Review of Ofwat's PR24 Draft Determinations approach to leakage

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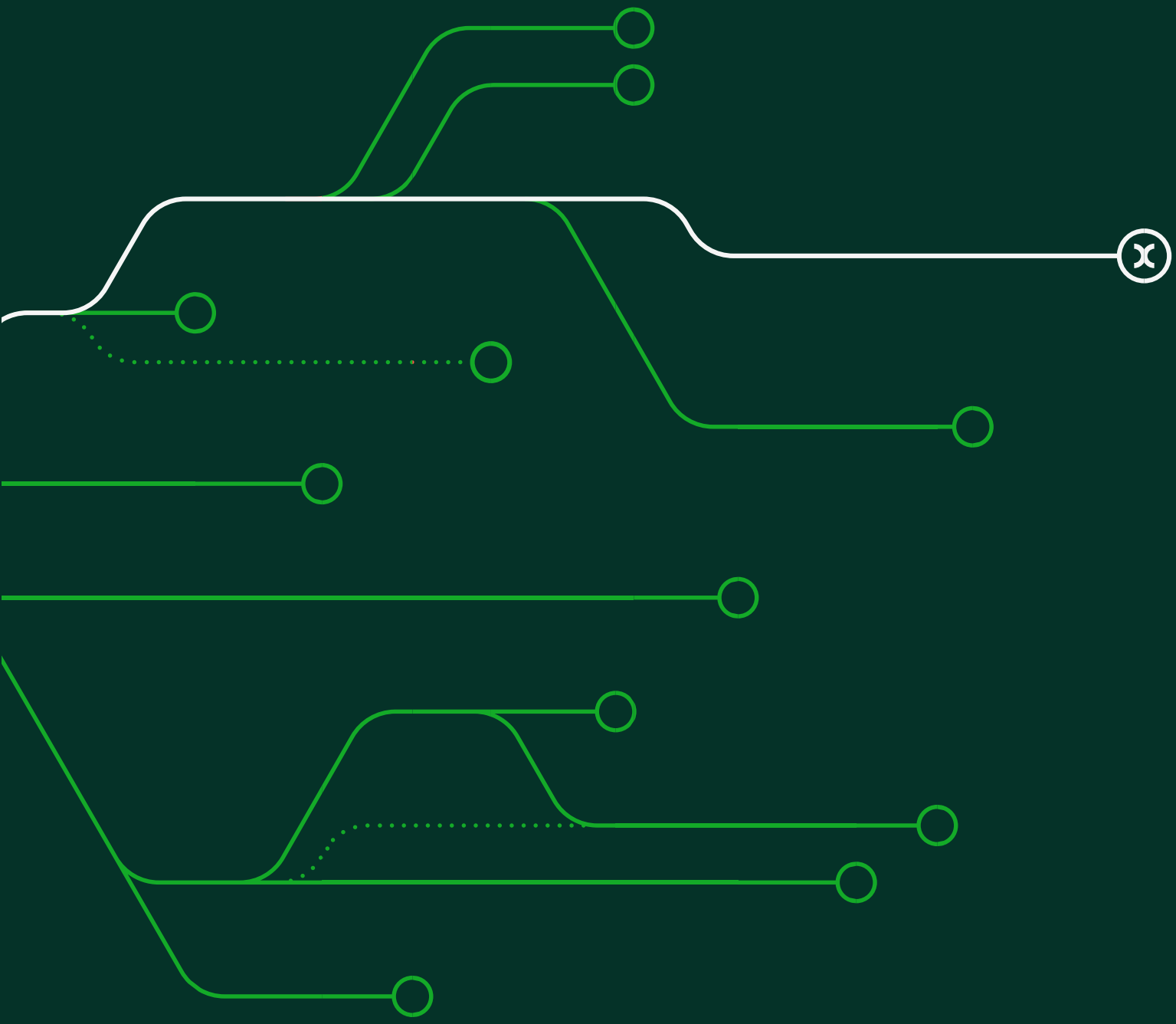
Prepared for Anglian Water

27 August 2024



Contents

Figures and Tables

Executive summary

Anglian Water has commissioned Oxera to assess Ofwat's approach to incentivising leakage performance, and funding leakage improvements, in the PR24 Draft Determinations (DD). We review the approach taken across the price control package as a whole, comprising:

- the performance commitment level (PCL) for leakage improvements;
- the Outcome Delivery Incentive (ODI) penalty and reward rate for performance on leakage and other parameters (such as caps, collars and deadbands);
- the funding made available to maintain leakage performance through base expenditure;
- the funding made available to fund leakage reductions through enhancement expenditure.

We consider these elements of leakage performance collectively, rather than as individual components in isolation. As noted by the Competition and Markets Authority (CMA) in its redetermination of the PR19 Final Determination (FD):

We [the CMA] have treated leakage as a separate section due to the interaction of funding and outcome incentives in relation to reducing leakage[1]

This was reflected in the CMA's approach to providing funding allowances for base and enhancement leakage expenditure allowances, where these were based on companies' relative leakage performance.

The link between performance and funding was also reflected in Ofwat's approach at PR19 prior to the CMA's redetermination.

- At the initial assessment of plans, Ofwat allocated 'companies a leakage reduction [i.e. enhancement] allowance where they are forecast to achieve performance beyond upper quartile in 2024-

[1] Competition and Markets Authority (2021), 'Anglian Water Services Limited, Bristol Water plc, Northumbrian Water Limited and Yorkshire Water Services Limited price determinations: Final report', 17 March, para. 8.2, accessed on 15 August 2024 at: https://assets.publishing.service.gov.uk/media/60702370e90e076f5589bb8f/Final_Report_---_web_version_-_CMA.pdf.

25 or where they propose reductions in leakage greater than 15%'.[2]

- This was revised for the FD stage, where Ofwat 'allow[ed] enhancement expenditure only for companies that forecast leakage performance beyond our [Ofwat's] threshold'.[3]
- At the FD stage, Ofwat also introduced an additional base allowance for companies that it assessed to incur additional costs to address leakage through alternative econometric models of base expenditure that accounted for leakage.[4]

This approach to funding meant that additional allowances were available to companies that were already at the industry frontier (funded through base expenditure), and those that were proposing to move the frontier of best leakage performance forward significantly (through enhancement).

At both the PR19 FD and CMA redetermination, while companies with leading leakage performance received additional funding, they also faced a more demanding PCL than their peers—as this was based on companies making a 15% reduction relative to their starting position in the last years of AMP6. On a mains- or property-normalised basis, this led to companies such as Anglian facing a PCL that required a delivery of leakage levels that was 33–49%[5] lower (more challenging) than the average company.

The approach taken at the PR24 DD marks a considerable departure from the PR19 approach to leakage in terms of funding while retaining the differential approach to performance targets. In particular, Ofwat effectively inverts its approach to funding:

...we only fund additional leakage reductions, beyond those set out in the 2019 price review. We fund the full additional leakage reduction over the 2025-30 period through leakage enhancement after accounting for savings from mains renewal and CSPL [customer supply pipe leakage]...[6]

[2] Ofwat (2019), 'Technical appendix 2: Securing cost efficiency', January, p. 48, accessed on 15 August 2024 at: https://www.ofwat.gov.uk/wp-content/uploads/2019/01/Technical-appendix-2-Securing-cost-efficiency.pdf.
[3] Ofwat (2019), 'PR19 final determinations: Securing cost efficiency technical appendix', December, p. 71, accessed on 15 August 2024 at: https://www.ofwat.gov.uk/wp-content/uploads/2019/12/PR19-final-determinations-Securing-cost-efficiency-technical-appendix.pdf.
[4] Ibid., p. 37.
[5] 33% based on the difference between Anglian's leakage per property PCL for 2024–25 and average industry leakage per property in 2019–20. 49% based on the difference between Anglian's leakage per mains PCL for 2024–25 and average industry leakage per mains in 2019–20.
[6] Ofwat (2024), 'PR24 draft determinations: Expenditure allowances', p. 100.

Ofwat distributes considerably more enhancement funding to the industry on this basis: £547m at PR24, compared with £132m[7] at PR19. The majority of these funding allowances are provided to companies with 2029–30 PCLs that are substantially behind[8] the mains- or property- normalised performance frontier for leakage defined by companies such as Anglian Water.

For this approach to funding and performance to be appropriate, the following assumptions would need to hold.

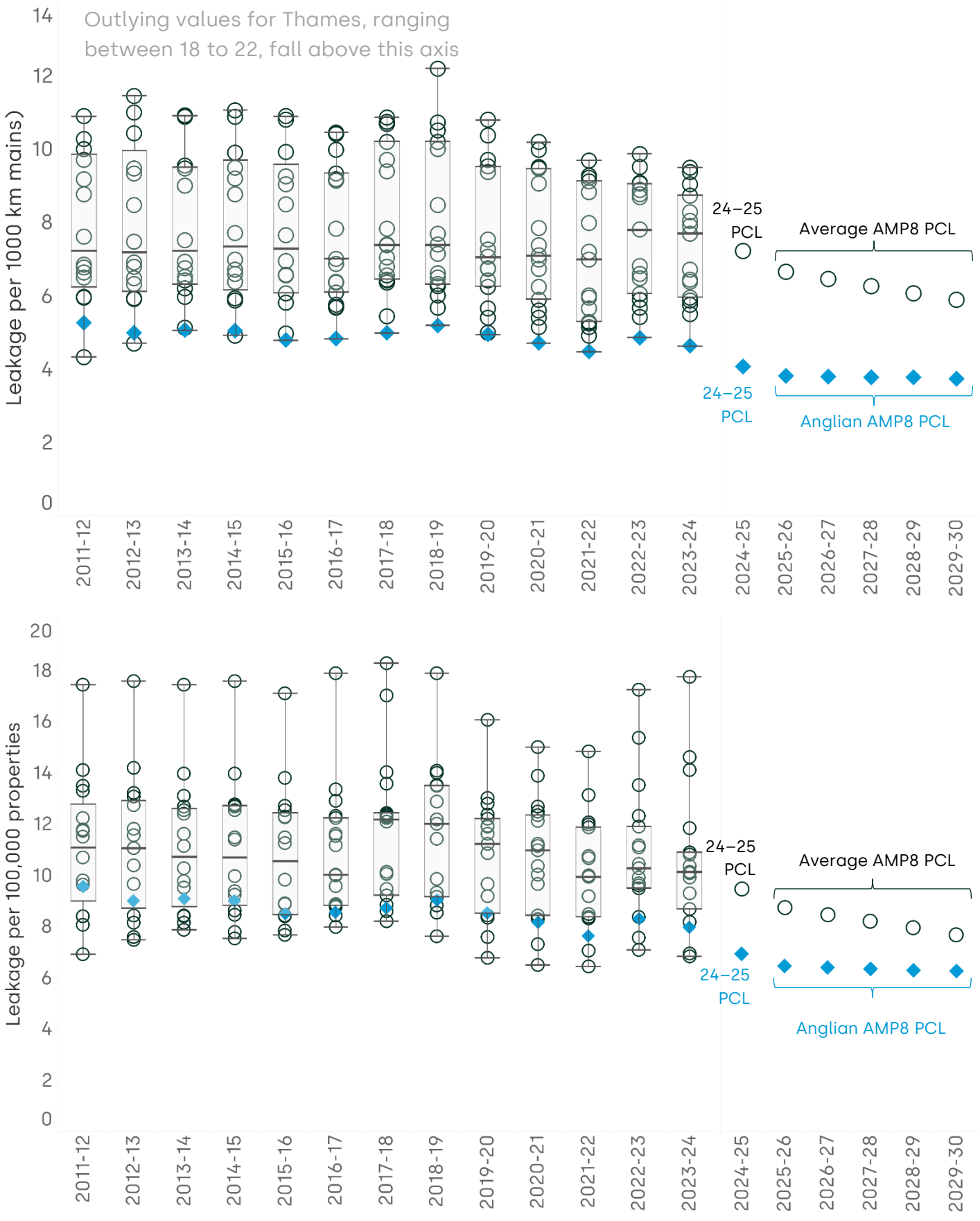
- That the PR19 company-specific PCLs represent a reasonable baseline for the level of performance that companies could have been expected to achieve without any additional funding.
- That a company maintaining its current leakage performance, or not proposing significant reductions beyond it, requires no additional funding, regardless of whether the company is performing at or behind the frontier of sectoral performance.
- That a company proposing improvements up to its PR19 PCL does not require any funding to meet these improvements in performance, regardless of how stretching the target was, and not accounting for the clawback of PR19 enhancement allowances through the Tier 1 ODI incentive rate.
- That any improvements beyond the PR19 PCL require funding, regardless of where the company is positioned relative to the rest of the industry.

In the subsequent sections of this report, we assess the validity of these assumptions in the context of the evidence from recent AMPs, statistical analysis of risk and the relationship between cost and leakage performance. We find that, based on the published PR24 DD reports to date, there is little evidence to support this material change to the historical approach to funding leakage.

This change in approach is particularly challenging for companies operating at the frontier of relative performance on leakage. As we set out in Figure 1 below, on a normalised basis Anglian faces a materially more challenging leakage PCL than the average company at AMP8.

[7] £132m expressed in 2022–23 prices, equivalent to £111.5m in 2017–18 prices, based on Ofwat (2019), 'Supply demand balance enhancement feeder model', sheet: Leakage enhancement assessment, accessed on 24 August 2024 at: https://www.ofwat.gov.uk/wp-content/uploads/2019/12/FM_E_WW_SDB_FD.xlsx.
[8] That is, have a higher (less challenging) leakage target.

Figure 1 Anglian and industry AMP8 PCLs against historical performance: i. per 1,000km mains; ii. per 100,000 property



Source: Oxera analysis based on data from Ofwat model 'Water – Leakage; enhancement expenditure model'; and Ofwat model 'Leakage' for 2011–23. For 2023–24 data we used companies' published 2023–24 Annual Performance Report values.

We highlight **three** specific issues with Ofwat's approach that are detrimental to companies such as Anglian that are at the frontier of industry performance. The focus of our report is on the company-specific context for Anglian, rather than the approach taken to leakage as a whole.

First, we highlight that Ofwat's approach to modelling the ODI risk Anglian faces with respect to leakage is biased towards understating the level of risk associated with this ODI, given the use of a historical data series comprised of companies facing materially less stretching leakage PCLs. We analyse the effect of evaluating industry performance relative to Anglian's AMP7 PCL (normalised per length of mains)—consistent with Ofwat's approach to setting PCLs for other ODIs (such as water supply interruptions, total pollution Incidents and internal sewer flooding).

Using Ofwat's risk model, we show that this would imply a sizeable increase in the risk range around the ODI, which indicates risk exposure 8 times greater than the +/-0.6% maximum RoRE risk exposure target Ofwat has set for strategic ODIs such as leakage. While there may be some factors unaccounted for in this normalisation, Ofwat's risk analysis makes no adjustment for companies' ability to meet their historical PCLs. Our analysis indicates the sensitivity of Ofwat's approach to assessing risk to its assumption that company PCLs remain unchanged, regardless of the level of performance from which companies are improving.

In other words, Ofwat evaluates risk based on average performance across the industry over a period in which some companies faced significantly higher leakage PCLs. Its analysis of AMP8 leakage ODI risk neglects to consider the significant risk exposure for companies that aim to deliver industry-frontier performance.

This is consistent with the evidence in section 1 that companies at the performance frontier for leakage have tended to underperform against the leakage ODI over AMP7, relative to some peers that faced less challenging targets on a normalised basis.

We address this in more detail in section 2.4 of the report.

Second, Ofwat reject in full the leakage enhancement funding proposed by Anglian in its PR24 business plan on the basis of an incorrect interpretation of the PR19 FD. Anglian's business plan proposed an AMP8 PCL reaching a 20.3% reduction in leakage (relative to the 19–20 baseline) by the end of AMP8—implying leakage performance of 154.7ML/d over a 3-year average.[9] Anglian's 2024–25 PCL was to achieve a reduction of 16.4% relative to the same baseline—implying leakage performance of 162.2ML/d over a 3-year average.[10] This represents a reduction in 3-year average leakage **of 7.5ML/d, or 4.8%** by 2029–30, from the 2024–25 PCL.

However, Ofwat reject Anglian's proposed leakage enhancement on the basis that:

This sheet [the leakage enhancement expenditure model] is used to ensure that all leakage reduction, beyond that set out in the 2019 price review, is funded and to ensure any under-delivery from the 2019 price review is not funded again... In the case of Anglian, this removes all funding as they propose only a **0.6 ML/d** reduction over what is proposed'.[11]

In the appendix on expenditure allowances, Ofwat present Anglian's proposed reduction in leakage over the period 2024–25 to 29–30 as **0.4%**, instead of 4.8%.[12]

This discrepancy may be driven by an ex-post adjustment that Ofwat have made to Anglian's historical end-of-AMP7 PCL. Ofwat assumes that companies' outturn performance in 2024–25 will flex up or down such that the 3-year average of performance meets the 2024–25 PCL. It is not clear why outturn leakage performance in 2022–23 and 2023–24 should have a bearing on Ofwat's comparison of PR19 and PR24 leakage PCLs, and we have not identified any documentation published with the DD that explains the reason for this adjustment.

[9] Anglian Water (2023), 'ANH03 Data tables - October 2023 submission', accessed on 24 August 2024 at: https://www.anglianwater.co.uk/siteassets/household/about-us/pr24/anh03-data-tables---october-2023-submission.xlsb.
[10] Ofwat (2019), 'PR19 final determinations: Anglian Water - Outcomes performance commitment appendix', December, p. 11, accessed on 23 August 2024 at: https://www.ofwat.gov.uk/wp-content/uploads/2019/12/PR19-final-determinations-Anglian-Water-%E2%80%93-Outcomes-performance-commitment-appendix.pdf.
[11] Ofwat (2024), 'Water – Leakage; enhancement expenditure model', accessed on 23 August 2024 at: https://www.ofwat.gov.uk/wp-content/uploads/2024/07/PR24-DD-W-Leakage.xlsm.
[12] Ofwat (2024), 'PR24 draft determinations: Expenditure allowances', July, p. 101, accessed on 27 August 2024 at: https://www.ofwat.gov.uk/wp-content/uploads/2024/07/PR24-draft-determinations-Expenditure-allowances-to-upload.pdf.

Ofwat appear to have added an additional challenge by reducing the PCL from the Anglian BP proposals of 154.7ML/d (a reduction in three-year average leakage by 2029–30 of 20.3% from 2019–20 levels)[13] to a PCL of 151.2ML/d (a reduction in three-year average leakage by 2029–30 of 21.8% from 2019–20 levels).[14] This increases the scale of the challenge to a reduction in 3-year average leakage **of 10.8ML/d, or 6.6%** by 2029–30, from the 2024–25 PCL.

Moreover, Ofwat's approach does not account for the Tier 1 ODI incentive rate applied to Anglian and other companies that were proposing to move the leakage frontier forward when evaluating company proposals for enhancement expenditure. From the CMA redetermination:

> Ofwat told us… that in any event the Tier 1 penalty is not a proper penalty but a clawback… [this penalty] is a clawback mechanism to ensure that consumers do not pay for quality improvements that do not materialise.[15]

Ofwat's PR24 assessment does not adjust for the significant clawback of AMP7 enhancement expenditure when assessing companies' proposals for leakage performance at AMP8 relative to their PR19 PCLs. As we set out in more detail below (section 3.3.1), given Anglian's position,[16] the design of the clawback effectively means that Anglian has been funded only for the improvement in leakage that it delivered in AMP7, rather than the ex-ante PCL. Therefore, when evaluating Anglian's enhancement proposals for AMP8, these should be considered to fund the difference between Anglian's current position and the proposed AMP8 PCL—as of the business plan submission a gap of 17%.

We address this in more detail in section 3.3 of the report.

Third, Ofwat rejects all claims for companies that are currently leading the sector in order to maintain their current performance levels. This

[13] Anglian Water (2023), 'ANH03 Data tables - October 2023 submission', accessed on 24 August 2024 at: https://www.anglianwater.co.uk/siteassets/household/about-us/pr24/anh03-data-tables---october-2023-submission.xlsb.
[14] Ofwat (2024), 'PR24-DD-PCM_Leakage', sheet: 'Additional information', cell: 'K15', accessed on 26 August 2024 at: https://www.ofwat.gov.uk/wp-content/uploads/2024/07/PR24-DD-PCM_Leakage.xlsx.
[15] Competition and Markets Authority (2021), 'Anglian Water Services Limited, Bristol Water plc, Northumbrian Water Limited and Yorkshire Water Services Limited price determinations: Final report', 17 March, paras 8.187–8.188, accessed on 15 August 2024 at: https://assets.publishing.service.gov.uk/media/60702370e90e076f5589bb8f/Final_Report_---_web_version_-_CMA.pdf.
[16] As a company that has delivered performance improvements relative to the 2019–20 frontier of performance, but has fallen short of its AMP7 PCL.

reverses Ofwat's previous position at the PR19 FD and the CMA's in its redetermination of the PR19 FD. While Ofwat cites analysis from the new leakage costs dataset that 'suggests that maintaining lower leakage levels does not cost more',[17] it does not provide sufficient detail on how this analysis has been undertaken and the robustness of the results (on this point we provide evidence to the contrary, as discussed below).

Given its position that maintaining a higher level of performance does not incur additional costs, Ofwat then does not consider any need to evaluate whether the companies that constitute the cost benchmark have better or worse performance than the levels of leakage that Anglian is expected to maintain. The average levels of leakage per 1,000km of mains over the benchmark period of 2018–19 to 2022–23 for the five companies[18] that form the cost efficiency benchmark on the relevant set of cost models (treated water distribution) range from **6.3**ML/d/1,000km to **19.7**ML/d/1,000km—relative to Anglian's performance of **4.8**ML/d/1,000km over the same period.

Using the leakage costs dataset, we present econometric evidence (in section 3.1) that demonstrates a statistically significant relationship between leakage costs and both current performance *and* performance improvements. We compute the incremental cost allowances implied by this model for Anglian's DD proposals, given an implicit allowance based on the performance of the companies assessed to be most cost efficient in treated water distribution. We identify leakage TOTEX underfunding across base and enhancement of £100.8m–£195.4m relative to these benchmark companies (excluding Thames). By comparison, Anglian submitted total expenditure proposals for £103m[19] in additional funding in its PR24 business plan.

We address this in more detail in section 3.2 of the report.

As a result, Ofwat's DD outcome is highly sensitive to the assumption that the cost and risk associated with making leakage improvements is no more difficult for companies performing at the frontier of leakage performance than for other companies. The evidence that we present indicates that this is not the case, and therefore that Anglian's leakage ODI and funding settlement at the PR24 DD does not adequately account for the higher costs associated with achieving and maintaining

[17] Ofwat (2024), 'PR24-DD-ANH_Cost-adjustment-claims', sheet: ANH_CAC4, accessed on 21 August 2024 at: https://www.ofwat.gov.uk/wp-content/uploads/2024/07/PR24-DD-ANH_Cost-adjustment-claims.xlsx.
[18] South West, Portsmouth, United Utilities, South Staffs and Thames.
[19] £68m for a base cost adjustment claim, and £35m as an enhancement claim.

the sector-leading levels of leakage performance implied by the current PCL.

This approach to calibrating leakage funding and incentives serves to undermine the incentives on companies pushing the frontier on leakage performance, as companies that make significant improvements to leakage beyond the performance frontier are not funded in future price controls to maintain and improve beyond that level. This perverse incentive is ultimately detrimental to customers, particularly those in water stressed regions, such as the East of England.

To redress the detriment to customers, and to secure an achievable price control settlement with respect to leakage, our assessment suggests that Ofwat will need to either consider adjusting Anglian's funding settlement to better align with the PCL that it has put forward, or reduce the level of the PCL in line with the performance being expected by other companies.

1 Historical performance

1.1 Introduction

In this section, we summarise companies' historical performance and regulatory treatment under PR19, with a focus on Anglian Water's performance relative to other industry players. We review the allowances granted by Ofwat in PR19 in relation to the stretch implied by the PR19 Performance Commitment Levels (PCLs), and the resulting financial performance.

The remainder of this section is structured as follows:

- section 1.2 discusses historical performance on leakage across the industry from 2011–12 onwards;
- section 1.3 details the PCLs and allowances set in PR19;
- section 1.4 analyses the financial performance of companies with respect to leakage Outcome Delivery Incentive (ODIs) over AMP7.

1.2 Historical performance on leakage

Leakage performance has varied historically across companies. Prior to PR19, this was driven by an agreed economic framework under which companies would only reduce leakage where the benefits of doing so outweighed the costs, based on a 'sustainable economic level of leakage' (SELL) model. The principle behind SELL is that it represents the level of leakage where the incremental costs and benefits of reducing leakage are exactly equal.[20]

Anglian Water has historically led the sector in securing improvements to the supply–demand balance through activity to reduce leakage. Investment and innovation to reduce leakage levels have been driven primarily by the more acute pressures on water supply in Anglian's catchment relative to those of most other companies—as well as evidence that reducing leakage was a key priority for Anglian's customers.[21] Anglian remains one of the top performers, with some of the lowest leakage rates per km of mains and per property in the

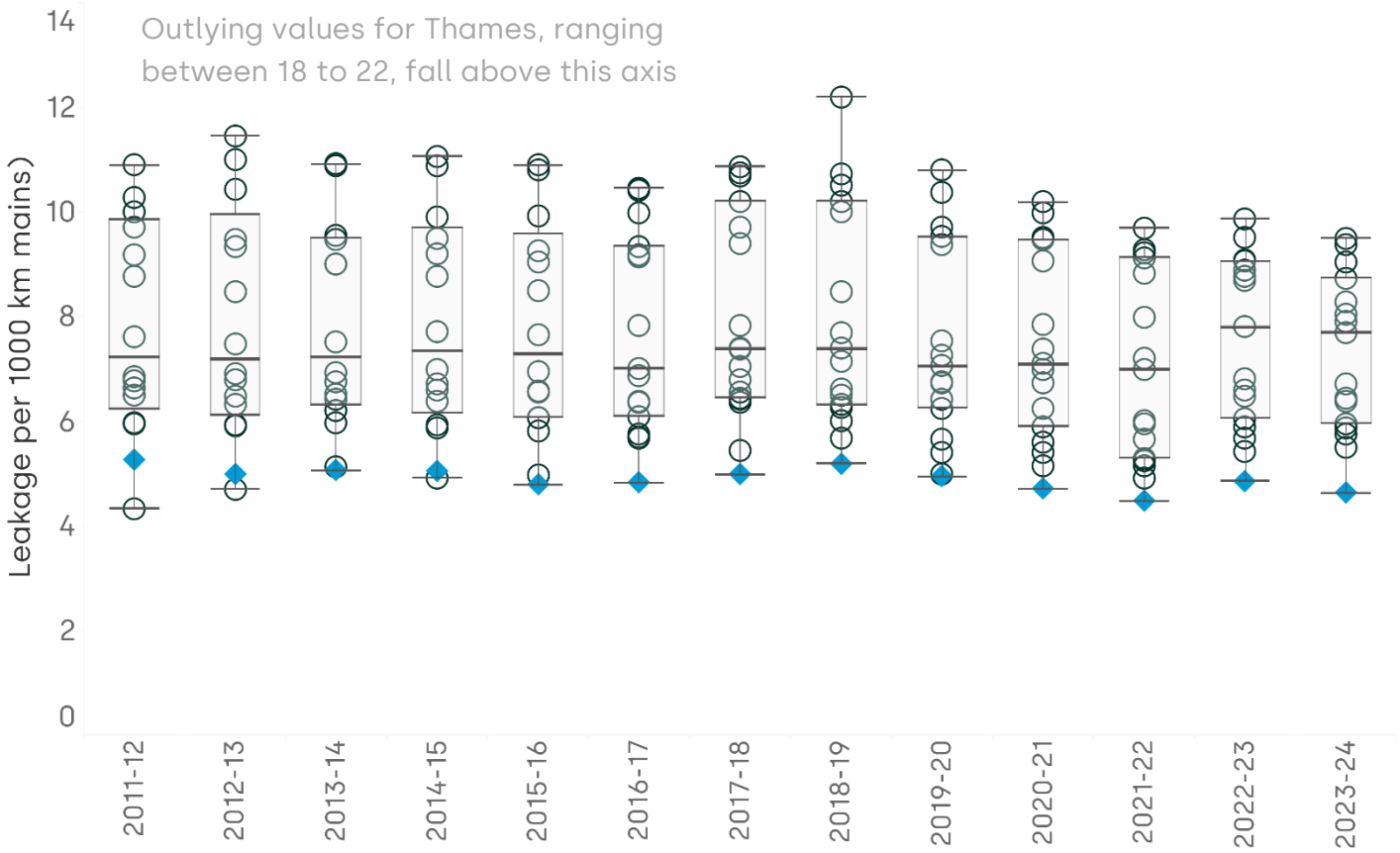
[20] Competition and Markets Authority (2021), 'Anglian Water Services Limited, Bristol Water plc, Northumbrian Water Limited and Yorkshire Water Services Limited price determinations: Final report', 17 March, para. 8.11, accessed on 15 August 2024 at: https://assets.publishing.service.gov.uk/media/60702370e90e076f5589bb8f/Final_Report_---_web_version_-_CMA.pdf.

[21] Anglian Water Customer Engagement Forum (2014), 'Representation on the Draft Determination', 1 October.

industry. In addition to Anglian, other high performers on leakage include Bristol Water, Wessex Water and SES Water.

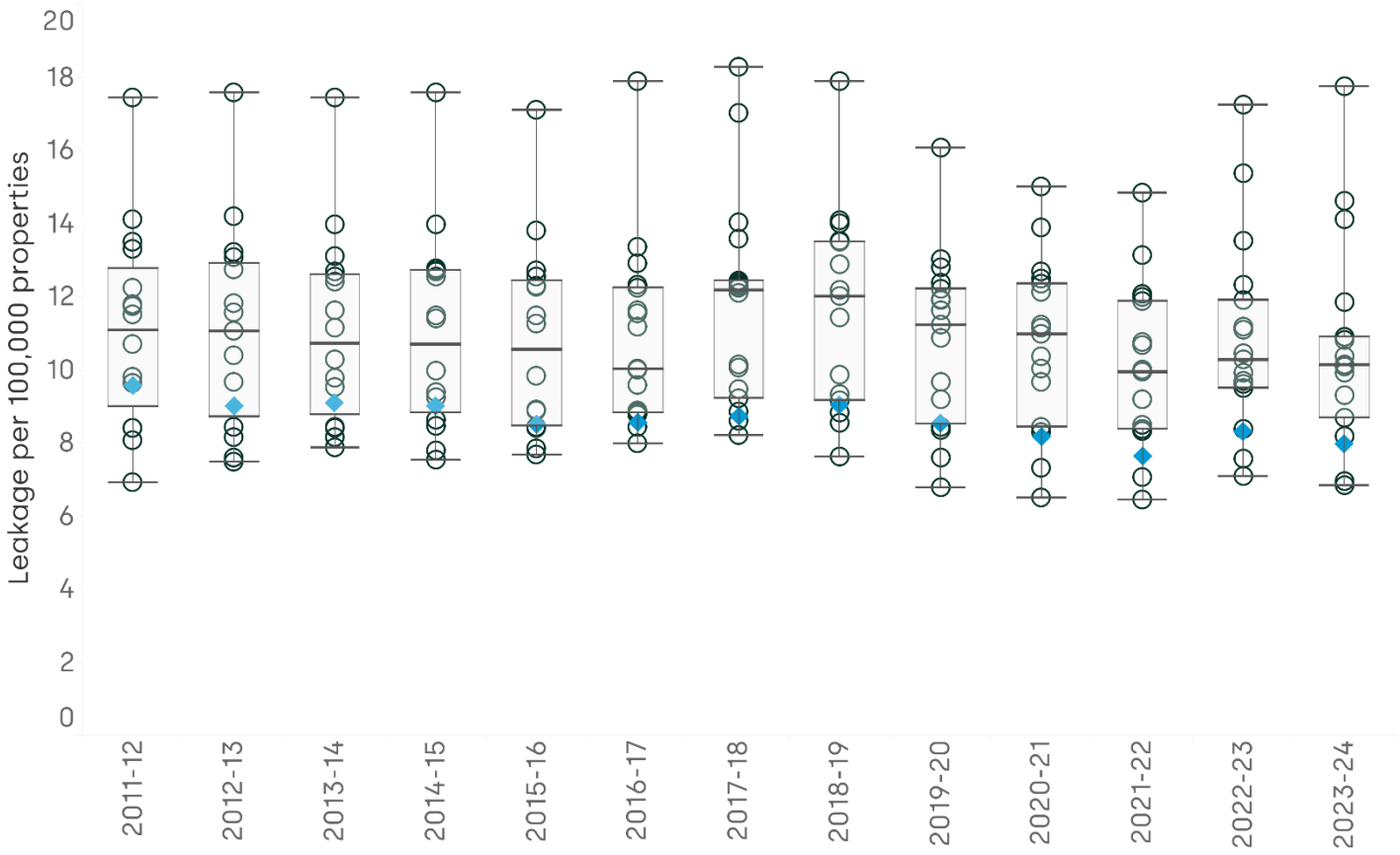
Figure 1.1 and Figure 1.2 illustrates Anglian Water's position (in blue) relative to those of other companies, based on leakage rates normalised per 1,000km of mains and per 100,000 properties. Industry-wide leakage performance per mains length and per property has remained fairly constant since 2011–12, with no significant reduction observed during this period.

Figure 1.1 Historical performance in leakage (ML/d) per 1,000km of mains length (Anglian shown in blue)



Note: The historical performance of Anglian Water is shown in blue. The boxes represent the interquartile range of company performance, bisected by median performance.
Source: Oxera analysis based on data from Ofwat model 'Water – Leakage; enhancement expenditure model'; and Ofwat model 'Leakage' for 2011–23. For 2023–24 data we used companies' published 2023–24 Annual Performance Report values.

Figure 1.2 Historical performance in leakage (ML/d) per 100,000 properties (Anglian shown in blue)



Note: The historical performance of Anglian Water is shown in blue. The boxes represent the interquartile range of company performance, bisected by median performance.
Source: Oxera analysis based on data from Ofwat model 'Water – Leakage; enhancement expenditure model'; and Ofwat model 'Leakage' for 2011–23. For 2023–24 data we used companies' published 2023–24 Annual Performance Report values.

1.3 PR19 Performance commitment levels and allowances

In PR19, Ofwat introduced a common ODI to incentivise leakage performance, given its view that previous methods had not achieved sufficient efficiency improvements or innovation. Under the PR19 framework, Ofwat required companies to achieve at least a 15% reduction in leakage from their annual levels and to reach forecast upper-quartile performance.[22]

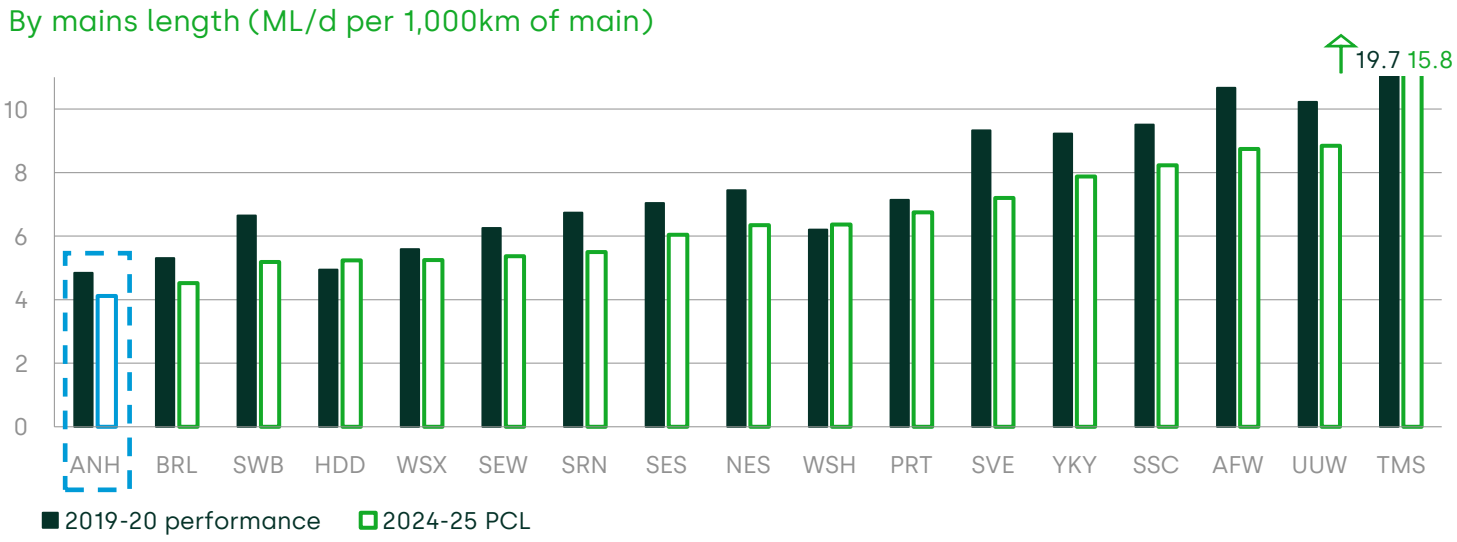
[22] Ofwat (2019), 'PR19 Final Determinations: Delivering outcomes for customers policy Appendix', December, pp. 33–40.

This led to the introduction of leakage-specific PCLs for the first time, marking a significant departure from PR14. There had been no equivalent common incentive for leakage performance at PR14.

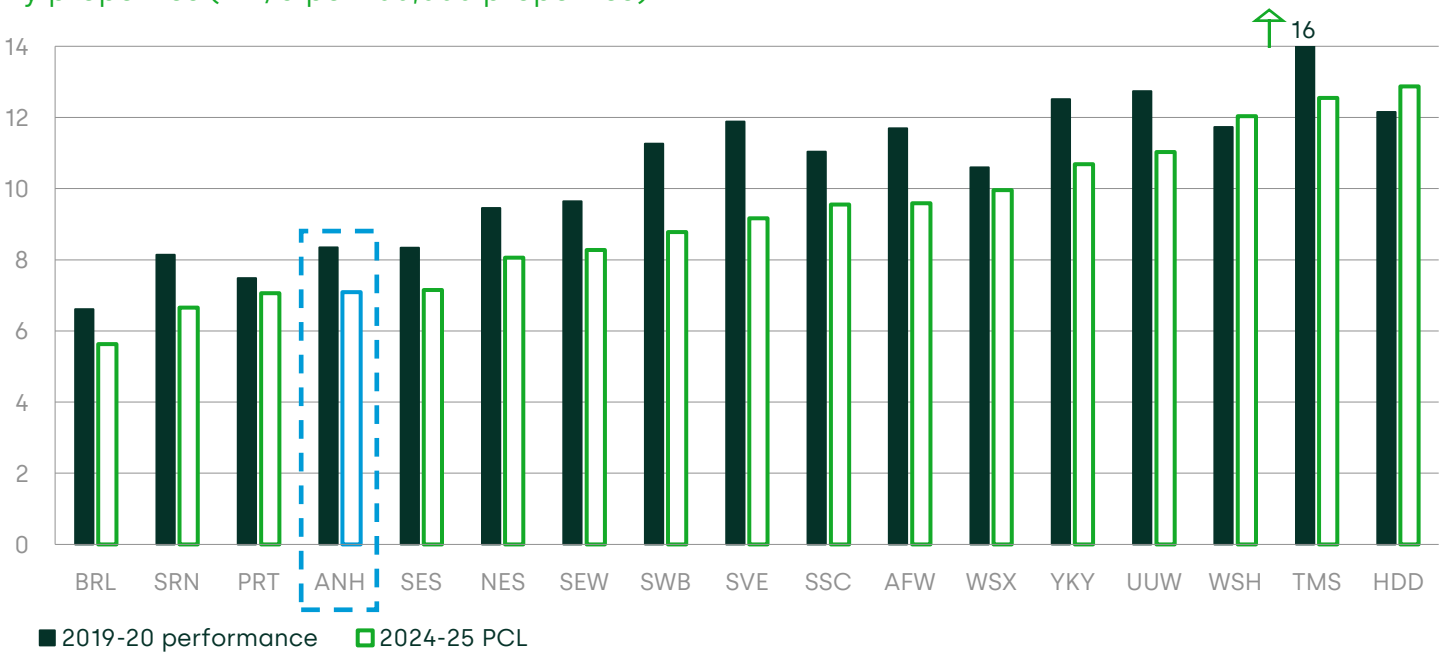
To account for varying leakage performance across the industry, Ofwat established individual PCLs for all companies. These PCLs challenged companies to deliver a 15% reduction in leakage by 2024–25, measured as a percentage decrease in annual average leakage relative to the outturn value for 2019–20 company performance.

Figure 1.3 below illustrates the different PCLs set for each company, normalised per 1,000km of mains and per 100,000 properties consistent with the figure above. It highlights significant variation in targets across the industry—driven by companies' starting position in 2019–20 and level of ambition at PR19. We order the chart from the most demanding PCL in 2024–25 (Anglian/Bristol) to the least demanding PCL (Thames/Hafren). This highlights the substantial variation across companies' targets, with a 115–130% spread between the most and least demanding targets (excluding Thames).

Figure 1.3 Leakage PCLs in PR19, by level of leakage (ML/d) per mains or property



By properties (ML/d per 100,000 properties)



Source: Oxera analysis based on data from Ofwat model 'Water – Leakage; enhancement expenditure model'; and Ofwat model 'Leakage'. Anglian PCLs have been adjusted to reflect accurate data.

Compared with other companies, Anglian Water had one of the most demanding (i.e. lowest) leakage PCLs per mains length and properties during AMP7. This marked a significant performance improvement to be made from its 2019–20 position.

For companies to meet the PR19 PCLs, Ofwat expected significant leakage reductions to be delivered from base. It granted enhancement funding for leakage only to the four companies that reduced leakage beyond the upper-quartile performance level (Anglian, SES, South East and Bristol), and a base adjustment for Anglian to maintain its high level of leakage.[23] Following a subsequent redetermination, the Competition and Markets Authority (CMA) changed the enhancement allowances for Anglian, Bristol and Yorkshire, and also included a base leakage allowance to Anglian Water. The table below summarises the final allowances that companies received during AMP7.[24]

[23] Ibid.
[24] Competition and Markets Authority (2021), 'Anglian Water Services Limited, Bristol Water plc, Northumbrian Water Limited and Yorkshire Water Services Limited price determinations: Final report', pp. 729–736, accessed on 15 August at:

For companies that received enhancement expenditure, Ofwat introduced a Tier 1 ODI rate linked to this funding. This mechanism was designed to recover ('clawback') funds if the company did not meet its enhancement targets (i.e. the PCL).[25] As a result, a proportion of leakage enhancement funding has effectively been returned through these tiered rates for companies that underperformed against their AMP7 PCL. This is set out in Table 1.1. The right-hand column of the table shows the adjusted allowances, after accounting for the outturn and anticipated clawbacks in enhancement funding, and the relevant cost-sharing rates for each of these companies. This construct effectively means the level of leakage delivered is the level of leakage that was funded.

Table 1.1 Leakage allowances for AMP7 (PR19 FD or CMA), before and after enhancement expected clawbacks

Company	PR19 FD/CMA base leakage allowance (£m)	PR19 FD/CMA enhancement leakage allowance, before clawbacks (*A*) (£m)	Anticipated enhancement clawbacks (*B*) (£m)	PR19 FD/CMA enhancement leakage allowance, after clawbacks (*A-B*) (£m)
Anglian Water	50.3	75.7	34.4[1]	**41.3**
Bristol Water	–	5.5	1.5	**4.1**
Yorkshire Water	–	33.3	1.4	**31.9**
SES Water	–	10.2	0.2	**10.0**
South East Water	–	31.5	7.8	**23.7**

Note: Units are in £ million over the whole 2020–25 price control in 2022–23 prices. The expected clawbacks for the years 2019–20 to 2023–24 have been calculated based on outturn performance, the increment between the relevant Tier 1 and Tier 2 penalty rates (under PR19 or the CMA determination), and the deviation from the companies' PCLs. The 2024–25 performance forecast for Anglian is included in order to estimate the anticipated clawback for that period. We do not calculate the expected clawback for other companies in 2024–25 due to the lack of company forecasts. We have used Anglian's PCL from the PR19 Final Determination. We have not done this for the other

https://assets.publishing.service.gov.uk/media/60702370e90e076f5589bb8f/Final_Report_---_web_version_-_CMA.pdf.

[25] Ofwat (2019), 'PR19 Final Determinations: Delivering outcomes for customers policy Appendix', December, pp. 115–116, accessed on 24 August 2024 at: https://www.ofwat.gov.uk/wp-content/uploads/2019/12/PR19-final-determinations-Delivering-outcomes-for-customers-policy-appendix.pdf.

companies. [1] Based on a penalty of £13.1m (£, 2017–18) adjusted for cost sharing (45%) and inflated to a 2022–23 price base.
Source: Oxera based on data from Ofwat model 'Wholesale Water Enhancement feeder model: Supply demand balance'; Ofwat (2019), 'PR19 Final Determinations' for the different companies; and Competition and Markets Authority (2021), 'Anglian Water Services Limited, Bristol Water plc, Northumbrian Water Limited and Yorkshire Water Services Limited price determinations: Final report', pp. 729–736.

We note that, unlike more output-based price control deliverables, this clawback does not necessarily correspond to underinvestment by Anglian. Rather, Anglian spent considerably in excess of its ex-ante allowance for leakage enhancement expenditure[26]—driven in part by the extreme weather experienced in 2022-23.

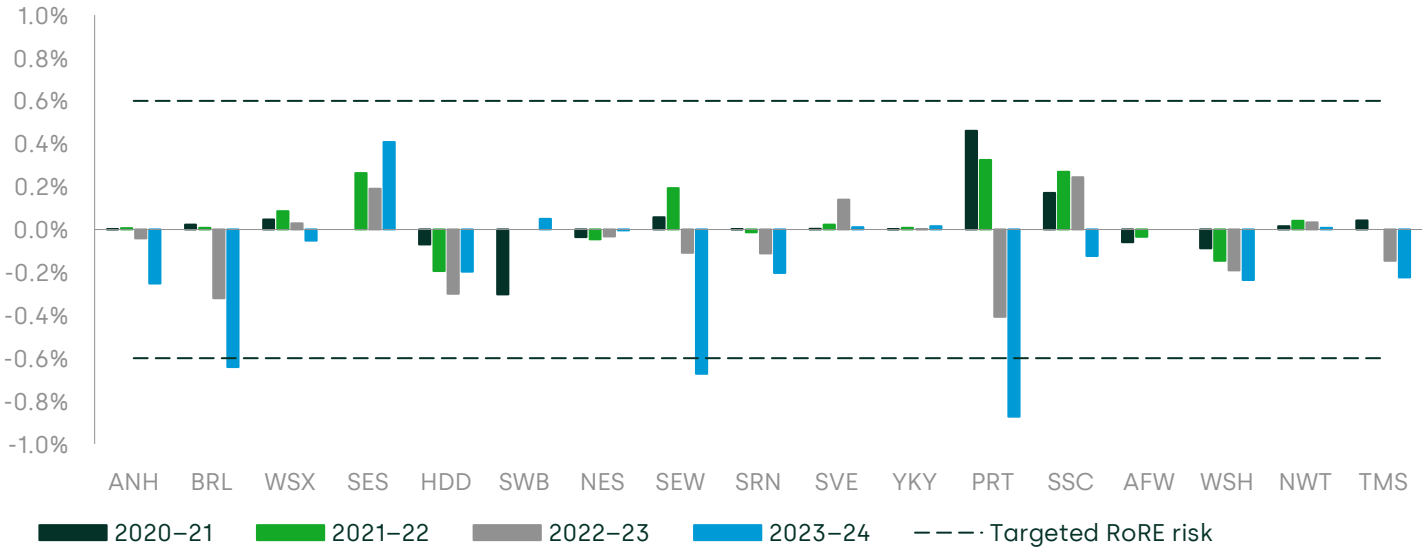
The significance of extreme weather events to explain leakage performance is recognised by Ofwat in the context of its modelling of other leakage enhancement expenditure. Ofwat includes only 2019–20 and 2021–22 data in the model it has developed, effectively discarding two of the three years of AMP7 available to it as a result of extreme weather.[27]

1.4 Financial performance over AMP7

Combining the PR19 leakage reduction PCLs with the performance of water companies over AMP7, we assess how the financial performance against the ODI regime has varied across companies at different levels of performance. Figure 1.4 shows the Return on Regulated Equity (RoRE) impact associated with the leakage PCL for each company across the years of AMP7. We order the companies from left to right, from the company with the lowest leakage on the left to the company with the highest levels of leakage on the right (normalised by mains length).

[26] Anglian has spent £103.8m for leakage in the first four years of AMP7 to date, relative to an ex-ante allowance of £75.7m and a post-clawback allowance of £41.3m (£, 2022–23).
[27] Ofwat (2024), 'Water – Leakage; enhancement expenditure model', sheet: 2019&2021 APR analysis, accessed on 22 August 2024 at: https://www.ofwat.gov.uk/wp-content/uploads/2024/07/PR24-DD-W-Leakage.xlsm.

Figure 1.4 RoRE impact associated with leakage reduction PCL during AMP7, by company—ordered from best (left) to worst (right) performance in 2023–24



Source: Oxera analysis based on data from Ofwat website, 'Water Company Performance', for 2020–21 to 2022–23. For 2023–24 data we used companies' published 2023–24 Annual Performance Report values. Errors in the data for SES for earlier years have been revised using Annual Performance Reports.

As the PCL becomes more challenging each year, financial penalties have increased in later years of the AMP for some companies. In 2023–24, several companies approach or exceed the PR24 targeted RoRE downside risk of 0.6% for high-priority performance commitments such as leakage. The industry paid net penalties of £37m in 2023–24 and is forecasting to finish the AMP in a net penalty position of over £100m,[28] dropping to around £50m when Thames and Welsh are excluded.

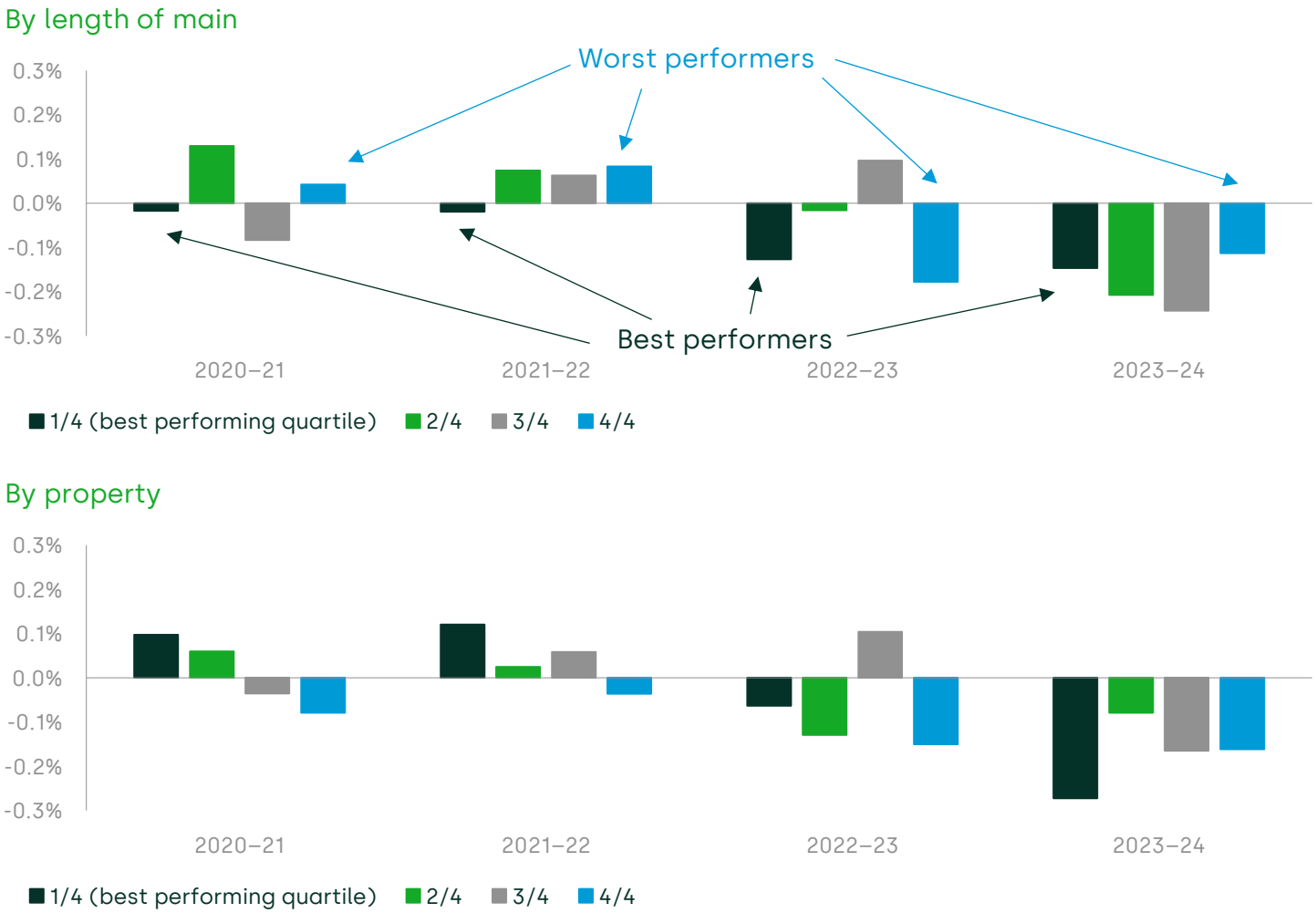
Notably, unlike other ODIs such as water supply interruptions, much of the variation between companies is explained by the variation in company PCLs rather than performance. This can be seen in the chart above, where placement towards the left or right is not associated with higher or lower levels of RoRE rewards or penalties.

In Figure 1.5 below, we categorise the RoRE impacts associated with the leakage reduction PCL by performance quartile for each corresponding year. The first quartile represents the best performance (i.e. lowest

[28] Based on those companies that have provided a forecast of AMP7-close position on the leakage ODI in the 2023-24 APR, with Hafren, Severn Trent, South West, United Utilities and Bristol submitting a missing or 0 AMP-close forecast.

leakage), while the last quartile represents the worst performance (i.e. highest leakage). This demonstrates the extent to which the ODI regime for leakage is driven by the company-specific PCLs summarised previously, rather than relative performance.

Figure 1.5 RoRE impact associated with leakage reduction PCL during AMP7, by quartiles for leakage per 1,000km of mains length and leakage per property performance (1/4 is the highest-performing quartile, 4/4 is the worst-performing quartile)

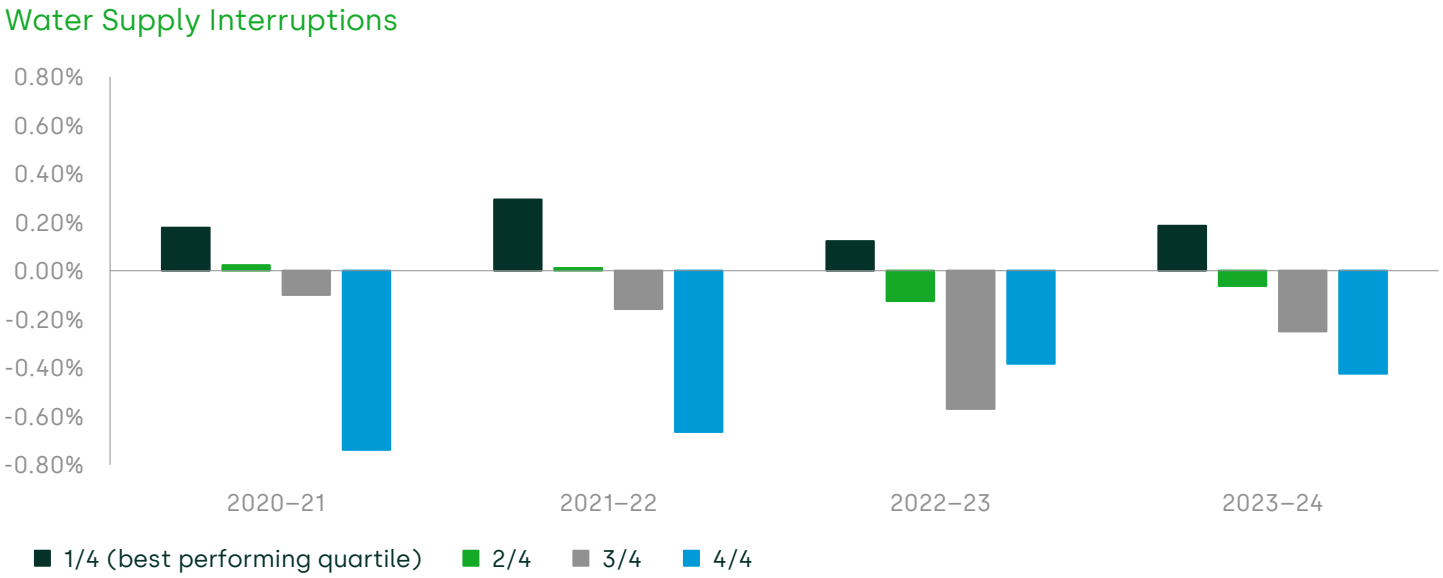


Source: Oxera analysis based on data from Ofwat website, 'Water Company Performance' for 2020/21 to 2022–23. For 2023–24 data we used companies' published 2023–24 Annual Performance Report values.

This contrasts with almost all other PR19 common ODIs—such as supply interruptions, total pollution incidents and internal sewer flooding, where the target was set on a common basis. For those measures, companies' outturn RoRE performance is clearly explained by their

relative performance—as can be seen in Figure 1.6 below for supply interruptions. The best quartile performers consistently earn greater rewards commensurate with their performance, while lower quartiles equivalently face penalties.

Figure 1.6 PR19 RoRE impact for water supply interruptions, by performance quartile (1/4 is the highest-performing quartile, 4/4 is the worst-performing quartile)



Source: Oxera analysis based on data from Ofwat website, 'Water Company Performance' for 2020–21 to 2022–23. For 2023–24 data we used companies' published 2023–24 Annual Performance Report values.

1.5 Conclusion

We highlight the following key points that can be drawn from the AMP7 outturn data, which are of relevance to assessing the PR24 DD position.

- Companies faced significantly different PCLs for leakage at PR19, depending on their starting position. These targets drive a significant proportion of companies' financial performance on the leakage ODI.
- Companies have struggled to meet increasingly stretching PCLs as AMP7 has progressed, with the majority of companies underperforming in the latest year of data.
    - As the AMP has progressed, this issue has been particularly pronounced for those at the frontier of leakage performance, as the PCL target rachets beyond the

historical frontier, as the ODI performance trends shown in Figure 1.4 demonstrate.

- Limited funding was made available at PR19—all of which was provided for companies that were at, or pushing, the frontier of leakage performance. However as a result of the performance challenges faced at AMP7, much of this funding has been returned to customers through the Tier 1 ODI arrangement. This is particularly relevant for considering the baseline level of performance that companies can be expected to deliver in AMP8.
- When evaluating the level of leakage improvement that Anglian was funded to deliver, this should be considered net of the anticipated and outturn clawback as a result of the Tier 1 ODI rate. As we cover in section 3, this should form part of the assessment for what Anglian is funded to deliver in PR24.

2 The PR24 Draft Determinations

2.1 Introduction

This section summarises the provisional outcomes in Ofwat's PR24 Draft Determinations (DD), assessing the level of stretch implied by the PCLs and allowances for Anglian Water and the industry as a whole. It also evaluates the risks associated with the incentive rates and PCLs set for the leakage ODI in the DD.

The remainder of this section is structured as follows:

- Section 2.2 discusses the PR24 DD PCLs;
- Section 2.3 covers the allowances set for leakage-related activities in the PR24 DD;
- Section 2.4 analyses the risks associated with Ofwat's proposed PR24 ODI regime for leakage;
- Section 2.5 concludes.

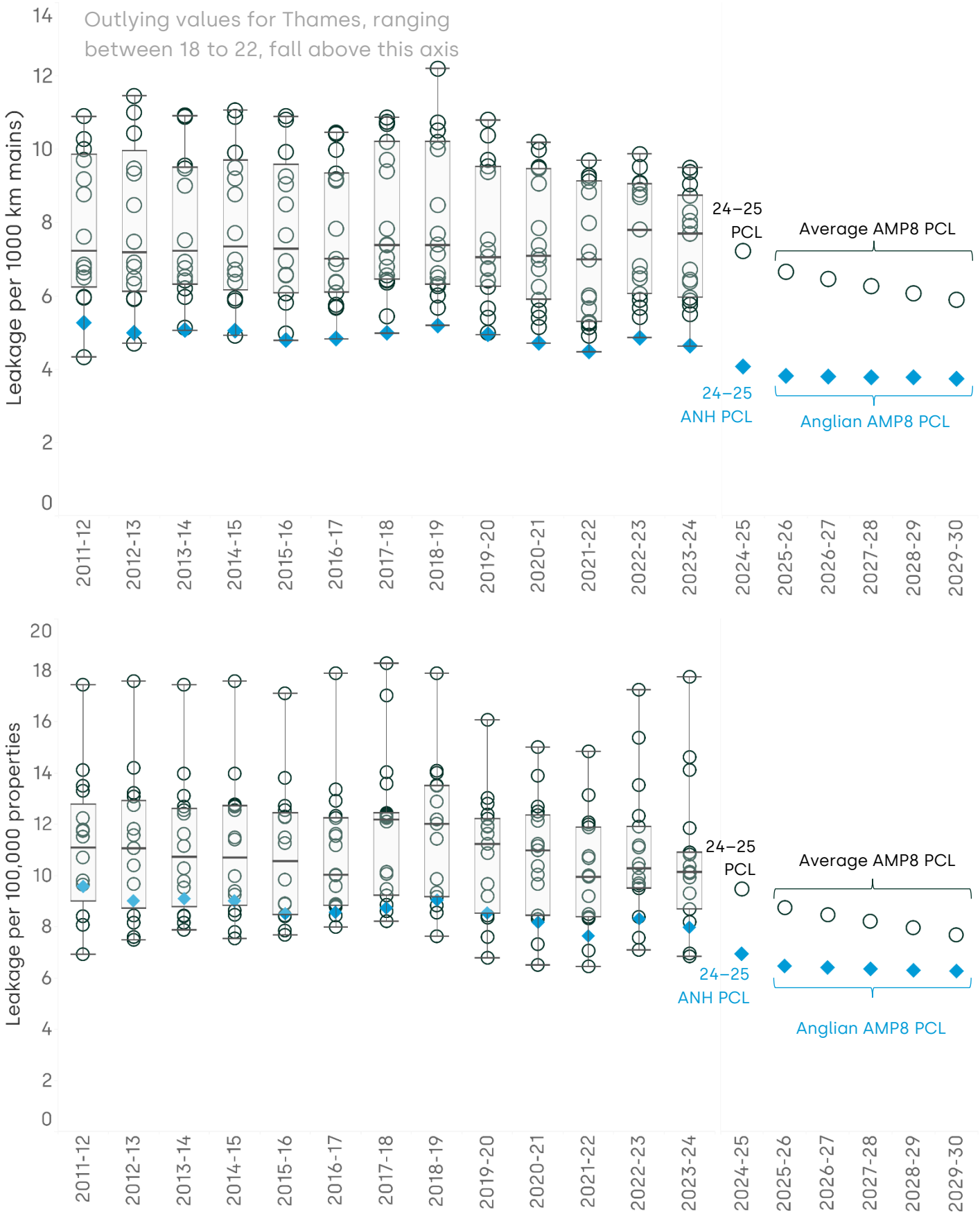
2.2 PR24 PCLs

In its PR24 DD, Ofwat has continued to propose company-specific PCLs as part of its long-term objective to reduce leakage.

In setting PR24 DD PCLs, Ofwat has expected companies with higher leakage levels to propose ambitious leakage reductions, while accepting lower proposed reductions from companies with already lower leakage levels. Ofwat has set the PR19 2024–25 PCL as a starting point for PR24, meaning that companies above their PR19 leakage PCL in the final year will need to achieve significantly greater leakage reductions in order to avoid paying penalties.

In total, the proposed PCLs deliver a combined leakage reduction of 13% over the 2025–30 period. The industry-average and Anglian-specific PCLs are set out in Figure 2.1 below relative to recent industry performance.

Figure 2.1 Anglian and industry AMP8 PCLs against historical performance: i. per 1,000km mains; ii. per 100,000 property



Source: Oxera analysis based on data from Ofwat model 'Water – Leakage; enhancement expenditure model'; and Ofwat model 'Leakage' for 2011–23. For 2023–24 data we used companies' published 2023–24 Annual Performance Report values.

As illustrated above, Anglian Water is expected to achieve a substantial reduction in leakage from its current levels, achieving levels significantly below the industry-average PCL. On a leakage per mains basis, Anglian could deliver performance better than the industry as a whole, improve the frontier of performance, and still face significant net ODI penalties, as was the case during AMP7.

2.3 PR24 allowances

Ofwat has changed its approach to setting allowances from PR19, in that it is not formally setting a reduction level to be delivered from base allowances over 2025–30. Base funding will not support leakage reduction directly, but will cover activities such as mains renewal or metering that are expected to indirectly reduce leakage. When setting allowances for mains renewals, Ofwat has adjusted company proposals to account for mains renewal funded through base allowances.

Table 2.1 below details the enhancement allowances and leakage reduction proposed by Ofwat during PR24.

Table 2.1 PR24 leakage allowances and proposed leakage reductions in AMP8

Company	Leakage allowances (£m)	Leakage PCL per 1,000km of mains in 2029–30	Leakage reduction to deliver in 2029–30 from 2023–24 levels (%)
Severn Trent Water	170.0	6.0	24%
United Utilities Water	150.0	7.7	19%
Southern Water	49.8	4.8	38%
Thames Water	47.9	12.8	28%
South East Water	33.5	4.7	30%
Affinity Water	19.1	7.4	18%
Yorkshire Water	15.8	6.9	14%
Bristol Water	15.7	4.2	23%
South West Water	14.3	4.4	31%

Company	Leakage allowances (£m)	Leakage PCL per 1,000km of mains in 2029–30	Leakage reduction to deliver in 2029–30 from 2023–24 levels (%)
South Staffs Water	11.1	6.9	21%
Northumbrian Water	9.6	5.9	8%
SES Water	3.4	5.0	14%
Portsmouth Water	2.1	6.0	28%
Wessex Water	2.1	5.0	14%
Dŵr Cymru	1.5	5.6	40%
Hafren Dyfrdwy	1.0	4.7	21%
Anglian Water	0.0	3.8	17%

Source: Oxera analysis based on Ofwat (2024), 'Expenditure allowances', July, pp. 101–102; data from Ofwat model 'Water – Leakage; enhancement expenditure model'; and Ofwat model, 'Leakage'. For 2023–24 data we used companies' published 2023–24 Annual Performance Report values.

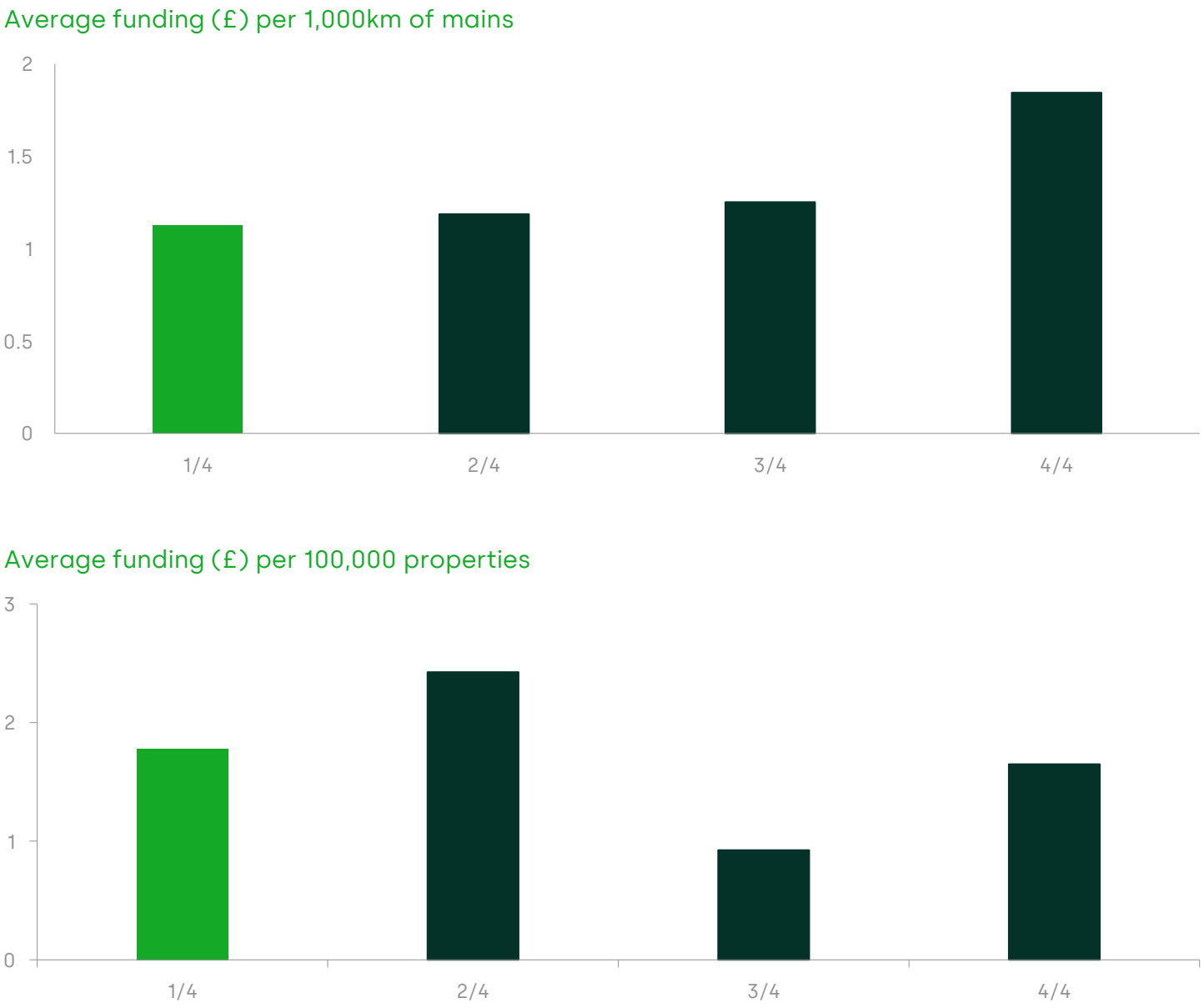
For Anglian Water, Ofwat does not grant any leakage-specific enhancement allowances, on the basis that although its PR24 PCL is sector-leading, it does not represent a material improvement beyond the PR19 PCL end-point. By withholding both base and enhancement allowances, Ofwat implies that maintaining the current low levels of leakage is costless, especially for a company with among the lowest leakage levels in the industry. Ofwat does not document the evidence base and analysis that it has used to make this conclusion, beyond referencing some correlation analysis (summarised in section 3). This approach implies that Ofwat is effectively rewarding poor past performance on leakage while penalising those at the frontier.

Anglian Water is expected to deliver the lowest leakage per mains length in the industry by 2029–30, while receiving no allowance to deliver such leakage reduction from its current leakage performance (17%). By using the PR19 2024–25 PCL as the baseline for PR24, Ofwat overlooks the fact that, after accounting for the enhancement clawback discussed in section 1.3 above, Anglian Water has not been funded to reach the 2024–25 PCLs. In other words, the company has not been allocated funding to achieve a 17% reduction from its current 2023–24 levels, either in PR19 or in PR24.

Figure 2.2 below shows the proposed leakage enhancement funding by performance quartile implied by the 2029–30 PCLs. It highlights that

companies that are targeted to be at the frontier of performance in 2029–30 are not receiving substantially higher enhancement funding. In fact, when funding is assessed per unit of mains length, these frontier companies, on average, receive the lowest enhancement leakage funding in PR24.

Figure 2.2 Average enhancement funding received by companies, by quartiles for leakage performance implied by 2029–30 PCLs



Note: The quartiles represent leakage levels as implied by the 2029–30 PCLs. The first quartile (i.e. on the furthest left) represents the lowest leakage level implied by the 2029–30 PCLs, while the last quartile (i.e. on the furthest right) represents the highest leakage level implied by the 2029–30 PCLs.
Source: Oxera analysis based on Ofwat (2024), 'PR24 Draft Determinations: Delivering outcomes for customers and the environment', July; and data from Ofwat model 'Water

– Leakage; enhancement expenditure model'; and Ofwat model 'Leakage'. For 2023–24 data we used companies' published 2023–24 Annual Performance Report values.

At PR19, the top-performing firms received additional base and enhancement allowances to meet materially more challenging targets than were faced by the rest of the industry. The PR24 DD represents a fundamental shift in approach—where some top performers are receiving little or no additional funding, while being required to meet and maintain significantly lower leakage targets in order to avoid ODI penalties.

2.4 Level of risk associated with meeting the PR24 DD leakage ODI

Ofwat assesses the risk range associated with the leakage ODI based on risk modelling using both a five-year additive and Monte Carlo approach. These models use historical data on company performance against their PCLs to estimate a P10 and P90 level of risk exposure around ODI performance. For leakage, this is based on the three years of AMP7 performance against companies' PR19 leakage ODIs. For strategic ODIs, such as leakage, Ofwat aims to set their risk exposure at +/-0.6% RoRE—i.e. the P10 expectation should indicate operational penalties no greater than 0.6% RoRE, and equivalently the P90 expectation should indicate operational rewards no greater than 0.6% RoRE.

As we set out in section 1, PCLs at PR19 were based on different levels of normalised performance for companies depending on their AMP6 closing performance. As a result, the input data on performance to assess the risk associated with Anglian's leakage PCL is not based on Anglian's proposed PR24 PCL, but is instead based on an average of significantly less challenging company PR19 PCLs. Indeed, on a mains-normalised basis the PCL being set for Anglian at PR24 has never been met by any company in the historical period. On a property-normalised basis, Anglian's 2029–30 PCL has been met only once—by Bristol in 2021–22.

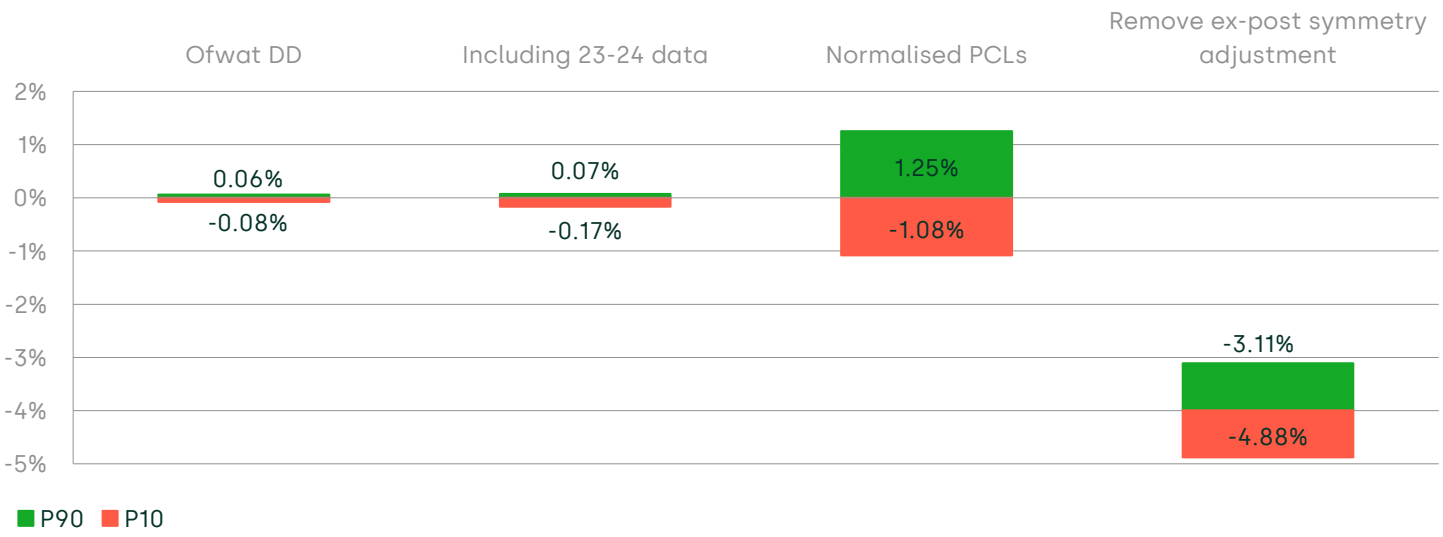
To explore the effect of this assumption, we have adjusted Ofwat's five-year additive risk model to evaluate companies' historical performance relative to a normalised level of performance equivalent to Anglian's PR19 PCL—rather than company-specific PCLs. In the chart below, we show the outcome of this analysis separated into four bars:

- the first, leftmost, bar shows Ofwat's stated P90 and P10 risk exposure in its PR24 DD;

- the second bar shows the impact of including the new year of 2023–24 performance data, and making no further changes to Ofwat's model;
- the third bar shows the impact of changing the historical PCLs to reflect Anglian's PR19 PCL, on a normalised basis per mains length;
- the fourth bar shows the impact of removing Ofwat's ex-post adjustment to historical performance that forces the estimate P50 to equal zero. We note that this adjustment factor is not based on any empirical evidence (for example, around industry trends), but rather is designed to ensure a symmetrical performance range even if the underlying data indicates historical evidence of asymmetric performance.

It can be seen that the latter two changes substantially increase the implied risk exposure faced around Anglian's leakage PCL, with a P10 of -1.1% and -4.8% RoRE respectively. We find similar results when re-estimating Ofwat's suite of Monte Carlo models for leakage.

Figure 2.3 PR24 leakage ODI risk model, P10 and P90 RoRE (%)



Source: Oxera analysis based on Ofwat's five-year additive performance range and RoRE payment models, accessed on 24 August 2024 at: https://www.ofwat.gov.uk/wp-content/uploads/2024/07/PR24-DD-ODI-risk-5-Year-Additive-Performance-Range-model.xlsx and https://www.ofwat.gov.uk/wp-content/uploads/2024/07/PR24-DD-ODI-risk-5-Year-Additive-RoRE-Payments-model.xlsx. Underlying changes to assumptions are summarised above and provided along with the charts as part of the Oxera datapack (ANH_DD_077 to ANH_DD_083). Note, as a P50 scenario is not calculated as part of the additive model, for the ex-post symmetry adjustment (the fourth bar) we calculate the midpoint as the simple average between P10 and P90 in order to define the line between the P90 upside (green) and P10 downside (red).

Using Ofwat's risk model, we show that this would imply a sizeable increase in the risk range around the ODI. A downside (P10) of 4.88% indicates downside risk exposure 8 times greater than the +/-0.6% maximum RoRE risk exposure target Ofwat has set for strategic ODIs such as leakage. While there may be some factors unaccounted for in this normalisation, Ofwat's risk analysis makes no adjustment for companies' ability to meet their historical PCLs. Our analysis indicates the sensitivity of Ofwat's approach to assessing risk to its assumption that company PCLs remain unchanged, regardless of the level of performance from which companies are improving.

This is consistent with the evidence in section 1 that companies at the performance frontier for leakage have tended to underperform against the leakage ODI over AMP7, relative to some peers that faced less challenging targets on a normalised basis.

Indeed, there has been a considerable increase in the ODI incentive rate associated with leakage at the PR24 DD, by design. As Ofwat sets out in the outcomes appendix to its PR24 DD:

For most companies, the rate proposed for PR24 is significantly stronger than at PR19. This reflects our overarching aim to set powerful incentives on performance.[29]

For Anglian its ODI penalty incentive rate more than doubles from a PR19 level of £0.43m per ML/d of leakage (£, 2022–23)[30] to £0.91m per ML/d of leakage at the PR24 DD. It seems counterintuitive that Ofwat finds a balanced ex-ante risk range within +/0.6% RoRE when company performance over AMP7 has been skewed to the downside and has exceeded that threshold for a number of companies (see Figure 1.4, above).

Ofwat is combining these higher ODI rates with more stretching leakage PCLs at AMP8. Given evidence that companies at the performance frontier for leakage have tended to underperform against the leakage ODI over AMP7 (see Figure 1.5, above), the historical AMP7 evidence also seems to support a wider risk range associated with the PR24 DD than identified by Ofwat's risk model without adjustments.

[29] Ofwat (2024), 'PR24 draft determinations: Delivering outcomes for customers and the environment', July, p.90
[30] £365,000 (£, 2017–18).

2.5 Conclusion

We highlight the following key points from our assessment of the PR24 DD position.

- As at PR19, companies at the frontier of leakage performance (such as Anglian) face materially more demanding targets than the industry average.
- Leakage allowances are only available where Ofwat assesses companies' PCLs to represent a significant stretch, relative to the (company-specific) 2024–25 AMP7 PCL. Unlike PR19, no funding is made available on the basis of companies' relative performance.
- Ofwat does not seem to have accounted for the Tier 1 ODI incentive rates when assessing the appropriate AMP7 PCL to evaluate company AMP8 proposals against.
- Ofwat's risk assessment may significantly understate the scope of downside risk for companies that face the most challenging leakage PCLs (on a relative, normalised basis), particularly in the context of more challenging targets and higher ODI rates.

In other words, Ofwat evaluates risk based on average performance across the industry over a period in which other companies faced significantly higher leakage PCLs. Its analysis of AMP8 leakage ODI risk neglects to consider the significant risk exposure for companies that aim to deliver industry-frontier performance.

3 The relationship between funding and leakage performance

3.1 Introduction: the statistical relationship between leakage and expenditure

As summarised in section 1.3, the PR19 price control gave additional funding to companies on the basis of the existence of a relationship between the level of leakage performance and base expenditure. This recognised that companies that sustain particularly low levels of leakage face additional costs associated with maintaining that level, before accounting for any additional improvements to be funded through enhancement expenditure.

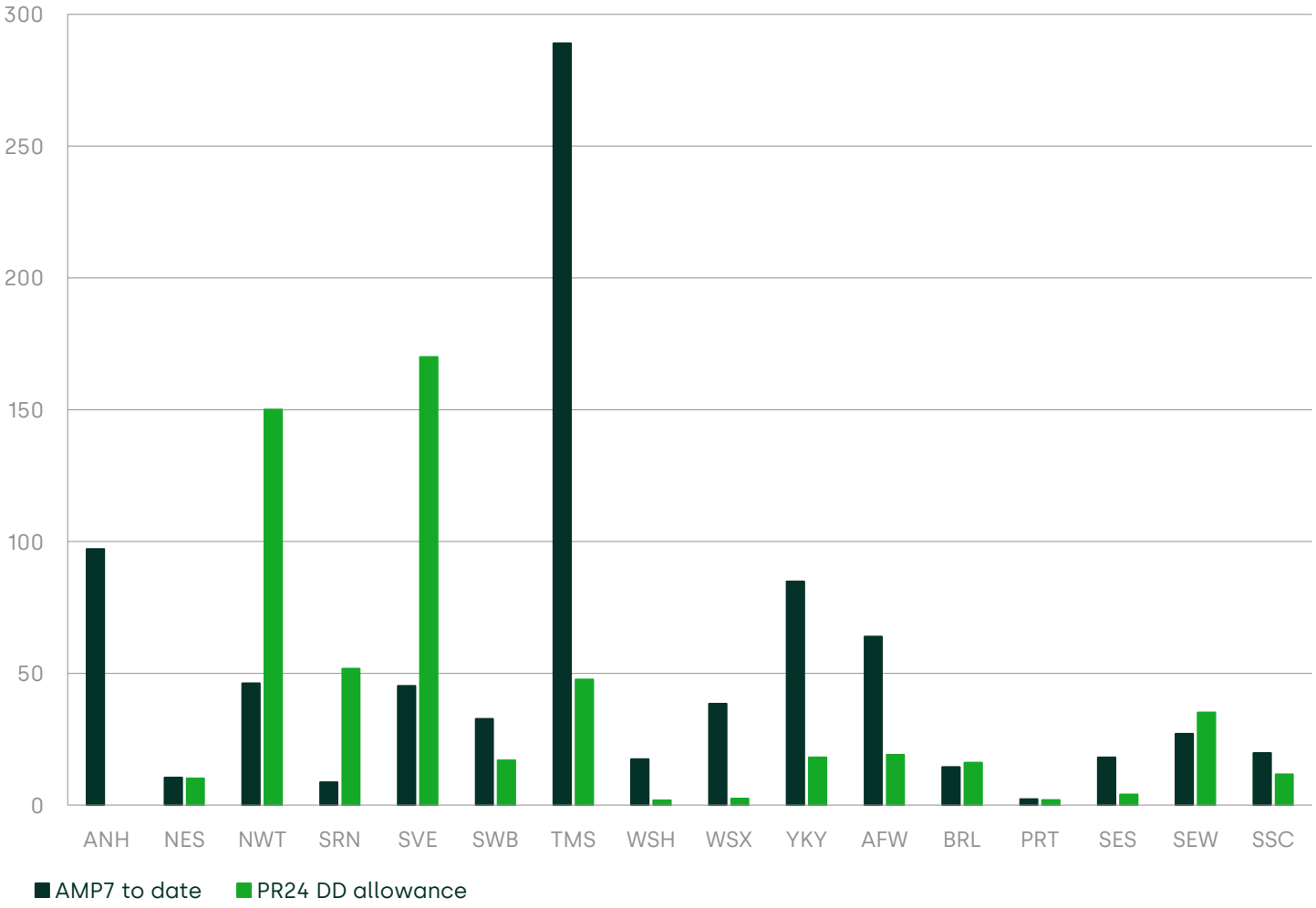
In its redetermination of the PR19 FD, the CMA noted that:

Since we conclude that there is a link between current performance on leakage and the costs to achieve that level of leakage, then those companies currently performing better than upper quartile are likely to be incurring more cost than will be reflected in the base cost models. In order to maintain their current level of performance, these high performing companies would be expected to incur costs that exceed the implicit allowance for leakage costs that is included in the base cost allowance.[31]

At PR24, Ofwat only provides funding for companies to make improvements relative to their PR19 PCL for 2024–25—regardless of how these benchmark against other companies' leakage PCLs. Ofwat states that the total allowance for leakage enhancement (£557m) provided across the industry at PR24 is similar to companies' outturn expenditure to reduce leakage (which we estimate for enhancement expenditure at £815m for the first four years of AMP8). However, individual companies will receive enhancement allowances that are significantly different to their outturn, as set out in Figure 3.1 below.

[31] Competition and Markets Authority (2021), 'Anglian Water Services Limited, Bristol Water plc, Northumbrian Water Limited and Yorkshire Water Services Limited price determinations', para. 8.59, 17 March.

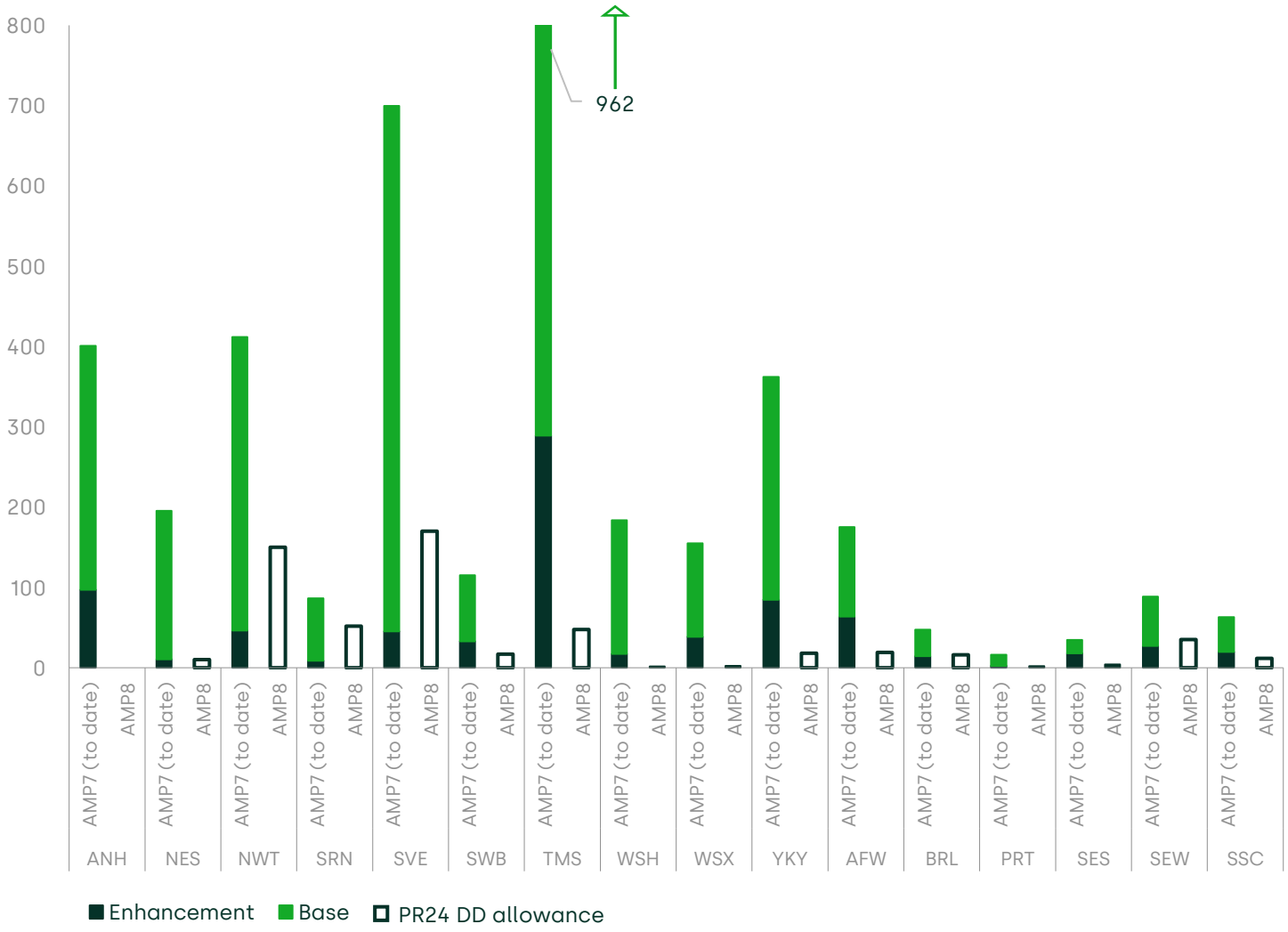
Figure 3.1 Expenditure to reduce leakage (enhancement): first four years of AMP7 against PR24 DD allowance, £m (2022–23)



Source: Oxera based on data from Ofwat model 'PR24-DD-W-Leakage'; and Ofwat (2024), 'PR24 draft determinations: Expenditure allowances', p. 101. For 2023–24 data we used companies' published 2023–24 Annual Performance Report values.

Some companies, such as United Utilities (NWT), Severn Trent (SVE) and Southern (SRN), receive substantially greater allowances than their AMP7 enhancement expenditure to date. Ofwat notes that some of its expenditure allowance for these companies overlaps with their base expenditure allowance claims. Figure 3.2 below illustrates the base and enhancement expenditure on leakage during the first four years of AMP7, against the PR24 DD allowance.

Figure 3.2 Expenditure to reduce (enhancement) and maintain (base) leakage: first four years of AMP7 against PR24 DD allowance, £m (2022–23)



Source: Oxera based on data from Ofwat model 'PR24-DD-W-Leakage'; and Ofwat (2024), 'PR24 draft determinations: Expenditure allowances', p. 101. For 2023–24 data we used companies' published 2023–24 Annual Performance Report values.

In the context of Ofwat retaining differential leakage PCLs, this departure from the PR19 and CMA precedent could be justified only if the only driver of leakage costs is percentage improvement. The costs associated with improving would need to be unaffected by companies' starting positions, and there would have to be negligible, if any, incremental costs associated with maintaining leakage performance relative to the implicit allowance provided for in the base cost models. This appears to be the position that Ofwat takes in rejecting Anglian's

cost adjustment claim for £67.6m of funding to maintain its frontier-leading performance:[32]

We have since collected further data from water companies on the cost to maintain and reduce leakage. Our analysis suggests that **maintaining lower leakage levels does not cost more**. The correlation between leakage spend per property and leakage per property shows a mixed picture at a company level. Across the industry, **companies with lower leakage levels per property tend to incur lower costs per property. Anglian Water has one of the lowest levels of leakage per property.** The company's costs to maintain leakage have gone up in recent years, but there appears to be little correlation between the company's levels of leakage and spending to maintain leakage over the last six years. [emphasis added]

We note that the analysis underpinning the finding that Ofwat relies upon to justify this departure from its PR19 approach is not readily available from the PR24 DD files that we have reviewed.

Operationally, Ofwat's separation of leakage activities into expenditure to (i) maintain; and (ii) reduce leakage is to an extent artificial. Fundamentally, the activities that will be carried out by the company to retain leakage performance at the current level will look similar to the activities required to improve leakage performance—in both cases similar interventions are being made to prevent, become aware of, locate and mend leakage (the PALM categories)[33].

We note that Ofwat's guidance in relation to allocating costs between maintaining and reducing leakage does not differentiate between activities, but rather to apportion expenditure between the cost to reduce leakage volumes such that current performance is maintained vs achieving reductions in leakage volumes beyond that.

There is an expectation that companies should be able to determine the costs and activities that are related to maintaining the current level of leakage… In summary there are three options we consider that companies could use to proportionally allocate costs between maintain and reduce:

[32] Ofwat (2024), 'PR24-DD-ANH_Cost-adjustment-claims', 11 July, worksheet ANH_CAC4.
[33] These decomposition of activities into Prevent, Aware, Locate and Mend (PALM) is set out in Ofwat's April 2022 leakage cost data request, Ofwat (2022), 'Leakage information request 2017–22 – supporting guidance', April, accessed on 24 August 2024 at: https://www.ofwat.gov.uk/wp-content/uploads/2022/04/Leakage-information-request-2017-22-%E2%80%93-supporting-guidance.pdf.

> A. proportionally allocate maintain/reduce costs based on consideration of volumes of leakage required to maintain the previous years reported level and volumes of reduction beyond this achieved in the reporting year. With volume required to maintain the previous year's level based on an assessment of NRR for the reporting year.
>
> B. proportionally allocate... With volume required to maintain the previous year's level based upon steady state analysis of repairs and using appropriate flow rate and leak growth data along with leak run times to determine the volume required to maintain.
>
> C. Where companies are unable to provide either of the above methods or have an alternative approach to estimating the volume required to maintain leakage this can be provided with a full explanation of the approach taken...[34]

As such, we have considered how this can inform the development of robust statistical models of leakage using the leakage costs dataset collected by Ofwat over AMP7. This records leakage costs over the period 2018–19 to 2022–23.

In particular, we have developed these models of leakage TOTEX (i.e. aggregating 'maintain and reduce' lines) to assess the relative statistical evidence for Ofwat's revised PR24 position on leakage funding (that only percentage improvements should be funded) relative to the position that it and the CMA took during the PR19 process.

We developed a model capturing unit leakage costs on both a per mains or a per property basis. We control for two cost drivers:

- **unit leakage performance**, divided by mains or properties (consistent with the dependent cost variable)—this is intended to capture the cost pressures of sustaining a higher level of performance once it has been attained;
- **the reduction or increase in leakage** next year attained by activities taken over the course of the year—this captures the cost associated with improving performance, realised the next

[34] Ofwat (2022), 'Leakage information request 2017–22– supporting guidance', April, accessed on 24 August 2024 at: https://www.ofwat.gov.uk/wp-content/uploads/2022/04/Leakage-information-request-2017-22-%E2%80%93-supporting-guidance.pdf.

year to reflect the lag in when expenditure can deliver performance benefits.[35]

Conditional on removing several companies with outlying values,[36] both drivers are statistically significant in our model, with an intuitive sign. This result is robust to including the additional 2023–24 year of data[37] and considering log specifications. We set out the resulting model coefficients in Table 3.1.

Table 3.1 Leakage model specifications, including 2023–24 data

Coefficients	Model 1 (levels, per mains)	Model 2 (levels, per property)
Leakage in-year, per mains/properties	-0.2449**	-0.2650**
	(0.015)	(0.017)
Change in leakage next-year, per mains/properties	-0.2002**	-0.1979**
	(0.046)	(0.046)
Constant	0.0039***	0.0554***
	(0.000)	(0.000)
Within R^2	0.2052	0.1789
Between R^2	0.1305	-0.2636

Note: * denotes a coefficient is statistically significant at the 10% level (i.e. a p value less than 0.1), ** denotes a coefficient is statistically significant at the 5% level (i.e. a p value less than 0.05), *** denotes a coefficient is statistically significant at the 1% level (i.e. a p value less than 0.01).
Source: Oxera analysis using data from Ofwat model 'Water – Leakage; enhancement expenditure model', supplemented with data from company annual reports in 2023–24

This provides clear statistical evidence that maintaining a lower level of leakage (i.e. higher performance) is associated with increased costs (coefficient 1), *and* that improving leakage performance incurs significant costs (coefficient 2). This analysis indicates that Ofwat's conceptual approach to funding leakage at PR19—rewarding leading

[35] As an extreme example, expenditure in spring 2022 is unlikely to have any effect on performance over summer–winter 2021, even though the two fall within the same financial year and yet would be considered as contemporaneous within an econometric model.
[36] We remove Thames Water throughout. We remove values for Hafren and Welsh where these present a discontinuity in the data (for the former because of a misreporting issue with Severn Trent, and for the latter due to the reassessment of its leakage position in 2022–23).
[37] There are significant discontinuities in reported data for Affinity and Yorkshire in the 2023–24 APR, so we exclude these pending finalisation of the APR. The results from the data including the 2023–24 data, both in terms of coefficient values, statistical significance and cost predictions, are similar between models that include and exclude the new year of data.

performance through a base adjustment, while providing enhancement for improvements—is better supported by the empirical evidence than its PR24 DD approach.

A number of methodologies could be used to implement an approach to leakage funding in line with these findings. These include the analysis developed by Ofwat and the CMA at PR19 and the combination of operational and statistical evidence put forward by companies, such as Anglian's PR24 base Cost Adjustment Claim and enhancement submission.

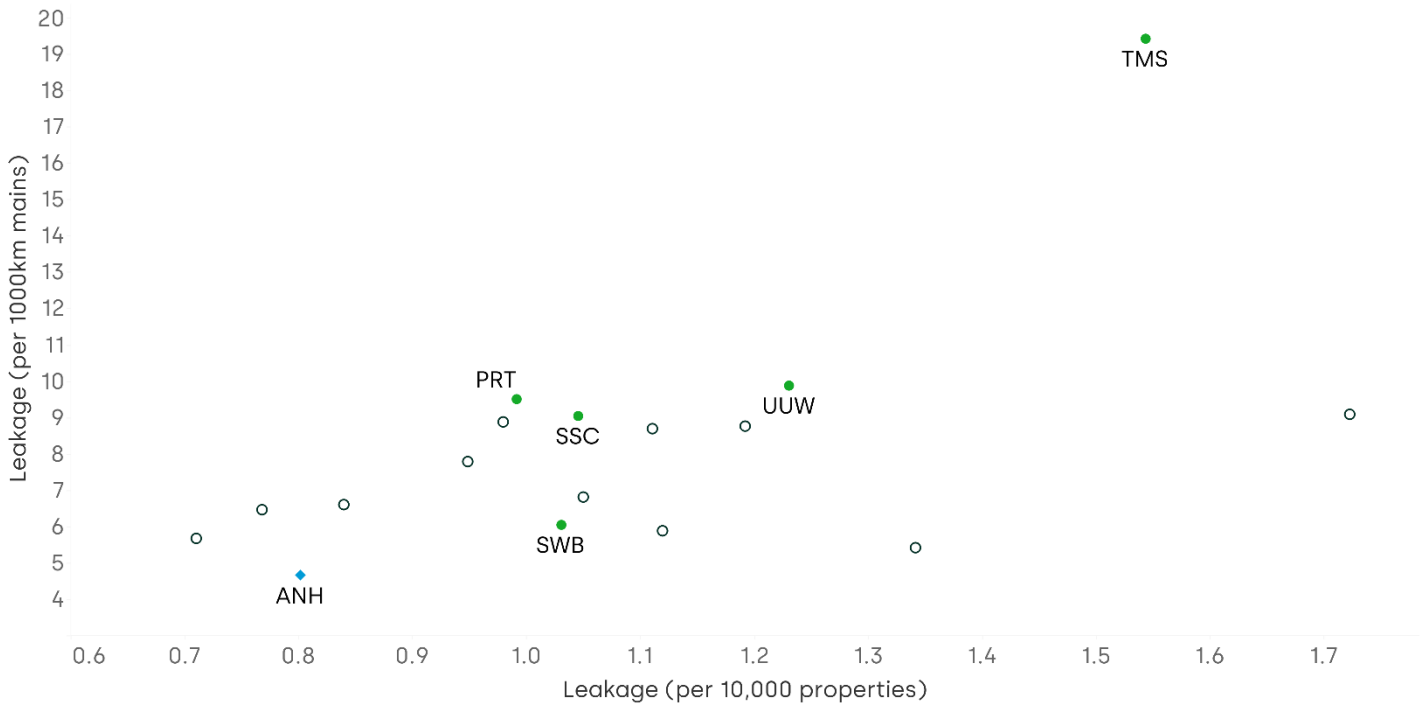
We supplement this existing evidence base by considering how the above model could be used to quantify an overall allowance (across enhancement and base expenditure) for Anglian, net of an implicit allowance.

3.2 Quantifying the costs associated with meeting Ofwat's PR24 PCL

The modelling suite that we have developed captures the relationship between a given PCL and direct leakage expenditure. However, a proportion of these costs will be funded within companies' existing base expenditure allowances.

To evaluate the level of performance that is implicitly funded through Ofwat's base modelling suite, we consider the leakage performance of the five companies that constitute and influence the upper-quartile benchmark in the treated water distribution modelling suite—Portsmouth, South Staffs, South West, United Utilities and Thames. We show the leakage performance of these five companies (measured per property and per mains length) in Figure 3.3 below, marked in green. Anglian (ANH) is marked in blue.

Figure 3.3 Leakage performance (ML/d) per mains (vertical axis) and per property (horizontal axis) in 2023–24



Source: Oxera analysis based on companies' published 2023–24 Annual Performance Report values. Highlighted companies based on the companies influencing the upper quartile assessment with Ofwat's

To quantify the required funding net of the implicit allowance, we first calculate the gross leakage allowance for Anglian, fitting the model specifications shown above onto the PR24 PCL values for leakage improvement. This gives a total level of required leakage funding for AMP8 of between £87m–£113m p.a.,[38] relative to historical levels of expenditure of £88m–£110m p.a. over AMP7. This is consistent with historical expenditure, given the significant additional stretch required to meet the PR29 PCL relative to historical performance (150ML/d, compared with 170ML/d–180ML/d).

Next, we compute an implicit allowance for the level of funding provided for in the base models based on the historical leakage performance and improvement of the five benchmark companies. We exclude Thames, consistent with our approach to excluding it as an outlier from the

[38] The £90m is from the model based on leakage per property, while the £115m is from the model based on leakage per length of mains.

regression modelling and to ensure that we do not understate the size of the implicit allowance.

We net this implicit allowance from the gross leakage allowance to arrive at a net leakage funding requirement of £20m–£39m p.a.[39] The resulting total funding allowance for the AMP8 period of £100.8m–£195.4m, net of any base implicit allowance, ranges significantly above Anglian's combined TOTEX (Cost Adjustment Claim plus enhancement) funding put forward in its business plan.

In the next section, we review the specific approach taken to assessing Anglian's enhancement submission, before concluding with implications for the PR24 FD.

3.3 Ofwat's assessment of Anglian's enhancement submission

3.3.1 Ofwat's approach to assessing enhancement

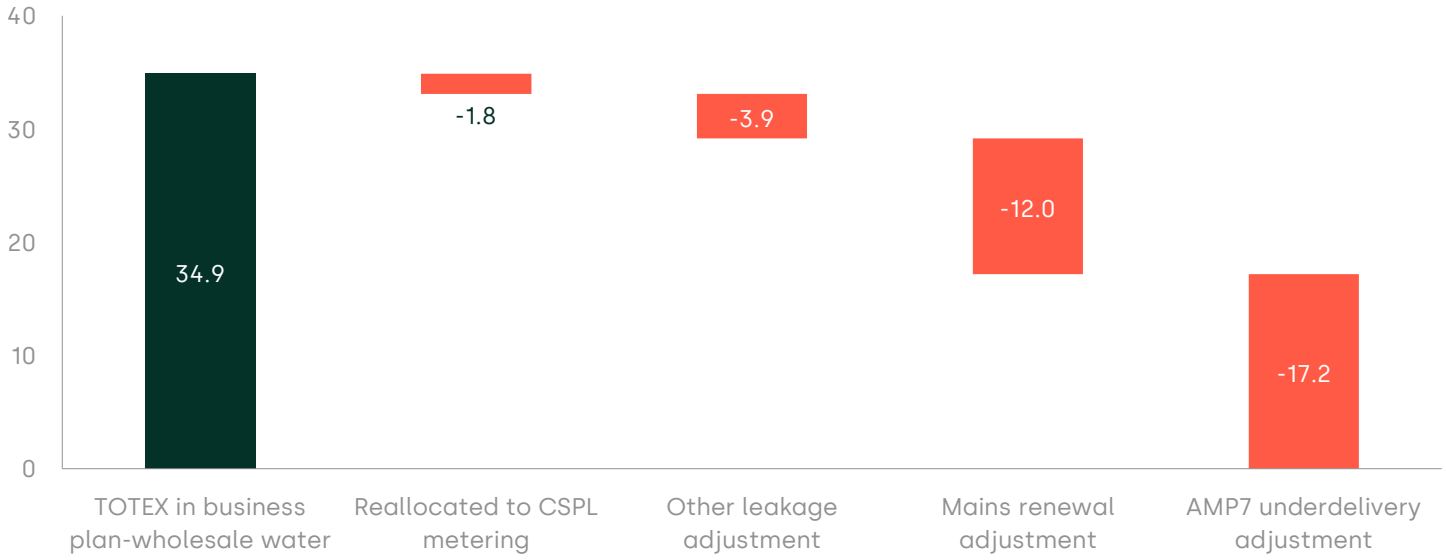
As noted above, Ofwat does not provide Anglian with enhancement funding for leakage over AMP8. This is the result of a four-step process:

- **£1.8m** of expenditure to fund reducing leakage through private water supply pipes (customer supply pipe leakage, CSPL) through metering is reallocated to companies' compulsory metering programme;
- **£3.9m** of expenditure is removed from the 'other leakage' category based on a unit rate analysis undertaken by Ofwat on the efficient cost to fund ML/d improvements to leakage based on its analysis of historical costs to reduce leakage in 2019–20 and 2021/22;
- **£12.0m** is removed from the 'mains renewal' category based on the unit cost to replace mains derived by Ofwat as part of its asset condition analysis and associated Price Control Deliverable (PCD);
- **£17.2m** (the residual funding submission) is removed on the basis that Anglian's proposed PCL for PR24 does not represent a sufficiently significant improvement on its PR19 PCL.

We set out each of these adjustments in turn in Figure 3.4 below.

[39] The £20m is from the model based on leakage per property, while the £39m is from the model based on leakage per length of mains.

Figure 3.4 Ofwat's assessment of Anglian's leakage enhancement, £m (2022–23)



Source: Oxera analysis based on data from Ofwat (2024), 'PR24-DD-W-Leakage', June.

We address the AMP7 'underdelivery adjustment' and the use of a unit cost adjustment in turn below.

3.3.2 Alleged AMP7 underdelivery

In its PR24 business plan, Anglian proposed to commit to delivering performance in line with its PR19 PCL over the course of AMP8. This represents a significant step change relative to any company's performance over AMP7.

Ofwat disallows Anglian's residual enhancement expenditure on the basis that Anglian is not proposing to go significantly further than its PR19 PCL, and that customers have already paid for this level of performance through the AMP7 bills. As we have noted in the Executive Summary above, Ofwat's view that Anglian's PR24 business plan did not go further than its 2024–25 PCL appears to be based on a different view of the AMP7 PCLs to that in Anglian's PR19 FD (post CMA redetermination). Correcting the 2024–25 PR19 PCL would give an implied reduction of **6.6%**, rather than Ofwat's stated value of 0.4%. This

is comparable with several companies that receive enhancement funding, such as Wessex Water (5.5%) and Bristol Water (6.3%).[40]

It is unclear how Ofwat has recognised the role of the Tier 1 ODI incentive rates developed at PR19 and retained by the CMA in the PR24 DD assessment. The Tier 1 ODI rates were calibrated to return enhancement funding to customers if companies' performance was worse than the PCL level. The intent of the Tier 1 ODI rates is summarised by the CMA in its redetermination:

Two penalty rates apply to Anglian and Bristol. The Tier 1 penalties applied only to companies that had been awarded enhancement spending. If a company maintained its 2019–20 level of performance, but did no better, it would have to return its enhancement cost allowance to customers. This would act as a clawback mechanism for the enhancement totex they received.[41]

As these incentive rates were directly calibrated to return enhancement funding to customers, there should not be a need for further intervention to avoid double-funding. As applied to Anglian, the Tier 1 penalty effectively returns Anglian to a position in which it had submitted a PCL that was commensurate with its outturn AMP7 performance.

A second consideration in assessing the PR24 DD assessment is the extent to which this has been calibrated against a reasonable expectation of performance. The outturn experience from AMP7 has indicated that there are significant operational challenges with improving leakage performance beyond the frontier defined by Anglian and other leading companies. This is underlined by Ofwat's decision to exclude data from 2020–21 and 2022–23 in assessing the efficiency of 'other leakage enhancement expenditure'. Ofwat effectively discards two of the three years of AMP7 available to it on the basis of atypically extreme weather events.[42] Additionally, as extreme weather events

[40] Ofwat (2024), 'PR24 draft determinations: Expenditure allowances', July, pp. 101–102, accessed on 26 August 2024 at: https://www.ofwat.gov.uk/wp-content/uploads/2024/07/PR24-draft-determinations-Expenditure-allowances-to-upload.pdf.
[41] Competition and Markets Authority (2021), 'Anglian Water Services Limited, Bristol Water plc, Northumbrian Water Limited and Yorkshire Water Services Limited price determinations: Final report', 17 March, para. 8.177, accessed on 15 August 2024 at: https://assets.publishing.service.gov.uk/media/60702370e90e076f5589bb8f/Final_Report_---_web_version_-_CMA.pdf.
[42] Ofwat (2024), 'Water – Leakage; enhancement expenditure model', sheet: 2019&2021 APR analysis, accessed on 22 August 2024 at: https://www.ofwat.gov.uk/wp-content/uploads/2024/07/PR24-DD-W-Leakage.xlsm.

become more frequent in future AMPs due to climate change, the cost of achieving and sustaining strong performance is likely to rise further.

Finally, Ofwat's approach should be evaluated in the context that it is the only mechanism through which companies can receive additional base or enhancement expenditure to fund leakage improvements. Given the evidence considered by Ofwat and the CMA during the PR19 determination process, submitted by Anglian and other companies in their business plans, and summarised in section 3.2 above, the funding approach should reflect the higher costs associated with maintaining lower levels of leakage.

3.3.3 Unit cost comparisons

The use of unit cost measures to assess the efficiency of different companies' leakage costs was evaluated in principle as part of the PR19 CMA redetermination. The CMA found the following:

> The use of an upper quartile-based unit cost measure may not allow for differences in circumstances between companies, which could be significant as companies are starting with different leakage levels and have different scope for pursuing low cost options...[43]

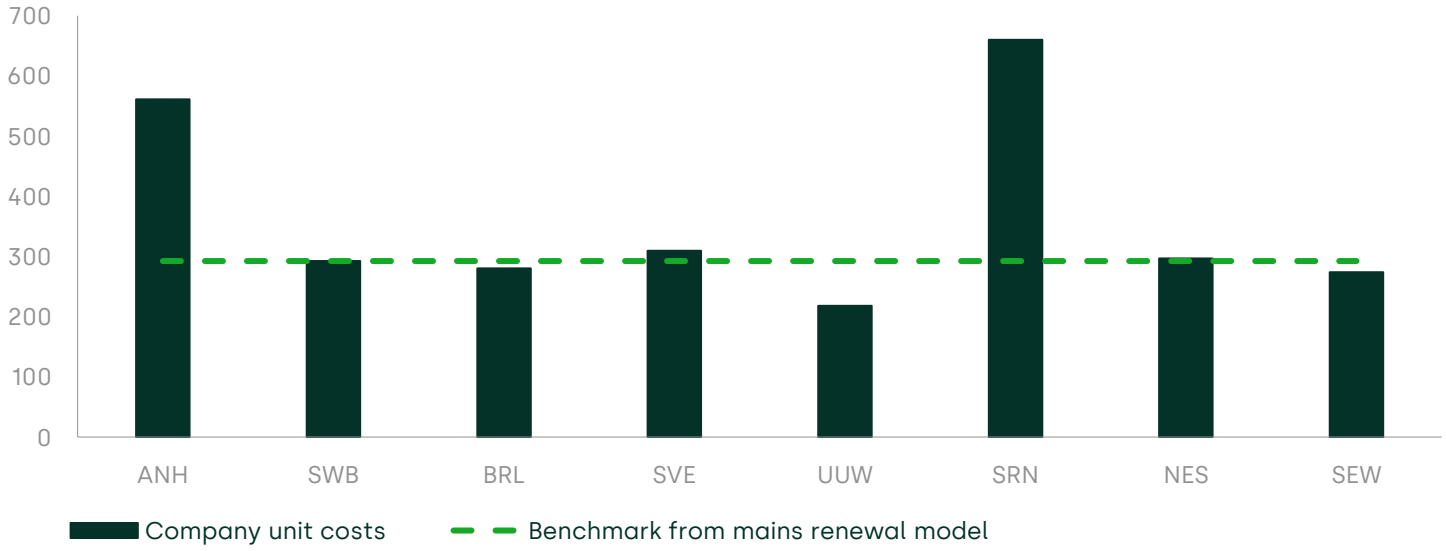
> ... However, our view is that there is too wide a range of unit costs and of local conditions for a simple unit cost approach based on an average of the Disputing Companies or of the industry overall to be sufficient.[44]

The most material area in which unit costs are used to determine leakage enhancement allowances is mains renewal targeted to improve leakage performance. The business plans exhibit a wide range of unit costs, ranging from £78 to £660 per metre of mains renewed. Ofwat evaluates these unit costs relative to a benchmark of £292 per metre taken from a generic model to estimate the cost of efficient mains replacement developed in the context of its asset condition PCD. The range of industry unit costs relative to the benchmark is set out in Figure 3.5 below.

[43] Competition and Markets Authority (2021), 'Anglian Water Services Limited, Bristol Water plc, Northumbrian Water Limited and Yorkshire Water Services Limited price determinations: Final report', 17 March, para. 8.124, accessed on 15 August 2024 at: https://assets.publishing.service.gov.uk/media/60702370e90e076f5589bb8f/Final_Report_---_web_version_-_CMA.pdf.

[44] Competition and Markets Authority (2021), 'Anglian Water Services Limited, Bristol Water plc, Northumbrian Water Limited and Yorkshire Water Services Limited price determinations: Final report', 17 March, para. 8.1125, accessed on 15 August 2024 at: https://assets.publishing.service.gov.uk/media/60702370e90e076f5589bb8f/Final_Report_---_web_version_-_CMA.pdf.

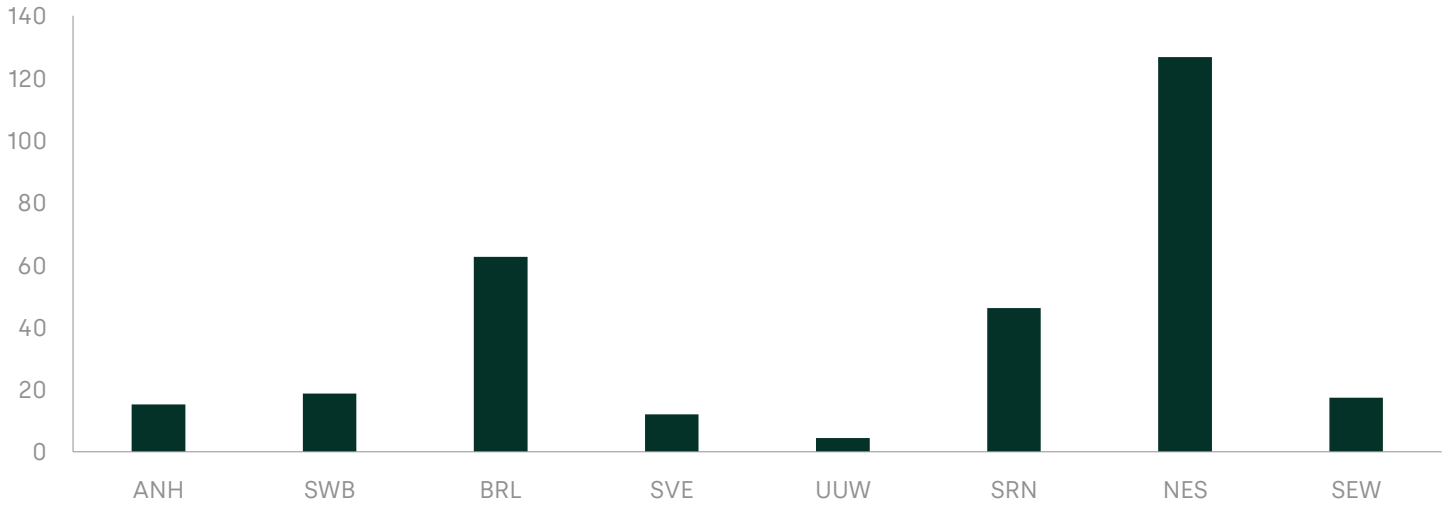
Figure 3.5 Mains replacement to reduce leakage unit cost ranges (£/metre)



Source: Oxera analysis based on data from Ofwat (2024), 'PR24-DD-W-Leakage', June.

We note that this analysis does not account for specifics in terms of the characteristics of the interventions included within company business plans. One clear example of this, which is readily available from Ofwat's enhancement model, is that the analysis does not account for the leakage reduction benefit. Evaluated on a £ per ML/d of benefit basis, it is clear that benefit drives a significant degree of the variation in company unit costs per length of mains, as set out in Figure 3.6 below. It can be seen that the relative positions of the companies with the most costly £/mains units costs (ANH and SRN) improve substantially, while other companies' relative positions worsen when benefit is used to normalise efficiency performance.

Figure 3.6 Mains replacement to reduce leakage cost per ML/d of benefit (£,'000 per ML/d)



Source: Oxera analysis based on data from Ofwat (2024), 'PR24-DD-W-Leakage', June.

This highlights the need for a less top-down approach to assessing unit costs, building on the evidence already submitted as part of the business plan and PR24 Enhancement Strategies Part 4: Enabling sustainable growth, section three Leakage.

3.4 Conclusion

We have identified two key issues with Ofwat's approach to funding leakage expenditure that are detrimental to companies such as Anglian that are at the frontier of industry performance.

First, Ofwat's approach does not account for the Tier 1 ODI incentive rate applied to Anglian and other companies that were proposing to move the leakage frontier forward when evaluating company proposals for enhancement expenditure. The CMA redetermination states that:

> Ofwat told us… that in any event the Tier 1 penalty is not a proper penalty but a clawback… [this penalty] is a clawback mechanism to ensure that consumers do not pay for quality improvements that do not materialise.[45]

[45] Competition and Markets Authority (2021), 'Anglian Water Services Limited, Bristol Water plc, Northumbrian Water Limited and Yorkshire Water Services Limited price determinations: Final report', 17 March, paras 8.187–8.188, accessed on 15 August 2024 at: https://assets.publishing.service.gov.uk/media/60702370e90e076f5589bb8f/Final_Report_---_web_version_-_CMA.pdf.

Ofwat's assessment does not adjust for the significant clawback of AMP7 enhancement expenditure when assessing companies' proposals for leakage performance at AMP8 relative to their PR19 PCLs. Given Anglian's position,[46] the design of the clawback effectively means that Anglian has been funded only for the improvement in leakage that it delivered in AMP7, rather than the ex-ante PCL. Therefore, when evaluating Anglian's enhancement proposals for AMP8, these should be considered to fund the difference between Anglian's current position and the proposed AMP8 PCL (17%).

Second, Ofwat rejects all base cost claims for companies that are currently leading the sector in order to maintain their current performance levels. This reverses Ofwat's previous position at the PR19 FD and the CMA's in its redetermination of the PR19 FD. While Ofwat cites analysis from the new leakage costs dataset that 'suggests that maintaining lower leakage levels does not cost more',[47] it does not provide sufficient detail on how this analysis has been undertaken or the robustness of the results.

Using the leakage costs dataset, we present econometric evidence that demonstrates a statistically significant relationship between leakage costs and both current performance *and* performance improvements. We compute the incremental cost allowances implied by this model for Anglian's DD proposals, given an implicit allowance based on the performance of the companies that are assessed to be most cost efficient in treated water distribution. We identify leakage TOTEX underfunding across base and enhancement of £100.8m–£195.4m relative to these benchmark companies (excluding Thames). By comparison, Anglian's PR24 business plan total expenditure proposals for leakage across Cost Adjustment Claims and enhancement were £103m (£68m and £35m, respectively).

In section 2, we set out how companies at the frontier of leakage performance face more challenging targets (on a normalised, relative basis) than peers. The challenges this poses to companies at the frontier is compounded by Ofwat's revised approach to funding leakage expenditure at AMP8.

[46] As a company that has delivered performance improvements relative to the 2019–20 frontier of performance, but has fallen short of its AMP7 PCL.
[47] Ofwat (2024), 'PR24-DD-ANH_Cost-adjustment-claims', sheet: ANH_CAC4, accessed on 21 August 2024 at: https://www.ofwat.gov.uk/wp-content/uploads/2024/07/PR24-DD-ANH_Cost-adjustment-claims.xlsx.

The result is that Ofwat's DD outcome is highly sensitive to the assumption that the cost and risk associated with making leakage improvements is no more difficult for companies performing at the frontier of leakage performance. The evidence we present indicates that this is not the case, and therefore that Anglian's leakage ODI and funding settlement at the PR24 DD does not adequately account for the higher costs associated with achieving and maintaining the sector-leading levels of leakage performance implied by the current PCL. This is detrimental to customers, as it creates a perverse incentive on companies at the performance frontier.

To secure an achievable price control settlement with respect to leakage, our assessment suggests that Ofwat will need to either consider adjusting Anglian's funding settlement to better align with the PCL it has put forward, or to reduce the level of the PCL in line with the performance being expected by other companies.

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