sales model.xlsx	28 August 2024	Several of our Draft Determination Response documents are referenced in our Statement of Case. Full August 2024 submission provided for ease.	Draft Determination Response submission
A174 - WSX-T14 - RPI-CPIH wedge true-up model.xlsx	28 August 2024	Several of our Draft Determination Response documents are referenced in our Statement of Case. Full August 2024 submission provided for ease.	Draft Determination Response submission

Name	Date	Context	Position
A175 - WSX-T15 - Strategic regional water reconciliation model.xlsx	28 August 2024	Several of our Draft Determination Response documents are referenced in our Statement of Case. Full August 2024 submission provided for ease.	Draft Determination Response submission
A176 - WSX-T16 - Bioresources reconciliation model.xlsx	28 August 2024	Several of our Draft Determination Response documents are referenced in our Statement of Case. Full August 2024 submission provided for ease.	Draft Determination Response submission
Copies of Annual Performance Reports			
A177 - WSX APR 2015-16 - All tables.xlsx	01 July 2016	Copies of our Annual Performance Reports - APRs - provided for information	Currently reported figures for financial year in question
A178 - WSX APR 2016-17 - All tables.xlsx	01 July 2017	Copies of our Annual Performance Reports - APRs - provided for information	Currently reported figures for financial year in question
A179 - WSX APR 2017-18 - All tables.xlsx	01 July 2018	Copies of our Annual Performance Reports - APRs - provided for information	Currently reported figures for financial year in question
A180 - WSX APR 2018-19 - All tables.xlsx	01 July 2019	Copies of our Annual Performance Reports - APRs - provided for information	Currently reported figures for financial year in question
A181 - WSX APR 2019-20- All tables.xlsx	01 July 2020	Copies of our Annual Performance Reports - APRs - provided for information	Currently reported figures for financial year in question
A182 - WSX APR 2020-21 - ODI performance model and tables 3A-3I.xlsx	01 July 2021	Copies of our Annual Performance Reports - APRs - provided for information	Currently reported figures for financial year in question
A183 - WSX APR 2020-21 - PR19 in-period adjustments model v1.4.xlsx	01 July 2021	Copies of our Annual Performance Reports - APRs - provided for information	Currently reported figures for financial year in question
A184 - WSX APR 2020-21 - Tables excluding 3A-3I.xlsx	01 July 2021	Copies of our Annual Performance Reports - APRs - provided for information	Currently reported figures for financial year in question

Name	Date	Context	Position
A185 - WSX APR 2021-22 - Bioresources Market Monitoring Information.xlsx	01 July 2022	Copies of our Annual Performance Reports - APRs - provided for information	Currently reported figures for financial year in question
A186 - WSX APR 2021-22 - ODI perfromance model and tables 3A-3I v1.7.xlsx	01 July 2022	Copies of our Annual Performance Reports - APRs - provided for information	Currently reported figures for financial year in question
A187 - WSX APR 2021-22 - PR19 IPD04 in-period adjustments model v1.4b.xlsx	01 July 2022	Copies of our Annual Performance Reports - APRs - provided for information	Currently reported figures for financial year in question
A188 - WSX APR 2021-22 - Tables excluding 3A-3I.xlsx	01 July 2022	Copies of our Annual Performance Reports - APRs - provided for information	Currently reported figures for financial year in question
A189 - WSX APR 2022-23 - PR19 IPD04 in-period adjustments model v1.4b.xlsx	01 July 2023	Copies of our Annual Performance Reports - APRs - provided for information	Currently reported figures for financial year in question
A190 - WSX APR 2022-23 - ODI performance model and tables 3A-3I v1.10.xlsx	01 July 2023	Copies of our Annual Performance Reports - APRs - provided for information	Currently reported figures for financial year in question
A191 - WSX APR 2022-23 - Tables excluding 3A-3I.xlsx	01 July 2023	Copies of our Annual Performance Reports - APRs - provided for information	Currently reported figures for financial year in question
A192 - WSX APR 2023-24 - ODI performance model and tables 3A-3I v1.11.xlsx	01 July 2024	Copies of our Annual Performance Reports - APRs - provided for information	Currently reported figures for financial year in question
A193 - WSX APR 2023-24 - PR19 IPD04 in-period adjustments model v1.4d.xlsx	01 July 2024	Copies of our Annual Performance Reports - APRs - provided for information	Currently reported figures for financial year in question
A194 - WSX APR 2023-24 - Tables excluding 3A-3I.xlsx	01 July 2024	Copies of our Annual Performance Reports - APRs - provided for information	Currently reported figures for financial year in question
Queries submitted as part of the PR24 process			
A195 - OFW-FD-WSX-012 - response.docx	10 February 2025	Query referenced in our Statement of Case.	Latest position

Name	Date	Context	Position
✂			
A198 - Wessex Water - April 2023 - PR19 density query.pdf	01 April 2023	Query referenced in our Statement of Case.	Internal document; latest position
A199 - OFW-REP-WSX-025 - Historical Allowances & Expenditure.xlsx	01 November 2024	Query referenced in our Statement of Case.	Latest position
A200 - OFW-REP-WSX-025 - response.docx	02 November 2024	Query referenced in our Statement of Case.	Latest position
A201 - OFW-REP-WSX-025 Asset condition data.xlsx	03 November 2024	Query referenced in our Statement of Case.	Latest position
A202 - OFW-REP-WSX-025 Historical references to funding increases.docx	04 November 2024	Query referenced in our Statement of Case.	Latest position
A203 - OFW-IBQ-WSX-027 - response.docx	03 August 2024	Query referenced in our Statement of Case.	Latest position
A204 - Ofwat - March 2025 - PR24 FD inbound queries publication - no. 88 and 89.docx	01 March 2025	Query referenced in our Statement of Case.	Latest position
A205 - OFW-OBQ-WSX-184 - response.docx	09 February 2024	Query referenced in our Statement of Case.	Latest position
Other documents referred to in our statement of case			
A206 - Ofwat - March 2025 - Our duties.pdf	18 March 2025	Referenced in our Statement of Case	External document
A207 - Ofwat - July 2024 - PR24 draft determinations Wessex Water Quality and Ambition appendix.pdf	11 July 2024	Referenced in our Statement of Case	External document
A208 - Ofwat - October 2024 - Water company performance report - 2023-24.pdf	01 October 2024	Referenced in our Statement of Case	External document
A209 - Ofwat - July 2022 - PR24 Draft methodology - Appendix 10 Aligning risk and return.pdf	07 July 2022	Referenced in our Statement of Case	External document
A210 - Ofwat - December 2019 - PR19 Final determinations securing cost efficiency technical appendix.pdf	01 December 2019	Referenced in our Statement of Case	External document
A211 - Ofwat - October 2024 - PR24 Consultation on outturn adjustment mechanism.pdf	01 October 2024	Referenced in our Statement of Case	External document

Name	Date	Context	Position
A212 - Ofwat - July 2024 - PR24 draft determinations Aligning Risk and Return Appendix 1.pdf	11 July 2024	Referenced in our Statement of Case	External document
A213 - Ofwat - December 2022 - PR24 final methodology - Appendix 9 Setting Expenditure Allowances.pdf	13 December 2022	Referenced in our Statement of Case	External document
A214 - Ofwat - July 2024 - PR24 draft determinations Expenditure allowances.pdf	11 July 2024	Referenced in our Statement of Case	External document
A215 - CMA - March 2021 - Anglian Water, Bristol Water and Yorkshire Water price determinations final report.pdf	17 March 2021	Referenced in our Statement of Case	External document
A216 - Deregulation Act 2015.pdf	18 March 2025	Referenced in our Statement of Case	External document
A217 - DEFRA - February 2022 - The Government's strategic priorities for Ofwat.pdf	18 March 2025	Referenced in our Statement of Case	External document
A218 - House of Lords - March 2023 - The affluent and the effluent - cleaning up failures in water and sewage regulation.pdf	01 March 2023	Referenced in our Statement of Case	External document
A219 - National Infrastructure Commission - October 2023 - The Second National Infrastructure Assessment.pdf	01 October 2023	Referenced in our Statement of Case	External document
A220 - DEFRA - October 2024 - Independent commission on the water sector regulatory system - terms of reference.pdf	18 March 2025	Referenced in our Statement of Case	External document
A221 - WICS - December 2020 - Final Determination - Strategic review of charges 2021-27.pdf	01 December 2020	Referenced in our Statement of Case	External document
A222 - Economic Insight - March 2025 - A balanced approach to ensuring long-term asset resilience.pdf	18 March 2025	Referenced in our Statement of Case. Produced for the CMA process.	External document
A223 - WICS - July 2019 - Decision paper - Asset Replacement.pdf	01 July 2019	Referenced in our Statement of Case	External document
A224 - SSWAN - sustainable solutions for water and nature.pdf		Referenced in our Statement of Case	External document
A225 - Kairos Economics - March 2025 - PR24 Allowed Return on Equity Report.pdf	19 March 2025	Referenced in our Statement of Case. Produced for the CMA process.	External document

Name	Date	Context	Position
A226 - KPMG - March 2025 - Assessing the balance of evidence in PR24 FD CoE estimates - Confidential.pdf	18 March 2025	Referenced in our Statement of Case	External document
A227 - Moody's - November 2024 - sector wide downgrade comment.pdf	14 November 2024	Referenced in our Statement of Case	External document
A228 - S and P - November 2024 - sector ratings comment.pdf	12 November 2024	Referenced in our Statement of Case	External document
A229 - Economic Insight - March 2025 - Evidence on overall company returns in the water industry.pdf	19 March 2025	Referenced in our Statement of Case. Produced for the CMA process.	External document
A230 - Economic Insight - March 2025 - List of figures and tables for two March reports (A223 and A230).pdf	19 March 2025	Referenced in our Statement of Case. Produced for the CMA process.	External document
A231 - Water Industry Act 1991.pdf	18 March 2025	Referenced in our Statement of Case	External document
A232 - Economic Insight - August 2024 - Evaluating the case for a gearing incentive mechanism.pdf	01 August 2024	Referenced in our Statement of Case	External document
A233 - Oxera - October 2024 - PR24 Investor engagement report.pdf	01 October 2024	Referenced in our Statement of Case	External document
A234 - Wessex Water - March 2025 – ✂ WTC concept design - Confidential.pptx	18 March 2025	Referenced in our Statement of Case	Internal document; latest position
A235 - Wessex Water - March 2025 - Detailed cost estimate for ✂ - Confidential.pdf	18 March 2025	Referenced in our Statement of Case	Internal document; latest position
A236 - DWI - March 2024 - Letter on ✂ .pdf	08 March 2024	Referenced in our Statement of Case	External document
A237 - Sustainable Fitch - February 2024 -Wessex Water ESG rating press release.pdf	01 February 2024	Referenced in our Statement of Case	External document
A238 - Frontier Economics - March 2025 - Background material for CMA.pptx	18 March 2025	Referenced in our Statement of Case. Produced for the CMA process.	External document
A239 - John Earwaker - 2025 - Guide to Economic Regulation.pdf	01 March 2025	Referenced in our Statement of Case	External document

Name	Date	Context	Position
A240 - Wessex Water - March 2025 - Alternative approaches to the base cost models.docx	19 March 2025	Referenced in our Statement of Case	Internal document; latest position
A241 - Valuation Office Agency - February 2025 - Draft valuation letter - Revaluation 2026 - Wessex Water.pdf	04 February 2025	Referenced in our Statement of Case	External document
A242 - COMAH - October 2023 - Wessex Water Avonmouth - COMAH notification.pdf	30 October 2023	Referenced in our Statement of Case	External document
A243 - DWI - 2021 - Wessex Water Services Limited – Discolouration Notice.pdf	31 December 2021	Referenced in our Statement of Case	External document
A244 - Phosphorus and freshwater eutrophication - challenges for the water environment.odt	18 March 2025	Referenced in our Statement of Case	External document
A245 - Environment Agency - September 2024 - Indicative Catchment Statistics for Nutrient Pollution.pdf	01 September 2024	Referenced in our Statement of Case	External document
A246 - The 500lbs Algae Adage.pdf	01 July 2003	Referenced in our Statement of Case	External document
A247 - Environment Agency - February 1999 - Aquatic Eutrophication in England and Wales - A Proposed Management Strategy.pdf	22 February 1999	Referenced in our Statement of Case	External document
A248 - UK Regulators Network - March 2023 - Setting the cost of capital	23 March 2023	Referenced in our Statement of Case	External document
A249 - Conservation of habitats and species regulations 2017.pdf	18 March 2025	Referenced in our Statement of Case	External document
A250 - Urban Waste Water Treatment Regulations 1994.pdf	18 March 2025	Referenced in our Statement of Case	External document
A251 - Environment Act 2021.pdf	18 March 2025	Referenced in our Statement of Case	External document
A252 - Levelling Up and Regeneration Act - LURA - 2023.pdf	18 March 2025	Referenced in our Statement of Case	External document
A253 - Biological wastewater treatment series -Treatment wetlands.pdf	01 October 2017	Referenced in our Statement of Case	External document
A254 - Practical information on design of specific wetland types and typical pitfalls.pdf	18 March 2025	Referenced in our Statement of Case	External document

Name	Date	Context	Position
A255 - Phosphorus removal in surface flow treatment wetlands for domestic wastewater treatment - Global experiences opportunities and challenges.pdf	03 September 2024	Referenced in our Statement of Case	External document
A256 - Wessex Water - January 2020 - PR19 Final Determination Response.pdf	30 January 2020	Referenced in our Statement of Case	Internal document; final position
A257 - Wessex Water - March 2025 - Letter to CMA re DWI disinfection support.pdf	19 March 2025	Referenced in our Statement of Case	Internal document; final position
A258 - Environment Agency - November 2024 - Wessex Water fine press release.pdf	11 November 2024	Referenced in our Statement of Case	External document
A259 - Ofwat - July 2024 - Investigation into sewage treatment works and sewerage networks.pdf	16 July 2024	Referenced in our Statement of Case	External document
A260 - DWI - March 2024 - Quarter 3 Drinking Water Quality Report.pdf	01 March 2024	Referenced in our Statement of Case	External document
A261 - DWI - 2024 – ✂ Works Disinfection Upgrade.pdf	31 December 2024	Referenced in our Statement of Case	External document
A262 - Wessex Water - September 2018 - PR19 business plan 05.01 - Protecting and enhancing the environment	01 September 2018	Referenced in our Statement of Case	Internal document; final position
A263 - Economic Insight - December 2024 - The basis for increased systematic risk at PR24.pdf	17 December 2024	Referenced in our Statement of Case	External document
A298 - Ofwat - December 2024 - PR24-FD-CA24-Business-rates - Wessex	19 December 2024	Referenced in our Statement of Case	External document
Data files containing source data			
A264 - Chapter 2 - Executive summary data sources.xlsx	18 March 2025	Data sources for the Statement of Case	Internal document; latest position
A265 - Chapter 3 - Wessex Water data sources.xlsx	18 March 2025	Data sources for the Statement of Case	Internal document; latest position
A266 - Chapter 4 - Our performance data sources.xlsx	18 March 2025	Data sources for the Statement of Case	Internal document; latest position
A267 - Chapter 7 - New bioresources health and safety requirements data sources - CONFIDENTIAL.xlsx	18 March 2025	Data sources for the Statement of Case	Internal document; latest position
A268 - Chapter 8 - Wholesale water base costs data sources.xlsx	18 March 2025	Data sources for the Statement of Case	Internal document; latest position
A269 - Chapter 9 - Phosphorus removal data sources.xlsx	18 March 2025	Data sources for the Statement of Case	Internal document; latest position

Name	Date	Context	Position
A270 - Annex A8 - Further information on bioresources health and safety requirements data sources.xlsx	18 March 2025	Data sources for the Statement of Case	Internal document; latest position
A271 - Annex A9 - Further information on wholesale water base costs data sources.xlsx	18 March 2025	Data sources for the Statement of Case	Internal document; latest position
A272 - Annex A11 - The regulatory drivers of phosphorus removal data sources.xlsx	18 March 2025	Data sources for the Statement of Case	Internal document; latest position
A273 - Annex A12 - An overview of the treatment processes for phosphorus removal data sources.xlsx	18 March 2025	Data sources for the Statement of Case	Internal document; latest position
A274 - Annex A13 - Examples of Wessex Water's sites that require phosphorus removal data sources.xlsx	18 March 2025	Data sources for the Statement of Case	Internal document; latest position
A275 - Annex A14 - How the Ofwat phosphorus removal model works data sources.xlsx	18 March 2025	Data sources for the Statement of Case	Internal document; latest position
A276 - Annex A15 - Alternative approaches to the phosphorus removal model data sources.xlsx	18 March 2025	Data sources for the Statement of Case	Internal document; latest position
A277 – NOT USED			
A278 - Economic Insight - March 2025 - Supporting files - Allowance Variation 16-03-25.xlsx	16 March 2025	Data sources for two Economic Insight reports	External document
A279 - Economic Insight - March 2025 - Supporting files - CAC-PCD analysis 16-03-25.xlsx	17 March 2025	Data sources for two Economic Insight reports	External document
A280 - Economic Insight - March 2025 - Supporting files - CM allowances over time -18-03-25.xlsx	18 March 2025	Data sources for two Economic Insight reports	External document
A281 - Economic Insight - March 2025 - Supporting files - CM CAC summary - 18-03-25.xlsx	18 March 2025	Data sources for two Economic Insight reports	External document
A282 - Economic Insight - March 2025 - Supporting files - CM expenditure by area - 18-03-25.xlsx	18 March 2025	Data sources for two Economic Insight reports	External document
A283 - Economic Insight - March 2025 - Supporting files - Efficiency asset health comparison 18-03-2025.xlsx	18 March 2025	Data sources for two Economic Insight reports	External document
A284 - Economic Insight - March 2025 - Supporting files - Enhancement capex over time - 17-03-25.xlsx	17 March 2025	Data sources for two Economic Insight reports	External document

Name	Date	Context	Position
A285 - Economic Insight - March 2025 - Supporting files - GFCF analysis - 18-03-25.xlsx	18 March 2025	Data sources for two Economic Insight reports	External document
A286 - Economic Insight - March 2025 - Supporting files - Historical Efficiency Analysis 17-03-25.xlsx	17 March 2025	Data sources for two Economic Insight reports	External document
A287 - Economic Insight - March 2025 - Supporting files - Model changes allowance variation 16-03-25.xlsx	16 March 2025	Data sources for two Economic Insight reports	External document
A288 - Economic Insight - March 2025 - Supporting files - Opex-capex-split_CMA-FINAL - EI additions - 06-03-25.xlsx	06 March 2025	Data sources for two Economic Insight reports	External document
A289 - Economic Insight - March 2025 - Supporting files - PR24-FD-CA22-Opex-capex-split-model - EI additions - 06-03-24.xlsx	06 March 2024	Data sources for two Economic Insight reports	External document
A290 - Economic Insight - March 2025 - Supporting files - QAA assessment vs cost gap - 16-03-25.xlsx	16 March 2025	Data sources for two Economic Insight reports	External document
A291 - Economic Insight - March 2025 - Supporting files - ROCE analysis - Average RCV 2009-19.xlsx	18 March 2025	Data sources for two Economic Insight reports	External document
A292 - Economic Insight - March 2025 - Supporting files - ROCE analysis - RCV analysis-05-03-25.xlsx	18 March 2025	Data sources for two Economic Insight reports	External document
A293 - Economic Insight - March 2025 - Supporting files - ROCE analysis - Regulatory accounts 2005 to 2010.xlsx	18 March 2025	Data sources for two Economic Insight reports	External document
A294 - Economic Insight - March 2025 - Supporting files - ROCE WACC comparison-18-03-25.xlsx	18 March 2025	Data sources for two Economic Insight reports	External document
A295 - Economic Insight - March 2025 - Supporting files - Sewer maintenance rates - 17-03-25.xlsx	17 March 2025	Data sources for two Economic Insight reports	External document
A296 - Economic Insight - March 2025 - Supporting files - Water mains renewal rates - 17-03-25.xlsx	17 March 2025	Data sources for two Economic Insight reports	External document
A297 - Economic Insight - March 2025 - Supporting files - WICS CM calculations - 16-03-25.xlsx	16 March 2025	Data sources for two Economic Insight reports	External document

Name	Date	Context	Position
A299 - Wessex Water - March 2025 - Water Base Costs do file for Monte Carlo analysis - OLS - no time trend specifications	20 March 2025	Data sources for A240 - Wessex Water - March 2025 - Alternative approaches to the base cost models.docx	Internal document; latest position
A300 - Wessex Water - March 2025 - Water Base Costs do file for Monte Carlo analysis - OLS - time trend specifications	21 March 2025	Data sources for A240 - Wessex Water - March 2025 - Alternative approaches to the base cost models.docx	Internal document; latest position
A301 - Wessex Water - March 2025 - Water Base Costs do file for Monte Carlo analysis - RE - no time trend specifications	22 March 2025	Data sources for A240 - Wessex Water - March 2025 - Alternative approaches to the base cost models.docx	Internal document; latest position
A302 - Wessex Water - March 2025 - Water Base Costs do file for Monte Carlo analysis - RE - time trend specifications	23 March 2025	Data sources for A240 - Wessex Water - March 2025 - Alternative approaches to the base cost models.docx	Internal document; latest position
A303 - 00-00 - Master SoC.do	18 March 2025	Stata files for Phosphorus removal analysis	Internal analysis supported by external consultants
A304 - Raw data - Barbour-ABI-construction-project-data.xlsx	18 March 2025	Stata files for Phosphorus removal analysis	Internal analysis supported by external consultants
A305 - Raw data - PR24 WINEP National Dataset.xlsx	18 March 2025	Stata files for Phosphorus removal analysis	Internal analysis supported by external consultants
A306 - Raw data - PR24-FD-CA60-Wastewater-p-removal-enhancement-expenditure-model-v2.xlsx	18 March 2025	Stata files for Phosphorus removal analysis	Internal analysis supported by external consultants
A307 - 05-00 - PR24_WINEP_data.dta	18 March 2025	Stata files for Phosphorus removal analysis	Internal analysis supported by external consultants
A308 - 05-00 - P-removal_WINEP_Drivers_data.dta	18 March 2025	Stata files for Phosphorus removal analysis	Internal analysis supported by external consultants
A309 - 01-00 - Modelled Schemes Data.dta	18 March 2025	Stata files for Phosphorus removal analysis	Internal analysis supported by external consultants

Name	Date	Context	Position
A310 - 01-00 - Modelled_Costs.dta	18 March 2025	Stata files for Phosphorus removal analysis	Internal analysis supported by external consultants
A311 - 01-00 - P-removal_raw_forecast_data.dta	18 March 2025	Stata files for Phosphorus removal analysis	Internal analysis supported by external consultants
A312 - 01-01 - Forecast Model Data.dta	18 March 2025	Stata files for Phosphorus removal analysis	Internal analysis supported by external consultants
A313 - 01-02 - Historic Model Data.dta	18 March 2025	Stata files for Phosphorus removal analysis	Internal analysis supported by external consultants
A314 - 01-00 - Data Cleaner Modelled Allowance Schemes.do	18 March 2025	Stata files for Phosphorus removal analysis	Internal analysis supported by external consultants
A315 - 01-01 - Data Cleaner Forecast Model Data.do	18 March 2025	Stata files for Phosphorus removal analysis	Internal analysis supported by external consultants
A316 - 01-02 - Data Cleaner Historic Model Data.do	18 March 2025	Stata files for Phosphorus removal analysis	Internal analysis supported by external consultants
A317 - 02-00 - Variation in PR19 Similar Scheme Costs.do	18 March 2025	Stata files for Phosphorus removal analysis	Internal analysis supported by external consultants
A318 - 03-00 - Ofwat FD Models Implied Enhanced Consent - Scheme Cost Relationship.do	18 March 2025	Stata files for Phosphorus removal analysis	Internal analysis supported by external consultants
A319 - 03-01 - Enhanced Consent - Scheme Cost Relationship Scatterplots.do	18 March 2025	Stata files for Phosphorus removal analysis	Internal analysis supported by external consultants
A320 - 03-02 - Breakpoints in Company Level Historic Data.do	18 March 2025	Stata files for Phosphorus removal analysis	Internal analysis supported by external consultants
A321 - 03-03 - Breakpoints in Company Level Forecast Data.do	18 March 2025	Stata files for Phosphorus removal analysis	Internal analysis supported by external consultants

Name	Date	Context	Position
A322 - 04-00 - PE Served Banding Tables.do	18 March 2025	Stata files for Phosphorus removal analysis	Internal analysis supported by external consultants
A323 - 05-00 - Regulatory Drivers.do	18 March 2025	Stata files for Phosphorus removal analysis	Internal analysis supported by external consultants
A324 - 06-00 - Barbour ABI.do	18 March 2025	Stata files for Phosphorus removal analysis	Internal analysis supported by external consultants
A325 - Output - 02-00 - Variation in PR19 Similar Scheme Costs.xlsx	18 March 2025	Stata files for Phosphorus removal analysis	Internal analysis supported by external consultants
A326 - Output - 03-00 - Ofwat Implied Enhanced Consent Scheme Cost Relationship.xlsx	18 March 2025	Stata files for Phosphorus removal analysis	Internal analysis supported by external consultants
A327 - Output - 03-01 - Scatter Group PE Served 0 to 1000 and Hist Consent 5 forecast data_1 data.xlsx	18 March 2025	Stata files for Phosphorus removal analysis	Internal analysis supported by external consultants
A328 - Output - 03-01 - Scatter Group PE Served 0 to 1000 and Hist Consent 5 historic data_1 data.xlsx	18 March 2025	Stata files for Phosphorus removal analysis	Internal analysis supported by external consultants
A329 - Output - 03-01 - Scatter Group PE Served 1000 to 2000 and Hist Consent 5 forecast data_2 data.xlsx	18 March 2025	Stata files for Phosphorus removal analysis	Internal analysis supported by external consultants
A330 - Output - 03-01 - Scatter Group PE Served 1000 to 2000 and Hist Consent 5 historic data_2 data.xlsx	18 March 2025	Stata files for Phosphorus removal analysis	Internal analysis supported by external consultants
A331 - Output - 03-01 - Scatter Group PE Served 2000 to 3000 and Hist Consent 5 historic data_3 data.xlsx	18 March 2025	Stata files for Phosphorus removal analysis	Internal analysis supported by external consultants
A332 - Output - 03-01 - Scatter Group PE Served 3000 to 4000 and Hist Consent 5 forecast data_3 data.xlsx	18 March 2025	Stata files for Phosphorus removal analysis	Internal analysis supported by external consultants
A333 - Output - 03-02 - Estimated Coefficients - ANH - historic.xls	18 March 2025	Stata files for Phosphorus removal analysis	Internal analysis supported by external consultants

Name	Date	Context	Position
A334 - Output - 03-02 - Estimated Coefficients - NES - historic.xls	18 March 2025	Stata files for Phosphorus removal analysis	Internal analysis supported by external consultants
A335 - Output - 03-02 - Estimated Coefficients - NWT - historic.xls	18 March 2025	Stata files for Phosphorus removal analysis	Internal analysis supported by external consultants
A336 - Output - 03-02 - Estimated Coefficients - SRN - historic.xls	18 March 2025	Stata files for Phosphorus removal analysis	Internal analysis supported by external consultants
A337 - Output - 03-02 - Estimated Coefficients - SVE - historic.xls	18 March 2025	Stata files for Phosphorus removal analysis	Internal analysis supported by external consultants
A338 - Output - 03-02 - Estimated Coefficients - SWB - historic.xls	18 March 2025	Stata files for Phosphorus removal analysis	Internal analysis supported by external consultants
A339 - Output - 03-02 - Estimated Coefficients - TMS - historic.xls	18 March 2025	Stata files for Phosphorus removal analysis	Internal analysis supported by external consultants
A340 - Output - 03-02 - Estimated Coefficients - WSH - historic.xls	18 March 2025	Stata files for Phosphorus removal analysis	Internal analysis supported by external consultants
A341 - Output - 03-02 - Estimated Coefficients - WSX - historic.xls	18 March 2025	Stata files for Phosphorus removal analysis	Internal analysis supported by external consultants
A342 - Output - 03-02 - Estimated Coefficients - YKY - historic.xls	18 March 2025	Stata files for Phosphorus removal analysis	Internal analysis supported by external consultants
A343 - Output - 03-03 - Estimated Coefficients - ANH - forecast.xls	18 March 2025	Stata files for Phosphorus removal analysis	Internal analysis supported by external consultants
A344 - Output - 03-03 - Estimated Coefficients - NES - forecast.xls	18 March 2025	Stata files for Phosphorus removal analysis	Internal analysis supported by external consultants
A345 - Output - 03-03 - Estimated Coefficients - NWT - forecast.xls	18 March 2025	Stata files for Phosphorus removal analysis	Internal analysis supported by external consultants

Name	Date	Context	Position
A346 - Output - 03-03 - Estimated Coefficients - SRN - forecast.xls	18 March 2025	Stata files for Phosphorus removal analysis	Internal analysis supported by external consultants
A347 - Output - 03-03 - Estimated Coefficients - SVE - forecast.xls	18 March 2025	Stata files for Phosphorus removal analysis	Internal analysis supported by external consultants
A348 - Output - 03-03 - Estimated Coefficients - SWB - forecast.xls	18 March 2025	Stata files for Phosphorus removal analysis	Internal analysis supported by external consultants
A349 - Output - 03-03 - Estimated Coefficients - TMS - forecast.xls	18 March 2025	Stata files for Phosphorus removal analysis	Internal analysis supported by external consultants
A350 - Output - 03-03 - Estimated Coefficients - WSH - forecast.xls	18 March 2025	Stata files for Phosphorus removal analysis	Internal analysis supported by external consultants
A351 - Output - 03-03 - Estimated Coefficients - WSX - forecast.xls	18 March 2025	Stata files for Phosphorus removal analysis	Internal analysis supported by external consultants
A352 - Output - 03-03 - Estimated Coefficients - YKY - forecast.xls	18 March 2025	Stata files for Phosphorus removal analysis	Internal analysis supported by external consultants
A353 - Output - 04-00 - PE Served Bands 5 Thousand.xlsx	18 March 2025	Stata files for Phosphorus removal analysis	Internal analysis supported by external consultants
A354 - Output - 05-00 - Sites Costs Pe_Served Subject to D_EnvAct Company Level.xlsx	18 March 2025	Stata files for Phosphorus removal analysis	Internal analysis supported by external consultants
A355 - Output - 05-00 - Sites Costs Pe_Served Subject to D_HD Company Level.xlsx	18 March 2025	Stata files for Phosphorus removal analysis	Internal analysis supported by external consultants
A356 - Output - 05-00 - Sites Costs Pe_Served Subject to D_HD_IMP_NN Company Level.xlsx	18 March 2025	Stata files for Phosphorus removal analysis	Internal analysis supported by external consultants
A357 - Output - 05-00 - Sites Costs Pe_Served Subject to D_SSSI Company Level.xlsx	18 March 2025	Stata files for Phosphorus removal analysis	Internal analysis supported by external consultants

Name	Date	Context	Position
A358 - Output - 05-00 - Sites Costs Pe_Served Subject to D_U Company Level.xlsx	18 March 2025	Stata files for Phosphorus removal analysis	Internal analysis supported by external consultants
A359 - Output - 05-00 - Sites Costs Pe_Served Subject to D_WFD Company Level.xlsx	18 March 2025	Stata files for Phosphorus removal analysis	Internal analysis supported by external consultants
A360 - Output - 06-00 - Construction projects cost variation data.xlsx	18 March 2025	Stata files for Phosphorus removal analysis	Internal analysis supported by external consultants

Wessex Water

PR24 CMA Redetermination

Annex A5 – Areas where we reserve the right to make further submissions as necessary

1 Other areas of disagreement not included in our focused Statement of Case

1.1 We have taken a narrow, targeted approach to our Statement of Case to ensure that the limited time all parties have available is spent on the key areas where we consider the measurement error in Ofwat's approach to estimating the costs appropriate for the efficient company is such that it has not met its duties.

1.2 There are a number of further areas in Ofwat's PR24 Final Determination with which we disagree and could also be re-determined. Given the time constraints in the process, the number of other water companies requesting a re-determination, and the need to continue to deliver for customers and the environment, we consider it proportionate and appropriate not to focus in our Statement of Case on these areas.

1.3 Nevertheless, we have summarised in this annex our position in respect of these areas, as well as signposting to where we have discussed these issues in more detail as part of the PR24 process (e.g. through our business plan submission, query responses, and subsequent Draft Determination representations).

1.4 In the event the CMA opts to take a detailed look at any of these (or other) areas as part of its overall re-determination, we reserve the right to make such submissions as we consider necessary.

Base costs wholesale – wastewater

1.5 Ofwat's approach to setting cost allowances for wastewater is similar to its approach in respect of wholesale water. As such, the cost allowances for this price control are also affected by the methodological flaws that our Statement of Case identifies there. In particular:

(a) Base costs are set considering only historical outturn spend and will therefore bake-in the underspend resulting from misaligned incentives.

(b) Ofwat's models are subject to significant measurement error, and set cost allowances on the basis of an artificially low efficiency frontier. As a result, the notional firm is underfunded.

1.6 The impact of these issues on our base cost allowance for wastewater network is not as significant as for our water network, and as such has not been prioritised for a redetermination given the time available.

Enhancement costs – WRC growth

1.7 We disagree with Ofwat's approach to setting cost allowances for WRC growth. Ofwat has relied on a set of specifications which do not exhibit a good fit for the data – both models report a relatively low adjusted R squared value (0.41 to 0.44) and there is significant variation in scheme-level costs that is not being explained by Ofwat's chosen modelling specifications[112].

1.8 We argued in our response to Ofwat's Draft Determination that the approach to setting allowances should recognise and account for the limitations of the chosen models for WRC growth – in particular, by considering the efficient cost of schemes which are clearly outliers (even if not identified via Cook's Distance) through a deep dive assessment. Ofwat did not address this argument in its Final Determination.

1.9 Our fuller position in respect of WRC growth allowances is set out in our Draft Determination representation *WSX-C10 – Enhancement costs – Water Recycling Centre (WRC) growth*[113].

1.10 We also note that Ofwat identified some unambiguous errors in its Final Determination. Specifically, Ofwat made an adjustment to allowances to reflect that some growth schemes span multiple AMPs (so only a portion of the scheme is funded in AMP8), but in doing so it incorrectly used the ratio of AMP8 to AMP9 spend in companies' requests, instead of the ratio implied by Ofwat's modelled allowances. It also made an error in adjusting allowances to account for costs which it said are related to ensuring compliance with DWF permits (rather than growth).

1.11 The net impact of these errors – which are separate to the issues with its modelling approach set out above – is to increase our revenue allowance by £46 million for this enhancement programme[114].

1.12 Ofwat has said that it will address this error through the blind year reconciliation process. We ask that the CMA directly makes the relevant adjustment to our revenue allowances.

Enhancement costs – IED

1.13 We disagree with Ofwat's approach to setting cost allowances for bioresources IED investment. IED is a complex area, characterised by bespoke, company-specific investment requirements that cannot be easily captured by simple cost drivers. Despite this, Ofwat has relied on a simple modelling approach to set cost allowances. The chosen IED models have some of the lowest adjusted R squared values of all models used to inform PR24 enhancement cost allowances (e.g. 0.097 for tank covering). They also omit factors that we consider to be important drivers of efficient costs, based on engineering rationale.

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112 See Section 5 of Ofwat (2024) PR24 Final Determinations - Expenditure allowances – Enhancement cost modelling appendix, in particular Section 5.4.
113 Provided in SoC Appendix A107.
114 This is set out in Ofwat's query response *OFW-FD-WSX-012*, provided in SoC Appendix A195.

1.14 Furthermore, we consider that Ofwat's upper quartile efficiency challenge is not sufficiently justified by the available data.

1.15 We argued in our response to Ofwat's Draft Determination that Ofwat should undertake a deep dive assessment of secondary containment and tank covering. In its Final Determination, Ofwat did not address our arguments about its overall approach, and only partly considered our views on modelling specification and efficiency challenge.[115]

1.16 Our fuller position in respect of IED allowances is set out in our Draft Determination representation *WSX-C18 – Enhancement costs – Bioresources and the Industrial Emissions Directive (IED)*[116].

Enhancement costs – leakage

1.17 We disagree with Ofwat's approach to setting enhancement cost allowances for leakage reduction. In its Draft Determination, Ofwat used a cost benchmarking approach to allocate a common unit cost for leakage reduction. This was more than three times lower than the median proposed in companies' business plans, was derived from only two years of outturn data, ignored the cost implications of adverse weather and did not account for leakage performance of each company.[117]

1.18 At Final Determination, Ofwat revised their cost model to use six years of outturn data and allocated a higher unit cost to the five highest performing companies, to take account of companies' different starting positions. However, this unit cost was itself significantly lower than the average of the highest performing companies.[118] Ofwat also made an upward adjustment to our leakage reduction baseline (2024-25) forecast, meaning we need to achieve an additional 2.4 Ml/d reduction in leakage over the AMP with no additional funding.

1.19 Further details of our arguments in respect of leakage reduction are set out in our Draft Determination representation *WSX-C07 – Enhancement costs – leakage and smart metering*.[119]

Enhancement costs – supply-side schemes

1.20 We disagree with Ofwat's approach to setting enhancement cost allowances for supply-side schemes. Ofwat used a simple unit cost approach to set cost allowances, where

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115 See Section 5 of Ofwat (2024) PR24 Final Determinations - Expenditure allowances – Enhancement cost modelling appendix, in particular Sections 6.3 and 6.4.
116 Provided in SoC Appendix A115.
117 See Section 3.5.4 of Ofwat (2024) PR24 Draft Determinations – Expenditure allowances, provided as SoC Appendix A214.
118 See Section 3.6.4 of Ofwat (2025) PR24 Final Determinations – Expenditure allowances.
119 Provided in SoC Appendix A104.

schemes were grouped into five categories and the cost allowance was set based on the median unit cost per Ml/d of scheme benefit in each category.[120]

1.21 We consider that this approach is not granular enough to be able to accurately and adequately assess the cost efficiency of options. In particular, it does not allow for a proper consideration of the complexity of options that may be in the same option type at a high level, but are characterised by very different complexities that affect costs. We asked Ofwat to review its approach to assessing schemes and setting unit cost rates.

1.22 Ofwat retained its approach in its Final Determination as it said that schemes in each category are sufficiently similar to allow costs to be compared and understand efficiency in delivering supply benefit across the industry. However, it did re-categorise some schemes.[121]

1.23 Our fuller position in respect of supply-side schemes is set out in our Draft Determination representation *WSX-C08 – Enhancement costs – supply schemes*.[122]

Enhancement costs – resilience funding

1.24 We disagree with Ofwat's approach to setting enhancement cost allowances for resilience, specifically in respect of climate change risks. Companies will each face unique challenges in this area and the requested funding in their business plans will reflect these circumstances. In light of this, we asked Ofwat to consider the information set out in plans and set the appropriate level of funding on a company-by-company basis. However, Ofwat has continued to set a common uplift on base allowances (of 0.714%) for companies to address their climate change risks.[123]

1.25 Our fuller position in respect of WRC growth allowances is set out in our Draft Determination representation *WSX-C13 – Enhancement costs – Resilience*.[124]

Retail costs

1.26 In the round, we have accepted Ofwat's retail price control allowance. However, we have concerns regarding the methodology used to derive and set allowances. In particular:

(a) The outputs of the bottom-up models need to be considered alongside what is observed in the real world. Ofwat's bad debt models imply a very wide range of efficiency scores, with some companies given a significantly lower allowance for bad debt costs than their business plans, and vice versa. This suggests that its

[120] See Section 3.5.1 of Ofwat (2024) PR24 Draft Determinations – Expenditure allowances, provided as SoC Appendix A214.
[121] See Section 3.6.1 of Ofwat (2025) PR24 Final Determinations – Expenditure allowances.
[122] Provided as SoC Appendix A105.
[123] See Section 3.8.2 of Ofwat (2025) PR24 Final Determinations – Expenditure allowances.
[124] Provided in SoC Appendix A110.

models are not capturing the full range of factors affecting companies' bad debt rates, or the true relationship between the factors which are included (e.g. income deprivation).

(b) Retail allowances should be indexed for inflation in the same way as for wholesale price controls. This is consistent with regulatory precedent in other industries and would maintain the wider allocation of inflation risk in the price control.

1.27 We raised these issues in our Draft Determination Response, but Ofwat did not explicitly consider them in its PR24 Final Determination.

Outcomes – performance targets

1.28 In the round, we have accepted Ofwat's performance commitment targets. However, we consider that some of these targets have been set at a level that makes underperformance more likely than overperformance for an efficient company, for the allowed level of funding.

1.29 In particular, this affects Ofwat's targets for:

(a) Storm overflows: The target for this performance commitment does not reflect the funding that we have received for storm overflow improvements in AMP8, or the number of improvements we are making, particularly when compared with the improvements made (for the funding received) during AMP7.

(b) Total pollution incidents: The targets for this performance commitment over AMP8 do not take account of the latest evidence on number of incidents which itself is the result of greater monitoring at assets. We believe the baseline used to set this performance commitment profile should be reflective of our most recent reporting including EDM data.

(c) Biodiversity: This target for this performance commitment is common rather than company-specific (contrary to Ofwat's PR24 final methodology) and therefore takes no account of individual company approach (e.g. where companies have proposed to nominate land of higher biodiversity value where improvements are more limited). It is also normalised by company area rather than company landholding, which disproportionately penalises WASCs as it assumes equal potential biological quality of the waste landholding as on the landholding held for water supply.

1.30 We also have specific concerns with performance commitments for:

(a) Unplanned Outage: We do not consider Ofwat's PR24 definition of this metric is a true measure of asset health, or that it reflects the outcomes that matter to customers. Because of this, we argued that this performance commitment could incentivise inefficient investments that would not represent best value for customers. Ofwat did not address these arguments as part of its Final Determination.

(b) Business demand: We believe this performance commitment is inconsistent with broader objectives in respect of economic growth, and could lead to perverse outcomes whereby a company could refuse to meet new business demand (which may be both locally and nationally significant for the economy) if that additional demand would result in a company failing to meet their performance target. We proposed some changes to this performance commitment definition and methodology to mitigate this risk, but Ofwat did not amend its approach in its Final Determination.

(c) Mains repairs: We believe this performance commitment sits at odds with the separate performance commitment for leakage as, by itself, it incentivises companies to reduce the level of proactive repairs which is a key element of company leakage reduction strategies.[125]

1.31 We set out further details on these issues in our Draft Determination representation *WSX-O01 – Performance and Outcomes*[126].

1.32 We note that Ofwat's Outturn Adjustment Mechanism (OAM) – which Ofwat consulted on following its Draft Determination consultation – partly mitigates the impact of these methodological flaws on the overall balance of risk and return in companies' PR24 settlement[127]. However, it does not address the fundamental source of these issues.

Outcomes – Outcome Delivery Incentive (ODI) rates

1.33 To incentivise the right (or efficient) level of performance, ODI rates should reflect the value of the relevant outcome to customers and the environment.

1.34 Ofwat amended its ODI approach at several points during the PR24 process, including at Draft Determination stage. The compounded impact of these changes has been to move these rates away from the marginal benefit associated with higher performance levels. This introduces a risk that ODI rates provide incentives for companies to deliver an economically inefficient level of performance e.g. to deliver performance for which the (efficient) costs are beyond that which is valued by the customer.

1.35 To address this risk, we proposed that Ofwat uses the ODI rates we proposed at PR19 (recognising that some updates may be needed), as these are more appropriately calibrated to the interests of customers and the environment.

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[125] We set out these arguments in our business plan document *WSX14 - Water networks plus strategy and investment* (provided as SoC Appendix A021). We said that low mains replacement rates are neither sustainable nor in the long-term interests of customers, and proposed an increasing trajectory over AMP8.

[126] Provided as SoC Appendix A148. See in particular Section 8 (Unplanned Outage) and Section 6 (Business Demand).

[127] See Ofwat (2024) PR24 consultation on outturn adjustment mechanism, provided as SoC Appendix A211.

1.36 Ofwat has made some substantive changes to its ODI rates in its Final Determination, which goes some way to addressing the risks that we identified. However, we consider the ODI rates continue to depart from the underlying evidence on marginal benefits.

1.37 Further detail on this issue is set out in our Draft Determination representation *WSX-O01 – Performance and Outcomes*[128].

Price Control Deliverables (PCDs)

1.38 Price control deliverables (PCDs) are a new regulatory mechanism introduced by Ofwat for PR24. We have supported the principle of PCDs where they promote an outcomes-based approach and do not lead to more input/output-based measures in place of performance commitments.

1.39 Ofwat did not consult on its full PCD framework until the publication of its Draft Determination. We raised several concerns that this framework would not deliver good outcomes in AMP8. In particular:

(a) The design of Ofwat's PCD framework materially restricts companies' flexibility to deliver customer outcomes in the most efficient way – particularly for programmes where there is a high degree of uncertainty in AMP8. This is because it specifies a set of outputs that companies must deliver ex-ante, rather than the outcomes that ultimately matter to customers and the environment.

(b) It also effectively compels companies to deliver some schemes in advance of when the Environment Agency considers they need to be delivered, and in isolation from consideration of companies' own delivery programmes. This may lead to inefficient delivery during AMP8, which will negatively affect customers and the environment.

(c) The scope of the PCD framework duplicates existing mechanisms by introducing further penalties where customers are already protected from the consequences of non-delivery. This could exacerbate the issues raised above in relation to ODI rates.

1.40 Furthermore, the way in which PCD payments are applied materially increases the delivery risk that companies face in AMP8, in a way that Ofwat's wider PR24 framework does not acknowledge.

1.41 We proposed some changes to Ofwat's proposals to address these issues, drawing on Ofgem's more mature PCD framework.

1.42 In its PR24 Final Determination, Ofwat has made some adjustments to its framework, in particular for the storm overflows PCD (to allow greater flexibility in what solutions are used). However, our view remains that PCDs will restrict companies to optimise deliver *between* different PCDs (e.g. delivering more of one PCD and less of another, if better

[128] Provided as SoC Appendix A148.

information demonstrates this would be beneficial for customers). We also believe that companies should be able to determine how best to sequence their programmes to ensure efficient delivery. Partly for these reasons, PCDs continue to skew companies' RoRE risk to the downside.

1.43 We set out further details on these issues in our Draft Determination representation *WSX-O02 – Price Control Deliverables*[129].

Delayed delivery cashflow mechanism (DDCM)

1.44 Another new mechanism that Ofwat has introduced in PR24 is a Delayed Delivery Clawback Mechanism (DDCM). This mechanism – which was only consulted on at Draft Determination stage – would claw back a proportion of revenue associated with unspent wholesale expenditure allowances, if companies are behind in delivery after the first two years of AMP8[130].

1.45 In our Draft Determination Response, we raised concerns with this, in particular that:

(a) It weakens incentive for companies to outperform their totex allowance (which would benefit customers) and / or could incentivise inefficient use of investment in order to not trigger this clawback. This would exacerbate the similar risk created by in-AMP PCD delivery targets.

(b) It does not recognise the dynamic nature of delivering stretching targets while managing shocks and stresses from the outside world that mean programmes can materially vary during an AMP without necessarily impacting overall delivery.

1.46 Ofwat has retained its DDCM in its PR24 Final Determination, albeit with a small adjustment to the 'trigger' threshold[131]. However, we do not consider it has adequately considered the issues set out above, and the potential adverse consequences.

1.47 We set out further details on this issue in our Draft Determination representation *WSX-O02 – Price Control Deliverables*[132].

Scope of uncertainty

1.48 Water companies are facing an unprecedented level of regulatory uncertainty in AMP8.

1.49 Ofwat's PR24 framework sets out a range of mechanisms to address specific uncertainties. However, given the type and scale of uncertainty at PR24, we consider that a more holistic approach to uncertainty would more appropriately limit the risks for

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129 Provided as SoC Appendix A149.
130 See Section 8 of Ofwat (2024) PR24 Draft Determinations – Aligning risk and return appendix, provided as SoC Appendix A212.
131 See Section 8 of Ofwat (2024) PR24 Draft Determinations – Aligning risk and return appendix, provided as SoC Appendix A212.
132 Provided as SoC Appendix A149.

customers and investors (and in doing so reduce the cost of delivering our full programme of work).

1.50 Drawing on regulatory precedent elsewhere, we recommended Ofwat introduce two types of uncertainty mechanism in its Final Determination: asset-linked volume drivers; and targeted reopeners. These mechanisms would target different types of uncertainty (i.e. whether the efficient costs are known but the volume of work is uncertain, or whether both the volume *and type* of intervention, and therefore associated costs, are not known *ex-ante*), and are an alternative way to provide customer protection against unspent revenues while avoiding the need to set an arbitrary threshold for clawback (as with DDCM).

1.51 However, Ofwat did not explicitly consider these mechanisms in its Final Determination.

1.52 We set out further details on this issue in our Draft Determination representation *WSX-M07 – Uncertainty mechanism*[133].

RoRE

1.53 Several of the issues highlighted above result in a significant downside skew in the overall RoRE range for our AMP8 settlement. These include:

(a) A significant downside totex risk due to the flaws in approach to setting Ofwat's cost allowances, particularly for its enhancement cost programmes.

(b) A downside ODI risk driven by the asymmetric risks of meeting some of our performance commitment targets.

(c) A further downside risk driven by the delivery profiles set for certain PCD, as well as the additional risk of incurring PCD non-delivery penalties for outputs which are delivered late.

1.54 These sources of downside skew have not been addressed in the allowed return that Ofwat has set for PR24.

1.55 Given our targeted approach to our Statement of Case, we have chosen to focus on the most material drivers of this downside skew. However, a fully balanced package would need to address the sources of these issues as well, or else adjust the return to appropriately compensate for such skew.

[133] Provided as SoC Appendix A145.

Wessex Water

PR24 CMA Redetermination

Annex A6 – Areas we are willing to accept in the round

1 Areas we are willing to accept in the round

1.1 There are also a number of areas in the Final Determination we are willing to accept in the round. Further details of these are provided below.

1.2 Again, we would be happy to make further submissions on these points if that would assist the CMA.

Enhancement costs – deep dives

1.3 Where enhancement programmes are highly company-specific and comprise bespoke schemes with individual characteristics, it is very difficult to reliably compare or benchmark costs between companies. In these circumstances, it is important that one considers the full range of evidence submitted as to why requested allowances are both necessary and efficient.

1.4 In such circumstances, we agree that efficient cost allowances should be informed by enhancement-specific engineering assessments (known a 'deep dives') and we support Ofwat's use of them. Ofwat has used this in a range of enhancement areas where companies have very different and bespoke programmes; this includes nitrogen removal[134], net zero, cyber security and investigations.

1.5 We note that, while we support the use of deep dive assessments, we do not necessarily agree with Ofwat's detailed assessment in each enhancement area.

Enhancement costs – shallow dives

1.6 For less material enhancement investment lines, Ofwat carried out a 'shallow dive' efficiency assessment. Ofwat did this by applying the average efficiency challenge applied to the company's enhancement programme that has been assessed through cost benchmarking, on the basis that this provides a reasonable indication of a company's opportunity for efficiency in other enhancement areas. It capped the maximum efficiency challenge for shallow dive areas at 20%.

1.7 We recognise that for smaller enhancement areas, it may not be proportionate to carry out deeper dives into companies' plans. In this context, the shallow dive approach is a pragmatic solution to balancing Ofwat's considerations. In our Draft Determination, we said that the maximum efficiency challenge should be reduced to 10% (in line with PR19) as this strikes a better balance for areas which have not been examined in detail. Ofwat made this change in its Final Determination.

[134] We note that Ofwat has taken a different approach to phosphorus removal which involves similar treatment processes.

Cost sharing rates

1.8 We accept Ofwat's use of cost sharing as a mechanism to address uncertainty. Furthermore, we welcome Ofwat's consideration of lower cost sharing rates in areas where companies face additional risks and / or are more exposed to exogenous cost changes outside of their control. This applies to areas such as enhancement costs and business rates.

1.9 We note that, while we are supportive of cost sharing in the absence of any other uncertainty mechanisms, our view remains that cost sharing will not be effective in itself in addressing the scope of uncertainty (for instance it will not mitigate large-scale unfunded risks) and that Ofwat should introduce other mechanisms to reflect the full extent of uncertainty faced by companies in AMP8, for instance in respect of the *scope* of regulatory requirements (as well as the cost of delivering them).

Outcomes – deadbands, caps and collars

1.10 We support the use of deadbands, caps and collars in limiting the extent of financial rewards or penalties for underperformance or outperformance. Performance in many areas is not solely within company control, and it would not be efficient or effective to allocate companies the full risk associated with extreme performance swings. As such, these mechanisms ensure a better balance of risk between companies and customers.

1.11 In response to representations made at Draft Determination, Ofwat introduced or increased collars on performance commitments for internal and external sewer flooding; pollution incidents; biodiversity; and introduced additional deadbands on performance commitments for discharge permit compliance, repairs to burst mains and serious pollution incidents[135]. We welcome these changes.

1.12 Recognising the benefits of these mechanisms, we consider that collars could be extended to all outcomes. We also consider there are other performance commitments where performance is driven by factors outside of management control for which a deadband would be appropriate – these include bathing water quality and storm overflows. Notwithstanding this, taken in the round, we have accepted Ofwat's performance commitment targets.

Measures of experience

1.13 We support the overarching framework for incentivising companies to deliver an excellent customer experience. Driving continuous improvement and investment in customer experience is an important objective for the industry, and we are supportive of

[135] See Table 1 in Ofwat (2025) PR24 Final Determinations – Delivering outcomes for customers and the environment.

Ofwat setting outward looking performance standards for the sector. We also welcome the extension of this regime to measure non-household customer experience.

1.14 We note that, while we support the principles of the customer experiences framework, we have some concerns with the specifics of each methodology, in particular the use of the UKSCI a cross-sector benchmark to calculate C-MeX under and outperformance payments.[136]

[136] Further details of our specific views on the C-Mex, D-Mex and BR-Mex metrics are set out in our Draft Determination representation *WSX-O03 - Measures of experience* (provided as SoC Appendix A150).

Wessex Water

PR24 CMA Redetermination

Annex A7 – Further information on disinfection at water treatment centres

1 Overview

1.1 A series of new obligations specific to Wessex Water have not been accounted for in the base cost allowances. We have previously included these in our base costs but given their nature as new activities, these could be reallocated to enhancement or considered as a cost adjustment claim – and in either case a PCD could be applied to provide customer protection.

The Wessex Water specific nature of this investment

1.2 As we noted in our business plan, *"Our proposed maintenance expenditure for AMP8 is more than AMP7 and is based on a combination of an increase in our BAU maintenance as well as our disinfection improvement programme"*.[137] This includes upgrades across a significant number of sites to meet new DWI expectations.

1.3 Specifically, Wessex Water has a number of treatment sites where a change in the agreed risk appetite between us and the DWI requires an increase in disinfection at a number of our sites. In general, larger sites already have disinfection in place. Therefore, this investment relates to our small, rural, groundwater treatment sites.

1.4 We welcome the acknowledgment of the issues with economies of scale at WTWs not being reflected in the allowed costs. However, the inclusion of the WATS variable distorts the impact of small treatment sites for rural companies.

1.5 As shown in Table A7-1 below, out of the companies where an adjustment has been made through this cost adjustment claim, we have significantly more water treated at simple sites (complexity < band 3), and these are all small sites that require disinfection improvements.

Table A7-1 – Proportion of water treated at simple sites (2019-2024)

	Prop Treatment Complexity < 3 Average over 2019-24
SRN	14%
WSX	49%
SEW	11%

The proposed expenditure

1.6 Table A7-2 below sets out our proposed investment (post frontier shift and RPEs). This is profiled evenly across the five years.

[137] See *WSX10 - Maintaining our services commentary and analysis*, provided as SoC Appendix A018.

Table A7-2 – Proposed expenditure for supply disinfection

Investment Need	Capex	Opex	Totex
877 - PR24 Supply Disinfection Improvements	£45.1m	£1.5m	£46.6m

Customer protection – the application of a PCD

1.7 We are currently proposing to make these improvements at eight sites. However, we note these sites form part of our wider 15-year investment plan, based on our current view of the risks at each of our sites. If the DWI identifies that another site has become a higher priority and issues a regulatory notice accordingly, then of course we will swap that site for one of the eight in the current plan. This will be agreed with the DWI as part of their regulatory processes.

1.8 Therefore, our proposed PCD is to complete disinfection works at a minimum of eight sites in AMP8 (with these sites to be determined and agreed with the DWI based on risk throughout the period) with a unit cost at the average cost. We would be happy to provide further information on our current planned investments here through the query process, or engagement with Ofwat.

2 Sites where this investment is currently planned

2.1 In the following tables we provide further information for the sites where this investment is currently planned. As set out above, these sites are subject to change as a result of discussion and agreement with the DWI.

2.2 This information is followed by an explanation of the need for the investment, our approach to cost estimation, and explanation of why these are not funded in Ofwat's base cost models.

Table A7-3 – Proposed expenditure –

Peak week production capacity (Ml/d)	10.5Ml/d
Investment solution planned	Installation of UV for primary disinfection and associated monitoring and run to waste improvements and modification of existing chlorination for network chlorine residual
Efficient forecast costs	£3.8m

	✂
Estimation method for costs	See cost estimation section
Projected impact on performance commitment	This investment forms part of a broader investment programme aimed at maintaining our current industry leading CRI & WSI performance
DWI improvement notices (references)	See need justification section
Current water treatment complexity category	W4 - site already has Ion exchange for nitrate (adsorption) treatment
Expected water treatment complexity category	W5 – addition of UV meets the more than one complex treatment rule

Table A7-4 – Proposed expenditure – ✂

	✂
Peak week production capacity (Ml/d)	13Ml/d
Investment solution planned	Installation of UV for primary disinfection and associated monitoring and run to waste improvements and modification of existing chlorination for network chlorine residual
Efficient forecast costs	£3.6m
Estimation method for costs	See cost estimation section
Projected impact on performance commitment	This investment forms part of a broader investment programme aimed at maintaining our current industry leading CRI & WSI performance
DWI improvement notices (references)	✂
Current water treatment complexity category	SD – marginal chlorination only at present
Expected water treatment complexity category	W4 - addition of UV meets the W4 definition

Table A7-5 – Proposed expenditure – ✂

	✂
Peak week production capacity (Ml/d)	17Ml/d
Investment solution planned	Installation of UV for primary disinfection and associated monitoring and run to waste improvements and modification of existing chlorination for network chlorine residual

	✄
Efficient forecast costs	£6m
Estimation method for costs	See cost estimation section
Projected impact on performance commitment	This investment forms part of a broader investment programme aimed at maintaining our current industry leading CRI & WSI performance
DWI improvement notices (references)	See need justification section
Current water treatment complexity category	W1 – site already has RGF for iron removal
Expected water treatment complexity category	W4 - addition of UV meets the W4 definition

Table A7-6 – Proposed expenditure – ✄

	✄
Peak week production capacity (Ml/d)	3.4Ml/d
Investment solution planned	Installation of UV for primary disinfection and associated monitoring and run to waste improvements and modification of existing chlorination for network chlorine residual. This site is particularly challenging, will require significant land purchase, access improvements, new balance tank and relift pumping station in new treatment building and major washout improvements
Efficient forecast costs	£9.4m
Estimation method for costs	See cost estimation section
Projected impact on performance commitment	This investment forms part of a broader investment programme aimed at maintaining our current industry leading CRI & WSI performance
DWI improvement notices (references)	See need justification section
Current water treatment complexity category	SD – marginal chlorination only at present
Expected water treatment complexity category	W4 - addition of UV meets the W4 definition

Table A7-7 – Proposed expenditure – ✄

	✄
Peak week production capacity (Ml/d)	11.4Ml/d

	✂
Investment solution planned	Installation of UV for primary disinfection and associated monitoring and run to waste improvements and modification of existing chlorination for network chlorine residual
Efficient forecast costs	£5.5m
Estimation method for costs	See cost estimation section
Projected impact on performance commitment	This investment forms part of a broader investment programme aimed at maintaining our current industry leading CRI & WSI performance
DWI improvement notices (references)	See need justification section
Current water treatment complexity category	SD – marginal chlorination only at present
Expected water treatment complexity category	W4 - addition of UV meets the W4 definition

Table A7-8 – Proposed expenditure – ✂

	✂
Peak week production capacity (Ml/d)	6.3Ml/d
Investment solution planned	Installation of UV for primary disinfection and associated monitoring and run to waste improvements and modification of existing chlorination for network chlorine residual. This site is very challenging, will require significant land purchase, access improvements, new balance tank and relift pumping station in new treatment building
Efficient forecast costs	£9.4m
Estimation method for costs	See cost estimation section
Projected impact on performance commitment	This investment forms part of a broader investment programme aimed at maintaining our current industry leading CRI & WSI performance
DWI improvement notices (references)	See need justification section
Current water treatment complexity category	SD – marginal chlorination only at present
Expected water treatment complexity category	W4 - addition of UV meets the W4 definition

Table A7-9 – Proposed expenditure – ✂

	✂
Peak week production capacity (Ml/d)	2.2Ml/d
Investment solution planned	Installation of UV for primary disinfection and associated monitoring and run to waste improvements including new washout arrangement and modification of existing chlorination for network chlorine residual
Efficient forecast costs	£2.9m
Estimation method for costs	See cost estimation section
Projected impact on performance commitment	This investment forms part of a broader investment programme aimed at maintaining our current industry leading CRI & WSI performance
DWI improvement notices (references)	See need justification section
Current water treatment complexity category	SD – marginal chlorination only at present
Expected water treatment complexity category	W4 - addition of UV meets the W4 definition

Table A7-10 – Proposed expenditure – ✂

	✂
Peak week production capacity (Ml/d)	12.5Ml/d
Investment solution planned	Installation of UV for primary disinfection on the boreholes (springs already have UV) and associated monitoring and run to waste improvements including new washout arrangement and modification of existing chlorination for network chlorine residual
Efficient forecast costs	£4.5m
Estimation method for costs	See cost estimation section
Projected impact on performance commitment	This investment forms part of a broader investment programme aimed at maintaining our current industry leading CRI & WSI performance
DWI improvement notices (references)	See need justification section
Current water treatment complexity category	W4 – site already has due to UV on springs supply
Expected water treatment complexity category	W4 – addition of UV on boreholes won't change categorisation

3 DWI Improvement need justification

3.1 We work together with the DWI to safeguard public health and to ensure the water we supply is always wholesome.[138]

3.2 Our previous disinfection policy was based on a raw water categorisation system using a range of biological and chemical parameters, which determined the disinfection requirement (Chlorination and/or UV). This system has served us well for many years and allowed for simple marginal chlorination for pristine groundwater sites.

3.3 However, following changes in WHO guidance and ongoing engagement with the DWI, we must now change our disinfection policy, raw water categorisation and disinfection requirements.

3.4 The WHO guidance takes account of recent developments in the understanding of microbial risks in drinking water, in particular the growing body of evidence on virus related risk. For this reason, the DWI have expressed a new expectation that we will apply a greater level of disinfection at all our sites in the future. A letter from the DWI[139] for ✂ indicates their requirement to move away from marginal chlorination and provide evidence of a minimum Effective Contact Time (ECT).

3.5 Specifically, we have been directed to adopt the approach recommended by the WHO, which categorises raw water solely on the concentration of E. coli, which in turn then informs the disinfection treatment required. As a result, our source waters will be allocated into two categories (A and B) and the resultant disinfection requirement will be met using the most appropriate choice of chlorine and/or UV disinfection.

3.6 The concept of marginal chlorination is not supported by the WHO guidance as the specified minimum log reduction in viruses requires an Effective Contact Time (ECT) or equivalent.

3.7 This is a significant change from our current approach as we currently undertake marginal chlorination at 34 of our sites, which would not achieve the required minimum ECT or equivalent. A substantial investment programme based on risk over a number of investment cycles will be needed to achieve full compliance with the proposed disinfection policy.

3.8 We are following a phased transition between our old and new systems. To enable this transition from one methodology to another, we will have to run the two systems in parallel for a period of time. To ensure a successful migration to the proposed approach, we will firstly change our design standards, so that any improvement schemes to

[138] Wholesome water, as defined by UK law, is water that is safe for drinking, cooking, and other domestic purposes. It must meet strict microbiological, chemical, and physical standards to ensure it does not pose any potential danger to human health.

[139] DWI (2024) *Letter on* ✂, provided as SoC Appendix A236.

disinfection or associated systems will be required to meet the criteria of the new disinfection policy. This will mean that both reactive and planned improvement works will progress upgrades to the disinfection systems to bring them in line with the proposed policy.

3.9 Other sites will continue with existing arrangements unless there is a significant deterioration in source water quality, as identified through routine reviews of the raw water quality, at which point they will be assessed against the new policy to determine treatment requirements.

3.10 Hence our approach to prioritising disinfection improvements is a combination of both proactive and reactive upgrading. The DWI are supportive of this approach.

3.11 In order to transition all sites to compliance with the new policy within this timescale we will be required to plan, and potentially implement, improvements at some sites which have not yet shown a deterioration in water quality. As deterioration may subsequently be detected at other sites, leading to an increase in their respective risk scores, these will then have to be prioritised for investment over the planned sites. That is, the specific sites where we will need to prioritise investment is subject to change.

3.12 For this reason, it was been agreed with the DWI that we will not seek individual Notices for the proposed sites. This is to ensure the most effective reduction of risk to the customer, whilst still delivering the full programme within the agreed period.

4 Cost estimating methodology

4.1 To develop costs, we first reviewed all our sites which will not be compliant with our new disinfection policy and looked to prioritise those sites to be upgraded first considering the public health risks. Eight sites were identified for implementation in the next five-year period, recognising we may see raw water deterioration at other sites which mean we reprioritise and defer one of these sites to enable another to be brought forward.

4.2 The eight sites were assessed by our internal engineering team to develop a conceptual design for each site to make the necessary improvements based on our agreed approach of installing UV for primary disinfection and associated monitoring, and run to waste improvements together with modification of existing chlorination facilities to provide a chlorine residual for the onwards treated water distribution network.

4.3 An example of a conceptual design is provided for WTW[140]. , like , is an example of a higher unit cost site. This is because at present these sites have borehole pumps that extract water from the ground and pump it directly to the receiving reservoir,

140 Wessex Water (2025) *WTC concept design*, provided as SoC Appendix A234.

resulting in a high-pressure system that is not suitable for UV. Therefore, for these sites we need to construct a new ground tank and relift pumping station which comes with a significant additional cost. All the other sites already have ground tanks and therefore their unit costs are lower. This is likely to be broadly representative of the balance required over this multi-period strategic investment.

4.4 The £2.9m cost for is the de minimis for UV installation for all small sites with a capacity of less than 3Ml/d and which already have a ground tank. For those without a ground tank, the de minimis for small sites less than 3Ml/d capacity would be circa £6m. Although site specific issues such as land and planning, access, and washout arrangements can also have a significant impact on cost.

4.5 These designs were then processed through our PR24 cost estimating team to provide the cost estimates using industry standard approaches. Costs have been developed through a bottom-up approach based on previous similar work and we believe our estimates fairly reflect the true cost of the scheme.

4.6 We also include a detailed cost breakdown for [141] which is our most developed scheme almost ready for full authorisation.

5 Ofwat's models

5.1 Under the current specifications and forecast variables the models do not (and cannot be expected to) accurately reflect these efficient costs.

5.2 Firstly, the forecasts variable for treatment complexity used in setting the base cost allowances is actually based on the average of the last two years and so do not account for the expected increase in costs. This methodological choice is intended to avoid double counting of new activities, such as this proposed expenditure.

5.3 Were the forecasts updated, it would not be sufficient to fund the necessary investment. This reflects the fact that models cannot account for new costs required to move sites between complexity bands. It more closely reflects the ongoing cost increase associated with these sites once they are in the new complexity band. Updating the forecast of explanatory variables to align with the impact of these improvements would only increase modelled costs by c£5m, far less than the capital costs of making the upgrades.

5.4 Secondly, at each site we incur substantial design, on costs and monitoring that does not scale with site size. That is, these improvements are all at small sites where our capital investment suffers from diseconomies of scale. This conceptual argument has

[141] Wessex Water (2025) *Detailed cost estimate for* , provided as SoC Appendix A235.

been recognised through the allowance of the cost adjustment claim for economies of scale at water treatment works. However, we do not believe that this cost adjustment claim adequately captures the underlying cost relationships. This is because:

(a) As noted in the diseconomies of scale CAC commentary the models with the inclusion of the WATS variable have low explanatory power. Crucially they seem to re-estimate the density relationship, with for example, urban companies such as Thames gaining large increases in allowances (in the models, not as applied at the Final Determination).

(b) We question whether this conceptually makes sense on the WRP models. The argument for a “U” shaped density relationship follows for network costs where there is increased cost of operating in congested areas, but we do not see the same engineering rationale for non-network costs.

(c) This results in the econometrics used to determine the cost adjustment claims overly rewarding “dense” companies with existing complex treatment and by corollary underfunding “sparse” companies, specifically, we believe, where there is substantial simple treatment.

Wessex Water

PR24 CMA Redetermination

Annex A8 – Further information on Bioresources health and safety requirements

Wessex Water

PR24 CMA Redetermination

Annex A9 – Further information on wholesale water base costs

1 Maintenance strategy

Original submission

1.1 The key documents that set out our maintenance strategy in our original October 2023 submission are:

(a) WSX10 - Maintaining our services commentary and analysis[142]

(b) WSX11 - Annexes - Maintaining our services[143]

(c) WSX12 - Water resources strategy and investment[144]

(d) WSX14 - Water networks plus strategy and investment[145]

(e) WSX15 - Annexes - Water networks plus strategy and investment[146]

(f) WSX47 - Outcomes tables commentary[147]

(g) WSX09 - Annexes - Base cost adjustment claims[148]

1.2 Table A9-1 below is taken from our original Table CW1 submission showing proposed AMP8 expenditure.

Table A9-1 – Wholesale water total expenditure summary – Original business plan submission

	Water resources	Water network+	Total
Base Operating expenditure	58.4	436.0	494.4
Base Capital expenditure	26.0	368.8	394.9
Total AMP8 Proposed Spend	84.4	804.8	889.2

1.3 The above expenditure was proposed to ensure long term resilience and asset health while delivering the performance as set out in our outcomes – Performance Commitments (PCs) document. The proposal did include works to achieve our discolouration notice[149] as well as invest in new disinfection improvements at 8 sites.

1.4 Our operating expenditure was based on our current run rate, considering expected step changes in costs. These included a step change to deliver our stretching performance targets as well as RPEs on power, business rates, and chemicals.

142 Provided as SoC Appendix A018.
143 Provided as SoC Appendix A019.
144 Provided as SoC Appendix A020.
145 Provided as SoC Appendix A021.
146 Provided as SoC Appendix A022.
147 Provided as SoC Appendix A052.
148 Provided as SoC Appendix A017.
149 DWI (2021) Discolouration Notice WSX-2021-00002, provided as SoC Appendix A243.

1.5 Our capital maintenance was based on detailed assessments of asset age and condition and expected replacement requirements over the next five years. The total included was lower than that implied by the modelling, as it was profiled across future price control periods to manage affordability and delivery.

Draft Determination Response

1.6 We submitted our Draft Determination Response in August 2024, the key maintenance documents are:

(a) WSX-C01 - Step up in capital maintenance and base costs[150]

(b) WSX-M02 - Summary of Wessex Water's response to Ofwat's PR24 Draft Determination[151]

1.7 As discussed in chapter 8, in our response to Ofwat's Draft Determination, and in particular its QAA conditions, we profiled £40m of expenditure into AMP 9. This change is set out in Table A9-2.

Table A9-2 – Wholesale water total expenditure summary – Original Submission v Draft Determination Response

	Water resources	Water network+	Total
Original Submission	84.4	804.8	889.2
Draft Determination Response	79.7	769.3	849.0
Reduction	4.8	35.5	40.2

1.8 The changes in Totex from our original £890m to the Draft Determination Response £849m are:

(a) A £1.4m increase in Base Opex primarily related to latest information on business rates and change in the principle use recharge being applied in these price controls.

(b) A £60.5m reduction in Base Capex spread across a number of areas on the assumption that risk can be taken in the short-term, delaying investment in proactive maintenance of boreholes and water mains in particular.

(c) A £18.8m increase in base capex as a result of the query process, this was recognising the advanced maintenance of upgrading existing meters to smart meters through the smart meter roll-out.

150 Provided as SoC Appendix A098.
151 Provided as SoC Appendix A140.

1.9 Alongside the reduction in costs, we committed to delivering further improvements in service more efficiently, these included:

(a) Leakage – we increased our year 2029/30 leakage reduction target from 16.6% to 19.8%.

(b) PCC – we increased our 2029/30 reduction target from 2% to 3.3%.

(c) Business demand – we reduced our 2029/30 reduction target from 10% to 7.7%.

(d) Repairs to burst mains – we reduced our 2029/30 from 171.4 to 150.4 based on an improvement in our reporting methodology.

1.10 We kept our unplanned outage profile as per our original submission as we believe this approach is in the best interests of our customers, and as set out in Section 8 of *WSX-O01 - Performance and outcomes*[152], we have serious concerns regarding this measure.

Our current base cost forecast - summary

1.11 Table A9-3 below compares our proposed spend versus our forecast AMP7 spend. This reflects:

(a) the capital maintenance requested in our initial business plan, plus the movement of metering maintenance (as a result of an error found , less the amount relating to new disinfection at water treatment centres; and

(b) our latest view of operating costs, which have changed only due to decisions by government offices.

Table A9-3 – Comparison to current spend

£m	2020-25 AMP 7 Fcst	2025-30	Change
Totex	725.4	891.8	+166.4
Opex	444.1	529.9	+85.8
Capex	281.3	361.9	+80.6

[152] Provided as SoC Appendix A148.

2 Proposed expenditure

Capital Maintenance

2.1 As detailed in our business plan documents *WSX10 - Maintaining our services commentary and analysis*[153] and *WSX11 - Annexes - Maintaining our services*[154], asset deterioration modelling was used to inform the investment plans for our above ground assets, supplemented with detailed bottom-up costing for large spend items/schemes.

(a) For our below ground assets, we performed a bottom-up assessment, extrapolating AMP7 costs to meet the requirements of our AMP8 Network programme with specific increases in proactive mains replacement being the primary driver for the cost increase. This activity gave us an unconstrained view of costs to deliver service and maintain a resilient asset base for future generations.

(b) The modelling activities for above ground assets identified significantly higher levels of required investment than we have included in our plans. Due to the size of our enhancement programme and the potential impact on customer bills, we took a risk-based approach to constrain the overall investment to a deliverable and affordable level profiling expenditure out to 2035.

2.2 The proposed expenditure is set out by asset class in Table A9-4 below. This table sets out what we need to invest in each asset class, what we will be delivering with the investment, and how we have assessed the costs.

2.3 This expenditure included would go some way to addressing historical underfunding in this price control by improving asset health and delivering the resilient service our customers deserve – whilst balancing deliverability, affordability, and recognising further investment will also be needed in future AMPs.

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[153] Provided as SoC Appendix A018.
[154] Provided as SoC Appendix A019.

Table A9-4 – Wholesale Water asset group assessment approaches and investment benefits

Spend area and proposed expenditure (£m)		Summary of outputs	Performance commitment impacted / benefits delivered by expenditure	Assessment approach
Capital Maintenance	**361.9**			
Supply Distribution System	161.6	Increase mains replacement rate to 0.4%pa which equates to 44km/yr. Lead pipe replacement and leakage reductions.	Mains Replacement target, Water quality contacts, and Leakage. Address DWI discolouration notice.	Deterioration modelling & historical analysis.
Water Treatment Works	87.9	Across our Water Treatment and distribution sites we will replace c.12,000 life-expired assets including c.6,000 Instruments, c.1,300 Pumps and c.1,200 Electrical distribution and control assets.	CRI, and increased resilience	A combination of deterioration modelling, bottom up capital expenditure assessment, asset performance data and risk assessments used to generate AMP8 spend and forecast longer term trends.
Revenue Meters	22.4	Proactive replacement of c.180,000 basic revenue meters with smart meters	Maintain resilience of existing asset base and supports all water performance commitments.	Reactive replacement on failure and proactive replacement in synergy with smart metering strategy.
Service reservoirs	18.0	Deliver established plan in service reservoirs programme including but not limited to replacement and refurbishment of modelled civil & EMI assets.	CRI.	Bottom up assessment based on individual asset performance data, surveys and risk assessments.
Boreholes and springs	13.0	Replace Mechanical, Electrical, Instrumentation, Control and Automation (MEICA) type assets. Plus - Investigate yield and quality issues, utilise more intensive rehabilitation measures, drilling new production boreholes to replace redundant/damaged assets, and deal with legacy issues such as decommissioning redundant assets.	Improve water available for use (WAFU).	Deterioration modelling used for MEICA assets but not appropriate for structures. Bottom up assessment based on detailed inspection data.

Spend area and proposed expenditure (£m)		Summary of outputs	Performance commitment impacted / benefits delivered by expenditure	Assessment approach
Raw water pumping stations and mains	4.2	Ongoing maintenance of	Abstraction resilience.	Bottom up assessment based on detailed asset and condition data, asset performance data and risk assessments.
Dams and impounding reservoirs	2.9	Increase in supervision circa £0.1m/yr. One off repair cost to deal with legacy issues in AMP8 estimated at circa £1.5m. Inspections of 17 structures and the required remedial works.	Maintain statutory compliance.	Bottom up assessment based on detailed inspection data.
Pumping stations	1.6	Replacement and refurbishment of Civil and electrical, mechanical, and instrumentation (EMI) assets	Maintain resilience of existing asset base.	A combination of deterioration modelling, bottom up capital expenditure assessment, asset performance data and risk assessments used to generate AMP8 spend and forecast longer term trends
Raw Water Transport & Storage	0.1	Asset refurbishments	Maintain WAFU.	Deterioration modelling not appropriate. Bottom up assessment based on individual asset performance data and risk assessments.
Shared assets used principally by water price controls	50.4	Ensure systems, vehicles and places of work enable us to provide excellent services.	Indirectly supports all water performance commitments.	A combination of deterioration modelling, bottom up capital expenditure assessment and risk assessments used to generate AMP8 spend and forecast longer term trends.

Water Supply mains

Trunk mains

2.4 Trunk mains can be defined in a number of ways, by diameter, by function (moving water from one location to another, not feeding customers) and for leakage as all mains not within DMAs. Wessex Water is a small predominantly rural area with no major conurbations, and therefore using the >320mm diameter size banding used in regulatory reporting we have just under 1,000km of trunk mains. Of this around 570km are in the >320mm and ≤ 450mm size band, and 316km in the >450mm and ≤610mm size band and only 84km >610mm. Our largest trunk main is 800mm.

2.5 Maintaining our trunk mains in a stable condition contributes to a number of customer-facing measures including: leakage, supply interruptions, water quality customer contacts.

2.6 We propose a significant uplift in proactive trunk main replacement, specifically to address the needs of our DWI Discolouration Notice WSX-2021-00002[155]. This Regulation 28 undertaking requires us to reduce water quality consumer contacts in the next price control period and as indicated in the notice our discolouration strategy has identified a number of trunk mains requiring replacement/rehabilitation.

2.7 In our original submission we had an additional £20m to deliver an additional 20km of water quality driven trunk mains replacement, the £1,000/m unit cost taken for the project planned for year 1, the Lacock to Bowden scheme which has been fully designed and costed. Trunk mains are much bigger than distribution mains, and hence require bigger excavations and working areas etc and hence the cost of much greater than for distribution mains which are typically 100mm to 150mm in diameter.

2.8 The proposed trunk main replacement requires a high unit rate due to the large size and strategic function of these assets, and as it is water quality driven the need is not reflected in the CW20 condition grading which is based solely on mains repairs. The scheme we are planning to do in year 1, Lacock to Bowden involves replacing 2.2km of 450mm diameter main at unit cost of just over £1000/m.

Distribution Mains

2.9 Distribution mains are the biggest asset group by value within this price control. Our total length of distribution mains is around 11,500km, of which 80% were ≤165mm in diameter.

2.10 Expenditure on distribution mains can broadly divided into two categories, reactive expenditure to maintain leakage and service to customers, and proactive mains replacement.

2.11 Our proactive mains replacement programme is directed towards our two mains asset health PCs, repairs to burst mains and water quality customer contact about Appearance, Taste & Odour (ATO) of which Brown Black and Orange discoloured contacts are the biggest component and for which we have a DWI Discolouration Notice WSX-2021-00002[156].

2.12 To ensure we maintain long term asset health on our water supply mains we are proposing to increase our proactive mains replacement to 0.4% per annum for this price

[155] DWI (2021) Discolouration Notice WSX-2021-00002, provided as SoC Appendix A243.
[156] DWI (2021) Discolouration Notice WSX-2021-00002, provided as SoC Appendix A243.

control. This may need to rise further to 0.6% per annum in AMP9 and possibly to between 0.8% and 1.0% in the long-term future to maintain this asset group in a stable condition.

2.13 This results in a step up in investment on distribution mains to support the increased length of mains replacement.

Service pipes

2.14 The service pipe is made up of the company owned communication pipe from the main in the street to the stop tap or Meter Valve Unit (MVU) close to the boundary of public and private land (footpath – garden wall); and the customer owned supply pipe to the wall of the property/building. We have just over 600,000 communication pipes with an estimated length of 3,500km and just under 640,000 supply pipes with an estimated length of 4,500km, the difference in totals being due to shared services, i.e. single communication pipes that supply more than one property.

2.15 A lot of activity is occurring on our service pipes, the most common of which is leak repairs. We repair over 10,000 leaks on service pipes each year. In addition, service pipes can be the root cause of customer contacts about the Appearance or Taste & Odour of drinking water and our investment towards this PC includes work on service pipes, both company owned communication pipes and customer supply pipes in some circumstances. Expenditure on these activities is maintenance. We are also proposing significant investment in lead pipe replacement, but this is funded from enhancement.

2.16 We anticipate that maintenance expenditure on service pipes in the next price control period will broadly be in line with recent levels.

2.17 Expenditure on all these assets over time is presented in Table A9-5 below.

2.18 These are the costs that would be reported as capex, which has changed over time. Some expenditure on these assets is also reported as opex and included within the infra renewals in subsequent sections. We are forecasting a c£25m increase on current levels (over leakage and infra renewals) due to a higher proportion of small reactive repairs expected to be considered as opex. These should be viewed together to get a complete view of the expected costs in AMP8.

Table A9-5 – Supply Mains costs over time

<table>
<tr><th></th><th>AMP5</th><th>AMP6</th><th>AMP7</th><th>AMP8</th></tr>
<tr><td>Base capex</td><td>151.9</td><td>155.9</td><td>130.4</td><td>127.2</td></tr>
<tr><td>Additional mains replacement</td><td></td><td></td><td></td><td>34.4*</td></tr>
<tr><td rowspan="2">Interventions / activities</td><td colspan="4">Reactive repair costs increasing as leakage is driven lower and lower</td></tr>
<tr><td>proactive replacement at 0.6%/yr</td><td>proactive replacement at 0.4%/yr</td><td>proactive replacement at 0.2%/yr</td><td>proactive replacement at 0.4%/yr</td></tr>
</table>

** This is the increased mains replacement from the current rate of 0.2% per annum at a unit rate of £350 per metre.*

Water Treatment Works

2.19 We have 64 Water Treatment Works. Our five surface water works provide around 25% of our total supply with 75% coming from groundwater sources, mainly boreholes. With a relatively large and diverse asset base it is necessary to have rolling programmes of site refurbishments carried out proactively to reduce the risk of multiple, simultaneous failures to maintain a satisfactory stable risk position and resilient service.

2.20 We proposed a significant increase maintenance expenditure, based on a combination of an increase in our business-as-usual maintenance as a result of growth in the asset base over the last 25 years.

2.21 As treatment technology has developed over the past 15 years, the blend of assets required has moved towards more instrumentation and complex electronic systems from the previous electrical and mechanical assets. At PR09, the assets at our Water Treatment sites totalled 8,119. The current asset count (January 2025) is 17,769. These instruments and control systems, making up approximately one third of the total, have a relatively short lifespan of 8-10 years and therefore require more frequent replacement.

2.22 Across our Water Treatment and distribution sites we will replace around 12,000 life-expired assets including 6,000 Instruments, 1,300 Pumps and 1,200 Electrical distribution and control assets. We also have a significant programme of works to replace and/or upgrade some of our existing membrane plants.[157]

2.23

2.24 Potential activities include the following which are being developed for prioritisation:

(a) upgrading raw water pumping station in particular the standby generators

(b) upgrading raw water pumping station in particular providing a standby pump

(c) upgrading run to waste facilities including forward GAC rinse, chlorine removal on RTW and improvements to holding tanks and lagoon

(d) upgrading RGF inlet arrangements including rinse facilities to return water to DAF not the RRGF inlet channel

(e) upgrading HV & Generator facilities

[157] Numbers are subject to change due to our risk based investment approach.

(f) upgrading [redacted] PLC and Profibus spares and contingency planning

(g) upgrade [redacted] lime plant, second silo and new ICS

(h) replacement of [redacted] penstocks

(i) upgrade existing automated valves and other facilities within the treated water network

2.25 Expenditure on these assets over time is presented in Table A9-6 below.

Table A9-6 – Water Treatment Costs Over Time

	AMP5	AMP6	AMP7	AMP8
Base capex	51.3	94.6	83.7	87.9
Disinfection improvements (moved to enhancement)				45.1
Interventions / activities	Asset replacement	Asset replacement + [redacted]	Asset replacement	Asset replacement + Disinfection upgrades

Revenue Meters

2.26 Our plan includes expenditure on both reactive replacement on failure as at present as a business as usual activity, and a significant uplift on proactive replacement based on the increased activity arising from our smart metering project which is split purpose with enhancement and maintenance allowances. We have considered the like for like basic meter replacement as maintenance, with the additional smart upgrade costs considered as enhancement. We have used our existing unit cost of basic meter replacement for the maintenance element, and allocated the additional costs associated with the smart meters allocated to enhancement

2.27 In the current five-year period we will replace around 60,000 revenue meters at a total cost of £6.78m which equates to an all-in average unit rate of £113 per meter. The reactive replacement unit cost is much higher, over £300 per unit, but the average is brought down as our much larger proactive replacement programme was limited to just external screw out and screw in replacements, ie no excavations. The higher reactive unit rate is based on actual costs incurred from current reactive job cards. We optimised our investment over 2020-25 to avoid abortive spend in this area where meters were due smart upgrades soon.

2.28 In the PR24 period we plan to replace 184,344 existing basic meters with smart meters. In Table CW7 of our Draft Determination Response we estimated the cost of this activity at £36.2m which equates to an average unit rate of £196/m including the smart upgrade costs. This unit rate is based on 7% being internal meter installations, 10% requiring excavation with the remainder as simple external screw out and screw in replacements – these represent much higher proportion of the programme with the higher unit rate costs.

2.29 As outlined in paragraph 2.26, meter replacement is a split purpose activity, in Table CW3 we requested just under £13m of enhancement funding for this activity, out of the total of £36.2m set out above. This results in maintenance costs of £22.4m which is a £16m increase over the average of the last three price control periods. This proportional allocation of costs between maintenance and enhancement is based on the above analysis of current basic for basic replacement costs and the estimated additional costs from the smart metering element. Expenditure on these assets over time is presented in Table A9-7 below.

Table A9-7 – Revenue Meters Costs over time

	AMP5	AMP6	AMP7	AMP8
Base capex	9.9	10.0	6.8	7.4
Interventions / activities	Reactive replacement on failure and age related (15 years) proactive replacement			
New capex				15.0
Interventions / activities			60,000	184,344

Service reservoirs

2.30 We have over 300 service reservoirs (including 11 water towers), which is a very large number for a company of our size, i.e. with less than 650,000 connected properties. This is a legacy issue arising from the hydrogeology of our area which allowed a large number of small local sources being developed each requiring one or more service reservoirs. Whist many of these local sources have subsequently been abandoned as we continue to rationalise and optimise our network the service reservoirs and pipe network configuration are largely unchanged. We also have a very large proportion of very small reservoirs.

2.31 The service reservoir maintenance programme is generated and prioritised from the inspection programme. The programme therefore has a degree of flexibility to take account of emerging, higher priority needs if and when they arise. Our bottom-up assessment of need suggests that we should be investing a similar amount in the next price control period as we are spending now. Expenditure on these assets over time is presented in Table A9-8 below.

Table A9-8 – Service Res Costs Over Time

	AMP5	AMP6	AMP7	AMP8
Base capex	11.6	23.1	19.7	18.0
Interventions / activities	Risk based inspections and remedial works			

Boreholes and springs

2.32 The borehole assets within Wessex Water are robust and continue to provide excellent service. However, regular inspection is required and increasingly so as the boreholes age. There are concerns over those boreholes which, for example, penetrate both the Chalk and the Upper Greensand. Historically, the construction method was to leave the Chalk (upper) section unlined and add a “drop set” screen into the Upper Greensand section. Inspection shows that loose blocks of Chalk and even relatively small flints, can fall out of the unlined section and wedge the pump into the “drop set” or damage the screen below. Regular borehole inspection with a view to the possible addition of casing through the chalk section will need to be carried out for early identification of weakness in the unlined sections of the boreholes.

2.33 Our proposed AMP8 plan of £12.99m is much higher than the historical long-term average of £4.5m and aims to further improve the understanding of the condition and performance of the assets to better inform decisions on the level of proactive maintenance interventions required to meet the maintenance objectives.

2.34 We will deliver our Borehole maintenance activities, such as Mechanical, Electrical, Instrumentation, Control and Automation (MEICA) type assets at a similar level to AMP7 and increase our investigations of yield and quality issues across 75 boreholes by undertaking pumping tests and CCTV inspections. We will utilise more intensive rehabilitation measures (e.g. acidisation) to improve the performance/output on 35 boreholes across the region and to address underlying deterioration we are also proposing drilling 5 new replacement boreholes.

2.35 In addition, top-down budget allocations derived from historical costs and lifecycle modelling assumptions have been forecast for inclusion in our AMP8 plans. Proposed activities include cyclical maintenance and cleaning activities at spring sources and greensand boreholes, borehole pump replacements, casing and head plate relining/replacement and an allocation for major refurbishment or rehabilitation of boreholes and spring sources as informed by the inspection programme. Detailed bottom up annual programmes of work will be developed for the above activities in each year of subsequent AMP based on the findings of an annual condition inspection programme and through ongoing monitoring of source yield and water quality. We consider that our planned investment for Boreholes & Springs maintains an acceptable, stable level of risk.

2.36 Expenditure on these assets over time is presented in Table A9-9 below.

Table A9-9 – Borehole and Spring costs over time

	AMP5	AMP6	AMP7	AMP8
Capex	6.4	4.6	8.6	13.0
Interventions / activities	Asset maintenance	Asset maintenance	Increased Asset maintenance	Further increased asset maintenance and new programme of asset replacement

Raw water pumping stations and mains

2.37 For Wessex Water owned assets we are expecting the capital maintenance expenditure for this small asset group to remain relatively consistent for this price control as no major proactive works and activities are planned. Activity over the next five years is best described as a business as usual combination of minor reactive and proactive interventions.

2.38 However we are anticipating a significant increase in expenditure in this asset group due to our contribution to the cost of maintaining the [redacted] raw water pumping station as detailed in the following sub-section.

2.39 [redacted]

2.40 [redacted]

2.41 [redacted]

2.42 [redacted]

2.43 [redacted]

Table A9-10 – [redacted]

Dams and impounding reservoirs

2.44 We are expecting the capital maintenance expenditure for this small asset group to remain relatively consistent for this price control.

2.45 Asset condition and performance is governed by regular inspection and monitoring of our impounding reservoirs to comply with the Reservoirs Act 1975 ensuring that our dams and reservoirs are maintained.

2.46 We own 16 Impounding reservoirs, 13 of which are governed by the Reservoirs Act 1975, with capacity greater than 25Ml. In addition, we have a maintenance responsibly for two other dams/reservoirs.

2.47 We are fully compliant with the Reservoir Act 1975, and our proactive inspection and maintenance strategy includes a forward-looking plan which indicates we anticipate a similar level of expenditure in the next five years in comparison with the last five years. Expenditure on these assets over time is presented in Table A9-11 below.

Table A9-11 – Dams and impounding reservoirs costs over time

	AMP5	AMP6	AMP7	AMP8
Capex	7.5	2.9	2.6	2.9
Interventions / activities	Regular inspection, maintenance and monitoring of our impounding reservoirs			

Pumping stations

2.48 We have 300 pumping stations, of which most re-pump water already within the treated water distribution system. We have a proactive and reactive maintenance strategy for this asset group. Generally, most pumping stations have a duty - standby configuration or similar that enables one pump to be out of service whilst maintaining supply and similarly we have a resilient system that enable bigger issues to be managed without any significant impact to customers. Our reactive and proactive inspection, maintenance, repair and replacement programmes enable us to manage this asset group, the most significant issue be the lead times for new bigger pumps and we have established a specific proactive programme to mitigate this risk.

2.49 Maintenance of this asset group in AMP8 can best be described as business as usual maintenance, with no major projects planned, and our proactive programme for long lead time bigger pumps continuing. Our bottom-up assessment of need suggests that we should be investing a similar amount in the next price control period as we have spent over the last three price control periods. Expenditure on these assets over time is presented in Table A9-12 below.

Table A9-12 – Pumping Station Costs Over Time

	AMP5	AMP6	AMP7	AMP8
Base capex	9.5	3.4	0.9	1.6
Interventions / activities	Asset maintenance and reactive and proactive replacement			

Raw Water Transport & Storage

2.50 For Wessex Water this is a very small asset group, and for the avoidance of doubt we have no assets that meet the raw water storage regulatory definition. We are expecting the capital maintenance expenditure for this small asset group to remain relatively consistent for this price control as no major proactive works and activities are planned. Activity over the next five years is best described as a business as usual combination of minor reactive and proactive interventions. Expenditure on these assets over time is presented in Table A9-13 below.

Table A9-13 – Raw Water Transport Costs Over Time

	AMP5	AMP6	AMP7	AMP8
Capex	0.7	0.1	0.2	0.1
Interventions / activities	Inspection and maintenance			

Shared Assets

2.51 The M&G or Management & General group contains costs related to Fleet, IT systems, property and laboratory services. These are the costs on assets that are potentially used by multiple price control areas but allocated based on principle use to wholesale water activities. Over 2025-30 these costs are forecast to be £50.36m.

2.52 Activities include Fleet electrification, Laboratory refurbishment and Work management system improvements. Further detail on these activities can be found in the original submission document WSX-10. Expenditure on these assets over time is presented in Table A9-14 below.

2.53 There is step change in costs attributed to supply in AMP8. This is due to more of the overall expenditure being allocated to supply. In total we are forecasting to spend £116.18m over AMP8 compared to £93.10m over this period.

2.54 There is uncertainty over this allocation, however, if it proves to be different, the impact on each price control would not be material. As if less is allocated directly, you would see more in opex due to the principle use recharges. Leading to no difference in assumed cost recovery, and matching totex over the fullness of time.

2.55 We are seeing specific steps up in costs relating to:

(a) Fleet services. This is in part due to the ongoing electrification of vehicles, and the replacement cycles of HGVs, which we are due to replace more of in the coming AMP.

(b) Laboratory costs. Across the company we have seen a 70% increase in lab tests required since 2019. To ensure ongoing resilient delivery this requires a step up in investment in this area.

(c) Information technology. We are continuing significant investment in work management software to ensure optimal and efficient planning of work. This will enable us to continue to deliver our stretching performance targets.

Table A9-14 – Shared Asset Costs over time

	AMP5	AMP6	AMP7	AMP8
Fleet	9.3	10.8	11.3	16.7
IT	16.3	24.9	10.3	22.4
Lab	0.6	0.7	1.8	7.1
Property	3.0	2.9	3.5	3.6
Other	0.5	1.8	1.3	0.6
Total	**29.7**	**41.1**	**28.1**	**50.4**

Operational Costs

2.56 Base opex has increased over recent years, we are currently spending c£75m per annum now compared to c£60m in 2020. The main drivers of this are:

(a) Increase in power and chemical prices, these are expected to remain higher and so drive an increase in absolute terms when comparing our opex forecast to the last five years, we have factored in real price effects based on expert reports submitted alongside our business plan[158].

(b) Over 2020-25 we have increased operational expenditure to address nutrient pollution. This is being delivered through working with third parties to deliver more efficient overall nutrient management by activities such as planting cover crops, buffer strips, and water course fencing. These activities result in lower levels of nitrates and pesticides entering the water we abstract, therefore reducing the need for intensive capital investment. We will need to continue this to achieve compliance. This relatively modest investment avoids both significant Capex and significant Opex in the construction and operation of nitrate and pesticide removal stages at WTCs.

(c) Increased in wholesale costs relating to leakage. This includes fixing customer side leaks and increased find and fix interventions on our assets. This too is expected to continue to achieve our stretching leakage reduction plan.

(d) Increase in lab costs. This is due to increased testing requirements to monitor and maintain compliance. In total, we have seen a 70% increase in the number of tests undertaken since 2022. On supply this predominantly driven by increasing testing requirements for PFAS chemicals.

[158] See *WSX09 - Annexes - Base cost adjustment claims* (provided as SoC Appendix A017), sections A8 to A13.

2.57 On top of this underlying increase reflected in our current run rate we have allowed specific changes for:

(a) Additional FTEs to deliver increased levels of inspections and proactive maintenance on our assets and support the increase in activities relating to permitting at our Water Treatment sites. Additional inspections include reducing our maximum service reservoir inspection frequency from 10 years to 6 years to align with industry best practice, with over 300 service reservoirs this is a significant item. Increased proactive maintenance includes increased operational support for the increase in mains replacement and supporting a significant increase in proactive rehabilitation of boreholes in particular which provide 75% of our water supply.

(b) Increased in infra renewals driven by the greater scale of mains replacement and investment in infrastructure assets, these are discussed in more detail in para 2.32-2.53.

(c) Increase in business rates. In Feb 2024 we received our draft valuation from the Valuation Office Agency (VOA)[159] this set a rateable value of £39.6m, £11m higher than we had assumed. We have based our revised forecast on this rateable value. This has been calculated by using the published business rate model used to set cost allowances and updating the rateable value with the increase[160]. We note negotiations will be ongoing in this area and we will provide updates with future valuations.

(d) Increased in employers' national insurance contributions coming into effect from the 1st April 2025. This will impact not only direct labour & subcontract costs but is also expected to have impacts throughout the supply chain resulting in increased costs. We have estimated this will increase opex by c£1k per employee per year.

A summary of these changes from current levels (2020-25) is provided in Table A9-15 below.

Table A9-15 – Opex Changes summary

£m @22-23 prices	2020-25	2025-30	Real Increase
Power & Chemicals	87.5	91.0	3.5
Catchment Solutions	0.0	7.1	7.1
Leakage Activities	38.2	43.4	5.2
Lab costs	24.1	28.2	4.1
Additional FTEs	0.0	12.0	12.0
Infra Renewals	39.5	59.9	20.4
Local Authority Rates	72.9	95.1	22.2

[159] Valuation Office Agency (2025) *Draft valuation letter - Revaluation 2026 - Confidential*, provided as SoC Appendix A241.
[160] Ofwat (2024) *PR24 final determination CA24 Business Rates – Wessex*, provided in SoC Appendix A298.

£m @22-23 prices	2020-25	2025-30	Real Increase
Impact of NI changes	0.0	11.1	11.1
Direct Labour & subcontract work	133.5	136.6	3.1
Other	34.6	32.3	-2.3
Service charges	13.8	13.3	-0.5
Total Opex	444.1	529.9	85.8

Wessex Water

PR24 CMA Redetermination

Annex A10 – Addressing Ofwat's concern with our base cost adjustment claim

1 Introduction

1.1 As we set out in chapter 8 of our Statement of Case, in its Draft Determination, Ofwat rejected our base cost request; and set a condition in its QAA[161] for us to move out of the inadequate category as follows: "*revisit the scale and efficiency of its cost requests or provide significantly improved evidence to demonstrate why the cost requests are needed, efficient and reasonable*."[162]

1.2 Given our view that these costs represented the appropriate approach to long-term resilience and asset health, our response was aimed at improving our evidence. However, the Draft Determination, and engagement with Ofwat in relation to it, did not provide us sufficient feedback to do this.

1.3 Our Board was committed to meeting Ofwat's QAA conditions and, given the uncertainty regarding Ofwat's concerns with our evidence, in our response to the Draft Determination we therefore:

(a) provided further evidence and information in Draft Determination Response document *WSX-C01 - Step up in capital maintenance and base costs* [163] (i.e. to demonstrate why the costs requested were needed, efficient and reasonable);

(b) reduced our requested wholesale water base costs by deferring some expenditure into AMP 9 (i.e. to reduce the scale of the costs); and

(c) submitted a cost adjustment claim for the difference between our view of efficient costs, and Ofwat's.

1.4 However, in the Final Determination our costs were once again rejected. Ofwat's review of our bottom-up evidence was limited to one paragraph, as below:

> *"The company presented a bottom-up cost estimate of base expenditure requirements in its PR24 business plan. But the company has provided limited detail on how the costs were developed and if they are efficient. The company mentions that it has worked closely with an external consultant to benchmark its cost models. But it is not clear how or if external benchmarking has been used to provide assurance that its proposed costs are efficient, or if this consultant has provided third party assurance of the company's proposed costs."*[164]

1.5 This paragraph lists some concerns with our evidence (all of which we would have been happy to engage on in the query process). However, we consider Ofwat provides insufficient justification to conclude that our evidence should be zero weighted in its assessment. Therefore, in the remainder of this appendix we set out, our concerns with

[161] Ofwat's QAA is set out in Ofwat (2024) PR24-draft-determinations-Quality-and-ambition-assessment-summary.pdf, provided as SoC Appendix A207.
[162] See page 2 of Ofwat (2024) PR24-draft-determinations-Wessex-Water-Quality-and-Ambition-appendix.pdf, provided as SoC Appendix A207.
[163] Provided as SoC Appendix A098.
[164] Ofwat (2024) PR24-FINAL DETERMINATION-CA19-Base-cost-adjustment-claim-feeder-model-–-Wessex-Water.xlsx

Ofwat's approach to assessing cost adjustment claims; and how we have addressed Ofwat's concerns with our evidence.

2 Ofwat's approach to Cost adjustment claims

Ofwat's approach to cost adjustment claims

2.1 Ofwat's approach to cost adjustment claims is set out in its final methodology.[165] As noted there, it broadly applies five criteria for assessing the claims: need for adjustment; cost efficiency; need for investment; best option for customers; and customer protection. Need for the adjustment and cost efficiency were highlighted as the two most important criterion.[166]

Concerns with Ofwat's approach to cost adjustment claims

2.2 As we set out in chapter 8 (as with any econometric modelling) the cost assessment models are limited in their ability to predict the appropriate future costs for an efficient company.

2.3 Therefore, where these models are used, the use of cost adjustment claims, or similar adjustments is essential to ensuring the model limitations are accounted for. However, in our view, Ofwat's process for assessing base cost adjustment claims restricts its ability to address these limitations. This is because the criteria Ofwat use are not well designed to address concerns relating to asset health and capital maintenance, and the evidential bar is unduly high.

2.4 Ofwat acknowledged this to some extent in its Final Determinations and specifically cited problems relating to data and information available from companies and the challenges in establishing the level of activity funded by its models.

> *"Assessing capital maintenance cost adjustment claims is challenging. The challenge stems from the lack of available robust asset condition and asset workload data that is comparable across companies and time, which enable us to understand what companies should already deliver with base expenditure allowances so that customers do not pay twice. We have overcome some of these challenges at PR24 for water mains, sewers and bioresources assets. But not for other assets such as treatment works and service reservoirs. We intend to collect asset condition and workload data across a wide range of assets maintained by water and wastewater companies ahead of PR29."* [167]

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[165] Pages 29-30 of Ofwat (2022) PR24 Final Methodology - Appendix 9 Setting expenditure allowances, provided as SoC Appendix A213.
[166] Pages 29-30 of Ofwat (2022) PR24 Final Methodology - Appendix 9 Setting expenditure allowances, provided as SoC Appendix A213.
[167] Pages 91-92 of Ofwat (2024) PR24-final-determinations-Expenditure-allowances-V2.pdf.

2.5 Therefore, whilst in the following section we address Ofwat's specific concerns we note more broadly that we have concerns with Ofwat's approach to its assessment and ask the CMA to consider the need for our investment more broadly.

3 Addressing Ofwat's concern with our base cost adjustment claim

3.1 In its Final Determination, Ofwat noted that Wessex Water had *"not provided compelling evidence to demonstrate the need for a cost adjustment for the following reasons".*[168]

3.2 In Table A10-1, we address each of Ofwat's concerns in turn.

Table A10-1 – Ofwat's assessment of our Draft Determination Response cost adjustment claim and how we have addressed its concerns

Ofwat assessment criteria	Ofwat assessment	Addressing Ofwat's concerns
	Copied directly and fully from Ofwat's assessment[169]	Our response to Ofwat's concerns is included below.
Need for adjustment	• Absence of clear outputs that will be delivered with the cost adjustment – Wessex Water's bottom up business plan evidence focuses on forecast increase in expenditure over the 2025-30 period for each asset class, and high-level reasoning for the change, without any evidence of what outputs the additional spend will deliver. The absence of clear outputs from the potential cost adjustment means we would not be able to guarantee improved outcomes from the cost adjustment, and we would be unable to hold the company to account for delivery of additional outputs / outcomes through a price control deliverable to protect customer interests.	In a dialogue with Ofwat, we explicitly proposed either price control deliverables or 100% cost sharing was introduced to cover all capital maintenance spend. [170] Such a "use it or lose it" approach would be consistent with Ofwat's PCD on network reinforcement, or indeed its approach to Strategic Resource Options.[171] This would protect customers and ensure cost allowances are spent on maintaining asset health. We ask the CMA to consider the use of appropriate customer protections.

[168] Column D, Tab: WSX_CAC1 of Ofwat (2024) PR24-FINAL DETERMINATION-CA19-Base-cost-adjustment-claim-feeder-model-–-Wessex-Water.xlsx
[169] Column D, Tab: WSX_CAC1 of Ofwat (2024) PR24-FINAL DETERMINATION-CA19-Base-cost-adjustment-claim-feeder-model-–-Wessex-Water.xlsx
[170] Ofwat query response *OFW-REP-WSX-025*, provided in SoC Appendix *A200.*
[171] Section 3.6.3, page 188 of Ofwat (2025) 9.-PR24-final-determinations-Expenditure-allowances.pdf; and Section 3.3.4 of Ofwat (2024) PR24-final-determinations-Price-control-deliverables-appendix.pdf.

Ofwat assessment criteria	Ofwat assessment	Addressing Ofwat's concerns
	Copied directly and fully from Ofwat's assessment[169]	Our response to Ofwat's concerns is included below.
	• Risk of customers paying twice and discouraging the sector from delivering renewals with base expenditure allowances - Wessex Water has not arrived at a view of 'what base buys' as it focuses on its own run-rate cost data only. There is a risk that customers pay twice if we allow the cost adjustment, once through the base cost models and again through the cost adjustment. This is a particular risk when our analysis indicates that Wessex Water has underspent on totex between PR99 and PR19. It would also discourage companies from delivering asset renewals through base allowances in the future.	As set out in the preceding section, both we and Ofwat acknowledge determining the level of activity funded in base costs is challenging. However, we consider this uncertainty points to a need to take a balanced approach to ensuring the optimal level of activity is funded. As set out in Economic Insight's (March 2025) Report: A balanced approach to ensuring long-term asset resilience due to the likely historic underfunding, and backward-looking models customers have clearly not paid sufficient in the past to maintain the asset base and there should be no concern of customers "paying twice". The customer protections we proposed would also encourage companies to deliver asset renewals through base allowances in the future and ensure customers are protected. Further, we note that Ofwat focuses on an underspend in totex. This is the wrong comparison. The efficiency incentive on enhancement expenditure is key element of the correct functioning of the sector and efficiency here, while delivering for customers, should not be used to compensate regulatory miscalibration. Furthermore, as set out in chapter 4 (and in response to OFW-REP-WSX-025) we are a responsible asset manager that has overspent capital maintenance allowances over the same period.
	• There is a lack of a clear link between exogenous factors and maintenance expenditure requirements - Wessex Water has failed to demonstrate what factors outside of its control is driving the forecast increase in capital maintenance expenditure requirements, which was a key part of the criteria set out in the PR24 methodology for forward-looking capital maintenance cost adjustment claims.	As we set out in our response to the Draft Determination[172] the cost adjustment claim was clear that the exogenous factor is the historical underfunding of capital maintenance, itself a result of models that focus on historical expenditure.

[172] See *WSX-C01 - Step up in capital maintenance and base costs*, provided as SoC Appendix A098.

Ofwat assessment criteria	Ofwat assessment	Addressing Ofwat's concerns
	Copied directly and fully from Ofwat's assessment[169]	Our response to Ofwat's concerns is included below.
	• The reasons provided by Wessex Water for the forecast increase in capital maintenance expenditure do not justify such a large increase in expenditure: o Deliver meeting of new demands that have not applied historically (eg enhancement creating new assets that require maintenance) – it is not clear from the evidence provided how much this will cost or why the additional costs outweigh the cost savings. For example, new assets should cost less to operate and maintain on a like-for-like basis, particularly when assets are rationalised. o Deliver stretching performance set out in business plan – Wessex Water suggested levels of improvement are no more ambitious than other companies. We have also updated performance commitment levels for Final Determinations which will reduce the level of stretch imposed on the sector relative to our Draft Determination position. We therefore believe that the suggested materiality of additional investment required to meet performance commitments will not be required over the period. o Maintain asset health – With the exception of water mains (for which we are providing a sector wide cost adjustment to increase renewals towards a more sustainable level), Wessex Water's assets generally do not appear to have deteriorated in asset condition since PR09 based on the information provided by the company through the query process.	We consider Ofwat's assumptions here only hold true where historical base allowances have been sufficient. It is also not necessarily the case that new assets cost less to operate this will vary considerably by asset type. We also note there are likely to be few instances of asset rationalisation in the context of assets in the sector. For example, as noted in Annex A9, at Water Treatment Works treatment technology has developed over the past 15 years, and the blend of assets required has moved towards more instrumentation and complex electronic systems from the previous electrical and mechanical assets. At PR09, the assets at our Water Treatment sites totalled 8,119, and the current asset count (January 2025) is 17,769. These instruments and control systems, making up approximately one third of the total, have a relatively short lifespan of 8-10 years and therefore require more frequent replacement. We also note considering efficiency in the way suggested by Ofwat would risk double counting the impact of frontier shift. Finally, we note the costs set out in the cost adjustment claim were those required to meet the levels of service set out in the Draft Determination Response, not those set out in the Draft Determination. In fact, the level of stretch imposed at Final Determination is very similar to that proposed in the Draft Determination Response and therefore the additional investment proposed is appropriate to reach these.
Cost efficiency	The company failed to produce compelling evidence in its original business plan submission or Draft Determination representation to demonstrate that the requested cost adjustment is efficient.	We refer the CMA back to the measurement error section of chapter 8 where we discuss the varying views on our efficiency under Ofwat's assessment.

Ofwat assessment criteria	Ofwat assessment	Addressing Ofwat's concerns
	Copied directly and fully from Ofwat's assessment[169]	Our response to Ofwat's concerns is included below.
	The company presented a bottom-up cost estimate of base expenditure requirements in its PR24 business plan. But the company has provided limited detail on how the costs were developed and if they are efficient. The company mentions that it has worked closely with an external consultant to benchmark its cost models. But it is not clear how or if external benchmarking has been used to provide assurance that its proposed costs are efficient, or if this consultant has provided third party assurance of the company's proposed costs.	As outlined in Annex A9 our costs are built up from deterioration modelling, historic trends and bottom-up cost estimates. Where we are using modelling or cost estimates, we have worked closely with Chandler KBS, utilising their access to sector-wide cost data to develop robust cost curves. These curves, based on industry data, reflect the actual efficient costs of delivery. Where we have relied on historic trends, we show through chapter 4 of the main Statement of Case that we have a track record of efficient delivery.
	The company also failed to demonstrate what outputs / outcomes will be delivered with the input of this cost adjustment. We would therefore not be unable to hold the company to account for delivery of additional outputs / outcomes through a price control deliverable to protect customer interests.	As set out above, we propose the CMA apply appropriate customer protections to our requested base cost allowance. This could be in the form of a PCD, or cost sharing rates.

Wessex Water

PR24 CMA Redetermination

Annex A11 – The regulatory drivers of phosphorus removal

1 Introduction

Introduction

1.1 The regulatory landscape for phosphorus management is complicated. A range of legislation drives investment in reducing phosphorus levels in water bodies. These include the Water Framework Directive, the Habitats Regulations, the Urban Wastewater Treatment Regulations, the Environment Act, and the Levelling-up and Regeneration Act.

1.2 These regulations collectively aim to protect and improve the ecological status of water bodies, through the setting of phosphorus reduction targets. As a result, water companies are required to implement a range of measures to achieve the desired environmental outcomes, including advanced treatment processes and catchment management initiatives, in accordance with – although sometimes constrained by – these regulatory requirements.

1.3 At PR24, this has led to a substantial increase in investment to enhance phosphorus removal capabilities.

2 The sources and impact of phosphorus

The sources of phosphorus in catchments

2.1 Phosphorus helps humans, animals, and plants to grow. We get most of our phosphorus from food, such as red meat, poultry, seafood and dairy. It is also extracted from phosphate rock to make products, such as fertilisers, animal feed and detergents. As a result, it is present across both the built and the natural environment.

2.2 Nutrients can enter surface water (such as lakes, rivers and streams) and groundwater from multiple sources. According to a 2022 Government report, of the phosphorous in the UK's rivers:[173]

(a) 60% to 70% is from sewage final effluent.

(b) 25% is from agriculture.

(c) 7% is from leakage, storm overflows and sewer misconnections.

(d) 1% to 2% is from private discharges and septic tanks.

2.3 The sources of phosphorus vary by catchment and can vary significant between catchments. Rural land use, such as agriculture, can account for between 8% and 83%

[173] Environment Agency (2022) Phosphorus: challenges for the water environment, provided as SoC Appendix A244.

depending on the catchment[174]. As a result, the primary and contributing sources of phosphorus varies.

The impact of phosphorus

2.4 High concentrations of phosphorus can lead to a process called eutrophication, whereby there is excessive growth of algae and other aquatic plants, this outcome of this is shown in Figure A11-1.

2.5 The algae and plants can block sunlight, produce a large amount of carbon dioxide and use up the water's oxygen. Eventually, this can create a 'dead zone' that cannot support life, resulting in a decrease in biodiversity. Around 1kg of phosphorus can lead to the growth of 300 to 500 kg of wet algae[175].

Figure A11-1 – Eutrophication of a waterbody

2.6 Some waters are formally designated as affected by freshwater eutrophication and are identified by Defra as sensitive areas. Excessive phosphorus poses a risk to the ecology of rivers and lakes that have been designated for their conservation interest,

[174] Pages 98-99 of Environment Agency (2024) *Indicative Catchment Statistics for Nutrient Pollution*, provided as SoC Appendix A245.
[175] Struss, R. (2003). *The "500 lbs. Algae Adage" where did it come from – and is it true?* University of Minnesota, provided as SoC Appendix A246.

with nutrients being one of the main reasons for these sites not achieving favourable condition.[176]

2.7 Phosphorus can have wider impacts. For example, it can also make water abstraction and treatment more difficult, as well as negatively impacting angling, water sports, and other recreational activities. [177]

3 The environmental legislation for phosphorus permits

Environmental permits

3.1 Discharge permit requirements are set by the Environment Agency, dependent on the sensitivity of the receiving environment, along with the type, size and impact of the discharge. Targets for phosphorus concentrations in river water bodies are set to protect against eutrophication.

3.2 Environmental permits are needed to discharge liquid effluent or wastewater:

(a) into surface waters, for example, rivers, streams, estuaries, lakes, canals or coastal waters; and

(b) into or on the ground, such as spreading waste sheep dip, or discharging treated sewage effluent to ground through an infiltration system.

3.3 Permits are not needed:

(a) to discharge uncontaminated water, such as clean rainwater from roofs or from small areas of hardstanding to surface water;

(b) to discharge uncontaminated water collected from public roads and small parking areas (that's been through a properly maintained oil separator) to surface water; or

(c) for certain low risk groundwater activities.

3.4 Historical targets have led to significant and geographically widespread investment in phosphorus removal at our WRCs. Tightening of these targets require a further level of investment to meet them[178].

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[176] Page 5 of Environment Agency (2022) Phosphorus: challenges for the water environment, provided as SoC Appendix A244.

[177] Page 10 of Environment Agency (2022) Phosphorus: challenges for the water environment, provided as SoC Appendix A244, and Environment Agency (1998) *Aquatic eutrophication in England and Wales: a proposed management strategy. Environmental Issues Series*, provided as SoC Appendix 247.

[178] See Figure 3-6 (p30) and Figure 3-12 (p37) of *Supporting Document 5.1 - Protecting and enhancing the environment* from our PR19 business plan. This is provided in SoC Appendix A262. Please also

Regulatory drivers

3.5 Permits at WRCs are set by legislation. There are many different types and sources of legislation, many of which overlap.

3.6 The principal UK Directives and Regulations affecting phosphorus removal are summarised below. For further details and context around please see section 2.1 (onwards) of our main business plan submission document *WSX16 – Waste water networks plus strategy and investment*.

Water Framework Directive

3.7 The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (the 'WFD) establishes a framework for community action in the field of water policy.

3.8 The key objectives of the WFD are to prevent deterioration in ecosystems, protect and improve the ecological condition of waters, and implementation of actions to improve them.

3.9 To implement this, the WFD requires each water body to be classified in terms of its ecological status as high, good, moderate, poor, or bad. This is determined by combining assessments results for biological (biomass/abundance of plants/algae) and physiochemical quality elements (nutrients, dissolved oxygen) quality elements.

3.10 Environmental objectives have been set for all water bodies. These objectives include status objectives for each water body and a requirement to prevent deterioration of status. Once published in the river basin management plans these objectives are legally binding.

3.11 The Environment Agency (EA) has historically adopted a uniform 'fair share' approach for determining target reductions for given sectors/contributors. This approach is grounded in the 'polluter pays' principle.

How did it impact our PR24 investment plan?

3.12 For PR24, the EA – in collaboration with Defra and Natural England – have adopted a 'non-uniform' fair share approach. This considers sector percentages as per a uniform approach but makes an adjustment based on an assumption as to what each sector can reasonably achieve, which generally favours requesting the water industry to do more. As such, in many catchments we are being asked to go significantly beyond our proportional fair share to offset the inability of other sectors to achieve their reduction targets.

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refer to *Annex A12 –An overview of the treatment processes for phosphorus removal* for details on further enhancement needs.

3.13 For PR19, the technically achievable limit (TAL) – as determined by the Environment Agency as the lowest concentration of phosphorus in treated effluent that can be consistently delivered – was 0.5mg/l for phosphorus. This followed an industry-wide review of processes and technologies through the AMP6 Chemical Investigations Programme. For PR24, the TAL was reduced to 0.25mg/l. This target was set on the basis of technical feasibility, irrespective of cost.

3.14 The PR24 WFD objectives are set within the 2021 River Basin Management Plan (RBMP), published in December 2022, and approved by the Secretary of State. The main objective is 'aim to achieve good status by 2015' for each and every individual water body, subject to certain and specific exemptions which includes extending the deadlines to 2027 and 2030. The option to set less stringent objectives (to remove the PR24 obligation) was passed when the plans were approved.

3.15 The WFD contains provision for the setting of less stringent objectives, such as where the achievement of the environmental objectives set would be infeasible or disproportionately expensive. This assessment is made at catchment scale.

3.16 The update to the RBMPs, along with a revised TAL, has meant that some measures previously discounted for PR19 for not being cost beneficial are included in PR24. This also includes revisiting WRCs that had already undergone upgrades in the previous AMP, for a more stringent limit. Many of the WFD measures remain non cost beneficial.

3.17 The requirements that water companies have to deliver are known as 'drivers'. The PR24 WFD drivers for phosphorus are:

(a) WFD_IMP – Implementation of actions to improve water quality in terms of relevant WFD status objectives. A subsequent suffix indicates what target the measure is aimed at achieving (i.e., g = Good status for the element).

(b) WFD_IMP_MOD – Actions to ensure no river, lake or estuary is in poor or bad ecological status due to the water industry.

(c) WFD_ND – Actions to meet requirements to prevent deterioration.

Habitat Regulations

3.18 The Conservation of Habitats and Species Regulations 2017[179], known as the Habitat Regulations, protect certain species and habitats in the UK.

3.19 The regulations require the designation of Special Protection Areas (SPAs) and Special Areas of Conservation (SACs) and that these sites are properly protected and managed. SPAs and SACs contribute to the network of European sites, referred to collectively as Natura 2000. Ramsar sites are wetlands of international importance and are treated in the same way as SPAs and SACs.

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179 The National Archives (2017) The Conservation of Habitats and Species Regulations 2017, provided as SoC Appendix A249.

3.20 Targets for phosphorus concentrations affecting designated sites have been set under the revised Common Standards Monitoring Guidance for Rivers (rCSMG) to protect against eutrophication. The rCSMG is the guidance produced by Joint Nature Conservation Committee to ensure protection of Sites of Special Scientific Interest (SSSIs) and SACs.

How did it impact our PR24 investment plan?

3.21 Our AMP7 plan included a number of water quality investigations related to SSSIs, SPAs and SACs, to better understand the quantum and origin of nutrients in the waterbodies, the impact of those nutrients, and to identify possible measures to reduce the nutrients. The latter was particularly focused on water company assets to inform measures for PR24.

3.22 The reduction to TAL as described earlier, along with information garnered from the AMP7 investigations, has necessitated further phosphorus improvements in PR24.

3.23 Measures to comply with Habitat Regulations are not required to be cost-beneficial, just cost-efficient.

3.24 The PR24 HD and SSSI drivers for phosphorus improvements are:

(a) HD_IMP – Actions to contribute to restoration of a European site or Ramsar site to move towards meeting the conservation objectives.

(b) HD_ND – Actions to contribute to maintenance of (or prevent deterioration) of the condition of a European site or Ramsar site to ensure the site contributes to achieving the favourable conservation status.

(c) SSSI_IMP – Action to contribute to restoration of a SSSI to favourable condition.

(d) SSSI_ND – Action to contribute to maintenance of (or prevent deterioration of) the condition of a SSSI.

Urban Wastewater Treatment Regulations

3.25 The Urban Wastewater Treatment Regulations 1994[180] (UWWTR) concerns the collection, treatment, and discharge of urban wastewater and from certain industrial sectors. It sets minimum standards and deadlines for the provision of sewerage systems, and treatment of sewage according to the population served by sewage treatment works, and the sensitivity of receiving waters to their discharges.

3.26 Under the UWWTR, WRCs that discharge directly – or indirectly but qualify through their size of contribution – into designated sensitive areas are required to achieve certain phosphorus permits as shown in Table A11-1.

[180] The National Archives (1994) The Urban Waste Water Treatment (England and Wales) Regulations 1994, provided as SoC Appendix A250.

Table A11-1 – UWWTR Phosphorus permits

Population Equivalent	Phosphorus Permit (Annual mean)
≥ 10,000	n/a
≥ 10,000 and ≤ 100,000	2 mg/l
> 100,000	1 mg/l

3.27 The limits come into force within 7 years of date of designation or a WRC exceeding the population threshold (and contribution proportion).

How did it impact our PR24 investment plan?

3.28 The EA's most recent review of Sensitive Areas (Eutrophic) made a recommendation to Defra that will require relevant qualifying discharges to meet the appropriate UWWTR phosphorus limits within 7 years of the date of designation. Defra formally designated the areas on 13 May 2023.

3.29 These improvements are not required to pass cost-benefit analysis. This review means that additional investment is required in PR24.

3.30 The PR24 UWWTR drivers for phosphorus improvements are:

(a) U_IMP1 – Actions to improve discharges from agglomerations that, through population growth, have crossed the population thresholds in the UWWTR and therefore must achieve more stringent UWWTR requirements.

(b) U_IMP2 – Actions to reduce total phosphorus and/or total nitrogen in qualifying discharges associated with the next review of Sensitive Areas (Eutrophic).

The Environment Act

3.31 The Environment Act 2021[181] operates as the UK's framework of environmental protection. Developed following the UK's exit from the EU, it offers new powers to set new binding targets, including for air quality, water, biodiversity, and waste reduction.

3.32 The Environment Act includes targets to reduce nutrient pollution in water by reducing phosphorus loading from treated wastewater (into freshwater rivers) by 80% by 2038 and reducing nitrogen, phosphorous and sediment from agriculture to the water environment by 40% by 2038, from a 2020 baseline.

3.33 However, the 80% reduction is a national target. The EA allocates a percentage removal rate for each catchment. This means that the quantum of phosphorus removal varies, especially for those with 2030 regulatory dates.

[181] The National Archives (2021). Environment Act 2021, provided as SoC Appendix A251.

How did it impact our PR24 investment plan?

3.34 The Environment Act is the new framework of environmental protection. As it was passed into law since PR19 there has been no investment to date to meet the wider targets of reducing nutrient pollution in water by reducing phosphorus loading from treated wastewater.

3.35 The PR24 EnvAct driver for phosphorus improvements is:

(a) EnvAct_IMP1 – Actions to Reduce phosphorus loading from treated wastewater by 80% by 2038 against a 2020 baseline. This is a national target, with the EA advising targets for each water company for their specific region.

The Levelling-up and Regeneration Act

3.36 The Levelling-up and Regeneration Act 2023[182] (LURA) requires that where sensitive sites are in unfavourable status due to nutrient pollution, Local Planning Authorities (LPA) can only approve a plan or project if they are certain the development will have no negative effect on the site's integrity.

3.37 Natural England have developed an approach called 'nutrient neutrality' to mitigate the impact of nutrient pollution so that development can go ahead. However, there is still a gap in the ability of LPAs and developers to find mitigation quickly and effectively.

3.38 The Act places a new statutory duty on water companies to upgrade WRCs to achieve 'technically achievable limits' for phosphorus and/or nitrogen in these nutrient neutrality areas (by 2030). The technically achievable limit (TAL) has been determined by the EA as 0.25mg/l for phosphorus. WRCs ≥2,000 population equivalent are required to achieve TAL; <250pe are exempt; WRCs between 250-2,000pe are by default exempt but can be designated as requiring improvement by the Secretary of State. Improvements are required within 7 years of designation or passing the population threshold.

3.39 LURA came into law on 26 October 2023, with the appropriate paragraphs translated across into the Water Industry Act. The sensitive areas and list of WRCs requiring upgrade are as published by Defra on 25th January 2024 (and updated 24th May 2024).

3.40 Under provisions within the LURA, water companies can use a catchment permitting (CP) approach to achieve the required nutrient load reductions, subject to approval by the Secretary of State. Furthermore, the LURA allows the Secretary of State to consider alternatives to site-based permits – such as catchment nutrient balancing (CNB) – subject to secondary legislation being put in place.

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[182] The National Archives (2023) Levelling-up and Regeneration Act 2023, provided as SoC Appendix A252.

How did it impact our PR24 investment plan?

3.41 As it was passed into law since PR19, there has been no investment to date to achieve the technically achievable limit for any sites.

3.42 We were invited by Defra in November 2023 to respond to an opportunity to promote CP and/or CNB in LURA-affected catchments. Our response in January 2024 offered alternative CP and hybrid CP and CNB proposals for the sensitive areas within our region, to achieve at least the equivalent nutrient load reduction for lower cost and wider environmental benefits. Our proposals built upon our successful CP and CNB delivered in AMP6 and AMP7, but we recognised that constraints for other regulatory drivers limited our ability to offer even greater overall benefit from a full catchment-based approach.

3.43 Whilst developed and presented for consideration as options that had potential to provide the most optimal outcomes, our alternative LURA proposals, however, did not meet regulator expectations without leaving excessive financial and performance risk for the amount of environmental benefit compared to the original LURA proposal.

3.44 Subsequently, however, we have agreed to deliver phosphorus TAL at WRCs serving 1,000-2,000pe within the Poole Harbour catchment by 2035 (through the PR29 WINEP), leading to the May 2024 update to the list of designated sites. This has allowed Natural England to remove their phosphorus nutrient neutrality requirement for developers within Poole Harbour.

3.45 The PR24 LURA driver for phosphorus improvement has been put under an HD code:

(a) HD_IMP_NN – Actions to reduce total phosphorus and/or total nitrogen levels to the Technically Achievable Limit (TAL) from discharges which drain to catchments where Nutrient Neutrality is advised.

The overlap between legislation

3.46 It is important that the legislative requirements are considered in relation to each other to understand the potential overlap in permits.

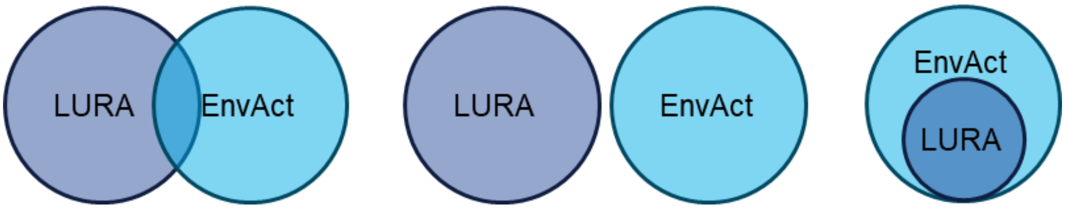
3.47 For example, as shown in Figure A11-2,

(a) the requirements for the Levelling-up and Regeneration Act could be partially within the Environment Act requirements, or

(b) the requirements for the Levelling-up and Regeneration Act could be completely independent of the Environment Act requirements, or

(c) the requirements for the Levelling-up and Regeneration Act could be completely within the Environment Act requirements.

Figure A11-2 – Potential overlap between EnvAct and LURA requirements



3.48 The different legislative drivers also allow different sets of activities by water companies to meet their phosphorus permits. Table A11-2 summarises the applicability of either point-source (e.g. WRC discharges) or diffuse (e.g. catchment measures) to the different regulatory drivers. Sub-options of each are discussed in *Annex A12 – An overview of the treatment processes for phosphorus removal*, as well as in our business plan document *WSX16 – Wastewater networks plus – Strategy and investment*[183], page 97. There are also some caveats on measure applicability depending on whether the driver is for Improvement or No Deterioration.

Table A11-2 – Applicability of site-specific or catchment options to various nutrient regulatory drivers

Regulatory Driver	Point Source (WRC)		Diffuse Source
	Specific Site	Catchment Permitting (river/catchment scale as appropriate)	Catchment Nutrient Balancing
WFD	✓	✓	✓
HD	✓	✓	✓
UWWTR	✓	×	×
EnvAct	✓	✓	×
LURA	✓	×	×

The impact of legislative changes

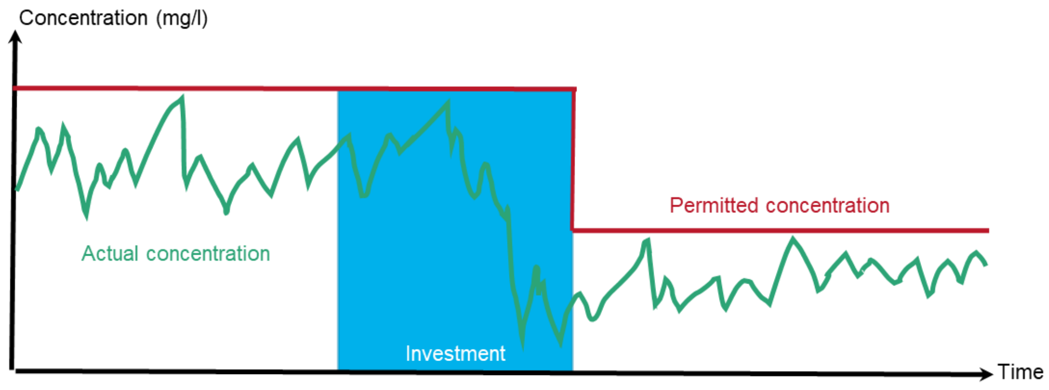
3.49 The legislative changes above have resulted in a shift in phosphorus permitting.

3.50 New requirements mean that the acceptable limit for phosphorus is now higher than previously. This means that significant investment is required to comply with these new permits, meet legislation, and provide the level of phosphorus removal required for a sustainable environment.

3.51 Figure A11-3 below shows how investment is required to ensure that the actual concentration of phosphorus entering waterbodies meets the permit concentration required by legislation.

183 Provided as SoC Appendix A023.

Figure A11-3 – The need for investment because of permit concentration changes.



The wider impact on Wessex Water

3.52 We have 398 water recycling centres (WRCs) serving a population of 2.9 million, across 10 catchments, as shown in Figure A11-4.

3.53 A significant proportion of the Wessex Water region has some form of environmental designation, and is therefore affected by one or more of the regulations detailed above, as shown in Figure A11-5.

Figure A11-4 – Wessex Water River Catchment Areas

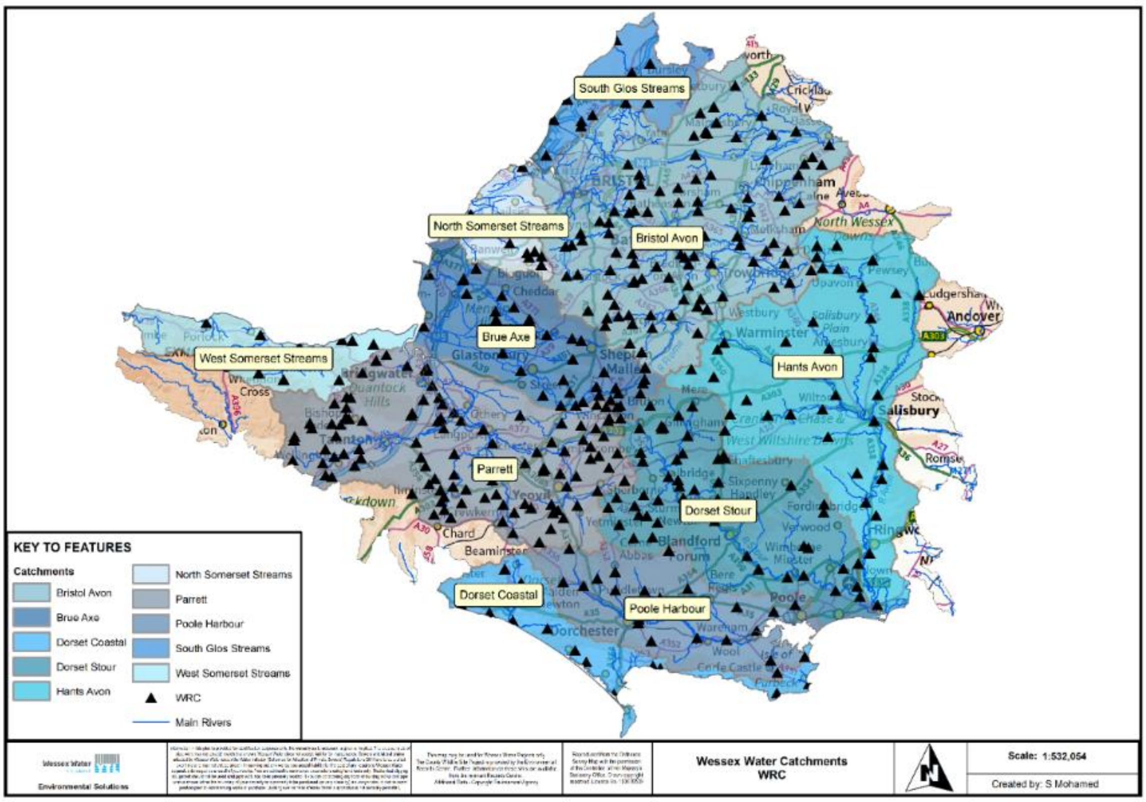
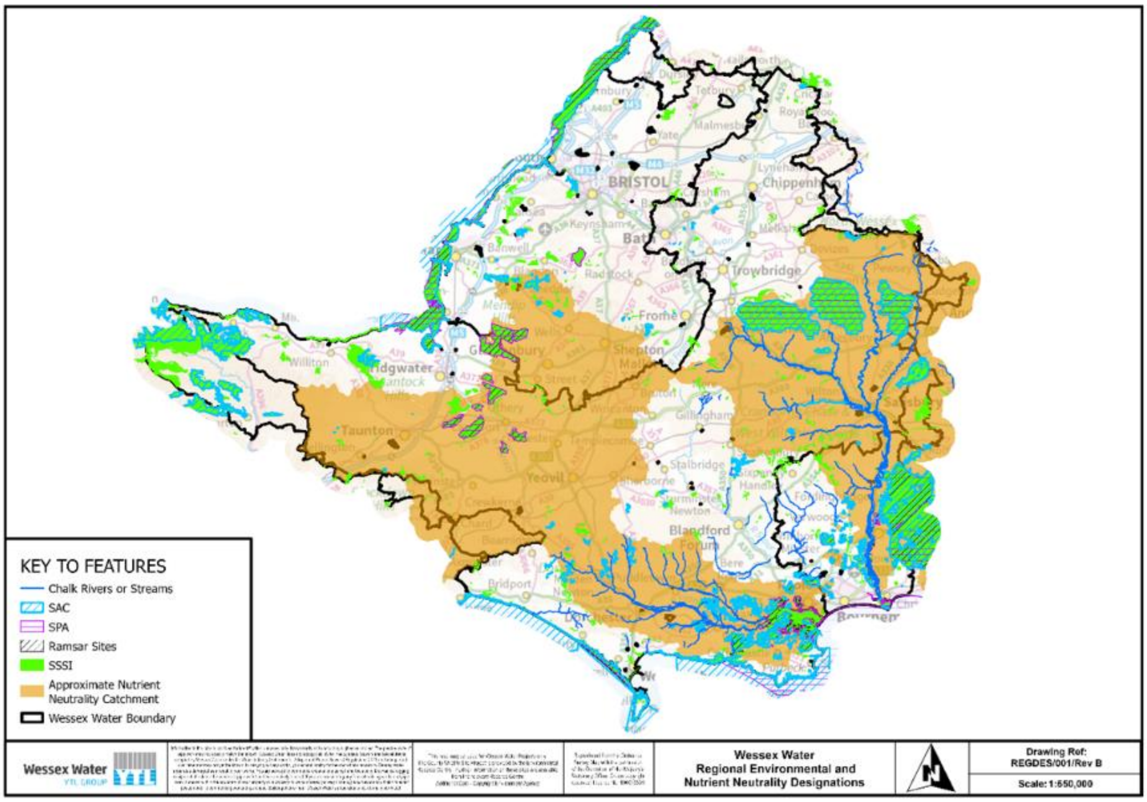
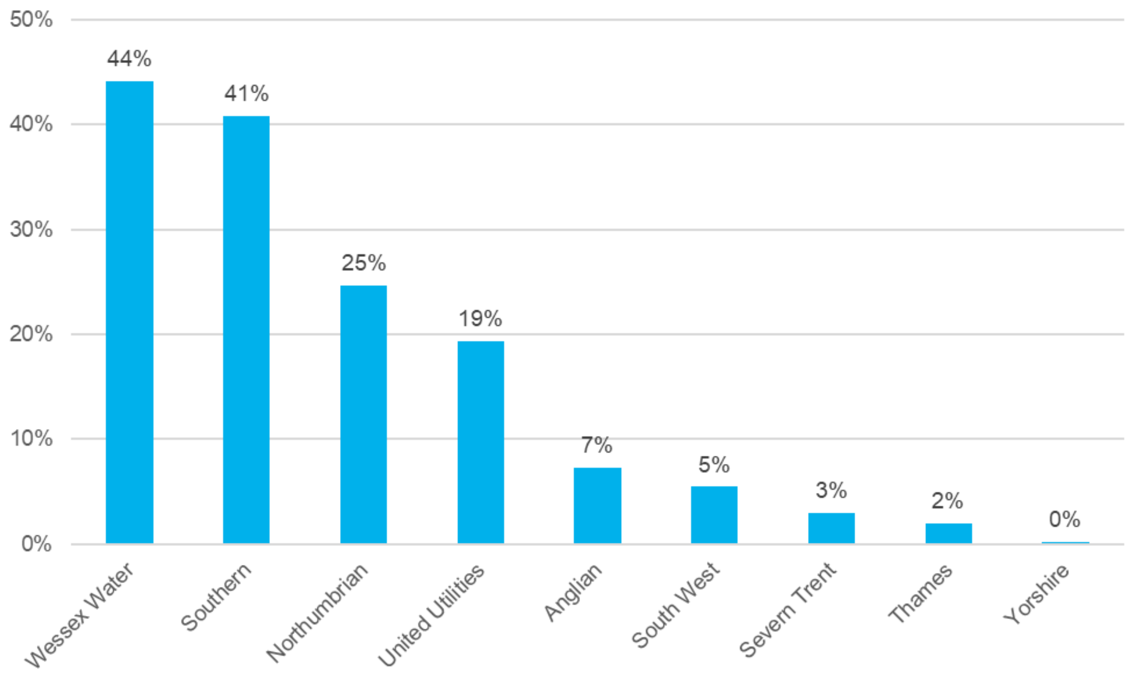


Figure A11-5 – Regional Environment and Nutrient Designations



3.54 Indeed, our assessment of nutrient neutrality catchments shows that almost half of Wessex Water's area is affected by designated areas with the LURA, which is more than any other company (Figure A11-6, % values based on our assessment).

Figure A11-6 – Proportion of company area covered by nutrient neutrality



Wessex Water

PR24 CMA Redetermination

Annex A12 – An overview of the treatment processes for phosphorus removal

1 Introduction

1.1 The treatment process for removing phosphorus is complicated, and different water recycling centres (WRCs) will face various constraints in how they can be upgraded to increase the amount of phosphorus they remove. This annex provides an overview of phosphorus removal options, highlighting the complexities that can significantly impact scheme costs. It explains the regulatory drivers and technical details of phosphorus removal, including the optioneering process for identifying the best solution for a given site and catchment. While removing phosphorus at the source is often ideal, it is not always feasible, necessitating on-site options that consider cost and environmental impact.

1.2 The treatment process for removing phosphorus is complicated, and the options for upgrading a given WRC to increase the amount of phosphorus it can treat will depend on a number of factors, and constraints. The most appropriate processes can therefore vary significantly, leading to different investment requirements even for seemingly similar sites.

1.3 This annex provides further context and detail on the options and constraints.

1.4 Examples of Wessex Water's sites and their selected phosphorus removal options are provided in Annex A13.

2 Water recycling

The treatment process

Overview

2.1 Water recycling (or, wastewater or sewage treatment), involves transporting sewage, rainwater, trade effluent, and other waste discharges from customers' homes and businesses through the sewage network to water recycling centres (WRCs) for treatment.

2.2 Whilst the general principles of treatment are broadly the same, the exact processes and technologies at each individual works can vary hugely. This depends on a range of factors including:

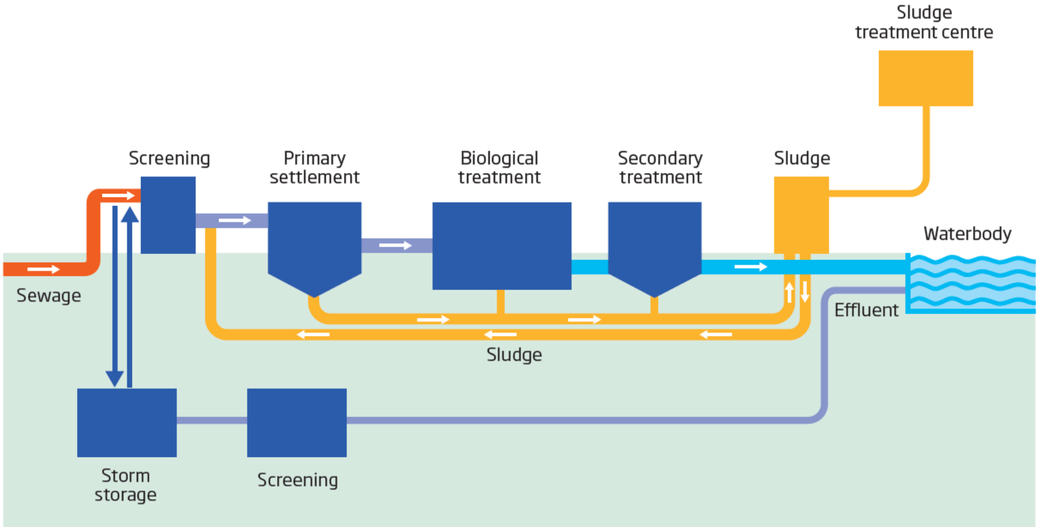
(a) The population that the WRC serves.

(b) The permit requirements, as discussed in Annex A11.

(c) The makeup of the incoming sewage (the 'influent').

2.3 The water recycling process is summarised in Figure A12-1.

Figure A12-1 – The water recycling process.



Sewerage network

2.4 When a toilet is flushed or liquid is poured down the drain, sewage is produced. In cases where there is a combined sewer network, this sewage includes rainwater from roads, roofs and gardens as well as industrial effluent. The sewerage network then carries this sewage to WRCs where the water recycling process begins.

Screening

2.5 When sewage arrives at a WRC, debris, rags and large objects are removed using screens and grit removal chambers. An example of a screen is shown in Figure A12-2.

Figure A12-2 – Example of a sludge screen at Trowbridge WRC.

Storm Tanks

2.6 In the event of a storm, excess flows are sent to storm tanks to be treated once the flows to the WRC have reduced. In extremely high flow scenarios, incoming flows are discharged straight to the environment as diluted sewage once storm tanks are full. An example of a storm tank is shown in Figure A12-3.

Figure A12-3 – Storm tanks at Saltford WRC.

Primary Treatment

2.7 After screening the flows then pass into settlement tanks (referred to as primary settlement) where the organic matter not generally removed through screenings process settles to the bottom and is removed. These solids are called sludge and go through a separate treatment process. The partly clarified liquid then flows to secondary treatment. An example of a primary settlement tank can be seen in Figure A12-4.

2.8 Primary settlement is an important part of a WRC. It removes circa 50% of the suspended solids (SS) together with around 35% of the pollution load, or biological oxygen demand (BOD) of raw sewage. If this part of the plant is not operating efficiently it will have a severe impact on the other processes by increasing the load on the rest of the WRC.

Figure A12-4 – Primary Settlement Tank at Chippenham WRC

Secondary Treatment

2.9 Next, the sewage undergoes secondary biological treatment using bacteria to clean the water. These bacteria feed off the waste, typically with the support of oxygen using aerobic treatment. However, some processes also use anaerobic treatment without oxygen to target the removal of certain nutrients.

2.10 Secondary biological treatment processes can again vary for the reasons detailed in paragraph 2.2. An example of the secondary biological treatment process can be seen in Figure A12-5 and Figure A12-6.

Figure A12-5 – Secondary biological treatment (Process type - activated sludge plant) at Holdenhurst WRC.

Figure A12-6 – Secondary biological treatment (Process type – trickling filters) at Wincanton WRC.

2.11 The sewage then goes through a further settlement process to remove the settleable solids produced by the bacteria, forming a secondary source of sludge.

Tertiary treatment

2.12 Some works then have a further tertiary treatment stage. This advanced treatment is often needed to treat sewage to a higher standard than can normally be achieved by secondary treatment alone.

2.13 Tertiary treatment is becoming increasingly common as permits tighten, and can encompass further biological, filtration or disinfection processes.

2.14 Discharge permit requirements are set dependent on the sensitivity of the receiving environment, along with the type, size and impact of the discharge. WRCs discharging into, for example, bathing or shellfish waters might require disinfection to reduce pathogens, such as through UV (ultraviolet) plants or membrane filtration.

Sludge treatment

2.15 The sludge, which is an organic byproduct of sewage treatment, also undergoes treatment. Current practice is to treat sludge through anaerobic digestion, which is a biological process for breaking down the organic material in the sludge into methane gas; or lime stabilisation, which is a process of adding lime into sludge to raise the pH of the sludge for sterilisation.

2.16 The treated sludge, known as biosolids, is recycled to agriculture and used as a soil additive for promoting crop growth and soil health. Biosolids can also be managed in other ways, including disposal through incineration.

2.17 The methane gas produced from anaerobic digestion of sludge can be used as a fuel in gas engines to produce electricity or injected into the gas grid and also help with decarbonisation.

Effluent discharge

2.18 The treated sewage, often referred to as effluent or discharge, then leaves the WRC and flows into waterbodies in line with permit conditions required by legislation. This means that the treatment process has ensured that the wastewater is not harmful when released into the local waterbodies.

3 Removing phosphorus from our catchments

Introduction

3.1 As highlighted in Annex A11, the sources of phosphorus in rivers are varied and diverse. For example, it occurs as a result of water treatment, agriculture and industry. As a result, a mixture of solutions is required from a variety of investment streams.

3.2 The levels of phosphorus reduction required in a catchment, and therefore the given level of removal required at an individual WRCs, is guided by the different regulations discussed in Annex A11. Sites and catchments may be covered under different drivers, which may restrict the ability to apply certain solutions, specifically when stringent permit conditions are required at specific sites. In reviewing potential options, it is important that legislation and permits are taken into consideration.

Optioneering

3.3 To identify the best solution in each catchment, all possible options are put through an optioneering process, discussed in our original business plan submission (section 6.2.2 in *WSX16 – Wastewater networks plus strategy and investment*[184]), and expanded upon in our Draft Determination Response (section 2.4.2 in *WSX-C09 – Enhancement costs – Wastewater treatment*[185]). In this process a range of unconstrained options are initially considered, with the applicability and viability of the unconstrained options then compared to the various drivers for improvement.

3.4 For each option – or combination of options – and for any given site or catchment, an assessment is made including capex and opex costs, and benefits (including carbon), derived through a mixture of bottom-up estimates, cost models and cost curves.

3.5 The remaining sections of this chapter comment on the potential unconstrained options that could be considered alongside on-site treatment discussed further in paragraphs 4.1 onwards.

Catchment management initiatives

Catchment nutrient balancing

3.6 As highlighted in Annex A11, phosphorus is present in many parts of a catchment. For example, from agricultural practices and run off from highways.

3.7 Water companies have worked with farmers, in particular since 2005, to reduce phosphorus, nitrate and pesticide levels from their activities, first on protecting groundwater sources of drinking water, and later the wastewater side to reduce the levels of pollutants found in waterbodies.

3.8 Whilst farmers have their own nutrient reduction targets, there remain opportunities for us to work with them to deliver phosphorus credits over-and-above their own targets, as well as supporting them in achieving their targets.

3.9 Catchment management approaches can be either more cost effective, less carbon intensive, or in some cases both, compared with conventional treatment work upgrades.

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[184] Provided as SoC Appendix A023.
[185] Provided as SoC Appendix A106.

As well as helping ensure we remove nutrients, pollutants, and impurities from entering our watercourses, they provide several wider benefits.

Source control

3.10 Source control works by preventing or treating pollutants before they enter the sewerage system. By working with trade effluent customers (such as factories, abattoirs, dog kennels, chicken farms, for example), it is possible to reduce both the flow (volume) and load (concentration) of their effluent being discharged into the wastewater system.

3.11 Phosphorus levels in relevant trade effluent is generally more highly concentrated than domestic sewage. This means that more targeted and localised treat-at-source options can reduce the need and/or scale of improvements required at water recycling centres.

Adapting sewerage networks

Transfers

3.12 Improvements and operational costs are generally disproportionately expensive at smaller water recycling centres. Therefore, it can sometimes be appropriate to look at diverting the incoming sewage for smaller WRCs to a larger site to allow for economies of scale, known as transfers – also called rationalisation or centralisation. The opportunities for this are often limited by the proximity of other WRCs.

3.13 Conversely, the opposite approach, decentralisation, recognises the potential benefit of dividing existing WRC catchments into smaller catchments. Whilst this is generally to avoid expensive sewerage network reinforcements to reduce flooding and/or to support new development, which could also involve significant disruption to communities, smaller WRCs – and especially those with surrounding land available – have a greater opportunity to benefit from nature-based solutions than larger WRCs, given the lower flows and load that is required to be treated.

Treat / pre-treat in network

3.14 Similarly to chemical dosing at treatment works, chemical dosing in networks works by bonding the phosphorus with the chemical ion.

3.15 As dosing in networks occurs upstream of the of a primary settlement process, it increases the amount of phosphorus that can be removed through the solids removal process at water recycling centres. This then reduces the phosphorus load transferred to the treatment works.

3.16 However, this option is rarely selected due to wider impacts; for example, if the dosing occurs upstream of a storm overflow, any discharges would be high in iron and have a negative environmental impact on the receiving watercourse. There are also multiple health and safety and logistical issues with dosing in a network that means that this is rarely a preferred option.

Discharge relocation

3.17 When there is a change in the permit for a particular waterbody, consideration is given to relocating the discharges from a water recycling centre to an alternative location. This often means moving the point at which the WRC discharges to the environment (the outfall) to a water body with a lower treatment requirement. This can remove or reduce the need to enhance the treatment process.

3.18 Whilst this option can improve the condition of local waterbodies, in many cases it does not negate the need for some sort of phosphorus removal overall. With perhaps the exception of sites near the coast or discharging into particularly sensitive waterbodies, discharge relocation is generally financially or environmentally unviable.

3.19 Indeed, the drive for river quality improvements risks compromising river flow requirements. This is because there is a risk that removal/relocation of a WRC's discharge could cause a deterioration to the local ecology of the local watercourse, as in some cases our continuous treated discharge comprises a significant proportion of the receiving river flows.

Reducing levels in sewage effluent

3.20 A mixture of both traditional ('grey') and more nature-based ('green') treatment solutions can be used to treat sewage effluent and reduce the level of phosphorus entering the environment from the treatment works discharge.

'Green' asset solutions

3.21 Treatment wetlands are specifically designed habitats created to encourage natural processes to treat sewage effluent and can remove phosphorus, primarily through adsorption, a precipitation process, and plant uptake which can be harvested and removed. [186] An example of a treatment wetland can be seen in Figure A12-7.

3.22 In addition, treatment wetland systems can provide additional benefits including other water quality elements such as pathogen removal, an increase in biodiversity and societal benefits. [187]

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[186] Page 6 in Dotro, G. et al (2017) *Biological wastewater treatment series - Treatment wetlands*, provided as SoC Appendix A253.

[187] Chapter 5, page 124 of *Langergraber, G. et al [editors] (2020) Wetland Technology: Practical Information on the Design and Application of Treatment Wetlands*, provided as SoC *Appendix A254 - Practical information on design of specific wetland types and typical pitfalls*

3.23 When combined with flexible permitting, they are an alternative to investing in grey infrastructure at smaller water recycling centres, especially those with surrounding land available. These sites have a greater opportunity to benefit from nature-based solutions than larger water recycling centres, given the lower flows and load that is required to be treated, and therefore lower land requirements.

3.24 However, in a global study, without upstream P removal, such as chemical dosing, 80% of sites with tertiary surface flow treatment wetlands, could generally only reach concentrations of around 3mg/l. The study showed that with enhanced upstream P removal processes, wetlands have the potential to achieve concentrations of 0.35mg/l, however, this was based on incoming phosphorus concentrations to the wetlands of between 0.09mg/l and 0.75mg/l.[188]. The land uptake required is also very extensive. Therefore, wetlands applicability for P removal has limited due to being both technically infeasible and cost prohibitive if WRCs need to achieve prescriptive discharge permit limits of 0.25mg/l and competing land pressures. They do, however, provide very significant benefits in terms of suspended solids, and BOD removal, alongside public health benefits and carbon sequestration as well as increased biodiversity.

‘Grey’ asset solutions

Traditional approaches to managing phosphorus have relied on “grey” assets, named in this way because they often require concrete to construct. “Grey” techniques include chemical dosing, where metal salts such as ferric sulphate are added to reduce phosphorus, and tertiary treatment, where solids are removed to reduce phosphorus. These treatment solutions are covered in more detail in chapter 4 of this annex.

[188] *t. Lyu et al, 2024, Phosphorus removal in surface flow treatment wetlands for domestic wastewater treatment: Global experiences, opportunities, and challenges*, provided as SoC Appendix A255.

Figure A12-7 – Cromhall Integrated Constructed Wetlands used to treat sewage effluent.

4 Removal of phosphorus at WRCs

Introduction

4.1 This chapter focuses on the treatment options available to remove phosphorus at WRCs. Often, despite considering the options discussed in chapter 3 for phosphorus removal within the catchment, it is necessary to remove the phosphorus through an asset-based solution due to regulatory constraints, as seen in Table A11-2. More information on this decision-making process is contained within our business plan submission, *WSX16 – Waste water networks plus strategy and investment*[189].

4.2 When reviewing a site for appropriate technologies, several factors must be considered:

(a) The incoming phosphorus load of the sewage

(b) The current phosphorus permit

(c) The future permit

(d) The current site performance

(e) The current treatment processes on site

(f) The level of resilience needed

[189] Provided as SoC Appendix A023.

(g) The level of risk an individual company is prepared to take

(h) Physical limitations of the site

(i) Available land

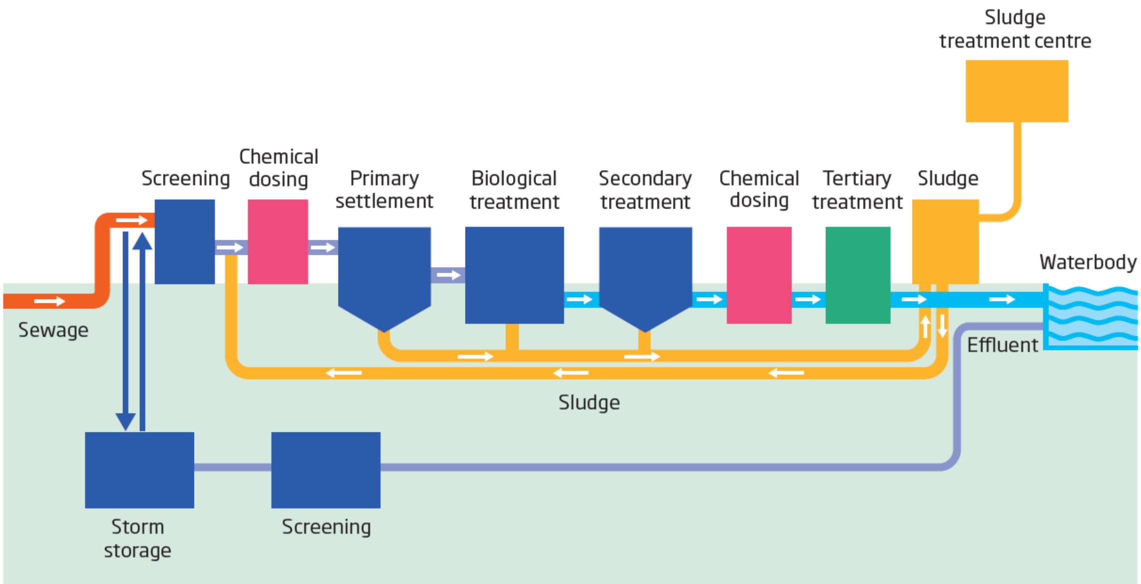
(j) Others, as listed previously

4.3 Each of these factors will impact the choice of solution, and therefore the cost and complexity on a given site. Often two sites that have the same new permit will require radically different approaches, meaning their costs cannot be compared. For further examples of this please see *Annex A13 – Examples of Wessex Water's sites that require phosphorus removal*.

4.4 Where possible, applying asset management principles to the existing site may mean that the new permit can be achieved.

4.5 But for some sites the only option is to build new stages to the treatment process or upgrade some of the existing processes to ensure effective P treatment. The additional processes required vary by site and permit requirements, but can include investment to the sewerage network, all treatment stages but particularly primary treatment and tertiary treatment or effluent discharge as illustrated in Figure A12-8.

Figure A12-8 – Aspects of the water recycling process where investment can improve phosphorus removal.



Utilising existing site assets to meet new permit requirements

Tolerating

4.6 In some cases, water recycling centres may already be regularly achieving some or all the future permit requirements. In this instance, it may be decided that that no investment is required, as they can tolerate the change in permitting without a new or improved treatment process.

4.7 This could occur because of investment decisions a company has taken in the past. For example, a site with an existing permit of 1mg/l may be regularly achieving less than 0.8mg/l due to the additional capacity built into the treatment process. If a new permit of 0.8mg/l was introduced, it may be decided to continue to operate the existing process with minor tweaks rather than invest in significant new treatment processes, albeit with a potentially increased compliance risk. The decision on accepting this compliance risk would be based on an in-depth process performance review of that particular site and would be very site specific.

4.8 However, many sites do not have redundant process capacity and condition and performance would reasonably be expected to deteriorate more quickly as more reliance is placed on these units.

Optimising and operating

4.9 In other cases, water recycling centres may already be occasionally but not always achieving the future permit requirements. In this case, targeted interventions can be used to optimise existing asset performance.

4.10 The resulting increase in reliability of meeting a lower concentration means that the new phosphorus permit can be achieved without substantial capital investment in the creation of new assets - a similar example to that in paragraph 4.7.

4.11 In many cases, however, this approach does increase the risk held by the company. Additionally, many sites do not have redundant or underutilised process units and, again, condition and performance would reasonably be expected to deteriorate more quickly as more reliance is placed on these units.

Building new treatment stages to meet new permits

Primary treatment - chemical dosing

4.12 Chemical dosing for phosphorus removal works by bonding the phosphorus with the chemical ion, with the compound then removed as sludge. Figure A12-9 shows a typical installation.

4.13 Ferric sulphate is generally used for chemical dosing. The flocculation, when the chemical binds with the matter in raw sewage, is most effective when the chemical is dosed upstream of a primary settlement process, as this is where most of the solid's removal in water recycling centres occurs.

4.14 However, the microorganisms that provide biological treatment at water recycling centres also rely on phosphorus as an essential nutrient for growth. Below a certain concentration of phosphorus, the micro-organisms will become phosphate limited and become less effective in removing pollutants such as ammonia from wastewater. The removal must therefore be balanced to ensure it does not impact the later biological treatment stages.

4.15 Phosphorus removal using primary chemical dosing only can generally achieve a permit limit of 1mg/l. This is, however, highly site specific and depends on the existing process performance as well as the chemical composition of the phosphorus in the influent, as discussed in paragraph 4.2.

Figure A12-9 – Phosphorus removal assets at a WRC – Chemical dosing kiosk, emergency shower and bunded delivery area

Tertiary treatment - solids removal

4.16 The requirement for a tertiary solids removal stage for phosphorus is subject to many factors, but typically dominated by the stringency of the phosphorus permit limit.

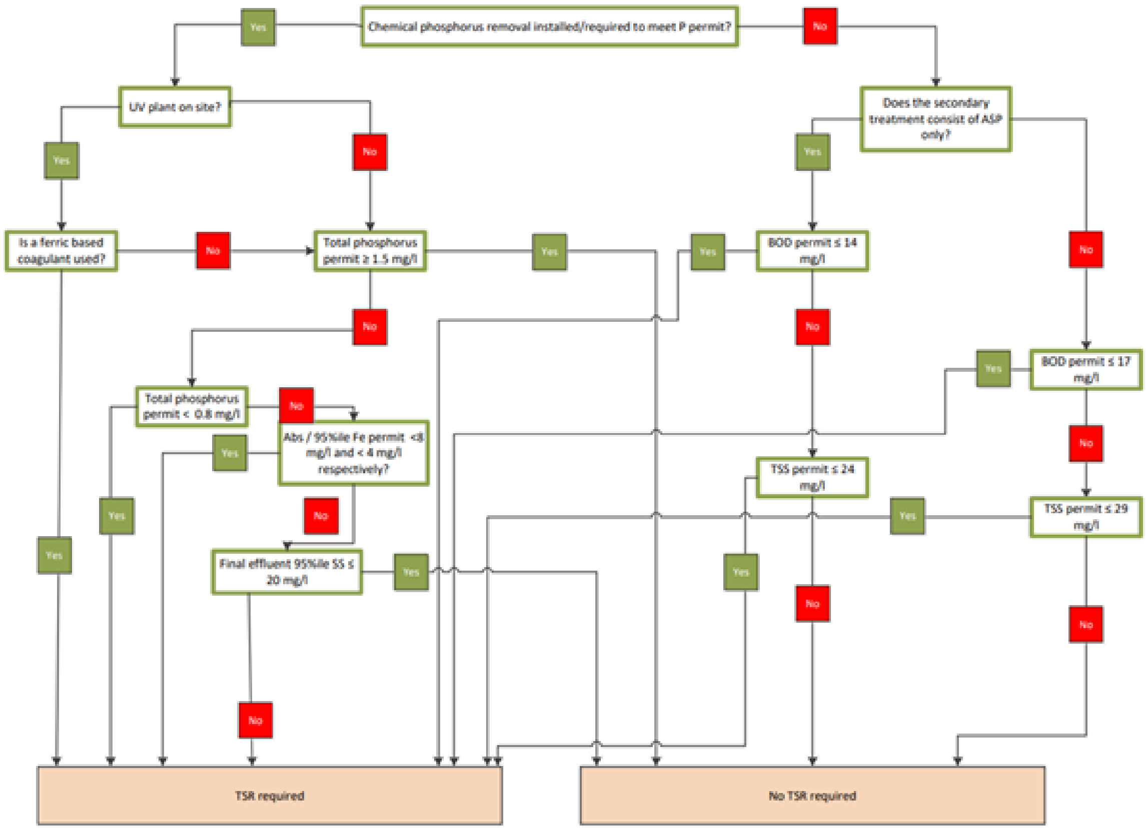
4.17 Our phosphorus removal design standard includes the decision tree as shown in Figure A12-10, with multiple choices and decision points required to determine the appropriate option. The chemical dosing decision tree has been applied across our investment plan to ensure that the correct option is selected for each site.

4.18 We note that since our business plan was developed, our design standards have continued to evolve, and this new tree is effectively the first half of the original decision tree included in *WSX16 – Wastewater networks plus strategy and investment*[190] (page 110). Once a decision is made on the need for a tertiary solids removal stage, there are subsequent assessments on the most appropriate technology itself.

4.19 As shown with this decision tree, the phosphorus limit itself is not the sole factor in whether or not a tertiary stage is needed. There may also be other site nuances not captured in the tree, where a tertiary stage might be required, and thus it can be hard to compare sites based on generic high-level assessments of, for example, population equivalent and permit. These choices are important to ensure that the option selected not only provides the phosphorus removal required, but also does not negatively impact the performance of the existing process treatment.

4.20 The decision tree also does not consider variations of ancillary upgrades, e.g. gravity or pumped pipelines due to site topography and/or existing site layout, which are site-specific, and could in turn impact on the most appropriate option.

Figure A12-10 – Decision tree for selecting the appropriate treatment option for phosphorus removal



[190] Provided as SoC Appendix A023.

4.21 Once the need for a tertiary treatment stage has been established, there are a range of tertiary treatment options available for solids removal for permits under 1mg/l. A typical installation is shown in Figure A12-11. Paragraphs 4.24– 4.29 give a brief explanation of the process behind each one, and Table A12-1 illustrates the different permit levels that can be achieved through each of these technologies based on supplier guarantee. These all assume that front end chemical dosing is also part of the solution scope. Biological nutrient removal would typically require a tertiary stage to get to 0.5mg/l or lower.

Figure A12-11 – Phosphorus removal assets at a WRC – Tertiary solids removal

Table A12-1 – Summary table showing the different treatment options and the phosphorus permit level that can be achieved.

Technology	Permit level			
	1mg/l	0.8mg/l	0.5mg/l	0.25mg/l
Pile cloth filters	Y*	Y*	Y	Y
Disc filters	Y*	Y*	Y	Trialling
Multi media filters	Y*	Y*	Y	Y
Ballasted media	Y*	Y*	Y	Y
Tertiary Continuously Backwashed Upflow sand filters	Y*	Y*	Y	
Biological nutrient removal (BNR)	Y*	Y*		

* Some sites may be able to achieve 1mg/l or 0.8mg/l without secondary chemical dosing or a tertiary stage.

4.22 The various tertiary treatment technologies have different advantages and disadvantages over each other, particularly when considered for individual sites. For example, a technology that required frequent backwashing would not be selected for a site with limited hydraulic capacity, as the implementation of this solution would impact the performance of the site. Although, there might be cases where the contrary is valid, in that for other reasons there might be a necessity to provide additional capacity – e.g. due to growth requirements or another quality enhancement driver – and it thus might be appropriate to select a particular tertiary technology that in direct comparison might be more expensive but when considered alongside other enhancements is more cost efficient.

4.23 It is important to note that even when an option is selected for a particular site, that does not mean that all sites with this option will require the same investment. This is because the investment needed will be site specific depending on the existing treatment process. For example, one site may only require minor investment to deliver the proposed solution, and the primary and secondary treatment processes do not need to be enhanced to meet the permit needs. Alternatively, a site with the same option may require significant investment to deliver the proposed solution as all aspects of the treatment process require improvement to implement the proposed solution.

Pile cloth filters

4.24 Pile cloth filters are a tertiary solids removal technology that removes particulate phosphorus from wastewater. It requires upstream chemical dosing to turn reactive soluble phosphorus into particulate phosphorus. The filters are a rotating pile cloth arranged in discs, that then traps the particulates as wastewater flows passes through. The cloths are cleaned (backwashed) using high pressure water and air, with this dirty water returned to the start of the WRC.

Disc filters

4.25 Disc filters are a tertiary solids removal technology that also remove particulate phosphorus from wastewater. It requires upstream chemical dosing to turn reactive soluble phosphorus into particulate phosphorus. The filters are a rotating mesh disc that then traps the particulates as wastewater flows passes through. The filters are cleaned (backwashed) using high pressure water and air, with this dirty water returned to the start of the WRC.

Multi media filters

4.26 Multi media filters are a tertiary solids removal technology that also remove particulate phosphorus from wastewater. It requires upstream chemical dosing to turn reactive soluble phosphorus into particulate phosphorus. Flow is driven through four layers of different sized media, that traps the particulates. The layers of media are cleaned using high pressure air and then backwashed with water to remove the particulates, with this dirty water returned to the start of the WRC.

Ballasted media

4.27 In ballasted media processes, ballast agents (such as micro sand or a compound called magnetite depending on the company providing the unit) are added to the flow with a coagulant and flocculant. This helps rapid settlement of particulates on the ballast media within what is called a clarification tank. The sludge is then removed with the ballast media, the ballast media is then separated from the sludge, cleaned, and returned to the unit for reuse. The sludge is sent to the sludge tanks on site.

Tertiary Continuously Backwashed Upflow sand filters

4.28 Tertiary Continuously Backwashed Upflow sand filters are a tertiary solids removal technology that also remove particulate phosphorus from wastewater. It also requires upstream chemical dosing to turn reactive soluble phosphorus into particulate phosphorus. Flow is driven through sand, that then traps particulate phosphorus. The sand is backwashed continually, with the dirty backwash water returned to the start of the works.

Biological nutrient removal

4.29 Biological nutrient removal relies on a site already having an activated sludge plant (ASP) as the biological treatment process. If the set up allows (although significant physical modifications are needed), the plant can be operated with specific oxygen and nutrient levels at different stages, creating sections where different bacteria can remove ammonia, nitrogen and phosphorus. It requires a significant carbon input, and so both methanol and coagulant dosing are required. Increased volumes of sludge are produced.

The law of diminishing returns

4.30 Complying with these new permits requires a step change in the amount of investment. Achieving these targets will also not be proportional to previous phosphorus removal schemes. This is because the costs to reach lower concentrations (i.e. <1mg/l) increase significantly due to this additional tertiary stage that is required, along with all other associated upgrades.

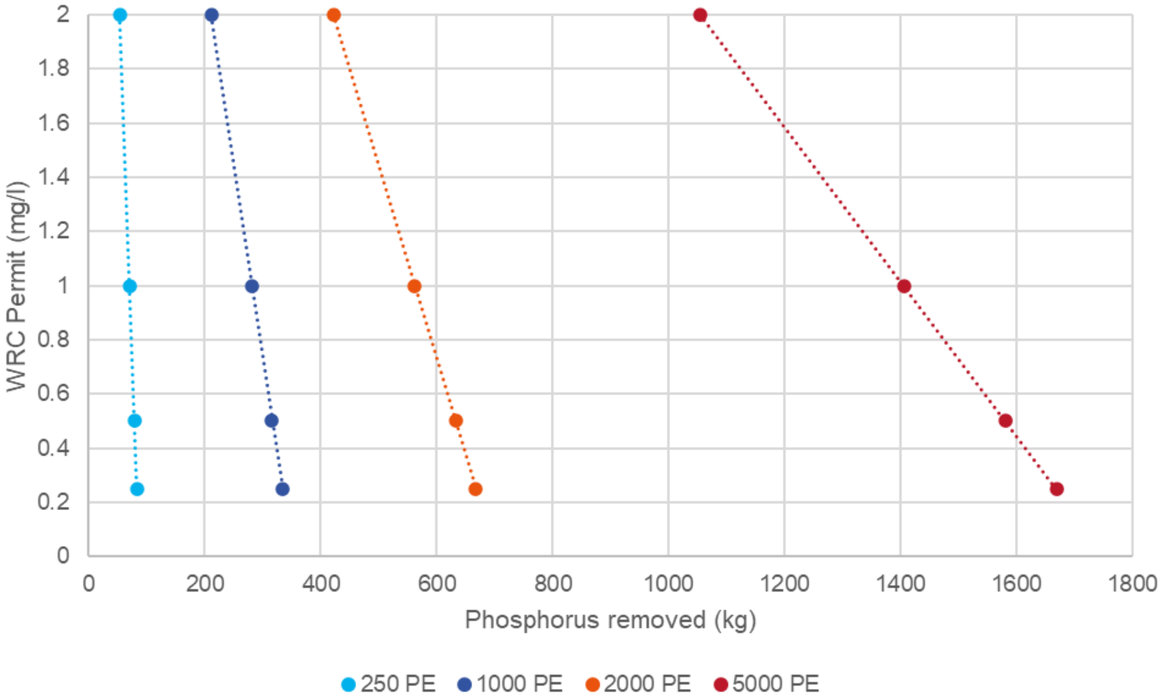
4.31 Table A12-2 and Figure A12-12 illustrate how, as the permit tightens, the incremental amount of phosphorus that is removed decreases. Without a specific phosphorus removal process, the concentration of phosphorus in the final effluent is assumed to be 5mg/l.

Table A12-2 – Phosphorus removed by permit level.

WRC size	Phosphorus load removed (kg/yr)*			
	New permit: 2mg/l	New permit: 1mg/l	New permit: 0.5mg/l	New permit: 0.25mg/l
250 PE	53	70	79	83
1,000 PE	211	281	316	334
2,000 PE	422	562	632	667
5,000 PE	1,054	1,405	1,581	1,669

* Compared to if discharging at default of 5mg/l

Figure A12-12 – Phosphorus removed by permit level.



5 Wider complexities of phosphorus schemes

Introduction

5.1 Scheme drivers vary by site. In the case of phosphorus, this is based on legislation as outlined in Annex A11. However, sites may or may not have other factors that make the delivery of investment to meet phosphorus permits more expensive. This chapter comments on the factors that may, on a site-by-site basis, increase the requirements when additional treatment stages are needed. *Annex A13 – Examples of Wessex Water's sites that require phosphorus removal* gives examples of Wessex Water specific sites.

Wider on-site requirements

5.2 When considering the investment required, taking the wider site requirements and permits into consideration is key. Whilst not always the case, the general principle is that the tighter the other site requirements are, the more expensive any enhancement on site will be. This is because not only does the investment need to meet the enhanced permit, but it also needs to do so without compromising the ability of the site to meet its other requirements.

5.3 Requirements that can increase the cost of investing to meet new phosphorus permits include:

(a) The hydraulic capacity, or flow, and the biological capacity, or population equivalent (PE) of the site.

(b) The presence of nitrogen and other permits.

(c) The type and quantity of chemicals used in the treatment process.

(d) The presence and frequency of any storm overflows or emergency overflows

5.4 If other investment is required, this may need to take place before any planned enhancement. This can mean that there is a shorter window to deliver the phosphorus scheme, requiring an accelerated programme that costs more but delivers the scheme on time.

5.5 However, in some instances this is not possible because of the scale of the investment required. The works to build the phosphorus removal processes must therefore occur alongside the capital maintenance works. This increases complexity of the works and scheduling these two programmes may mean that more expensive methods are required to ensure the works can progress in parallel to meet individual regulatory dates.

Scheme constraints

Electrical supply

5.6 The ability to secure a resilient and reliable source of energy is key to operating any wastewater treatment process that requires electricity. However, the availability of such a supply varies by site.

5.7 On rare occasions, and not applicable to the schemes Wessex Water is delivering between 2025-30, sites can be remote meaning that they may be geographically removed from the electricity grid. As a result, connecting to the grid may be more expensive for the sites if there are sites that do not have power already.

5.8 However, even when sites are already connected to the grid, that does not mean that there is supply capacity within the existing site power connection to support the scheme. In these cases, it can be necessary to upgrade the existing supply capacity, requiring additional investment.

5.9 Maintaining energy at sites is also vital to ensure that they can operate in the event a sites grid supply is down as tertiary solid removal treatment technologies suitable for low phosphorus permits are energy intensive. A power interruption may lead to chemically dosed effluent with high metal concentrations bypassing the tertiary solids removal during a power outage and discharging to the watercourse, causing major potential ecological harm. Generally, this resilience is provided by having permanent standby generators as an alternative short term energy source. The size, and subsequently the cost, of these generators varies depending on the energy needs of the treatment process and the current set-up on site.

Ground conditions

5.10 The site typography and geotechnical conditions can not only vary significantly by site, but can also vary across the site itself. These ground conditions can have a significant impact on costs.

5.11 Site typography refers to how undulating or flat a site is. In general, it is easier to construct an asset on a site that is flat, as less earthworks are required. When the gradient of the site is undulating, more earthworks are required at an additional cost.

5.12 Contamination of the underlying soil can also have a significant impact on costs. This is especially a concern for wastewater sites that were historically located in industrial areas where contamination can be more prevalent depending on the previous use. When contamination is present, this can require treatment at an additional cost. Alternatively, contamination can mean that the proposed site is unsuitable, requiring an alternative site to be purchased at additional costs.

5.13 Depending on the makeup of the soil, the ground conditions can impact on construction. If poor or unstable ground conditions exist, additional temporary works can be required to undertake the work at and additional cost.

5.14 Similarly, the makeup of the soil can impact on design of any scheme. When poor or unstable ground conditions exist, additional foundations or structural support is required to ensure that the asset is stable. These can have a significant impact on cost.

Land

5.15 The availability of land can vary from site to site. Some treatment works have large areas of surrounding land under the ownership of the water company. When this is the case construction is often simple. However, this is not always the case, and sites can also be constrained with limited land available either on the existing site or in the surrounding areas.

5.16 When the land required is not already under the ownership of the water company, a purchase agreement is required. While water companies do have compulsory purchase order rights, this process can be slow and complex and can add significant time in the context of a five-year investment period. Instead, water companies tend to work directly with landowners to come to a purchase agreement. Unfortunately, some landowners can use this to drive up the price of the land, knowing that water companies frequently have no option to pay over market value for land to deliver schemes.

5.17 The location of the available land in relation to sensitive areas can also have an impact on the cost of a proposed scheme. Planning requirements for these areas can mean that certain solutions are unsuitable or require additional investment to offset the impact they have on the sensitive areas, driving up cost.

5.18 Other land constraints can also drive-up costs. This includes but is not limited to the sites being located within floodplains, and the presence of protected or invasive species.

Hydraulic constraints

5.19 Hydraulic constraints can have a massive impact on scheme costs. As the hydraulic design of each site is unique these costs can also vary significantly. However, to ensure the flow of water across the site is key to the treatment process, and therefore upgrades must ensure that the hydraulic performance is not impacted as a result of any investment.

Overall scheme complexity

5.20 The over complexity constructing the solution has a large impact on the cost. The constructability risk of each site varies depending on its layout, characteristics and age. As phosphorus investment is typically added on to an additional treatment process, this often increase the complexity of delivering the scheme, increasing costs.

Historical permit

5.21 A key factor when considering the price to meet a new phosphorus permit requirement is the historical permit. Although not always the case, generally the larger the gap between the historical permit, not just phosphorus but also suspended solids, and the enhanced permit, the greater the investment requirement to meet the new requirements.

Wessex Water

PR24 CMA Redetermination

Annex A13 – Examples of Wessex Water's sites that require phosphorus removal

1 Introduction

1.1 In Annex A11, we outlined the complex regulatory environment, and the factors that impact how these requirements can be met. To provide further context, this annex provides examples of our proposed investment. We also provide some examples of sites of comparable size and permit tightening, but where the required scope (and thus cost) is different.

2 Examples of proposed investment

2.1 In

2.2 Table A13-1 below, we provide further detail on the investment proposed at a number of our sites. These sites represent those where there is the largest absolute difference between our own and Ofwat's view of efficient costs.

Table A13-1 – Overview of Wessex Water model 'outlier' sites – P-removal

WRC	Justification	WSX DDR	Ofwat FD *
Wells	Wells WRC is located wholly within a Local Wildlife Site and an area of an historic landfill. While operational land is available, it consists of old sludge lagoons and areas of the site that are identified as a risk and subject to ongoing monitoring due to the historic movement of retained material. Additional operational land is required to accommodate the AMP8 treatment plant. To facilitate this and avoiding land purchase, the area of the existing grass plots will be used as part of the solution. This removes the need for land purchase, planning approval for a change in land use as well as the associated land/offsetting requirements to meet Biodiversity Net Gain requirements, which are particularly significant given the Wildlife Site status. The existing works cannot accept backwash flows from a tertiary solids removal (TSR) process that is required for the new P permit. The layout of the works is complex with some assets being overloaded and some underloaded (both hydraulic and organic) but resulting in a blended flow which is compliant with existing permit conditions. It is not possible to accommodate the TSR without significant changes to the existing works layout to balance the loads. Additionally, the grass plots are used for ammonia polishing to enable consistent compliance with the existing permit limits. Taking them out of operation requires additional nitrification capacity to be provided. As a result of both the nitrification and site configuration issues a new sidestream process will be required. An allowance was requested for growth in our Draft Determination Response as an opportunity for efficiencies between schemes.	£17.5m Capex: £17.2m Opex: £0.2m	£5.5m (-68%)

WRC	Justification	WSX DDR	Ofwat FD *
Christchurch	The site is located within Green Belt, Flood zone 3, and is adjacent to multiple SSSI, SAC, SPA & Ramsar sites, a Salmonid bypass stream and within the Bournemouth Airport (Hurn) Zone. The site is further constrained by and adjacent to a railway to the north, and two main roads to the east and west. As also identified in our response to query OFW-OBQ-WSX-184, the site is located within an area of sands and gravels together with a high water table, which would require continuous dewatering during construction and any structures to be built with anti-floatation measures. The existing ultraviolet (UV) disinfection plant is not hydraulically capable of accommodating the backwash flows from the new tertiary solids removal (TSR) plant. The current system is permitted on a received dose basis. However, the EA's current guidance on UV disinfection is for validated dose systems. They advise that a permit based on this approach is required if there is any substantial change (such as increases in maximum flow above design of plant) or if UV irradiation equipment is upgraded. A new UV plant is thus required. The scheme includes additional sludge handling and the provision of mechanical thickening. Whilst this might not be unique to sites of this size, the land constraints necessitate demolition of disused assets to provide the necessary space. The scale of upgrades required at the site also requires a step-change in power supply provision, including upsizing of the incoming transformer and standby generator. We provided information in our response to OFW-OBQ-WSX-184.	£23.8m Capex: £23.4m Opex: £0.3m	£11.5m (-52%)
Gillingham	Based on the site's existing assets, the same solution is required to achieve 0.25mg/l as it is for 0.6mg/l. In recognition of the step change in scope (and thus costs), we had originally considered catchment nutrient balancing in combination with tolerating a small tightening of the P limit, however whilst this hybrid approach was suitable to achieve WFD requirements, point source improvements were required to contribute towards the Environment Act load reduction target, forcing us towards a comparatively inefficient solution. The existing tertiary solids removal process is not suitable for reliably achieving the PR24 P limit. The combination of backwash from the new TSR and existing sand filters would hydraulically overload the site. The scope is therefore to abandon sand filters and provide alternative nitrification that does not produce backwash flows.	£13.6m Capex: £13.4m Opex: £0.2m	£3.5m (-75%)
Ratfyn	Additional land is required to accommodate the AMP8 treatment plant, along with associated additional land/offsetting requirements to meet Biodiversity Net Gain requirements. The site is on land adjacent to the Stonehenge World Heritage Site, River Avon SSSI and the Long Barrow scheduled monument, which impact the amount, extent/quality and locality of any BNG mitigation measures.	£15.0m Capex: £14.9m Opex: £0.1m	£4.9m (-67%)

WRC	Justification	WSX DDR	Ofwat FD *
	The existing site setup and topography necessitates an extensive amount of interstage pumping, with appropriate balancing and resilience. To accommodate the backwash from the TSR required for phosphorus removal, two pumping stations require upgrading, along with modifications to the outlets of the humus tanks. Upsizing of existing chemical dosing system is required however due to site configuration a second chemical tank and associated ancillaries are also required.		
Glastonbury	We provided information in our response to OFW-OBQ-WSX-184, in which we provided rationale for Glastonbury not being comparable with sites of similar sizes or existing/enhanced permit requirements. We provided a summary of scope requirements that included enhanced two-stage secondary treatment (for both biological and hydraulic requirements), enhanced sludge handling and thickening, and additional power upgrades for the incoming power supply, transformer and standby generator. In our response we highlighted that whilst individual scope items aren't necessarily bespoke to Glastonbury, we consider it rare that they are all required at a single site, or at least when compared to other comparably-sized and permitted sites.	£15.3m Capex: £14.9m Opex: £0.4m	£6.5m (-57%)
Wool	Refer to section A3-2.9 of *WSX17 - Annexes - Wastewater networks plus strategy and investment* Wool WRC has both P & N drivers for AMP8. There is insufficient space available within the existing site boundary to accommodate the necessary process improvements and sufficient space for temporary construction activities so additional land is required. The site is located within an area of Dorset heathland which includes various Local Wildlife Sites, common land, SSSI etc. Opportunities for expansion of the site are limited to a field immediately west, the site is surrounded by areas of woodland on three sides. A Scheduled Monument is located approx. 200m along the northern boundary of this field. The impact of Biodiversity Net Gain now required as part of the planning process are likely to be significant. The site relies on activated sludge (two concentric ASPs) to treat sewage prior to discharge to the nearby River Frome. While efficient in terms of land use, concentric ASPs such as these are not easy to maintain as the aeration and settlement stages are intrinsically linked – to carry out maintenance on one stage requires both to be taken offline. This will not be possible following the introduction of a tertiary solids removal stage, due to the amount of backwash that cannot be balanced during these activities.	£11.5m	£4.5m (-61%)
Shrewton	Due to its catchment, Shrewton operates at its Flow Passed Forward (FPF) limit for extended periods. The WRC does not have sufficient capacity to accommodate the backwash flows in addition to this.	£8.8m	£3.8m (-57%)

WRC	Justification	WSX DDR	Ofwat FD *
	Additional scope to accommodate the backwash comprises modifications to primary settlement flow split chamber, additional biological and final settlement. Land purchase will be required to accommodate these process units.		
Ringwood	In addition to phosphorus improvements, Ringwood WRC also has drivers for sanitary parameters and growth. The combination of these results in the need for the purchase of additional land. There is limited land availability due to flood zones and Avon Valley Ramsar site. The phosphorus scope alone could be built within the site's existing operational boundary, however this would then mean the other drivers of sanitary and growth would be more costly, along with attracting additional costs to interface with a non-ideal site layout. We have chosen a holistic – and best value – solution taking all drivers into the consideration, and with appropriate cost allocation across the respective enhancement drivers.	£12.4m	£5.6m (-55%)
Wareham	Refer to section A3-2.8 of *WSX17 - Annexes - Wastewater networks plus strategy and investment* Wareham WRC has two treatment streams – activated sludge plant (ASP) and biofilters. Recently, It's had a UWWTR requirement to reduce the amount of nitrogen discharging into Poole Harbour (a designated environmentally sensitive area), and a grey solution was included within PR19 with a Regulatory Date of 22nd December 2021. This required the purchase of additional land to the North which involved protracted negotiations with the owner. The addition of chemical dosing for AMP8 increases solids loading within the ASP / final settlement tank. Wareham WRC does not have sufficient capacity for these solids loadings necessitating additional treatment capacity to be added. The biofilter stream also has limited hydraulic capacity to accept backwash flow rates from the TSR required for phosphorus, which also requires mitigating. Land purchase will also be required. The site borders a Ramsar, SPA and SSSI and a public right of way While the land purchased for the PR19 scheme did include some space for 'future expansion' it is unlikely to be sufficient to accommodate the scope required for AMP8, with further expansion therefore required to the North. This is with the same landowner as before, and so protracted negotiations and increased costs are expected, in order to meet the regulatory date. There is also a covenant on what structures can be built within the existing site. The access to site crosses of the main London Waterloo to Weymouth railway line via an unmanned (telephone) crossing which requires increased cost to manage during construction.	£13.0m	£6.3m (-52%)
North Petherton	North Petherton has an unusual site configuration with the preliminary treatment stage located immediately to the east of the M5 motorway, with the rest of the treatment stages being in	£11.4m	£5.6m (-51%)

WRC	Justification	WSX DDR	Ofwat FD *
	a separate site approximately 150m further away to the east. This necessitates split assets which might otherwise have been combined on other sites, resulting in increased costs to provide both front- and back-end chemical dosing. The operational access to the site is from the west via a dedicated underpass. This is not suitable for construction vehicles, necessitating a temporary access for the scheme. The scheme also includes £400k extra in-AMP opex. Aligning the scheme with a growth driver will deliver efficiency savings.		
Salisbury	Salisbury WRC is located within the flood plain of the River Avon and the area frequently floods. Any plant provided will therefore need to be raised, likely requiring extensive piling for the foundations. It has not been possible to accommodate the required scope within operational land and therefore will be subject to planning permission and Biodiversity Net Gain. Flood compensation volume will also be required for any works within the flood plain. To avoid the need for two separate chemical storage / bunded areas along with associated ancillaries, a single chemical storage and delivery bund is being supplied in a suitable location to both dosing locations. The WRC has insufficient hydraulic capacity to accommodate backwash flow rates from technologies normally associated with 0.25mg/l P limit and therefore a technology with lower backwash has been selected (‘Actiflo’). However, the process itself is more expensive when considered in isolation to other tertiary solids removal stages. It also needs polymer to be effective, which requires a polymer makeup system and higher operational costs. Whilst technology choice has been made to reduce backwash flows, additional modifications are required which include pumping station(s) and modifications of existing channels. The scheme includes improved sludge handling and mechanical thickening. Whilst this might not be unique to sites of this size, the lack of available space on site necessitates the demolition of disused assets.	£14.0m	£11.2m (-20%)

* Ofwat’s scheme allowance, pre-FS and RPEs adjustment.

3 Comparative examples

3.1 On the following pages, we provide an overview of a four pairs of sites of otherwise comparable sizes and permit tightening, as summarised in Table A13-2, but for which the required scope (and thus cost) is different.

3.2 We note that for all pairs of sites, the ‘cheapest’ of the two is still deemed inefficient by Ofwat, with the exception of Wookey. Our concerns with Ofwat’s approach to determining P-removal allowances are set out in chapter 9 of our Statement of Case and Annex A14.

Table A13-2 – Comparative P-removal sites, with scope and cost variances

WRC	PE Served	Design PE	Permit Change	WSX DDR Request	Ofwat FD Allowance
Wookey	1,262	1,412	N/A (new) to 1.5mg/l	£1.7m	£1.7m
Beckington	1,216	1,360	N/A (new) to 1.5mg/l	£2.2m	£1.7m
Blackheath	6,655	7,445	N/A (new) to 0.25mg/l	£8.0m	£5.6m
North Petherton	6,210	7,236	N/A (new) to 0.25mg/l	£11.4m	£5.6m
Merriott	4,044	4,524	1mg/l to 0.25mg/l	£5.7m	£4.0m
Hurdcott	4,058	4,596	1mg/l to 0.25mg/l	£8.1m	£4.0m
Ringwood	19,310	22,559	1mg/l to 0.25mg/l	£12.4m	£5.6m
Wells	18,942	21,190	1mg/l to 0.25mg/l	£17.5m	£5.5m

3.3 For all sites, we have assessed a range of options as described in Annex A12, including catchment permitting and catchment nutrient balancing, considering the costs and benefits, and particularly recognising breakpoints in treatment requirements when considering mixtures of options for any given site and/or catchment.

3.4 Phosphorus improvements are required at these specific locations to the identified permit due to eutrophication concerns in the local or downstream waterbody and/or regulatory restrictions/considerations on the solutions available for use.

3.5 For each site identified, the best value and least cost solution is improvements at the WRC themselves, with the proposed scope, to the permit limits as identified.

Wookey and Beckington

Overview

3.6 The following case study presents a comparison of two of our P-removal schemes which have seemingly ‘similar’ characteristics: Wookey and Beckington (see Table A13-3). Whilst the two schemes are similar from the perspective of Ofwat's models – in terms of the PE Served and the change in permit – we estimate the cost of Beckington to be approximately 30% more than Wookey.

3.7 We set out the key characteristics and features which make Beckington a more expensive scheme than Wookey; namely technological differences and site access considerations. We note these characteristics and features are not captured in Ofwat’s econometric models.

Table A13-3 – Comparative P-removal sites: New to 1.5mg/l (Wookey and Beckington)

WRC	PE Served	Design PE	WINEP Drivers	Permit Change	WSX DDR Request	Ofwat FD Allowance
Wookey	1,262	1,412	WFD_IMPg, EnvAct_IMP1	N/A (new) to 1.5mg/l	£1.7m	£1.7m
Beckington	1,216	1,360	WFD_IMPg, EnvAct_IMP1	N/A (new) to 1.5mg/l	£2.2m	£1.7m

Need for enhancement investment

3.8 There is definite link between the discharge from Wookey WRC and eutrophication in the local watercourse, necessitating improvements at this specific site to meet the requirements of the Water Framework Directive (refer to Annex A11 for details on regulatory drivers).

3.9 WFD improvements are not needed for the immediate discharge location for Beckington. There is a need, however, for improved water quality at a downstream confluence, requiring improvements upstream of this point.

3.10 There are two WRCs upstream of this location – Beckington and Royal Wootton Bassett – allowing a combined approach to achieve the WFD catchment requirements. For Beckington, through option development work we have identified the most efficient approach to include a permit at Beckington that requires tertiary treatment, alongside a smaller tightening at nearby Royal Wootton Bassett WRC. For this site, the performance and condition of the existing assets allows us to achieve its future permit limit through reduced scope and thus limiting cost.

Key differences in site characteristics / features

3.11 The process requirements are comparably the same at both sites, namely:

(a) a new chemical dosing system (comprising chemical dosing rig, storage tanks, bunded delivery area, emergency shower, dosing lines, flowmeters, etc.),

(b) sludge storage provision,

(c) ancillary upgrades, such as new/expanded Motor Control Centres, telemetry upgrades and sampling monitors

(d) associated access, road and landscaping works.

3.12 There are, however, some key differences.

<u>Technological requirements</u>

3.13 Whilst essentially carrying out the same process, the chemical dosing equipment is larger – and thus more expensive – for Beckington than Wookey, despite the sites serving comparable PEs.

3.14 Wookey has both activated sludge (oxidation ditch) and percolation (mineral media) biofilters whereas Beckington is a filter works only. The oxidation ditch was added at Wookey in 1970 as the least cost and preferred solution at time of implementation, to facilitate growth and achieve a tightened discharge permit. The Iron:Phosphorus ratio for an activated sludge plant – that is used to calculate dose rates and therefore size process units – is lower than a percolation biofilter works. Beckington thus attracts higher costs for larger units along with increased operational and maintenance costs, due to greater dosing requirements.

<u>Site Access</u>

3.15 The ability to access the two sites also varies considerably. At Wookey we have direct access to the site off the public highway. At Beckington, whilst we have a right of way over a private track – we don't own it – it will require reinforcement to allow construction vehicles, which will require agreement from the owner. This results in additional costs both for the upgrades themselves, as well as increased ongoing maintenance due to increased operational traffic following scheme completion (e.g. due to chemical deliveries, increased sludge tanker movements).

3.16 Figure A13-1 shows the access track, and some specific points for consideration.

Figure A13-1 – Beckington WRC access track considerations

3.17 Overall, this leads to Wookey costing £1.7m and Beckington costing £2.2m. However, Ofwat's models see these as essentially the same schemes despite the clear idiosyncrasies that drive different costs.

Blackheath and North Petherton

Overview

3.18 The following case study presents a comparison of two of our P-removal schemes which have seemingly ‘similar’ characteristics; Blackheath and North Petherton (see Table A13-4). Whilst the two schemes are similar from the perspective of Ofwat's models – in terms of the PE Served and the change in permit – we estimate the cost of North Petherton to be over 40% higher than those at Blackheath.

3.19 We set out the key characteristics and features which make North Petherton a more expensive scheme than Blackheath, namely site geography and access considerations. We note these characteristics and features are not captured in Ofwat’s econometric models.

Table A13-4 – Comparative P-removal sites: New to 0.25mg/l (Blackheath and North Petherton)

WRC	PE Served	Design PE	WINEP Drivers	Permit Change	WSX DDR Request	Ofwat FD Allowance
Blackheath	6,655	7,445	HD_IMP_NN, HD_IMP, SSSI_IMP	N/A (new) to 0.25mg/l	£8.0m	£5.6m
North Petherton	6,210	7,236	WFD_IMP_MOD WFD_IMPm, EnvAct_IMP1	N/A (new) to 0.25mg/l	£11.4m	£5.6m

Need for enhancement investment

3.20 Blackheath WRC is included in the WINEP for phosphorus and nitrogen improvements associated with nutrient reduction targets required in the downstream Poole Harbour catchment.

3.21 The local river (Petherton Stream) into which North Petherton WRC discharges is in WFD poor status, requiring localised improvement. No other WRC discharges into the stream, with the permit need itself identified through an AMP7 WINEP investigation.

3.22 Neither currently has a permit and both are required to meet a new permit of 0.25mg/l.

Key differences in site characteristics / features

3.23 The process requirements are comparably the same at both sites, namely:

(a) new two-point chemical dosing systems (comprising chemical dosing rig, storage tanks, bunded delivery area, emergency shower and dosing lines),

(b) new tertiary solids removal stage (including feed pumping station, clean and dirty backwash tanks),

(c) appropriate backwash handling/treatment,

(d) ancillary upgrades, such as standby generators, new/expanded Motor Control Centres, telemetry upgrades, and sampling monitors,

(e) associated access, road and landscaping works.

3.24 There are, however, some key differences as described in the following paragraphs.

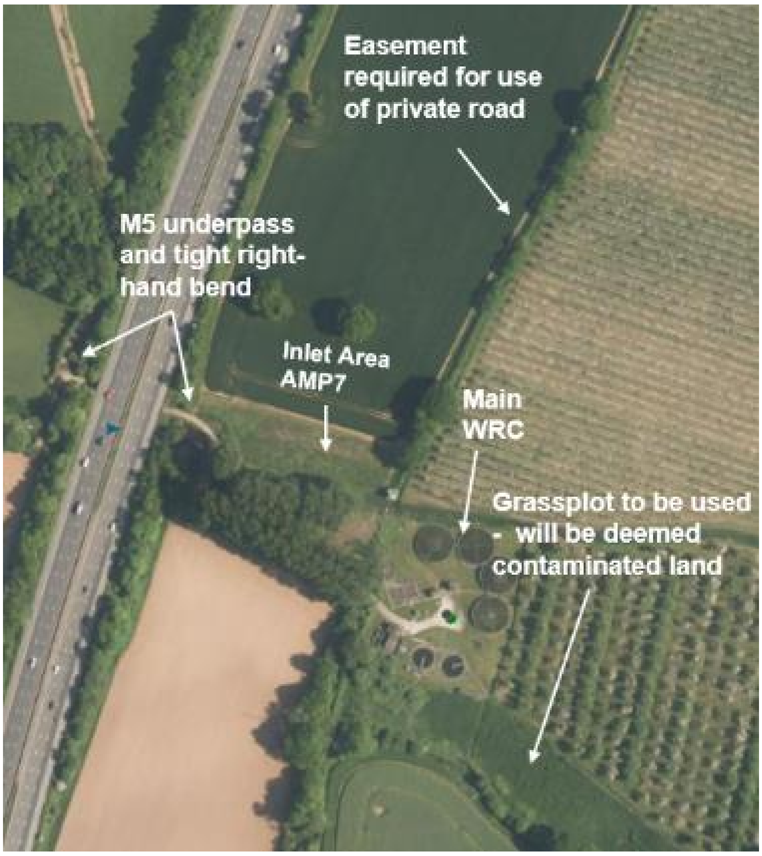
Site Access

3.25 The operational access to North Petherton is from the west of the M5 via a dedicated underpass, as shown in Figure A13-2. This route is not suitable for use by construction vehicles, and a recent AMP7 Frequently Spilling Overflow scheme at the site required the construction of a temporary access from the north through a private field. This field has now been proposed for development as a solar farm, and thus a different new temporary access is required for the AMP8 scheme. This will require new access or modifications due to the size and weight of construction traffic.

Geography

3.26 North Petherton also has an unusual site configuration for historical reasons, with the preliminary treatment stage in a separate site approximately 150m to the west of the main site, with access between being through a wooded area.

Figure A13-2 – North Petherton WRC split site configuration



Cost efficiencies through multi-purpose schemes

3.27 Blackheath has nitrogen and sanitary enhancement drivers in the PR24 WINEP. The required process and hydraulic upgrades associated with the introduction of the tertiary solids removal stage for phosphorus have been incorporated into a more holistic scheme design, providing cost efficiencies.

Scheme phasing

3.28 North Petherton also includes £400k extra in-AMP opex. Aligning the scheme with a growth driver for the site should deliver cost savings when considered against them being delivered separately.

3.29 Overall, this leads to Blackheath costing £8.0m and North Petherton costing £11.4m. However, Ofwat's models see these as essentially the same schemes despite the clear idiosyncrasies that drive different costs.

Merriott and Hurdcott

Overview

3.30 The following case study presents a comparison of two of our P-removal schemes which have seemingly 'similar' characteristics: Merriott and Hurdcott (see Table A13-5). Whilst the two schemes are similar from the perspective of Ofwat's models – in terms of the PE Served and the change in permit – we estimate the cost of Hurdcott to be over 40% more than Merriott.

3.31 We set out the key characteristics and features which make Hurdcott a more expensive scheme than Merriott, namely technological differences. We note these characteristics and features are not captured in Ofwat's econometric models.

Table A13-5 – Comparative P-removal sites: 1 to 0.25mg/l (Merriott and Hurdcott)

WRC	PE Served	Design PE	WINEP Drivers	Permit Change	WSX DDR	Ofwat FD Allowance
Merriott	4,044	4,524	HD_IMP_NN, HD_IMP, SSSI_IMP, EnvAct_IMP1	1mg/l to 0.25mg/l	£5.7m	£4.0m
Hurdcott	4,058	4,596	HD_IMP_NN, HD_IMP, SSSI_IMP, EnvAct_IMP1	1mg/l to 0.25mg/l	£8.1m	£4.0m

Need for enhancement investment

3.32 Merriott WRC was included in the PR19 WINEP for a new phosphorus permit of 1mg/l, to meet WFD requirements. There is a downstream offtake to a SSSI being part of the Somerset Levels and Moors, and the WRC has been included again in the PR24 WINEP, with HD_IMP_NN (and HD_IMP and SSSI_IMP) drivers for a more stringent phosphorus limit.

3.33 Habitats Directive (HD) improvements are required locally at Hurdcott (but only for 0.9mg/l), with the nutrient neutrality HD_IMP_NN driver associated with downstream elements of the Hampshire Avon and point source improvements at specific sites serving ≥2,000pe.

Key differences in site characteristics / features

3.34 The process requirements are comparably the same at both sites, namely:

(a) improvements/modifications to the existing chemical dosing systems (including provision of a secondary dosing point),

(b) new tertiary solids removal stage (including feed pumping station, clean & dirty backwash tanks),

(c) ancillary upgrades, such as standby generators, new/expanded Motor Control Centres, telemetry upgrades and sampling monitors,

(d) associated access, road and landscaping works.

3.35 There are, however, some key differences as described below.

<u>Technological requirements</u>

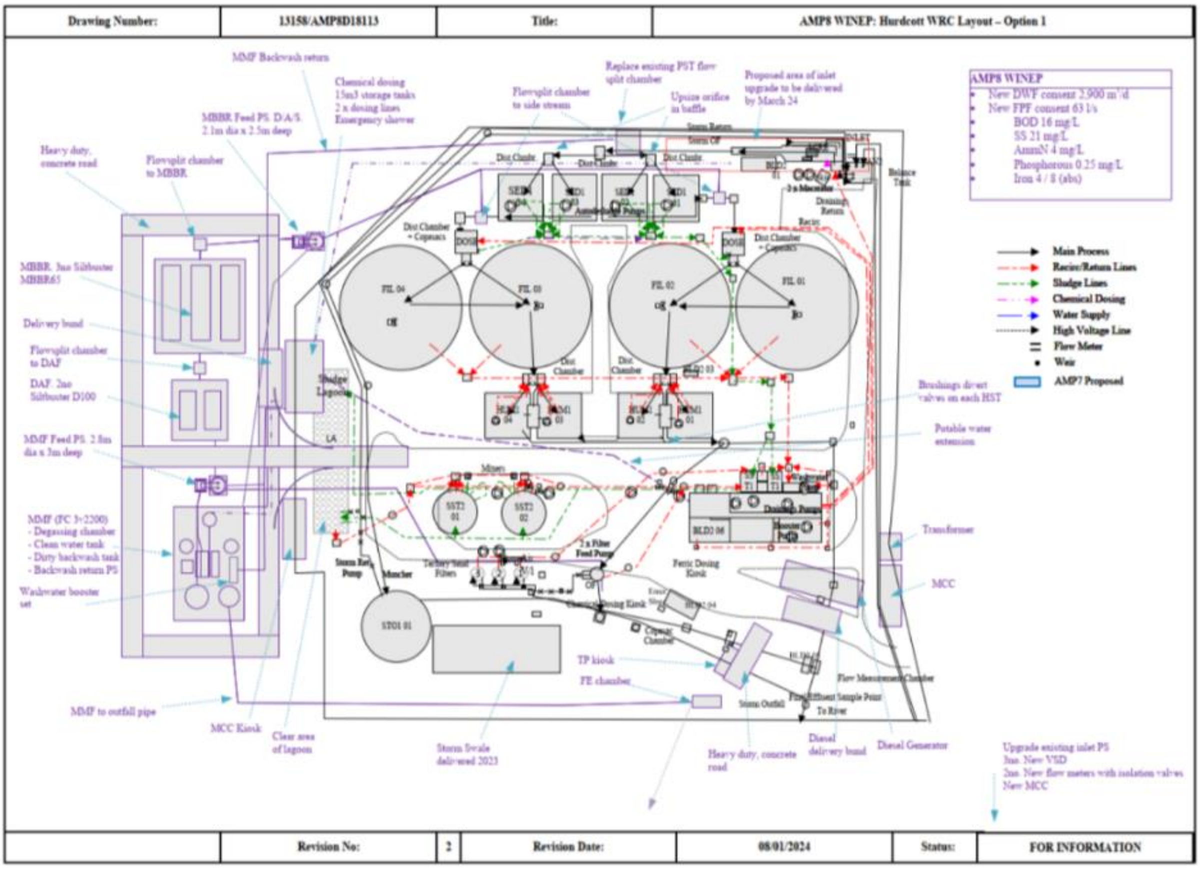
3.36 Due to the nature of its chalk strata catchment, Hurdcott operates at its Flow Passed Forward (FPF) limit for extended periods. This is because, when the water table is high, drainage in the area – where nearly three quarters of pipes are privately owned – allow infiltration. This lasts for months and means that the WRC is operating at maximum hydraulic capacity, and thus cannot accommodate the backwash from the new tertiary solids removal plant. This means new capacity must be provided.

3.37 Additional land is required at Hurdcott on which to locate the tertiary solids removal process and backwash treatment. To minimise the extent of land purchase, a disused sludge lagoon on site will be emptied and the land repurposed. Arisings need to be treated as contaminated material and disposed of in accordance with regulatory licence requirements; this comes at an increased cost but is offset by the reduced area of land that needs to be purchased.

3.38 An AMP7 scheme has been completed at Merriott for a 1mg/l P permit, and for PR24 we have accepted a shorter design horizon for these newly constructed assets to enable their continued use (e.g. reduced chemical storage time), albeit the other required improvements are still above Ofwat’s allowance.

3.39 Figure A13-3 provides a site schematic layout of the proposed upgrades identified at Hurdcott WRC. This shows the need for additional land outside of the site boundary for the tertiary and backwash treatment stages, whilst also showing other assets located where possible within the current boundary.

Figure A13-3 – Hurdcott WRC proposed site layout



3.40 Overall, this leads to Merriott costing £5.7m and Hurdcott costing £8.1m. However, Ofwat's models see these as essentially the same schemes despite the clear idiosyncrasies that drive different costs.

Ringwood and Wells

Overview

3.41 The following case study presents a comparison of two of our P-removal schemes which have seemingly 'similar' characteristics: Ringwood and Wells (see Table A13-6). Whilst the two schemes are similar from the perspective of Ofwat's models – in terms of the PE Served and the change in permit – we estimate the cost of Wells to be over 40% more than Ringwood.

3.42 In the following we set out the key characteristics and features which make Wells a more expensive scheme than Ringwood, namely flow differences and technological considerations. We note these characteristics and features are not captured in Ofwat's econometric models.

Table A13-6 – Comparative P-removal sites: 1 to 0.25mg/l (Ringwood and Wells)

WRC	PE Served	Design PE	WINEP Drivers	Permit Change	WSX DDR Request	Ofwat FD Allowance
Ringwood	19,310	22,559	HD_IMP_NN, HD_IMP, SSSI_IMP, WFD_ND, EnvAct_IMP1	1mg/l to 0.25mg/l	£12.4m	£5.6m
Wells	18,942	21,190	HD_IMP_NN, HD_IMP, SSSI_IMP, WFD_IMPg, EnvAct_IMP1	1mg/l to 0.25mg/l	£17.5m	£5.5m

Need for enhancement investment

3.43 Ringwood WRC is included in the WINEP for phosphorus improvements associated with nutrient reduction targets required in the Hampshire Avon, both locally and for the wider catchment. The WINEP drivers have different limit requirements: WFD_ND is for 0.6mg/l; HD_IMP & SSSI_IMP is for 0.4mg/l; HD_IMP_NN is for 0.25mg/l.

3.44 Wells WRC was included in the PR19 WINEP for a tightening of its phosphorus permit from 2 to 1mg/l, under HD_IMP & SSSI_IMP drivers. This recent improvement in the levels of P discharged, however, is not deemed sufficient for the PR24 regulatory drivers, with further improvement now required. The permit limit for the AMP7 scheme could be accommodated without the need for substantive upgrades at the site, just prior to the treatment breakpoint beyond which tertiary treatment (and associated other upgrades and ancillaries) is needed. There is a downstream offtake to an SSSI, necessitating the HD_IMP_NN (and HD_IMP and SSSI_IMP) drivers.

Key differences in site characteristics / features

3.45 The process requirements are comparably the same at both sites, namely:

(a) improvements/modifications to the existing chemical dosing systems (including provision of a secondary dosing point)

(b) new tertiary solids removal stage (including feed pumping station, clean & dirty backwash tanks),

(c) appropriate backwash handling/treatment,

(d) sludge handling facilities,

(e) ancillary upgrades, such as standby generators, new/expanded Motor Control Centres, telemetry upgrades and sampling monitors

(f) associated access, road and landscaping works.

3.46 There are, however, some key differences as described in the following paragraphs.

Technological requirements

3.47 The sizing of tertiary solids removal and backwash treatment is hydraulically and solids driven. Whilst the PEs are relatively similar, the flow passed forward is markedly different: Wells at 181l/s & Ringwood (current DWF) at 132l/s.

3.48 There is limited operational land availability at Wells WRC. To mitigate the need to buy land and ease delivery programme constraints, the area of grassplots that are currently in use as tertiary ammonia removal will be utilised for the phosphorus scheme. This does lead, however, to additional process capacity being required to accommodate the higher backwash flows and mitigate the ammonia risk following the removal of the grassplots. Wells WRC had an WFD_ND ammonia scheme completed in AMP7, which we achieved through minimal spend but with increased compliance risk through continued use of the grassplots.

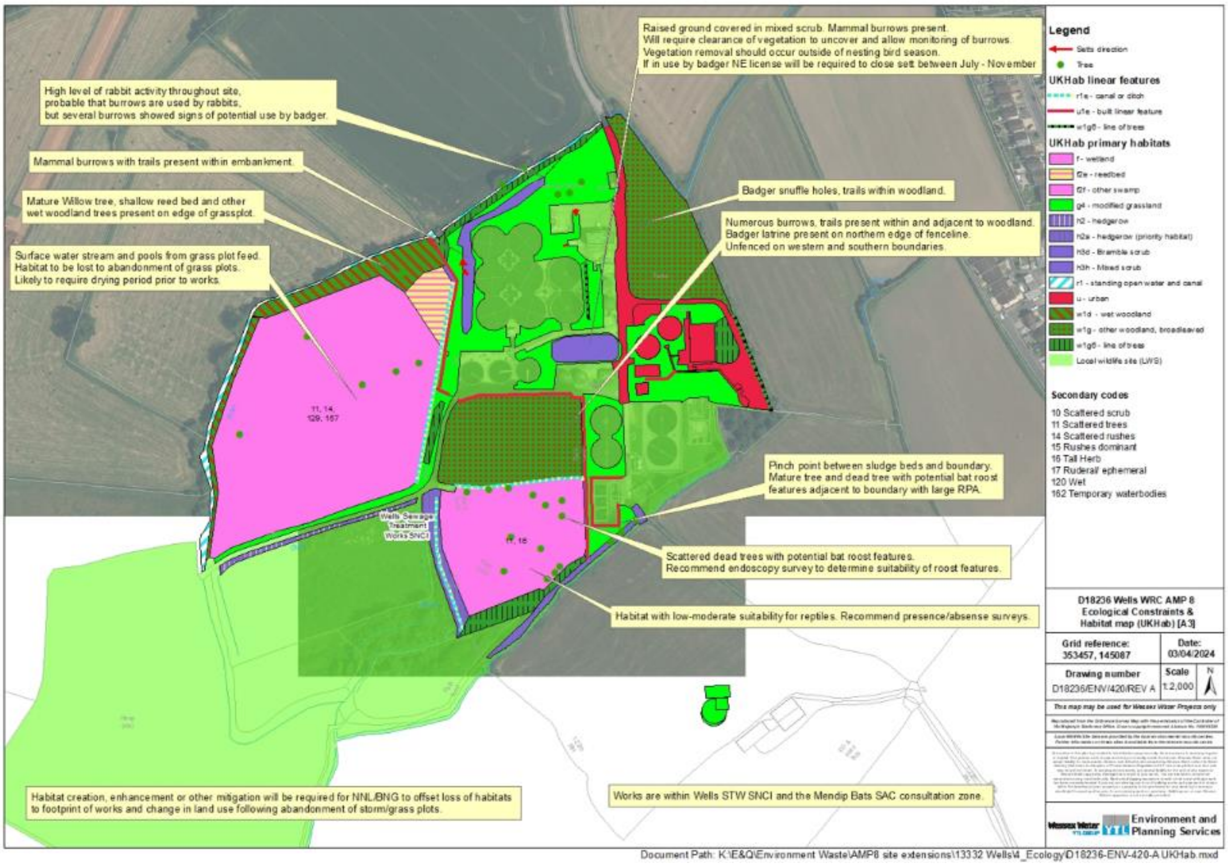
3.49 For PR24 we have also included a growth allocation at Wells – appropriately purpose split (approx. 75% P / 25% Growth) – to ensure efficiencies through increased secondary sidestream (biological) treatment rather than separate backwash handling & tertiary ammonia removal, and secondary biological. If this growth driver was not present then the phosphorus request would have been higher, by c.10% (+£1.5m).

Environmental sensitivity

3.50 Wells WRC is wholly located within a County Wildlife Site, increasing environmental mitigation requirements associated with the replacement of the grassplots. There are also many other environmental considerations, as shown in Figure A13-4.

3.51 If we had not repurposed the grassplots and instead purchased additional land, planning permission would be necessary. The associated Biodiversity Net Gain requirements would also be more substantial than for a non-designated site – in terms of quantum, time and cost – given the County Wildlife Site status.

Figure A13-4 – Wells WRC ecological constraints & habitat map



3.52 Overall, this leads to Ringwood costing £12.4m and Wells costing £17.5m. However, Ofwat's models see these as essentially the same schemes despite the clear idiosyncrasies that drive different costs.

Wessex Water

PR24 CMA Redetermination

Annex A14 – How the Ofwat phosphorus removal model works

1 Ofwat approach to modelling P-removal

Introduction

1.1 Phosphorus (P) removal enhancement cost allowances are set by Ofwat to cover the efficient cost of P-removal schemes, necessary to comply with the Water Industry National Environment Programme (WINEP) for England and the National Environment Programme (NEP) for Wales.

1.2 This annex provides a description of Ofwat's approach to determining P-removal allowances at the PR24 Final Determinations, from their specific P-removal models.

Overview of Ofwat's approach

1.3 Company requests for P-removal are captured across four different suites of enhancement expenditure models:

(a) P-removal (for 'standard' P-removal schemes)

(b) Nutrients or sanitary determinands nature-based solutions

(c) Nutrient balancing

(d) Catchment permitting

1.4 Ofwat's allowances for nature-based solutions, catchment nutrient balancing or catchment permitting rely on deep/shallow dive analysis, and are not included in their standard P-removal models in (a).

1.5 To determine companies' enhancement cost allowances for P-removal under model suite (a), Ofwat sets scheme level allowances using a combination of three main components.

(a) Econometric benchmarking modelling. Ofwat uses a set of four econometric models to set enhancement cost allowances for what it refers to as *"modelled schemes".* 78% of sites across the industry are assessed under this component.[191]

(b) Deep dives. Under this component, Ofwat undertakes detailed reviews of the evidence provided by companies supporting their proposed costs. It adopts this approach for schemes where Ofwat deems their costs to be 'material' and/or where the need for the investment is deemed 'uncertain', and where the scheme is not assessed under its econometric models referenced above (because, in Ofwat's view, the scheme does not *"lend itself"* to benchmarking). 7% of sites across the industry are assessed under this component.

[191] Excludes: transfer schemes; development allowance schemes; two 'optimisation' schemes; all nature based solutions; and catchment nutrient balancing or catchment permitting schemes.

(c) Shallow dives. Under this component, Ofwat applies an average company level P-removal efficiency challenge[192] (as estimated using its econometric models) to individual P-removal schemes (up to a capped % efficiency challenge). This approach is used for schemes not assessed under either of the above two approaches (i.e., schemes that Ofwat considers do not *"lend themselves"* to benchmarking and for which the costs are not material and/or where the need is not deemed 'uncertain'). 14% of sites across the industry are assessed under this component.

1.6 Total cost allowances for P-removal are calculated by summing a company's individual scheme level cost allowances. The company level allowance is then multiplied by Ofwat's reconciliation adjustment factor, to account for the differences in companies' business plans and aggregate phosphorus removal enhancements. This is calculated as the ratio of a company's total forecast P-removal enhancement costs to the sum of its forecast scheme level costs.

1.7 In this annex we focus on Ofwat's approach to econometric benchmarking (which is used to determine the costs for the majority of our P-removal schemes).[193] Ofwat adopts a different approach to determining efficient P-removal costs for: (i) treatment upgrade schemes (schemes improving processes to reduce the P concentration in wastewater); and (ii) transfer schemes (schemes transporting wastewater from an existing site to a nearby site, or alternative watercourse). We therefore set out the approach for each.

Treatment upgrade schemes

Econometric benchmark modelling

1.8 Ofwat sets cost allowances for treatment upgrade schemes, on a 'per scheme' basis, using four econometric cost benchmarking models (referred to as PR1, PR2, PR3, and PR4). These are intended to estimate schemes' efficient costs by identifying relationships between P-removal costs and explanatory (cost driver) variables.

1.9 Models PR1 and PR2 use company forecast data for PR24 P-removal (FY 2024/25 – 2029/30).[194] Models PR3 and PR4 use historical data for PR19 P-removal schemes (FY 2019/20 – 2024/25, with forecasts used for FY 2024/25).[195]

[192] This is achieved by comparing the sum of a company's proposed costs against the sum of cost allowances for schemes with costs able to be estimated using benchmarking models.

[193] This note does not consider nature based solutions, catchment nutrient balancing or catchment permitting schemes as their allowances rely solely on deep/shallow dive analysis and are not included in Ofwat's P-removal enhancement expenditure model.

[194] Schemes with over £5m in forecast costs after FY 2029/30 are excluded. PR19 schemes not delivered in FY 2019/20 - 2025/25 are included.

[195] Capex for PR19 P-removal schemes after FY 2024/25 is included.

1.10 Table A14-1 shows the variables used in Ofwat's four models.

Table A14-1 – Overview of cost driver variables included in Ofwat's P-removal models [Source: Economic Insight analysis of Ofwat publications]

Variable	Definition	How it affects cost	Variable included			
			PR1	PR2	PR3	PR3
Population equivalent (PE) served	The population equivalent that the sewage treatment works serves in each year.	Intended to capture the size of a site / scheme, as larger sites / schemes typically cost more.	Yes	Yes	Yes	Yes
Historical permit	The maximum allowed P-concentration in wastewater, as previously required in the WINEP/NEP before regulations were tightened.[196]	Intended to reflect the fact that the 'change' in the 'tightness' of permitted phosphorus will affect costs incurred (i.e., the greater the required change, the more upgrades etc are needed; thus leading to higher costs).	Yes	Yes	Yes	Yes
Enhanced permit	The maximum allowed P-concentration in wastewater as now required in the WINEP/NEP.	Intended to capture the fact that (notwithstanding historical permitted P-concentration) current permitted P-concentration affects treatment complexity required; with more complex treatment leading to higher costs.	Yes	Yes	Yes	Yes
Enhanced permit squared	The square of the enhanced permit.	This captures how, as the P-concentration falls, the marginal cost of further P-removal increases.	Yes	No	Yes	No
Technically achievable limit (TAL) dummy	A variable equal to one if the enhanced permit is less than 0.25 mg/l and zero otherwise.	This captures how costs typically rise sharply when (in Ofwat's view) reducing the P-concentration beyond the TAL.	No	Yes	No	Yes

[196] Where there is no prior maximum P concentration, an assumed historical permit of 5 mg/l is used.

Identification and treatment of outliers

1.11 The model datasets for treatment schemes are 'filtered' by Ofwat to remove: (i) statistical outliers (schemes with undue influence on estimated efficient costs);[197] (ii) unmodelled schemes (those with an enhanced permit exceeding 2 mg/l, or no reduction in maximum allowed P concentration); and (iii) transfer schemes.

1.12 Ofwat sets cost allowances for statistical outliers, unmodelled schemes and transfer schemes separately from its econometric models. Similarly, Ofwat also sets allowances for engineering outliers separately. However, such schemes are still included within its econometric models, and therefore will therefore influence the relationship between P-removal costs and cost drivers

Statistical outliers

1.13 This refers to schemes that (in Ofwat's view) overly influence the efficient cost estimates of the PR1 or PR2 models. Their allowances are assessed separately, due to Ofwat considering that their apparent efficiency (or inefficiency) may stem from unmodelled factors

1.14 For these (statistical outlier) schemes, Ofwat assesses costs by taking the following steps.

1.15 Firstly, the scheme's efficient costs are estimated using the PR1 and PR2 models.

1.16 Secondly, the estimated efficient costs are then separately adjusted, as follows:

(a) If the model's estimated efficient cost exceeds the company's proposed cost, the estimate is adjusted to equal the company's proposed cost.

(b) If the model's estimated efficient cost is below the company's proposed cost, the model's estimated cost is adjusted to a value between the model's initial cost estimate and the company's proposed cost, based on a deep dive analysis.

1.17 Thirdly, a scheme's allowance is set at the unweighted average of the PR1 and PR2 model estimates, after the above adjustment.

Unmodelled schemes

1.18 These are schemes with an enhanced permit of over 2 mg/l, or no reduction in the allowed P-concentration. Allowances for these are assessed separately, as Ofwat considers these schemes to be unrepresentative of typical schemes at PR24.

1.19 Unmodelled schemes' efficient costs are not estimated using econometrics. Instead, their allowances are calculated by multiplying a company's proposed cost of a scheme

[197] Statistical outliers are identified separately for each model. When estimating the PR1 and PR2 models statistical outliers identified in either the PR1 or PR2 model are removed. By contrast, the PR3 and PR4 models only remove outliers identified within their respective models.

by their 'modelled efficiency'. A company's 'modelled efficiency' is the ratio of: (i) the sum of allowances for the company's modelled schemes to (ii) the sum of the proposed costs of these schemes. If 'modelled efficiency' exceeds 1, unmodelled scheme allowances are set equal to the company's proposed cost.

Transfer schemes

1.20 Transfer scheme allowances are estimated by Ofwat through a single econometric model, which aims to estimate efficient costs by identifying the relationship between companies' transfer scheme costs (both forecast and historical) and the following cost drivers: the length of transfer (km);[198] and the transferred flow of wastewater (m^3/day).[199]

1.21 The allowance for each transfer scheme is set equal to the estimated efficient cost using this model.

1.22 We note that there is no allowance correlation made between combined nitrogen and phosphorus transfer schemes – as in the case of our Lytchett Minster, which has been purpose split 50%/50% between N and P – for which Ofwat have undertaken a deep dive for the nitrogen portion but have modelled the phosphorus portion, with different allowances.

Engineering outliers

1.23 This refers to schemes with an enhanced permit below 0.25 mg/l (or schemes that use a biological treatment technique). Their allowances are assessed separately, due to their likely higher than typical cost (in Ofwat's view).

1.24 For engineering outliers, Ofwat estimates costs using the same three steps as per statistical outliers outlined above, but with step (2) changed as follows:

(a) If the model's estimated cost exceeds a company's proposed cost, the estimate is set equal to the company's proposed cost.

(b) Otherwise, the model's estimated cost set to equal the model's initial estimate, plus 75% of the difference between the company's proposed cost and the model's estimate.

[198] The distance wastewater is transported by a transfer scheme.
[199] The volume of water transported by a transfer scheme per day.

Non-outliers

1.25 All treatment schemes which do not fall into the categories above (non-outliers), cost allowances are set equal to the unweighted average of the efficient costs estimated across Ofwat's four models (PR1; PR2; PR3; and PR4).[200,201]

Summary of modelling outcomes

1.26 Total cost allowances for P-removal are calculated by summing a company's individual scheme level cost allowances. The company level allowance is then multiplied by Ofwat's reconciliation adjustment factor (the ratio of a company's total forecast P-removal enhancement costs to the sum of its forecast scheme level costs).

1.27 Of the £887.5m[202] we proposed for our P-removal schemes, Ofwat allowed £609.1m in its Final Determination. Of this:

(a) 113 schemes costing £717.1m (81% of our proposed total costs) are assessed via Ofwat's main suite of econometric models, which results in allowances of £462.7m (a 35% efficiency challenge);

(b) four schemes costing £153.5m (17% of our proposed total costs) are identified by Ofwat in the models as outliers, which overall see an efficiency challenge of 8%:

(i) Poole WRC, our largest P-removal site, was assessed via a deep dive assessment of our engineering evidence and received a 10% efficiency challenge (and due to its categorisation as a large scheme, 25:25 sharing rates);

(ii) Dorchester WRC was also assessed by a deep dive and received a 17% efficiency challenge; and

(iii) Holdenhurst WRC and Yeovil WRC are deemed to be efficient outliers and received no cost efficiency challenge;

(c) one scheme, costing £10.6m, (1% of our total costs) is assessed under the Transfers model, which results in an allowance of £4.5m (a 57% efficiency challenge); and

(d) four schemes costing £6.3m (1% of our total costs) are assessed under the >=2mg/l model, which results in an allowance of £4.4m (a 31% efficiency challenge).

1.28 Table A14-2 below provides an overview of Ofwat's modelling and adjustments.

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200 Schemes subject to uncertainty receive an allowance of 6% of the company's proposed cost.
201 We note there are 12 non-outlier schemes within its dataset for which Ofwat does not provide an allowance from its econometric models.
202 Note – costs and associated calculations in this section are post-frontier shift and RPEs, and account for changes to our WINEP.

Table A14-2 – Ofwat's modelling and allowances (following deep dives) for P-removal schemes

WRC	Draft Determination Response	Modelled cost *	Allowed cost	Overall efficiency challenge applied	Assessment
Holdenhurst WRC	12.5	21.2	12.5	0%	Efficient outlier, received requested allowance
Yeovil WRC	0.03	9.5	0.03	3% **	Efficient outlier, received requested allowance
Dorchester WRC	32.8	6.9	27.1	17%	Deep dive review of specific factors.
Poole WRC	108.2	22.4	97.8	10%	Deep dive review of specific factors. Enhanced engagement and cost sharing applied.
All other cost modelled sites	717.1	462.7	462.7	35%	Ofwat cost modelling
Transfers (modelled separately)	10.6	4.5	4.5	57%	Ofwat cost modelling
Enhanced >=2mg/l schemes	6.3	4.4	4.4	31%	Ofwat cost modelling
Total	**887.5**	**531.6**	**609.1**	**31%**	**As above**

Costs in this table are post-frontier shift and RPEs.
* Modelled cost estimated using Ofwat-determined frontier shift. Ofwat's P-model itself uses analysis/assessment based on pre-frontier shift, before then applying frontier shift.
** When assessed pre-frontier shift, Yeovil's efficiency challenge is 0%, however it is 2% when using Ofwat-determined frontier shift. This discrepancy is principally due to the delivery phasing of the scheme.

Wessex Water

PR24 CMA Redetermination

Annex A15 – Supplementary phosphorus removal analysis

1 A detailed review of Ofwat's approach – beyond idiosyncrasies

1.1 This technical annex sets out supplementary analyses, evidence and further methodological details, relating to the P-removal chapter in our Statement of Case. The annex is organised around the corresponding section headings in chapter 9.

Concerns with Ofwat's approach

Insufficiently weighted material factors: ensuring allowances reflect the true relationship between cost drivers and efficient costs

The relationship between scheme size and efficient costs

1.2 As discussed in chapter 9 of our Statement of Case, we find that P-removal cost disallowances (the difference between company requested costs and Ofwat allowed costs) are much greater for larger schemes, as compared to smaller schemes.

1.3 Table A15-1 provides a detailed breakdown of cost disallowances by individual 'PE served' band. For each band, it shows: the number of schemes; requested and allowed costs; and disallowed costs (as a proportion of requested costs). For the 441 'small' schemes (Band 1; PE served of between 0 and 5,000) allowed costs set by the econometric models were just 4% lower than companies requested. Percentage disallowances vary across individual larger sized bands but, in general, are materially greater than for 'small' schemes.

Table A15-1 – Allowed costs versus industry requested costs, by size of scheme (upgrade schemes for which costs are determined by econometric models)

Size of scheme (PE served 000's)	Number of schemes	Industry requested costs (£m 22/23 prices)	Ofwat allowed costs (£m 22/23 prices)	Disallowed costs (% of requested)
Band 1 (0 - <5)	441	1,653	1,586	-4%
Band 2 (5 – <10)	87	487	393	-19%
Band 3 (10 – <15)	48	315	230	-27%
Band 4 (15 – <20)	22	158	113	-28%

Size of scheme (PE served 000's)	Number of schemes	Industry requested costs (£m 22/23 prices)	Ofwat allowed costs (£m 22/23 prices)	Disallowed costs (% of requested)
Band 5 (20 – <25)	21	132	123	-7%
Band 6 (25 – <35)	18	171	116	-32%
Band 7 (35 – <50)	21	187	168	-10%
Band 8 (50 – <95)	20	281	214	-24%
Band 9 (55 – <140)	7	157	108	-31%

Source – Analysis of data in Ofwat's PR24 Final Determinations

Note – 'Disallowed costs' refers to the difference between 'industry (or company) requested' and 'Ofwat allowances'

1.4 In addition to the above being true for the industry as a whole, the pattern is systematic, holding true across most individual companies. This is shown in Table A15-2, where we find that for six out of nine WaSCs (excluding Hafren Dyfrdwy and Northumbrian Water, who have too few sites to meaningfully assess the distribution of disallowed costs by site size), the PR24 Final Determination econometric models for P-removal generally disallow a higher proportion of costs for 'large' schemes (PE served of 5,000 or greater), as compared to 'small' schemes (PE served of less than 5,000) .

Table A15-2 – Allowed costs versus requested costs, by individual company and by size of scheme (schemes for which costs determined by Ofwat's models)

Company	Number of schemes		Requested costs (£m 22/23 prices)		Ofwat allowed costs (£m 22/23 prices)		Disallowed costs (% of requested)		Large schemes have greater dis-allowed costs?
	Small schemes	Large schemes	Small schemes	Large schemes	Small schemes	Large schemes	Small schemes	Large schemes	
Anglian Water	106	71	304	298	457	389	51%	30%	✓
Welsh Water	31	3	60	25	80	18	34%	-30%	✓
Hafren Dyfrdwy	1	0	1	0	2	0	119%	NA	NA
Northumbrian Water	1	1	4	2	5	4	32%	49%	NA

Company	Number of schemes		Requested costs (£m 22/23 prices)		Ofwat allowed costs (£m 22/23 prices)		Disallowed costs (% of requested)		Large schemes have greater dis-allowed costs?
	Small schemes	Large schemes	Small schemes	Large schemes	Small schemes	Large schemes	Small schemes	Large schemes	
Severn Trent Water	61	26	270	236	171	157	-37%	-33%	✗
South West Water	17	7	55	51	64	35	17%	-33%	✓
Southern Water	52	22	157	142	184	141	17%	-1%	✓
Thames Water	34	29	179	386	144	206	-19%	-47%	✓
United Utilities	28	18	149	185	89	133	-40%	-28%	✗
Wessex Water	63	52	281	460	199	280	-29%	-39%	✓
Yorkshire Water	47	15	194	101	190	105	-2%	4%	✗

Source – Analysis of data in Ofwat's PR24 Final Determinations

1.5 The above is important, because the systematic nature of the finding indicates the P-removal econometric models relied upon at the PR24 Final Determinations are either:

(a) omitting relevant variables relating to (or correlated with) the size of scheme; and/or

(b) that the existing size related variables (PE) included in the models are mis-specified.

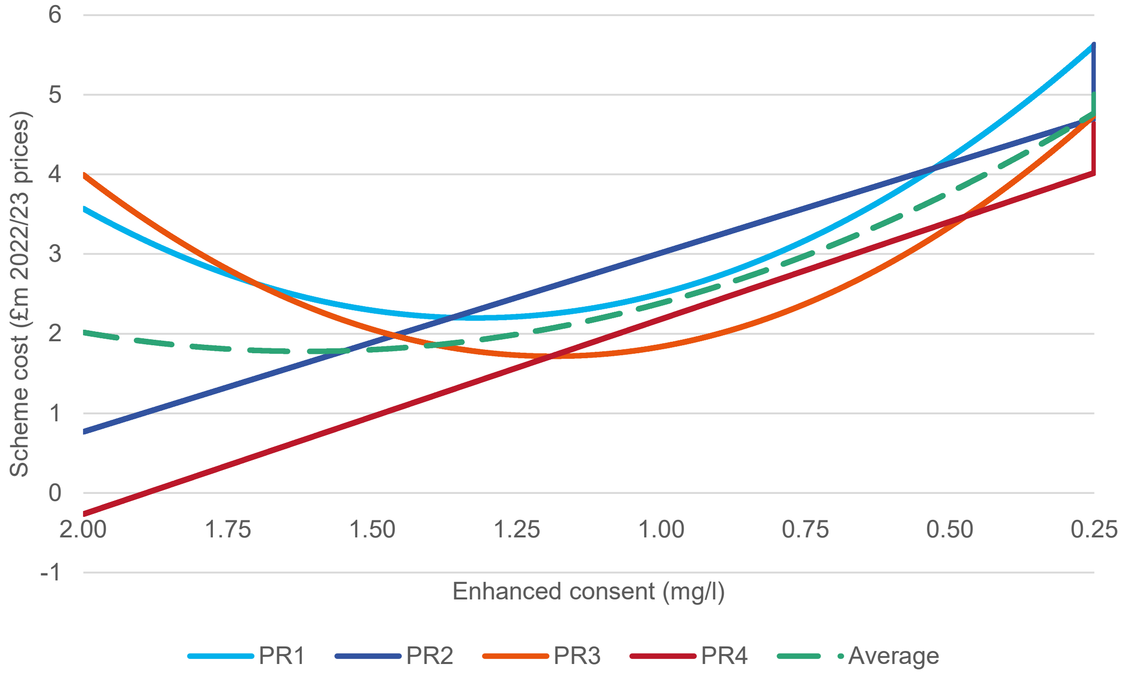
1.6 In turn, this means that companies with a greater number of large schemes versus small schemes (or for whom the model is a poor fit) will be especially impacted by the above issue.

The existing models largely assume a continuous relationship between permit level and cost

<u>Ofwat's assumed relationship between permit level and P-removal costs</u>

1.7 Figure A15-1 plots the assumed relationship between permit level and P-removal costs for each of Ofwat's models (PR1; PR2; PR3; and PR4). The green dashed line shows the average relationship between permit level and P-removal costs across the four models (i.e., this is the triangulated model, as used to set company allowed costs at the PR24 Final Determinations).

Figure A15-1 – Assumed relationship between permit level and P-removal costs under Ofwat's four models



Source – Analysis of Ofwat's PR24 Final Determination models

Note – Historical consents and PE held constant in order to illustrate consent / cost relationship. Historical consent is set to 5.0mg/l and PE Served is set to the median for modelled schemes.

<u>Company evidence submitted as part of the PR24 process</u>

1.8 Table A15-3 summarises evidence submitted by companies during the PR24 process relating to discontinuities in P-removal scheme costs.

Table A15-3 – Summary of evidence on discontinuities submitted by WaSCs as part of PR24 process

Company	Position	Engineering basis provided	Quantitative evidence provided
Southern Water	Significant cost increase occurs at 0.7mg/l. Also appears to imply 0.25mg/l is a relevant breakpoint (but it is not explicitly described as such).	0.7mg/l is that point at which tertiary treatment is required, which *"considerably increases the costs".*	Not provided.

Company	Position	Engineering basis provided	Quantitative evidence provided
Thames Water	DD representation submission consistent with possible breakpoints (i) between 0.7mg/l and 1.5mg/l; and (ii) at 0.25mg/l. Thames also submitted that it was subject to permits with particularly stretching consent levels of 0.20mg/l and 0.15mb/l, which other companies were (mainly, or entirely) not. Thames submitted that the costs of achieving these more stretching levels were higher.	Possible breaks between 0.7 and 1.5mg/l, linked to point at which tertiary treatment and 2-part chemical dosing are required. Priority technology is required to deliver the stretching targets <0.2mg/l, and these result in a *"significant nonlinear step-change increase in costs."*	Provided a case study of Broadwell STW, setting out the solution and cost step-change incurred in meeting a more stretching 0.15mg/l target.
Wessex Water	Our DD representation stated that the relationship between P-tightness and costs is non-linear. A specific breakpoint in costs may arise at either 0.8mg/l or 0.7mg/l.	0.8mg/l or 0.7mg/l represents the point at which backend dosing and tertiary treatment is required.	Not provided.
Yorkshire Water	There are breakpoints in costs at both 0.5mg/l and 0.25mg/l.	Change in treatments required to meet permitted levels leads to a step change in costs.	OXERA modelling showed statistically significant breakpoints at both 0.5mg/l and 0.25mg/l.

Source – Southern Water (October 2023). SRN39 WINEP Enhancing Wastewater Treatment – Enhancement Business Case; Thames Water (August 2024). TMS-DD-038 Thames Water OR24 DD response – Enhancement Cases; Thames Water (August 2024). TMS-DD-109 PR24 WINEP EC supporting evidence phosphorus stretch targets; Oxera (August 2024). Cost adjustment claims Prepared for Yorkshire Water Services; Wessex Water (August 2024). WSX-C09 – Enhancement costs – wastewater treatment.

1.9 As can be seen from the above, many companies have made submissions consistent with the existence of a non-continuous relationship between P-tightness and scheme cost. In addition: (i) some companies explicitly made submissions consistent with there being multiple breakpoints (e.g., Yorkshire Water and Thames Water); and more broadly (ii) variation across companies in where they consider breakpoints may arise could itself be viewed as being consistent with the possibility of there being multiple breakpoints. That is to say, two companies taking different views on where a single breakpoint might be raises the possibility that both points of view might be accurate (i.e., there are two breakpoints).

<u>Ofwat's position on discontinuities at PR19</u>

1.10 A single discontinuity (breakpoint) at <0.25mg/l (as assumed in Ofwat's PR24 Final Determination models) appears somewhat contrary to Ofwat's position at PR19, as reflected in the following statement, taken from Ofwat's PR24 Final Determination enhancement cost appendix. *"That* [a counterintuitive sign in relation to P-tightness using its previous company level models at PR19] *is also contrary to engineering* *rationale as schemes subject to tight permits below 0.5 mg/l are more likely to require additional and / or more complex treatment processes."*[203]

1.11 In its PR19 Final Determinations, Ofwat also considered that (in addition to the engineering rationale cited in the preceding quote), companies had demonstrated, with evidence, that a discontinuity exists at the 0.5mg/l level: *"we use the consent limit of 0.5mg/L as companies provide evidence that costs increase significantly (ie nonlinearly) after this threshold."*[204]

1.12 In summary, Ofwat has previously assessed that there was a discontinuity at 0.5mg/l. Therefore, if at PR24 Ofwat considers there to be a discontinuity beyond 0.25mg/l (the TAL) it is unclear why it has not considered that this: (i) may exist in addition to another discontinuity (such as at 0.5mg/l), as it found existed at PR19; and/or (ii) implies a need to consider the possibility of multiple discontinuities more broadly.

The CMA's position on discontinuities at the PR19 redeterminations

1.13 The CMA's approach at the PR19 redeterminations was also consistent with multiple discontinuities. Namely, the CMA made use of four models. Within one (Model 2) a breakpoint of <=0.5mg/l was assumed, and within another (Model 4) a breakpoint of <=1.0mg/l was assumed. As the CMA set cost allowances by averaging across these models, the implied average cost curve it used to set efficient costs had two breakpoints. The CMA's reasoning was that both Ofwat (who had a breakpoint at <=0.5mg/l) and Anglian (who advocated a breakpoint at <=1.0mg/l) had provided good evidence to support their positions at that time.[205]

1.14 The above passages are not intended to strongly suggest we would expect there to be discontinuities per se. Rather, merely that there are good reasons that this possibility should be considered and tested with evidence, to ensure the using models as part of an overall approach to setting P-removal enhancement costs is as robust as it can be.

Discontinuities can be identified in company data

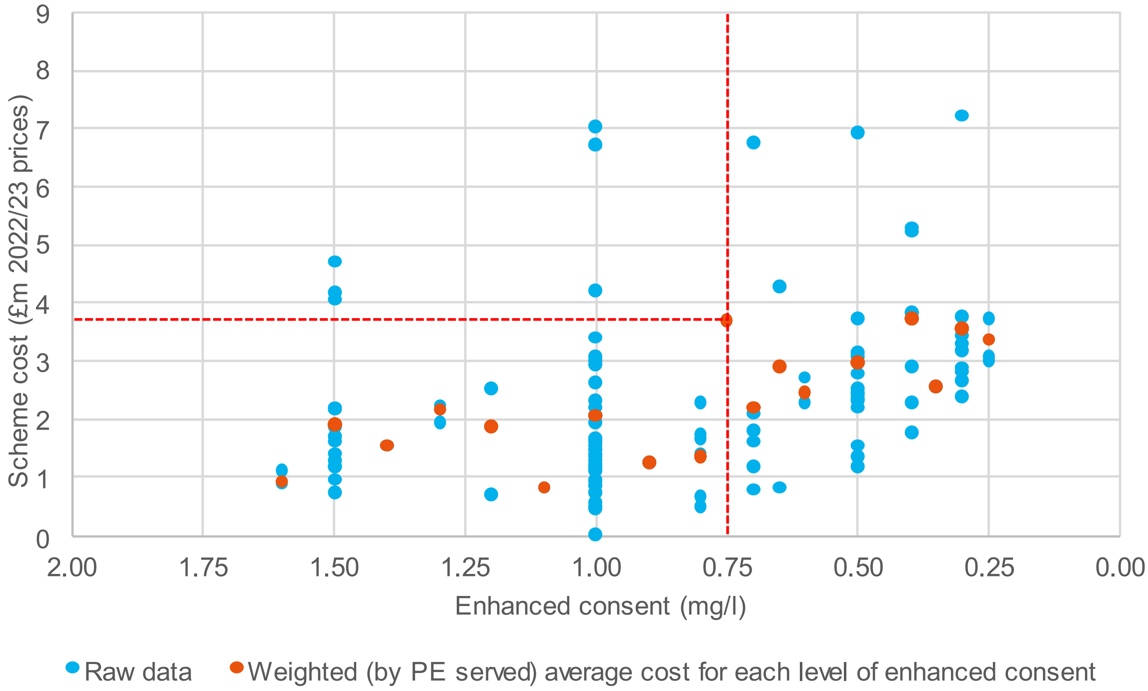
1.15 By way of a preliminary investigation, we have examined data submitted by companies at PR24 to see if any potential discontinuities can be readily observed. Here, a challenge is that due to the idiosyncratic nature of P-removal schemes, it would likely be difficult to observe any discontinuities in the P-concentration/cost relationship, when one looks across data for all schemes/companies. To mitigate this challenge, we have analysed the relationship between scheme costs and the extent of P-tightness for similar schemes.

[203] Page 63 of Ofwat (2024) PR24 Final Determinations - Expenditure allowances – Enhancement cost modelling appendix
[204] Page 93 of Ofwat (2020) PR19 Final Determinations: Securing cost efficiency technical appendix, provided as SoC Appendix A210.
[205] Paragraph 5.75 of CMA (March 2021) Anglian Water, Bristol Water and Yorkshire Water price determinations final report, provided as SoC Appendix A215.

1.16 Firstly, focusing on historical company data (PR19) where actual cost information is available, Figure A15-2 shows a scatterplot of scheme costs against enhanced consent for all schemes with a: (i) PE Served of up to 1,000; and (ii) historical consent of 5mg/l. Figure A15-3 does similarly for all schemes with a: (i) PE Served of between 2,000 and 3,000; and (ii) historical consent of 5mg/l.

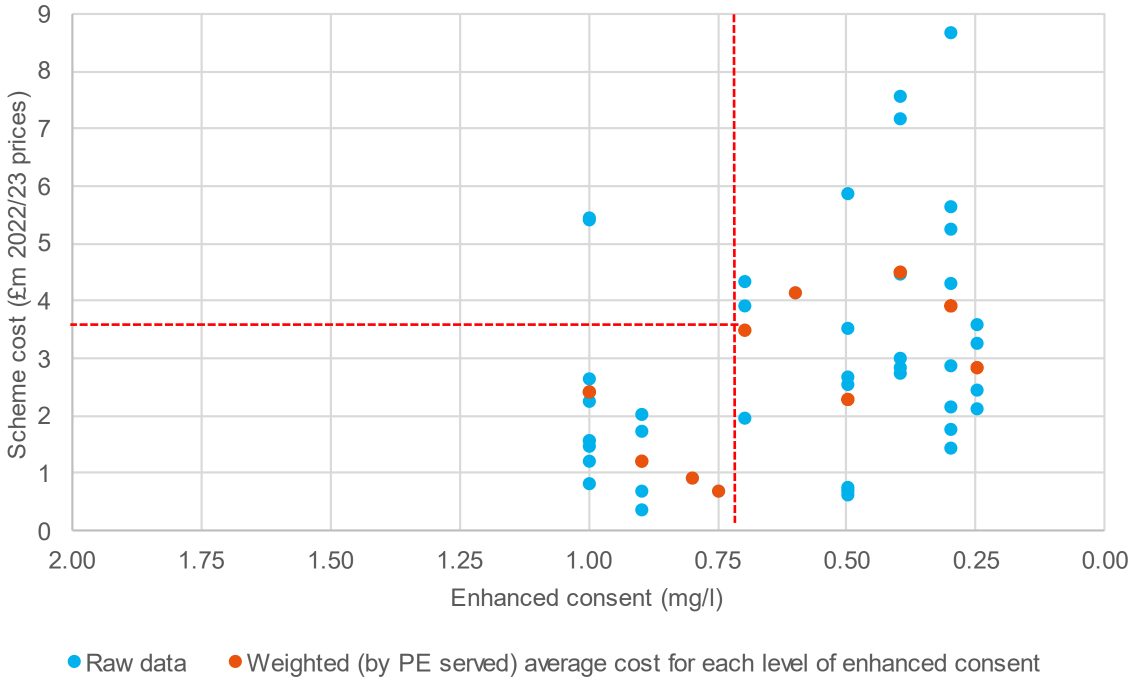
1.17 As indicated by the orange dots (which show average weighted scheme costs at each enhanced consent level), the data appears consistent with a stepped-increase in costs at 0.75mg/l in the former and 0.7mg/l in the latter.

Figure A15-2 – Scatterplot of scheme costs against enhanced consent for all schemes with a PE Served <1,000 and historical consent of 5mg/l – historical company data



Source – Analysis of company historical data in PR24 Final Determination models

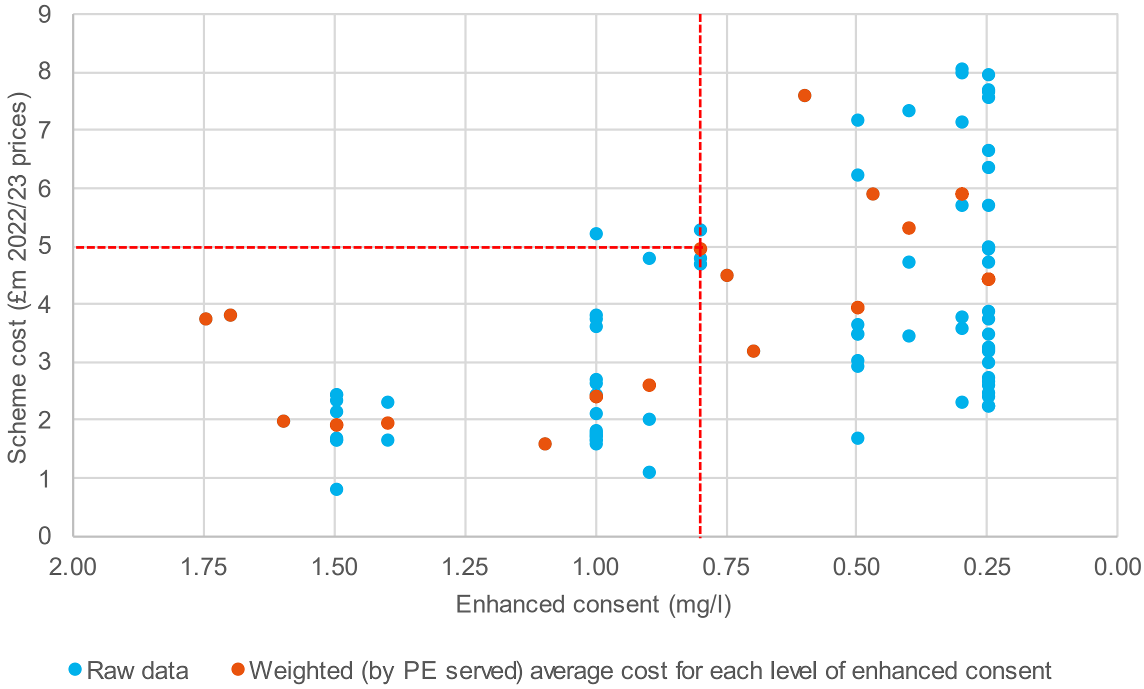
Figure A15-3 – Scatterplot of scheme costs against enhanced consent for all schemes with a PE Served between 2,000 and 3,000 and historical consent of 5mg/l – historical company data



Source – Analysis of company historical data in PR24 Final Determination models

1.18 Secondly, turning to forecast data (company proposed costs over PR24), we have repeated the above exercise. Figure A15-4 shows a scatterplot of all schemes with a: (i) a PE Served between 1,000 and 2,000; and (ii) a historical consent of 5mg/l. This appears consistent with a stepped-increase in average scheme costs (as indicated by the red dots) at around 0.8mg/l.

Figure A15-4 – Scatterplot of scheme costs against enhanced consent for all schemes with a PE Served between 1,000 and 2,000 and historical consent of 5mg/l – forecast company data over PR24



Source – Analysis of company forecast data in PR24 Final Determination models

1.19 Following from the above, to inform the appropriate approach the CMA might take to using models as part of a mixed method approach under its redeterminations, it is important to further examine the extent to which:

(a) we can observe discontinuities for individual companies (i.e., how consistent is the above pattern across companies?); and

(b) how this varies between historical and forecast data.

1.20 We explore these matters in the following subsection, which sets out our preliminary investigation of discontinuities at the company level.

<u>Evidence on discontinuities by company</u>

1.21 Table A15-4 sets out whether, for each individual company, we find evidence of any breakpoints in the historical data (over PR19) and any breakpoints (in addition to or in place of the TAL) in the forecast data (over PR24). Green shading with a ‘tick’ is used where we find evidence of breakpoints (significant at the 10% level), red shading with a 'cross' where we do not ('NA' indicates a sample size of below 30 schemes). The table also reports the number of schemes each company has with enhanced consent <=0.25mg/l at PR19.

Table A15-4 – Summary of evidence regarding multiple discontinuities by individual company

Company	Number of sites with enhanced consent <=0.25mg/l at PR19	Company historical data indicative of breakpoints over PR19	Company forecast data indicative of breakpoints (other than TAL) over PR24
Wessex Water	0	✓	✓
Welsh Water	2	NA	✗
South West Water	3	NA	NA
Northumbrian Water	4	NA	NA
Thames Water	4	NA	✓
Yorkshire Water	14	✓	✗
Southern Water	15	✓	✓
United Utilities	17	✗	✓
Anglian Water	28	✓	✓
Severn Trent Water	44	✓	✓

Source – Analysis of company historical and forecast data, as used in PR24 Final Determination models

Note – In the historical data, we test for discontinuities by using Ofwat's two historical models (excluding any TAL dummy) by including the following breakpoints separately: 0.25mg/l and increments of 0.1mg/l between 0.5mg/l and 1.0mg/l. In the forecast data, we test for discontinuities in additional to the TAL in increments of 0.1mg/l between 0.5mg/l and 1.0mg/l.

1.22 In interpreting the above results, it is helpful to consider the possible explanations for why we may, or may not, observe discontinuities at the individual company level. These reasons differ between the historical and forecast data.

1.23 To the extent that we observe discontinuities in the historical cost P-tightness relationship for some companies, but not others, this could be due to: (i) genuine differences in cost structures between firms (where those differences may, or may not be, efficient); and/or (ii) the data not being comparable, because the data relates to different parts of the cost curve (i.e., some companies' data mainly relates to levels of/changes in P-tightness for which there are not any discontinuities); and/or (iii) differences in how companies have recorded their historical costs.

1.24 Turning to forecast data, to the extent we observe discontinuities in the cost P-tightness relationship for some companies, but not others, this could be due to: (i) genuine differences in cost structures between firms (where those differences may, or may not be, efficient); and/or (ii) the data not being comparable, because the data relates to different parts of the cost curve; and/or (iii) differences in how companies have estimated their forecast costs.

1.25 On (iii) our understanding is that companies typically use a mixture of ‘bottom-up’ and ‘cost curve’ methods to estimate their future P-removal scheme costs. It is therefore conceivable that, where firms use the cost curve method in particular, there is a risk that the method itself assumes there is no discontinuity (meaning the absence of discontinuities in said data reflects the assumption made, rather than it being actual evidence that none exist).

1.26 Relatedly, it is logical to assume that companies whose historical data does not show discontinuities (i.e., because they have not yet experienced them) may be more likely to rely on cost curves that assume no discontinuities arise in future. There is therefore a risk that the prior lack of experience in reaching a certain (more demanding) level of P-concentration by some companies could mask the true extent of cost/P-tightness discontinuities. Further to the above, we find that:

(a) Every company (with the exception of Yorkshire Water) that has experience of discontinuities in their historical data has also submitted forecast cost data consistent with multiple discontinuities over PR24.

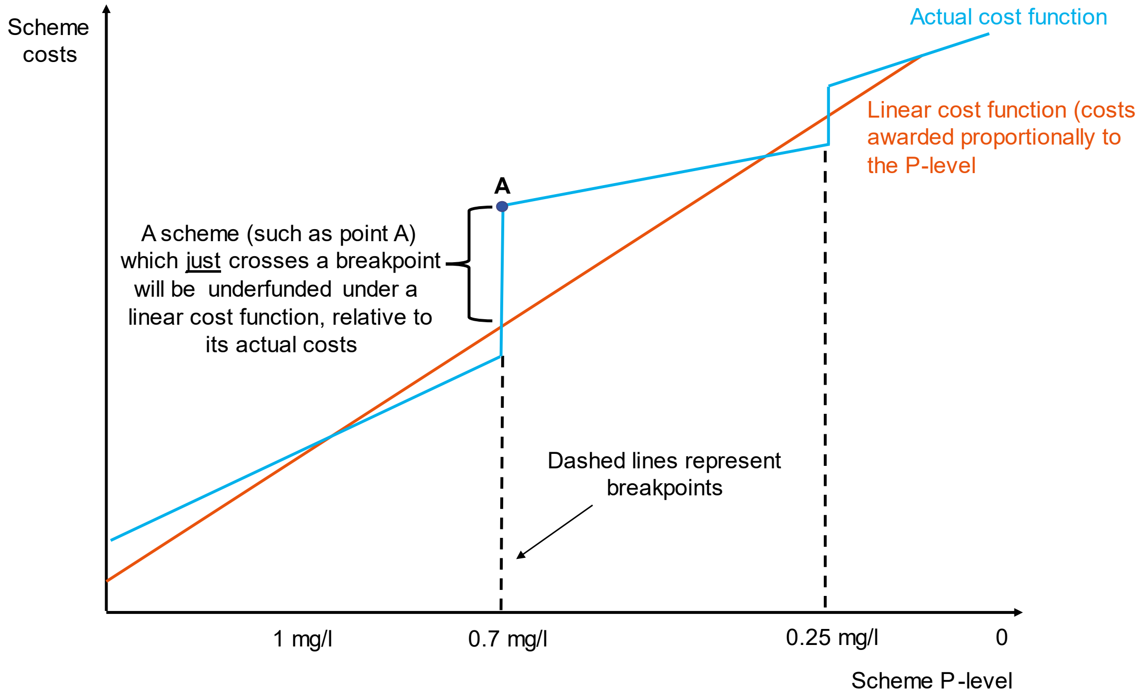
(b) Other than Yorkshire Water, the only company not forecasting multiple discontinuities at PR24 is Welsh Water, for which we do not find discontinuities in its historical data. In addition, Welsh Water only had two schemes at the TAL historically, which means the company has limited experience of achieving the low P-concentrations at which discontinuities may have been discovered.

(c) The two companies with by far the most experience of achieving low P-concentration levels at PR19 (Anglian Water and Severn Trent Water) have forecast data consistent with the presence of multiple discontinuities in the relationship between scheme cost and P-tightness.

1.27 In summary, we therefore suggest the above is generally supportive of companies with more experience of achieving low P-concentration levels: (i) identifying multiple discontinuities in their data; and thus (ii) forecasting them in their expected costs over PR24 (or, rather, submitting forecast costs that are consistent with multiple discontinuities arising).

1.28 To the extent that there are discontinuities in the relationship between efficient P-removal costs and permit levels, an approach that does not properly reflect this will not robustly identify the appropriate level of P-removal enhancement costs across the industry. Moreover, companies with a higher proportion of schemes that ‘just’ cross a breakpoint will be particularly adversely affected by this issue, as illustrated in Figure A15-5.

Figure A15-5 – Illustration of how firms with schemes 'just' crossing breakpoints are adversely affected by a failure to adequately recognise cost discontinuities



Source – Economic Insight analysis

Possible impact of regulatory drivers on efficient P-removal costs

1.29 Under the approach to determining P-removal enhancement cost allowances at the PR24 Final Determinations, there is no explicit mechanism by which the impacts of regulatory drivers on efficient company costs is factored in. However, as the econometric models relied on by Ofwat do capture the historical and current levels of P-tightness companies must achieve, then to the extent that: (i) this (permit levels) is the only impact on efficient costs that arises from the regulations; and (ii) the relationship between permit levels and costs is correctly specified in the models, this may be appropriate. However, as set out in our discussion of cost discontinuities, we do not consider that (ii) is the case in practice.

1.30 Using the PR24 WINEP data, we identify whether scheme level P-removal costs may be driven by the following regulations: the Environment Act; Habitats regulations; Habitats regulations – nutrient neutrality; SSSI; UWWTR; and the WFD. Of these, we find that there is a tendency for the PR24 Final Determination econometric models to allow relatively less costs for schemes driven by: (i) Habitats regulations – nutrient neutrality; (ii) SSSI; and (iii) UWWTR, as summarised in Table A15-5.

Table A15-5 – P-removal cost disallowances by regulatory driver

Regulatory driver	Company requested costs (£m 2022/23 prices)		Ofwat allowed costs (£m 2022/23 prices)		Disallowances (%)		Regulation associated with greater disallowances
	Subject to regulation	Not subject to regulation	Subject to regulation	Not subject to regulation	Subject to regulation	Not subject to regulation	
Environment Act	2,572	857	2,219	719	-14%	-16%	✗
Habitats regulations	1,051	2,378	924	2,014	-12%	-15%	✗
Habitats regulations – nutrient neutrality	614	2,815	459	2,479	-25%	-12%	✓
SSSI	506	2,923	345	2,594	-32%	-11%	✓
UWWTR	122	3,307	67	2,872	-45%	-13%	✓
WFD	2,615	814	2,277	662	-13%	-19%	✗

Source – Analysis of PR24 WINEP data and company forecast data used in PR24 Final Determination models

Notes – (1) Welsh water companies are excluded. (2) Excludes schemes with data recording issues in the PR24 WINEP data.

1.31 The above is consistent with the possibility that the Habitats regulations – nutrient neutrality; SSSI; and UWWTR regulations are:

(a) themselves affecting efficient costs (over and above their impact on P-tightness); and/or

(b) are correlated with other factors impacting efficient costs, in a way that is not currently captured in the econometric models.

1.32 The above findings could also (in whole, or in part) be a consequence of the relationship between permit level and efficient costs being mis-specified under the PR24 Final Determination models, as we believe to be the case.

1.33 Focusing on Habitats regulations – nutrient neutrality; SSSI; and UWWTR, Table A15-6 sets out the difference in disallowances between schemes subject to, and not subject to, these regulations by individual company. This is to inform whether, and to what extent, the pattern we observed above is systematic across the industry, or is more company-specific.

Table A15-6 – P-removal cost disallowances for schemes driven by Habitats regulations – nutrient neutrality; SSSI; and UWWTR, by company

Company	Habitats regulations – nutrient neutrality		SSSI		UWWTR	
	No. of sites subject to regulation	Difference in disallowance between schemes subject to regulations and schemes not subject to regulations (%)	No. of sites subject to regulation	Difference in disallowance between schemes subject to regulations and schemes not subject to regulations (%)	No. of sites subject to regulation	Difference in disallowance between schemes subject to regulations and schemes not subject to regulations (%)
Anglian Water	16	0%	2	9%	0	NA
Northumbrian Water	0	NA	0	NA	0	NA
Severn Trent Water	2	27%	13	13%	2	-41%
South West Water	7	14%	0	NA	2	36%
Southern Water	10	-6%	10	-22%	0	N.A
Thames Water	1	-340%	0	NA	3	19%
United Utilities	8	8%	0	NA	5	-16%
Wessex Water	40	9%	53	2%	1	26%
Yorkshire Water	0	NA	0	NA	0	NA

Source – Analysis of PR24 WINEP data and company forecast data used in PR24 Final Determination model

Notes – (1) If, for a given company, sites subject to the regulation face higher disallowed costs (as a % of requested) than sites not subject to the regulation, then the difference in disallowance figure will appear positive, and vice versa (2) Excludes schemes with data recording issues in the PR24 WINEP data.

1.34 From the above, we find the evidence is mixed as to whether disallowances are systematically greater for individual companies where regulations apply. In the case of Habitats – nutrient neutrality, the evidence is somewhat more suggestive of this being systematic, as we find four companies out of seven have greater disallowances where the regulations apply. Excluding companies with fewer than five sites subject to the regulations (Northumbrian Water; Severn Trent Water; Thames Water; and Yorkshire Water) this changes to three out of five companies.

1.35 As noted above, there are three possible explanations for the above results. First, the results may, to some extent, reflect a misspecification in the existing models, regarding the relationship between permit level and costs. Therefore, it will be necessary to investigate the extent to which these results hold, once our concerns regarding omitted discontinuities have been tested and addressed (if required).

1.36 The second possibility is that regulatory drivers (Habitats regulations – nutrient neutrality; SSSI; and UWWTR) are themselves impacting efficient costs (in some circumstances) over and above the interaction with permit level. This could be because they: (i) constrain the options available to companies (meaning they cannot always select the lowest cost scheme); and/or (ii) for a given scheme, give rise to increased costs.

1.37 The third possibility is that the above three regulations are correlated with omitted relevant factors that affect the efficient costs companies incur (in some circumstances) over and above permit level. Again, those other omitted factors might impact costs either by: (i) constraining the option set available to companies; and/or (ii) increasing costs for implementing a given scheme.

1.38 In terms of the second possibility above, at the PR19 redeterminations, the CMA recognised that regulations could affect the option set available to companies in some circumstances. Specifically, whilst the CMA was not persuaded that regulatory drivers should be explicitly factored into the across industry econometric models, it did partially accept Yorkshire Water's argument at that time that the UWWTR (then referred to as UWWTD) constricted its option set, stating: *"we consider Yorkshire's comments on the constraints regarding how UWWTD driven obligations can be met further by considering below the implications on model results of removing three United Utilities sites from the dataset (where the use of catchment management approaches has been identified as underpinning relatively low unit P-removal costs)."*[206] That is to say, the CMA found that regulations could affect the options available to companies; and in Yorkshire Water's case, implemented a company-specific remedy to reflect this in its cost allowances.

[206] Paragraph 5.80 of CMA (March 2021) Anglian Water, Bristol Water and Yorkshire Water price determinations final report, provided as SoC Appendix A215.

Wessex Water

PR24 CMA Redetermination

Annex A16 – Glossary

1.1 The following table is provided for use alongside our Statement of Case, annexes and appendices.

Table A16-1 – Glossary

Abbreviation	Full title	Definition
AD	Average Demand	The average demand usually over one or three years
AD	Anaerobic Digestion	A biological process in which microorganisms break down organic material in the absence of oxygen. Used for treating sewage sludge and other organic waste materials to produce biogas.
ADPW	Average Demand Peak Week	The highest average demand over seven days, normally occurs during the temperatures peak in the year
ADS	Auto-desludging	The automated removal of sludge from a settlement tank, usually on a sewage treatment works.
AGA	Above Ground Asset	Refers to all built assets which are above ground, e.g.: buildings, tanks, sewerage treatment plant, water treatment plant, pumping stations.
AICR	Adjusted cash interest cover ratio	The adjusted cash interest cover ratio (AICR) is similar to interest cover, but measures the ability to make interest payments after meeting costs that have been expensed and RCV run-off.
ALC	Active Leakage Control	Active leakage control is the practice of actively looking for unreported leaks and bursts in the distribution network. This is opposed to passive leakage control where leaks are reported by customers and/or are visibly apparent.
AM	Abstraction Meter	Meter used to measure the volume of raw water abstracted from the environment
AMF	Asset Management Framework	Structure used for managing assets (policy, strategy, plans), processes (implementation, assessment, improvement) and controls (structure, competency). Sometimes more commonly referred to as an Asset Management System.
AMP	Asset Management Plan	The five year financial plan which dictates the investment to be undertaken by water companies. This is agreed by Ofwat, the Environment Agency and English Nature.
AMR	Automatic Meter Reading	Electrical metering on smaller supplies, which regularly transmits consumption information back to the electricity supplier so that bills can be based on real-time information.
AONB	Area of Outstanding Natural Beauty	Areas designated by the Countryside Agency and confirmed by the Secretary of State for the Environment to conserve the natural beauty of the area. Since 2023, they have adopted the name National Landscapes, although AONB remains the designated legal term.
APD	Acid Phase Digestion	The first phases of anaerobic digestion (hydrolysis, acidogenesis and acetogenesis) which require acidic conditions. Having a separate initial APD phase results in greater breakdown of organic matter and higher yields of biogas than a single-stage anaerobic digestion (AD) process.

Abbreviation	Full title	Definition
AS/ASP	Activated Sludge Plant	Activated sludge is a process for treating sewage and industrial wastewaters using air and a biological floc composed of bacteria and protozoas. A suspended growth biological sewage and wastewater treatment process which allows activated sludge (AS) to be mixed with incoming effluent and aerated, subsequent settlement then separates the sludge from the treated effluent and recirculation of a portion of the activated sludge (the return activated sludge, RAS).
ATEX	Atmospheres Explosibles	Atmospheres Explosibles (ATEX), which are two EU directives describing the minimum safety requirements for workplaces and equipment used in explosive atmospheres.
ATO	Appearance, taste and odour	Acceptability characteristics when referring to the quality of drinking water and the specific parameters included in the Ofwat common performance commitment
BAF/BAFF	Biological Aerated Filter (Or Biological Aerated Flooded Filter, Biological Aerated Floating Filter)	A fixed film biological sewage treatment process involving an aerated, submerged bed of filtration media which supports the biomass. The effluent could flow upwards or downwards through the bed.
BC	Bioresources Centre	This is a term we use to refer to a site or facility where sewage sludge is processed or treated. The former term used is Sludge Treatment Centres (STC).
BGA	Below Ground Asset(s)	Assets belonging to the company which can be found below ground level, e.g.: water mains, sewers.
BIM	Building Information Modelling	A process for creating and managing information through the lifetime of a construction project and lifecycle of an asset, based around intelligent 3D modelling and digital built asset information. BIM is supported by PAS1192 specifications.
BIM	Better Information Management	Alternative definition of BIM, as defined by BIM4Water (a water industry forum).
BNG	Biodiversity Net Gain	Biodiversity Net Gain (BNG) is an approach to development and/or land management, that aims to leave the natural environment in a measurably better state than it was beforehand.
BOD	Biochemical (or biological) Oxygen Demand	The amount of dissolved oxygen consumed by micro-biological action when a sample of sewage is incubated, usually for 5 days at 20°C (in the UK expressed as BOD5). In some countries the BOD test is carried out over differing periods such as 7 days (BOD7), and 10 days (BOD10).
BW	Bathing Water	The water at an EA designated bathing water site.
BWBSL	Bristol Wessex Billing Services Ltd	Former name for the joint venture between Wessex Water and Bristol Water to provide billing services, now known as Pelican.

Abbreviation	Full title	Definition
CAF	Cyber Assessment Framework	An NCSC (National Cyber Security Centre) framework used for operators of essential services and to assist with NIS (Network and Information Systems Directive) compliance
CALM	Central Area Link Main	Trunk Main system which allows treated water to travel west from Wiltshire to Somerset.
Capex	Capital expenditure	Funds used to purchase, upgrade or maintain physical assets.
CAPM	Capital Asset Pricing Model	A financial model that calculates the expected rate of return for an asset or investment
CAT	Environmental Pollution Incident Categories	Environmental Pollution Incident categories: 1 major; 2 significant; 3 minor.
CCW	CCW the voice for water companies	Independent body that represents water and sewerage consumers in England and Wales.
CHP	Combined Heat and Power	Also known as cogeneration, CHP is the recovery of waste heat from the electric generation process to produce other forms of useful energy simultaneously, such as useable heat or steam. CHP engines are typically found on sites where anaerobic digestion takes place, to produce electricity and recover heat from biogas.
CI	Cast Iron	Ferrous pipe material used from the early 1800's and superseded by ductile iron and modern plastics in the 1960s to 1970s period.
CM	Capital Maintenance	Planned work to replace and renovate existing assets.
CM	Catchment Management	Working within in a catchment to improve raw water quality
C-MeX	Customer Measure of Experience	Ofwat's measure of household customer experience (wholesale and retail).
CNB	Catchment Nutrient Balancing	'Offsetting' water recycling centre nutrient loads through catchment interventions - usually farming.
COD	Chemical Oxygen Demand	A measure of the amount of oxygen consumed by chemical reactions in a liquid, expressed in mg oxygen per ml of liquid. Commonly used for sewage effluent.
CoM	Contact Management	Our Contact Management system provides a single view of the customer's information and preferences, allowing us to provide a more connected and personalised experience for the customer throughout the lifecycle of an incident.

Abbreviation	Full title	Definition
COMAH	Control of Major Accident Hazards Regulations 2015	The Control of Major Accident Hazards Regulations 2015 (COMAH) are applicable to any establishment storing or handling large quantities of industrial chemicals or explosives substances of a hazardous nature, such as methane and biogas. The aim of the COMAH regulations is to reduce the risks of potential major accidents that are associated with the handling of hazardous or explosive substances.
COSHH	Control of Substances Hazardous to Health Regulations 2002	Using chemicals or other hazardous substances at work can put people's health at risk. The law requires employers to control exposure to hazardous substances to prevent ill health.
CP	Catchment Permitting	The linking of two or more water recycling centre discharge permits in a catchment to achieve a common water quality objective, particularly for nutrients.
CRI	Compliance Risk Index	A measure created by the DWI to give an overall score for water companies on their compliance with all drinking water quality requirements
CSO	Combined Sewer Overflow	Combined sewer overflows (CSO), also known as Storm Overflows, are permitted assets that act as relief mechanisms to prevent flooding during heavy rainfall. CSOs allows the discharge of a combination of storm water and domestic waste as a result of the sewer or treatment works capacity being exceeded during heavy storms. The resulting volume of rainwater and sanitary wastewater exceeds the system's capacity and sewage is forced to overflow into the environment (land, streams, rivers, sea etc) through CSO outfalls.
CSU	Customer Services Unit	Wessex Water call centre and complaint handling team dealing with all operational contacts from customers.
DAF	Dissolved Air Flotation	A water or wastewater/sewage treatment process. The water to be treated flows through a tank where a pressurised air/water mixture is injected into the incoming water, near the base of the tank. The microbubbles resulting from the pressurised air/water mixture attach to solids and float them to the surface to form a sludge layer which is intermittently scraped off. On water supply this stage is often preceded by coagulation and flocculation. Used for fats, oils and grease (FOG) removal in wastewater and sewage.
DD	Draft Determination	Ofwat draft decision on price limits that will operate for a five-year period and the specific outputs we have to deliver.
DDCM	Delayed Delivery Clawback Mechanism	A new mechanism introduced to return money to customers where they have paid for investment that has been delayed significantly

Abbreviation	Full title	Definition
DEFRA	Department of the Environment, Food and Rural Affairs	A government department that brings together the interests of farmers and the countryside; the environment and the rural economy; the food we eat, the air we breathe and the water we drink. It integrates environmental, social and economic objectives and champions sustainable development as the way forward for government.
DI	Ductile Iron	A ferrous pipe material that superseded cast iron in the 1970s and still in use today.
DIST	Distribution Input	Water that enters the public water supply, abstracted water minus process usage (e.g. filter back washing) compensation flows and any operational use at the water treatment works, e.g. flushing boreholes to waste.
DMA	District Metered Area	A defined area of a water distribution network which can be isolated by valves and for which the quantity of water entering and leaving can be measured primarily for the purposes of managing leakage.
D-MeX	Developer Services Measure of Experience	Ofwat's measure of customer experience for developer services (new connections).
DO	Dissolved Oxygen	The amount of gaseous oxygen dissolved in a liquid, affect by temperature and pressure. Usually measured in milligrams per litre (mg/l).
DOC	Dissolved Organic Carbon	Dissolved organic molecules, as determined by a standard laboratory procedure, measured in mg/l carbon.
DOM	Dissolved Organic Material	An alternative term for dissolved organic carbon (DOC).
DS	Design Standard	Used in Wessex Water to refer to a document which defines the agreed design requirements and parameters for construction projects.
DS	Dry Solids	Measurement of the quantity of solids in a sample after drying it, commonly used as a measurement of sludge thickness or sludge cake dryness. Referred to as % dry solids (percentage is weight solids/weight sample).
DSEAR	Dangerous Substances and Explosive Atmospheres Regulations 2002	The aim of the Dangerous Substances and Explosive Atmospheres Regulations 2002 (DSEAR) is to reduce the risk of a fatality or serious injury resulting from a dangerous substance igniting and potentially exploding, for example, biogas.
DWF	Dry weather flow	For a sewage treatment works the EA definition is “the average daily flow to the treatment works during seven consecutive days without rain (excluding a period which includes public holidays) following seven days during which the rainfall did not exceed 0.25 ml in any one day".

Abbreviation	Full title	Definition
DWI	Drinking Water Inspectorate	Responsible for assessing the quality of drinking water in England and Wales, taking enforcement action if standards are not being met, and appropriate action when water is unfit for human consumption.
DWMP	Drainage and Wastewater Management Plan	Long term (25-year) plan for our drainage and wastewater systems to ensure we can provide an effective and resilient service now and into the future considering development, climate change and other challenges (urban creep, consumption rates etc).
DWSPs	Drinking Water Safety Plans	Risk assessments for every water treatment works and water supply system.
EA	Environment Agency	Public body for protecting and improving the environment in England and Wales.
ECT	Effective Contact Time	The time that chlorine is in contact with water taking into account the efficiency of mixing, used to measure disinfection.
EDM	Event Duration Monitoring	Term applied to the monitoring of combined sewer overflow (CSO) spills to watercourses.
EIA	Environmental impact assessment	Completed for larger, more sensitive or complex individual projects.
EnvAct	Environment Act	The Environment Act (2021) allowed the UK to enshrine better environmental protection into law once the UK left the EU. It provided the Government with powers to set new binding targets, including for air quality, water, biodiversity, and waste reduction.
EPA	Environmental Protection Act	The Environmental Protection Act (1990) is a UK Act of Parliament relating to the transfer, treatment and disposal of controlled wastes.
EPA	Environmental Performance Assessment	Annual report on the environmental performance of England's water and sewerage companies, as compiled by the Environment Agency.
ERI	Event Risk Index	A measure created by the DWI to score Companies response to water quality events.
ESAS	Elimination of Stand-Alone Source	To describe a supply network or addition to a network to provide a second source of supply to enable the normal source of water to be taken out of supply.
FD	Final Determination	Ofwat final decision on price limits that will operate for a five-year period and the specific outputs we have to deliver.
FFT	Flow to Full Treatment	The peak flow treated by a Water Recycling Centre (WRC), as dictated by the EA in the site's Environmental Permit. This is the flow used for hydraulic design of a sites. It is commonly 3 times or 6 times the DWF. FFT has been replaced with Flow Passed Forward (FPF).

Abbreviation	Full title	Definition
FPF	Flow Passed Forward	Replaces Flow to Full Treatment (FFT) - Permitted flow site must pass before any spill to storm/environment can be permitted. It is the rate of flow (litres per second) of the wastewater arriving at the overflow from its upstream collection system and passed forward to the continuation flow. It does not include any flows that have already been passed forward by the overflow and are reintroduced to the incoming flow upstream of the overflow from any point downstream of it
FST	Final Settlement Tank	The final settlement stage, typically after an activated sludge plant (ASP) at a Water Recycling Centre (WRC).
FTS	First Time Sewerage	Implementation and adoption of new sewerage systems to areas that have not been served before.
GAC	Granular Activated Carbon	Granular absorbent media used on Water Treatment Centres in "filters" for absorbtion of organic compounds such as pesticides, colour, taste and odour. Also used at Water Recycling Centres (WRC) to remove odorous compounds for air flows in odour control units.
GBT	Gravity Belt Thickener	A sludge thickening process where sludge is passed over a fabric belt allowing liquid to drain.
GIS	Geographical Information System	A system for storing and visualising information in a spatial context
GR	Grid Reservoir	A grid reservoir has been built to store water independently to a distribution reservoir, it can then transfer into a distribution reservoir or be moved onto another grid reservoir via the grid trunk mains.
GSS	Guaranteed Standards of Service	Statutory requirements laid out by Defra. It details the payments we must make to customers should we fail to comply with the level of service specified.
HD	Habitat Directive	The Conservation of Habitats and Species Regulations 2017 (previously known as the Habitats Directive), protects certain species and habitats. The legislation requires the designation of Special Protection Areas (SPAs) and Special Areas of Conservation (SACs) and that these sites are properly protected and managed. SPAs and SACs contribute to the network of European sites, referred to collectively as Natura 2000.
HH	Household customers	Household customers. Essentially domestic customers but may include some smaller commercial customers e.g. a shop with a single connection.

Abbreviation	Full title	Definition
HRA	Habitat Regulations Assessment	Any activities (especially projects) which take place within or near sites protected at the European level (i.e. special areas of conservation SAC, special protection areas SPA and Ramsar sites) require a habitat regulations assessment to ensure they will not result in significant effects to the features for which they are designated (for example rare birds, mammals and habitats). HRA derives from the Habitat Regulations which is the legislation these sites are legally protected under.
HRF	High-Rate Filter	A biological filter used in sewage treatment. In Wessex Water Design Standards they operate under a BOD loading of >2 kg/m3.d to remove 50 - 75% of the applied average BOD load. High-rate filters often use plastic filter media.
HSE	Health & Safety Executive	The Health and Safety Executive is a UK government agency responsible for the encouragement, regulation and enforcement of workplace health, safety and welfare, and for research into occupational risks in Great Britain.
HST	Humus Settlement Tank	Sewage or effluent treatment settlement stage after biological treatment. The settled sludge is known as humus sludge.
ICS	Integrated Control System	A control system which performs functions typically performed by multiple independent systems such as building management systems, lighting control and security.
IED	Industrial Emissions Directive	The IED aims to achieve a high level of protection of human health and the environment by reducing harmful industrial emissions across the EU, in particular through better application of Best Available Techniques (BAT). Some of Wessex Water's sites are subject to permitting under IED.
ILG	Index-Linked Gilts	Government issued debt that offers full protection for inflation
KPI	Key Performance Indicator	An important measure of performance for the company / industry
LDAR	Leak Detection and Repair	The main element of Active Leakage Control, involves staff pinpointing the location of a leak such that it can be repaired.
LEP	Local Enforcement Position	An LEP is issued by the Environment Agency to undertake an activity. It is a legal document and is often in place if an environmental permit is not suitable or if it is not possible to get a permit in place in time for an activity to be undertaken (often emergency situations).
LLFA	Lead local flooding authority	Risk management authority responsible for local flood risk (normally the Unitary Council). The LLFA is responsible for reducing the risk of flooding from surface water, groundwater and ordinary watercourses under the Flood and Water Management Act 2010.

Abbreviation	Full title	Definition
LURA	Levelling Up and Regeneration Act	The Levelling-up and Regeneration Act (LURA) (2023) was introduced to reduce regional disparities across the UK by reforming local government and planning processes. Particularly for wastewater, the Act introduced new nutrient pollution provisions for sensitive catchments.
m3/d	Cubic metres per day	A measurement of a volume of water. One cubic meter of water equals 1,000 litres.
MAD	Mesophilic Anaerobic Digestion	Mesophilic anaerobic digestion (MAD) refers to the second step in an advanced anaerobic digestion process with acid-phase digestion (APD) as the first step. In mesophilic anaerobic digestion, the methanogenesis step in the anaerobic digestion process occurs. Methane gas (biogas) is produced from mesophilic anaerobic digesters.
MAPP	Major Accident Prevention Policy	A Major Accident Prevention Policy (MAPP) is a document that operators of establishments handling dangerous substances must prepare and submit to the Competent Authority, outlining how they will ensure a high level of protection for people and the environment, including their aims, principles, and management's responsibilities. In the MAPP, operators are required to identify and evaluate the potential major accident hazards within the establishment and develop a process safety management system for managing these hazards and achieving the hazard prevention policy. All COMAH establishments are required to develop a MAPP.
MBBR	Moving Bed Biofilm Reactor	A fixed film biological sewage treatment process which uses an aerated tank filled with plastic media on which the biofilm grows.
MBR	Membrane Bioreactor	A sewage treatment process which combines membrane filtration with activated sludge.
MCA	Monte Carlo analysis	A technique used to estimate the likely range of outcomes from a complex process by simulating the process under randomly selected conditions a large number of times.
MCPD	Medium Combustion Plant Directive	New legislation regarding the use of medium combustion plants (i.e. generators or CHP engines) for generating energy.
MEAV	Modern Equivalent Asset Value	The current replacement cost of a company's assets.
MEICA	Mechanical, Electrical, Instrumentation, Control, and Automation	Often abbreviated as MEICA, this is a group of relatively short life assets used in all kinds of water supply and wastewater processes.
mg/l	Milligrams per litre	A measurement of the weight of a substance within a liquid, often used for defining allowable concentrations of substances in water or effluent.

Abbreviation	Full title	Definition
MLD	Megalitres per day	A measurement of flow or usage of water. One mega litre of water equals one million litres.
MLSS	Mixed liquor suspended solids	The concentration of suspended solids found in mixed liquor in the activated sludge sewage treatment process.
MNF	Minimum night flow	The lowest flow through a DMA meter at night when most customers are asleep which us used as part of the method to estimate leakage in the treated water distribution network.
MO	Market Operator	Responsible for calculating wholesale bills based on meter reads and providing a central repository of property & NHH customer data.
MOSL	Market Operator Service Ltd	A not-for-profit company set up to develop and operate the business water retail market which opened in 2017.
MVU	Meter Valve Unit	Also referred to as the boundary box, this apparatus includes the revenue meter used for billing customers for water supply and an isolation valve (stop tap) all housed in one small unit buried usually in the footpath outside customers properties
MZC	Mean Zonal Compliance	A measure used by the DWI to measure the compliance with all drinking water regulations within a water supply zone which is defined as an area with a specific water source or combination of sources.
NAV	New appointments and variations	Limited companies which provide a water and/or sewerage service to customers.
NCSC	National Cyber Security Centre	The National Cyber Security Centre (NCSC) is an organisation of the United Kingdom Government that provides advice and support for the public and private sector in how to avoid computer security threats. It is the UK's National technical authority for cyber threats and Information Assurance.
NE	Natural England	Government body and advisor on the natural advisor, sponsored by DEFRA.
NEP	National Environment Programme	Also known as WINEP, see entry for WINEP.
NHH	Non-household	Business customers who purchase water via a water retailer, i.e.: not domestic customers.
NIS	Network and Information Systems Directive	The Security of Network & Information Systems Regulations (NIS Regulations) provide legal measures to boost the level of security (both cyber & physical resilience) of network and information systems for the provision of essential services and digital services.

Abbreviation	Full title	Definition
NPV	Net present value	The difference between the present value of cash inflows and the present value of cash outflows. NPV is used in capital budgeting to analyse the profitability of an investment or project.
ODI	Outcome Delivery Incentives	These are a measure used by Ofwat to monitor our performance. They are designed with customers to make sure our objectives align with things that matter most to them. If we exceed these targets, we unlock significant financial outperformance rewards
Opex	Operating Expenditure	The costs that the company pays for the running of the business.
OSM	Operator Self-monitoring	Water companies must collect and analyse samples of permitted discharges to surface water and ground water to check compliance with the defined numerical conditions in environmental permits, as regulated by the Environment Agency.
OT	Operational Technology	The practice of using hardware and software to control industrial equipment. OT includes specialised systems used in manufacturing, energy, medicine, building management, and other industries.
PAC	Polyaluminium Chloride	Also known as Aluminium Chlorohydrate. Used in wastewater treatment as a coagulant to remove dissolved organic matter and aid in settlement.
PAC	Powdered Activated Carbon	An alternative to granular activated carbon (GAC) which is held within a vessel, powdered activated carbon can be dosed into water, commonly for removal of taste and odour and/or pesticides, and then removed via the plant's filters.
PC	Performance Commitment	OFWAT derived performance pledges which water companies make to customers and stakeholders; financial gains or penalties apply for over- or under-performing.
PCC	Per Capita Consumption	The average amount of water used per person/customer, usually measured per day.
PCD	Price Control Deliverable	Specified outputs that are targeted to be delivered, with mechanisms to refund customers if they are not
PE	Population Equivalent	A measure of the volume and strength of sewage, based on an assumption of 0.06 kg BOD per capita per day.
PF	Pressure Filter	A type of filter, usually a sand filter used at a Water Treatment Centre. Similar to a rapid gravity filter (RGF) but contained in a vessel where pressure can build up allowing water to be forced through the media. They have the advantage of preventing any pressure in the feed water, e.g.: from pumping, from being wasted.
PFF	Pass Forward Flow	The flow passed forward at a wastewater network asset, normally relevant at an overflow.

Abbreviation	Full title	Definition
PR24	Price Review 2024	The process in which Ofwat determines water companies targets and allowed revenues for the 5 year period April 2025 - March 2030 (also known as AMP8).
PSR	Priority Services Register	Some of our customers may need extra consideration or support at times due to age, ill health, a disability or additional needs. We can help through Priority Services. Priority Services is a free service and anyone living in the Wessex Water region can sign up for it.
PST	Primary Settlement Tank	The initial solids settlement step used at a Water Recycling Centre (WRC).
RAB	Regulatory Asset Base	The Regulatory Asset Base (RAB) was established in the 1990's on privatisation of utility companies. It represents past investments, comprising what investors paid when the assets were originally privatised plus subsequent capital expenditure adjusted for depreciation.
RAS	Return activated sludge	In an activated sludge plant, a portion of sludge settled out in the final settlement tanks (FST) is returned to the head of the activated sludge plant to "re-seed" the plant with bacteria for treatment.
RBC	Rotating Biological Contactor	A fixed film biological sewage treatment process where the biomass is present on rotating discs. The discs are partially submerged allowing the biomass to receive oxygen during the rotation cycle.
RBMP	River Basin Management Plans	Government plans which align with the Water Framework Directive (WFD), they set out how organisations, stakeholders and communities will work together to improve the water environment, the first set of River Basin Management Plan (RBMPs) were drawn up in 2009 and are reviewed an updated every 6 years.
rCSMG	revised Common Standards Monitoring Guidance	Revised river water quality targets for environmentally sensitive sites.
RCV	Regulatory Capital Value	The regulatory capital value represents capital value of a company for regulatory purposes. It is the initial market value of a company at privatisation, including debt, plus new capital expenditure / expenditure not directly recovered from customers on regulatory obligations. It is adjusted for inflation and only applies to the wholesale part of the business.
RENO	Revenue Effects of New Obligations	Changes in operating expenditure to account for additional costs of operating new assets installed for regulatory obligations.
REOC	Revenue Effect of Capex	Changes in operating expenditure to account for additional costs of operating new assets installed for regulatory obligations.
RFR	Risk-Free Rate	The return an investor would expect for a hypothetical investment with no risk

Abbreviation	Full title	Definition
RGF	Rapid Gravity Filter	A filtration process which relies on gravity for the downward flow through the filter media, commonly involves sand filters on Water Recycling Centres.
RORE	Return on Retained Earnings	A calculation that shows how well a company's profits, after dividend payments, are reinvested and is an indicator of its growth potential.
RoRE	Return on Regulated Equity	The return investors get for their equity invested in a regulated company
RPEs	Real Price Effects	There is a "wedge" (positive or negative) between the growth rate of an input price and general inflation.
RPI	Retail Price Index	A measure of inflation published monthly by the Office for National Statistics. It measures the change in the cost of a representative sample of retail goods and services. Commonly used by Ofwat.
S101A	Section 101A of the Water Industry Act	Duty to provide a public sewer for the purpose of draining domestic sewerage from a previously unserved locality, where the current drainage arrangement is found to be having an adverse impact on the environment or amenity
S104	Section 104 of the Water Industry Act	Duty to adopt new sewers and pumping stations.
S106	Section 106 of the Water Industry Act	Duty to allow connections to public sewers.
S41	Section 41 developer new main (supply)	Means we can be requisitioned to design and lay new water mains to serve a development.
S45	Section 45 developer site services (supply)	Means water companies have a duty to connect a service pipe to the water mains to supply water for domestic purposes, where the owner or occupier of any premises serves notice on the company requiring it.
S98	Section 98 of the Water Industry Act	Means we can be requisitioned to design and lay new sewers to serve a development.
SAC	Special Areas of Conservation	Special Areas of Conservation (SACs) are areas designated for their internationally recognised importance for nature conservation, particularly for their habitats and species.
SAF	Submerged Aerated Filter	A fixed film biological sewage treatment process which involves an aerated, submerged, bed of media which supports the biomass. Similar to a BAF plant but with a settlement stage after the filtration, often installed as a package plant for relatively small flows.
SAS	Surplus activated sludge	In an activated sludge plant, a portion of sludge settled out in the final settlement tanks (FST) is returned to the head of the activated sludge plant to "re-seed" the plant with bacteria for treatment; this is the return activated sludge (RAS). The surplus activated sludge (SAS) is the remainder of the sludge which is transferred to sludge storage and sludge processing facilities as a bioresource.

Abbreviation	Full title	Definition
SBC	Submerged Biological Contactor	A fixed film biological sewage treatment process where the biomass is present on rotating discs, unlike a rotating biological contact (RBC), the discs in a submerged biological contactor (SBC) are fully submerged and require aeration.
SBR	Sequencing Batch Reactor	A suspended growth biological sewage and wastewater treatment process which allows activated sludge (AS) to be mixed with incoming effluent and aerated. Unlike conventional activated sludge plants (ASP) a submerged biological contactor (SBC) is a batch process which uses a sequence of fill, mix, settle, draw down.
SEMD	Security and Emergency Measures Direction	The SEMD requires the company to ensure it could maintain a minimum supply of water to its customers at all times.
SHT	Sludge Holding Tank	Usually refers to pre-thickened sludge storage tanks on water recycling centres and bioresources centres.
SIM	Service Incentive Mechanism	An Ofwat measure which promotes good customer service and gives companies a financial incentive to improve their performance. Replaced with CMeX and DMeX in AMP7.
SNCI	Site of Nature Conservation Interest	An area designated for its local importance for nature conservation. These sites are identified at council level and form part of a network of local wildlife sites (LWS) across the country. They are generally small (we have over 6,000 in our region) and are 'non-statutory', meaning they receive no legal protection as such; however, they are a material consideration in the planning process.
SOC	Statement of Case	The document Wessex Water has submitted to the CMA on the 21 March 2025.
SPA	Special Protection Areas	Special Protection Areas (SPAs) are designated to protect the habitats of migratory birds and certain particularly threatened birds.
SPS	Sewage Pumping Station	Collection of assets for pumping sewage, can be found on Water Recycling Centres (WRCs) as standalone sites.
SR	Service Reservoir	Storage facility for treated water.
SS	Suspended Solids	A measurement of the concentration of solids which are held in suspension in a liquid sample. Suspended solids is a parameter in most sewage effluent discharge permits.
SSSI	Site of Special Scientific Interest	A formal conservation designation denoting a protected area.
SST	Sludge Storage Tank	Usually refers to thickened sludge storage tank on water recycling centres and bioresources centres.

Abbreviation	Full title	Definition
SSWAN	Sustainable Solutions for Water and Nature	SWAN is a partnership of organisations who share the same goal: to find sustainable solutions for water and nature. They have drawn up proposals for regulatory reform of the water industry, based on a catchment-wide approach focusing on nature-based and low carbon solutions.
STC	Sludge Treatment Centre	A previously used term for sludge treatment sites in Wessex Water. Superseded by the term Bioresources Centres (BC).
STW	Sewage Treatment Works	Term previously used in Wessex Water for sites where sewage is treated. Superseded by the term Water Recycling Centres (WRC).
SUDs	Sustainable Urban Drainage Systems	Practices which aim to maximise the use of natural alternatives to traditional draining and minimise run off to sewers.
TAL	Technically Achievable Limit	For phosphorus, the technically achievable limit (TAL) is 0.25mg/l, as determined by the Environment Agency. Permit limits tighter than this are considered to be technically infeasible unless the water company agrees locally to go tighter.
TDS	Total Dissolved Solids	A measurement of the total concentration of all dissolved matter in a liquid.
TE	Trade Effluent	Industrial waste, disposal and treatment.
THP	Thermal Hydrolysis Plant	Thermal hydrolysis (THP) is the pre-treatment step in an advanced anaerobic digestion process. In THP, organic matter in sludge is broken down using heat and pressure. Sludge that has been treated through THP is then digested in mesophilic anaerobic digesters (MAD) to produce methane (or biogas).
TMR	Total Market Return	The total expected return of an investment portfolio that is representative of the entire capital market
TOC	Total Organic Carbon	A measure of the total amount of nitrogen associated with organic compounds within a liquid.
TON	Total Organic Nitrogen	A measure of the total amount of carbon associated with organic compounds within a liquid.
TSF	Tertiary sand filters	Tertiary sand filter
UV	Ultraviolet	Ultra-violet disinfection, used for water treatment and wastewater treatment to kill bacteria and other pathogens.
UWWTD	Urban Waste Water Treatment Directive	Adopted in 1991, this aims to protect and improve the water quality of inland surface waters, and coastal waters, receiving wastewater discharges from urban areas by the step-wise introduction of comprehensive treatment facilities.
UWWTR	Urban Waste Water Treatment Regulations	This is the UK implementation of the European Union's Urban Waste Water Treatment Directive (UWWTD) into UK law and includes some UK specific features.

Abbreviation	Full title	Definition
VFA	Volatile Fatty Acids	Anaerobic digestion of sewage sludge results in bacteria breaking down organic matter into volatile fatty acids (VFAs) whilst releasing methane.
VOA	Valuation Office Agency	The office that gives the government the valuations and property advice needed to support taxation and benefits.
VOC	Volatile Organic Compound	Volatile organic compounds (VOCs) are organic compounds that have a high vapor pressure at room temperature, for example benzene, formaldehyde, toluene, and xylene. Some VOCs are harmful to human health.
VS	Volatile solids	Organic compounds in sludge that are easily broken down biologically via anaerobic digestion to produce methane gas.
WACC	Weighted Average Cost of Capital	The return a company earns to cover its debt and equity obligations
WAFU	Water Available for Use	A water resources planning term to define available supply, as deployable output minus outage.
WASC	Waste and Sewerage Company	Legally appointed water and sewerage company. There are 11 companies regulated by Ofwat in England and Wales. The remainder are water only companies, or in Scotland or Northern Ireland with separate regulatory conditions.
WFD	Water Framework Directive	The Water Framework Directive 2000/60/EC is an EU directive which committed European Union member states to achieve good qualitative and quantitative status of all water bodies by 2015.
WINEP	Water Industry National Environment Programme	The Environmental Agency's programme which sets out the environmental requirements which water companies will need to comply with over a five-year AMP period.
WISER	Water Industry Strategic Environmental Requirements	A joint Environment Agency and Natural England strategic plan for water companies on the environment, resilience, flooding and business planning.
WQZ	Water Quality Zone	A discrete zone that receives water from a single or several sources, blended to give consistent water chemistry across the zone. Used to monitor water quality.
WRAS	Water Regulations Advisory Service	Advisory service to promote knowledge of UK water regulations.
WRC	Water Recycling Centre	Wessex Water's term for a sewage treatment works.
WRMP	Water Resources Management Plan	Five yearly regulatory submission (principally to DEFRA and the EA) outlining long term forecasts for supply and demand and outlining any options for addressing deficits.
WSX	Wessex Water	The prefix 'WSX' denotes the company Wessex Water by Ofwat

Abbreviation	Full title	Definition
WTC	Water Treatment Centre	Wessex Water's term for a water treatment works, the facility that treats raw water such that it is suitable for human consumption.
WTP	Willingness To Pay	Customer's willingness to pay.
WTW	Water Treatment Works	Known as a Water Treatment Centre (WTC) in Wessex Water.
WWTW	Waste Water Treatment Works	Another name for a sewage treatment works
YTD	Year to Date	Typically spend in the current financial year to the current date.