love every drop
anglianwater

Outcomes
PR24 data tables commentary

October 2023

Outcomes PR24 Data Table Commentary

This document provides table commentary for the OUT tables of our PR24 business plan. For tables one to five and table seven we provide commentary on a performance commitment by performance commitment basis. This commentary should be read in conjunction with the 'Our Commitment to Customers' chapter in our business plan, which outlines our approach to engaging customers, setting performance commitment levels (PCLs), considering incentives and identifying our bespoke performance commitment.

1 OUT1-5 & OUT7: Outcome performance

1.1 Water supply interruptions

Table 1 Water Supply Interruptions

Ofwat category	Customer	Anglian Water long term ambition	Resilient to the risk of drought and flood
Short description of measure	This performance commitment is designed to incentivise the company to minimise the number and duration of supply interruptions		
Performance	2024/25	2029/30	2049/50
HH:MM:SS	00:09:48	00:05:00	00:03:00

Overview

This performance commitment is defined as the average number of minutes lost per customer for the company's whole customer base where interruptions lasted more than three hours. The measure is designed to reduce the impact on customers and improve the reliability of water supply.

Customer views

Providing a constant supply of clean drinking water is seen as fundamental for a water company. Overall our household customer satisfaction with performance on unplanned interruptions is relatively high despite this being one of the more commonly experienced problems.[1] This chimes with our Outcome Delivery Incentive research which showed water supply interruptions being of medium importance for financial incentives.[2] However, valuations significantly increase for longer interruptions and unplanned supply interruption. Inconvenience regarding toilet use and personal hygiene seem to be the driving factors which cause concern.[3]

In the first phase of our Affordability and Acceptability testing for our business plan, we tested a proposed PCL of 06:00 minutes by 2029-30. This proposal was considered acceptable by customers. This is further evidence that suggests customer are broadly happy with a stable level of performance and are not looking for big performance improvements.

1 Annex ANH55 Customer Synthesis Report
2 Annex ANH59 Outcome Delivery Incentive Research
3 Annex ANH55 Customer Synthesis Report

Our performance commitment level - table OUT1

We observe that, across companies, there is significant volatility year on year in the performance delivered, suggesting that exogenous factors, such as weather, have a noticeable impact. We provide a Figure below outlining historical and forecast performance for us and the rest of the industry. The volatility is captured by the grey spikes in the 'Historical inter-quartile range' in the figure above, for example the dry summer and freeze thaw in 2022-23. We are mindful of such volatility when drawing on the observed past performance by us, and by other companies, to inform our view on the level of appropriate targets for AMP8.

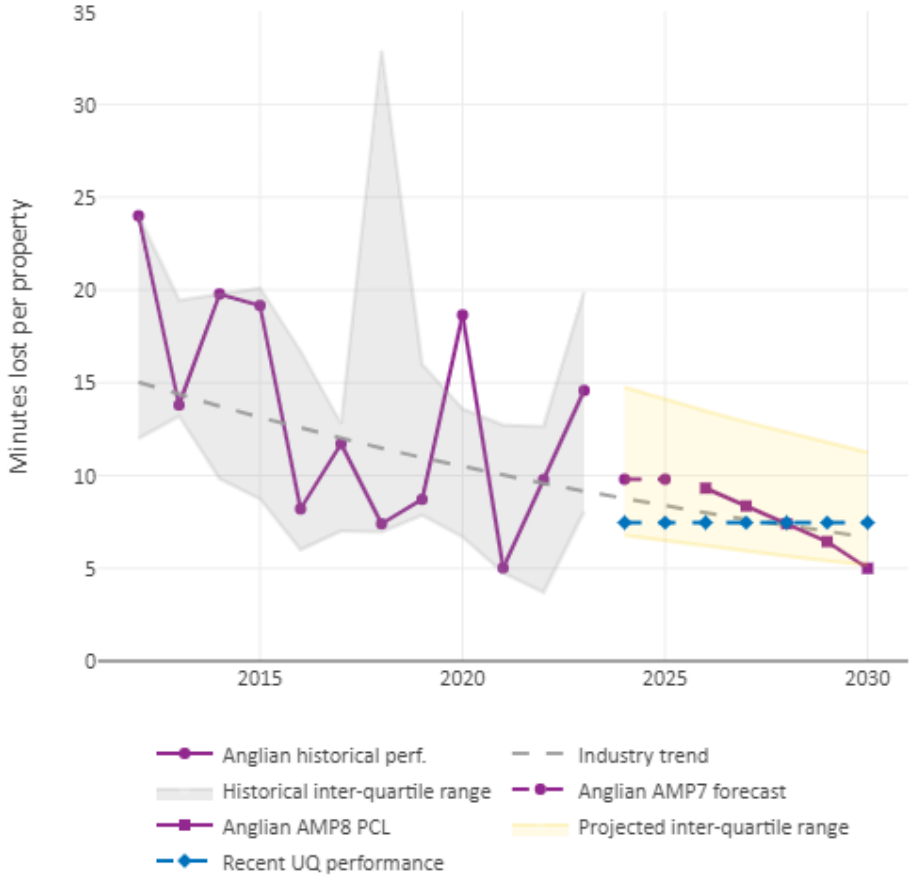
Throughout this commentary on performance commitments we use a consistent set of Figures to give visibility to historical and forecast performance. The bullets below provide an explanation of the elements of the Figures in this commentary.

- **Anglian historical performance** - our historical performance, denoted by a solid purple line with circles for data points.
- **Anglian AMP7 forecast** - our forecast performance for the remainder of AMP7, aligned to our 2022-23 Annual Performance Report (APR), denoted by a dashed purple line with circles for data points.
- **Industry trend** - historical and forecast trend derived from historical company performance to model the industry trend in performance relating to each PC. Specifically, using the panel dataset of companies' annual performance for each of the years in the dataset, we estimated a random effects model of the natural logarithm of the relevant performance metric against a variable controlling for the year. This functional form implies a given, constant, rate of improvement or of deterioration in performance over time. The value of that rate is determined by the estimated coefficient for the variable controlling for the year. This series is denoted by a grey dashed line.

- **Historical inter-quartile range** (IQR) - The historical inter-quartile range marks the range, for each year, between the lower- and the upper-quartile (UQ) level of performance across companies in the relevant year. This is denoted by a grey area.
- **Projected IQR** - econometric modelling in line with the trend to derive a projected modelled inter-quartile range. This range gives an indication of the area between the modelled projected performance when an upper-quartile 'performance challenge' is applied and when a lower-quartile' performance challenge is applied. This is shown as a yellow area.
- **Anglian AMP8 PCL** - the series reflects our proposed PCLs for AMP8. These are performance levels that incorporate our view of the impact of the enhancement benefits we propose to deliver within AMP8. This series is denoted by a solid purple line with squares for individual data points.
- **Recent UQ performance** - this is the level of UQ performance across the industry, based on each company's average performance in the period 2020/21 to 2022/23. This series is denoted by a blue dashed line.
- For total pollution incidents and for water supply interruptions, we developed econometric models to benchmark companies' performance. Those models controlled for time as well as for differences in company characteristics (namely population density of the region served) which, the analysis suggests, explain some of the observed differences in performance.
  - **ANHmodelled per w/ reg adj** - this is the performance predicted for Anglian (ANH) by the suite of estimated econometric models. Both for pollution and for water supply interruptions, our analysis put forward a suite of two models, rather than settling on a single preferred econometric model, and the series presented is the average of those two relevant models. The "ANH modelled per w/ reg adj" series provides a benchmark for Anglian Water's performance which controls for characteristics of the region served by the company, namely of population density, and which affect companies' performance.
  - **Reg adj IQR** - for each company, we calculated a 'performance ratio', i.e. the ratio of modelled performance, as predicted by the suite of models, to actual performance. We did this after first averaging modelled and actual performance over the five-year period 2018 to 2022. We then calculated the upper- and the lower-quartile of that ratio, and multiplied Anglian Water's modelled performance by each of those figures. The regionally adjusted interquartile range (IQR) marks the range between those values. The lower bound of the "Reg adj IQR" area defines what that Anglian Water's benchmark would be if an upper-quartile 'performance challenge' were applied, in an analogous way to how Ofwat applies an UQ efficiency challenge to modelled costs in its cost assessment analysis.

Our proposal is a significant reduction in interruptions given our historical performance. It would see us overtake the industry trend (grey line in the figure below) and beyond an extrapolation of our historical improvement trend. We have also committed to eliminate all serious pollution incidents from our assets by 2025. Our proposed PCL is more stretching than the projected industry's trend by 2030 (grey line in figure below) and upper quartile in AMP7 (blue line in figure below).

Figure 1 Water supply interruptions historical and forecast performance



We are proposing a PCL of 5 minutes by 2029/30 to be a stretching one. This has been calculated on the basis of a linear improvement from 2024/25. This seeks to balance the acceptability of a 6 minute target to customers with regulatory expectations in light of our AMP7 target. It requires a reduction of 49% from where we forecast to be at the start of AMP8 and will mark an improvement on our best ever performance, achieved in 2020/21 which was atypical due to Covid. This would see us beat the UQ performance in AMP7, which is around seven and a half minutes (denoted by the blue dashed line in Figure 1 Water supply interruptions historical and forecast performance.

We consider that our target is particularly stretching in light of the characteristics of the region we serve, namely the extent of its rurality, and of the radial nature of our network. The role and impact of these factors were identified in work that Reckon carried out to consider potential drivers of WSI performance and to explore the use of statistical econometrics models to help improve the benchmarking of companies (discussed further in the appendix to this section). The starting point for that work was to explore the appropriateness of Ofwat's approach to date of benchmarking water supply interruptions implicitly assumes that efficient and well-run water companies will achieve the same levels of interruptions per property supplied, regardless of any differences in the geographic areas that they serve.

Some key findings from Reckon are as follows:

- From an operational, engineering and economic perspective, there are a number of exogenous factors that could lead to significant differences (all else equal) in companies' WSI performance.
- A key issue is the density and location of customers within each companies' area of appointment. Customer density can affect WSI performance through several different channels, including through its impact on the opportunities for (efficient) interconnectedness.
- Reckon developed econometric models that relate measures of customer density to WSI performance, drawing on variables used in Ofwat's base cost models. Reckon considered that, combined with the operational, engineering and economic perspective, it supports the view that density does affect performance (all else equal), with higher levels of interruptions being associated with lower levels of population density (e.g. greater rurality).

In the light of Reckon's quantitative and qualitative analysis, we do not consider it appropriate to benchmark companies on the WSI metric without consideration of density or interconnectedness. While the econometric modelling is at a relatively early stage, it seems possible to use econometric models to help improve on the benchmarking of water supply interruptions by taking some approximate account of the influence of customer density. This information could be used to set different PCLs for companies using a consistent methodology. In the figure below, we show a projected inter-quartile range adjusted for regional factors (blue area) which demonstrates that our proposed PCL could be considered beyond the forecast upper quartile if regional factors are taken into account.

Figure 2 Water supply interruptions historical and forecast performance with regional adjustment

The conclusion of this work suggests that overly simplistic approaches to benchmarking performance are not robust and can be improved statistically. This may partly explain why the industry has collectively struggled to meet the PCLs set at PR19 for common performance commitments such as WSI, with the upper quartile in 2022-23 at over eight minutes. This shows that our proposed PCL is more ambitious in practice than it might appear if density and interconnectivity are ignored. This information could both inform setting appropriate common PCLs or potentially support the setting of company specific PCLs using a common approach.

Given this we think it is appropriate to reset the PCL in AMP8 and challenge the industry to deliver a consistent level of performance approaching five minutes. This is more stretching than the performance forecast for our company modelled by Reckon (as shown by our proposed PCL reaching the top of the regionally adjusted inter quartile range (blue area) in the preceding figure). This reflects a 49% reduction in our performance and is particularly stretching given our rural region and radial network. Nonetheless, this signifies a significant improvement from recent performance. Better targeting of our mains renewal activities will support the delivery of this performance improvement. We think this strikes the right balance between reflecting on the views of customers about stable performance being acceptable and meeting the PCL from AMP7.

Performance from base - table OUT2

In our response to Ofwat's 'performance improvements from base, enhancement and ODIs' data request, we outlined that this PC had received minor benefits from historic enhancement investment, although this was on the whole related to investment driven by other needs (e.g. resilience).

We expect improvements for this performance commitment to be driven by expenditure derived from base allowances in AMP8. We expect improvement to be delivered by reducing the number and duration of interruptions and the number of properties affected by interruptions through but not limited to the following activities:

- Reduced number of interruptions
  - Greater local interconnectivity and mains renewal increasing resilience within our network
  - Faster identification of I2S risk including enhancing our event management platform and our pipe criticality modelling (WISPA) (we've shared a paper with Ofwat on that previously - we aren't claiming any I2S reduction from it but it will help 'maintain' performance).
- Reduced duration of interruptions
  - Near real time reaction capability including use of Smart Valve, Actuated valves and Enhanced Pressure Monitoring capability
  - Improvements to critical spares processes and deployment
- Reduced number of properties affected

- Improve data and understanding from all aspects above to drive faster response times and implement rezones etc to reduce properties affected in an event.

We have completed the OUT tables on the basis that all of the proposed performance improvement is derived from base expenditure (shown in table OUT2).

Our focus will be on operational improvements and the activities listed above. This builds on our existing programme of pressure management, optimisation and automation of the network.

Performance from enhancement - table OUT3

We have systematically assessed the performance benefits of our enhancement expenditure. We have not identified that there will be significant benefits to performance on this measure from our AMP8 enhancement expenditure.

Other commentary - table OUT4

We have provided historical data where it is available. For "Total number of properties supplied at year end" we have provided a full set of data back to 2011-12 that is consistent with our Annual Performance Report and cost assessment datasets. For "The total number of properties whose supply was interrupted >= 3 hours", we have provided this data for the three years that this has been a requirement for APR reporting. For all other years, we do not have the data and have deliberately left the cells blank. For "The total minutes lost for supply interruptions of >= 3 hours", we have complete data going back to 2016-17, but have provided approximate back calculations for earlier years. All data in the "Average number of minutes lost per property" row are consistent with the data provided to Ofwat as part of the historical performance trends information request for PR24.

Calibrating incentives - table OUT7

We have used Ofwat's indicative incentive rate and benefit sharing factor for this performance commitment.

In recognition of the potential skewed downside risk with this performance commitment, we propose a wide collar on underperformance payments, in line with the PR24 Final Methodology (appendix 8, page 63). The objective of collars is to address the risk that companies may face disproportionately high penalties, for example as a result of one-off failures in the network. The CMA recognised this concern during the PR19 Final Redetermination, noting Bristol's performance on this metric one year in AMP6 being multiple times worse than the PCL due to a single event. Therefore, we propose a collar being set on a targeted basis to mitigate this risk.

We propose this collar is set at 18 minutes and 37 seconds above the PCL each year i.e. the collar will be set at 00:23:37 in 2029/30. This figure was established based on 0.5% wholesale RoRE, which on average is £25.33m a year in AMP8. We calculated the collar by dividing this value by the proposed incentive rate. We note even with this wide collar, based on historic trends we expect this measure will remain volatile due to the impact of exogenous factors and that we would still be exposed to considerable risk.

1.2 Water supply interruptions appendix

Discussion of setting targets for water supply interruptions

Benchmarking companies' performance against common PCs can be a valuable tool for both understanding how our own performance can evolve over time and for the purposes of setting PCLs as part of the price review process.

However, as recognised in Ofwat's established approach to benchmarking base costs, there may be exogenous factors that affect companies' measured performance. This generates a need to take account of these factors before it is reasonable to make inferences around companies' relative performance and their ability to make improvements in the future.

To date, Ofwat's approach to benchmarking water supply interruptions (WSIs) implicitly assumes that efficient and well-run water companies will achieve the same levels of interruptions per property supplied, regardless of any differences in the geographic areas that they serve.

Reckon have carried out a targeted exercise to consider potential drivers of WSI performance and to explore the use of econometric models to help improve the benchmarking of companies in terms of their WSI performance. We have drawn on this in developing our projections for our WSI performance into AMP8 in tables OUT1, OUT2 and OUT4. The results of this analysis are discussed in detail later in this section.

Some key points are as follows:

- From an operational, engineering and economic perspective, there are a number of exogenous factors that could lead to significant differences (all else being equal) in companies' WSI performance.
- A key issue is the density and location of customers within each company's area of appointment, and we have focused our analysis on this at this stage. Customer

density can affect WSI performance through several different channels, including through its impact on the opportunities for (efficient) interconnectedness.

- We have developed some econometric models that relate measures of customer density to WSI performance, drawing on variables used in Ofwat's base cost models. The econometric modelling we have carried out at this stage does not provide quite the same level of statistical significance or precision, in terms of the estimated impact of density on performance, as seen in the more established base cost benchmarking models. Nonetheless, we consider that, combined with the operational, engineering and economic perspective, it supports the view that density does affect performance (all else being equal), with higher levels of interruptions being associated with lower levels of population density (e.g. greater rurality). We consider that this makes intuitive sense.
- We have considered whether the inclusion of customer density variables in Ofwat's base cost models means that it is not necessary or appropriate to take account of customer density when benchmarking WSI performance. There is no reason why the inclusion of density in the base cost models means that the potential impacts of density on WSI performance can be ignored. It is an empirical matter whether, in the historical period covered by the data, the impacts of density are manifest only in terms of costs, only in terms of WSI performance, or in terms of both costs and WSI performance. Our assessment is that the available evidence indicates that density has been affecting both costs and WSI performance; this also makes sense from an economics perspective.

In light of our quantitative and qualitative analysis, it is appropriate to benchmark companies on the WSI metric with consideration of density or interconnectedness. While the econometric modelling is at a relatively early stage, **it seems possible to use econometric models to help improve on the benchmarking of WSIs by taking some approximate account of the influence of customer density.**

We have compared our performance projections/PCLs for AMP8 against benchmarks derived from econometric models that take account of the estimated relationships between density and performance. These help to show that our performance projections are stretching but achievable. In the charts below we have taken the average of the projected values from models WSI_1 and WSI_5 (projections made assuming the value for the density variables in our modelling remain the same to 2029/30 as their 2021/22 level). We have calculated benchmarks with and without a PC-specific upper quartile adjustment.

Figure 3 Historical, projected and modelled WSI performance for Anglian Water

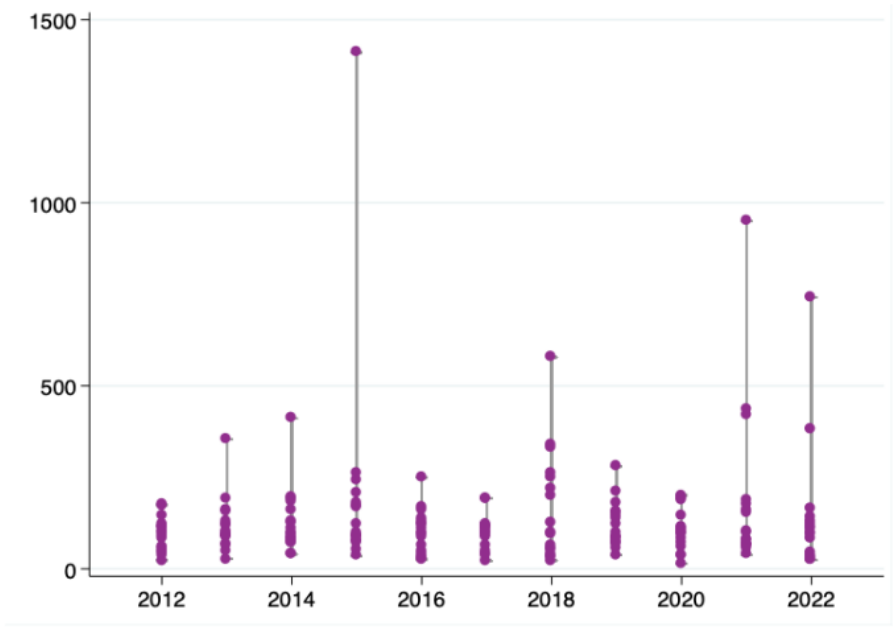
Limitations of Ofwat's approach to benchmarking performance

At PR19, Ofwat set the same PCL for WSIs for all companies in terms of average minutes per property supplied. It drew on benchmarking comparisons across companies and its benchmarking did not take account of any exogenous factors that may affect companies' ability to achieve a given level of interruptions. Ofwat's approach to benchmarking WSI performance implicitly assumed that well-run companies will achieve the same levels of interruptions per property supplied.

However, for the purposes of our business plan, we were concerned that this might be an overly simplistic approach to benchmarking this key area of water company performance. We have looked for opportunities to make improvements.

One piece of evidence that indicates that there may be scope for improvements is the wide spread of performance that we see across companies under Ofwat's PR19 approach of assuming that each company can achieve the same level of interruptions per property. We show this in the Figure below. The chart shows the ratio of a company's actual WSI to the median level of WSI across companies, expressed as a percentage, taking each year in the period 2011/12 to 2021/22 in turn.[4] For this analysis, we have combined data for Severn Trent England and Hafren Dyfrdwy and not treated the two as separate entities.

Figure 4 Performance ratios for water companies based on Ofwat's benchmarking model (%)



We highlight two features of the spread of efficiency ratios shown in the preceding figure. First, in some of the years (e.g. 2015, 2018, 2021 and 2022) the range of the efficiency ratios is particularly wide, influenced by the performance of one or two companies having especially long interruptions in the year. The identity of the one or two companies with such outlying performance in those years is not always the same. Second, and this is a point of greater relevance to the work we have done, even in those years where, visually, the figure suggests the range in the performance ratio was relatively narrow (e.g. in 2020) it is the case that, in fact the range of the performance ratio spanned a wider interval than what we tend to see for the models derived by Ofwat for cost assessment. For 2020 the range of the ratio of actual to the median level of performance was 15% to 200%, i.e. from less than a sixth to twice the median value.

This evidence suggests that there are exogenous factors affecting performance.

To help put this into context, the spread of efficiency ratios across companies in terms of wholesale water modelled base costs are in a range of between 73% and 147% on average across Ofwat's aggregated wholesale water models from April 2023 (with the efficiency ratio calculated using costs averaged over the last five years). This range would be considerably higher if Ofwat's models did not take account of a number of different cost driver explanatory variables.

Factors affecting overall performance

Our view is that differences between companies in performance against the WSI common performance commitment may, further to good or poor luck, reflect a range of different factors in particular:

1. Exogenous factors that affect the ability of water companies to limit water supply interruptions and the efficient costs of doing so.
2. Difference between companies, both now and in the past, in the effectiveness and efficiency of their strategies and actions to reduce WSIs.
3. Differences between companies, both now and in the past, in the extent to which they have prioritised performance in relation to WSIs relative to other aspects of performance (e.g. performance against other common performance commitments or performance in terms of restraining levels of expenditure).
4. Differences between companies in the historical configuration of their systems (insofar as these are not solely due to exogenous factors) and in the extent to which companies have benefitted from past investment (enhancement expenditure) that has helped to reduce WSIs.

The focus of this section is on point (1) above: exogenous factors. However, it is important to keep the other factors in mind for two key reasons:

4 The main analysis we carried out in relation to the benchmarking of WSI performance was based on data to 2021/22 so this is the timeframe for several of the charts and analysis presented here. We did not have the opportunity, for the purposes of our business plan submission, to fully update the analysis for data to 2022/23. However, we did do some indicative and targeted updates to some of the economic modelling, which is discussed further below.

- First, it means that there can be quite substantial differences in performance in terms of WSIs between companies that are not due to exogenous factors which can, in turn, make it more difficult for quantitative analysis to reveal underlying relationships between exogenous factors and performance (i.e. to isolate how exogenous factors would affect performance in a hypothetical scenario where companies are all in the same position in relation to factors 1, 2 and 4 above). In the context of econometric modelling, factors 1, 2 and 4 can lead to substantial noise in the data which - unless controlled for in the model - limit the statistical precision with which the scale or materiality of the impacts of exogenous factors can be gauged.
- Second, it means that it is quite possible for a company which faces adverse exogenous factors to nonetheless perform relatively well in terms of WSIs compared to other companies (i.e. if factors 1, 2 and 4 above act to offset factor 3). For instance, evidence that one company with an adverse position on an exogenous factor performs relatively well does not prove that the exogenous factor is not a material driver of performance.

Potential exogenous factors that may affect WSI performance

In its approach to benchmarking base costs between water companies, Ofwat emphasises the importance of using models that are "consistent with engineering, operational and economic rationale [5].We agree that this should be a foundation for any benchmarking approach, whether applied to costs or to performance.

We sought to draw on internal knowledge and insight to identify potential drivers of WSI performance taking account of engineering, operational and economic considerations. One point of note is that discussions with experts with operational and asset management roles sometimes highlighted things that affect performance but which are not necessarily linked to underlying and exogenous drivers (e.g. factor 4 rather than 3 above). For this exercise, we have followed Ofwat's cost assessment principles and sought to focus on exogenous drivers.

In the table below we highlight issues identified from discussions with operational and asset management experts and then seek to relate these, where applicable, to more underlying and exogenous factors. This table is not intended to be comprehensive of all potentially relevant factors.

Table 2 Exogenous factors affecting WSI performance:

Issue identified from operational perspective	Link to exogenous factor
Network interconnection	· Density and location of customers within area of appointment
Journey times and distance travelled to resolve interruptions	· Density and location of customers within area of appointment
Ease of access to resolve interruptions	· Density and location of customers within area of appointment
Incidence of freeze/thaw events	· Climate and weather patterns
Incidence of prolonged dry conditions	· Climate and weather patterns · Soil classification
Soil movement	· Soil classification
Capacity of water storage points	· Climate and weather patterns · Higher demand due to more home working and less commuting out of region (e.g. to London)

Prioritisation for our business plan submission

As far as we are aware, there is no well-established approach for econometric benchmarking of WSIs across water companies in England and Wales.

We carried out some preliminary econometric modelling to try to benchmark performance on WSI between companies while controlling for some of the potential exogenous factors above. For this we considered density (using the types of explanatory variables used by Ofwat in its base cost modelling) and soil classification (using data from a study by MapleSky Ltd). [6]

5 Ofwat (2023)Econometric base cost models for PR24, page 15
6 Farewell, T (2023) "The exceptional summer of 2022", study by MapleSky Ltd. We drew on data reported in Table 3.

Based on a combination of initial results from econometric models, and our judgement from an economic, operational and engineering perspective, we prioritised density for further work.The rest of this section considers customer density in greater detail, with further discussion of the rationale for considering this a driver of performance and some outputs from quantitative analysis.

Rationale for considering customer density as a driver of WSI

This section concerns the rationale for customer density as a driver of WSIs within the context of benchmarking WSI performance across companies. It is organised as follows:

- We start by elaborating on what we mean by customer density.
- We highlight different ways in which customer density may affect WSI performance.
- We discuss interactions between customer density and management control.
- We discuss interactions with the inclusion of density variables in base cost benchmarking models.

Customer density

For this section we use the term "customer density" as a shorthand to refer to exogenous factors relating to the location of customers within water companies' area of appointment. The term customer density is something of an approximation and is largely the same as the population density terminology used by Ofwat for its base cost models. For the purposes of our work, we intend to capture several further elements within the broad concept of customer density. In particular:

- The overall geographic spread of customers across a company's area of appointment.
- Population density across local areas within a company's area of appointment.
- The extent to which a company's area of appointment comprises rural versus suburban versus urban areas (and further gradations of urbanity/rurality within this).

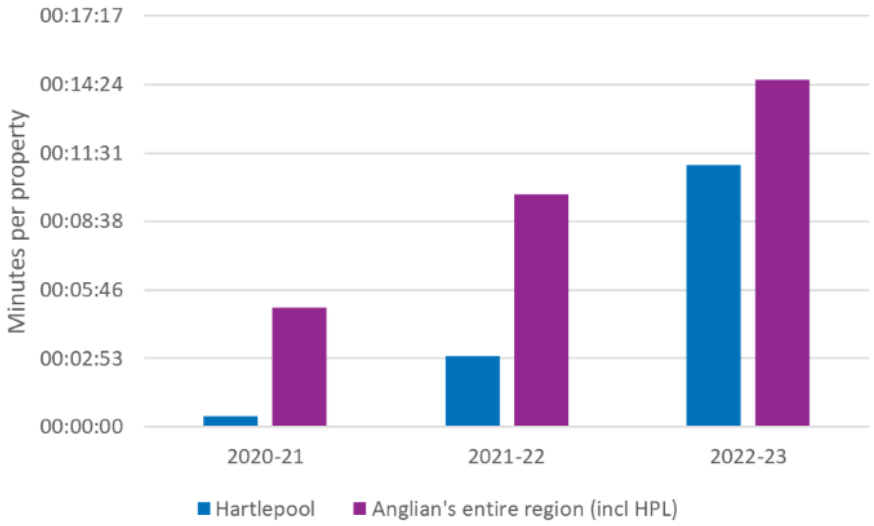
Ways in which customer density may affect WSI performance

In principle, and drawing on engineering, operational and economic insight, the relationship between customer density on WSIs might arise through a number of different channels. For instance:

- **Interconnection effect (water distribution)**. The greater is the extent of interconnection within treated water distribution systems (e.g. the more it comprises an integrated grid rather than radial spurs) the lower is the likelihood that a burst main or pumping failure in one part of the system will lead to supply interruptions at customer premises (e.g. rather than just leakage and loss of pressure), since interconnection provides another route for water supplies to reach the customer. The lower is customer density in an area of appointment, the less opportunity there is for (efficient) interconnection.
- **Travel times to resolve interruptions**. The duration of WSIs will be affected by how long it takes for a team to identify and reach the part of the system that has led to an interruption so that it can be resolved. The relationship between population density and travel times is potentially non-linear: for a given cost of operations, rural areas may take longer to reach than more average areas due to the distance covered and interconnectivity of road networks, but highly urban areas may also take longer than more average areas due to traffic congestion.
- **Number of impacted properties per interruption**. Leaving aside the points above, another relevant factor is how many properties are affected by an interruption (where one does occur). For rural areas, water mains may serve fewer properties so, when an interruption occurs it causes fewer interrupted minutes in total and has a lower impact on the average minutes of interruptions per property at the company-level.

Our view, informed by operational experience, is that the first effect above (interconnection) dominates the third. Ultimately this is an empirical matter. There is certainly no basis for an ex-ante view - before consideration of the evidence - that the various effects above cancel out such that population density and rurality have no impact on WSIs. This is corroborated by the fact that our Hartlepool region consistently has a lower level of interruption than our region at large, shown in the figure below. Hartlepool is far more urban and interconnected than the rest of the Anglian region and does not have the same soil characteristics.

Figure 5 Water supply interruptions for Hartlepool and Anglian regions



Some recent evidence on the role of the interconnection effect above is available from the commentary provided by South East Water in its 2023 Annual Performance Report. This highlighted that, despite South East Water's relatively poor company-level performance on WSI in 2022/23, it experienced a relatively strong level of WSI performance in one distinct part of its area of appointment which benefits from greater network connectivity.[7]

Interactions between customer density and management control

Ofwat commented at PR19 as follows:[8]

"Companies have a range of options to improve performance on the duration of supply interruptions, including better management of the response time to reported interruptions, ensuring sufficient availability of teams equipped to restore supply as quickly as possible; better monitoring of the network to more quickly detect and locate pressure losses (e.g. through flow meters and pressure loggers to send live data to control centres); better connectivity by removing areas of single supply; and having mitigation plans in place with local authorities/land owners for areas where bursts maybe difficult to reach e.g. highly populated areas or difficult to reach areas (fields/countryside)."

Ofwat highlights that companies can put in place to improve performance on WSI. However, the extent to which companies need to do so - and the costs of doing so - will vary due to factors that are largely outside management control. The degree of connectivity of a company's network, which is mentioned by Ofwat in the quotation above, is an example of such one factor.

For instance, in our submission to Ofwat in February 2023 on the 'Impact of historical enhancement expenditure on performance trends' we identified some enhancement activities we are doing that affect performance:

- Our internal interconnectors programme will improve network resilience and thereby provide some modest benefits to WSIs.
- Our investment to reduce the number of properties that are dependent on treated water supplies from single sources can provide a minor benefit to WSIs. A larger number of interruptions are driven from network issues such as mains bursts, interruptions caused by non-infrastructure assets are often lower likelihood but potentially higher impact events.

These actions can be seen as measures that help to mitigate - but not eliminate - the impact of lower customer density on WSIs; they come at a cost and there are limitations in terms of what is efficient and acceptable to do. Furthermore, the majority of our interruptions are from the treated water distribution system so the specific initiatives above at best provide an incremental improvement in WSI performance.

Interactions with density variables in base cost benchmarking models

We have considered the interactions with Ofwat's base cost models, based on those from its April 2023 consultation and the types it has used in the past. Its consultation models for water resources plus, treated water distribution and wholesale water all include explanatory variables intended to capture underlying cost drivers relating to density (e.g. number of connected properties per length of mains or the measures of local-level population density derived from ONS data).

The inclusion of density variables in the base cost models does not mean that there is no basis for considering density as a separate driver of WSI performance.

7 South East Water (2023) Annual Performance Report, page 6.
8 Ofwat (2019) PR19 final determinations: Delivering outcomes for customers policy appendix, page 21.

It is an empirical matter whether, in the historical period covered by the data, the impacts of density are manifest only in terms of costs, only in terms of WSI performance, or in terms of both costs and WSI performance. Our assessment is that the available evidence indicates that density has been affecting both costs and WSI performance.

Furthermore, there are good economic reasons to expect density to affect both costs and WSI performance. While companies operating in less dense areas might be able, in principle, to fully mitigate the effects of density differences on their WSI performance through incurring additional expenditure, this seems unlikely to be the case in practice.

For instance, since companies will determine their strategies and actions for limiting WSIs in light of information on the costs (which may vary according to density) and benefits (e.g. customer attitudes, cost of improvements and ODI rates) different companies would tend to reach different points on the trade-offs between costs and benefits of further action to reduce interruptions. It would be natural for density to affect both costs and WSI performance.

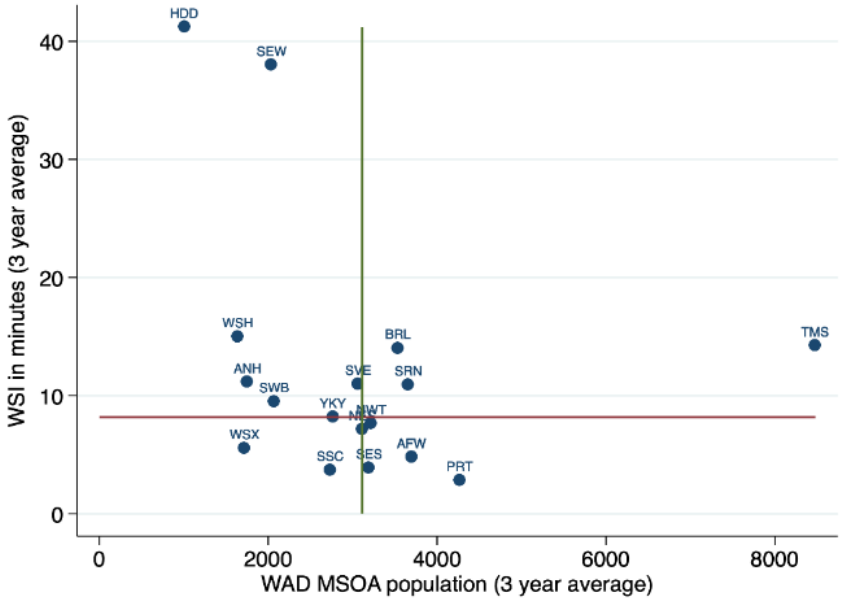
To give an example, it would be more costly to install and operate water mains grid infrastructure that offers the same degree of interconnection in rural areas as in urban areas.

Analysis of impact of customer density on WSI performance

Charts of WSI performance against metrics of customer density

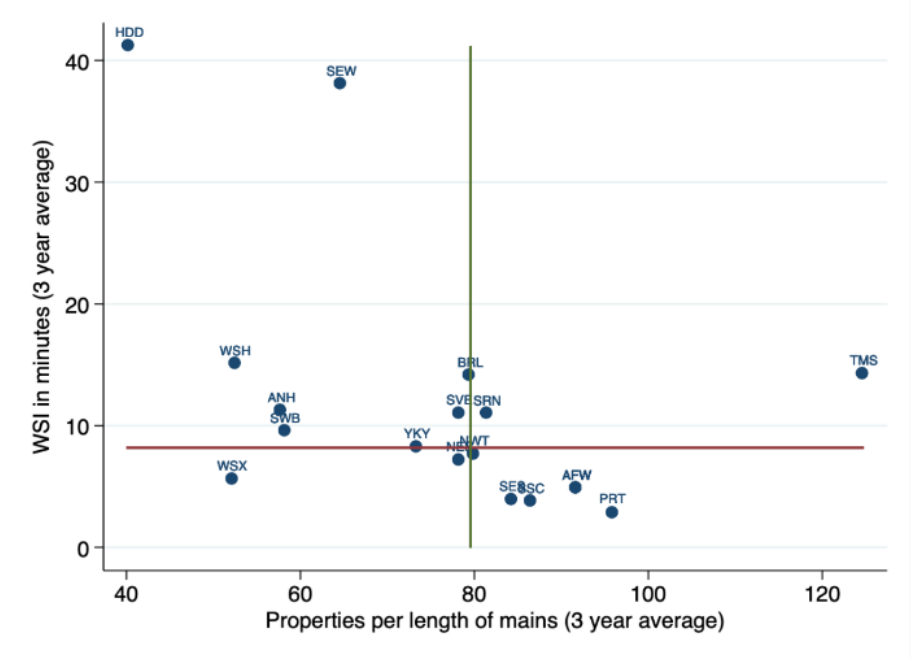
Later in this section we present some econometric modelling of WSI performance against explanatory variables relating to customer density. Before turning to this we present two charts that show how WSI performance across companies compare to (a) Ofwat's MSOA-level population density variable from its April 2023 base cost models (b) the number of customers per length of main. [9] In these charts we have inserted a horizontal line for the median level of performance and a vertical line for the median value of the customer density metric. We have averaged performance data over the period 2019/20 to 2021/22, this echoes the averaging applied to leakage and PCC.

Figure 6 WSI performance versus Ofwat's MSOA



9 MSOA refers to "Middle Layer Super Output Area" which is a type of geographic area used by the ONS for some of its statistics, including those providing more local-level population density. For its consultation on base cost econometric benchmarking models in April 2023, Ofwat drew on company-level metrics of population which were calculated from MSOA-level population density data. For our analysis of WSI performance, we used the MSOA-level population density variable that Ofwat referred to in its April 2023 consultation as "Weighted average density - MSOA".

Figure 7 WSI performance versus properties per length of main



We observe:

- Portsmouth Water has the lowest WSIs and has (behind Thames) the highest MSOA-based population density.
- HDD and South East Water have the highest WSIs and are at the lower end of both MSOA and properties per length of main.
- Especially on the chart of properties per length of mains, there is some indication of a negative correlation with WSIs, with six companies having worse-than-median performance and lower-than-median properties per length of main and five companies having better-than-median performance and greater-than-median properties per length of main.

For the reasons set out earlier, and given the small sample size of water companies, even if there is a strong underlying relationship between customer density and WSI performance, we would not expect to see a very close relationship in charts such as these, due to the influence of other factors affecting performance.

Econometric modelling

We have carried out a targeted exercise to explore the use of econometrics models to help improve the benchmarking of companies in terms of their WSI performance.

We developed some econometric models that relate measures of customer density to WSI performance, drawing on variables used in Ofwat's base cost models. We present results below for a set of models that use the three different density variables that feature in Ofwat's April 2023 base cost models for wholesale water activities. We followed Ofwat's approach of considering model variants in which there is a single density variable and variants with the density variable and a squared version of the density variable. We summarise results in the table below for models denoted WSI_1 to WSI_5. The table shows the estimated coefficients for the explanatory variables in each model.[10]

10 with */**/*** indicating implied statistical significance at the 10%/5%/1% levels and with the t-ratio in brackets and the p-value in curly bracket.

Table 3 Estimated coefficients for the explanatory variables in each model

	WSI_1	WSI_2	WSI_3	WSI_4	WSI_5	WSI_6
Dependent variable	**Log of WSIs per property (in minutes)**					
Log of properties per length of mains	-0.693* (-1.657) {0.097}	-5.182 (-0.421) {0.674}				
Log of properties per length of mains squared		0.531 (0.361) {0.718}				
Log of weighted average population density (MSOA based)			-0.29 (-1.137) {0.255}		-7.423 (-1.612) {0.107}	
Log of weighted average population density (MSOA to LAD based)				-0.193 (-1.481) {0.139}		-1.227 (-0.692) {0.489}
Log of weighted average population density squared (MSOA based)					0.45 -1.57 {0.116}	
Log of weighted average population density squared (MSOA to LAD based)						0.074 -0.572 {0.568}
Financial year	-0.063*** (-2.928) {0.003}	-0.063*** (-2.922) {0.003}	-0.064*** (-2.942) {0.003}	-0.065*** (-2.975) {0.003}	-0.064*** (-2.984) {0.003}	-0.065*** (-2.983) {0.003}
Constant	132.936*** -3.045	142.901*** -2.603	133.593*** -3.055	134.293*** -3.065	162.980*** -3.095	138.571*** -3.108

	WSI_1	WSI_2	WSI_3	WSI_4	WSI_5	WSI_6
Dependent variable	**Log of WSIs per property (in minutes)**					
	{0.002}	{0.009}	{0.002}	{0.002}	{0.002}	{0.002}
Overall R-squared	0.137	0.141	0.108	0.124	0.134	0.128
Number of observations	187	187	187	187	187	187

As part of our model development, we had explored a broader range of models than the six shown above, and considered a wider set of candidate explanatory variables. However this did not yield models that made intuitive sense while having acceptable statistical results.

The econometric modelling we have carried out at this stage does not provide quite the same level of statistical significance or precision, in terms of the estimated impact of density on performance, as seen in the more established base cost benchmarking models. Nonetheless, we consider that two of these six models perform reasonably well in terms of their statistical results:

- Model WSI_1 involves a single explanatory variable (besides the time trend and constant terms) which is the natural logarithm of the properties per length of mains, which can be seen as both a measure of customer interconnectedness and a proxy for the underlying customer density. This variable is well established in Ofwat's base cost models. In model WSI_1 this variable has a relatively low p-value and is statistically significant at the 10% level. [11]
- Model WSI_5 involves the MSOA-level population density variable in linear and squared forms. The p-values for both of these density variables is just over 10%.
- For comparison a reference model with the same model structure as above, but no density explanatory variables, has a very low R-squared of 0.08. This reflects the wide degree of variation in observed performance between companies and over time. Models WSI_1 and WSI_5 have an R-squared of 0.14 and 0.13 respectively indicating a considerable increase in the goodness of fit of these models which take some account of density.

While model WSI_1 performs slightly better in statistical terms there is value in both models together. For instance, WSI_5 has the benefit of using more exogenous explanatory variables from the MSOA variable.

Implications for our benchmarking of our WSI performance

In the light of the analysis above, we make three points:

1. First, for a combination of intuitive and statistical reasons, it is unreliable to benchmark companies on the WSI metric without consideration of density and network interconnectedness.
2. Second, our proposed performance and PCL (OUT1) for WSI is more ambitious in practice than it might look if density and interconnectedness are ignored.
3. Third, while the econometric modelling is at a relatively early stage, it seems possible to use the types of models introduced above to help improve on the benchmarking of WSIs.

We have compared our performance projections/PCLs for AMP8 against benchmarks derived from econometric models that take account of the estimated relationships between density and performance. These help to show that our performance projections are stretching but achievable. In the charts below we have taken the average of the projected values from models WSI_1 and WSI_5 (projections made assuming density variables the same up to 2029/30). We have calculated benchmarks with and without a PC-specific upper quartile adjustment.

Figure 8 Historical, projected and modelled WSI performance for Anglian Water

11 In its base cost benchmarking Ofwat gives weight to the p-values and statistical significance levels of the estimated coefficients for the explanatory variables when assessing the merits of alternative models. These relate to estimates of the degree of precision/accuracy with which the coefficient on the explanatory variable is estimated (under the assumptions of the model and with the data available).

1.3 Compliance Risk Index (CRI)

Table 4 Compliance Risk Index

Ofwat category	Customer	Anglian Water long term ambition	Resilient to the risk of drought and flood
Short description of measure	This performance commitment incentivises the company to fully comply with statutory obligations and to mitigate any issues affecting performance.		
Performance	2024/25	2029/30	2049/50
Score	2.92	0	0

Overview

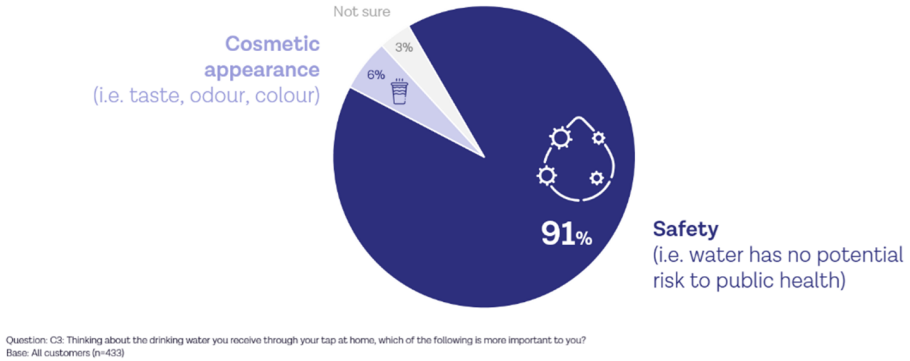
This performance commitment is defined in line with the Drinking Water Inspectorate's (DWI) Compliance Risk Index (CRI). The measure is designed to illustrate the risk arising from treated water compliance failure and aligns with the current risk-based approach to regulation of water supplies used by the DWI. It assess companies effectiveness at managing risk.

The CRI score is calculated for every individual compliance failure at water supply zones, supply points, water treatment works, and service reservoirs. The annual CRI for the company, for any given calendar year, is the sum of the individual CRI scores for every compliance failure reported during the year.

Customer views

Drinking water quality remains a key priority for us and our customers. As captured within our Customer Synthesis Report, participants in numerous surveys and research activities stated that safe, clean water is the base level of expectation of the company. Investing to continue to supply high quality drinking water was the top priority of the services we provide over both a 2025-30 and a 2025-50 time horizon according to participants of the Investment Priorities Research conducted by Trinity McQueen.[12] Our customer research demonstrates that the safety of drinking water is more important than cosmetic appearance to our customers, and that our priority should be providing safe, reliable drinking water, as shown in Figure 9 Customer importance of safety and cosmetic appearance of drinking water.[13]

Figure 9 Customer importance of safety and cosmetic appearance of drinking water



This view is corroborated by the 'Outcome Delivery Incentive research' conducted by ICS, where participants ranked monitoring and maintaining drinking water quality as the most important PC for financial incentives, but reducing contacts in relation to the quality of water amongst the least important.[14]

Our performance commitment level - table OUT1

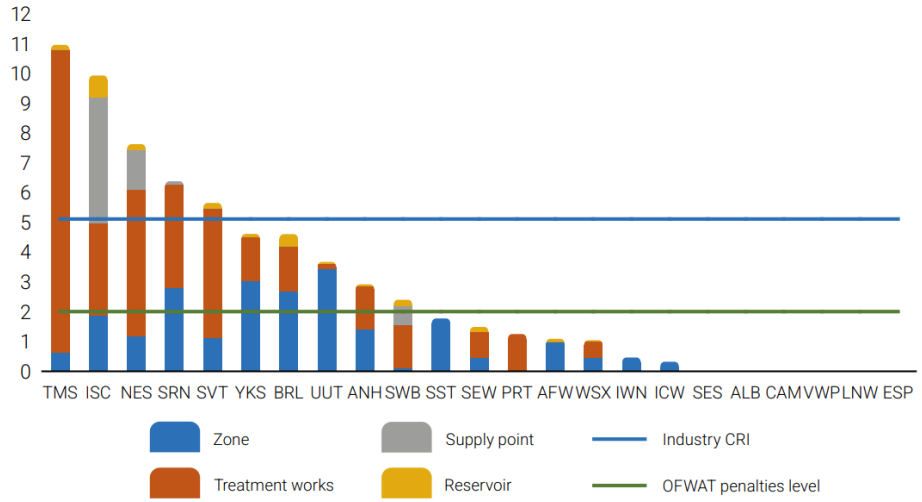
We are proposing to set our PCL on the aspiration to achieve full compliance with the DWI's CRI in each year of the AMP. This is in line with Ofwat's position in the PR24 Final Methodology. We have completed table OUT1 on the basis of a CRI score of 0 in every year of AMP8 and thereafter. While enhancement investment isn't intended to improve performance, it is required to maintain performance. This is an area where differing historic enhancement allowances could be influencing observed performance.

This reflects a hugely ambitious commitment from us. However to reflect that the PCL is aspirational, the measure is an index of risk that can not be fully eradicated in practice and performance is influenced by factors outside of our control, we are proposing a deadband for this measure. This is discussed in more detail in the upcoming section on calibrating incentives.

Our historical performance has tended to be better than average in the industry. In 2022/23 we scored 2.92, above our PCL and outside the deadband. Even in 2022/23 we had the third lowest score of any water and sewerage company (WaSC).

12 Annex ANH55 Synthesis Report
13 Annex ANH55 Synthesis Report
14 Annex ANH59 Outcome Delivery Incentives Research

Figure 10 Compliance Risk Index by company England 2022, DWI Chief Inspector's report 2022



Performance from base - table OUT2

In our response to Ofwat's 'performance improvements from base, enhancement and ODIs' data request, we outlined that CRI had received some minor benefits from historic enhancement investment e.g. catchment management and lead pipe replacement.

We expect improvements in drinking water quality as captured by CRI to be driven predominantly by base expenditure on asset health and maintenance. This includes storage point cleaning and inspection, maintenance activity on treatment works (for example granular activated carbon (GAC) regeneration) and our Planned Preventative Maintenance (PPM) programme activities such as sedimentation flushing programme. As such, we have completed the OUT tables on the basis that most of the proposed performance improvement is derived from base expenditure (shown in table OUT2).

Performance from enhancement - table OUT3

The key contribution from enhancement investment to CRI is investments that are intended to protect performance from deteriorating in line with DWI's approach to preventing deterioration of water quality. All enhancement expenditure for water quality will have a DWI Letter of Support. Ofwat's guidance in response to data tables query 272 was to:

[companies should assume] they will receive efficient cost allowances to address any deteriorating performance (eg allowances for growth in network). Therefore, we do not expect companies to show performance degradation due to these factors in table OUT 2.

As such we have not quantified the benefits of these historical or proposed investments by showing a degradation in performance in table OUT2. At PR24, we do not anticipate that performance will improve as a result of enhancement expenditure. However our plan includes investment in addressing raw water deterioration that will protect CRI performance from degrading in AMP8.

Calibrating incentives - table OUT7

We have used Ofwat's indicative incentive rate and benefit sharing rate for this performance commitment.

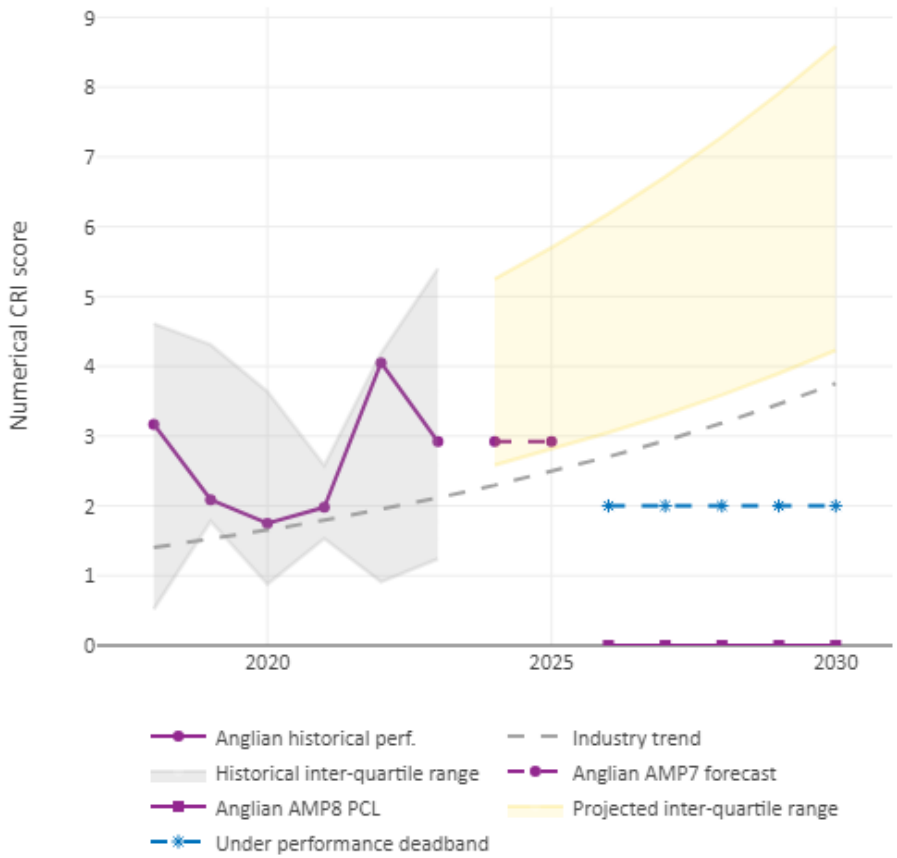
While our aspiration is to achieve full compliance with CRI every year, we recognise that this is unlikely. Our customer engagement shows that nearly all customers are satisfied with the safety of their drinking water. There is significant risk without a deadband that the industry will lose this customer confidence in the safety of drinking water quality through showing companies to be 'failing' against an absolute target. Although the industry provides excellent quality drinking water, as accepted by the DWI an element of residual risk remains and all risks cannot be managed to zero.

Ofwat stated that a deadband is appropriate for this measure in the PR24 Final Methodology [15] to reflect stakeholder feedback, especially that of the DWI. This is in line with the regulatory precedent established by the CMA during the PR19 Final Redetermination. The CMA stated deadbands may be appropriate where a measure itself allows very little tolerance and companies might 'miss' the PCL without necessarily having objectively failed in the management of the commitment. CRI was cited as an example of this circumstance. As Ofwat state within the PR24 Final Methodology, a deadband also accounts for the fact that full compliance on this measure is challenging to achieve due to factors which remain outside of management control, such as customer internal pipes and fittings which are outside the statutory functions of water companies.

15 Ofwat PR24 Final Methodology, page 71

We are proposing that the deadband be set at a CRI score of two each year of the AMP, the baseline performance expected by the DWI in the annual Chief Inspector's report. The Chief Inspector of the DWI, discussed CRI at the Chief Inspector's Report launch on 11 July 2023. He recognised there is a residual risk associated with drinking water quality even when companies are providing excellent quality drinking water, therefore it is unrealistic not to accept this residual risk at company assets and customer properties exists and therefore a deadband remains appropriate for this measure. This is shown in the following figure.

Figure 11 Historical and forecast performance for CRI



Setting the deadband at 2 is appropriate for this performance commitment on this basis to ensure companies do not receive underperformance payments each year whilst meeting the baseline expectations of our drinking water quality regulator and providing excellent quality drinking water, which may unjustifiably damage the sector's strong reputation for providing high quality drinking water. This level of performance is achievable, demonstrated by our historic performance in 2019/20 and 2020/21 which was below 2.

1.4 Customer contacts about water quality

Table 5 Customer contacts about water quality

Ofwat category	Customer	Anglian Water long term ambition	Resilient to the risk of drought and flood
Short description of measure	This performance commitment incentivises the company to measure the number of water quality contacts from customers relating to taste, odour and appearance.		
Performance	2024/25	2029/30	2049/50
Contacts per 1,000 population	1.14	1.04	0.82

Overview

This performance commitment is measured as the number of consumer contacts per 1,000 population due to the taste, odour, or appearance of drinking water. A reduction in the number of contacts by customers on the aesthetics of drinking water indicates an increase in the acceptability of water to customers.

Companies will report consumer contacts separately for appearance, taste and odour.

Customer views

We have engaged extensively with our customers to inform our AMP8 water quality strategy, with insight compiled and synthesised in our Customer Synthesis Report. Across our insight, although our customer evidence shows that water quality remains a high priority for our customers for PR24, most Anglian Water customers are content with the aesthetics of water and instead prioritise water safety. In the national Water Matters 2020-21 customer satisfaction CCWater survey, 93% of participants were satisfied with the appearance of water. Our customer research demonstrates that the safety of drinking water is more important than cosmetic appearance to our customers, and that our priority should be providing safe, reliable drinking water. The Investment Priorities Research conducted by Trinity McQueen found that for 91% of participants, the safety of drinking water is more important than cosmetic appearance.[16] This finding is supported by the Outcomes Incentive Research conducted by ICS, which found that reducing customer contacts about how drinking water looks & tastes was one of the least important areas for our Anglian region customers to be incentivised.[17]

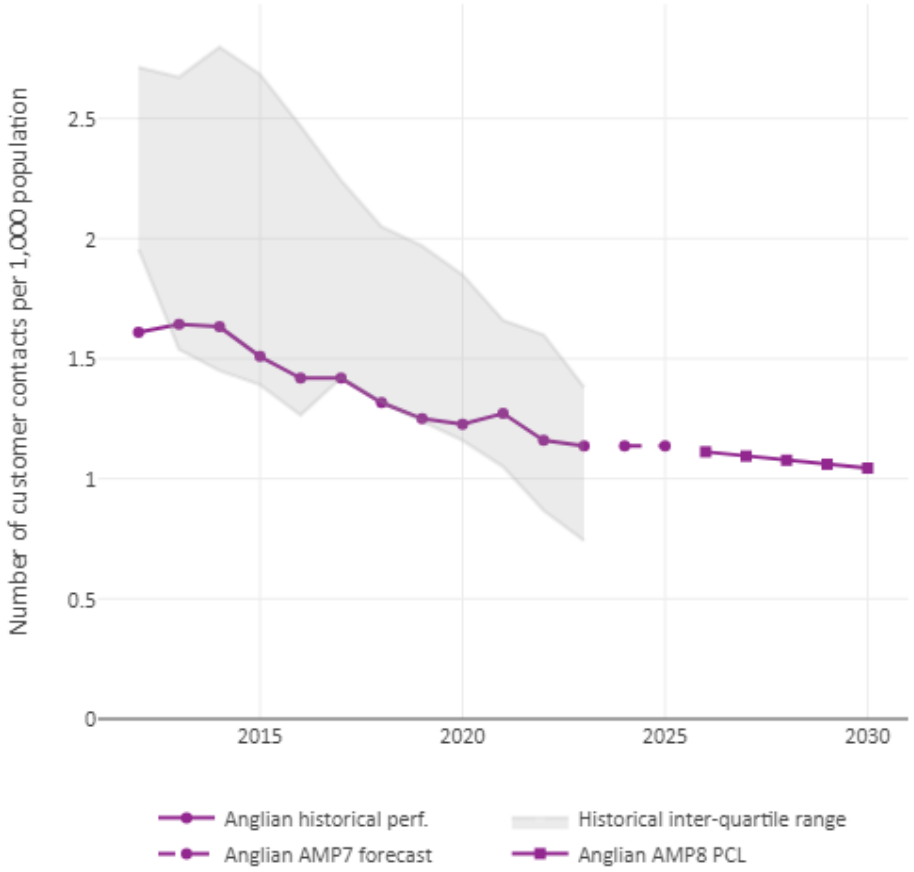
This contrasts with Ofwat/ CCW's central collaborative customer research which placed the appearance of water as a high priority.

Our performance commitment level - table OUT1

Figure 12 Customer contacts about water quality historical and forecast performance shows that we have made steady progress on reducing water quality contacts over time. We have considered performance benchmarks when setting our PCL. However the change to the guidance from DWI and definition of this PC at PR24 means there is considerable uncertainty about future industry performance. We have therefore focused on our own historic performance and improvement.

16 Annex 55 Customer Synthesis Report
17 Annex ANH59 Outcomes Delivery Incentives Research, page 21

Figure 12 Customer contacts about water quality historical and forecast performance



We propose a PCL of 1.04 contacts per 1,000 customers by 2029/30, an 8% reduction during AMP8. This PCL was selected through extrapolating forward our historic and current performance improvements on this measure, moderated and weighted to more recent years of performance and taking into account the change in methodology brought in by the Drinking Water Inspectorate. Our proposed PCL was considered acceptable by our customers in the first phase of our Affordability and Acceptability research.[18]

Our proposed PCL is appropriate as it shows stretching improvement from our recent AMP7 performance. This will be especially challenging given we expect our strategic interconnectors to be commissioned at the end of AMP7 and we plan a further set of interconnectors for delivery during AMP8. We expect the commissioning of the interconnectors will likely lead to an increase in the number of contacts as the acceptability, particularly taste and odour of some customers' water changes when they receive a new source of water through the interconnector. This will not have any health implications for customers.

Performance from base - table OUT2

In our response to Ofwat's 'performance improvements from base, enhancement and ODIs' data request, we outlined that customer contacts about water quality had received some minor benefits from historic enhancement investment, although this was generally related to calmer networks and the Water Quality Section 19 programme.

Following Ofwat's notice (IN 23/07) we have looked again at quantifying historic performance from base and enhancement. As noted in our response to the data request earlier in 2023, there are a number of factors that make quantification difficult but we have sought to provide further information for the requested performance commitments. For this performance commitment we conclude that it is not possible to quantify this given the available information. Our response to the data request outlined that in our view for our company, we considered the impact of enhancement to be limited to performance, although there were likely to be some interactions with leakage enhancement. This is an area where differing historic enhancement allowances could be influencing observed performance which suggests a common PCL may be less appropriate.

We expect improvements for this performance commitment to be driven by expenditure derived from base allowances. The majority of this improvement will be delivered through the following activities:

- Sedimentation flushing,
- Housing and estate mains flushing and Planned Preventative Maintenance (PPM),
- Proactive quality contacts,
- Water in buildings initiatives,

18 Data included in this research used the PR19 definition.

- Air valves PPM, and
- Critical valves PPM.

Performance from enhancement - table OUT3

We do not anticipate there will be any benefits to performance from our AMP8 enhancement programme. We propose enhancement investment to address three taste and odour Regulation 28 Notices following odour detections from the regulatory monitoring point final water samples. These investments are not related to customer complaints but are pro-actively addressing potential issues at the works, not for water in distribution. As such, this will not lead to any noticeable impact on our performance against this performance commitment, as captured in CW15.

We note that enhancement expenditure that upgrades network infrastructure can increase the number of contacts received in the short term.

Other commentary - table OUT4

We have provided historic information in line with our APR and DWI reporting. We have inflated our historic performance under the PR19 definition by a factor of 12.6%. This represents the average of the impact of the new definition on AW's performance in 2022 (the only year we have data for) and the industry average (excluding companies who reported a negative change) in Ofwat's historical performance data set which was 16.5%.

We have forecasted an increase in calendar year population in line with the level of growth in population forecast for WRMP-24. We have inflated our historic performance under the PR19 definition by a factor of 12.6% to account for the new DWI method counting combined events of taste, odour and appearance as separate contacts, as well as our AMP7 forecast for 2023-24 and 2024-25.

As noted in our response to the Historical performance trends data request, we are not able to provide historical data on this performance commitment as we changed systems in our operational call centre to Mercury. We have sought to estimate the impact on performance by reviewing data for 2022. We believe this would result in an uplift of roughly 10% to our reported number of contacts for 2022-23. However we lack confidence in this estimate as our systems are still being put in place in line with the new guidance and believe this is likely to underestimate the impact of the change. On its own we would not be confident providing this as an estimate of performance. We have had regard to the impact quantified by other companies on performance in the historical performance trends data request which provides a number of data points. We note that for companies that reported an increase between the two definitions the average uplift across all years is 16.5%.

To provide an estimate for our performance in 2022-23 we have taken an average the industry average uplift and our own estimate, recognising that our own estimate is a single data point with low associated confidence.

This represents the average of the impact of the new definition on AW's performance in 2022 (the only year we have data for) and the industry average (excluding companies who reported a negative change) in Ofwat's historic performance data set. For 2022-23 we have used the best available internal information to estimate performance using the new methodology resulting in a 9-10% uplift compared to our APR performance for 2022-23.

Calibrating incentives - table OUT7

We have used Ofwat's indicative incentive rate and benefit sharing factor for this performance commitment.

In recognition of the potential impact of commissioning of our strategic interconnectors at the end of AMP7 and the further interconnector schemes in AMP8, we propose a deadband for this performance commitment. We anticipate commissioning of the interconnectors will see an increase in the number of contacts on taste, odour and appearance due to customers receiving drinking water from a different source/ or mixture of sources , and therefore experiencing a change rather than a worsening of the aesthetics of their water. We propose the deadband is set at 10% above the PCL. This is outlined in the table below.

Table 6 Customer contacts about water quality deadband

Deadband type	2025-26	2026-27	2027-28	2028-29	2029-30
Underperformance	1.22	1.20	1.18	1.17	1.15

We note at the PR19 Final Redetermination, the CMA introduced deadbands for measures where there was risk of penalties that might arise due to factors outside of the companies control. We consider a deadband for this measure is appropriate on this basis, as the number of contacts we receive due to changing taste and odour from a change in source is outside of company control where this is required to address the supply-demand deficit.

The following table illustrates the change in the numbers of customers receiving water from a particular source due to the AMP7 interconnectors. Currently six of the Water Treatment Works (WTW) that will feed the interconnectors serve 2.6m customers. Once the programme is complete, water from the twin Wing and Morcott WTWs will reach 2.5m customers (an increase of 150%) out of a total 3.1m

water customers. Although customers will eventually become used to the taste and aesthetics of water from a new source, changing where water is supplied from will likely be initially noticeable to customers.

Table 7 Population served by Water Treatment Works

Water treatment works	Current population served	Population served after delivery of interconnection
Covenham	563,834	1,869,388
Elsham	184,639	1,442,291
Wing & Morcott	1,671,812	2,500,472
Etton	133,807	1,062,152
Bexwell	90,773	828,660
Rede	43,635	637,458

1.5 Internal sewer flooding

Table 8 Internal sewer flooding

Ofwat category	Customer	Anglian Water long term ambition	Resilient to the risk of drought and flood
Short description of measure	This performance commitment incentivises the company to reduce the number of internal sewer flooding incidents.		
Performance	2024/25	2029/30	2049/50
Incidents per 10,000 sewer connections	1.46	1.15	0.17

Overview

This performance commitment is defined as the reduction in the number of internal sewer flooding incidents, normalised per 10,000 sewer connections. Flooding incidents are defined as any escape of water from a sewerage system, irrespective of size, as evidenced by standing water, running water or visible deposits of silt or sewage solids. Internal sewer flooding refers to when a flooding event enters a building used for residential, public, business or community purposes. Where a property floods both internally and externally during the same event it shall only be recorded as an internal flooding incident.

Reducing the number of internal sewer flooding incidents helps to minimise disruption for customers.

Customer views

As captured within our Customer Synthesis Report, our customers at PR24 continue to consider flooding to be a particularly serious (although rare) service failure. Participants in Ofwat/CCW's Customer Preferences Research (April 2022) ranked internal and external flooding in the highest importance category for us to address, alongside supply interruptions and water quality.[19]

In our outcome delivery incentive research with ICS, customers ranked internal and external sewer flooding amongst the most important PCs to financially incentivise.[20] This is confirmed through the societal valuation our customer ascribe to sewer flooding, which is amongst the most highly valued element of service in the framework.[21]

Additionally, customer research conducted during the development of our DWMP (July 22) found that with an increase in flooding being witnessed in hometowns and on the news, our customers perceive flooding as an imminent and realistic risk which could cause significant damage to homes, the environment, and the economy. Therefore, AW investing in reducing flooding risk in the short-term is seen as of paramount importance for the wellbeing and safety of customers.[22]

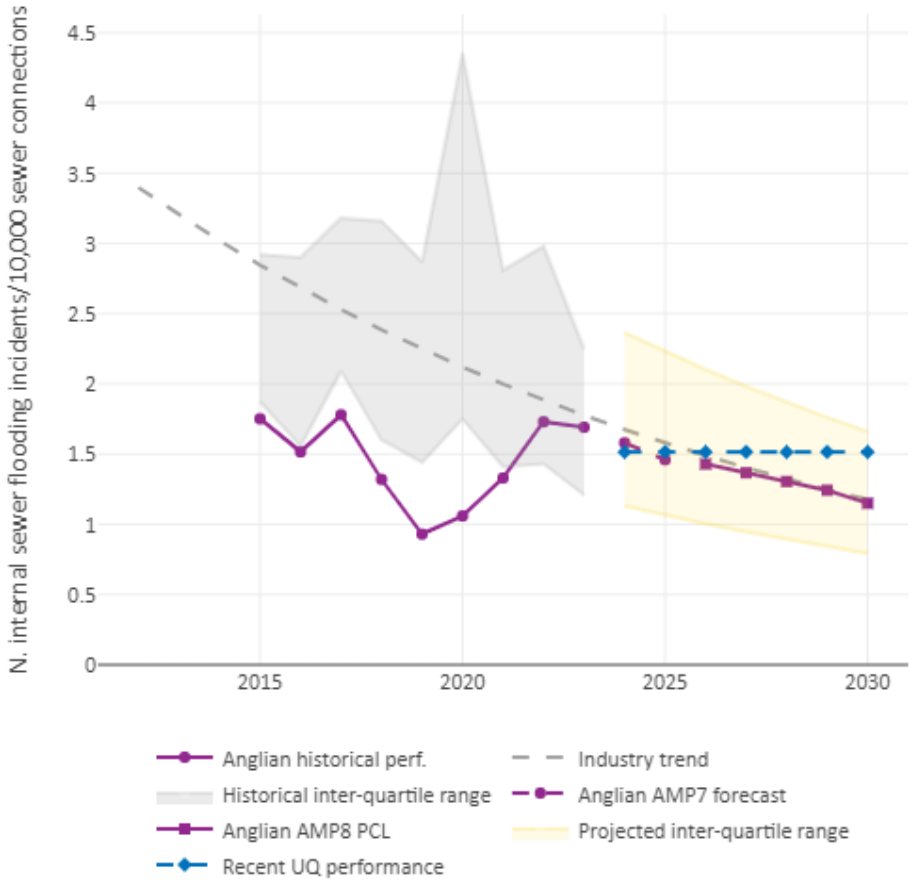
70% of the customers surveyed as part of national Water Matters 2020-21 Customer satisfaction study were satisfied with companies' actions to minimise flooding.

Our performance commitment level - table OUT1

Historically we were one of the strongest performers on this measure within the industry. We observe that industry performance has been volatile and our recent performance trend within AMP7 has worsened. This is attributable partly to improved reporting during AMP7 compared to shadow reporting in AMP6 and the impact of weather. We remain better than average within the industry.

19 Annex ANH55 Customer Synthesis report
20 Annex ANH59 Outcome Delivery Incentive Research
21 Annex ANH67 Societal Valuation Triangulation Report
22 Annex ANH55 Customer Synthesis report

Figure 13 Historical and forecast Internal Sewer Flooding performance



We propose a performance commitment level of 1.15 incidents per 10,000 sewer connections in 2029/30, which is an ambitious 21% improvement within AMP8. This would equate to approximately 354 internal sewer flooding incidents overall, a reduction of 80 incidents total from our expected 2024/25 performance.

This target would see us regain our position as one of the leading companies on sewer flooding. Our proposed target is more stretching than our performance trend and would see us ahead of the AMP7 industry upper quartile (blue dashed line in the preceding figure). We have proposed this scale of improvement as informed by the importance of this area to our customers.

In response to our extensive customer consultation, we were challenged to go beyond our initial recommendation. We initially considered a target of 1.52, based on recovering and maintaining performance, as part of our Affordability and Acceptability qualitative research. However participants indicated this target was less acceptable and called for more ambition in the short term. Other customer insights collated in our Customer Synthesis Report collaborated that customers view this area as a priority for improvement. We have listened to the preferences of our customers. Our revised target also accounts for the expected benefits of our PR24 sewer flooding investments and our forecast AMP7 position.

This will require us to turn around our recent performance and deliver significant improvement for customers. We have identified a future programme of targeted sewer inspection, sewer misuse schemes, monitoring and improvements to increase sewer capacity which will support us in returning our performance to historic levels. Between our historic performance and our proposed future improvements, we are confident we can deliver this rapid performance improvement within the AMP. Achieving this level of performance will be dependent on the level of expenditure allowed in the FD.

Improvements from base - table OUT2

In our response to Ofwat's 'performance improvements from base, enhancement and ODIs' data request, we outlined that internal sewer flooding had received some benefit from historical enhancement investment, predominantly investment to increase storage capacity, address flooding risk, and address odour.

We expect most of the improvement for this performance commitment to be driven by schemes delivered from enhancement expenditure allowances. However base expenditure will help maintain performance in the face of pressure from growth and a lower enhancement request than the investment need identified in the DWMP by funding replacement of sewer monitors, relining sewers to prevent infiltration and sewer jetting to tackle blockages.

Improvements from enhancement - table OUT3

We discuss our approach to quantifying the benefits of our enhancement programme in the commentary for tables CW15 and CWW15. We expect there to be significant benefit from enhancement expenditure for this performance

commitment. This includes both primary benefits from investment aimed at reducing flooding risk, and secondary benefits from investment primarily aimed at other drivers. We expect the greatest benefit to materialise from network monitoring, sewer enhancements, and surface water management schemes. This is shown in table OUT3. The quantified improvements to be delivered from enhancement expenditure are captured in table CWW15. Further detail in support of this enhancement case is provided in 'Our PR24 Enhancement Strategies, Part 1: Resilience to the risk of drought and flood, Reducing flooding risk for properties.

We understand Ofwat's intention to move sewer flooding enhancement expenditure into the base plus models. If Ofwat proceeds on this basis then the performance improvements shown in table OUT3 should be translated to table OUT2.

Other commentary for tables OUT5

We have assumed that proportion of reactively identified and proactively reported incidents remains the same as the average for the last three years (2020-21 to 2022-23). Forecast number of sewer connections is aligned to the level of growth used in the business plan and LTDS.

Calibrating incentives - table OUT7

We have used Ofwat's indicative incentive rate and benefit sharing factor for this performance commitment.

1.6 External sewer flooding

Table 9 External sewer flooding

Ofwat category	Customer	Anglian Water long term ambition	Resilient to the risk of drought and flood
Short description of measure	This performance commitment incentivises the company to reduce the number of external sewer flooding incidents.		
Performance	2024/25	2029/30	2049/50
Incidents per 10,000 sewer connections	16.10	15.10	1.61

Overview

This performance commitment is defined as the reduction in the number of external sewer flooding incidents, normalised per 10,000 sewer connections. Flooding incidents are defined as any escape of water from a sewerage system, irrespective of size, as evidenced by standing water, running water or visible deposits of silt or sewage solids. External sewer flooding refers to where wastewater enters the curtilage of a building (ie gardens used for residential, public or business purposes, detached garages etc) but does not enter properties. Where a property floods both internally and externally during the same event it shall only be recorded as an internal flooding incident.

Reducing the number of external sewer flooding incidents helps to minimise disruption for customers.

Customer views

As captured within our Customer Synthesis Report, our customers at PR24 continue to consider flooding to be a particularly serious (although rare) service failure. Participants in Ofwat/CCW's Customer Preferences Research (April 2022) ranked internal and external flooding in the highest importance category for us to address, alongside supply interruptions and water quality.[23]

In our outcome delivery incentive research with ICS, customers ranked internal and external sewer flooding amongst the most important PCs to financially incentivise.[24] This is confirmed through the societal valuation our customer ascribe to sewer flooding, which is amongst the most highly valued element of service in the framework.[25]

Additionally, customer research conducted during the development of our DWMP (July 22) found that with an increase in flooding being witnessed in hometowns and in the media, our customers perceive flooding as an imminent and realistic risk which could cause significant damage to homes, the environment, and the economy. Therefore, AW investing in reducing flooding risk in the short-term is seen as of paramount importance for the wellbeing and safety of customers.[26]

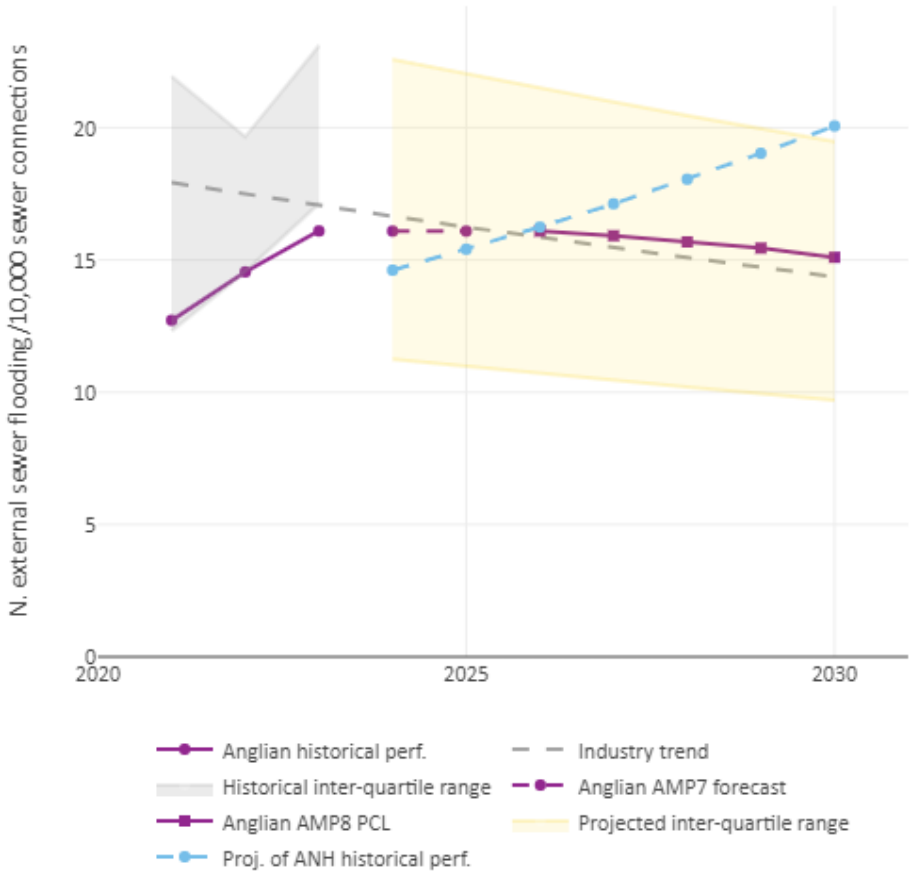
70% of the customers surveyed as part of national Water Matters 2020-21 Customer satisfaction study were satisfied with companies' actions to minimise flooding.

Our performance commitment level - table OUT1

We are one of the strongest performers on this measure within the industry. In general the performance of the best performing companies has worsened in recent years. For us this is attributable partly to improved reporting during AMP7 compared to shadow reporting in AMP6 and the impact of the weather.

23 Annex ANH55 Customer Synthesis report
24 Annex ANH59 Outcome Delivery Incentive Research
25 Annex ANH67 Societal Valuation Triangulation Report
26 Annex ANH55 Customer Synthesis report

Figure 14 Historical and forecast performance external sewer flooding



We propose a performance commitment level of 15.10 incidents per 10,000 sewer connections in 2029/30. This would equate to approximately 4,650 sewer flooding incidents overall.

This target would see us maintain our position as one of the leading companies on sewer flooding. Our proposed target is more stretching than our performance trend (pale blue line in the figure below), which shows our ambition to turn our performance around. The proposed PCL is more stretching than the industry upper quartile in 2022-23 which was 17.1 incidents per 10,000 sewer connections.

We have identified a future programme of targeted sewer inspection, sewer misuse schemes, monitoring and improvements to increase sewer capacity which will support is in returning our performance to historic levels. Between our historic performance and our proposed future improvements, we are confident we can deliver this rapid performance improvement within the AMP. We note achieving this level of performance requires our request base and enhancement expenditure to address sewer flooding to be permitted in full.

Improvements from base - table OUT2

In our response to Ofwat's 'performance improvements from base, enhancement and ODIs' data request, we outlined that external sewer flooding had received some benefit from historical enhancement investment, predominantly investment to increase storage capacity, address flooding risk, and address odour.

We expect most of the improvement for this performance commitment to be driven by schemes delivered from enhancement expenditure allowances. However base expenditure will help maintain performance in the face of pressure from growth and a lower enhancement request than the investment need identified in the DWMP by funding replacement of sewer monitors, relining sewers to prevent infiltration and sewer jetting to tackle blockages.

Improvements from enhancement - table OUT3

We discuss our approach to quantifying the benefits of our enhancement programme in tables CW15 and CWW15. We expect there to be significant benefit from enhancement expenditure for this performance commitment. This includes both primary benefits from investment aiming at reducing flooding risk, and secondary benefits from investment primarily aimed at other drivers. We expect the greatest benefit to materialise from network monitoring, sewer enhancements, and surface water management schemes. This is shown in table OUT3. The quantified improvements to be delivered from enhancement expenditure are captured in table CWW15.

We understand Ofwat's intention to move sewer flooding enhancement expenditure into the base plus models. If Ofwat proceeds on this basis then the performance improvements shown in table OUT3 should be translated to table OUT2.

Other commentary - table OUT5

We have assumed that proportion of reactively identified and proactively reported incidents remains the same as the average for the last three years (2020-21 to 2022-23). Forecast number of sewer connections is aligned to the level of growth used in the business plan and LTDS.

Calibrating incentives - table OUT7

We have used Ofwat's indicative incentive rate and benefit sharing factor for this performance commitment.

1.7 Biodiversity

Table 10 Biodiversity

Ofwat category	Environment	Anglian Water long term ambition	Work with others to achieve significant improvements in ecological quality of catchments
Short description of measure	This performance commitment is designed to incentivise the company to conserve and enhance biodiversity in the exercise of its functions.		
Performance	2024/25	2029/30	2049/50
Change in biodiversity units per 100km2	N/A	0.08	0.34

Overview

This performance commitment is defined as the net change in the number of biodiversity units on nominated land per 100km2 of land in the company's area. This performance commitment is designed to incentivise companies to conserve and enhance biodiversity within their regions. Benefits of improved biodiversity include a reduced extinction risk, greater amenity value for customers, and improved ecosystem service provision (i.e. water quality).

This is a new performance commitment for PR24. We were pleased to collaborate with Ofwat and other stakeholders to support the development of this performance commitment through the Biodiversity Task and Finish Group, which was chaired by Chris Gerrard, Natural Catchment and Biodiversity Manager at Anglian Water.

Our ambition for biodiversity

This Biodiversity Performance Commitment is part of our wider ambition for, and commitment to biodiversity.

- We have a legal duty to ensure our Sites of Special Scientific Interest (SSSI) are in Favourable Condition. This applies to 2,843Ha of our land, approximately 41% of our total land. By area, 98.76% of our land is in Favourable Condition.
- We have a good understanding of the value of the rest of the Anglian Water estate. We worked with University of East Anglia (UEA) to prioritise our sites according to the principles set out in 'Making Space for Nature: A review of England's Wildlife Sites and Ecological Network', commonly known as the Lawton Principles. We also undertook a biodiversity baseline in 2018 of our assets using the Defra Biodiversity Metric. These information sources help us prioritise which non-SSSI assets we should be enhancing for wildlife.
- We are committed, this AMP and next, to our Voluntary Natural Capital Performance Commitment. This compliments our statutory biodiversity net gain (BNG) commitments, which are anticipated to start in November 2023. Our Voluntary BNG commitment sees us delivering a minimum 10% net gain on measured losses on AW-owned land when we build assets for which planning permission is not required.
- We work in partnership with environmental non-governmental organisations (NGOs) on biodiversity projects across the region, including Water for Wildlife and RiverCare & BeachCare.
- Our environmental investment plan and WINEP, enhances thousands of kilometres of rivers during each AMP period, improving habitats for wildlife.

Customer views

As identified in our Customer Synthesis Report, which collates our customer insight across our engagement activities, environmental protection is considered by our customers to be an important aspect of our work. The Customer Investment Priorities Research (wave 1) conducted by Trinity McQueen found that '[maximising] our green spaces at our operational sites to create biodiverse, wild areas for wildlife to flourish' ranked 10th out of 18 investment options. Future customers ranked this measure higher than the wider participation base.[27]The Ofwat/CWW Customer Preferences Research identified that biodiversity was a medium customer priority.

Site selection

In 2018 UEA helped us to assess all our assets (over 6000), applying ecological theory and weightings to enable each asset to be scored for their relative biodiversity value. The higher the score the better the asset for biodiversity. The rank of one, has the highest biodiversity score.

The Lawton Principles of Bigger, Better, and more Joined habitats were applied to each asset to enable the scoring. The principle of More was not included in the assessment, as at the time AW had no plans to purchase land for biodiversity enhancement.

The following factors were considered during site selection:

27 All views drawn from the Synthesis Report, Annex ANH55 Synthesis Report.

- UEA's score (based on the Lawton Principles)
- Habitat types, size, time to target condition, adjacent land use, and potential net gain opportunities
- Location
- Staff resources
- Base cost allowance

Listed below are three of our supply assets which rank in our top 150 assets. They have been selected to go into the Biodiversity Performance Commitment (PC) at this stage:

1. Grafham (Offord intake)
2. Elsham Water Treatment Works
3. Heigham Water Treatment Works

We also had to consider that under the PC we must be able to provide assurance that biodiversity across the company's estate is being maintained and not declining.

The biodiversity enhancements on these three sites include improvements in grassland condition, the creation of mixed scrub and non-priority habitat ponds.

These sites will become "showcase" operational biodiversity sites for the business, our operational nature reserves. This will give the business confidence in their feasibility, help us meet our Biodiversity Duty, whilst creating a healthy and safe working environment.

We will work with our newly established Biodiversity Challenge Group to establish if any further sites are suitable for nomination during the course of AMP8.

Our performance commitment level - table OUT1

Our proposed performance improvement is stretching. Land nominated for inclusion is operational, enhancing operational land for biodiversity has not been a business focus historically. It will bring to the table new and exciting challenges. Lessons will be learnt; trust will be built across a network of stakeholders and ultimately more land will be brought into management to benefit biodiversity.

Our PCL has been set in line with ecological consultants' views on the required time to reach target condition for the habitat types on the three sites. These outputs have been used to populate our data tables and their reports are available on request. This includes management and benefits into AMP10 which we have reflected in this table and the LTDS tables.

We are proposing to manage these sites in line with the ecologists' recommendations for improvements from base cost allowances. To ensure reaching this target and our increasing duties to biodiversity conservation and enhancement are achievable, we are looking to recruit additional staff for our biodiversity team.

At this stage our plan is to deliver this performance commitment on three sites. The PC definition allows us to nominate land at any time, subject to approval by the expert panel required by the commitment. This allows us to build our confidence in how the PC will operate in practice, adding more sites at a later date. It should be noted that outperforming the PC may be challenging given we are working with natural systems. Opportunities to realise biodiversity units ahead of the target condition proposed by expert ecologists may be rare.

Improvements from base - table OUT2

We expect improvements in biodiversity to be driven predominantly by base expenditure. These are drawn from the Habitat Management Plan for each site.

Table 11 Summary of habitat management by site

Site	Activities
Grafham (Offord Intake)	· Thinning out the woodland: over a five year period 80 trees are either being coppiced, pollard or veteranized. · Planting 4,000 trees in the felled areas · Creation of four non-priority habitat ponds · Creation of woodland wildflower rides around the woodland · Carrying out surveys: bats, breeding birds, wintering birds, reptiles
Elsham Water Treatment Works (WTW)	· Felling silver birch self-set trees and grinding out stumps to restore the area back to grassland · Cutting back the bramble scrub making sure it doesn't creep into the grassland areas · Cutting and collecting grassland vegetation and the creation of habitat piles · Control of Japanese knotweed · Carry out species survey: reptiles, botanical

Site	Activities
Heigham Water Treatment Works (WTW)	• Sympathetic other neutral grassland management. This involves fewer grassland cuts, and those cuttings to be collected • Short grass paths to be maintained to enable access to assets for maintenance; and buffer strips will be implemented adjacent to hard surfaces / assets to ensure Health and safety compliance and asset checks and maintenance can take place as required • Improvements in grassland condition will be monitored and if required green hay may be spread on site to enhance the diversity of wildflowers in the sward

We have completed the OUT tables on the basis that all the proposed performance improvement is derived from base expenditure (shown in table OUT2).

Improvements from enhancement - table OUT3

We discuss our approach to quantifying the benefits of our enhancement programme in the commentary for table CW15 and CWW15. We do not anticipate there will be any significant benefits to performance on the sites nominated from our AMP8 enhancement programme. All performance improvements for this performance commitment will be delivered from expenditure derived from base allowances.

Other commentary - table OUT4

For completion of table OUT4, our calculations are based on the three proposed sites for this performance commitment (Heigham WTW, Elsham WTW, and Grafham (Offord Intake).

We have taken the BNG assessments and the recommended biodiversity improvements from ecologists directly and this means we carry some uncertainty and risk for the three sites we have nominated. The proposed biodiversity improvements are back-to-back with the recommendations in the ecologists' BNG reports. These reports are available on request.

It should be recognised that we are assuming that the recommended habitat creation, restoration and/or enhancement on the sites takes place to the required standard, e.g. appropriate time of year, in optimum conditions, with the ideal equipment and by suitably trained technical professionals, to ensure the habitats meet the target biodiversity unit counts for the site in the required time frame. Environmental factors outside our control could impact our performance, e.g. drought conditions.

We have assumed that our company supply area remains constant, and can confirm that the area figure excludes New Appointments and Variations (NAVs).

Calibrating incentives - table OUT7

Ofwat state in the Final Methodology (appendix 8, page 17) the intention to use external valuations to determine incentive rates for this performance commitment. Ofwat outline the potential to use the biodiversity net gain market as a starting point to estimate marginal benefits while reviewing against a range of sources. More detail on the approach to set incentives for this performance commitment will be given as part of the determinations.

We have proposed an incentive rate of £30,000 per biodiversity unit and a marginal benefit of £42,857. We have multiplied this marginal benefit by the water supply area in 100 km2 (227.14) to convert the marginal benefit to normalised performance. Defra's biodiversity credit prices range from £42,000 (low distinctiveness) to £650,000 (high distinctiveness) per credit depending on habitat type. Many of the habitats on our proposed sites are either low or medium distinctiveness. This is consistent with our approach to incentivise our supply chain to deliver our voluntary BNG commitments which will use a figure of £30,000 a unit.

Biodiversity habitat information - table OUT9

For completion of table OUT9, our calculations are based on Anglian Water data and our land agents Savills.Data was generated on the assumptions that:

- the 2019 Anglian Water biodiversity baseline geographic information system (GIS) dataset is still representative of the ground conditions in 2023
- The open-source data sets we used from .gov have been updated to reflect any recent changes,
- and that the Savills property database is up to date

Calculations have been undertaken in Anglian Water's GIS; or manually from the Savills property database.

Where data has not been provided, it is not currently readily available. If these data items are likely to be requested within future APRs it is important that sufficient notice is provided so that appropriate systems and processes can be established.

1.8 Operational greenhouse gas emissions (water and water recycling)

Table 12 Operational greenhouse gas emissions

Ofwat category	Environment	Anglian Water long term ambition	A carbon neutral business
Short description of measure	This performance commitment incentivises the company to reduce greenhouse gas emissions arising from its own operational activities		
Performance	2024/25	2029/30	2049/50
Water tonnes CO2e	116,064	113,457	97,536
Water recycling tonnes CO2e	246,590	238,782	237,354

Overview

These performance commitments are defined as reduction of greenhouse gas (GHG) emissions associated with company operations, measured both in the tonnes of CO2e and the percentage change since 2021-22.

There are two performance commitments measuring reductions in operational GHG emissions at PR24, one for water and one for water recycling. The water PC is also reported as kgCO2e per megalitre of distribution input (pre-MLE), and the water recycling PC is also reported as kgCO2e per megalitre of volume of wastewater received at sewage treatment works.

These performance commitments are designed to incentivise companies to reduce the GHG emissions associated with their operations, to support the attainment of the UK Government's 2050 and interim net zero targets. However the performance commitment is defined using fixed assumptions such as grid emissions factors which will result in different emissions being reported in reality compared to this performance commitment.

The methodology employed excludes the purchase of renewable electricity from the grid. In addition, as the grid electricity emissions factor is fixed at 2022 levels, and thus higher than the likely grid emissions factor in 2030, emissions reported will be higher than will be the case in 2030. This could mean a focus on reducing emissions which will reduce naturally through grid decarbonisation rather than hard to reduce areas such as process emissions. It will also underestimate the industry's progress towards achieving net zero emissions.

For each performance commitment, we outline our approach to target setting, how we established the improvements to be delivered from base and enhancement, and how we identified incentive rates in turn below.

Customer views

Our customer insight as captured within our Customer Synthesis Report confirms that customers generally support our efforts to reduce our carbon footprint, recognising the threat of climate change to our region and the environment. Although low in terms of overall importance (as identified by the Trinity McQueen Investment Priorities wave 1 research) in the short term, our customers hold us to our commitment to meet long-term net zero targets. This is an area that is particularly important to future customers, with Trinity McQueen research identifying that reducing our carbon footprint was the second most important priority to our future customers.[28] However, in the Outcome Delivery Incentive Research conducted by ICS, customers responded that reducing emissions was one of the lower priority performance commitments for financial incentives.[29]

Our performance commitment level - table OUT1

Water

We propose a performance commitment level of 113,457 tonnes CO2e. This is a 2% reduction against the 2024/25 baseline. Our forecast is based on our bottom-up view of how the components of emissions, as captured in the carbon accounting workbook (CAW), will adapt over time.

We are forecasting to reduce emissions from their current levels during AMP8, however this will be challenging as without action we anticipate emissions may rise during AMP8 due to population and demand growth and our growing asset base.

28 Annex ANH55 Synthesis Report.
29 Annex ANH59 Outcomes Delivery Incentives research.

Water recycling

We propose a performance commitment level of 238,782 tonnes CO2e. This is a 3% reduction against the 2024/25 baseline. Our forecast is based on our bottom-up view of how the components of emissions, as captured in the carbon accounting workbook (CAW), will adapt over time and the benefits of our enhancement investments.

At PR19, the majority of our operational emissions are associated with our water recycling functions. We anticipate this trend will continue into AMP8 and beyond.

Our track record and comparative performance

For many years we have been at the forefront of carbon reduction in the water industry. Our decarbonisation journey began in 2010, when we first set ambitious goals to reduce our operational and capital carbon emissions, at a time when measuring and managing capital carbon - the carbon in our assets and what we build - was unheard of. With committed leadership and a determined supply chain, by 2020 we had reduced capital carbon by 63 per cent in our capital programmes from our original 2010 baseline and reduced operational emissions by 34 per cent from a baseline set in 2014/2015.

Working with Government and leading businesses through our role in the Green Construction Board, we developed the world's first standard for managing carbon in infrastructure (PAS 2080), which is now being used nationally and internationally. We have also achieved platinum status on ISO 14064, the international standard for the quantification and reporting of greenhouse gases.

We are continuing to be proactive. Our net zero strategy is one of the most detailed in the entire industry, we were the only UK Water company to have a formal role at the UN Climate Change Conference COP26 and in 2021 received funding through Ofwat's innovation fund for two carbon focused projects, Whole Life Carbon Design and Triple Carbon Reduction. A case study for Whole Life Carbon Design is provided below.

Ofwat innovation fund - Enabling Whole Life Carbon in Design

At Anglian Water we understand the framework required around leadership, innovation, and behaviours to reduce carbon and cost within our investment programmes of work. To go beyond this existing performance, and deliver net zero, we need a step change in how we value carbon. Having long recognised the importance of collaboration in the space of carbon reduction and that committing to reducing carbon and building carbon literate teams is vital, we wanted to continue to lead the sector on the next steps of its journey to measure, manage and reduce carbon through this Ofwat innovation fund project.

Bringing together water companies and experts in digitisation and carbon management from sectors beyond water, the team has created a playbook, aligned to PAS2080, that will support the water sector and its value chain to:

- measure whole life carbon and cost
- use digital values-based visualisations that enable the rapid identification of carbon and cost hotspots during the design phase
- and most importantly, embed carbon as an equal decision-making metric to cost

This project has provided an approach and set of tools that enables carbon and cost to be visualised simultaneously, and valued equally, during decision making. Understanding the carbon and cost 'hotspots' through the design process means we can immediately see the impact of different solutions and continually challenge ourselves on the journey to net zero.

Through this industry-first collaborative project the sector now has:

- A standard whole life carbon equation and template that enables the measurement and reporting of capital, operational and whole life carbon
- An approach to visualising carbon and cost hotspots in building information modelling (BIM) models; allowing live hotspotting of data such as capital carbon and capex, tonnes of CO2 per £m spent and whole life carbon and cost

- A framework for how to embed whole life carbon into governance and decision-making processes
- And a guide to managing organisation change; ensuring the new whole life approach is embedded into business practices as standard.

We truly believe this project has created a transformational carbon and cost management toolkit that will benefit our sector. Ofwat has stated the project has significant potential to help the sector understand the emissions associated with constructing capital infrastructure projects and therefore take necessary action.

Ofwat's definition includes reporting performance on a normalised basis per Ml/d of distribution input or wastewater treated. We note that caution must be exercised when comparing company performance and consider that it may not be appropriate for this performance commitment to compare performance or PCLs as currently defined.

We are concerned that the approach to normalisation will not have the desired outcome. Normalising based on distribution input and volume of wastewater treated misses crucial drivers of carbon emissions, namely the level of pumping required to move water and wastewater to and from customers. This coupled with setting a common performance commitment could penalise companies who must use more energy, and reward others arbitrarily.

A key driver of energy consumption required by water companies is the electricity consumption to power pumps. Usually 50-60% of our emissions were associated with power. Our region is famously flat. With few hills we can't take much advantage of gravity, so we necessarily require more energy than other water companies to pump clean water, and water for recycling, from place to place. For our draft methodology response we looked into this issue and considered that normalisation needs to take account of topography. Ignoring it can give unrealistic impressions of comparative performance. Below we show the ranking of companies emissions in 2020-21 using Ofwat's proposed normalisation and one accounting for distribution input and pumping head (as a measure of topography and pumping requirements). The table clearly shows the rankings of some companies changes significantly.

Table 13 Greenhouse gas emissions using different normalisers, 2020-21

Company	Gross emissions	
	Ranked based on emissions per mega litre of distribution input	Ranked based on emissions per mega litre of distribution input and average pumping head
ANH	15	9
Company 2	10	3
Company 3	3	13
Company 4	9	1
Company 5	6	2
Company 6	11	12
Company 7	4	4
Company 8	2	11
Company 9	8	6
Company 10	14	14
Company 11	7	16
Company 12	5	8
Company 13	12	5
Company 14	1	15
Company 15	16	10
Company 16	13	7
Company 17	17	17

To us this suggests that Ofwat must place more emphasis on the journey's that companies have already been on, rather than performance comparisons, when setting PCLs.

We note that there is a disconnect between the definition of this performance commitment and broader net zero commitments as the performance commitment uses fixed grid emissions factors. Nonetheless, this target places us on the right trajectory to meet all relevant net zero 2050 and interim targets. This includes the target for the water sector to reach net zero emissions by 2030 as stated in Water UK's Public Interest Commitment.

Conclusion

Overall our proposals represent stretching but achievable levels of performance. As our asset base grows alongside an enhancement programme that is our biggest ever, double our AMP7 programme.

Improvements from base - table OUT2

Water

Our performance forecasts include base activities, such as energy efficiency initiatives. The scale of our enhancement expenditure means we will have a significant number of new assets and will be pumping higher volumes of water across our region through our interconnector programme, this puts upwards pressure on emissions. For water we have also accounted for the potential of renewable generation at our sites which we are not proposing to fund via enhancement. As such for water all the performance improvement is attributable to base expenditure.

Water recycling

Our performance forecasts include base activities, such as energy efficiency initiatives. However, given our significant enhancement programme and pipeline of new assets our expectation is that emissions will increase without

Improvements from enhancement - table OUT3

Water

We are not anticipating that our enhancement programme in AMP8 will improve performance.

Water recycling

We have quantified the expected emissions reductions of our net zero investments. Key enhancement investments that contribute to reducing emissions are biomethane to grid, process emissions and introduction of electric heavy good vehicles (HGV).

Other commentary - table OUT4

Carbon Accounting Workbook (CAW) v17 has been used to generate carbon emissions information for each year 2018/19 to 2034/35.

Background to the data provided for 2018/19 to 2022/23

For historical data 2018/19 to 2022/23, raw data from each year has been used to populate CAWv17. As the carbon emission factors in CAWv17 differ from previous versions, the carbon emissions detailed in table OUT4 are not comparable with carbon emissions data published in the APR in each of the relevant years.

The data used to calculate historical annual carbon emissions for 2018/19 to 2022/23, calculated using the CAW relevant to each year, were verified against ISO14064. This raw data therefore is accurate and is not estimated data.

Ofwat PR24 Operational Greenhouse Gas Emissions Performance Commitment Water requires the reporting of emissions from chemicals. Historically Anglian Water has not reported on emissions from chemicals as part of annual carbon emissions reporting but data has been gathered. Therefore the historical data on chemical use is actual, and not estimated, data. Whilst actual data has been used this was not verified against ISO14064 in each year.

Background to the data provided for 2023/24 and 2024/25

This raw data is forecast data based upon our existing plans for the rest of AMP7. Whilst this is necessarily forecast data, given that plans and programmes are in place for the remainder of AMP7 this data should be considered as having a high degree of accuracy.

Background to the data provided for 2025/26 to 2029/30

This raw data is forecast data based upon our proposed PR24 investment programme including Net Zero enhancement investments.

Background to the data provided for 2030/31 to 2034/35

This raw data is forecast data including the proposed PR24 investment programme but with no further enhancement investments for the 2030/31 to 2034/35 (AMP9) period.

CAWv17 data points

Set out below are the assumptions made for the various data points to generate the carbon outturn for each year required for the completion of CAWv17:

- Grid electricity used for water pumping and water treatment
  - For 2023/24 and 2024/25 consumption based on budgeted forecasts for electricity use
  - For 2025/26 to 2029/30 consumption calculated to include consumption from new assets as per PR24 plan. Assumed saving of 4 GWh per annum in line with our ongoing energy efficiency programme. Grid consumption over the period reduced due to consumption of private wire PV electricity from installations at water sites.
  - For 2030/31 to 2034/35 consumption calculated to on the basis of no enhancement spend during this period so number effected as an increase due to larger population served and as a decrease due to ongoing energy efficiencies. Grid consumption over the period reduced due to private wire PV installation at water sites.
- Private wire solar electricity used for water pumping and water treatment increases up to 2027/28 and then remains constant until 2034/35. This increase to 2027/28 is as a consequence of the development of PV installations at some Anglian Water sites.
- Renewable Energy Guarantees of Origin (REGO) accredited solar electricity that is exported increases to 2027/28 and then remains constant through the period. This increase to 2027/28 is as a consequence of the development of PV installations at some Anglian Water sites.
- The volume of water treated by ozonation has been assumed to increase in line with population growth. The fraction of total ozone generated which is generated from air has been assumed as constant 2023/24 to 2034/35. This constant fraction was calculated using historic performance averages.
- Mass of Granular Activated Carbon (GAC) replaced by virgin GAC numbers have been generated from the volumes proposed to be installed in AMP8 for PFAS removal. This would be 15 existing surface water sites, 5 existing groundwater sites, new GAC treatment at 2 sites and new GAC treatment at a wash water handling site. Also included is virgin replacement of media at one site.
- Mass of GAC replaced by regenerated GAC numbers driven historic performance, by chosen regeneration sites in the PR24 plan and with exclusions for those sites now employing virgin GAC for PFAS removal.

Other commentary - table OUT 5

Carbon Accounting Workbook (CAW) v17 has been used to generate carbon emissions information for each year 2018/19 to 2034/35.

Background to the data provided for 2018/19 to 2022/23

For historical data 2018/19 to 2022/23, raw data from each year has been used to populate CAWv17. As the carbon emission factors in CAWv17 differ from previous versions, the carbon emissions detailed in table OUT5 are not comparable with carbon emissions data published in the APR in each of the relevant years.

The data used to calculate historical annual carbon emissions for 2018/19 to 2022/23, calculated using the CAW relevant to each year, were verified against ISO14064. This raw data therefore is accurate and is not estimated data.

Ofwat PR24 Operational Greenhouse Gas Emissions Performance Commitment Water requires the reporting of emissions from chemicals. Historically Anglian Water has not reported on emissions from chemicals as part of annual carbon emissions reporting but data has been gathered. Therefore the historical data on chemical use is actual, and not estimated, data. Whilst actual data has been used this was not verified against ISO14064 in each year.

Background to the data provided for 2023/24 and 2024/25

This raw data is forecast data based upon our existing plans for the rest of AMP7. Whilst this is necessarily forecast data, given that plans and programmes are in place for the remainder of AMP7 this data should be considered as having a high degree of accuracy.

Background to the data provided for 2025/26 to 2029/30

This raw data is forecast data based upon our proposed PR24 investment programme including Net Zero enhancement investments.

Background to the data provided for 2030/31 to 2034/35

This raw data is forecast data including the proposed PR24 investment programme but with no further enhancement investments for the 2030/31 to 2034/35 (AMP9) period.

CAWv17 data points

- Population served from secondary sewage treatment has been forecast based upon population forecasts for the business plan.
- Grid electricity used for Waste Water pumping and Waste Water treatment
  - For 2023/24 and 2024/25 consumption based on budgeted forecasts for electricity use
  - For 2025/26 to 2029/30 consumption calculated to include consumption from new assets as per PR24 plan. Assumed saving of 7 GWh per annum in line with our ongoing energy efficiency programme. Grid consumption over the period for wate water treatment increased due to increased treatment capacity and the introduction of gas to grid schemes to replace CHP installations.
  - For 2030/31 to 2034/35 consumption calculated to on the basis of no enhancement spend during this period so number decreased due to energy efficiencies
- Natural gas usage decreases with the replacement of a number of CHP installations with gas to grid during 2026/27 to 2029/30 and remains constant 2030/31 to 2045/35.
- Sludge produced forecasts taken from Bio Table 1 and disposal routes forecasts taken from Bio Table 4 .
- Biogas used in CHP decreases 2026/27 to 2029/30 as some CHP assets are replaced by gas to grid schemes and then remains constant until 2034/35.
- Biomethane to grid commences 2026/27 and reaches maximum in 2029/30 and then remains constant until 2034/25.
- Chemicals used have been forecast based upon historic performance and growth in population served.
- Emissions from Anglian Water owned tankers forecast to reduce 2025/26 to 2029/30 in line with the introduction of electric HGVs replacing existing diesel vehicles
- N2O emissions reduced in line with the introduction of various N_2O reduction approaches in the PR24 plan. The savings achieved from these approaches applied as an overall reduction to the CAWv17 waste water output as no facility exists in the CAWv17 to adjust N_2O outputs for specific sites
- CH4 emissions reduced in line with the introduction of various CH_4 reduction approaches in the PR24 plan. The savings achieved from these approaches applied as an overall reduction to the CAWv17 waste water output as no facility exists in the CAWv17 to adjust CH_4 outputs for specific sites
- The benefits for the CH_4 capture schemes have been estimated at an average 5 per cent increase in the volume of gas captured, it has been assumed that this gas will go to the existing CHP engines and be used to produce electricity. The electrical benefit takes account of the energy used in the capturing of this additional gas (vacuum degassers, aerators and odour control systems for example) and where we are already exporting electricity it is assumed that net electricity generated will be exported to the grid.
- For gas to grid, no allowance has been made in the OPEX for any additional gas captured through other schemes.
- There is an annual increase in energy requirements for waste water treatment between 2022/23 and 2029/30. This is driven by forecast increases in population served plus increases driven by RICS as a result of our investment programme. An annual saving of 7,000 MWh through efficiencies has been applied.

Common assumptions for tables OUT4 and OUT5

We make the following common assumptions:

- Diesel is gradually replaced by hydrotreated vegetable oil (HVO) such that by 2030/31 all diesel is replaced by HVO.
- Kerosene and Propane use has been assumed constant throughout the period and in line with historical use.
- Other chemicals have been forecast based upon historic performance and population growth.
- Emissions from administration activities (buildings) for the whole period to 2035 have been assumed in line with historic performance as there are currently no plans to change the Anglian Water office estate. Administration emissions have been split 50/50 between Water and Waste Water.
- Emissions from company vans and cars have been forecast as a decline in the use of petrol and diesel vehicles and an increase in electric vehicle use over time. Over the short term this trajectory has been based on forecast of electric vehicle orders with assumptions made over the longer term in light of company vehicle replacement cycles and increasing availability of electric vehicle charging infrastructure. Assumption made that that there will be no emissions from petrol and diesel cars and vans from 2032/33 onwards. Emissions from company cars and vans have been split 50/50 between Water and Waste Water.

- Emissions from private cars from expense claims have been forecast to decline in line with the replacement of petrol and diesel vehicles with electric alternatives. Assumptions made as to private car replacement in line with legislation over the availability of new petrol and diesel vehicles post 2030. Assumption made that that there will be no emissions from petrol and diesel cars from 2034/35 onwards. Emissions from private cars from expenses have been split 50/50 between Water and Waste Water.
- Emissions associated with expense claims from the use of taxis, buses and rail assumed constant for the whole period based on 2022/23 performance. Any increases in taxi, bus or rail mileage will be offset by reductions in emissions as a consequence of improved vehicle efficiency. Emissions split 50/50 between Water and Waste Water.
- Emissions from long haul international air travel forecast to fall slightly from 2022/23 levels to 2024/25 and then remain constant until 2035. Emissions split 50/50 between Water and Waste Water. Emissions split 50/50 between Water and Waste Water.
- Emissions from domestic air travel forecast to reduce steadily to zero in 2028/29 and remain zero thereafter. Emissions split 50/50 between Water and Waste Water.
- Over the period 2022/23 to 2029/30 the amount of energy required to pump and treat water has remained relatively constant with abstraction reductions and annual efficiency assumptions equalised by RICS increases from our investment programme.

Calibrating incentives - table OUT7

Ofwat state in the Final Methodology (appendix 8, page 17) the intention to use external valuations to determine incentive rates for this performance commitment. Ofwat outline the potential to use the latest external valuations of marginal benefits, such as those in the Green Book at related guidance, to set incentive rates. More detail on the approach to set incentives for this performance commitment will be given as part of the determinations.

We have left the cells for marginal benefits blank. We will work with Ofwat on its thinking on these incentives ahead of the PR24 Draft Determination.

1.9 Leakage

Table 14 Leakage

Ofwat category	Environment	Anglian Water long term ambition	Enabling sustainable economic and housing growth
Short description of measure	This performance commitment is designed to incentivise the company to reduce leakage.		
Performance	2024/25	2029/30	2049/50
Ml/d single year	164.2	151.5	118.5
Ml/d three year average	171.5	154.7	119.2

Overview

This performance commitment (PC) is measured as the volume of water lost on average in megalitres per day (Ml/d). The PC will be measured on a three-year average basis. This measure is designed to incentivise companies to further reduce leakage to support the supply demand balance. As captured within our WRMP, demand-side interventions within our region can benefit the supply-demand balance in light of additional pressures on water supplies due to growth, tightening license caps, and climate change.

This measure, in addition to Per Capita Consumption (PCC) and Business Demand, form a package of PCs promoting water efficiency by customers and companies through different techniques.

Customer views

As noted at PR19, our synthesised customer insight as presented in our Customer Principles Report shows that leakage remains one of our customers top priorities for PR24. Leakage is a particular concern for our customers, who see it as wasteful and a sign that we are not doing enough to conserve water and invest in infrastructure. Reducing leakage was seen as the second priority (behind provision of high-quality drinking water) in the first wave of our Trinity McQueen Investment Priorities research and is ranked consistently as a top priority across our surveys and research. Customers views on leakage centre on the loss of drinking water being 'wasteful', and Anglian Water needing to 'get the house in order' before looking to customer side actions to address demand. Leakage takes priority compared to other demand management activates. In qualitative affordability and acceptability testing of the business plan, a proposed performance commitment level of 70 litres per property per day by 2030 was tested with customers. This target was considered acceptable but feedback suggested it could be more ambitious. [30]

30 All views drawn from the Synthesis Report, Annex ANH55 Synthesis Report.

Our performance commitment level - table OUT1

Reducing leakage is a particularly important to us, both to maintain a resilient supply-demand balance in the driest part fo the country (in line with our WRMP) and to enable sustainable economic and housing growth in our region by balancing the increased demand that comes from this growth. Our leakage performance is currently industry leading. We have cut leakage by more than a third since privatisation in 1989 and it is now at very low levels; around half the national average based on the amount of water lost per kilometre of main.

Leakage has continued to fall from 191Ml/d at the end of AMP6. In 2021/22 we achieved a record low leakage level of 173.44Ml/d, with leakage for 2022/23 increasing to 182.6Ml/d, reflecting the challenges we faced due to the extreme summer heat (>40 degrees) and multiple winter freeze/thaw events. However, underlying leakage (3-year rolling) is at a record low.

The scale and timing of our leakage ambitiont is fully aligned with our WRMP. The scale and timing of investment has been refined by striking the right balance between supply, demand, interconnectors and other options, informed by customer views and the financial, environmental and social costs and benefits of these options. In the short term (before 2030) we face an immediate supply-demand deficit challenge for which we are reliant upon demand side (and limited supply-side) options which can deliver more immediate benefit than major supply-side schemes which require a long lead-in time (but do nevertheless form part of our proposed investments for AMP8 as well).

The leakage reduction in the plan has been set in the context of the long-term need to reduce leakage by 28% over the WRMP24 25 year plan period. This represents a 38% reduction from the national Framework 2017/18 base-line.

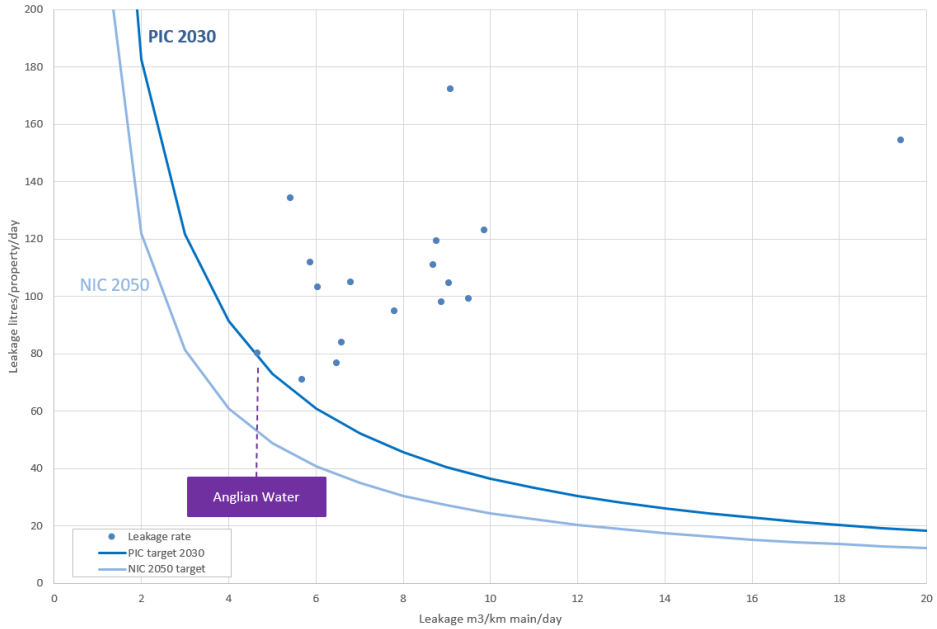
As a frontier performer on leakage, we have fewer low cost options to reduce leakage, which are available to other companies. Our current performance is already beyond the Public Interest Commitment target for 2030, and with the investments included in our PR24 plan, we expect to cross the industry-wide 2050 target before 2030.

We propose to set our performance commitment level at 151.5 Ml/d for 2029/30 (single year). This is 67 litres per property per day, which is more stretching than the target tested with customers which was considered acceptable but could have been more ambitious. This directly aligns with the targets set out in our Water Resources Management Plan 24 (WRMP24) and represents a further stretching level of leakage reduction for AMP8, which will see us maintaining our positions as one of the leading companies on this measure. As one of the leading companies within the industry on reducing leakage, maintaining our performance alone constitutes a challenging and expensive task.

This figure below updated to current values (2023 values used to update the original graph shown in the 'Leakage Routemap to 2050' report) shows the wide range of current leakage positions for different water companies, and indicates that for the national 50% reduction to be achieved some companies need to reduce their leakage values by a much larger amount than other forefront companies such as Anglian Water. Additionally it must be noted that as companies, such as Anglian Water, reach lower and lower leakage levels, the costs for finding and repairing greater numbers of smaller and smaller leaks will lead to diminishing returns for significantly higher costs. This was accepted at PR19 by both Ofwat and the CMA providing an additional base allowance to maintain leakage.

Note that the attainment curves for PIC and NIC targets have been created in the National Leakage Routemap by aggregating the water company leakage values to a national value, halving this, and then creating a set of equivalent figures for the combined metrics of leakage per km main and leakage per property

Figure 15 Relative positions of water companies against nation targets 2023



Our options to further reduce leakage are predominantly the most complex and hard to access, which drives higher marginal costs. Despite our current frontier leakage position we have responded to our WRMP consultation process and chosen our most ambitious program of reduction in AMP8 and beyond. Whilst considering our draft WRMP consultation responses and the National Framework target, we revised and increased our ambition for leakage reduction for our revised draft WRMP24 plan. We originally proposed a a 24% reduction in leakage (from the 2017/18 National Framework baseline) based upon an assessment of cost and benefit. In response to feedback from stakeholders and customers we have now revised this target to a 38% reduction (against the 2017/18 baseline). We have reviewed our 38% leakage target against the UKWIR National Leakage Route map attainment curves; this review shows that we expect leakage to be below the Public Interest Commitment target by 2025 and the National Infrastructure Commission target by 2040. This is shown in Figure 47 of our WRMP[31].

31 revised-draft-wrmp24-demand-management-preferred-plan.pdf (anglianwater.co.uk)

We have recognised the importance of our role as an industry leader in leakage reduction, in helping to meet the National Framework 50% leakage reduction target. We currently record very low levels of leakage compared to the rest of the industry. This makes the realisation of additional leakage reduction more difficult and costly. This is discussed further in our WRMP24.

We recognise our target is very stretching our proposed leakage reductions are achievable as they align with our WRMP ambitions and associated investment. Our WRMP includes significant investment to complete the rollout of smart meters in our region, which enables significant benefits for leakage and PCC reduction through more efficient and timely identification of both 'plumbing loss' and customer supply side leaks. The second phase of our smart meter program is forecast to enable savings of 7.8Ml/d by 2029/30 and further detail can be found in the associated enhancement investment commentary.In addition, we propose investment for targeted mains renewal.

A challenge to the achievability of our target are exogenous factors outside management control (i.e. severe weather events) which can impact leakage performance. We observed in 2022-23 extreme variation in weather, in both the hot dry summer and then the freeze thaw event in December. Our region recorded the highest temperature in the UK, with over 40 degrees being recorded at Coningsby in Lincolnshire on 19 July 2022. This extreme weather can cause soil movement which impacts underground network assets, causing bursts and leakage. This increased our leakage by 9 Ml/d compared to 2021-22. Our proposed PCL sees us recovering rapidly from this set-back but our expectation is that extreme weather will increase in frequency in the future.

Performance from base - table OUT2

In our response to Ofwat's 'performance improvements from base, enhancement and ODIs' data request, we outlined that leakage had received significant benefits from historic enhancement investment. We outlined we expected this improvement was primarily driven by the smart metering programme, calmer networks programme, our intensive leakage programme, and the installation of network sensors. We outlined that it was not possible to disaggregate with accuracy the performance driven by base and enhancement expenditure allowances due to a number of complicating factors. These factors remain unchanged since February.

Following Ofwat's notice (IN23/07) we have looked again at quantifying historic performance from base and enhancement for certain PCs. Our PR19 business plan included significant enhancement expenditure for leakage and smart meters. We also submitted a cost adjustment claim outlining how base cost allowances would not maintain our leading leakage performance. Given these factors we have assigned all of our performance changes in AMP7 for leakage to enhancement expenditure.

For leakage, in AMP6 our PCL was set at the sustainable economic level of leakage, 192 Ml/d and we were funded to deliver this level of leakage using the historical reporting methodology. However our ODI outperformance rate included a component to fund additional leakage reduction. As such we set AMP6 performance from base on leakage at 192 Ml/d in line with the PCL. Using the PR24 reporting methodology we have reflected stable performance against the first available three year average of performance (2017/18 to 2019/20).

For leakage we are not forecasting any reductions from base in line with our cost adjustment claim. Consistent with being beyond the upper quartile we require additional base funding to maintain our leakage level. For PCC and business demand our forecasts from base align to our revised draft WRMP-24. More detail on the other water demand PCs can be found in the Per Capita Consumption and Business Demand sections.

Although we anticipate our AMP8 leakage reduction will be driven by enhancement expenditure we note our leakage cost adjustment claim, submitted as part of the early submission, requests an allowance adjustment to reflect the higher marginal costs incurred by better performing companies. Our proposed target here assumes that our cost adjustment claim is accepted in full.

Performance from enhancement - table OUT3

At PR24, we expect significant performance improvements to be delivered for this performance commitment through enhancement expenditure. These are discussed in our enhancement strategies for Leakage and Metering.

We are aiming to reduce leakage by targeting losses in our distribution system (through mains replacement), losses due to customer supply pipe leakage (identified using smart meters), leakage from shared supply properties (identified using smart meters) and internal plumbing losses.

Under our preferred smart metering option in our revised draft WRMP-24, we intend to complete our installation of smart meters across our region by 2029/30 (a 10 year roll-out), reaching the limit of feasible meter penetration (94.8%).

We have also readjusted our installation profiles and our proposed AMP8 PCL to account for the AID program (Accelerated Infrastructure Delivery); installing 60,000 in AMP7.

Smart metering is also enabling significant benefits for leakage reduction through the more efficient and timely identification of both 'plumbing loss' and customer supply side leaks. The identification of leakage will inform our home visits, adding significant value to our water efficiency activities. Consequently, the systems that we are investing in are robust and, critically, must be able to supply accurate and reliable data collection over the long term. This requirement has been foremost in our thinking regarding our original smart meter trials and in the selection of the current system being installed across the region.

Our proposed long-term target also relies upon a significant amount of mains replacement by 2049/50 (>8000km of mains replaced) at a very significant cost (>£4 billion), but we believe that these costs will be mitigated over time as technology advances and we will review plans at WRMP and PR29. Therefore, whilst sequencing this leakage reduction program, we have ensured that the bulk of these costs, impact after AMP8 (2029/30).

Other commentary - table OUT4

We have provided data for "Total annual leakage" that is consistent with the data we have provided in our APRs and as part of the Historical performance trends information request for PR24.

Our forecast aligns to our revised draft WRMP-24 until 2029-30. After this point performance is stable on the basis that performance improvements cannot be delivered from base.

Calibrating incentives - table OUT7

Incentive rate

We have used Ofwat's indicative incentive rate and benefit sharing factor for this performance commitment.

Enhanced incentives

We set the threshold for the enhanced incentive in line with our revised draft WRMP-24 performance level, which for 2029/30 is 154.7 Ml/d as a three-year average. Setting the threshold at this level reflects the frontier shifting ambition of our WRMP.

We have calculated the incentive rate in line with Ofwat's guidance, setting enhanced incentives at twice the standard rate.

1.10 Per capita consumption

Table 15 Per capita consumption

Ofwat category	Environment	Anglian Water long term ambition	Enabling sustainable economic and housing growth
Short description of measure	This performance commitment is designed to incentivise the company to help customers reduce their consumption.		
Performance	2024/25	2029/30	2049/50
L/p/d single year	131.8	123.5	107.6
L/p/d three year average	132.1	125.4	107.9

Overview

This performance commitment is measured as the percentage reduction of three-year average PCC in litres per person per day (l/p/d) from the 2019-20 baseline. Three-year average values are calculated from annual average values for the reporting year and two preceding years expressed in l/p/d.

The measure is designed to incentivise the company to help customers reduce the amount of water they use in their homes. This measure, in addition to leakage and business demand, form a package of PCs promoting water efficiency by customers and companies through different techniques.

Customer views

As captured within our Customer Principles Report, for demand management our customers view reducing PCC as the second priority after leakage reduction. There is an expectation that companies should 'get their house in order' by tackling leakage before actions on the customers' side can be considered.[32]This is reflected in both our ODI rate research conducted by ICS and in Ofwat/CCW's collaborative customer valuation research, where leakage is seen as a greater priority to customers than PCC and business demand. Demand-side options are favoured above new supply options, although customers recognise it is difficult to achieve a reduction in PCC through educational activities alone. Customers are increasingly recognising the importance of smart metering in encouraging water efficiency through tracking their own usage. This is especially the case for future customers, who ranked metering as the third highest priority for Anglian Water in the next five years in the Investment Priorities research conducted by Trinity McQueen.[33]

Our stakeholders also support efforts to encourage water saving as part of the tools to deal with water shortages.

Our performance commitment level - table OUT1

We are consistently amongst the best performing companies for PCC, either upper quartile or better. However the Covid-19 pandemic and impact on consumption patterns has had a significant impact on PCC in AMP7.

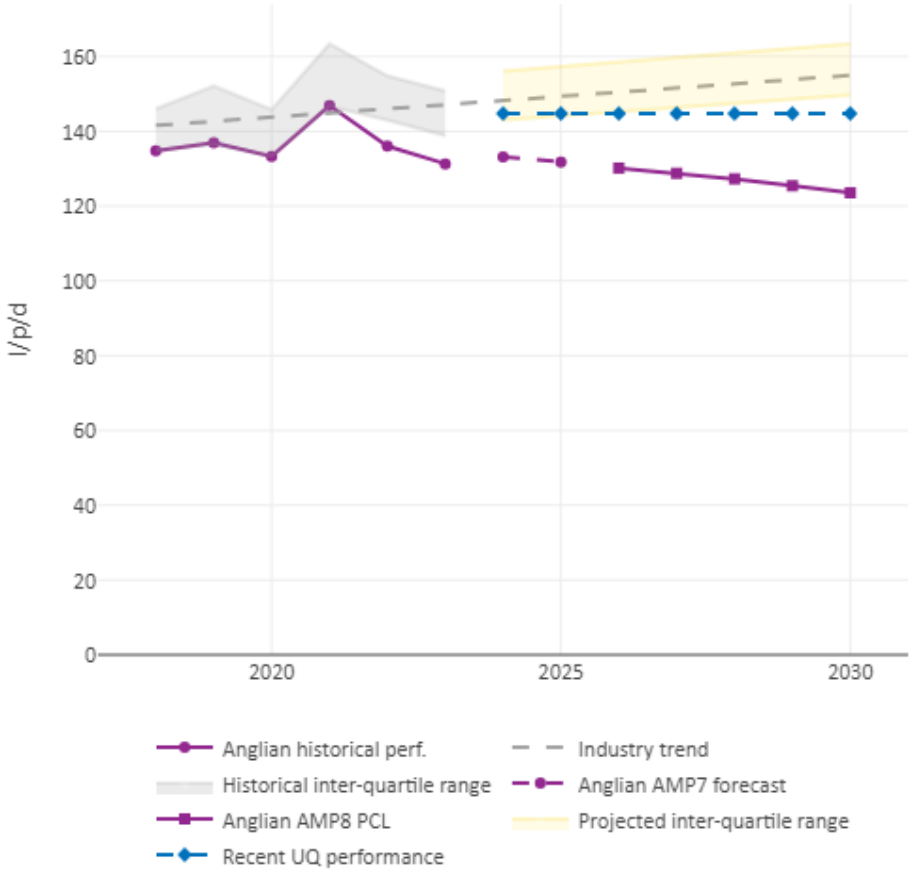
We propose a performance commitment level of 123.5 l/p/d by 2029/30, which is a 7.1% reduction from the 2019-20 baseline. This target directly aligns with the targets set out in our revised draft Water Resources Management Plan 24 (WRMP 24). Our WRMP includes ambitious reductions in PCC to help us balance water supply and secure the east of England against the risk of drought. This target places us on track to meet the following PCC targets and interim targets:

- In 2038, we expect to meet the target of 122 l/h/d as stated in the UK Government's Environmental Improvement Plan and the Water Resource Planning Guidance
- Before 2050 expect to reach 110 l/p/d, meeting the targets set out in the National Framework, Environmental Targets (Water) (England) Regulations 2023, and the Water Resource Planning Guidance.

Delivering this level of reduction will be stretching as it is based on a number of factors which influence customer demand for water, some of which are outside of management control.

32 Annex ANH55 Synthesis Report.
33 All views drawn from the Synthesis Report, Annex ANH55 Synthesis Report.

Figure 16 Historical and forecast PCC performance



Although we recognise our target is very stretching given the impact of exogenous factors on this measure, our proposed PCC reductions are achievable as they align with our WRMP ambitions and associated investment. Our WRMP includes significant investment to complete the rollout of smart meters in our region, which facilitates our strategies to encourage water efficient behaviour from customers. In addition, as captured within our WRMP we seek to change customer behaviours through campaigns and initiatives to help our customers use less water.

Performance from base - table OUT2

In our response to Ofwat's 'performance improvements from base, enhancement and ODIs' data request, we outlined that enhancement had a significant impact on historical performance. Following Ofwat's notice (IN 23/07) we have revisited quantifying historic performance from base and enhancement. As noted in our response to the data request earlier in 2023, there are a number of factors that make quantification difficult but we have sought to provide further information for these performance commitments.

Our PR19 business plan included significant enhancement expenditure for leakage and smart meters. This includes the benefit of metering, behavioural campaigns and the fitting of water-saving devices to customers' homes has caused PCC to reduce over previous AMPs. In AMP7 this reduction has been offset by changes in customer behaviours and the shift to home working, particularly from customers who would have been working outside our area now working from home in our area, although in 2022-23 we observed PCC returning to pre-pandemic levels on a single year basis. These trends were discussed in our submission to Ofwat on the impact of Covid. [34] Aside from Covid, our view is that the weather and metering are the biggest drivers of PCC.

As part of our WRMP, we have considered PCC trends in the absence of further intervention, known as the baseline. This captures the on-going benefits of customers switching to measured charges on our dumb meters and savings from smart meters already roll-out. As dumb meters have an average life of 12 years, most of our dumb meters will have been replaced from base expenditure and as such we assigned reduction from these meters to base in this table. Benefits of AMP7 smart meter rollout have been attributed to enhancement.

We discuss our approach to quantifying the benefits of our enhancement programme in the commentary for table CW15 of our business plan and WRMP24 Demand Management preferred plan report. We do not anticipate any future performance improvements on this measure to be driven from base investment.

Demand management options and smart meter benefits (including plumbing loss reductions which will impact PCC) are described in detail in the 'Revised draft WRMP24 demand management preferred plan technical supporting document'.

34 See Annex ANH46 'Impact of Covid on PCC' for further details

Performance from enhancement - table OUT3

Performance improvements for this measure will be driven solely by enhancement expenditure, primarily by further smart metering rollout in AMP8. Our enhancement expenditure is discussed in the Metering and Demand-side improvements enhancement strategy.

Smart metering is fundamental in supporting our water efficiency and behavioural change activities, through the provision of real time consumption data for both our customers and ourselves. We intend to build on our current progress in developing our water efficiency communications strategy, as part of revised draft WRMP24. Data is being provided on a daily basis to customers through a dedicated website and 'customer portal' and we intend to develop these communication channels further over the WRMP24 planning period. The central imperative, which drives our 'smart meter' roll-out, is the provision of information for our customers, so that they can understand their consumption and so that we can help encourage behavioural change. Changing attitudes and behaviours will reinforce current water savings, as customers become metered and measured and unlock the potential for additional water efficiency measures, in a mutually reinforcing way.

Under our preferred smart metering option for the revised draft WRMP24, we intend to complete our installation of smart meters across our region by 2029/30 (a 10 year roll-out), reaching the limit of feasible meter penetration (94.8%) by 2049/50. We have also readjusted our installation profiles to account for the AID program (Accelerated Infrastructure Delivery); installing an 60,000 of AMP8's smart meters early in AMP7.

By 2029/30 (the end of AMP8), we estimate that smart meters, combined with behavioural change and the improvements in leakage performance that they enable, will result in 5.3Ml/d from behavioural change demand savings and by 2049/50, we estimate smart meters will result in 7.7Ml/d from behavioural change demand savings. Additionally, we expect to save 8.8Ml/d from 'plumbing loss' reductions by 2029/30 (the end of AMP8) and 16.7Ml/d by 2049/50.

Over-all the AMP8 smart meter enhancements should save 14.0Ml/d by 2029/30 and 24.2Ml/d by 2049/50 (this excludes additional cspl smart meter savings.)

Also note that this excludes AMP7 savings from smart meters.

Other commentary - table OUT4

We have identified an issue with the 'Total Household Population row' for this performance commitment (reference 4.46). This row in OUT4 is looking up data in table SUP1a for population numbers. However, the look-up is capturing both resident and non-resident population. The performance commitment definition references 'WRMP19 - Methods - population, household property and occupancy forecasting, 15/WR/02/8, UKWIR 2015' which in the glossary of population states that water companies calculate estimates and forecasts of population that is usually resident in their customer properties. It also notes that the definition of usually resident calculated by water companies differs from official statistics. Appendix A states that 'When water companies determine the population in their water supply area they normally use the official statistics for usually resident population, but exclude people who have their own private supply or people who are temporarily resident in their area.'

Given this guidance, our WRMP does not include non-resident population in the population forecast and there are inherent challenges in forecasting this population accurately. As our WRMP forecasts, including of PCC, exclude non-resident population we have amended the formula in OUT4 to calculate PCC on the basis of resident population from table SUP1a. This ensures alignment with our WRMP.

To confirm, our proposed PCC performance is shown in the table below in single year figures.

Table 16 Proposed PCC performance

Units	2025-26	2026-27	2027-28	2028-29	2029-30
L/p/d	130.2	128.7	127.3	125.4	123.5

Calibrating incentives - table OUT7

We are proposing an alternate to Ofwat's indicative incentive rate for this performance commitment. See 3 OUT7: Outcome performance - alternate incentive rates and our compelling evidence.

From Ofwat's collaborative customer research, insight shows that customers do not place the same value on all the demand PCs despite them delivering the same overall outcome; leakage is proposed as a 'medium' priority, with PCC and business demand as 'low' priorities. This demonstrates that the measures are of different priorities to customers, who recognise that leakage is entirely 'wasted' water whilst the majority consumption is legitimate use. We believe the rate for leakage from the centralised values is appropriate for this measure, however we vary the rates for the other water demand measures to capture this strong customer preference for leakage reduction as the preferred water-saving method. More detail on the alternative rates for the other water demand PCs can be found in the Per Capita Consumption and Business Demand sections.

Enhanced incentives

For leakage and PCC we are proposing that enhanced incentives apply if we outperform our performance commitment levels, set in line with our WRMP. We are the leading company for demand management, leakage and PCC and if we can deliver our ambitious WRMP targets we will have moved the industry frontier even further to the benefit of all stakeholders.

We set the threshold for the enhanced incentive in line with our WRMP performance level, which for 2029/30 is 125.4 l/p/d over a three-year average. Setting the threshold at this level reflects the frontier shifting ambition of our WRMP.

We have calculated the incentive rate in line with Ofwat's guidance, setting enhanced incentives at twice our proposed rate.

1.11 Business demand

Table 17 Business demand

Ofwat category	Environmental	Anglian Water long term ambition	Enabling sustainable economic and housing growth
Short description of measure	This performance commitment is designed to incentivise the company to promote the water efficiency of business customers.		
Performance	2024/25	2029/30	2049/50
Ml/d single year	304.1	299.5	287.0
Ml/d three year average	309.6	300.5	286.4

Overview

This performance commitment is measured as the percentage reduction of three-year average business demand in megalitres per day from the 2019-20 baseline. Three-year average values are calculated from annual average values for the reporting year and two preceding years expressed in Ml/d.

The opening of the Business Retail Market and the subsequent Retail Exit Code Regulations in 2017 materially changed our relationship with Business Customers. Retailers now own the direct relationship with their customers. We now expect to work collaboratively with Retailers to help business customers reduce their water usage. The measure is designed to incentivise the company, working with retailers, to help business customers reduce the amount of water they use. This measure, in addition to Leakage and PCC, form a package of PCs promoting water efficiency by customers and companies through different techniques.

Customer views

Our insight captured in our Customer Synthesis Report indicates non-household (NHH) customers are more likely to select smart metering and transferring water as solutions to address supply/demand than household customers. Our findings show business customers are increasingly interested in grey water recycling as a potential method to reduce cost and want water companies to prioritise this. [35]

From our wider customer base, there is an expectation companies should 'get their house in order' by tackling leakage before actions on the customers' side can be considered. This is reflected in both our ODI rate research conducted by ICS and in Ofwat/CCW's collaborative customer valuation research, where leakage is seen as a greater priority to customers than PCC and business demand.

Our commitment to water efficiency while enabling sustainable economic growth

As captured within our SDS ambitions, we are committed to enabling sustainable economic and housing growth within our region. Based on current WRMP forecasts, we anticipate that demand by businesses will grow over the coming years as businesses move or expand within the East of England.

Although we support efforts to encourage businesses to adopt water efficiency measures, by measuring the absolute levels of business demand without normalisation we believe that this performance commitment as it is currently designed may inadvertently create a perverse incentive to throttle economic growth. We believe that normalisation of this measure or another suitable alternative should be considered to ensure that companies that support businesses in becoming more water efficient whilst experiencing economic and business growth in their regions are not penalised.

Our performance commitment level - table OUT1

Non-household consumption accounts for a substantial proportion of overall demand in Anglian Water, representing 27% of our overall demand (2022/23). Economic growth in the East of England puts significant upwards pressure on business demand for water in our region now and predicted over the coming years.

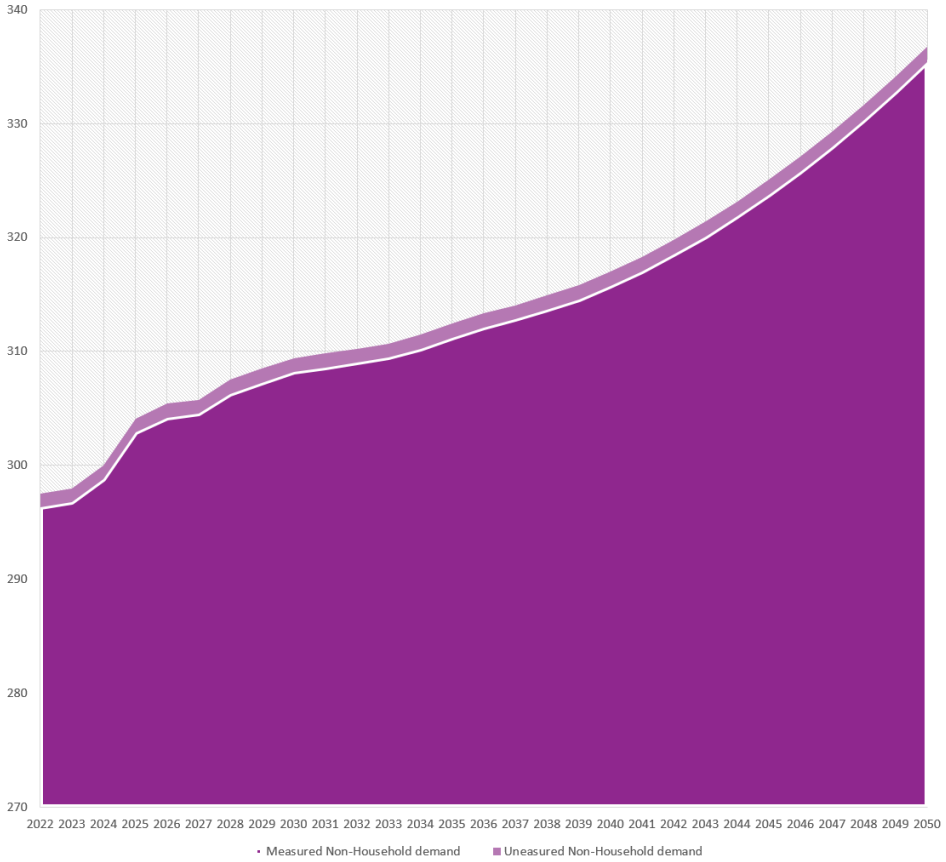
Recently non-household demand has been increasing, with new customers requesting water or existing customers requesting more. This appears to have three drivers in our supply area: (i) Brexit and the 'onshoring' of food and drink production (ii) the loss of abstraction licences held by non-household customers and (iii) net zero-related developments including hydrogen production and carbon

35 Annex ANH55 Synthesis Report

capture, use and storage (CCUS). While wholesalers may have a role to play in helping these customers use water efficiently, it would appear unreasonable to expect them to be able to fully mitigate these trends.

From our draft WRMP24, the following graph illustrates the baseline forecast for measured and unmeasured non-household demand without any demand management from 2022 to 2050.

Figure 17 Non-household demand forecast



We propose a performance commitment level of 299.46 Ml/d by 2029/30 and 270.6 by 2049-50 (single year).

Our proposed AMP8 PCL proposes a small reduction in demand from current levels. Given the significant growth forecast in our region and the lack of normalisation for this measure, even maintaining performance will be a stretching target for us to deliver. The PCL reflects our role to support businesses to manage water efficiently through our smart metering and educational activities, rather than reducing the overall consumption by businesses which is driven by factors outside of management control, such as the number of businesses or type of industry and associated water requirements.

Our role is to ensure sustainable population and economic growth, aligned to our company purpose to bring environmental and social prosperity to the region we serve through our commitment to Love Every Drop.

We note the 9% reduction targets for 2038 from 2019/20 specified by the UK Government's Environmental Improvement Plan and the Water Resources Non-Household Demand. In total, our options help us achieve approximately 8% reductions by 2037/28 and 15% by 2049/50, but these reductions can only be achieved relative to the non-household demand position (including growth at those points in time). We do not, therefore, believe that, achieving the absolute levels of non-household demand reduction, from the 2019/20 base-line, should be included in the revised WRMP24 plan, as this represents a degree of uncertainty with respect to the implementation of the newly developed options.

Performance from base - table OUT2

We do not anticipate any performance improvements on this measure to be driven from base investment. Due to economic growth we anticipate business demand performance will increase without enhancement funding. The forecast is aligned to our WRMP baseline forecast of business demand.

Performance from enhancement - table OUT3

Performance improvements for this measure will be driven solely by enhancement expenditure, primarily by further business smart metering rollout in AMP8. Building upon our smart metering rollout in AMP7, our WRMP outlines how we will overcome existing barriers to implementing non-house water efficiency options, and implement the following options:

- Delivery of smart meter targeted water efficiency measures

- Specialist water efficiency audits
- Addressing plumbing losses and customer supply side leakage identified by smart meters

Our portfolio of non-household options which are expected to save 10Ml/d of water by 2029/30. These benefits are fully aligned to our WRMP to 2030. This is discussed further in the Enhancement strategy in ANH29 Our PR24 Enhancement Strategies, Part 4: Enabling sustainable economic and housing growth.

We note that Ofwat's formula in table OUT3 is overestimating the benefit of enhancement to this performance commitment. This is due to our expectation that due to economic growth, even after enhancement investment demand will increase. Without enhancement investment demand will increase significantly. As both of these figures are minus in the two tables the formula is incorrectly calculating the difference as a positive figure.

Other commentary - table OUT4

We have provided data for "Total business consumption" that is consistent with the data we have provided as part of the Historical performance trends information request for PR24. We note errata 6 in relation to this performance commitment. We derive our non-household consumption data from meter reads and do not distinguish between occupied and void properties in our reporting. This is on the basis that all water delivered is assumed to be consumption in the guidance for current leakage reporting and that disaggregation is challenging to do with accuracy. Therefore the figures reported in OUT4 include consumption from void properties.

Calibrating incentives - table OUT7

We are proposing an alternate to Ofwat's indicative incentive rate for this performance commitment. See 'Table OUT7 - alternate incentive rates and our compelling evidence'.

From Ofwat's collaborative customer research, insight shows that customers do not place the same value on all the demand PCs despite them delivering the same overall outcome; leakage is proposed as a 'medium' priority, with PCC and business demand as 'low' priorities. This demonstrates that the measures are of different priorities to customers, who recognise that leakage is entirely 'wasted' water whilst the majority consumption is legitimate use. We believe the rate for leakage from the centralised values is appropriate for this measure, however we vary the rates for the other water demand measures to capture this strong customer preference for leakage reduction as the preferred water-saving method. More detail on the alternative rates for the other water demand PCs can be found in the Per Capita Consumption and Business Demand sections.

1.12 Total pollution incidents

Table 18

Ofwat category	Environment	Anglian Water long term ambition	Work with others to achieve significant improvements in ecological quality of catchments
Short description of measure	This performance commitment is designed to incentivise the company to reduce the number of pollution incidents that impact the environment.		
Performance	2024/25	2029/30	2049/50
Nr/ 10k sewer	27.65	16.38	3.34

Overview

This performance commitment is reported as the total number of pollution incidents (categories 1 to 3) in a calendar year emanating from a discharge or escape of a contaminant from a water company sewerage asset affecting the water environment, per 10,000km of sewer length from wastewater assets for which the company is responsible. Incidents are defined in line with the total pollution incidents metric set out in reporting guidance from the Environment Agency's water and sewerage company Environmental Performance Assessment (EPA) methodology version 9.

This is an existing common performance commitment, which sits alongside a new common performance commitment for category 1 and 2 pollution incidents.

Customer views

There is a concern regarding pollution and the impact that has on human health and the ecosystem. There is much more awareness of pollutions through recent media attention - customers' views are mixed, but some report anger and feeling upset and anxious, regarding recent media reporting.[36]

We have engaged with customers extensively on the preferred approach to addressing pollution incidents in AMP8 and beyond. This insight is captured with our Customer Synthesis Report. It is clear that preventing pollution is important to customers. Pollutions are a concern to our customers (citing potential implications for the ecosystem and health), with customers expecting us to minimise the impact of our operations on the environment. The Synthesis Report demonstrates that across our engagement our customers rank flooding and pollutions as jointly the third priority for Anglian Water to address. [37] Within the three sources of Ofwat's collaborative customer research, total pollution incidents were identified as a medium priority. [38]

In addition, our Willingness to Pay evidence suggests customers prioritise improvements that have a wider impact across the region (including tackling pollution) and that they have a strong preference for avoiding deteriorating service levels, especially for environmental measures.[39] However, when asked, the majority of customers opt for statutory levels of investment to improve river water quality rather than going beyond this with additional discretionary investment (68% v 32%). [40]

We amended our draft target for 2029/30 from 24.5 incidents per 10km sewer to 16.38 following Affordability and Acceptability qualitative research, where customers indicated the target we consulted on was acceptable but could be more ambitious.[41] This was in recognition of our customer and stakeholder insight that consistently placed addressing pollution as a key priority for AMP8, which we fully support.

Our performance commitment level - table OUT1

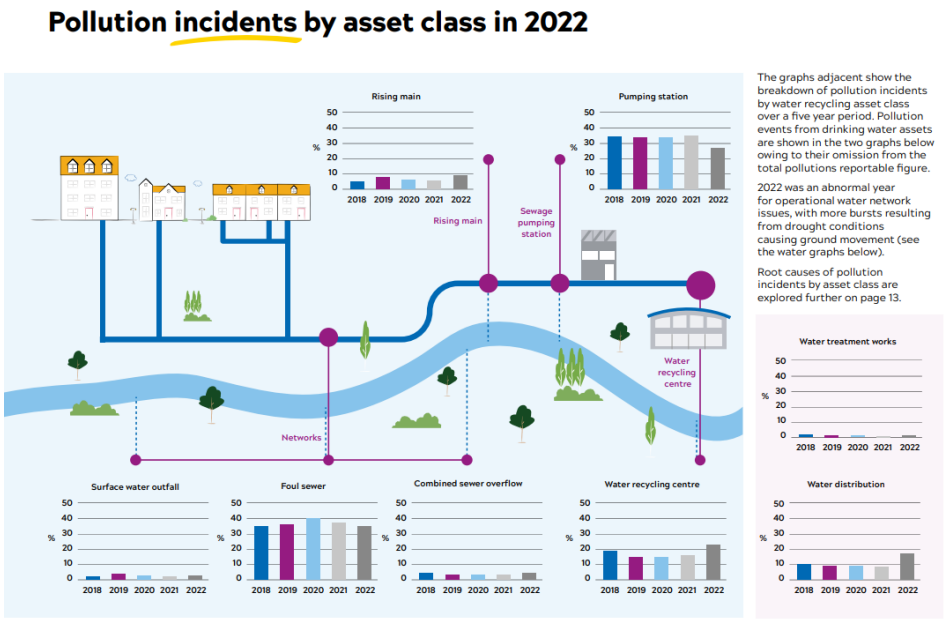
One of the most important contributions we can make is to ensure that our activity does not contribute to environmental harm. Caring for our environment is so fundamental to the way we operate at Anglian Water that we have built our commitment into the fabric of the company, in 2019 becoming the first major utility to change our Articles of Association to enshrine public interest for the long term. We regard any pollution incident taking place in our region as one too many, and we are wholeheartedly committed to reaching zero pollutions in the long-term. Our ambitions are aligned to customer expectations in this area.

36 ANH54 Customer Principles Document
37 ANH55 Synthesis Report
38 Ofwat, PR24: Using collaborative customer research to set outcome delivery incentive rates
39 ANH67 Societal Valuation Triangulation Report
40 ANH55 Synthesis Report
41 ANH55 Synthesis Report

In 2022/23, we missed our target for this performance commitment, reporting 33.36 pollution incidents per 10,000 of sewer length. This in part reflects our voluntary reporting of EDM data and potential dry day spills to the EA which is reflected in our reported pollution figures but is not standard industry practice but part of our commitment to transparency. The root cause of our pollutions in 2022 was blockages (41%) predominately caused by wipes and fats, oils and grease. This was followed by hydraulic overload (16%). More detail on our ambition and recent performance can be found in the most recent iteration of our Pollution Incident Reduction Plan (2023-25).

Our response was to double down our focus and construct a new pollution incident reduction plan incorporating extensive benchmarking and new leading practices. pollution reduction improvement spans all of our asset classes and requires us to take into account the unique geography of our region (rural, highly drained).

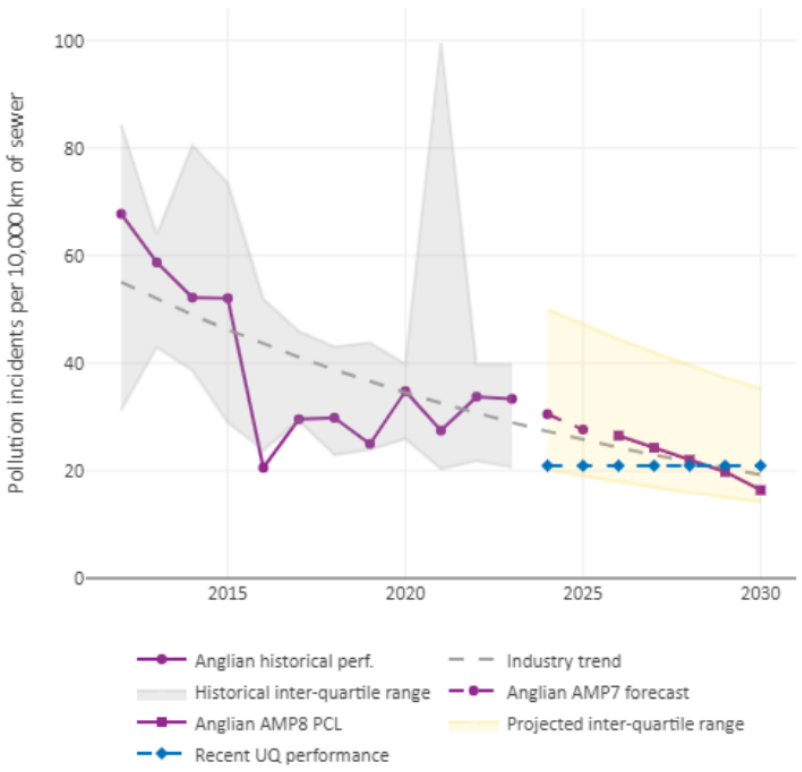
Figure 18 Pollution incidents reduction plan



We are proposing a performance commitment level of 16.38 incidents per 10,000km of sewer in 2029/30 (126 incidents total) This is based on a 50% reduction from our 2022-23 performance and a glide path to achieve that from now until 2029-30. Table OUT1 has been completed on the basis of this glide path.

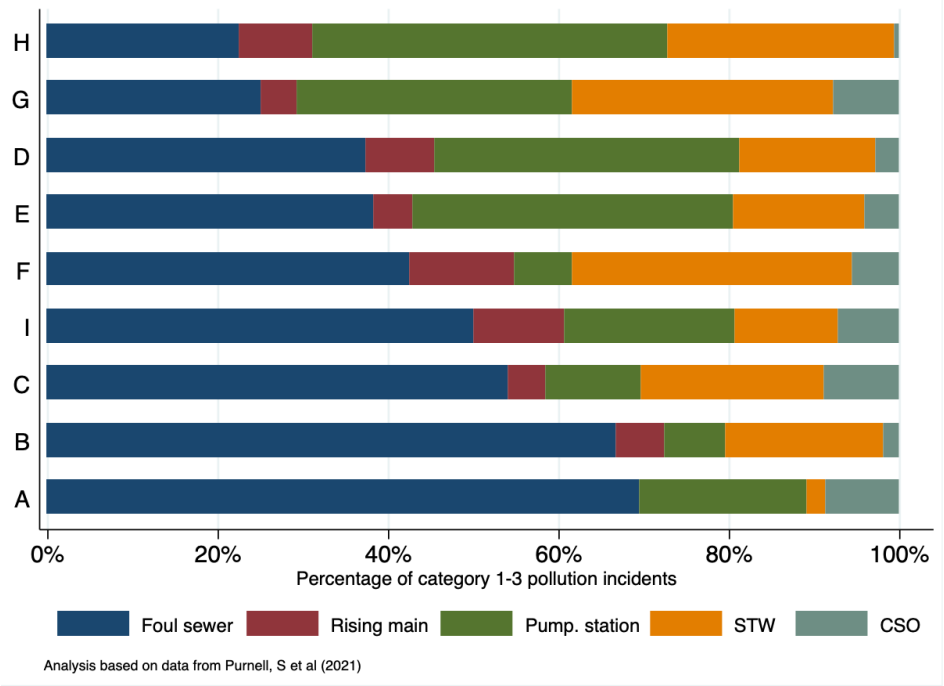
This is a significant reduction in the number of total pollution incidents given our historical performance and goes above and beyond the targets set out in our DWMP and beyond an extrapolation of our historical improvement trend. We have also committed to eliminate all serious pollution incidents from our assets by 2025. Our proposed PCL is more stretching than the projected industry's trend by 2030 (grey line in the following figure) and upper quartile in AMP7 (blue line in the following figure).

Figure 19 Historical and forecast Total Pollution Incidents performance



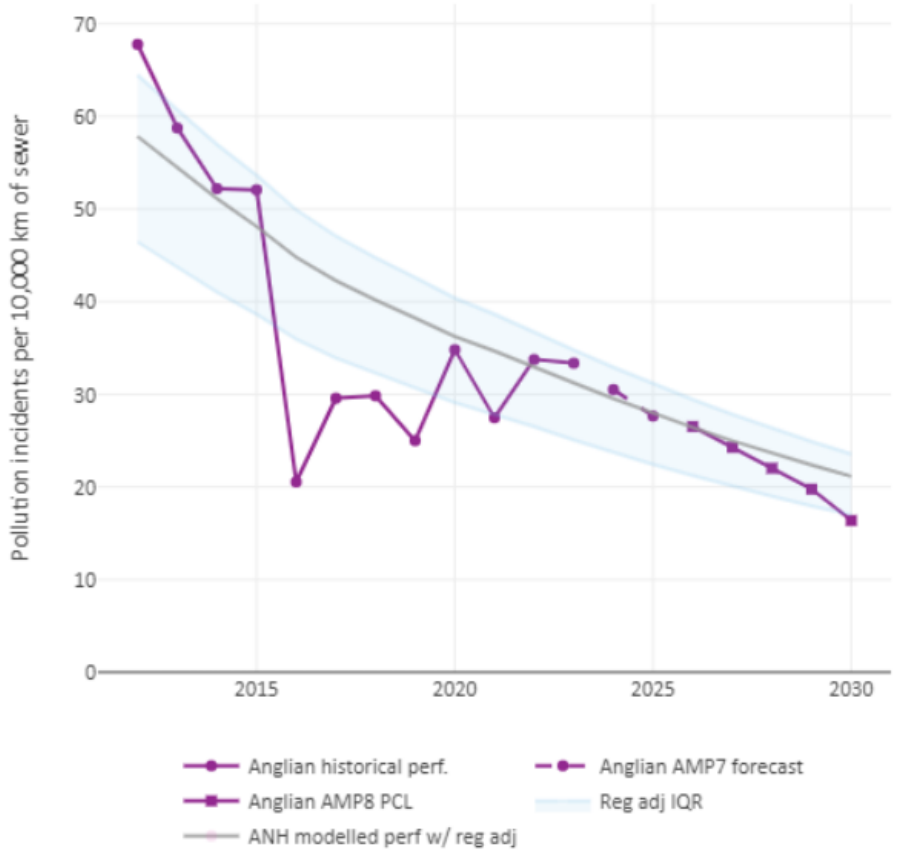
In context of the figure above our proposed PCL is stretching. We are also conscious that performance on this PC is driven by more than just sewers, which accounts for less than 50% of our incidents. This is illustrated in the figure below, with company D representing Anglian Water. The figure shows that this is true for a number of companies. Using a composite measure to normalise the number of pollution incidents suggests that the projected upper quartile would be 20% higher than shown in the figure above.

Figure 20 Pollution incidents by asset type by company in England



Working with Reckon LLP, we have explored using a composite of asset classes to normalise performance, as well as developing econometric models that account for regional factors. This analysis is discussed the appendix to this PC. In the figure below, we show a projected inter-quartile range adjusted for regional factors (blue area) which demonstrates that our proposed PCL could be considered beyond the forecast upper quartile if regional factors are taken into account.

Figure 21 Historical and forecast total pollution incident performance adjusted for regional factors



Nonetheless, this level of service improvement will be particularly stretching and challenging for us in our rural, heavily drained region. The analysis presented in the appendix supports our proposed PCL, could be used to set industry PCLs in a common way but could also inform a company specific PCL for this PC.

Performance from base - table OUT2

In our February 20223 response to Ofwat's 'performance improvements from base, enhancement and ODIs' data request, we outlined that pollution incidents had received some minor benefits from historic enhancement investment, although this was generally related to investment driven by other needs (e.g. storage and flooding investments). We outlined that it was not possible to disaggregate with accuracy the performance driven by base and enhancement expenditure allowances due to a number of complicating factors. These factors remain unchanged since February so we have generally not provided historical performance information from base expenditure. However given the varying scale of historical enhancement to water recycling assets it may be the case that other companies have benefitted to a greater extent from enhancement investment on this performance commitment.

Forecast improvements on this measure tend to be predominantly driven by expenditure derived from base allowances in AMP8. We expect improvements in clearing our sewer network, sewer misuse schemes, and condition-based monitoring to deliver the most benefit for this performance commitment. As such we have completed the OUT tables on the basis that most of the proposed performance improvement is derived from base expenditure (shown in table OUT2).

We note that some of the historical improvement trends observed in industry performance in AMP5 and AMP6 not been continued in recent years. This may reflect past enhancement but also evolution of reporting and guidance. This suggests that using more recent data is likely to be more relevant for considering future levels of performance in the absence of significant enhancement investment.

Performance from enhancement - table OUT3

We discuss our approach to quantifying the benefits of our enhancement programme in the commentary for table CWW15. We expect only minor benefit from enhancement expenditure for this performance commitment, predominately from network monitors and sewer enhancements. These investments are primarily aimed at other drivers, e.g. storm or emergency overflow reduction, reducing flooding risk for properties. We have assumed that monitoring of the network and emergency overflows will reduce the risk of pollution incidents by 25% where monitors are present. We have assumed that surface water investments for storm overflows will reduce pollution incidents by 5 incidents in total.

Overall our expected benefit for enhancement investment on this performance commitment is 1.5 incidents per 10,000 km of sewer. This is shown in table OUT3.

The quantified improvements to be delivered from enhancement expenditure are captured in table CWW15.

Other commentary - table OUT5

Historical data provided in line with that reported to the Environment Agency.

We have used fixed length of sewers for each AMP. For AMP7, we have used the length of sewer reported in 2017-18 every year (76,437). For AMP8, we have used the length of sewer reported in 2022-23 every year (77,290). For AMP9, we have used the projected length of sewer for 2027-28 every year (77,800). Over AMP8 and AMP9 we have assumed that category 4 incidents reduce at half the rate at which the number of category 3 incidents fall . We have assumed some improvement in AMP7.

Calibrating incentives - table OUT7

We are proposing an alternate to Ofwat's indicative incentive rate for this performance commitment. See 'Table OUT7 - alternate incentive rates and our compelling evidence'.

We have therefore reflected a marginal benefit based on our societal valuations in table OUT7 for this performance commitment. We have used Ofwat's default sharing factor of 70%.

Enhanced incentives

We set the threshold for the enhanced incentives in line with the current frontier of company performance from 2022/23 performance. The threshold will be set at 16.29 incidents per 10,000km of sewer in 2029/30 as per United Utilities performance on this metric in 2022/23, which was industry leading. We haven't proposed any improvement factor to reflect the fact that a simplistic normalisation per length of sewer misses important drivers of performance that act to make improving performance in our region more challenging.

We have calculated the incentive rate in line with Ofwat's guidance, setting enhanced incentives at twice the standard rate.

1.13 Total pollution incidents appendix

Setting targets for total pollution incidents

Comparison of companies' performance against common performance commitments can be a valuable tool for both understanding how our own performance can evolve over time and for the purposes of setting PCLs as part of the price review process.

In the case of total pollution incidents (categories 1 to 3) the PC used by Ofwat does not seem suitable, on its own, for direct comparisons of performance between companies. It is overly simplistic to assume a proportional relationship between the number of pollution incidents and sewer length and, in turn, to expect efficient and well-run water companies to experience the same number of pollution events per 10,000km of sewer - regardless of other differences in their assets, systems and operating environment.

We present evidence later in this section which shows that, across companies, the source of category 1 to 3 pollution events is not predominantly from sewers. Rather, these pollution events arise from a wider set of system assets which includes sewers, pumping stations and sewage treatment works.

We do not see any immediate need to change the PC definition, but there is a need for greater attention to be given to how companies' relative performance in terms of pollution incidents (categories 1 to 3) is compared and interpreted.

As part of the development of our business plan for PR24, we have considered alternative ways that companies' relative performance might be compared and benchmarked. To inform our PCL we have

- We have developed a composite performance metric that takes account of companies' relative performance in terms of (i) pollution incidents normalised relative to sewer length; (ii) pollution incidents normalised relative to the number of pumping stations; and (iii) pollution incidents normalised relative to the number of sewage treatment works. This approach fits better with the evidence on the sources of pollution incidents than an assessment of performance that simply normalises using sewer length. Furthermore, benchmarking across companies using this composite metric approach better explains the historical data on category 1 to 3 pollution events than benchmarking using the number of pollution incidents per 10,000km of sewer. We find that the upper-quartile benchmark for number of incidents per 10,000km of sewer length for Anglian Water derived by taking into account companies' performance on the composite performance metric to be around 20% above

the upper-quartile benchmark that would be set if regard were given to a performance measures normalised by sewer length basis alone.

- We also carried out econometric modelling of the number of pollution incidents to explore ways to take account of the drivers of these incidents. We were not able to develop well-functioning models that accounted for the multiple different asset types that are the source of pollution events (e.g. sewers, pumping stations and sewage treatment works). However, we did develop some models that sought to explain companies' levels of pollution events per connected property by reference to a population density variable that Ofwat uses for its base cost models. These models have the benefit of using more exogenous data rather than data on asset volumes. Population density might be seen as an underlying exogenous factor that gives rise to differences across companies in assets such as length of sewers, number of pumping station and the number of treatment works.

This is a new and challenging area and the approach to benchmarking pollution incidents is likely to benefit from further refinement in the future. That said, we consider that benchmarking analysis we have done is a clear improvement on the simplistic approach of assuming a proportional relationship between the number of pollution incidents and sewer length.

One implication of our work in this area is that it points to an approach to setting PCLs that is at an intermediate position between: (a) common PCLs for pollution incidents across the industry; and (b) a company-specific and bespoke approach to setting each company's PCL for pollution incidents. This intermediate approach would involve a common approach/methodology for benchmarking performance which would lead to PCLs that are differentiated by company (in an evidence-based way).

For the purposes of our business plan we have drawn on these approaches in understanding our historical performance and making projections for the future. In particular:

- We have taken into consideration the evidence from the composite metric analysis which suggests that the upper quartile benchmark level of peformance for Anglian Water could be around 20% higher than would be expected from the more simplistic approach of comparing peformance only in terms of pollution events per 10,000 km of sewers.
- We have drawn on the results from our econometric modelling of pollution incidents over time which takes account of variations of population density across company areas, including for the calculation of the series showing the regionally adjusted Anglian Water modelled performance and the regionally adjusted inter-quartile range.

We provide further information on our approach later in this section.

Shortcomings in Ofwat's established approach to assessing and comparing performance

Ofwat's performance metric and approach to benchmarking

For PR24, Ofwat proposes to assess companies' performance with regard to total pollution incidents by reference to a metric defined as the number of category 1 to 3 pollution incidents per 10,000 km of sewer. The PR19 performance commitment on pollution incidents draws on that same metric. The measure is well established in the Environmental Performance Assessment carried out annually by the Environment Agency in England.

Nonetheless, we see significant problems with the use of this metric to compare the relative performance of water companies in terms of the number of category 1 to 3 pollution incidents and as the basis for setting a common PCL across the industry. The fact that it is a measure reported on by the Environment Agency alone does not imply that it is a reasonable or reliable way to benchmark companies' performance on pollution incidents and set PCLs for price control purposes.

At PR19, Ofwat set a common PCL for category 1 to 3 pollution incidents, other than for Hafren Dyfrdwy. Leaving aside the treatment of Hafren Dyfrdwy, this approach implies that it is reasonable to assume that all efficient and well-run companies will achieve the same number of pollution incidents per length of sewer. Implicit in this, therefore, is a view that there are no other significant factors which differ across companies and which contribute to explaining some of the variation in the number of pollution incidents across companies. This position does not seem to rest on any factual assessment of the existence and role of such factors and of how best to benchmark companies' performance. Instead, it is the simplest approach available, drawing on the familiar metric defined and used by the Environment Agency.

Ofwat is alert to how external, exogenous, effects, can impact on companies' performance. In its July 2023 information note relating to the impact of enhancements on performance, Ofwat states that in the context of leakage and per capita consumption it may use econometric analysis to take account of a range of exogenous factors when setting the PCLs. We suggest that there are grounds for taking account of such factors in other areas of companies' performance, including in relation on pollution incidents.

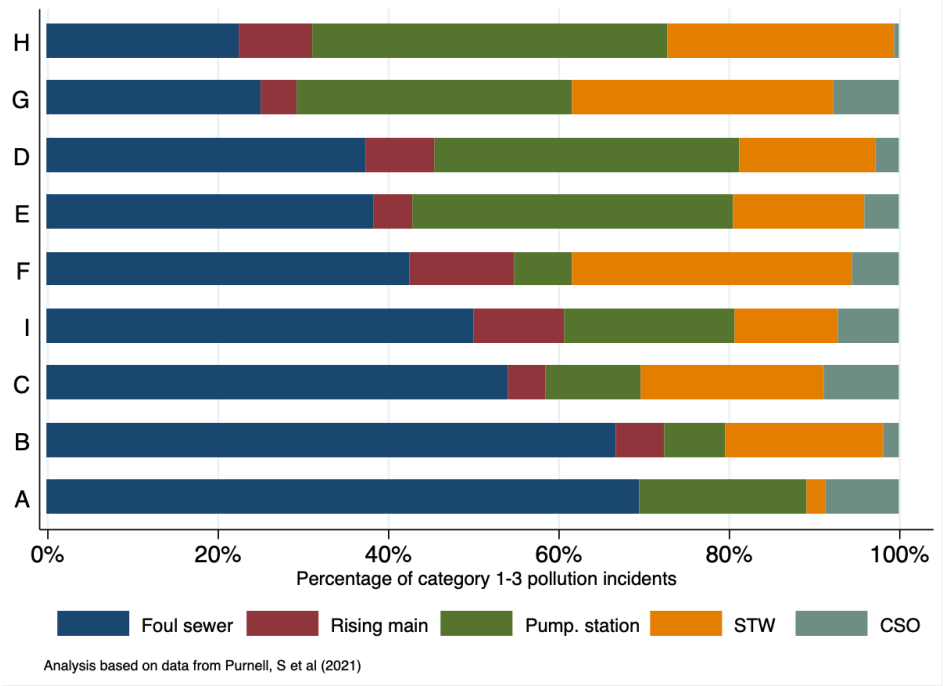
Consistency with evidence on the sources of pollution incidents

On operational and engineering grounds, the exclusive focus on sewer length for standardizing the number of pollution incidents for benchmarking purposes is questionable. Comparing performance on that metric alone does not take account of the impact from differences in companies' network in respect of, for example, the number or capacity of pumping stations or the number of sewage treatment works which, in turn, may be associated with demographic and topographical differences between the regions served. Pollution incidents are not caused exclusively by problems with sewers.

This is illustrated in the figure below. The chart shows the relative contribution of failures of different asset types to category 1 - 3 pollution incidents varies across the nine of wastewater companies in England. The source data underlying the chart are anonymised so that nine companies are labelled A through to H. [42]

As observed in the chart, foul sewers represent a significant source of pollution incidents but it is not the case that they account for the majority: for five of the nine companies, the percentage of incidents which are associated with foul sewers is below 50%.

Figure 22 Pollution incident source by asset by company in England



Analysis based on data from Purnell, S et al (2021)

Assessing company performance by reference to incidents per sewer length alone fails to take account of differences in the configuration of assets in companies' networks - of the relative number of pumping stations, sewage treatment works and combined sewer overflows - and, as suggested by the previous figure, such differences are likely to affect the number of incidents.

The evidence above shows that, for the purpose of comparing the performance of companies to each other, it does not seem valid to assume a simple relationship between category 1-3 pollution incidents and sewer length. And yet, that is what is implicit in the Ofwat's approach of using the metric defined by the Environment Agency to set a common PCL and to make statements about companies' performance.

The large scale of unexplained performance differences between companies

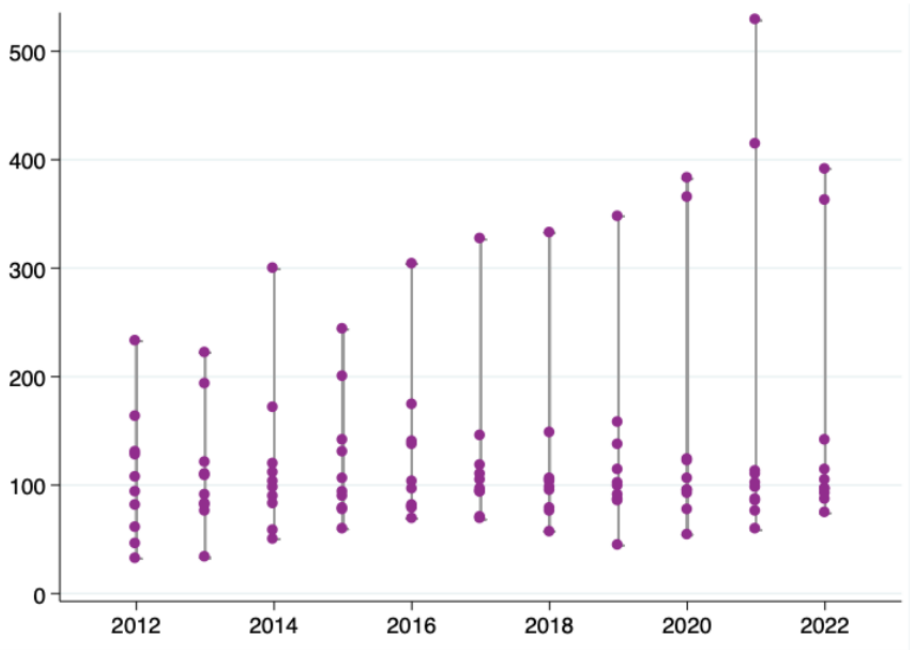
42 The data are from the study by Purnell, S et al (2021) "Assessment of the pollution incident performance of water and sewerage companies in England". PLoS ONE 16(10): e0251104.

To analyse the extent of the performance differences that are unexplained by Ofwat's approach, we draw on a measure we label the "performance ratio". This is defined as the ratio of a company's actual performance (in terms of pollution incidents per 10,000 km of sewer) to the benchmarked (or modelled) level of performance, expressed as a percentage. A performance ratio above 100% indicates that a company has a greater number of pollution incidents per 10,000 km than its benchmarked level of performance. Conversely, values below 100% indicate that a company's actual performance is below that of its benchmarked level.

The concept is analogous to that of the "efficiency ratio" which Ofwat derives in the context of its modelling of base plus costs. In that context, when developing its models, Ofwat has regard to the spread of the efficiency ratios under a give model as this gives an indication of the extent to which companies' actual costs differ from the predicted modelled costs.

In a similar vein, it is insightful to set out the spread of the performance ratios obtained when companies' performance on pollution is benchmarked in line with the model that is implicit in Ofwat's approach. We have done this by calculating the ratio of a company's actual performance, as measured by the metric of pollution incidents per length of sewer, to the median level of performance across companies, taking each year in the period 2011/12 to 2021/22 in turn. For this analysis, we have combined data for Severn Trent England and Hafren Dyfrdwy, and not treated the two as separate entities; this mitigates the risk that results are unduly influenced by the small-sized Hafren Dyfrdwy, and is in line with approach Ofwat takes in its wastewater cost assessment models.

Figure 23 Performance ratios based on Ofwat's benchmarking model



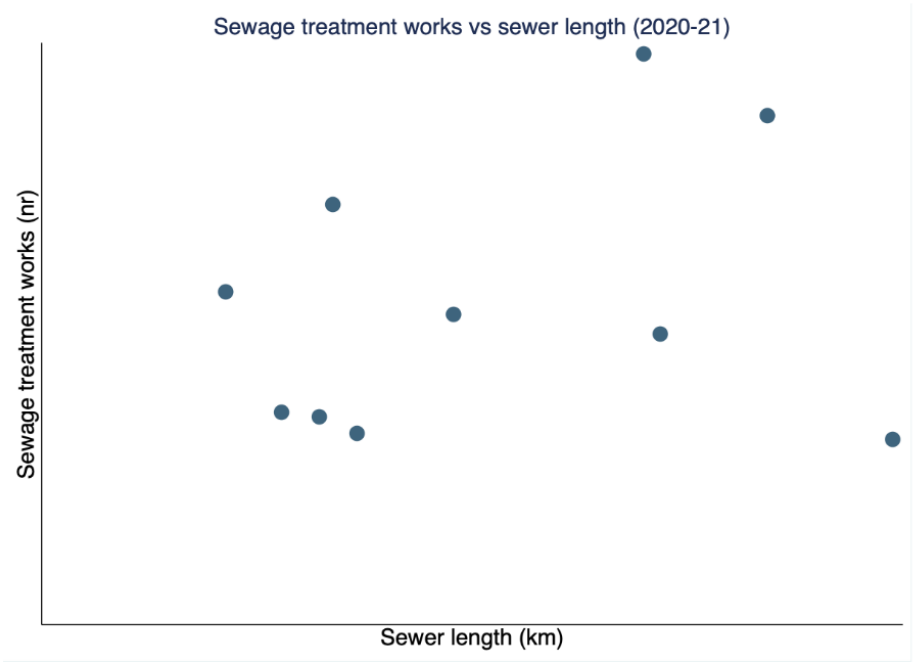
This figure shows that the range of the performance ratio is very wide, driven to a large extent by the relative standing of two of the ten wastewater companies. These ranges would still be implausibly wide with the most extreme outliers removed. The range is significantly wider than those typically observed for the cost assessment models drawn on to benchmark companies' efficiency. Across the whole set of models published by Ofwat in April 2023 to assess wastewater costs, for example, the range of efficiency ratios ranged from just above 80 to 150.

Further review of Ofwat approach

Ofwat's approach of relying on sewer length alone to standardise the number of incidents across companies might be reasonable if there were a high correlation between sewer length and STWs or number of booster pumping stations - which, as shown earlier, are categories of assets that account for a substantial share of incidents - so that sewer length might be seen as a proxy for the number of those other assets. Such assumptions do not bear out. There is a low correlation between

the length of sewers and the number of STW (the value is 0.25) and the correlation with number of booster pumping stations is 0.80. The figure below shows a scatter of the number of STWs against length of sewers, illustrates the former.

Figure 24 Sewage treatment works vs sewer length (2020/21)



To further probe Ofwat's approach, and, in particular, its focus on sewer length as the standardising metric, we drew on econometrics to examine the contribution that controlling for sewer length would make to explaining the observed variation in pollution incidents per connected property. In this exercise, we used the number of connected properties to standardise the number of pollution incidents as we considered it to be a 'neutral' scale variable; defining the dependent variable in that way does not introduce a bias towards one asset type or another. We then considered the relative performance of the following two models to explaining the variation in the number of incidents per property:

- a model that included no explanatory variables other than a time trend; and
- a model that included a time trend as well as a variable capturing the length of sewers, normalised by number of properties.

The results were revealing. The inclusion of the variable defined as the length of sewers per property made a modest contribution to the goodness of fit of the model and, more tellingly, the estimated coefficient on that variable was not statistically significant at the 40% level.[43] Put differently, once the number of pollution incidents is standardised for the scale of a company, here done using the number of connected properties, it is not clear that controlling for length of sewers per property contributed much further to explaining differences across companies' number of incidents per property.

Implications for benchmarking and PCLs at PR24

The findings cast doubts on the reasonableness of relying on a proportional relationship between incidents and sewer length, to benchmark companies. That model leaves much of the observed variation in companies' performance unexplained.

In that light, the upper quartile company on Ofwat's metric is unlikely to be a reasonable and realistic benchmark to set for all companies. Such an upper quartile level will be distorted by it not taking account of factors which demonstrably have an impact on number of pollution incidents and which are overlooked by Ofwat's approach.

We do not consider it appropriate to use this simple type of benchmarking as the basis for informing what Anglian Water can deliver with regards to pollution incidents in AMP8 and beyond. And, by the same token, it would not be reasonable for Ofwat to judge the level of ambition in Anglian Water's planned performance over AMP8, as captured in the OUT1 data tables, by comparing it to the upper quartile or some other stretching level of a metric that only considers number of incidents per 10,000 km of sewer.

Alternative approaches for benchmarking pollution incidents

We explored alternative approaches to benchmark companies' performance on pollution incidents. In particular, we considered:

- the use of performance metrics that involve alternative ways to standardise the number of pollution incidents across companies; and
- the use of econometric models.

Alternative approaches to standardise the number of pollution incidents

43 Whilst there is no objectively defined threshold to determine what is an acceptable statistical significance level or not, a value of 40% is well above the levels that are drawn on in common practice, including by Ofwat in its appraisal of cost assessment models.

Ofwat's metric standardises the number of pollution incidents by dividing the number of incidents by the length of sewers in companies' network. We explored the role of alternative measures that could be used, alongside sewer length, to derive standardised measures.

We approached the task from an economic and engineering basis, in line with one of the principles adopted by Ofwat for the purpose of developing its base cost models. In this light, we considered there was merit in taking the number of sewage treatment works (STW) and number of booster pumping stations as alternatives measure with which to standardise the count of pollution incidents. This drew on the results set out earlier, showing that those two categories of assets, as well as sewers, are the sources of a significant number of pollution incidents.

In this context, we note that the measure being standardised - the number of category 1 to 3 pollution incidents - does not take account of the severity of the incidents (at least for incidents that meet the threshold for category 3); it is a count of such events. As such, the purpose of the variable used in the denominator, to standardise the measure, is that of putting the number of incidents on a more comparable basis, rather than their scale or impact. If, instead, the numerator also captured the scale of the impact of incidents, there could have been greater motivation for considering the capacity of treatment works and of pumping stations, rather than their number as candidate measures to use as the standardisation factors.

The number of STWs and of booster pumping stations are not the only candidate factors likely to have an impact on the number of pollution incidence and so on the variation in observed incidents across companies. Differences across companies with respect to, for example, the proximity of companies' sewage network to water bodies, the nature of water bodies (e.g. whether they have been straightened), the susceptibility of soil in the service area to movement are, from an operational point of view, some of the other potential factors. These, however, are less amenable to an analysis aimed at developing a composite performance metric - which we turn to below - and we do not cover them further in this section.

It would not be sensible to use either the number of sewage treatment works or the number of booster pumping stations as the standardising measure in isolation, and as alternatives to using the length of sewers. There are operational grounds for considering that sewer length is one of the drivers of the number of pollution incidents and the concern we have with the current approach arises from the focus on a single asset type only rather than from the choice of that asset type.

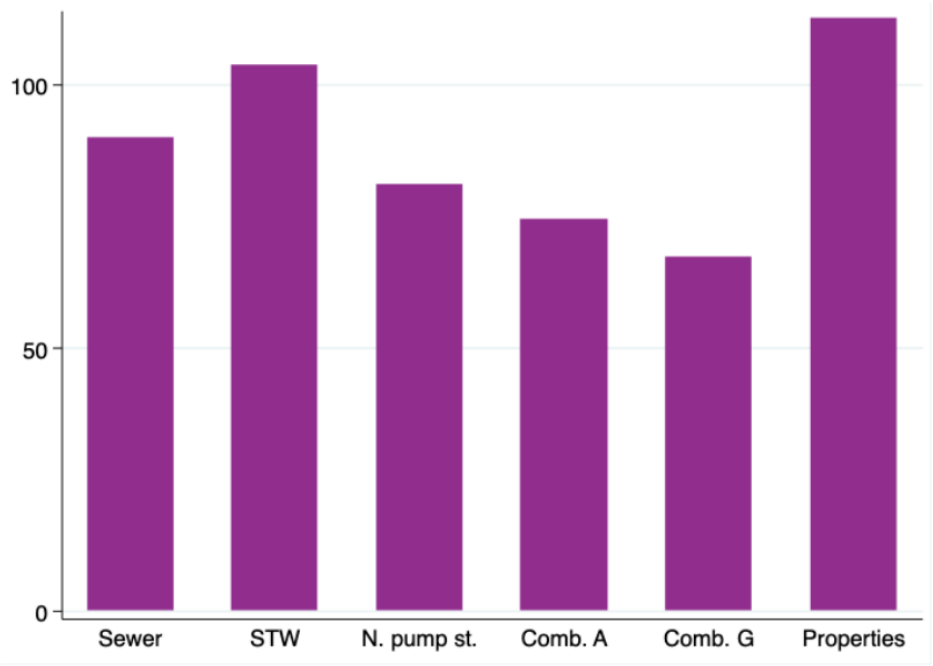
We calculated a composite measure of performance that takes account of companies' performance when the number of pollution incidents is standardised, separately by reference to each of three different drivers - by length of sewers, by number of sewage treatment works and by number of booster pumping stations - and then brought these together in a single composite metric. Specifically, taking each of the three drivers in turn, we calculated a standardised measure of company's performance and then calculated the performance ratio of each company under that standardised measure. The performance ratio is the ratio of a company's actual standardised performance to the median of the relevant standardised performance across the industry. For a given company, the composite measure of performance is then the arithmetic mean, or, in a second variant we considered, the geometric mean of its performance ratio across the three different derived measures.

The composite performance measure is a simple means of taking account of the relative performance of companies in a context where there are multiple variables that might be used to normalise performance across companies for the purposes of comparison. The approach has some similarities to that which Ofwat and the CMA drew on at PR19 when considering companies' performance on leakage; there performance on a per property basis and on a per km of mains basis were brought together in the analysis.

To compare the extent to which, modelling performance by reference to median of each of the different performance measures fit the observed data over the entire period, 2011/12 to 2021/22, we calculated the standard deviation of the performance ratios derived under each of the measures. Specifically, for each of the approaches to standardise performance, we took each year in turn and, for each, calculated companies' performance ratios as outlined above and then calculated the standard deviation of those performance ratios.

The figure below charts the result for the metrics based on a comparison using sewer length (only), number of sewage treatment works (only) and number of booster pumping stations (only), and for the two variants of the composite performance measure, based on an arithmetic mean (labelled "Comb. A" in the figure) and on a geometric mean ("Comb. G"). Lastly, and for reference, the figure also shows the range when the measure is standardised by reference to the number of connected properties which is another potential scale variable to use for the purposes of standardisation, albeit with less of an operational and engineering rational if taken in isolation.

Figure 25 Standard deviation of performance ratios across alternative approaches to standardisation



The standard deviation statistic is a measure of the variation around the mean of, in this case, the performance ratios: a higher standard deviation points to a greater variation. The relative height of the bars in the figure above point to the standard deviation being smaller when companies' performance is assessed through either of the variants of the composite metric. That is to say, in contrast to an approach where companies' performance is benchmarked by reference to the median level of pollution incidents per sewer length, an approach that also takes account of performance when the number of STWs and the number of pumping stations are used as scale variable produces a narrower assessment of the relative performance of companies.

Based on the analysis summarised above, our view is as follows:

- A composite performance metric approach provides a practical way to take account of differences between companies in asset types that are the source of pollution events besides sewers, which is more consistent with an economic, operational and engineering perspective.
- There is statistical support for this composite performance metric approach better explaining the observed data than either the incidents per sewer length metric or alternative performance metrics that use a single variable to normalise performance across companies.

Exploring econometric modelling

Constructing composite measures of performance is one route to take account of different, alternative, measures of standardising the number of pollution incidents. With a view to complementing that work, we carried out some preliminary econometric analysis to explore models that allowed for the different candidate drivers, as well as other candidate drivers of pollution incidents, to be controlled for.

The analysis developed is insightful and, we suggest, contributes to the view that it is not reasonable to benchmark companies' performance simply by reference to number of pollution incidents per sewer length alone. That said, we do not claim to have produced a single model, or a preferred suite of models, that are immediately fit-for-purpose to be used for PR24.

We explored econometric models to explain the variation of incidents on a per connected property basis. Compared to models where the dependent variable is defined in terms of incidents per sewer length, such models are more neutral in terms of not imposing, or giving more weight, to sewer length, or to a specific other category of assets, as the key asset type driving pollution incidents.

We considered the role of several key asset drivers, namely (i) the length of sewers, (ii) the number of sewage treatment works, (iii) number of booster pumping stations, and (iv) booster pumping capacity. We estimated models that controlled for each of these asset type cost drivers separately, after normalising them by the number of properties.

From our preliminary modelling exercise, we were not able to derive intuitively sensible results for models that controlled for more than one of the asset types we considered, e.g. controlling for both sewer length per property and number of sewage treatment works per property. We found that the models we explored which controlled for more than one type of asset did not perform well.

We also estimated models that controlled for density using the population density measure developed by Ofwat and drawn on by Ofwat in its base plus cost assessment models. We focused on the measure derived from the weighted average population density of the Middle Layer Super Output Areas (MSOAs) within

wastewater companies' service areas.[44] Population density might be seen as an underlying exogenous factor that gives rise to differences across companies in assets such as length of sewers, number of pumping station and number of treatment works. These models that controlled for differences in population density yielded intuitive results, namely that the number of incidents per property are negatively associated with population density, and improved significantly the goodness of fit compared to the model that controlled for the time trend alone: in models which controlled for differences in population density, the R-squared statistic was around 0.26, compared to a value of 0.11 in a model that controlled for time alone. We present results from these models in the table below (with the t-ratios of the estimated coefficients shown in brackets and, below those, the -values within curly brackets).

44 The "Middle Layer Super Output Area" (Or MSOA) is a type of geographic area used by the ONS for some of its statistics, including those providing more local-level population density. For its consultation on base cost econometric benchmarking models in April 2023, Ofwat drew on company-level metrics of population which were calculated from MSOA-level population density data. For our analysis of pollution incident performance, we used the MSOA-level population density variable that Ofwat referred to in its April 2023 consultation as "Weighted average density - MSOA".

Table 19 Econometric modelling results for total pollution incidents

	POL_1	POL_2	POL_3
Dependent variable	Log of pollution incidents per 1,000 connected properties		
Explanatory variables			
Ln MSOA-based population density		-0.67 (-1.64) {0.10}	-12.72* (-1.91) {0.06}
Square of Ln MSOA-based population density			0.75* (1.89) {0.06}
Time trend	-0.06*** (-4.36) {0.00}	-0.06*** (-3.60) {0.00}	-0.06*** (-3.49) {0.00}
Constant	121.01*** (4.29) {0.00}	116.40*** (3.91) {0.00}	162.79*** (4.23) {0.00}
Overall R-squared	**0.11**	**0.26**	**0.27**
Number of observations	**110**	**110**	**110**

We considered the interactions with Ofwat's wastewater base cost models based on those from its April 2023 consultation and the types it has used in the past. Those models include explanatory variables intended to capture underlying cost drivers relating to density, measures of local-level population density derived from ONS data. The inclusion of density variables in such base cost models does not mean that there is no basis for considering density as a driver of performance related to pollution incidents.

It is an empirical matter whether, in the historical period covered by the data, the differences in density across companies (and over time) help explain the observed variation in performance related to pollution incidents, irrespective of whether they also help explain variations in companies' base costs. There are good economic reasons to expect density to affect both costs and performance regarding pollution incidents. Our assessment is that the available evidence indicates that density has been affecting both costs and pollution incident performance.

Enhanced evidence to inform Anglian Water's AMP8 projections

Drawing on the analysis outlined above, we draw the following findings:

- that it is not reasonable to benchmark companies' performance simply on the basis of the metric of pollution incidents per sewer length, as Ofwat currently does; and
- that improvements to the current approach can be achieved through (i) the use of a combined performance metric, and/or through (ii) the use of econometric models, namely ones that control for differences in population density across companies.

With regard to the second point, and drawing from within the set of analyses and models we have considered, we see value in the following approaches going forward:

- Use the composite performance metric based on the geometric mean of performance on a (i) per sewer length, (ii) per STW and (iii) per booster pumping station.
- Use the output of econometric models where the number of pollution incidents per property is regressed on a time trend and on variables capturing population density.

We see merit in both of these approaches and consider that there is value in drawing on both.

Taking each of these approaches in turn, we set out below the steps involved in deriving benchmarks for Anglian Water for AMP8.

Deriving benchmarks for Anglian Water based on the composite performance metric

We derived the benchmark for Anglian Water based on the composite performance metric outlined earlier. The sequence of steps involved in doing so are set out in the table below.[45]

45 For this calculation we have used the industry median level of performance as the denominator for performance ratios. We can also see a case for using the average. This is a matter that we leave open at this stage. Our focus is on the overall methodology, and the set of steps could equally be applied with corresponding industry average figures replacing industry median figures in the right hand column of the table.

Table 20 Deriving Anglian Water benchmarks for AMP8 based on the composite performance metric

	Element in calculation	Values	
Historical data			
		ANH (1)	Ind. median (2)
A	PoI incidents per 10,000km sewer (avg. 2018-2022)	30.17	26.83
B	PoI. incidents per STWs (avg. 2018-2022)	0.20	0.27
C	PoI. incidents per pumping station (avg. 2018-2022)	0.04	0.05
Performance ratios for Anglian Water			
D = A1 / A2	Perf. ratio based on sewer length	1.13	
E = B1 / B2	Perf. ratio based on number of STWs	0.76	
F = C1 / C2	Perf. ratio based on number of pumping stations	0.69	
G = Geom. Mean of D, E and F	Composite performance ratio for Anglian Water	0.84	
Upper quartile benchmark of composite performance metric			
H = UQ of set of values G	UQ of composite performance ratios across companies	0.78	
Relative contribution to Anglian Water's composite performance			
I = E / D	Ratio of performance ratio based on STW to perf ratio based on sewer length	0.67	
J = F / D	Ratio of performance ratio based on pumping stations to perf ratio based on sewer length	0.61	
UQ benchmark for Anglian Water			
K = (H^3 / (I * J))^(1/3) * A(II)	UQ benchmarked incidents per 10,000 km sewer (2018 - 2022)	28.00	

The upper-quartile benchmark of number of incidents per sewer length for Anglian Water derived by taking into account companies' performance across the different measures to standardise pollution incidents is 28.00 incidents per 10,00 km of sewer length. This is 19. 8% greater than the upper-quartile benchmark that would be derived if we were to focus on the use sewer length as the standardising measure alone. (The upper-quartile number of incidents per sewer length, taking average performance over 2018-2022, was 23.37).

We outline here some points on the calculations set out in the table The top two thirds of table[Table 20 Deriving Anglian Water benchmarks for AMP8 based on the composite performance metric] set out the calculations involved in deriving the composite performance ratio for Anglian Water; we described those steps earlier. As shown in the table, we calculate the composite performance ratio for Anglian Water to be 0.84. Across the industry, the upper quartile of the composite performance ratio is 0.78. We draw on this to calculate an upper quartile benchmarked number of pollution incidents per 10,000 km sewer for Anglian Water. Specifically, we decompose the upper quartile geometric mean back into its constituent components for Anglian Water by assuming that the relative contributions are in line with those when calculating the geometric mean for Anglian Water. This recognises the fact that a company will, almost certainly, have different levels of relative performance depending on the measure used to normalise the number of incidents and that this ought to be reflected when producing a benchmark that is focused on a single one of those measures, namely on sewer length. The result of the calculation produces a benchmarked value for the number of pollution incidents per 10,000 km sewer of 28.00.

The benchmark derived above reflects an upper-quartile level of performance in terms of the composite metric, when performance on pollution incidents also takes account of incidents per STW and per number of pumping stations as well as on a per length of sewer basis.

Deriving benchmark for Anglian Water based on the econometric models

We have used the two econometric models outlined earlier which controlled for measures of population density, and which included a time trend, to derive benchmarks for Anglian Water for AMP8.

The dependent variable in those models is expressed in terms of the number of incidents per property. To derive the benchmark in terms of number of pollution incidents per sewer length, we drew on forecasts for AMP8 of the number of connected properties and of the length of sewer in the year that is used as the base year for the purpose of calculating Ofwat's pollution incidence metric. For the purpose of our calculation we assumed that the value of the population density measures used in the models would remain at the 2021/22 level, the most recent year for which we have data on that variable.

Because the econometric models include a time trend, the benchmarks derived from the above incorporate the effects of the estimated ongoing performance improvements.

For the purposes of illustration - and without seeking to imply that such a challenge is appropriate -we also derived and applied an upper quartile challenge to the modelled number of incidents per sewer length derived from the models. For each of the two models, we calculated this upper quartile challenge as follows:

- We calculated the modelled number of pollution incidents per sewer length for each company in each of the years from 2017/18 to 2021/22, the last five years covered by our data.
- For each year, we calculated the average (mean) of the modelled number of incidents and used this to calculate a performance ratio for each company, in each year, i.e. we divided the actual standardised number of incidents by the modelled industry average.
- For each company, we calculated the average over the five years of their performance ratios.
- We calculated the upper quartile across companies of those average performance ratios.

The above steps produced an upper quartile challenge of 25% for model POL_2 and 20% for model POL_3. We applied each of these adjustment to the respective forecast number of incidents per sewer length derived from the two models.

Lastly, and with a view to putting forward a single set of values as a projection, we average the values derived from the two models.

1.14 Serious pollution incidents

Table 21 Serious pollution incidents

Ofwat category	Environment	Anglian Water long term ambition	Work with others to achieve significant improvements in ecological quality of catchments
Short description of measure	This performance commitment is designed to incentivise the company to reduce the number of serious pollution incidents that impact the environment.		
Performance	2024/25	2029/30	2049/50
No.	4	0	0

Overview

This performance commitment is reported as the total number of pollution incidents (categories 1 to 2) in a calendar year emanating from a discharge or escape of a contaminant from a water company sewerage asset or water supply asset affecting the water environment, per 10,000km of sewer length from wastewater assets for which the company is responsible. We have set our target at achieving zero serious pollution incidents by the start of and throughout AMP8.

Incidents are defined in line with the serious pollution incidents metric set out in reporting guidance from the Environment Agency's water and sewerage company Environmental Performance Assessment (EPA) methodology version 9.

This is a new common performance commitment for PR24, which sits alongside an existing common performance commitment measuring the total number of pollution incidents from Water Recycling assets.

Customer views

There is a concern regarding pollution and the impact that has on human health and the ecosystem. There is much more awareness of pollutions through recent media attention - customers' views are mixed, but some report anger and feeling upset and anxious, regarding recent media reporting.[46]

We have engaged with customers extensively on the preferred approach to addressing pollution incidents in AMP8 and beyond. This insight is captured with our Customer Synthesis Report. It is clear that preventing pollution is important to customers. Pollutions are a concern to our customers (citing potential implications for the ecosystem and health), with customers expecting us to minimise the impact of our operations on the environment. The Synthesis Report demonstrates that across our engagement our customers rank flooding and pollutions as jointly the third priority for Anglian Water to address.[47] Within the three sources of Ofwat's collaborative customer research, total pollution incidents were identified as a medium priority.[48]

In addition, our Willingness to Pay evidence suggests customers prioritise improvements that have a wider impact across the region (including tackling pollution) and that they have a strong preference for avoiding deteriorating service levels, especially for environmental measures.[49] However, when asked, the majority of customers opt for statutory levels of investment to improve river water quality rather than going beyond this with additional discretionary investment (68% v 32%).[50]

Our Independent Challenge Group has taken a keen interest in pollution incidents, particularly serious incidents, challenging us to be ambitions and deliver zero serious incidents as soon as possible. [51]

Our performance commitment level - table OUT1

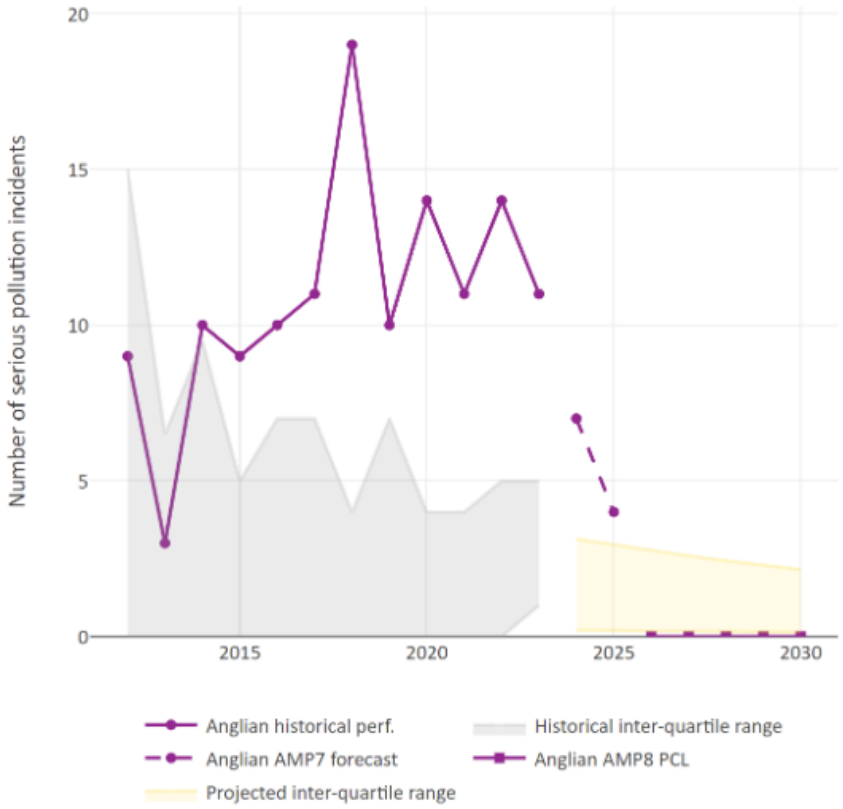
One of the most important contributions we can make is to ensure that our activity does not contribute to environmental pollution. Caring for our environment is so fundamental to the way we operate at Anglian Water that we have built our commitment into the fabric of the company, in 2019 becoming the first major utility to change our Articles of Association to enshrine public interest for the long term. We regard any pollution incident taking place in our region as one too many, and we are wholeheartedly committed to reaching zero serious pollutions. This is the minimum standard we expect as an environmentally conscious company. Customer expectations in this area are rightly high and we are committed to meeting them.

We are proposing a performance commitment level of 0 for each year of AMP8, in line with our ambitions, the views of our customers and Ofwat's expectations for this measure. In table OUT1 we have projected significant improvements in

46 ANH54 Customer Principles Document
47 ANH55 Synthesis Report
48 Ofwat, PR24: Using collaborative customer research to set outcome delivery incentive rates
49 ANH67 Societal Valuation Triangulation Report
50 ANH55 Synthesis Report
51 ANH88 Independent Challenge Group Report

performance in the remainder of AMP7 and then 0 incidents per year from AMP8 onwards. This is shown in the figure below. We will have to equal our best ever performance in the remainder of AMP7 to get on track for AMP8. This is the maximum level of stretch possible and constitutes 100% reduction from 2022/23 levels. Avoiding all serious pollution incidents will be very stretching for us to achieve as a company operating in a rural, heavily drained region.

Figure 26 Historical and forecast performance for serious pollution incidents



Nonetheless, we believe setting our ambition at zero is the right decision for our customers and the environment and delivers on our company purpose to bring environmental and social prosperity to the region we serve. As stated in our Get River Positive pledges, we have committed to eliminate all serious pollution incidents from our assets by 2025. This PCL will hold us accountable to maintaining this commitment over the course of AMP8 and beyond.

We will aim to meet this target through the approach outlined in our Pollution Incident Reduction Plan (PIRP). The PIRP includes over 100 short, medium and long-term water recycling and clean water pollution reduction initiatives set out in a programme of bespoke asset class improvement activity including increased blockage detection, more proactive monitoring, use of our water network pressure sensors to identify and respond quickly to bursts and operational control standards which combined will allow us to deliver the expected improvement in performance.

Performance from base - table OUT2

In our response to Ofwat's 'performance improvements from base, enhancement and ODIs' data request, we outlined that pollution incidents had received minor benefits from historic enhancement investment, although this was generally related to investment driven by other needs (e.g. storage and flooding investments).

Improvements on this measure will be predominantly driven by expenditure derived from base allowances. We expect improvements in clearing our sewer network, sewer misuse schemes, and treatment plant maintenance to deliver the most benefit for this performance commitment. And on the water side our use of our pressure sensors to identify and respond quickly to bursts. We have completed the OUT tables on the basis that all of the proposed performance improvement is derived from base expenditure (shown in table OUT2).

Performance from enhancement - table OUT3

We discuss our approach to quantifying the benefits of our enhancement programme elsewhere within our business plan. We expect some benefits from enhancement expenditure for this performance commitment, predominantly from network monitors and surface water management schemes. These investments are primarily aimed at other drivers, e.g. storm or emergency overflow reduction and reducing flooding risk for properties. We have assumed that monitoring of the network and emergency overflows will reduce the risk of pollution incidents by 50% where monitors are present.

Our expected benefit for enhancement investment on this performance commitment is three serious pollution incidents by the end of AMP8.

The quantified improvements to be delivered from enhancement expenditure are captured in table CWW15.

Other commentary - table OUT5

Historical data provided in line with those reported to the Environment Agency. In the remainder of AMP7 we have forecast the reduction in serious pollution incidents will mean no serious pollution incidents from water assets.

Calibrating incentives - table OUT7

We are proposing an alternate to Ofwat's indicative incentive rate for this performance commitment. See3 OUT7: Outcome performance - alternate incentive rates and our compelling evidence.

We have therefore reflected a marginal benefit based on our societal valuations in table OUT7 for this performance commitment. We have used Ofwat's default sharing factor of 70%.

Price control allocation

We have allocated 16% to water network plus and 84% to water recycling network plus. This allocation has been done on the basis that most of the historic proportion of sources of serious pollution incidents.

1.15 Discharge permit compliance

Table 22 Discharge permit compliance

Ofwat category	Environment	Anglian Water long term ambition	Work with others to achieve significant improvements in ecological quality of catchments
Short description of measure	This performance commitment is designed to incentivise the company to fully meet its discharge permits.		
Performance	2024/25	2029/30	2049/50
%	98.73	100	100

Overview

This performance commitment is designed to incentivise companies to fully meet discharge permits, to contribute to efforts to improve the status of water bodies into which companies discharge. The discharge permit compliance metric, as defined in the Environmental Performance Assessment (EPA) methodology version 9 reporting guidance from the Environment Agency (EA), measures the number of water and water recycling sites failing their numeric discharge permit conditions.

This performance commitment is an existing measure from PR19 and applies on an underperformance only basis. In 2022/23 we reported 98.57% against this measure, meaning that we missed both the performance commitment level and the deadband for this measure.

Customer views

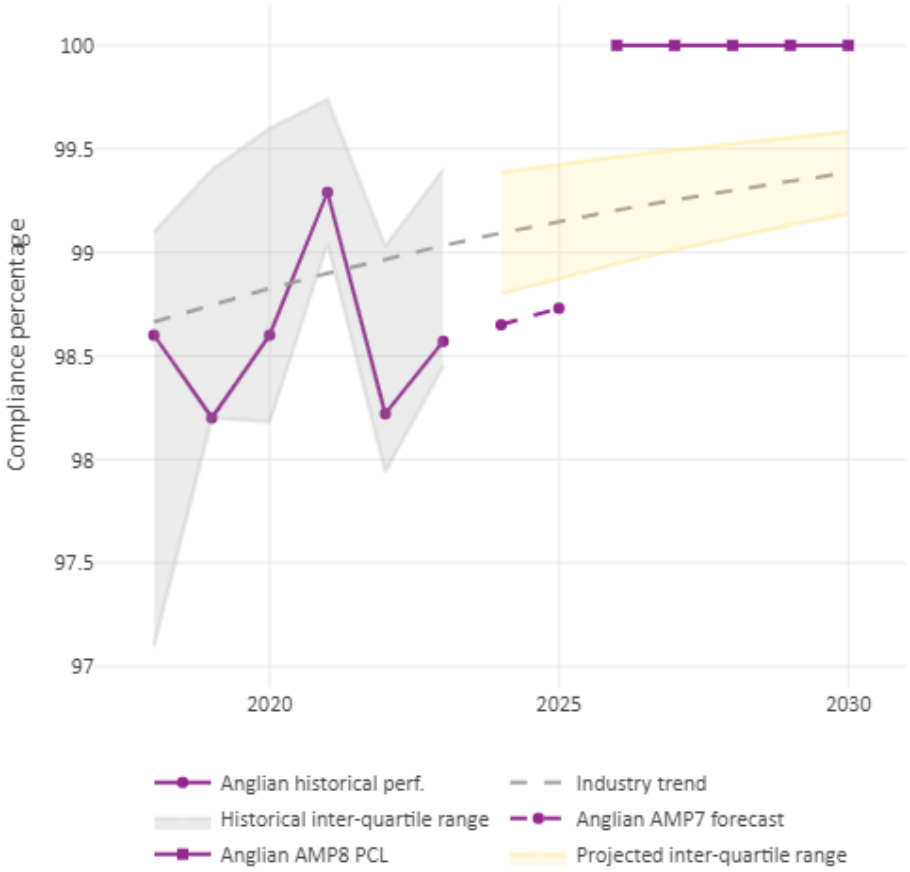
This is a difficult measure to engage customers on directly but improving river water quality and reducing pollution is consistently important to customers. However customers often opt for statutory levels of investment before discretionary investment (68% v 32%).

Our performance commitment level - table OUT1

Industry performance is generally high, with compliance usually between 98% and 99%. However performance can be volatile due to the weather and no companies consistently achieve 100% compliance.

We are proposing to set our PCL at full compliance for each year of AMP8. This is in line with Ofwat's position in the PR24 Final Methodology and the expectations of the Environment Agency. Setting the PCL at full compliance is the maximum level of stretch possible.

Figure 27 Discharge permit compliance historical and forecast performance



Performance from base - table OUT2

In our response to Ofwat's 'performance improvements from base, enhancement and ODIs' data request, we outlined that discharge permit compliance had received minor benefits from historic enhancement investment, although this was generally related to investment driven by other needs (e.g. growth, storage, nutrient removal and sanitary parameters, microbiological treatment). This type of investment would generally maintain service levels rather than improve it in absolute terms.

We expect improvement on this performance commitment to be driven by base through treatment plant maintenance and improvements to operational resilience.

Based on the analysis in our ASRAP we do not propose increases in water recycling treatment works maintenance expenditure in the short term. However, as explained in relation to water treatment works, we are concerned about the level of confidence of the analysis in particular for civil structures which have less regular, but higher cost maintenance work than mechanical assets. For this reason we set the long term risk to amber, meaning that we currently believe beyond 2030 we will need to increase maintenance expenditure in this area.

Performance from enhancement - table OUT3

Enhancement expenditure will be used to offset deterioration against this measure, as informed by our Predictive Analytics modelling exercise. We expect that investment to enhance treatment plants (including creation of additional capacity storage and smart monitoring), manage growth and for infiltration and surface water schemes will deliver the majority of this benefit to offset deterioration. However, given the deterioration trend identified by Predictive Analytics, this enhancement expenditure will not drive an improvement in performance.

Other commentary - tables OUT4 and 5

We have provided data that is consistent with the data we have provided as part of the historical performance trends information request for PR24. We have assumed improving performance in AMP7, aiming for 100% compliance from the start of AMP8. We have assumed the number of numeric discharge permits remains constant for the purposes of completing the table but this will likely vary during AMP8.

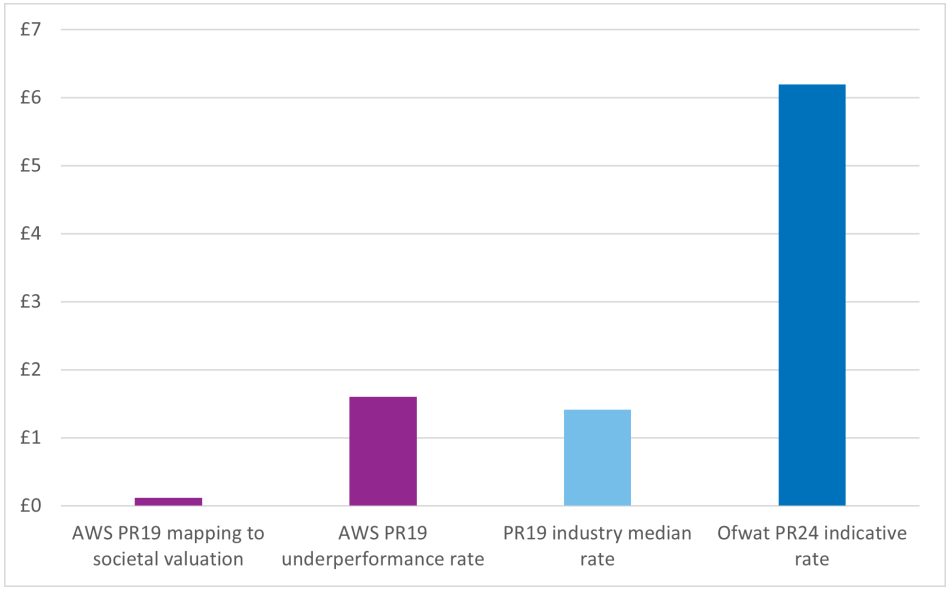
Calibrating incentives - table OUT7

Incentive rate

We have used Ofwat's indicative incentive rate and benefit sharing factor for this performance commitment. This performance commitment has underperformance payments attached only.

The figure below compare four sources of evidence for the incentive rate for this performance commitment.

Figure 28 Comparison of discharge permit compliance incentives, £m 2022-23



We believe this incentive rate is too high as Ofwat's suggested PR24 ODI rate is substantially higher than the PR19 rates. This is concerning as it is difficult to directly gauge customer's valuation of this measure due to its indirect impact on customers and the environment. We believe the indicative rate put forward by Ofwat is the absolute maximum that the rate could be set at for PR24,, although suggest the rate is adjusted to align more closely with the PR19 rate

Deadband

The EA assess company performance in this area through the EPA. Achieving 'green' status within the EA's EPA requires 99% compliance.

We are proposing a deadband of 99% for this measure. Full compliance is our long-term aspiration, which is why we have selected full compliance as our PCL. However, meeting full compliance in AMP8 will be very challenging. Industry performance does vary, influenced by the weather, and in some years (e.g. 2017 and 2021) the upper quartile company performance was at 99% compliance. Figure[Figure 27 Discharge permit compliance historical and forecast performance](#) shows the volatility in industry performance and the feasibility of any companies consistently achieving a 100% target.

For PR24 a 99% deadband constitutes an achievable level of performance that ensures companies are not penalised whilst at the same time meeting the EA's expectations for achieving 'green status'. The 1% difference from full compliance still ensures excellent levels of performance therefore does not dull the incentive. We have over 800 works with numeric consents so a deadband at 1% represents eight works.

Setting a deadband for this measure is in line with the regulatory precedent established by the Competition and Markets Authority (CMA) during the PR19 Final Redetermination. The CMA stated deadbands may be appropriate where a measure itself allows very little tolerance and companies might 'miss' the PCL without necessarily having objectively failed in the management of the commitment. Discharge (formerly Treatment) Permit Compliance was cited as an example of this circumstance, as this measure had a PCL of full compliance. This will ensure companies are not penalised for delivering excellent levels of service whilst recognising the aspiration for 100% compliance.

Price control allocation

We have allocated 11% to water network plus and 89% to water recycling network plus. This allocation has been done on the proportion of water and water recycling permits of our total permits.

1.16 Bathing water quality

Table 23 Bathing water quality

Ofwat category	Environment	Anglian Water long term ambition	Enabling sustainable economic and housing growth
Short description of measure	The purpose of this performance commitment is to incentivise the company to improve water quality at surface waters designated for swimming within its region.		
Performance	2024/25	2029/30	2049/50
%	82.8	87.4	90.76

Overview

This performance commitment is calculated as a single overall average 'score' (expressed as a percentage) for bathing waters based on the classification given by the appropriate agency. This measure is designed to incentivise the company to improve water quality at surface waters designated for swimming within its region.

This score includes samples taken during short term pollution events irrespective of whether these have been disregarded in the appropriate agency's classification. If an eligible bathing water is closed and sampling cannot be undertaken, the most recent classification will apply for the purposes of calculating the company's performance. Any additional bathing waters, newly designated during the 2025-30 period, will not be eligible for the purpose of calculating performance against this performance commitment.

Customer views

Bathing water quality is increasingly important to our customers, government, and the media alike. Our customer insight as captured in our Customer Synthesis Report shows that there are concerns from customers regarding the water quality used for recreational use. Research conducted by Incling with our Online Community showed that 42% of participants use bathing waters recreationally. Of those participants that stated that they see water quality as being of high importance for recreation, many had concerns about the risk to health for swimmers (ie infection, disease) and the potential negative impact for biodiversity. [52]

While important to customers, it's priority as a performance commitment appears less prominent compared to other factors. As identified by Ofwat/CCW in the national Customer Preferences Research (April 2022), bathing water improvement was ranked by participants as a 'low' priority for improvement. This was corroborated by our own 'Outcome delivery incentive research' conducted by ICS which found that our customers thought bathing water quality to be one of the least important measures to financially incentivise. [53]

Our performance commitment level - table OUT1

Bathing waters are based on a 4-year rolling average, therefore, one bad year or extreme result can impact a bathing water for 4 years, even if each subsequent year is Excellent. This can lead to a delay in improvements following investments. Impacts from activates AMP8 are not fully visible through the performance commitment until AMP9, even if the quality of the bathing water is improved.

Improving performance is particularly challenging given the impact on performance that may occur due to factors outside of our control. We note that bathing water quality can be significantly affected by a number of factors (I.e. diffuse sources of pollution not originating from company assets, transient bird pollution) and third-party activities (i.e.. agricultural run-off). We are seeing more extreme weather patterns leading to increased number of storm events and algal blooms which can impact water quality. This is particularly relevant given the inclusion of samples excluded by the relevant agencies, which increases the volatility of this metric to abnormal operating conditions outside of management control.

We propose a performance commitment level of 87.4% by 2029/30. As part of our approach for achieving this target, we are proposing to increase the number of our bathing waters classified as good or excellent to 48 sites by 2029/30, our highest ever level. This proposed level is based on the expected improvements that our enhancement programme in AMP7 and AMP8 will deliver from our current performance. Our proposed PCL will see us performing better than the current upper quartile in AMP7 and ahead of the industry trend by 2029-30.

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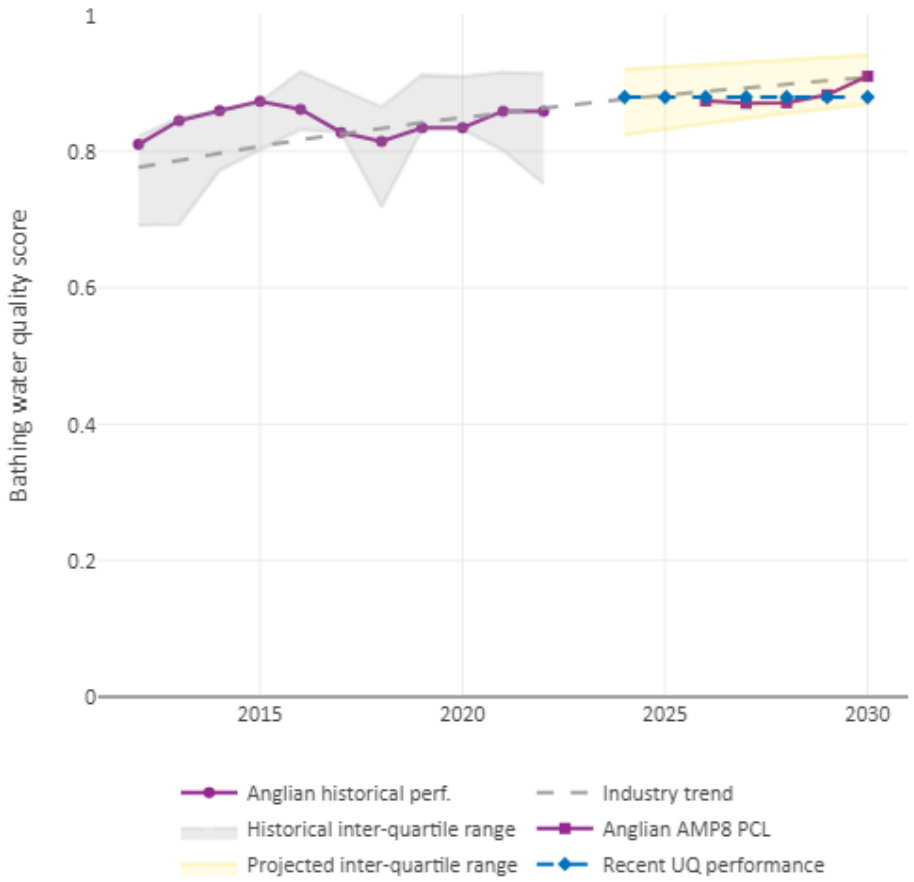
Figure 29 Bathing water quality historical and forecast performance



Nonetheless, our proposals align with the improvement investments identified in our WINEP enhancement programme. This includes investment predominantly aimed at meeting new and tightened conditions for microbiological parameters at coastal bathing waters.

Improvements from base - table OUT2

We expect all improvements for this performance commitment to be driven by schemes delivered from enhancement expenditure allowances. As outlined in table OUT2, we assumed that our bathing water quality performance will be held stable by base enhancement in line with forecast performance in 2024-25, without any improvement from base. We have completed the OUT tables on this basis to reflect that we anticipate no improvement to be delivered from base expenditure.

Improvements from enhancement - table OUT3

We discuss our approach to quantifying the benefits of our enhancement programme in the commentary for table CWW15 of our business plan. We expect there to be significant benefit from WINEP-driven enhancement expenditure for this performance commitment. This includes both primary benefits from investment relating to meeting new or tightened microbiological treatment limits, and secondary benefits from investment primarily aimed at other drivers. We expect the greatest benefit to materialise from activities such as surface water management schemes, UV treatment and engagement with stakeholders (i.e farmers and local authorities). The quantified improvements to be delivered from enhancement expenditure are captured in table CWW15.

There have been a number of WINEP investigations carried out in AMP7 which have informed the AMP8 investment programme.

Other commentary - table OUT5

Bathing water designations in 2020 as per 2019. Improvements continue to accrue in AMP9 for AMP8 improvements.

There have been changes to the number of bathing waters within AMP7, with Clacton's Groyne 41 becoming declassified and three new inland bathing waters designated.

Several non-designated bathing waters are predicted to be designated before the end of AMP7, although we have not included these in our forecasts in line with the performance commitment's definition.

Several capital schemes included in the WINEP are designed to improve water quality or protect the current bathing water classification. Total number of Excellent bathing waters helped by the two new bathing waters at Rutland Water which we anticipate will be excellent, but this will need to be confirmed next year.

There are challenges to predicting improvements throughout an AMP, due to the potential impacts from diffuse pollution sources. We are seeing more extreme weather patterns leading to increased number of storm events and algal blooms which can impact water quality. However we have accounted for the impact of the enhancement investments in the plan.

AMP9 predictions partially based on AMP8 investment submissions, as well as general observations of patterns within AMP7.

Calibrating incentives - table OUT7

We have used Ofwat's indicative marginal benefit and sharing factor to set the incentive rate for this PC.

1.17 River water quality (phosphorus)

Table 24 River water quality

Ofwat category	Environment	Anglian Water long term ambition	Work with others to achieve significant improvements in ecological quality of catchments
Short description of measure	The purpose of this performance commitment is to incentivise the company to improve water quality in the rivers within its area by reducing the amount of phosphorus entering rivers from water company activities		
Performance	2024/25	2029/30	2049/50
% reduction 2020 baseline	7%	15%	71%

Overview

This performance commitment is defined as the percentage reduction in phosphorus emissions to river catchments because of water company activities relative to the baseline load of total phosphorus discharged by all wastewater treatment works. The baseline captures the cumulative total load of phosphorus from relevant discharges of all the company's wastewater treatment works from 1st January 2020 to 31st December 2020. This measure is designed to incentivise companies to address phosphorus loading, which is a significant reason why rivers fail to be classified as having good status.

Customer views

As captured within our Customer Synthesis Report [54], customers consider that environmental protection is an important aspect of our work. Across our customer insight, our customers have a strong preference for avoiding deterioration in river water quality. Participants in the Trinity McQueen Investment Priorities Research (wave 1) ranked improving river water quality fifth out of eighteen priorities for investment between both 2025-30 and 2025-50, therefore an above average priority. However, when asked the majority of customers opt for statutory levels of investment to improve river water quality rather than going beyond this with additional discretionary investment (68% v 32%).[55]

Participants in Ofwat/ CCW's Customer Preferences Research (April 2022) ranked river water quality as a medium priority to be addressed, alongside storm overflows and pollution incidents.

Setting our performance commitment level - table OUT1

We propose a performance commitment level of 15% reduction by 2029/30 in line with our statutory requirements. Meeting this PCL will require us to deliver a stretching programme of nutrient investment to deliver a reduction in the amount of phosphorus discharged from works within AMP8. Nutrient schemes to address phosphorus loading builds upon investment during AMP7, which has included over 160 new or upgraded phosphorus removal plants at water recycling centres (WRCs) under the Good Ecological Status obligation or Urban Waste Water Treatment Directive obligation, and further removal investments under the No Deterioration and SSSI obligation. We have accounted for our Accelerated Infrastructure Delivering funding in our performance forecasts and this demonstrates our commitment to enabling growth and protecting the environment. This has resulted in a 7% reduction in AMP7.

Our target is achievable as it aligns to our PR24 WINEP enhancement investment programme, including accounting for the associated benefit from nutrient removal schemes. Although the scale of our PR24 WINEP programme is significantly larger than PR19, we have a track record of delivering obligations on time which gives us confidence that delivering these improvements is achievable.

This target places us on the right track to contribute to the Government's Environment Act target of an 80% reduction against a 2020 baseline in the levels of phosphorus discharged from treated wastewater in England by 2038.

A list of phosphorus improvements for AMP9/10 has been agreed with the Environment Agency to ensure that we achieve our fair share of nutrient removal to achieve good ecological status. This is equivalent to the 80% reduction target set in the Environment Act, but as Ofwat notes in response to data table query 387 there is some misalignment between the two approaches.

Improvements from base - table OUT2

We expect all improvement for this performance commitment to be driven by schemes delivered from enhancement expenditure allowances. We have completed OUT2 and OUT3 to reflect that we attribute all performance improvements to be attributable to enhancement. Where we already outperform permits from base, we have assumed that we will continue to do so out of base cost allowances.

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Improvements from enhancement - table OUT3

We discuss our approach to quantifying the benefits of our enhancement programme in the commentary for tables CW15 and CWW15 of our business plan. We expect there to be significant benefit from enhancement expenditure for this performance commitment. This includes both primary benefits from nutrient removal and sanitary parameters investment, and secondary benefits from investment primarily aimed at other drivers. We expect the greatest benefit to materialise from investment into traditional P removal schemes and treatment wetlands. The quantified improvements to be delivered from enhancement expenditure are captured in table CWW15.

Other commentary - table OUT5

Phosphorous loads were calculated using total annual flow multiplied by annual average P concentration. Observed annual flow volumes from our total sewage flow rate (TSFR) database were used for 2012-2022.

Flow projections were based on the basis of a growth forecast aligned to the Office of National Statistics (ONS) forecast for 2023-2035. Average annual P concentration per WRC with an active P permit was calculated using pooled operator self sample (OSM) and urban was water directive sample results per-site, per-year 2012-2023. Either or both types of sample results were available in our Permitting and Compliance Environment (PACE) database for every year at every site except one site-year combination. Non-regulatory P sample results were used to calculate annual average P concentration for this site during the year for which regulatory results were not available in PACE. Annual average P concentration for 2024-2035 was assumed to be the level of discharge per-site, per-year. Sites with a permit in 2023 were assumed to discharge at the permit limit in all future years, unless future investments are planned that will result in a new permit limit. When sites will have a new permit limit due to future investments, the new limit applies from the following calendar year, except for obligations due in March 2030 where we have assumed the new level of performance from the start of 2030.

The 2020 rolling baseline calculations only include sites that have a P permit in any given year, and assume the 2020 average P concentration is 5 mg/l if no permit existed for that site in 2020. We note Ofwat's position on historical performance but there are a number of factors that suggest performance commitment levels should be set in line with the permits. These include:

- We are not funded to outperform our permits;
- Assuming performance below permits may not be sustainable in the long-term as it is linked global supply of chemicals, which may not be optimal;
- An increasing number of permits are set at the technically achievable level, by 2035 we expect 214 of our 503 permits to be set at 0.25 mg/l of phosphorous.

We have provided historic information for phosphorous emitted from works with phosphorous limits back to 2012-13. We have only provided 'Phosphorus emitted in 2020 from treatment works that had a phosphorus limit for the latest calendar year' from 2020-21 onwards. Our proposed reductions are aligned to our WINEP nutrient programme. These figures are likely to change the WINEP programme is finalised with the EA in 2023 and 2024.

Calibrating incentives - table OUT7

We have used Ofwat's indicative incentive rate and benefit sharing factor for this performance commitment.

1.18 Storm overflows

Table 25 Storm overflows

Ofwat category	Environment	Anglian Water long term ambition	Resilient to risk of drought and flood
Short description of measure	This performance commitment is designed to incentivise a progressive reduction in the adverse impacts of discharges from the company's storm overflows.		
Performance	2024/25	2029/30	2049/50
No. spills per overflow	20.00	16.63	2.00

Overview

This performance commitment is designed as the average number of spills per storm overflow in a given calendar year. This is a new performance commitment for PR24 and is designed to incentivise companies only to use storm overflows in exceptional circumstances to reduce the adverse impacts of storm overflows on public health and the environment.

Customer views

This is a challenge where the public, government and media have collectively pushed for greater ambition by the industry. We wholeheartedly support this; despite only 1% of RNAGs being down to storm overflow operations, we recognise addressing storm overflows is critical to the value of watercourse and to support our push on bathwater designation. We have engaged extensively with our customers and external stakeholders through various channels, with our customer insight collated in our Customer Synthesis Report [56]. From across the research conducted, our customers support focus on addressing storm overflows that link directly to key rivers and coastal waters with the highest amenity values as customers feel this will have the most impact.

Our Online Community research demonstrated that although customers support efforts to reduce the number of spills, they wish for targets (such as the Defra 2050 target) to be hit sooner rather than later, and for zero spill incidents in the long term.[57] We understand that any spill that causes harm to the environment is unacceptable, but we need to make sure that the improvements we make are effective and sustainable over the long term. Storm overflows are seen as an outdated protection mechanism historically used for flooding prevention. However this is now an outdated approach and we need to move to a place in the future where storm overflow operation is a thing of the past. We are very much aligned to the customer expectation of getting there quicker. Therefore, we need to plan and deliver a resilient programme of work that can eliminate harm caused by storm overflows while improving the enjoyment of watercourses by customers in our region. Investment prioritisation is agreed with the Environment Agency based on greatest impact. As part of Get River Positive, we have committed that our storm overflows and our water recycling centres will not be the reason for unhealthy watercourses in our region by 2030, which we are measuring as those sites currently identified as being the reason the watercourse does not achieve good status (as defined by the Water Framework Directive).

Therefore, although we propose to put forward a stretching improvement target for storm overflows, we will have to balance deliverability and consequence on flooding resilience alongside customer views.

Setting a stretching but achievable performance commitment level - table OUT1

We set our performance commitment level at 16.63 average spills per storm overflow in 2029/30, a 17% improvement compared to our projected end of AMP7 performance. This is ahead of Defra's expectations.

As the following graph demonstrates, we are the company with the lowest levels of spills from storm overflows in the industry, and are on track to meet our Get River Positive pledge to reduce storm spills to an average of 20 per year by 2025:

Nonetheless, listening to the views of our customers and stakeholders alike (which we fully endorse), we recognise there is much further to go to address this challenge which is reflected in the ambition of our AMP8 targets. Our proposed targets place us on the right trajectory to meet long-term legally binding targets within the Environment Act and the Storm Overflows Discharge Reduction Plan before the target dates. This includes meeting the 14% reduction target in the total number of spills from storm overflows by 2030 and achieving the 2050 target of 10 spills per overflow by 2040. Delivering this level of reduction will be stretching especially given factors outside of our control such as weather events, however its vital to help us achieve our Get River Positive pledges, our statutory regulatory requirements and meet the expectations of our customers.

Our investment programme including those improvements funded from base and enhancement expenditure is sufficient to deliver this performance level in the absence of abnormal weather events such as extreme rainfall. Investments are

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closely coupled with a sustained step change in operational response which we have significantly worked on in AMP7 i.e.. responding to failures in EDM telemetry. As the definition of this performance commitment, requires an assumption of 100 spills/year for any missing data periods it strongly incentivises us to investigate and resolve missing data as this is over 5 times our average annual spill frequency.

Performance from base - table OUT2

We have identified that some of the performance improvements for this PC will be delivered from investment derived from base expenditure, although most improvement will be delivered from improvements delivered from our enhancement programme. Maintenance activities at treatment plants and schemes to address sewer misuse in the network are expected to have the greatest benefit for performance against this PC from our base-funded activities. On that basis, we have completed the OUT tables to reflect the split in improvements to be delivered from enhancement and base expenditure (shown in table OUT2 and OUT3). 36% of our spill reductions for AMP8 we expect to come from maintenance activities, and the rest from enhancement. We will target the highest priority areas first such as bathing water and high amenity value watercourses.

Performance from enhancement - table OUT3

The performance commitment level has been selected to account for the benefits expected to be delivered from our PR24 enhancement investments, in particular our storm overflows investment portfolio which will increase storage capacity and manage flows to reduce dependence on storm overflows. More detail is available in the associated Storm Overflows enhancement case.

We have accounted for the Accelerated Infrastructure Delivery funding for our 'Regional overflow reduction plan' which assumes a benefit of 459 spill reduction by 2027/28 in setting our PCL and the contribution of enhancement. This has been delivered through innovative approaches such as innovative optimisation technology, smart networks solutions and SUDs. Our approach also utilises our leading approach to partnership working for surface water removal.

We have quantified the benefit of these enhancements in CWW15 in order to account for this investment in our performance commitment level. We discuss our approach to quantifying the benefits of our enhancement programme in commentary for table CWW15.

Other commentary - table OUT5

We have provided the total number of overflows which is higher than the number of event duration monitors in place historically. We will complete our Event Duration Monitor (EDM) roll-out in 2023. This does mean that total number of spills reported in the future will be higher than that reported historically, but the spills per overflow will be the same or lower.

We have input the EDM coverage in the uptime row to reflect the partial coverage of monitoring historically. In line with the performance commitment definition, we have retained the current level of storm overflows in future years of performance in line with the definition that allows 'a storm overflow which is the subject of a permit may remain in the denominator for the remainder of the 2025-30 period provided that the company provides evidence and assurance that the appropriate agency has confirmed a permit is no longer required in relation to that storm overflow'.

Calibrating incentives - table OUT7

We have used Ofwat's indicative incentive rate and benefit sharing factor for this performance commitment.

1.19 Mains repairs

Table 26 Mains repairs

Ofwat category	Asset health	Anglian Water long term ambition	Resilient to risk of drought and flood
Short description of measure	This performance commitment is defined as the number of mains repairs per thousand kilometres of the company's entire water main network. This measure is designed to incentivise companies to maintain and improve the asset health of its infrastructure and below ground water mains network.		
Performance	2024/25	2029/30	2049/50
No. per 1,000 km mains	142.3	131.1	130.1

Overview

This performance commitment is defined as the number of mains repairs per thousand kilometres of the company's entire water main network. This measure is designed to incentivise companies to maintain and improve the asset health of its infrastructure and below ground water mains network.

Customer views

Although it is difficult to establish customer views on asset health measures such as mains repairs as there is no direct customer outcome, it is clear operational resilience of our water network assets remains important to our customers. Research with our Online Community on Asset Health (as captured within the Synthesis Report) showed that 92% of participants prioritised proactive work over doing the bare minimal to prevent issues before they occur to reduce long-term repair costs and potential disruption due to asset failure. [58]As outlined in our Customer Synthesis Report [59], our customers believe that we should be planning for the future through taking a balanced approach to investing in what is needed now and investing to ensure long term resilience of our assets and operations.

Our performance commitment level - table OUT1

We observe that our reported performance has worsened over time. We believe this may be influenced by our very low levels of leakage that result from our active leakage detection programmes. Our performance has also been volatile, particularly in 2022-23. This fluctuation in performance in AMP7 was driven by extreme dry weather in the summer of 2022 and a long period of below zero cold weather in the winter of 2022.

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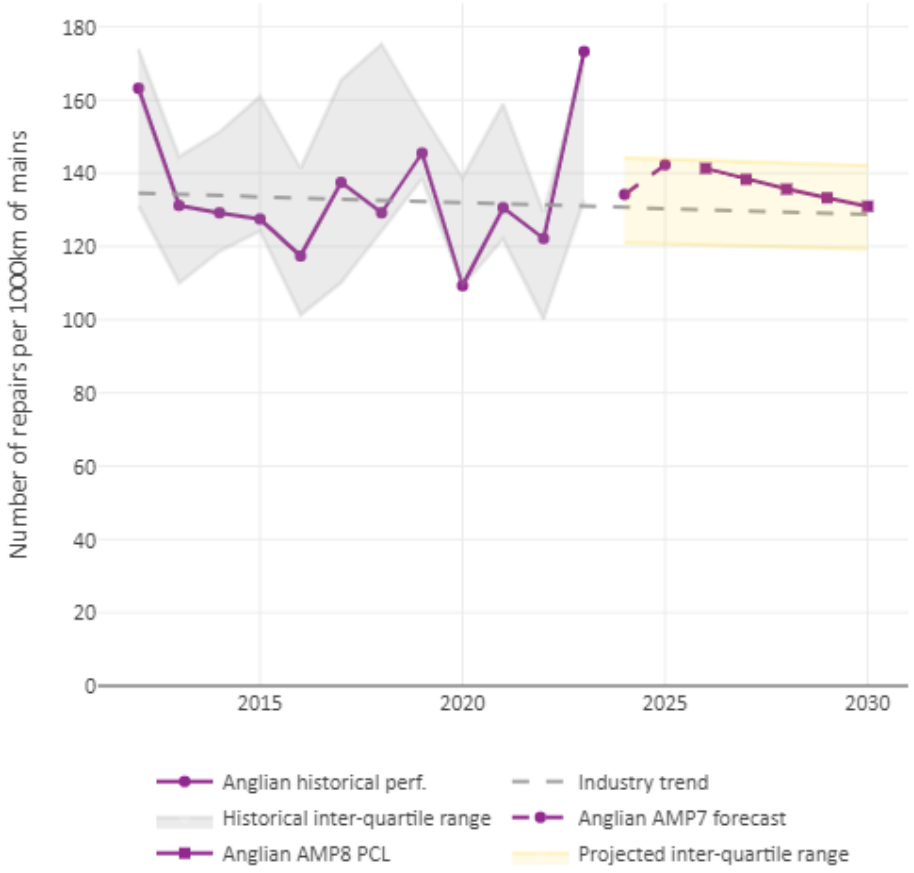
Figure 30 Mains repairs historical and forecast performance



Our water mains are projected to come under increasing pressure from climate change and resulting climatic events such as extreme temperatures and rainfall. Our region is particularly at risk of climate driven bursts due to factors such as soil types [60]. In line with the CMA's recommendations from the PR19 Final Redetermination, we have sought to take a more 'forward looking' approach to maintenance of our assets, including due to the risks posed by climate change. To address this emerging risk and ensure we maintain our levels of service despite increasing risk to water networks from high temperatures and shrink/swell events, we have proposed targeted enhancement investment to start addressing asset climate vulnerability within our region [61]

We are proposing a performance commitment level of 131.1 repairs per 1,000 kilometres of water mains for 2029/30 with a glide path to get there from our anticipated 2024/25 performance. This proposed target is ahead of our performance trend. By achieving this target, we maintain performance in line with our long term average of 134.7 since 2011-23. This would reduce the number of mains repairs reported last year.

Delivering performance better than our long term average through reaching our target of 131.0 will continue to be stretching for AMP8 due to factors outside of management control such as the extreme weather events detailed above.

Nonetheless, although delivering stable performance will be challenging, this target is achievable as it has been calibrated to include our proposal to increase the rate of mains renewal in AMP8 as well as our commitment to invest to reduce the climate vulnerability of our assets.

We recognise the interaction between this performance commitment and the leakage PC. We note that this performance commitment as currently defined may inadvertently discourage companies from carrying out maintenance and inspection of mains (including leakage detection) if proactively identified issues are included within the measurement of the leakage PC.

Performance from base - table OUT2

In our response to Ofwat's 'performance improvements from base, enhancement and ODIs' data request, we outlined that mains repairs had received some minor benefits from historic enhancement investment, although this was generally related to investment driven by other needs (e.g. new mains laying, water quality Section 19 programme, leakage pressure management and calmer networks). Generally historically performance has been maintained by base expenditure but influenced by exogenous factors such as extreme variation in the weather.

At PR24, we anticipate all improvements against this measure will be driven by enhancement expenditure. However, investment derived from base expenditure is necessary to prevent deterioration.Based on the research and analysis in our ASRAP, we do not believe that current maintenance levels are sustainable in the

60 Please refer to 'Enhancement Strategies: Resilient to the risks of flood and drought' for more detail on the impact of climate change on our region
61 Please refer to 'Enhancement Strategies: Resilient to the risks of flood and drought' for more detail on the impact of climate change on our assets and our proposed investment to address this.

long term, and therefore these are marked as amber or red, meaning that increased maintenance expenditure is required beyond 2030 potentially requiring up to £80m per year. We are including an increase in mains renewal rates specifically targeted to mitigate climate effects on those assets found to be at risk of worsening climate impacts in our PR24 plans from 2025 -2030. We are also including additional investment in mitigating single points of failure. Within our LTDS document we have also scenario tested the future impacts of technology and reflected the potential benefits of these improvements to smart networks on long term performance. With these mitigations in place we believe that the mitigated forecast for the period to 2030 is stable.

Performance from enhancement - table OUT3

We expect all improvements against this performance commitment to be delivered from enhancement expenditure in AMP8. This is primarily based on the asset climate vulnerability investment captured in our resilience (water) enhancement strategy [62]. Quantified benefits of our enhancement programme for this PC can be found in CW15.

Other commentary - table OUT4

Historical performance provided in line with the data we have provided in our APRs and as part of the Historical performance trends information request for PR24.

We have assumed the proportion of reactive and proactive repairs remains the same as the average for the last three years of reporting. We have forecast mains length from 2030 based on the average increase in length during AMP8 to reflect the consistent growth forecasts.

Calibrating incentives - table OUT7

Setting incentives

We have used Ofwat's indicative incentive rate and benefit sharing factor for this performance commitment. However we note that Ofwat has adjusted the incentive rate after its top down approach. Our PR19 incentive rate was set using societal valuations of the service impacts of main bursts. Ofwat's indicative rate for PR24 is significantly higher than our PR19 rate (even after adjusting for inflation). In our view this incentive rate may be too high and the indicative rate proposed should be seen as the absolute maximum that could be appropriate at PR24.

Deadband

We propose an underperformance deadband for this measure. This is to address the volatility of performance against this metric in single years due to exogenous factors such as extreme weather events. Penalising companies for small changes in performance doesn't provide a true representation of asset deterioration or companies' commitment to act as responsible stewards of their assets. Maintaining a deadband on this measure therefore reflects that the purpose of this performance commitment, is to ensure the long-term health of assets and networks for both current and future generations not penalising companies for temporary exogenous factors outside of their control.

There is an interaction between this performance commitment and leakage. We are determined to continue to reduce leakage and active leakage detection can increase the number of mains repairs as small leaks are identified and repaired. A deadband would mitigate the perverse incentive on us not to find and fix leaks. There is regulatory precedent for setting a deadband on this measure. The Competitions and Markets Authority (CMA) introduced a deadband on main repairs during the PR19 Final Redetermination (main document, page 666). The deadband was set for all four disputing companies to balance the risk of reducing incentives to improve the aspects of performance which matter most to customers against the objective of mitigating undue levels of penalty. The underperformance deadband for the four companies was set at 10 repairs per 1,000 km above the PCL, approximately 5-10% above the PCL for the four companies. The CMA stated "We consider that this small deadband maintains the disincentive to allowing asset health to deteriorate, whilst allowing for some proactive repairs and noting that poor winter weather conditions can impact on the level of repairs needed" (Final Redetermination main doc, page 666).

As such, we set the underperformance deadband at 10 bursts per 1,000 km water main above the PCL.

62 Please refer to the 'Enhancement Strategy 'Resilient to the risks of flood and drought''

1.20 Unplanned outage

Table 27 Unplanned outage

Ofwat category	Asset health	Anglian Water long term ambition	Resilient to risk of drought and flood
Short description of measure	This performance commitment is designed to incentivise the company to appropriately maintain and improve the asset health of our above-ground water assets and demonstrate its commitment to its asset stewardship responsibility.		
Performance	2024/25	2029/30	2049/50
%	2.32	1.77	0.86

Overview

This performance commitment measures the temporary unplanned loss of peak week production capacity (PWPC), reported as a percentage of the overall company PWPC. PWPC is equivalent to the maximum volume of water which can be put into supply and sustained over a period of one week measured in Ml/d. This should be at least as great as the highest historic performance that has been sustained for any seven-day period in the last five years (unless a change to assets or process can be evidenced) but could be higher.

This measure is designed to incentivise companies to ensure that water treatment works (WTW) are maintained to reduce the risk that unplanned outage occurs when capacity is required.

Customer views

Although it is difficult to establish direct customer views on asset health measures such as unplanned outage as there is no direct customer outcome, it is clear operational resilience of our water assets remains important to our customers. Research with our Online Community on Asset Health (as captured within the Principles Report) showed that 92% of participants prioritised proactive work over doing the bare minimum to prevent issues before they occur to reduce long-term repair costs and potential disruption due to asset failure [63].

In addition, provision of safe, clean water is consistently ranked as the top customer priority across the breadth of our customer research, as outlined in our Customer Synthesis Report. Although due to high levels of interconnection and resilience at WTWs within our region customers are highly unlikely to experience any impact from a temporary loss of PWPC, we recognise acting as responsible stewards of our treatment assets is required to maintain this.

Our performance commitment level - table OUT1

We are proposing a performance commitment level of 1.77% in 2029/30. In AMP8, we intend to reduce unplanned outages each year in line with our historic trend, weighted towards more recent years of performance. This weighting reflects 'low hanging fruit' improvements and diminishing returns in improvement following early gains when the measure was introduced and shadow reporting in AMP6. Our AMP8 strategy for improving on unplanned outage centres on maintenance activities and other activities delivered from base expenditure such as condition based monitoring.

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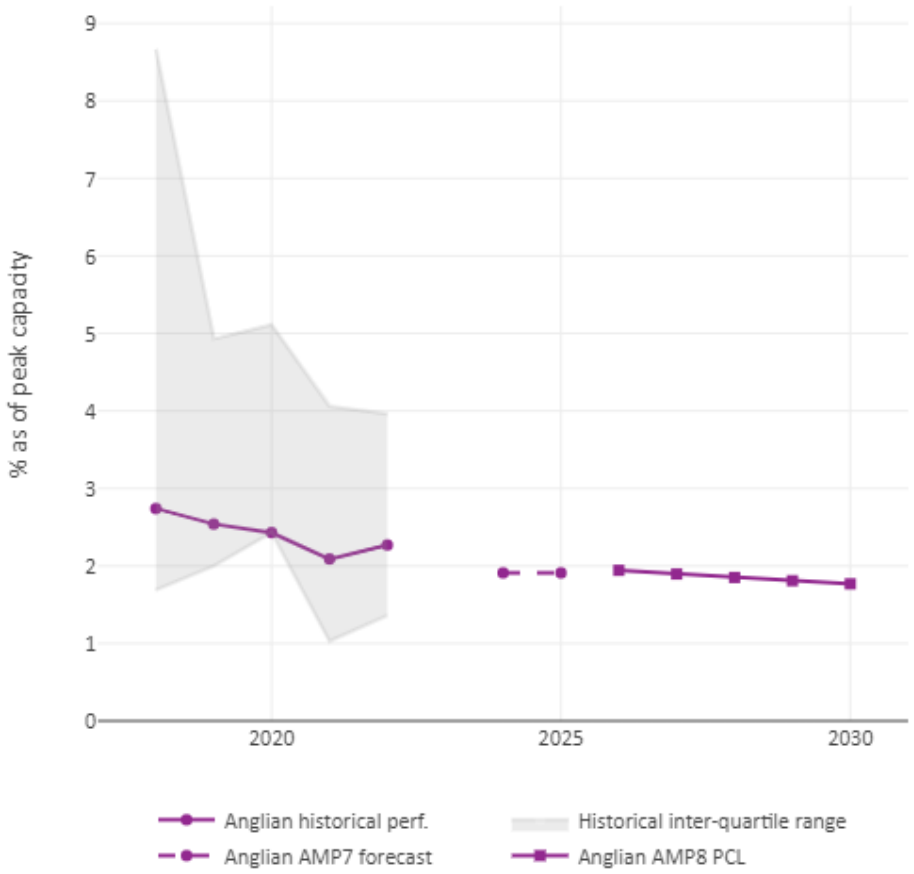
Figure 31 Unplanned outage historical and forecast performance



This target will be especially stretching due to the removal of exclusions. Exclusions at PR19 were typically granted because of water quality deterioration outside of management control (such as raw water contamination by a third party) rather than for reasons related to asset health. Exclusions permitted companies the appropriate time to properly resolve these issues, with supply to the network maintained using an alternative supply made possible due to interconnection.

Including these events increases the volatility of this measure, rather than providing a true representation of asset health through maintaining performance over the long term. Therefore, the removal of exclusions significantly increases the volatility of this measure despite creating no resulting customer benefit, making maintaining our current improvement trend especially stretching.

Although our target is very stretching, we will continue to improve performance against this metric through increasing our focus on condition-based monitoring and maintenance of our assets to detect and prevent issues to enable proactive repairs. We have accounted for changes to the definition of this PC at PR24 in our benchmarking and proposed PCL.

Improvements from base - table OUT2

We expect improvement on this performance commitment to be driven by base expenditure. We anticipate the greatest benefit from our base investment for this performance commitment will be driven by condition-based monitoring and maintenance. We have completed the OUT tables on the basis that all of the proposed performance improvement is derived from base expenditure (shown in table OUT2).

Improvements from enhancement - table OUT3

We discuss our approach to quantifying the benefits of our enhancement programme in the commentary of table CW15 and CWW15 of our business plan. We do not anticipate any benefit from our enhancement programme for this performance commitment.

Other commentary - table OUT4

Peak week production capacity forecast in line with Distribution Input from WRMP24.

Calibrating incentives - table OUT7

We have used Ofwat's indicative incentive rate for this performance commitment.

Penalty collar

In recognition of the potential risk associated with this performance commitment due to the removal of exclusions (as detailed in section 'OUT1' above), we propose a collar on underperformance payments for this performance commitment. Although we anticipate performance against this measure will be volatile due to

the removal of exclusions, this collar will provide some control over volatility that could impact customer bills for impacts on performance that are outside of management control.

We propose this collar is set at 11.83% above the PCL each year, as shown in the table below. This figure was established based on 0.5% wholesale RoRE, which on average is £ 25.33m a year in AMP8. We calculated the collar by dividing this value by the proposed incentive rate.

Table 28 Unplanned outage deadband

2025-26	2026/27	2027-28	2028-29	2029-30
13.78%	13.73%	13.69%	13.64%	13.60%

1.21 Sewer collapses

Table 29 Sewer collapses

Ofwat category	Asset health	Anglian Water long term ambition	Resilient to risk of drought and flood
Short description of measure	This performance commitment is designed to incentivise the company to appropriately maintain and improve the asset health of its infrastructure or below-ground wastewater assets and demonstrate its commitment to its asset stewardship responsibility.		
Performance	2024/25	2029/30	2049/50
Nr. per 1k sewers	5.50	5.50	5.50

Overview

This performance commitment is defined as the number of sewer collapses per 1,000 kilometres of sewer that have not been identified proactively by the company. This measure is designed to incentivise companies to proactively maintain and improve the asset health of its infrastructure or below-ground wastewater assets in recognition of the potential impact on service to customers or the environment due to asset failure.

Customer views

Although it is difficult to establish customer views on asset health measures such as sewer collapses as there is no direct customer outcome, it is clear operational resilience remains important to our customers. As seen in our Customer Synthesis Report [64], there is widespread support for maintaining assets to ensure resilience and reduce the future risk of disruption over the long term. Research with our Online Community on Asset Health (as captured within the Synthesis Report) showed that 92% of participants prioritised proactive work over doing the bare minimal to prevent issues before they occur to reduce long-term repair costs and potential disruption due to asset failure [65]. Preventing pollution incidents and addressing flooding are customer priorities for PR24, which may be caused due to sewer collapses. We remain committed to ensuring excellent levels of asset health to mitigate the associated impacts of asset failure, as captured within our Strategic Direction Statement ambition 'To make the East of England resilient to the risks of droughts and flooding' and our Asset Management Maturity Assessment report.

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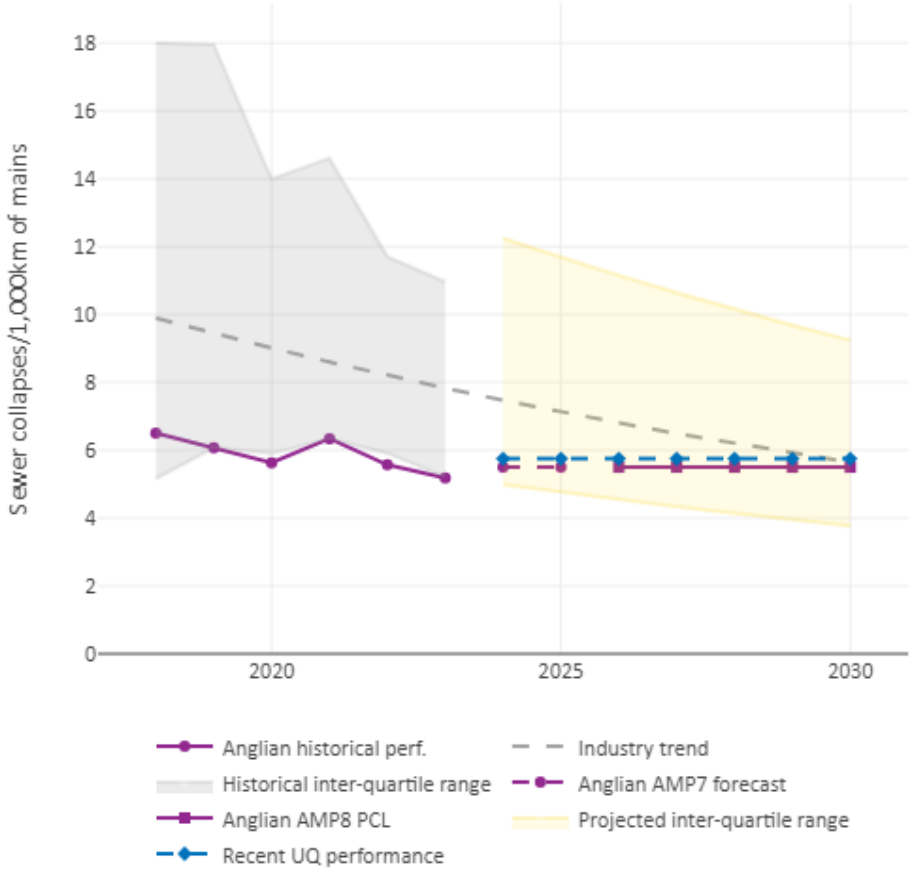
Our performance commitment level - table OUT1

Presently, we are one of the top performing companies on this performance commitment; in 2022/23, we were the second-best company in the industry on sewer collapses behind Thames. Our proposed PCL (purple line in the figure below) is ahead of the upper quartile so far in AMP7 (blue line). We are proposing a performance commitment level of 5.5 sewer collapses per 1,000 kilometres of sewer for 2029/30. This target represents a slight improvement over our current three-year average on this measure, but primarily is proposed to keep performance stable.

Figure 32 Sewer collapses historical and forecast performance



Maintaining our performance for this measure is appropriately stretching due to the intent of this performance commitment to ensure long term asset health. Our PCL of 5.5 will ensure that we continue to be effective stewards of our assets to minimise any associated customer and environmental impact over the long term, rather than rapid service improvements within the short term. Going beyond this level of performance in a five-year window would be costly at limited customer benefit when the ambition of this performance commitment is to incentive long-term management of asset health to prevent deterioration.

In addition, there is a long lag time between taking proactive action to improve the asset health of sewers and this being reflected within sewer collapse performance. Therefore, by maintaining our performance this performance commitment level will ensure we continue to play an active role in maintaining our assets for the benefit of customers and the environment without excessive cost for limited customer benefit. This PCL is achievable as we have delivered these levels of performance historically, and in AMP8 will look to increase our usage of condition-based monitoring and sewer inspection and cleaning to maintain this performance.

Performance from base - table OUT2

We expect improvement on this performance commitment to be driven by base expenditure. There will be upward pressure on performance from asset deterioration as quantified by our Asset System Resilience Appraisal (ASRAP).

As such we will need to take action to maintain performance and we anticipate the greatest benefit from our base investment for this performance commitment will be driven by condition-based monitoring, inspecting and clearing sewer networks, and sewer maintenance. We also note prudent AMP7 investments on sewer monitoring will support with collapse detection over the long term.

The ASRAP notes thatoperational strategies maximise use of existing maintenance budgets, it is clear from the above modelling that in the longer term scenarios we have tested there is a requirement for increasing rates of replacement to avoid increasing levels of reactive maintenance of collapsed sewers which have the potential to cause pollution incidents, and therefore we expect to request this increase at PR29 to begin increases in AMP9 2030-35.

As noted in our DWMP data tables, historically our performance on sewer collapses has improved over time. Although we assume in the DWMP a 0.5% performance improvement from the baseline each year from base investment, we note that in the future this performance improvement may be under additional pressure from growth, urban creep, and climate change therefore is an indicative assumption only and was offsetting some degradation over time. We have assumed no degradation in performance here. On that basis, we have completed the OUT tables on the basis that all of the proposed performance improvement is derived from base expenditure (shown in table OUT2).

Performance from enhancement - table OUT3

We do not anticipate any benefit from our enhancement programme for this performance commitment.

Other commentary - table OUT5

We have forecast sewer length from 2030 based on the average increase in length during AMP8 to reflect the consistent growth forecasts.

Calibrating incentives - table OUT7

We have used Ofwat's indicative incentive rate and benefit sharing factor for this performance commitment.

1.22 Lower carbon concrete assets

Table 30 Lower carbon concrete assets

Ofwat category	Environment	Anglian Water long term ambition	A carbon neutral business
Short description of measure	This performance commitment incentivises the company to reduce the carbon associated with concrete used in the delivery of the capital programme relative to traditional solutions		
Performance commitment level	2024/25	2029/30	2049/50
	N/A	20%	70%

Rationale for performance commitment

We propose this as our only bespoke performance commitment for PR24.

Concrete is a carbon intensive material that is used throughout our asset base due to its high strength, long lifetime, and ability to form many different shapes. This performance commitment measures the percentage reduction in the carbon emissions associated with the concrete used in the construction of our capital assets. This will be achieved through avoiding and reducing our use of concrete, as well the use of 'lower carbon concrete' materials and revolutionary approaches to sequester carbon. This will require us to be pioneering, collaborating with our supply chain by investing and incentivising them to make innovative approaches and techniques widely available across our dispersed asset base. The knowledge and insight we generate will be truly water sector and construction industry leading. We have already reduced our capital carbon by over 63% since 2010, we have taken the easy wins and the low hanging fruit, further reductions on this element of capital carbon will be hard won. Our approaches to capturing and managing data for robust reporting will also be valuable looking ahead to PR29.

Detail of performance commitment

The capital carbon associated with concrete will be calculated for each scheme, as proposed in our PR24 enhancement programme, based on a need identified and a typical baseline solution than we currently would deliver to resolve the need. The 2022/23 baseline approaches for this measure reflect emissions reduction activities delivered over previous AMPs. The measure will report the programme level percentage reduction between the carbon equivalent emissions from the final scheme designs as built and the typical solutions identified in the baseline.

How we have responded to Ofwat's feedback

To ensure we clearly demonstrate how we have sought to meet Ofwat's quality and ambition (QAA) and Board Assurance requirements, we have set out in the appendix to this performance commitment how our definition has been developed to address feedback received in the letter 'Detailed assessment of potentially suitable bespoke performance commitments', received 30th June 2023.

Ofwat's feedback centred on how this performance commitment could act as a pathfinder for the industry on how to deliver less concrete-intensive infrastructure, encouraging targeted action on embedded carbon. Ofwat asked for further clarity on the mechanics of the performance commitment, such as providing more information on the cost-benefit of lower carbon concrete to demonstrate that this is likely to be more sustainable and cost effective in the long term. Ofwat also asked for more detail on our reporting and monitoring process for this performance commitment. Our response to all of the feedback in Ofwat's response is provided in the appendix to this section. We also rpovide an updated definition to reflect this feedback in document ANH89 Lower carbon concrete definition.

Customer views

Our customers are supportive of bespoke PCs being incentivised to reflect their priorities beyond Ofwat's common performance commitments. In the ODI research conducted by ICS, 77% of respondents agreed with bespoke incentives to reflect their priorities, with 77% of respondents also stated that it is important to include incentives with a long-term focus. [66]

As captured within our Customer Synthesis Report, our research clearly shows that our customers want us to take more action to reduce our carbon footprint.

74% of the participants in our Customer Investment Priorities Wave 4 research conducted by Trinity McQueen stated that addressing carbon emissions resulting from construction was a high- or medium- priority for Anglian Water to address in the next five years. [67] Earlier engagement in Waves 1 & 2 indicated that reducing our carbon footprint is a particular priority for future customers, ranking 2nd place for this demographic out of the investment areas.

66 Please refer to Annex ANH55 Synthesis Report
67 Annex ANH55 Synthesis Report

Setting the baseline for 2025-30 - table OUT10

We have developed a concrete baseline for each investment in the PR24 business plan. This uses the currently accepted practices for design and construction techniques used for concrete assets in the UK water sector (as of 2022) . This reflects the improvements we have already made as part of our reduction of capital carbon since 2010. To measure improvement, we will compare the baseline to the solution implemented in AMP8. Our baseline performance was established for the AMP8 programme using the following process:

- We first used C55 (our asset investment planning and management system) to report our PR24 investments to use as a base for our calculation of the estimated AMP8 program capital carbon emissions associated with concrete.
- The C55 report was then used to identify for which assets most carbon was recorded. This was used to target which asset models to update to reflect the total emissions and material volumes for concrete and rebar.
- The identified models were then updated to reflect the total emissions and material volumes for concrete and rebar only.
- The amended models were then applied to the C55 report to calculate the volumes of concrete associated with the concrete and rebar in the assets in the PR24 report
- This allows us to establish the tonnes of concrete material, and subsequently the approximate tCO2e for this concrete at 25% GGBS. This is based on the UK national average annualised data from the Mineral Products Association.

The carbon estimates are based on the existing AW model framework for carbon. These were originally developed in 2013 but have steadily been enhanced and improved, reflecting our progress and understanding as we have reduced capital carbon. The carbon models are designed to capture the key essence of each asset (I.e. they simplify the assets and allow key parameters, but not every parameter, to be tuned to the specifics of an individual use case). Each model has one or more drivers (e.g. the length of a pipe and its diameter) that allow the carbon emissions to be tailored to the specifics of the construction of that asset. To achieve this each model is a mathematical expression (a polynomial) with one or more input values (the “x” in the equations) that allow the output of the calculation to vary. The sum of all these models for each asset within an investment allows the total carbon for a specific investment to be calculated. This approach will be consistent for both the baseline and actual figures reported.

Our baseline will need to be flexible to reflect the schemes which are actually delivered and when they are delivered in AMP8 and those that may be deferred into AMP9.

We have provided our forecast performance as a % reduction in AMP. As uncertainty remains about the AMP9 programme we have not provided a baseline at this time. This means we have adjusted the formula in OUT10.74 from 2030-31 onwards.

Setting a stretching but achievable performance commitment level - table OUT1 & OUT10

As with our common performance commitments, we have selected a target that is sufficiently stretching but achievable.

Our target aligns with ‘route one’ of the Low Carbon Concrete Routemap developed by the Institution of Civil Engineers/ Green Construction Board’s Low Carbon Concrete Board. The Routemap details how efforts to reduce the embodied carbon of concrete are critical to meet the Government’s net zero by 2050 target, with the next 10-15 years being critical to scale up new technologies and approaches. By 2050, to reflect new technologies our ambition is to achieve a 70% reduction aligned to route 2 of the routemap.

This performance commitment is measured as a cumulative reduction over the AMP. We will need deliver a greater than 20% reduction in the final year to achieve a 20% reduction overall.

Delivering a 20% reduction in concrete capital carbon (from 2022 baseline) will be challenging for us given the given the significant reduction in overall capital carbon we have already delivered (63% overall reduction in capital carbon from a 2010 baseline) and the fact that we are only targeting here one material element of our entire investment potential carbon footprint. It will also be more challenging for us than other construction projects or even other water companies given our supply chain is more rural and dispersed and the progress we have already made.

However our long term progress in reducing emissions and commitment to achieving operational net zero by 2030 show we have the carbon reduction leadership record and drive to deliver this PCL.

Performance from base - table OUT2

We are not requesting additional funding to deliver this performance commitment. Therefore all performance improvement will be delivered from base expenditure.

Improvements from enhancement - table OUT3

While this performance commitment will involve delivering our enhancement programme differently, we are not requesting additional enhancement funding to achieve this.

Incentives - table OUT7

Incentive rate

At the PR24 Outcomes Working Group, Ofwat outlined the following options for setting incentives for bespoke performance commitments:[68]

When putting forward rates for bespoke performance commitments, companies can use customer research, a top-down approach or credible external valuations. They should provide a robust justification for which approach they have used and clearly present the evidence and assumptions that underpin the rate they have set.

For this performance commitment, there are two potential approaches to setting an incentive rate. One is to use a top-down approach in-line with Ofwat's approach to setting incentive rates for common performance commitments; the alternative is to use an existing valuation.

We considered using the government's carbon value to set our incentive rate. However, we note (and discussed further in response to Ofwat's feedback on this performance commitment) that we are beyond the carbon-cost tipping point for reducing capital emissions and by extension concrete emissions. We believe we are approaching a point where we have already made improvements at minimal costs, and addressing the remaining carbon will cost more money to address as we have achieved the 'low hanging fruit'. We are also cognisant that the Government's position is that unless translated to a tangible incentive, the carbon value alone will not incentivise private industry, and that incentives may need to be set higher than the government's carbon valuation:[69]

Carbon valuation is not a policy instrument in itself. It is a £-value applied in appraisal in order to guide government decision-making, and further signal the level of ambition that should be factored into those policies. Unless it is translated into a tangible incentive (and the incentive may exceed the carbon value in order to overcome barriers), it will not act upon private economic agents, whether individuals or business.

This incentive aims to kick-start emissions reductions that will have wider benefits and develop intellectual capital to support similar activity in the wider UK water, utilities and wider infrastructure sectors. We have therefore concluded that to set an appropriate incentive, we should use a top-down approach aligned with the one adopted by Ofwat for common performance commitments. This is appropriate in the absence of a customer valuation and noting the scale of the challenge and investment needed in the supply chain.

We are proposing to apply 0.4% of RoRE to this performance commitment. This is on the basis that in the Outcome Delivery Incentive research conducted by ICS, reducing emissions was one of the lower priority performance commitments for financial incentives. As such we considered it appropriate to align the scale of incentives to those assessed as being of lower relative importance to customers.

The annual average notional equity over AMP8 is £5,065.36m (assuming gearing of 55%) in 2022/23 price base. Therefore 0.4% of this is £20.26m per annum. We have divided this figure by a performance range of 20% to derive an outperformance rate of £0.71m per % reduction (and an implied marginal benefit of £1.01m as we have used the default 70% sharing factor). This is based on delivering no emissions reductions against a proposed PCL of a 20% reduction. While it is possible that emission would increase compared to the baseline, we believe 20% represents the most plausible range or potential performance given current information.

We are also conscious that the potential benefits to the sector and wider UK construction industry are significant. We have already delivered significant reductions in our capital emissions since 2010 and will need to invest to further reduce our concrete emissions. Given our leadership position and noting that if we deliver further reductions but to not quite achieve our stretching PCL we will be delivering wider benefits we do not believe that it is appropriate for the underperformance incentive rate to equal the outperformance rate. As such we are proposing to use the same implied marginal benefit but apply a sharing factor of 35% (half the standard sharing factor) to set the underperformance rate. This results in an underperformance incentive of £0.35m per %.

Price control allocation

We have allocated this performance commitment 2.7% to water resources, 36% to water networks plus, 54.5% to water recycling networks plus and 6.8% to bioresources. This allocation has been done on the relative proportion of the enhancement programme in each price control.

68 Ofwat, June 2023, Summary of discussion at June 2023 Outcomes Working Group - ODI rates
69 Department of business, energy & industrial strategy, September 2021, Valuation of greenhouse gas emissions: for policy appraisal and evaluation

1.23 Lower carbon concrete assets appendix

Low carbon concrete annex - responding to Ofwat's feedback

"As outlined in our initial feedback letter and based on the information that has been submitted to date, we consider that this measure could be suitable for a bespoke PC because of:

- ***potential evidence of benefits - the company provides evidence that a bespoke performance commitment will lead to significant additional benefits for customers and the environment that are unlikely to be realised without it.***
- ***outcome focus - we consider that this measure is focused on the delivery of an outcome.***
- ***other PC overlap - there is no overlap with common performance commitment measures.***

As highlighted, the PC should encourage 'targeted' action on embedded carbon. Action on embedded emissions, within which action on capital emissions falls, is in line with our net zero principles and our PR24 methodology. However more detailed information within the definition, in line with above feedback and recommendations, is critical to ensuring the proposed bespoke PC delivers robust reductions in carbon and that it delivers on the envisaged potential of the PC to act as water industry 'pathfinder' with regards to how best deliver less concrete-intensive infrastructure"

We welcome Ofwat's comments that this measure is potentially acceptable as a bespoke performance commitment. We outline how we have responded to Ofwat's feedback line-by-line below, including discussion on measurement and benefits. We are confident that by responding to this feedback we have demonstrated that this is an appropriate bespoke performance commitment. We provide an updated performance commitment definition as an appendix to our business plan which reflects our revisions [70].

"As the PC is designed to facilitate a 'percentage reduction in carbon emissions from concrete used in the delivery of capital projects', we consider that it would be more appropriate if this PC was referred to as 'lower' carbon concrete. It is not known or made clear what constitutes 'low' carbon concrete. This change is recommended to prevent any misleading claims and/or stakeholder misunderstandings."

We agree with Ofwat' feedback here, and now refer to this performance commitment as 'lower' carbon concrete.

"We expect that more information will be provided on the cost benefit analysis of the proposal in your business plan. Evidence should make clear that lower carbon concrete-based water services are more sustainable and cost effective in the long-term, with such action being central to the achievement of company and wider government net zero targets."

Benefits

There is a clear imperative to reduce greenhouse gas emissions. The Intergovernmental Panel on Climate Change concluded that Panel "Without taking into account the economic benefits of reduced adaptation costs or avoided climate impacts, global Gross Domestic Product (GDP) would be just a few percentage points lower in 2050 if we take the actions necessary to limit warming to 2°C (3.6°F) or below, compared to maintaining current policies,"

The UK Government provides a valuation of carbon to enable effective policy development and business cases to be established. This provides clear evidence that there is an official view of the social benefits of reducing emissions. Our proposed performance commitment level is a reduction of 20% compared to our baseline approach, which would equate to a reduction in emissions of 17,061 tonnes of CO2e, with a value of £6.24m or £9.34m using the government's 'high' figure. However, we believe the benefits of this performance commitment will be far greater as our progress and precedents can be used to incentivise the water sector at PR29 and benefit other sectors. If the scale of benefits we are aiming for can be achieved across the water sector, the benefits from carbon savings would reach £60-90m.3 This is likely to be an under estimate as the value of carbon will only increase over time, and other companies should be able to deliver greater than 20% reductions as they will be starting from a higher baseline than we are.

We expect in some instances that reducing carbon will reduce cost. However, we also expect that in the short term, using innovative lower carbon products and approaches may increase cost and construction time e.g. due to longer curing periods. This is discussed further below. Nonetheless, this is an opportunity to be 'ahead of the curve' and prepare the industry for further focus on this area in the future. Proactive efforts by the industry to phase in lower carbon options over the coming years will potentially save cost in the long run e.g. improved knowledge on how to use new materials.

We already publicise our performance and strategy on reducing our emissions in our Net Zero Strategy and will continue to refresh this document to capture learning from this performance commitment. In addition, to ensure that this performance commitment supports the sector to reduce the emissions associated

70 Annex ANH89

with concrete in their capital programmes, we will share our best practice with all companies through a bespoke case study document. Our intention is to publish one report during AMP8 and another at the start of AMP9.

Cost of materials

A key way to reduce the emissions associated with concrete is the materials used. It may be possible to replace Ordinary Portland Cement (OPC) which has a high carbon intensity with other products, such as Ground Granulated Blast-furnace Slag (GGBS) or other substitutes. The price of GGBS has risen in previous years and may continue to rise if demand increases.

The most expensive ingredient of concrete is the cement component - i.e. the GGBS/OPC. So price changes in GGBS have a strong impact on the overall concrete price.

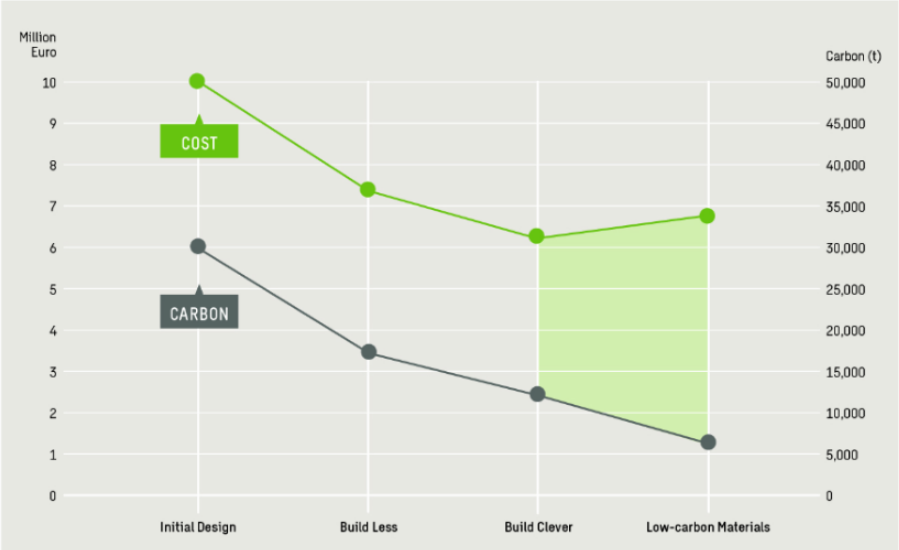
However, the price of GGBS is increasing significantly and has doubled in recent years. As more organisations look to reduce emissions, awareness of GGBS and demand for it are likely to increase. It will also require investment in the supply chain to make it more readily available, particularly across dispersed rural areas. Furthermore, large scale projects such as High Speed Rail 2 (HS2) are using up significant construction resources as will other UK PLC projects. The scale of these demands, timing and location could all impact cost and make future estimations uncertain. It is also likely that other low carbon concrete products will become available on the market, and these are likely to cost more than OPC. For example, we understand from one of our suppliers that their 'Earth Friendly Concrete' product is roughly double the cost of OPC.

In addition, innovative lower carbon alternatives will require further assurance by more experienced staff than existing proven solutions, which is likely to raise the cost of delivery. To ensure lower carbon alternatives are working as they should, we anticipate more time of experts being spent on due diligence and more frequent assurance of assets.

There is also likely to be an increase in cost due to limited existing demand for lower carbon materials in our region, ultimately driving up cost as suppliers deliver materials from areas with a more established market.

Overall, we note that there is a tipping point where reducing carbon increases costs.[71]Given our journey reducing capital carbon since 2010, we may already be at that tipping point. As we focus on changing materials we would expect costs to increase in the short to medium term.

Figure 33 Relationship between cost and carbon



Aligned to the original PAS2080 hierarchy (Build Nothing, Build Less, Build Clever, Build Efficiently) the graphic demonstrates the general relationships between cost and carbon emissions. At earlier projects stages where the need for concrete can be designed out (Build Nothing, Build Less) and then the volumes optimised (Build Clever) - these carbon reductions also result in cost reductions as less material is required. However, as discussed where concrete is required this will cost more to decarbonise this final, reduced volume.

Cost of design time

It is possible to reduce carbon intensity of concrete through the design process, although this will not be possible on all schemes. We have considered some example schemes and engineers to identify potential additional cost of design. We would expect larger schemes to deliver greater savings of carbon for the time input. Our estimate of the range of cost for increasing design time is £5-20/m3. Compared to the usual cost of concrete of £100-150/m3 this suggests a noticeable additional cost. These are average costs and we would expect marginal costs to be higher.

71 SWECO,Carbon Cost in Infrastructure: the Key to the Climate Crisis?https://www.swecogroup.com/urban-insight/climate-action/report-carbon-cost-in-infrastructure-the-key-to-the-climate-crisis/

We intend to focus our additional design time on reducing carbon associated with concrete in our large-scale bespoke schemes, for instance storage tanks. We anticipate this is where the majority of carbon within our capital carbon is emitted from, therefore look to address these schemes as a priority.

Conclusions

The imperative to reduce emissions is clear and there is growing evidence that the benefits of mitigation will outweigh the costs. For this performance commitment there is limited evidence available to do a formal cost benefit analysis. By establishing this performance commitment we will develop the evidence base to improve cost benefit analysis in the future.

However the main benefits of this performance commitment are that it will help the industry unlock the next step towards tackling capital and embedded emissions at a grander scale. It will also benefit the wider construction and utilities industry in the UK. The benefits of this are difficult to quantify but obviously significantly greater than the direct benefits of emissions reduction by Anglian alone.

"We note that changes in emissions will only be included where they are driven from your activities, use of materials or supply chain specific rather than changes in existing emissions factors. Therefore, although it is mentioned that reductions will be achieved 'through innovative techniques', we expect it to be made clear, within the definition, what exact company actions will count as facilitating the decarbonisation of concrete beyond actions by producers and/or manufacturers. This information is key to better understanding the envisaged impact company actions will have on the decarbonisation of concrete used."

We consider that changing suppliers' and producers' emissions factors must not be excluded from this performance commitment. For the performance commitment to incentivise us to choose suppliers with lower emissions for their operations or particular products and create demand for new products, the emissions factors must be accounted for. Otherwise the performance commitment would only incentivise us to remove carbon from concrete by designing assets differently. Changing emissions factors have been considered as part of our approach to setting a performance commitment level and the fact that we are proposing reductions without requesting additional funding. However we would not expect to benefit from changes in industry average factors such as the Institute of Chartered Engineers data base. We have sought to clarify this in the definition

Using our data and our experience of delivering large-scale capital carbon reductions allows us to understand the best possible interventions in the various scheme types. These interventions include re-use and re-purposing of previously redundant assets, innovative construction techniques, the use of alternative materials, natural capital and nature based solutions and sophisticated design approaches to maximise material use efficiency. The following actions are the company actions that will facilitate the decarbonisation of the concrete used. The order presented here reflects the hierarchy for prioritisation of actions:

1. Avoid emissions by delivering the customer or environmental need without building new assets:
   Adapting project scope or introducing an alternative design solution between the initial promotion to the capital vehicle from Anglian Water to outline design.
   Re-purposing existing assets to avoid concrete being required to build new assets.
   These solutions will only be acceptable if they still meet the customer and environmental need. Their condition and performance will need to be assessed at additional cost and time and the investigation may conclude it to be more cost-effective to build a new asset. Therefore, optimisation of existing assets may be applied in combination with other solutions outlined below.
2. Improving the design of our concrete assets:
   Reducing the mass of concrete or reinforced steel within design between the baseline and build phases of a project.
   By conducting more detailed design analysis and optimisation we can reduce the physical size (e.g. area or thickness of concrete elements) while still complying with the relevant civil engineering standards. This may require additional design tools (e.g. advance software) and specialist training to equip or teams with the skills sets to empower them to do this. This may also take significantly longer than using tried and tested designs and could result in greater risk in delivery.
   Using lower carbon alternative materials (e.g. Glass coated steel tank)
3. Switching components of concrete to use lower carbon alternatives:
   Changing supplier (i.e. switching to a supplier that uses lower carbon materials).
   Changing the product from our suppliers, such as products with a higher proportion of lower carbon alternative components (e.g. GGBS) compared to Ordinary Portland Cement (OPC).
   GGBS has been used as a replacement for OPC in the UK and abroad, although OPC is still the standard product, and is produced as a side product of the blast furnace process of making virgin steel. We note British standards currently limit the compositions of concrete permitted. The BS8500 standard limits the maximum percent of GGBS additions in place of OPC to 70%. However, this is typical not achievable in practise due to weather conditions and program implications. It is also not normally done in precast applications as manufacturing time is so key for profitability. Therefore there is probably a cost in doing this.
   Using alternative materials to steel reinforcement

Encouraging our suppliers to stock non-standard, lower carbon products and purchasing them.
We note our market power to select lower carbon options and to encourage our suppliers to go further. Many of our sites are more rural and remote, therefore we may have to work with suppliers who are further afield to source the materials we wish to use or we may have to invest in warehouse capacity of our own.

4. Sequestration
It may be possible that in coming years, concrete could act as a medium to sequester carbon. If this can be proven and adopted in relevant standards then this could contribute to our emissions reductions.

We note our percentage reduction target has been based on the solutions available to the company as of August 2023. This list is not meant to be exhaustive but illustrative of the types of interventions that would be eligible to contribute to a reduction in emissions. It is important that the definition does not stifle innovation or adoption of new products and technologies in AMP8. Therefore, new ideas within the broad framework outlined here are permitted.

Setting and calculating the baseline each year

Our proposed definition outlined that the performance commitment will operate in the same manner as our PR19 capital carbon performance commitment, which measures emissions for projects against a 2010 baseline. The baseline referred to is the methodology and approach used to deliver an outcome or output for customers and the environment.

In the data table for OUT10 we have input expected emissions associated with concrete using current techniques and practises but aligned to our expected AMP8 programme each year. During AMP8 we would review the projects delivered in a given year, calculate the baseline emissions and the modelled actual emissions to work out the % change. Our ability to reduce emissions from what they would have otherwise been is the key measurement. This is how our PR19 capital carbon performance is reported.

"We expect the definition to make clear all sources of GHG emissions, measured as tCO2e, against which a percentage reduction in emission will be qualified. The inclusion of an example calculation may provide clarity to the process utilised for the calculation."

This performance commitment measures the percentage reduction of GHG emissions from both concrete and rebar. Rebar refers to reinforced concrete where additional components (such as metal wires and bars) are added to provide strength to the system when in tension. This performance commitment only applies to standalone schemes, in alignment with our PR19 Capital Carbon commitment.

Standalone schemes are large individual schemes that are typically in one physical location. Standalone schemes represent the majority of our large scale capital delivery schemes.

For simplicity the following example focuses purely on the concrete and not the reinforcing elements. This example also ignores any restrictions that might be imposed by which may prohibit options as presented in this idealised imagined example, such as:

- Site safety configuration e.g. solutions being limited in height due local power lines
- Layout e.g. existing site services including underground and maintaining a build with a working WRC
- Local planning rules e.g. issues with the height & screening of assets
- Access Restriction e.g. limitations on the size or type of vehicles which may prohibit certain types of materials
- Land ownership/purchase e.g. space for temporary construction traffic or materials as well as for permeant locations of new assets.
- Materials availability e.g. local supply chain capabilities to supply specified materials
- People resources within organisation & supply chain e.g. to implement more complex design & construction processes

Table 31 Lower carbon concrete example

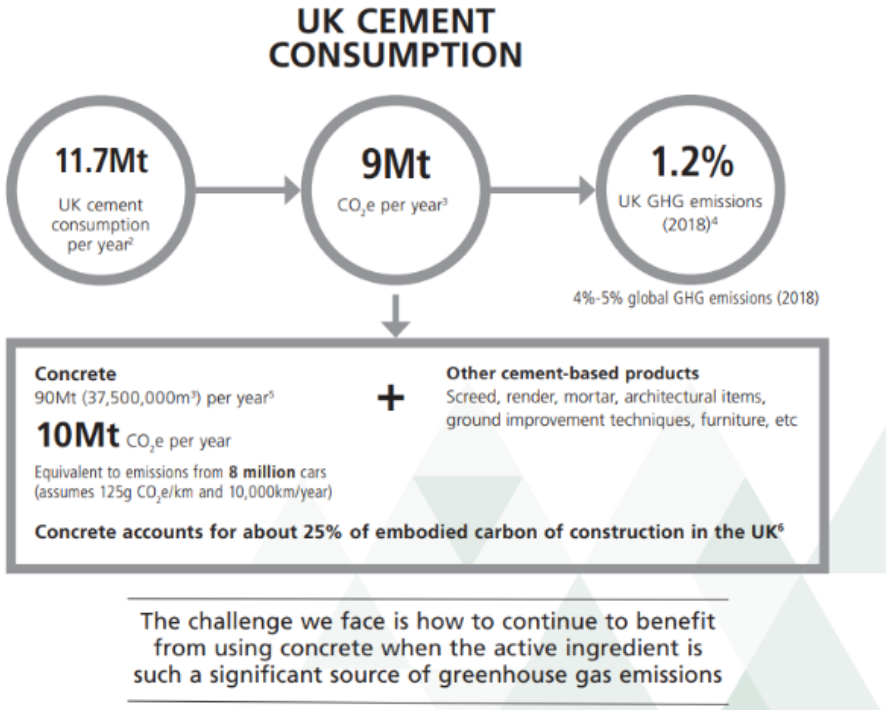
Step			
1	Business Need - A WRC requires additional storm water capacity to meet a WINEP obligations		
2	Baseline solution would be a single concrete storage tank and associated pumping to meet the full additional volume stated by the EA as required. **Concrete Carbon Emissions = W**		
3	A review of the site identified three partial solutions - which will be used together to meet the WINEP obligation		
	A) Measurement of the existing storm volume shows it is slightly larger or smaller than thought,	B) some unused old assets that could be repurposed, (may be possible on some sites)	C) a space onsite for a new storage tank.
	Either No further action taken - no build partial solution Or Additional volume is required increasing carbon **Concrete Carbon Emissions = 0**	A more detailed structural & suitability review identifies refurbishment requirements - these have a lower carbon footprint of the conventional solution. However the construction program is more complicated with a greater range of contractors and detailed inspections are necessary collaborating with a board supply chain (at additional financial cost) **Concrete Carbon Emissions = T**	While the traditional solution to this new volume would be concrete tank (walls & floor), a possible innovative solution which may be suitable (subject to site specific circumstances), for example a concrete base with a glass coated steel tank - this alternative material lower the Whole life carbon cost (even though it has a shorter lifetime), although requires a broader supplier base (and may require new suppliers **Concrete Carbon Emissions = Y**
4			Traditionally the tank would sit on a square concrete foundation as this is easy to design and construct - a possible the innovative engineering design solution is a hexagonal a more complex shaped concrete based floor shape (which for technical reasons is also slightly thinner). This requires more time on site to construct the formwork increasing labour costs as well as more time to complete a more complex design. Consideration is required of long term maintenance requirements to avoid creating operational issues **Concrete Carbon Emissions = B**
5			Normal industry standard practise is to use sa 100% OPC mix would be used due to fast setting time. Innovative, working in close partnership with the local supply chain a 30% GGBS (balance OPC) is identified. Due to the winter weather at the time of construction this will set slowly. Therefore the construction program is modified to allow a longer cure period (increases cost). Close collaboration with the supply chain is required both to supply materials and a suitably trained workforce to use these materials **Concrete Carbon Emissions = C**

$$\textit{Reduction on this example scheme} = W - \frac{0 + T + (Y - B - C)]}{W}$$

"We expect supporting evidence for the PC to make clear how the emissions reductions incentivised by the PC will enable government and company net zero targets to be met. In this regard usage of relevant frameworks for managing an organisation's decarbonisation could be made. This information is currently missing and is critical to stakeholders being able to fully recognise the potential impact and benefits of the PC in aiding the achievement of net zero"

Concrete accounts for about 25% of embodied carbon of construction in the UK. To achieve the UK government's net zero by 2050 target and interim 78% reduction by 2035 target, the same ambition must subsequently be reflected in both the utilities and construction sectors to decrease the carbon intensity of concrete accordingly. This was reflected in the government's strategic priorities for Ofwat which stated that "water companies should also have regard for the policies and proposals set out in the Net Zero Strategy". The necessary research, technology, and collaboration across companies, regulators, government and researchers will have a long lead time, therefore require a proactive and coordinated approach to ensure the target completion date for these targets are met. The Institution of Civil Engineers and the Green Construction Board's Low Carbon Concrete Group's Low Carbon Concrete Route map outlines how decarbonisation of concrete plays an essential part in wider net zero targets and will require engagement across supply chain and industries primarily in the next ten to fifteen years to achieve interim and 2050 net zero targets. Our bespoke PC aligns to the recommendations and approach outlined by the ICE/GCB Low Carbon Concrete Routemap to support wider net zero goals.

Figure 34 Source: ICE/GCB's Low Carbon Concrete Routemap UK Cement consumption



As concrete use in our assets also is one of the major carbon emitters from our activities, using lower carbon concrete will support us on the path to achieving our 70 percent reduction of capital carbon emissions by 2030 (from a 2010 baseline) as outlined in our Anglian Water Net Zero 2030 strategy. We expect this PC to incentivise a meaningful contribution to this target.

Lower carbon concrete remains a novel area, and increasing sector demand for this type of material or reflecting this priority in the design process will need to be delivered to become a proven solution and increase confidence by the industry. In step with the recommendations of the ICE/GCB Low Carbon Concrete Routemap, this performance commitment will act as an industry pathfinder on how best to deliver less concrete-intensive infrastructure projects through extensive collaboration with our partners in the supply chain, helping to create a more sustainable water sector in the long term. It could contribute to the development of a common capital/embedded carbon performance commitment at PR29.

Our customers will benefit from reducing the carbon intensity of concrete through the mitigation of the negative effects of GHG emissions on the environment and atmosphere, as well as taking proactive rather than reactive approaches to reducing emissions. This is particularly salient in the Anglian region, as the East of England is disproportionally susceptible to the impacts of climate change as a low-lying region was a long-lying, eroding coastline.

"The definition is not clear if the percentage reduction in the greenhouse gas emissions associated with concrete used will be on project-by-project / asset-by-asset basis or whether a percentage reduction in overall capital-based emission is being aimed for. Therefore, we expect the definition to be clear on exactly how the proposed PC will be calculated."

One number will be reported for the entire capital programme - a % reduction from the baseline approach.

"In working towards delivering performance in line with the proposed PC, we also expect the company to be clear within the definition on how it will address the risk of actions linked to the PC resulting in a shift of pollution from one environmental medium to another, particularly as material inputs change and/or are reduced."

We recognise Ofwat's concern that this measure could inadvertently promote a shift in emissions from concrete to another environmental mediums (i.e. Replacing a concrete tank with a higher carbon-intensity alternative but still measuring a reduction against this metric). We will include in the definition that the shifting of pollution or emissions from one environmental medium is counter to the purpose of the performance commitment, and that this must be considered as part of delivering and reporting performance.

Any design, scope or other change which helps us achieve the performance commitment level will not be accepted by our internal governance process if it results in increase in overall emissions as this would adversely affect our capital carbon target of a 70% reduction by 2030. If there is a legitimate and reasonable technical reason why a material change is required, this must be evidenced and approved by the appropriate internal governance processes and assured as part of our reporting assurance processes.

"The proposed PC has potential to be a targeted, rational, and impactful way to focus management of embedded GHG emissions. However, we consider that there are risks associated with the proposed approach. For instance, what is proposed will not necessarily lead to a reduction in total emissions linked to the use of concrete as it is focused on achieving a % reduction in carbon emissions linked to the use of reinforced and unreinforced concrete and not a reduction in total emissions. So, it is possible that overall capital asset-based emissions could increase. As a result, it is expected the company will submit information in support of the PC definition that makes clear how this risk, and potential stakeholder criticism, will be mitigated."

We recognise the difference between a percentage reduction in emissions linked to concrete and an absolute increase or decrease in the total emissions associated with concrete in the entire capital programme. We expect due to the increasing scale of our AMP8 capital programme in comparison to our AMP7 programme that our overall capital asset-based emissions will increase in the next price control period despite efforts to reduce the emissions associated with concrete. This performance commitment will support us in our efforts to limit this expected increase in emissions which stems from a growing capital programme in the next five years. Our long-term ambition remains to reduce our overall capital carbon as demonstrated by our commitment to reduce our capital emissions by 70% by 2030 (against our 2010 baseline) within our Net Zero Strategy and our Sterling Green Bonds. We were the first public utility in the UK to launch a green bond, which means our investors can invest with confidence that they are financing investments essential for infrastructure knowing they are green, better for the environment, and will have a reduced carbon footprint. We remain committed to reducing our capital carbon progressively over multiple AMPs, however, will consider how best to present in our communications the benefits of our efforts to increase the use of lower-carbon concrete and alternative approach despite a temporary expected increase in our overall programme emissions.

"You identify in the definition that changes in existing emissions factors will not be included. This statement should be included within the 'Specific exclusions' section, alongside examples"

The following are excluded from the scope of this PC:

- Parcel schemes: a parcel scheme refers to where a similar activity is delivered in bulk, ie a metering parcel replaces a large quantity of meters. This measure will only apply to standalone schemes.
- Major infrastructure projects which are delivered through DPC or SIPR rather than through our traditional delivery routes.
- Projects that transition between AMP periods would be excluded.

We consider that the changing of suppliers and products emissions factors must not be excluded from this performance commitment. For the performance commitment to incentivise us to choose suppliers with lower emissions for their operations or particular products and create demand for new products, the emissions factors must be accounted for. Otherwise the performance commitment would only incentivise us to remove carbon from concrete by designing assets

differently. Changing emissions factors have been considered as part of our approach to setting a performance commitment level and the fact that we are proposing reductions without requesting additional funding.

"Although we are aware that you have been reporting on your capital-based emissions for several years, details about the comprehensive nature of the monitoring and reporting process for this PC must be set out within the definition, as well as it being clearer on the rationale for using PAS2080."

In 2016 Anglian Water became the first organisation in the world to be externally verified (by LRQA) to PAS2080 Carbon Management in Infrastructure. We were involved in the development of PAS2080 alongside organisations including the Institution of Civil Engineers, Environment Agency, Department for Transport, National Grid, Atkins, and Arup among others. PAS 2080 outlines a carbon management process that is applicable across both infrastructure and buildings, recognizing that they have key commonalities and are part of an interconnected system - the built environment. By following the PAS 2080 approach, value chain members across the built environment can work collaboratively towards the common goal of net zero carbon transition and achieve the following outcomes:

- align buildings and infrastructure projects and/or programmes of work, at the asset, network or system level, to the net zero transition by or before 2050, and therefore contribute to limiting global warming to 1.5 °C, as per Paris Climate Agreement 2015;
- reduce carbon and increase value across the whole life of buildings and infrastructure; and
- remove silos and create collaborative ways of working that promote innovation, encourage positive change for society and support economic development

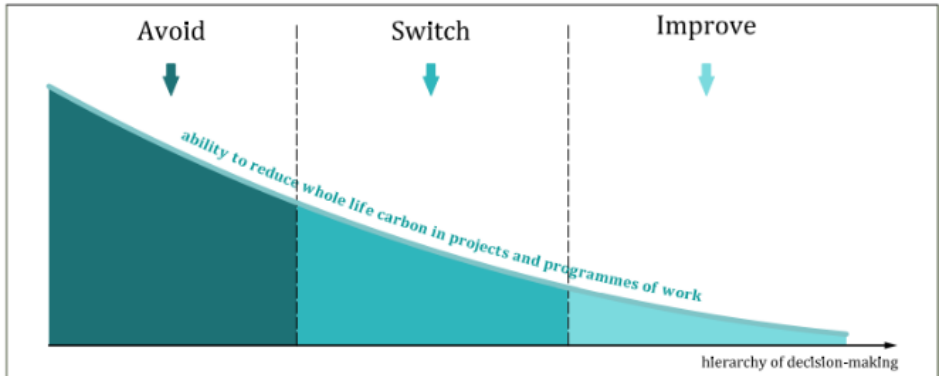
We have been accredited since 2016, with an annual three-day audit process conducted by the BSI Assurance UK Ltd to ensure we continue to align to the standards. An update to PAS2080 was released in 2023. For the purposes of this performance commitment, we propose to use PAS2080:2023 as this will be the version we will be verified against in AMP8, unless the PAS is refreshed in which case we will update to the latest version.

We selected PAS2080 to support the monitoring and reporting for this performance commitment as the PAS takes a whole life carbon management approach when delivering projects and programmes and recognises the importance of relationships between value chain members across networks and assets. The carbon framework at the heart of the PAS2080 standard ensures that our approach is aligned with key stakeholders within the value chain, including product suppliers, constructors and designers, in demanding and enabling low carbon solutions. The PAS includes requirements for developing a carbon management process built around the following components:

i. Decarbonization principles (Clause 4).
ii. Leadership (Clause 5).
iii. Integrating carbon management into decision-making (Clause 6).
iv. Whole life carbon assessment principles to support decision-making (Clause 7).Target setting and baselines (Clause 8).
v. vi) Monitoring and reporting (Clause 9).
vi. Procurement (Clause 10).
vii. Continual improvement (Clause 11).
viii. Claims of conformity (Clause 12).

The PAS2080 utilises the same carbon reduction hierarchy we propose within this performance commitment for the reduction of carbon in concrete, providing additional assurance that we are taking the best optimal approach to reduce whole life carbon emissions.

Figure 35 Carbon reduction hierarchy within PAS 2080



***NOTE** This figure represents a simplified and streamlined version of the carbon reduction hierarchy presented in PAS 2080:2016 and the* Infrastructure carbon review *[1]. It has been updated to clarify its applicability and relevance to a wider range of projects and programmes within the built environment (i.e. to clarify that the carbon reduction hierarchy is not solely about new builds).*

The annual three-day audit process reviews the following meet the requirements for PAS2080:

- Our carbon management process, including review of the following:
  - Carbon models: our carbon models are spreadsheets which plot the best fit polynomial curve establishing the expected emissions from schemes based on characteristics of the asset (ie size). All models are retained on SharePoint and used from this drive by C55 and the Carbon Modeller. The models cover our standard products, so is reflect of our processes and assets rather than being generic for the industry. All models are individually controlled via date and version number. New models are developed as required to ensure innovation is maintained by the Carbon Manager in association with key staff in the Alliance organisations.
  - Carbon footprint modeller: the modeller uses the various carbon models and has the ability to calculate the life carbon and water of infrastructure projects. The Carbon and Water Footprint Modeller is used by the delivery routes for calculating carbon associated with proposed scheme solutions (DM2-4).
  - C55: C55 is our corporate master system for supporting expenditure decisions. It gives us a common location to store and report on all of our investments in our assets, and uses a common framework to assess them. It is used to calculate carbon baselines (DM0) from the carbon models. C55 is used for carbon and cost modelling before scheme are handed to a delivery route
  - Carbon accounting workbook: Anglian Water quantifies its operational greenhouse gas emissions using UKWIR's Carbon Accounting Workbook and follows Defra guidance 2009 and 2013 on how to measure and report greenhouse gas emissions. The UKWIR Carbon Accounting Workbook provides UK water companies with a consistent and transparent approach for accounting greenhouse gas (GHG) emissions from their annual operational activities. The workbook is reviewed annually by a cross company working group facilitated by UKWIR. This allows for updates to be included to reflect any changes in operational practices, best practice of carbon calculations. As a minimum operational emissions factors are updated annual in line with those issued by the UK Government (Defra). On an annual basis data is collected from across the business including metered grid electricity consumption, fossil fuel delivery, sludge treatment and water treatment including ozonation. The data is then compiled within the Carbon Accounting Workbook to provide scope 1, 2 and 3 emissions.
- Leadership, through interviews within individuals at all levels of the organisation and provide leadership across all aspects of carbon management.
- A review of planned activities, ie a review of our Strategic Pipeline project or projects carried out by the @one alliance.

PAS 2080 is closely associated to our existing carbon management and data assurance processes. Our carbon data is externally assessed and verified as part of our regulatory reporting requirements. Our BSI Verification Certificate or external assessment report is available on request.

In addition to PAS2080 and our regulatory reporting requirements, our capital carbon emission totals are also reviewed as part of the assurance process for our Green Bonds and KPIs. We propose to continue to do this for AMP8 to support reporting and monitoring of this performance commitment.

"As stated in Appendix 8 of our Final methodology, we will only consider end-of-period payments for bespoke performance commitments where a company can demonstrate that the impacts on customers are expected to be realised over multiple price control periods, and that it does not significantly reduce management focus on these service areas or add disproportionate complexity. Without such evidence we consider that it is appropriate that company performance is reported and any out or underperformance identified in-period, in line with the reporting of operational greenhouse gas emissions performance commitment, rather than at the end of the period"

We are happy to accept Ofwat's suggestion of in-period payments.

"We note that some evidence of customer engagement has been provided for the proposed bespoke PC. In line with our letter of 31 May 2023, our expectations for customer engagement evidence are set out in 'PR24 and beyond: Customer engagement policy - a position paper' (Ofwat, February 2022). We consider that companies should regard this as a set of minimum standards for what should be submitted with business plans. It is also made clear that external third-party assurance will be undertaken on all data required for maintaining PAS2080."

Throughout our engagement with customers to identify and develop bespoke performance commitments, we have designed and conducted our research in line with Ofwat's principles of customer engagement. More detail on our customer engagement and the Independent Challenge Group can be found in the Customer Engagement chapter of our business plan.

- Useful and contextualised: for our engagement with customers through both the Online Community and the Investment Priorities research conducted by Trinity McQueen, customers were informed that the research would be used to inform the selection of bespoke performance commitments. Customers were also informed on the purpose of performance commitments and the difference between common and bespoke PCs.
- Neutrally designed: we presented customers with a wide range of potential bespoke performance commitments - customers were free to express that they did not feel any were high priorities in the short term. For the Trinity McQueen

research, the bespoke PC candidates were presented alongside a selection of common PCs for completeness. Our ICG reviewed the materials for the Trinity McQueen research and we reflected their feedback before launching the survey.

- Fit for purpose: We tested the clarity of our bespoke PC definitions with our Online Community before a further iteration of research with this group and the larger Trinity McQueen sample which established levels of support for potential measures. This was to ensure that customers were happy that the definitions were fit for purpose and clear so they felt informed to prioritise measures.
- Inclusive: throughout our research we have made efforts to ensure vulnerable customers in addition to future bill payers (16-24 years) are fairly reflected in our research, and their views captured. 33% of respondents participating in our research with Trinity McQueen identified as vulnerable. Net zero is an area which is particularly important to our future customers, which was identified in earlier phases of our engagement on Investment Priorities with Trinity McQueen.
- Continual: our bespoke PC selection process was informed by the synthesised views of our customers captured in our Customer Principles Report to identify measures that are most important to our customers. We have collected views on decarbonisation and our path to Net Zero through a range of engagement activities throughout the development of our LTDS and PR24 business plan, which was factored into the selection of this commitment.
- Shared in full with others & independently assured: our research materials were shared with our Independent Challenge Group to check these were neutral, contextualised and met the principles of customer engagement. We discussed our approach and emerging conclusions of the research with our ICG.

"We expect you to include a compliance checklist, such as exists for most common performance commitments, in order to increase the clarity of reporting requirements."

Working with Government and leading businesses through our role in the Green Construction Board, we developed the world's first standard for managing carbon in infrastructure (PAS 2080). This standard is now being used national and internationally.

We have assessed the baseline reporting confidence grade as B on the basis that our data and systems are robust, but currently some manual intervention is required to focus on concrete only elements of emissions. We are looking to enhance and automate before AMP8 begins.

We have assigned a confidence grade of C to the actual outturns for performance reporting. This is on the basis that enhancements are required to our reporting and systems to capture with greater specificity the grades and emissions factors of emissions for as built projects. We will work on developing these capabilities before AMP8 begins.

Figure 36 Lower carbon concrete assets compliance checklist

	Component / Element	Component R/A/G	Element R/A/G	Reason for any non-compliant component	Confidence grade
1	**BASELINE**				
1a	Mass of material for baseline solutions for all completed schemes				B
	Performance requirements of material (ie. Strength, local conditions etc) for baseline solutions for all completed schemes				B
	Chemical composition of material for baseline solutions for all completed schemes				B
2	**ACTUAL**				
2a	Mass of material for as built solutions for all completed schemes				C
	Performance requirements of material (ie. Strength, local conditions etc) for as built solutions for all completed schemes				C
	Chemical composition of material for as built solutions for all completed schemes				C
	Supplier specific concrete information				C

2 OUT6: Summary information on outcome delivery incentive payments

Data provided for these tables is consistent with the data provided in table OUT8. The differences between this table and our forecasts provided in our 2023 APR are explained in the commentary to table OUT8.

3 OUT7: Outcome performance - alternate incentive rates and our compelling evidence

3.1 Overview

This document provides our commentary for Table OUT7 where we have used alternative marginal benefits to set incentive rates than those provided by Ofwat. This document outlines our compelling evidence for using alternatives.

3.2 Setting incentive rates

Outcome Delivery Incentives should align with the value of services to society

We agree with Ofwat's original intention for PR24 to set Outcome Delivery Incentives informed by customer value in order to drive efficient outcomes for customers.

"we planned to set these rates at a level consistent with the benefits to consumers of the improvement in service (sometimes referred to as 'marginal benefit'). This incentivises companies to improve services if the cost of doing so is less than the customer benefit."[72]

This is in line with our broader view that the views of customers views and valuations in decision making for the industry. This is a key way for the preferences of customers to inform company decision making. We have been championing this for a number of years, including at previous price reviews. At PR19 Ofwat assessed our customer engagement as exceptional in it's initial Assessment of Plans (IAP), including our approach to valuation and triangulation:

The company provides convincing evidence of the effective use of a wide range of customer engagement techniques, (both on triangulation and segmentation) including innovative multi-stage willingness to pay research for which assurance was provided.

The company demonstrates a clear line of sight from the results of its customer engagement to the outcomes its business plan will deliver for customers. Its package of performance commitments has been developed on the basis of robust customer valuation research which has been appropriately triangulated to set incentives that reflect customer preferences and priorities across its package of outcome delivery incentives.[73]

Our six-capital Social Value framework has been in place for over ten years and has developed over time to allow full integration of societal and environmental impacts into our day-to-day decision making and long-term planning.

Given its long standing nature, we regularly review our framework. Ahead of PR24 we have undertaken a comprehensive, rigorous and high-quality programme of activity to refresh values in our Social Value Framework. Our Societal Valuation Triangulation report (ANH67) provides s full discussion of our refresh, triangulation and final values.. We undertook this refresh as we think it is vital that we understand and respond to the preferences and valuations of our customers. Our societal values have been independently assessed as best practice:

"Overall, our assurance review of Anglian Water Triangulation Report is that it strongly aligns to the CC Water best practice guidance."[74]

Our societal values have been used to inform choices and prioritise investment in our plan. They should also be used to support incentive rates.

It is our view that it is in our customers' interests that, as at PR19, incentive rates should be set in relation to these values, which robustly represent the benefits to consumers and society of changes in services delivered in our region. This will help ensure that there is a strong connection between what we are incentivised to deliver and the things valued most by customers.

Principally we believe incentive rates should be based on marginal benefits derived from research designed to establish customers valuations where this is available. This information is available for our customers. However we have used Ofwat's top-down indicative incentive rates for the majority of PCs in our plan. This is intended to be a constructive, pragmatic approach in light of the guidance for PR24.

72 PR24: Using collaborative customer research to set outcome delivery incentive rates, Ofwat, August 2023, p.6
73 Ofwat, PR19 Initial Assessment of Plans, Anglian Water: Test question assessment, p.1
74 Jacobs, AW Societal Valuation assurance

However for four PCs there are material differences between the Social Valuation of our customers and Ofwat's proposed indicative incentive rates where, alongside other evidence, we have proposed alternative incentive rates in our business plan. This document discusses our compelling evidence for these alternatives.

We note that Ofwat plans to further revise and calibrate ODI rates during the determinations phase of PR24,[75] taking into account inputs including *'the degree of confidence in the estimates of marginal benefits*'. We have a high degree of confidence in the evidence underpinning our social values for all common performance commitments, not only the four where we are proposing alternative rates in our plan. We will review any further changes to Ofwat's rates carefully and propose alternatives, if appropriate, to further the best interests of our customers.

Our Societal valuation programme

Our six-capital Value framework has been developed over time to allow full integration of societal and environmental impacts into our day-to-day decision making and long-term planning. Although joint national research was planned for PR24, because of the importance of our Value framework for both developing the business plan and the ongoing delivery of our investment programme, we decided to continue to conduct our own societal valuation programme. The refresh for PR24 built on our existing high-quality programme in a proportionate way ensuring the views of our customers fully informed the work and allowed us to obtain values to specifically fit the requirements of our value framework. The refresh for PR24 to ensures that our valuation work continues to be comprehensive, compelling and remains industry leading by:

- building on the robust underpinning foundations of our PR19 programme - maintaining the core principles while responding to the latest regulatory requirements and best practice;
- ensuring values remain up to date given macroeconomic changes and time since PR19; and
- embedding our company Purpose and six capitals framework.

The approach to the refresh is shown in the figure below. A description of our valuation refresh is included in 'Chapter 5 Customer Engagement' within our business plan.

Developing the PR24 valuation programme started from the view of what matters to customers, identifying where their voice can influence outcomes. The strategy refresh assessed each service area in terms of importance for PR24 and priority of the existing data for an update. We then reviewed valuation options in order to determine the most appropriate approach for each area. The analysis was brought together to create a roadmap for our Societal valuation programme with four workstreams of activity:

A **Integrated willingness to pay survey** - A multi stage WTP and preferences survey covering stated preference values and preference weights was conducted providing up-to-date values to account for macro-economic changes. This involved an online survey with 1,023 household customers and 201 non-household customers with face-to-face sampling with 55 digitally disengaged customers. Customers in vulnerable circumstances were included in the sample with other segments in line with the AWS sampling strategy developed as part of the wider PR24 engagement strategy. The survey design built on the PR19 design and was adapted to include a preference weight exercise that builds on the PR24 centralised research approach. The survey was tested with cognitive interviews and piloting to test the understanding of survey content and choice tasks, motivations and how the survey might be improved. Respondent feedback, along with qualitative testing from the survey, shows high levels of engagement throughout the survey, as well as demonstrating that the survey and choice tasks were manageable for respondents.[76]

B **Service failure post event survey** - Post event research with informed customers affected by interruption to supply was conducted to capture information on actual costs incurred, disruption and customers' behavioural response to incident. The innovative study was designed with the explicit intent of using different methods (avertive behaviour, stated preference compensation and subjective wellbeing) to estimate the impact of the events on customers and allow comparison of values across these methods. The sample involved 298 customers affected by three events in different duration, locations and seasons occurring in 2022 across the Anglian Water region. The survey design was iterative with development with operational employees that handle similar events, a pilot and soft launch.[77]

C **Benefit transfer and mapping values -** to complete our refresh we undertook a desk-based review and updates of measures not directly valued with customers. This included mapping of values to measures such as discharge compliance and the sourcing of values for traffic congestion and shellfish. It used day-to-day data such as insurance claims and S101a customer applications.

75 Not least in order to overcome the challenges of setting fair rates for smaller water only companies, any solution to which may have ramifications for wider company rates and therefore for our customers.
76 ICS, Integrated WTP study February 2023
77 ICS, PR24 societal valuation programme: Post event research March 2023

It also included an audit of values against standardised sources and a review of the approach to comparing to other company values.

D **Triangulation** - the triangulation report bring together a breadth of information to produce values to inform PR24. This includes insights from workstreams A to C, substantial dataset collected at PR19, the wider AWS engagement process findings (including the synthesis report and day-to-day data such as customer sentiment analysis) and information from external sources. The societal valuation values derived through triangulation inform our value framework alongside private values and are used to appraise each investment. These are optimised to produce a best value plan that meets PC levels.

The PR24 programme builds on the best practice approaches from PR19 with a lighter touch programme that targets research where it could have most impact. Responding to feedback from Ofwat and CCWater, greater emphasis has been placed on revealed preference, benefit transfer for triangulation and engaging seldom heard customer segments, such as vulnerable and future customers. This information was then included in our value framework, shown below.

Figure 37 Our value framework categorised by Six Capitals

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

Triangulation

The triangulation reports bring together multiple sources of information to produce values to inform PR24. This includes insights from the four workstreams described above, the data collected at PR19, the PR24 engagement programme and information from external sources. The reports follow CCWater best practice guidance principles and use a wide range of inputs with transparent assumptions, weightings and approach to generate a recommended set of values.[78]

Assurance and independent challenge group engagement

Our valuation research has been conducted in line with our wider PR24 customer engagement principles.

Figure 38 Tailoring our valuation refresh to the needs of customers

Throughout the programme we worked carefully to ensure that we met Ofwat's standards for high quality research. This is demonstrated in the table below.

Table 32 Ofwat's standards for high quality research and our approach

Ofwat research standards	Description	Summary of our approach
Useful & contextualised	Research should have practical relevance. It should be clear why the research has been undertaken, to what it will contribute and how. The research should be designed with quality rather than quantity as a priority (in other words, a better quality of research, rather than a larger quantity of research). As much as possible, research findings should be presented alongside a wider evidence base - including research conducted by others. The analysis should contextualise the findings and explain how they will be used.	· Developing the valuation programme started from the view of what matters to customers and identified where their voice can influence outcomes. The societal valuation strategy sets out the evidence the business needs for decision making and how those needs will be met through multiple sources. · The valuation strategy ensures all research is planned to provide a proportionate evidence base which feeds through to the Anglian Water triangulation process. It ensures customers are providing meaningful input into the business planning process. · In the delivery and reporting of research, the approach considers the wider body of research and the relevant industry context. External industry data (e.g., Discover Water) is used for benchmarking and presenting data to customers, in keeping with Ofwat's guidelines.

78 ANH67 ICS, Anglian Water Valuation Triangulation PR24

Ofwat research standards	Description	Summary of our approach
		· Research findings are assessed in the context of wider quantitative and qualitative evidence in the triangulation process. The triangulation process synthesises the valuation and preference research into a coherent view and draws upon multiple methods and sources both specific to Anglian Water and from wider sources (including other company, other external research and Government approved values). · The valuation programme generates a range for sensitivity testing allowing AWS to develop robust conclusions or identify where further verification through wider engagement is required.
Neutrally designed	Research should be designed and delivered in a way that is neutral and free from bias. The potential for bias and the ways to negate this should be considered at every stage of a project, and evidenced - including set up, question wording, question ordering, stimulus materials, selective use of quotes or data in reporting and interpretation of findings. If there is some inherent bias that is unavoidable or was an unintentional outcome of the research, this should be acknowledged and explained in the research findings.	· The AWS primary research adheres to the Anglian Water sampling strategy, to ensure that each project delivers a representative sample. Where required research outputs are weighted to align with quotas. · The AWS research informing the valuations builds on earlier studies that have had extensive testing. Our research design process contains iterative test and retest steps (e.g. cognitive interviews and pilots) to ensure that research is engaging and easy to understand. Unexpected results or evidence of mis interpretation trigger a review of question design. The design approach also includes review for unintended bias, for example, ensuring question or answers are rotated to avoid ordering bias. The Anglian Water ICG are also invited to review research materials to provide independent scrutiny. · The triangulation approach leverages and builds on the breadth of data and evidence collated for both PR24 and PR19 as well as wider sources. The influence from one research study is offset by the wider evidence base. In addition, each source is formally assessed for 'Robustness' and 'Relevance' to understand the extent to which the design and application of the study aligns with total economic value for the Anglian region. This approach is designed to identify and remove any bias and determines

Ofwat research standards	Description	Summary of our approach
		the extent to which each study influences the final triangulated value and consequently business decisions.
Fit for purpose	The research sample and methodology should be appropriate for the research objectives. Participants should be able to understand the questions they are being asked and surveys should limit the use of forced choice options. A research approach that has previously been challenged should not be repeated unthinkingly. Innovation is welcome if it is likely to lead to meaningful and trusted insight and learning.	· Careful scoping of the societal valuation research programme ensured that available information and customer data was used to prioritise the PR24 valuation programme. The PR24 societal valuation programme was designed to complement the existing evidence base and provide insight where it is highest priority. This incudes an assessment of existing evidence base and uncertainty, customer priorities, materiality and where customers views are most likely to influence the plan outcomes. The triangulation of values enables the population of the AWS valuation framework that underpins and informs both business planning and day to day decision making. · The triangulation approach has been developed to drive best practice and complies with the CCWater triangulation best practice guidance and our valuation programme follows good practice and regulatory guidance. · The research programme draws upon past studies where these have been extensively tested. This includes incorporating customer friendly language which is known to have been understood. The process can include cognitive testing within a test and re-test approach and pilot stages. · Research approaches are subject to review by a range of experts within the researcher team and AWS steering groups - challenging research at the design stage enables us to ensure high-quality findings and meet current best practice. · We have sought opportunities to innovate within customer research where this can bring real benefits. For instance, post event research designed to value the impacts of supply interruptions through three valuation methods using the same sample as a control. This provided avertive behaviour valuations, subjective wellbeing valuations and stated preference compensation valuations (aligned with

Ofwat research standards	Description	Summary of our approach
		the collaborative research approach), helping to evaluate the influence of the method applied.
Inclusive	Research should include different audiences and socio-demographics, considering local or regional or national populations, business customers and business retailers. Where possible, research findings should identify and report on variances by sociodemographic and consumer types (for example, bill payers, future customers). Research findings should provide details of those who may have been excluded or under-represented in the research. Where possible, research should use mix-method approaches to provide a more inclusive set of findings. While the range of representation may vary from project to project, the research programme as a whole should be demonstrably inclusive.	· The research programme engaged both household and non-household customers. Across the programme and within key projects research modes are varied to maximise their reach. Meaningful engagement of digitally disengaged customers was enabled through face-to-face sampling to ensure their voices could be heard. Samples also include customers in vulnerable circumstance and other segments in line with the AWS sampling strategy and we have included research with customers who have experienced service issues. · Primary research findings are segmented and analysed by the groupings contained within the AWS sampling strategy to identify variation in customer views by factors such as socio-economic background, age and different aspects of vulnerability. · The triangulation assesses the values for household and non-household customers and at a combined level to produce a range for each value. The variation of segments is reviewed based on the findings form the primary studies. In doing so, this provides a check that customers with lower WTP are covered by the recommended range. · The AWS wider synthesis of research maintains a record of customer views and values across the research programme and how they vary within the customer base. This includes the views of future customers, providing a better balance for inter-generational decisions.
Continual	Companies' research programmes should be continual, enabling day-today insight gathering, as well as specific and relevant research for informing business plans and long-term delivery strategies. This will allow areas of concern or change to be more easily identified and acted on.	· The AWS valuation programme and triangulation are a continual process. The PR24 approach builds on the on the best practice PR19 approach that received a grade A from Ofwat. Since PR19 we have developed our processes to align with our six-capital framework. · The evidence base combines specific valuation research with day-to-day insight and wider research as well as the engagement findings collated through the AWS synthesis

Ofwat research standards	Description	Summary of our approach
		report. This includes customer sentiment analysis from calls to the AWS customer contact centre, flooding insurance data and customer feedback on events and experiences. Anglian Water has also included a programme of post event surveys focused on capturing customers experiences and interactions with the day-to-day AWS service. The AWS customer engagement synthesis is a live document, that collates our research and identifies common threads and outliers across our qualitative and quantitative projects.
Ethical	Companies' research programmes should be continual, enabling day-today insight gathering, as well as specific and relevant research for informing business plans and long-term delivery strategies. This will allow areas of concern or change to be more easily identified and acted on.	All our research partners conduct research in line with Market Research Society ethical standards. Our research partners also adhere to General Data Protection Regulation (GDPR).
Shared in full with others	Research findings should be published and shared in full, as early as possible with as wide an audience as possible. This will add value to the evidence base on customers: · by allowing research approaches to be understood and improved on · by building the shared knowledge base about customers' views, preferences and experiences · by allowing research findings to be considered in a comparative way - meaning water companies can better understand their own customer base, by comparison with the findings from other areas. Research findings should always be accompanied by clear and detailed information on the methodology for the research. This should include, for example, recruitment screeners, questionnaires, discussion guides, and copies of any stimulus materials used.	· The valuation research findings and the triangulation of values have been shared with Anglian Water. · As with PR19, we will publish our business plan and supporting research, including experimental research to support the progression of best practice and learning within the industry. · Our valuation programme research reports include full details of questionnaires and supporting materials to enable full transparency. The standard reporting approach outlines the research objectives, research design, the methodology implemented as well as the findings. · · We have shared knowledge and best practice through our active participation in wider research such as the Ofwat and CC Water collaborative research and Water Resources East.
Independently assured	Research should be reviewed by individuals or groups that are independent of water companies. Those reviewing research should have a range of relevant skills and experience	· Our customer engagement, valuation and triangulation builds on industry best practice and current regulatory guidance.

Ofwat research standards	Description	Summary of our approach
	and feel confident and able to challenge on all elements of research. Information shared with them should be relevant and timely. Water companies should be transparent about the research findings and whether, and in what ways, it has been used.	· Customers provide the first layer of assurance through feedback on experiences of completing research which provides important validity checks on understanding and quality of engagement. Research design subject to scrutiny from the Anglian Water Independent Challenge Group to provide further checks and balances through an iterative process. · Finally, the PR24 valuation research and triangulation processes and outputs have been subject to independent expert assurance provided by Jacobs.

The programme has been independently assured by experts from Jacobs who have reported positively about the overall strategy, the individual workstreams approaches and their alignment to Ofwat guidance principles and CCWater best practice guidance.

"The Anglian Water strategy refresh clearly embeds societal values in their stated purpose and holistic decision-making approach using a six capitals framework building on existing practice. For PR24 societal valuation, Anglian Water started from a position of strength, so it targeted research that could have the most impact. The prioritisation exercise included an assessment of the relative importance of each service area versus the need for updated data sources and reached some sensible conclusions for the overall refresh priority through a transparent process. Greater emphasis has been placed upon observation revealed preference research with the post-event workstream and on benefits transfer."[79]

Robust customer challenge in line with Ofwat's guidance was provided by our Independent Challenge Group (ICG) who were engaged at key points in the programme. Valuations were discussed at ICG meetings in December 2022 and June 2023 and provided written updates at other meetings and an in depth 1-1 meeting with one of the representatives.

Conclusion

Our societal values provide a robust source of customer evidence and have been used to inform choices and prioritise investment in our plan. They provide a contemporary source of compelling customer evidence to set alternative incentive rates.

It is our view that it is in our customers' interests that, as at PR19, efficient ODI rates should be set in relation to these values, which robustly represent the benefits to consumers and society of changes in services delivered in our region

3.3 Ofwat's indicative incentives for PR24

Ofwat's top-down indicative ODI rates for PR24

As set out by Ofwat in August 2023,[80] Ofwat's original intention was to set ODI rates for PR24 in relation to customer values. Ofwat intended to set these on the basis of one piece of research, led by Ofwat working closely with Consumer Council for Water (CCW), companies and stakeholders (the collaborative research). This contrasts to the approach that Ofwat set out at PR19 whereby companies were required to provide triangulated marginal benefit values representing the value of the unit benefits of a change in service to their customers/region.

The values we used in PR19 drew on primary research with our customers, triangulated with wider evidence to develop robust marginal benefits, which received an 'A' grade from Ofwat in its Initial Assessment of Plans (IAP) and was assessed as best practice by CCWater. At that time, Ofwat's IAP concluded:

"Its performance commitments are based on robust customer valuation research with incentives that reflect customer preferences and priorities."

"Its package of performance commitments has been developed on the basis of robust customer valuation research which has been appropriately triangulated to set incentives that reflect customer preferences and priorities across its package of outcome delivery incentives (ODIs)"

79 Jacobs, AW Societal Valuation assurance
80 PR24: Using collaborative customer research to set outcome delivery incentive rates, Ofwat, August 2023

"The company provides convincing evidence of the effective use of a wide range of customer engagement techniques, (both on triangulation and segmentation) including innovative multi-stage willingness to pay research for which assurance was provided."

"The company provides sufficient and convincing evidence supporting its ODI rates….It demonstrates a high-quality approach to customer research and triangulation to support robust estimation of marginal benefits."

As set out above, we have refreshed our values for PR24 updating our leading PR19 work to ensure that we respond to the latest best practice, regulatory requirements and macroeconomic changes since PR19.

Ofwat's original intention was to publish indicative ODI rates - based on the collaborative research - alongside the Final Methodology for PR24. However, as set out in August 2023, Ofwat has encountered more challenges than originally envisaged both in conducting the collaborative research and then using its findings to set indicative ODI rates. We have previously provided feedback to Ofwat, including expert peer review, on our concerns about the design of the collaborative research.

As a consequence of these challenges, Ofwat has moved to a top down approach to set indicative incentive rates for PR24. This top-down approach relies on two key inputs:

- ·the maximum amount of RoRE at risk, which Ofwat notes "should represent a theoretical maximum amount of risk a company is exposed to through ODI payments ie if it was very significantly underperforming or outperforming on a PC' (p.41); and
- ·a 'stretching but achievable' performance range that RCV at risk will be spread over.

We understand that Ofwat now plans to calibrate ODI rates during the determinations phase of PR24, taking into account inputs including 'the degree of confidence in the estimates of marginal benefits'.

As set out above, robust values are available in our region through our Social Values framework to form both the basis of and calibration of ODI rates.

Summary of feedback on Ofwat's top-down approach and indicative rates

Ofwat have requested feedback on their top-down approach to ODI rate setting for them to take into account at draft determinations.

Where companies use the indicative ODI rates, we would still encourage them to provide feedback on both the top-down approach and the indicative rates as part of their business plan submission. This will help to inform how we set rates at draft determinations.

The connection between value to customers and incentives is being lost

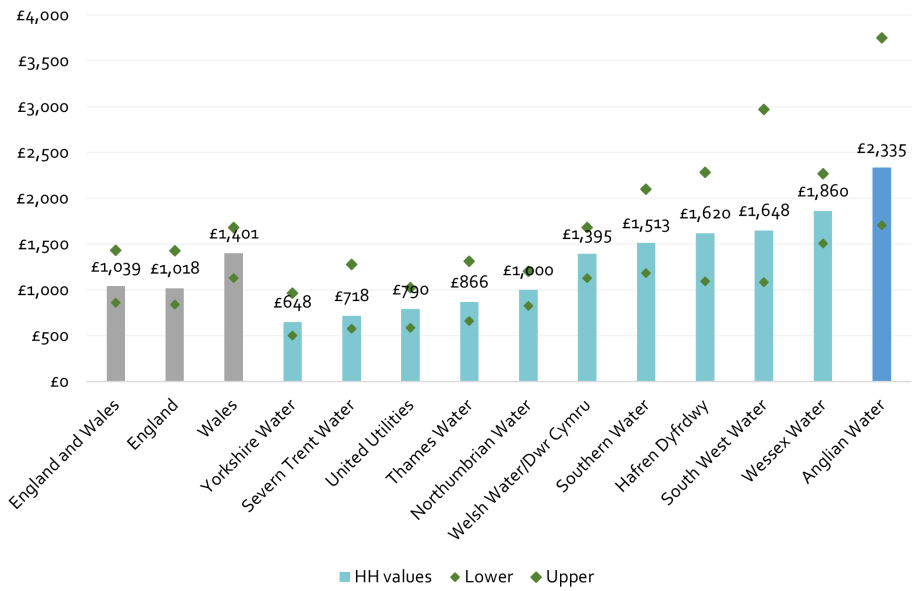
Ofwat's deviation from the use of value-based incentives presents a challenge to companies by driving a wedge between what is valued by society and responding to the incentives. This is vital for efficient rate setting and incentive-compatibility. It is in our customers' best interests for perverse incentives to be avoided and for incentives to align with optimal outcomes for society.

Ofwat's initial approach to base ODI rates on the collaborative research would have watered down the robust, triangulated Anglian Water social values by replacing them with single source values. Ofwat's view that rates should be consistent across companies causes a detriment to customers of companies, such as Anglian Water, with robust social values that more accurately reflect the value of services in their region. Ofwat should calibrate ODI rates to reflect these robust social values in our region, whilst ensuring that the overall RORE exposure reflects regional customer preferences and provides a level of consistency across companies.

We note Ofwat's Final Methodology for PR24 set out Ofwat's intention to 'set rates in a consistent way between companies, ***while allowing for material differences in customer preferences***'[81]Ofwat interprets one of the findings of the collaborative research 'that customer preferences were generally similar between companies. This supports the common approach adopted for PR24 and has enabled us to use consistent valuations across the industry'.[82] We do not agree that the findings of the collaborative research can be meaningfully interpreted in this way to say that the values are similar across companies. The example below for internal sewer flooding shows that the Anglian Water value for sewer flooding is significantly different to five of the ten other companies. Therefore setting consistent unit rates (using any approach) dilutes the insight that our customer's value sewer flooding than the national average.

81 Ofwat, 'Creating tomorrow, together: Our final methodology for PR24', December 2022, p. 66
82 PR24: Using collaborative customer research to set outcome delivery incentive rates, Ofwat, August 2023

Figure 39 Comparison of household values for Internal Sewer Flooding from Ofwat's collaborative research



Ofwat is concerned about the values emerging from this research and there are clear differences, both across regions and compared to our robust triangulated regional values. The differences between Ofwat's top down indicative rates and our robust regional values provide compelling evidence for alterative rates in our region.

Ofwat's drive for consistency in unit rates results in inconsistent incentives, because performance ranges differ between companies and the normalisation of performance (which seek to account for differences in company scale e.g. number of properties) do not scale linearly with RCV. The effect of Ofwat's 'one size fits all' policy is therefore that actual incentive exposure varies by company which must result in many of these incentive rates being materially too high or too low. An example of this is Discharge Permit Compliance where the intended incentive scale is 0.5% of RoRE, but multiplying the normalised unit rate by the industry range gives a RoRE exposure of 0.6%.

We understand Ofwat's desire for consistency, but this should only be consistency in the absence of compelling evidence for differences or alternatives. We do not believe consistency should be the end in itself.

Using performance ranges to set top-down rates

Ofwat's top-down indicative rates use historic analysis of all (relevant) companies to produce a risk range expressed as a percentage relative to target. This can be very different to the company historic range.

Ofwat's approach assumes that historical risk is reflective of the future. Targets may have gotten tougher over time and may be set differently. It is also true that for a number of PCs definitions have changed e.g. to remove exclusions (e.g. water supply interruptions, unplanned outage etc). While targets have gotten tougher, the risks to performance of operational incidents, climate change or extreme weather remain or are even exacerbated by changes to definitions. This suggests that performance ranges could be larger in the future, not smaller.

We are concerned that it is unreliable to use a few years' data to identify performance ranges. For example, external sewer flooding (where the range appears particularly small in the previous two years) has led to a large unit rate. The calculation for external flooding relies on two years of data during a period of drought. This is a new common PC and the extent of variance, especially given the climatic circumstances, is unlikely to be reflected in the data.

We are concerned about the implications of using an aggregated performance range for leakage, per capita consumption and business demand as aggregation can underestimate the performance variability for the individual performance commitment targets.

Perverse results from applying identical unit rates to differing regional targets

Examples are Bathing Water Quality and River Water Quality. Rates for different companies are distorted by applying a common level of performance variation to different assumed targets, before calculating the median, depending on the extent of the variability of the PC targets. We have used these indicative ODI rates in our plan but recognise that this could become an issue if data underlying the ODI rate calculation is amended during later stages of the PR24 process.

River water quality

This calculation compares natural variability in performance within the consent as a surrogate for variability in PC performance. However performance will be driven by a company's ability to remove phosphorous through it's investment

programme. However the historical performance range is derived from natural variability in performance within the consent arises from variability in incoming load and the nature of wastewater treatment.

Volatility in incentives between periods

Ofwat's approach introduces large changes in some incentives between PR19 and PR24, which could distort investment decisions in what are predominantly long-lived assets. For example there are big changes to water quality contacts. Customers can conflate cosmetic appearance of drinking water with safety. As discussed in our CRI commentary, our customers have been very clear that safety is far more important than cosmetic appearance. We think this performance commitment has been overvalued and could lead to expensive investments in long-term assets for little real customer benefit. The definition is also changing so the performance range needs to be revisited.

Use of research

We note the pieces of customer research used to inform customer prioritisation were not undertaken with this use in mind and have been retrospectively applied for this purpose. This contrasts to our dedicated Outcome Delivery Incentive customer research which explores customers views on the importance of having an ODI for each of the PCs. It is important to note that customers views on the importance of service in an area may differ from their views about the more specific question of the importance of having an ODI in that area. This could be because customers consider the current level of service to be appropriate.

Conclusion

There is an unwelcome degree of uncertainty remaining in incentives at this late stage of business planning. For example some rates to not reflect changing definitions. We note Ofwat will consider further the incentive rates at Draft Determination taking into account updated information, including company representations. We are conscious that Ofwat is in discussions with smaller companies about the impact of top-down incentives on them, but we have no information regarding what implications these discussions may have for our own incentives.

3.4 Our approach to setting incentive rates

Our default approach to incentives, in line with Ofwat's guidance, is to use the indicative incentive rates provided by Ofwat.

We have undertaken cross-check indicative rates, using four criteria: their alignment with societal values and customer priorities, changes from existing rates, materiality and the degree of company control. This has enabled us to identify differences between the preferences of our customers and the proposed indicative rates and the relative strength of the evidence. This cross check has identified four areas where there is compelling evidence for using alternative incentive rates than those provided by Ofwat.

Our approach to our cross-check of incentives

Our four criteria aim to assess Ofwat's proposed rate for balance across customer, company and societal objectives, as we set out below.

Table 33 Our approach to assessing proposed incentive rates

Criterion	Overview	Rationale
Alignment with AWS societal values for individual PCs	Comparison of Ofwat's indicative ODI rates to the rates from PR19 (underperformance) once adjusted for inflation and allowing for the change in benefit sharing factor.	Building on Ofwat's initial approach to setting top down ODI rates for asset health, our criteria assessed with the change from PR19 is a significant change compared to current performance. Volatility in incentives could lead to high regret investments in long-lived assets as companies respond to new incentives only for them to change again in the future.
Change from PR19	Comparison of Ofwat's indicative ODI rates to the rates from PR19 (underperformance) once adjusted for inflation and allowing for the change in benefit sharing factor.	Building on Ofwat's initial approach to setting top down ODI rates for asset health, our criteria assessed with the change from PR19 is a significant change compared to current performance. Volatility in incentives could lead to high regret investments in long-lived assets as companies respond to new incentives only for them to change again in the future.
Extent of company control	The ability for a water and sewerage company to manage the performance recognising that this varies by PC and for some PCs are more likely to vary due to external influences.	Reflects the principle of good regulation, providing incentives by exposing companies to risk for outcomes that are under their control.

Each of the common ODI rates have been assessed against the four criteria. The results are summarised in a Red- Amber-Green rating, based on the scale of the divergence.

For example, for PR19 alignment to account for the change in benefit sharing rate to 70% from 50% any increase lower than a factor of 1.5 is given a green rating. Rates that are 3 times or more higher are given a red rating. A similar scale is used for the alignment with AWS societal values. Extent of company control is based on judgement.

Summary of findings

The results of the analysis are set out in the following figure, we conclude that Ofwat's top-down approach to setting ODI incentive rates substantially over-values delivering improved service, compared to the views of customers in our region, which could lead to higher expenditure and bills relative to customers preferences. We also observe that divergence between our customer evidence and Ofwat's rates could lead to the business prioritising areas of service that are less important to our customers.

Figure 40 Summary of our assessment of Ofwat's indicative incentive rates

Performance commitment	Alignment with AWS values	Change from PR19 incentives	Extent of company control	Conclusion
Water supply interruptions	AWS higher	Similar	Moderate	Adopt Ofwat indicative rate
Compliance Risk Index (CRI)	N/a	Up slightly	Moderate	
Water quality contacts	Ofwat higher	Up Significantly	Moderate	
Internal sewer flooding	AWS higher	Similar	Moderate	
External sewer flooding	Ofwat higher	Up Significantly	Moderate	
Leakage	Ofwat higher	Down Slightly	Moderate	
Per capita consumption	**Ofwat higher**	**Up Significantly**	**Low**	**Propose alternative based on our Societal Valuation**
Business demand	**Ofwat higher**	**N/a**	**Low**	
Total pollution incidents	**Ofwat higher**	**Up Significant**	**Moderate**	
Serious pollution incidents	**Ofwat higher**	**N/a**	**Moderate**	
Discharge permit compliance	Ofwat higher	Up Significantly	Moderate	Adopt Ofwat indicative rate
Bathing water quality	Similar	Up Significantly	Moderate	
River water quality (phosphorous)	N/a	N/a	Good	
Storm overflows	N/a	N/a	Low	
Mains repairs	Ofwat higher	Up moderate	Moderate	
Unplanned outage	N/a	Up slightly	Good	
Sewer collapses	AWS higher	Down moderate	Moderate	

In some instances, our societal valuations are similar to Ofwat's incentives e.g. bathing water quality or the performance commitment is of low materiality e.g. unplanned outage and therefore we have opted to maintain our default position and adopt Ofwat's PR24 indicative rates.

However the table highlights:

- significant divergences of Ofwat's rates from the social values for discharge permit compliance, water quality contacts and mains repairs; and
- a significant increase in rates compared to PR19. At the extreme we see an increasing of 6.9 times in the rate for bathing waters. The ODI rates for water quality contacts, external flooding, PCC and discharge compliance are all around four times higher.

We are conscious that Ofwat are seeking greater consistency at PR24 and so we have set a high evidential threshold for proposing variations to Ofwat's top-down indicative rates. We have therefore focused on the areas where there is the strongest evidence and most material differences to our societal valuations.

However, our assessment shows that the results are particularly concerning for four PCs. For all four PCs, Ofwat's indicative incentive rate is at least two and a half times higher than an incentive rate based on our customer's societal valuations. For the two PC where an incentive exists at PR19, the increase is more than triple for Total Pollution Incidents and nearly quadruple for PCC.

A comparison of Ofwat's indicative rates and our proposed rates is shown in the table below.

Table 34 Comparison of Ofwat's indicative incentive rates and those based on the societal valuation of our customers

Performance commitment	Unit	Ofwat indicative incentive rate (£m)	Our incentive rate based on societal valuation (£m)
PCC	Litres/person/day	1.77	0.46
Business Demand	Megalitres/day	0.36	0.09
Total Pollution Incidents	Incidents per 10k km sewer	1.74	0.61
Serious Pollution Incidents	Incidents	1.14	0.15

These PCs can be thought of as two sets of two PCs (demand and pollution) given that they are interrelated. The impact is even more material at this aggregated level as these are areas where additional PCs have been introduced since PR19 (serious pollution incidents and business demand). For pollution incidents and serious pollution incidents do not align with the societal values and there is a disproportionate increase in the total pollution incident rate relative to PR19.

These two groups of PCs are discussed in turn in the following sections.

3.5 Demand performance commitments

Summary of the compelling evidence for using alternative rates for Business Demand and PCC

The preceding sections outline a number of points that combined, we consider to represent compelling evidence for the use of alternative incentives rates.

- As demonstrated above, the proposed incentives do not align to the conclusions of Ofwat's customer research which show that Business Demand and PCC are less important to customers than leakage and should have different incentive rates.
- The proposed indicative incentive rates for Business Demand and Per Capita Consumption are materially different to our own societal valuations. However Ofwat's indicative incentive for leakage is not dissimilar to our own societal valuation for leakage. Therefore using our societal valuations for Business Demand and PCC aligns our incentives to the views of out customers and relative prioritisation of three PCs.
- There are methodological issues in combining performance to set a performance range that ignore the nuances of individual performance commitments. If Ofwat's methodology to calculate unit rates was consistent for Leakage, PCC and Business Demand to the other PCs this in itself would result in stronger incentives for leakage which would be more aligned to customer evidence.
- There is a fundamental difference between leakage, which is a waste of a precious resource and the responsibility of water companies and demand, which is largely legitimate and can only be controlled by companies. This means that incentives should vary between these measures of service.
- Incentivising Business Demand with a powerful incentive rate, without any normalisation for economic growth, strongly disincentivises companies to facilitate economic growth. This is at odds with wider government policy. Unless the performance commitment definition is adapted it is inappropriate for such a powerful incentive rate to be applied to this PC and will undermine government policy.

Comparison of indicative incentives to Ofwat's and our own customer evidence

Ofwat's approach to generating top down indicative ODIs for the demand PCs differs to the standard approach for common PCs. Ofwat rightly notes that historic data on water consumption has been affected by responses to the Covid-19 pandemic. Ofwat's response to this historic anomaly is to create top-down incentives at the aggregate demand level. However this is a disproportionate response to Covid-19 that introduces significant unintended consequences that are not in the best interest of our customers.

Ofwat's view is that the increases in PCC that occurred in response to the pandemic are offset by reductions in business demand. While this may be true at an industry scale, it misses distributional effect on individual companies. For us distribution input remains higher than pre-pandemic levels, likely due to more home working from commuters who previously worked in London five days a week. Ofwat aggregates PCC, leakage and business demand in its considerations of historic

performance to generate the performance range (against historic aggregate demand PCLs) over which to spread the monetary value of RORE at risk in order to generate the indicative unit aggregate ODI rate.

This approach presents some significant problems that drive a wedge between the indicative rates and underlying customer and social value and so risks incentivising inefficient outcomes or creating perverse incentives:

- The indicative rate is directly related to the historical performance. Aggregating the historic demand to calculate the performance range significantly reduces the performance ranges and so underestimates the level of risk exposure associated with the separate performance metrics. PR24 performance against the metrics will be assessed separately and incentives incurred separately and so the unit rates should be calculated from disaggregated performance ranges.
- Ofwat's approach implicitly assumes that future household and non-household demand changes will offset each other, but provides no evidence as to why this assumption should be appropriate in Anglian Water's region even in the presence of another pandemic.
- Ofwat's approach of aggregating demand assumes that the value of a Ml/d reduction in water usage is the same across the three different types of reduction - leakage, PCC and business demand is valued equally. This is clearly inconsistent with Ofwat's own customer research, as well as the robust social value evidence that consistently across time and companies identifies differing customer preferences and value across demand reduction options. Customers value leakage (which they view as entirely waste) very differently to consumption, which is viewed as legitimate, enjoyable use as well as waste. This is compounded by the use of an absolute target for business demand reduction, rather than a per property, business or meter or by economic output in a region. This may act as a constraint on government economic growth objectives.
- Setting a single ODI rate across the three water demand PCs will drive a wedge between social value and ODI rates. This will incentivise companies to improve performance where costs are lower, rather than where social value is higher.
- An aggregate unit rate is only appropriate for an aggregate PC and aggregate target, where regulators wish to drive lowest cost activities that are interchangeable across the disaggregated components. (i.e. if Ofwat wishes to incentivise demand reduction at least cost regardless of which type of demand reduction it delivered). However, government policy drives separate targets for household and non household demand reductions. There are also far higher reputational incentives associated with leakage and meeting the leakage PCL. Separation of targets is in line with differing social value across the three elements of aggregate demand reduction. An aggregate unit rate is not suitable for use with disaggregated targets.

Social value differs by type of demand reduction

Ofwat's customer research and analysis demonstrates that customers have different priorities and values for leakage compared to PCC and business demand.

Ofwat commissioned three pieces of customer research that it uses to infer customer priorities for ODI rate size. As set out in the table below two of these consider leakage and PCC/business demand. Both produce higher customer importance for leakage compared to consumption reductions and Ofwat concludes leakage is a middle priority and demand reductions a low priority. The unit rate should clearly reflect this difference in priority for leakage, rather than aggregating RoRE exposure across the three measures to set the same unit rate for all three. Ofwat's aggregate top-down approach is clearly inconsistent with its own evidence.

Figure 41 Ofwat's prioritisation of PCs

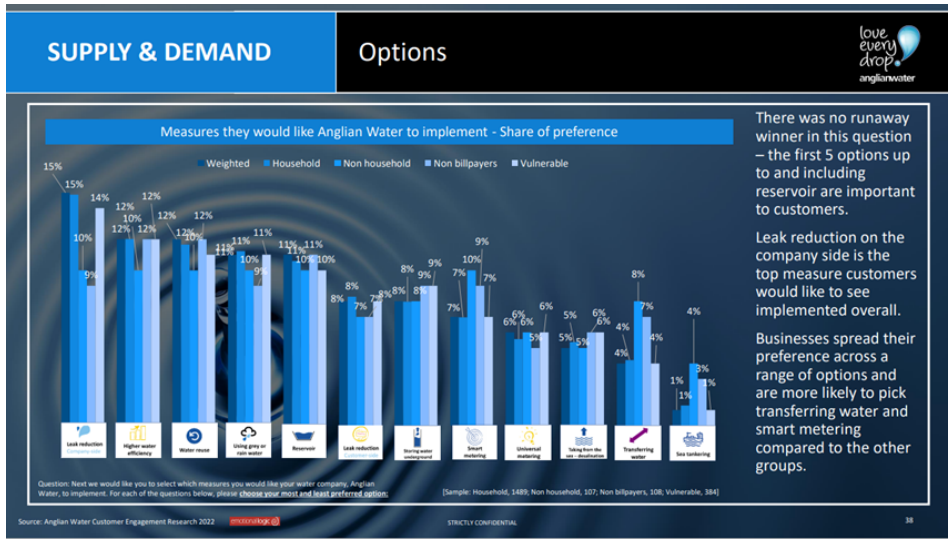
	PC	Customer research 1	Customer research 2	Customer research 3	Proposed ranking
Customer-facing	Internal sewer flooding	1	H	84%	H
	External sewer flooding	2	H	84%	H
	Water supply interruptions	3	H	83%	H
	Compliance risk index (CRI)	4	H	87%	H
	Customer contacts	5	H	87%	H
Environmental	*Discharge permit compliance*	-	M	82%	M
	Serious pollution incidents	6	M	82%	M
	Storm overflows	7	L	82%	M
	Total pollution incidents	8	M	82%	M
	River water quality	9	M	82%	M
	Biodiversity	-	M	69%	M
	Asset health	-	-	78%	M
Demand	***Leakage***	10	M	81%	M
	Per capita consumption	10	L	79%	L
	Business demand	10	L	79%	L
	Operational GHG emissions	-	L	68%	L
	Bathing water quality	11	L	82%	L

PCs in italics are those included in Batch 3.

The findings of Ofwat's research is supported by our own extensive regional water resources research. This research included a large quantitative survey undertaken by Emotional Logic. The findings are summarised in the Figure below, and also demonstrate higher customer preference for leakage as opposed to other types of demand reduction. While our customer research findings align with Ofwat's, Ofwat's approach to setting combined demand incentives ultimately results in incentives that are at odds with their customer research.

This study has been undertaken with 1,489 current and future household customers and 107 non-household customers. The survey included a series of video clips designed to illustrate some of the key points and to give respondents background information to allow them to make informed choices.

Figure 42 Our customers preferences for water resource options

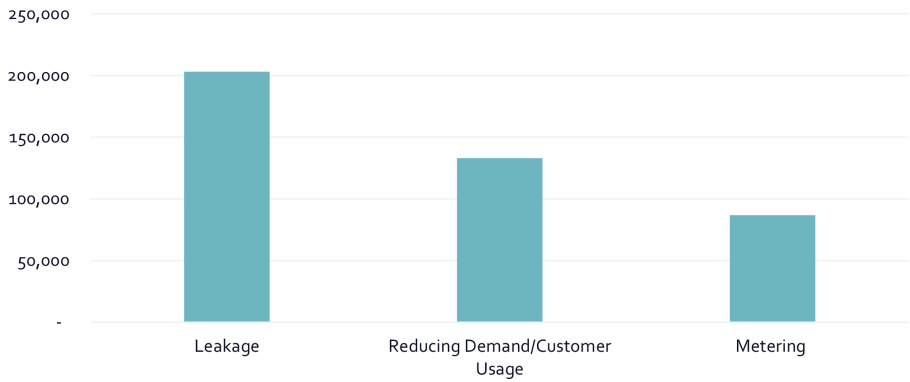


Our wider synthesis drawing upon the PR24 research programme, the wider WRMP research and PR19 research concludes that before any supply options can be considered customers have a strong view that we should 'get their house in order first'. For a significant majority of customers this means fixing leaks. The research consistently found that reducing customer consumption is a priority but less important than leakage.

This is aligned with PR19 research that indicated that customers prefer options that avoid perceived waste and promote efficiency.

Most tellingly, this preference of customers for leakage over reducing demand is provided by the results of our independently assured, comprehensive and robust triangulated social values. As shown in the following figure these demonstrate that the value of an Ml/d saved differs by type of reduction, with customers valuing leakage reduction more highly than reductions in consumption.

Figure 43 Our customers valuation of demand management per Ml/d, £



Further information on the studies and the development of the values is including in the section below on our alternative rates.

Performance risk is not consistent across the three components

Uncertainty is very different across each measure. Ofwat's aggregate approach averages these out and consequently underestimates overall risk levels in the top-down unit rate calculations. This drives a larger ODI rate per Ml/d compared to undertaking the analysis for each performance commitment.

The table below shows further analysis of the data used in the Ofwat top-down model and how the performance range varies significantly for the disaggregated PCs compared to the aggregated variance:

Table 35 Analysis of P10 and P90 performance range for each PC for the three years of data used by Ofwat (2019-20 to 2021-22)

	P10 range	P90 range
Ofwat aggregate range	-5%	3%
Leakage	1%	10%
PCC	-14%	2%
Business demand	-3%	16%

Applying these PC performance ranges to the PCL and equity at risk assumption from the Ofwat analysis for each Performance Commitment separately produces notably lower ODI rates per Ml/d than those calculated using the Ofwat aggregate approach:

Table 36 Top-down incentives using aggregate and disaggregate approaches

	ODI rate per MLD
Ofwat aggregate indicative rate	£0.365m
AWS analysis: Leakage	£0.325m
AWS analysis: PCC	£0.062m
AWS analysis: Business demand	£0.153m

We note that adopting this approach would give a result more in keeping with Ofwat's, and our own, customer research.

Ofwat's concerns about reporting

In our view the risk of mis-reporting is small. There are now more consistent approaches to reporting in place since the beginning of AMP7 and mechanisms to ensure consistency. Remaining risk could be mitigated by additional guidance to accompany the performance commitment definitions. As more companies adopt smart metering the quality of consumption data will only increase further reducing the risk of mis-reporting. This is already the case for us so is further justification to revert to our customer's view to set incentive rates.

This theoretical issue is also relevant for all PCs, as the stronger the incentives are in certain areas would encourage misreporting regardless of PC. This doesn't lead Ofwat to conclude that it is appropriate to incentivise all PCs equally.

In our view the consequences of mis-calibrating incentives outweighs other considerations here. Ofwat has other regulatory tools to ensure accurate reporting that would avoid having to explicitly deviate from customer preferences.

Comparison to Anglian's societal valuations

As noted in , Ofwat's indicative incentive rates are either moderately or significantly higher than our own societal valuations. This is demonstrated explicitly in the table below.

Table 37 Comparison of marginal benefits

Performance commitment	Unit	Ofwat 'implied marginal benefit'	AWS Societal value marginal benefit
Per Capita Consumption	Litre/person/day	£2.5m	£0.661m
Business demand	Ml/d	£0.5m	£0.133m

Taken with the concerns regarding Ofwat's approach, our desire to link incentives to the preferences of our customers and the strength of our own societal valuations we conclude that our PR24 incentives should be based on our societal valuations for these measures.

Our alternative incentive rates for Business Demand and PCC

The alternative rates that we have used for business demand and PCC are based on our robust societal values for customer demand/reduced consumption. We have used the Ofwat indicative rate for leakage, which although higher than our robust social value for leakage is lower than our PR19 ODI rate.

Our values are based on the triangulation of seven AWS studies in our valuation and triangulation programme which has been independently assured as best practice. The values have been validated and sense checked by comparing to wider data. [83]

83 ANH67 Societal Valuation Triangulation

The resulting marginal societal values and ODI rates are shown in the table below. The ODI rates are 70% of the marginal societal values to account for the benefit sharing factor:

Table 38 Our marginal benefits and incentive rates

Performance commitment	Unit	AWS Societal value	ODI rate per unit
Per Capita Consumption	Litre/person/day	£0.661m	£0.463m
	Ml/d	£0.133m	£0.093m

The marginal societal values for business demand and PCC are set relative to the triangulated leakage value using separate triangulated customer preference weights for the different demand options.

The results are based on customer evidence from both household and non-household customers. The values have been assessed separately for these groups of customers and aggregated:

Figure 44 Approach to producing a value for demand options

The leakage value is based on data from PR24 and PR19. This includes:

- The PR24 integrated Willingness To Pay (WTP) study,
- The PR19 dedicated Water Resources second stage research stated preference study
- The PR24 investment priorities study
- The PR19 main stated preference study
- PR19 Best worst scaling stated preference study

Our assurance processes both at PR24 and P19 have assessed these reports as high quality:

84 Jacobs, AW Societal Valuation assurance Final
85 Professor Ken Willis,PR19 Main stage Willingness to Pay review (PR19 Annex 12i)
86 ONS Natural Capital Accounts (2020). Referenced in Defra ENCA

"Overall, our assurance review of Anglian Water Integrated WTP Workstream A Report is that it strongly aligns to the Ofwat guidance principles of useful and contextualised, neutrally designed, fit for purpose, inclusive, continual, shared in full with others, independently assured and ethical."[84]

Our PR19 reports were subject to peer review by Professor Ken Willis:

"The eftec & ICS willingness to pay study research is an excellent, commendable, and professional piece of research. The study conforms to current best practice in SP and DCE. The analysis is meticulous and detailed, and provides accurate and reliable information about customers' preferences and values. It provides a wealth of information on customers' WTP values which can be used in a cost-benefit analysis of investment projects to improve water supply and water quality to Anglian Water customers."[85]

The value is consistent with wider evidence, in particular:

- The triangulated value is consistent with the wider evidence and aligns with external data from the ONS Natural Capital Accounts (2020) which is referenced in the Defra ENCA and uses a resource rent approach.[86] This gives a value of £196k per Ml/d which compares to the AWS value of £203k per Ml/d.
- The supply deficit value is calculated using the values for severe water restrictions, data on the draft WRMP24 deficit and reduction in chance of severe restriction. It uses a similar approach to how Ofwat intended to develop a value for leakage. The supply deficit value is £172k per MLD which is slightly lower than the leakage value of £203k per MLD. This is consistent as the supply deficit value covers the changes to the chance of a restriction, and the customer evidence shows that customers place higher weight on leakage compared to other sources.

Triangulated customer preference weights

The leakage value is mapped to other options using customer preference weights for different supply and demand options from two key studies:

- PR24 WRMP Quantitative research survey by Emotional Logic
- PR19 water resource options stated preference study

At PR19 further focus groups were undertaken to discuss and sense check the findings. Further qualitative research has also been undertaken at PR24.

A weighted average is calculated based on the robustness and relevance of the two studies as part of the triangulation process prior to being applied to the AWS value for leakage. This analysis was completed separately for household and non-household customers.

"Overall, our assurance review of Anglian Water Integrated WTP Workstream A Report is that it strongly aligns to the Ofwat guidance principles of useful and contextualised, neutrally designed, fit for purpose, inclusive, continual, shared in full with others, independently assured and ethical." [87]

"The PR19 Water Resources Second Stage Research Stated Preference Study by ICS and eftec is a meticulous piece of research. The methodology, and questionnaire, follows good practice. The vast majority of customers could clearly understand the tasks required. The survey was skilfully implemented, and the analysis derived statistically significant estimates of customers' preferences for the majority of water supply measures, and for water use restriction options. Anglian Water can have confidence in the results.[88]

3.6 Pollution performance commitments

Summary of the compelling evidence for using alternative rates for Serious Pollution Incidents and Total Pollution Incidents

The following sections outline a number of points that combined, we consider to represent compelling evidence for the use of alternative incentives rates.

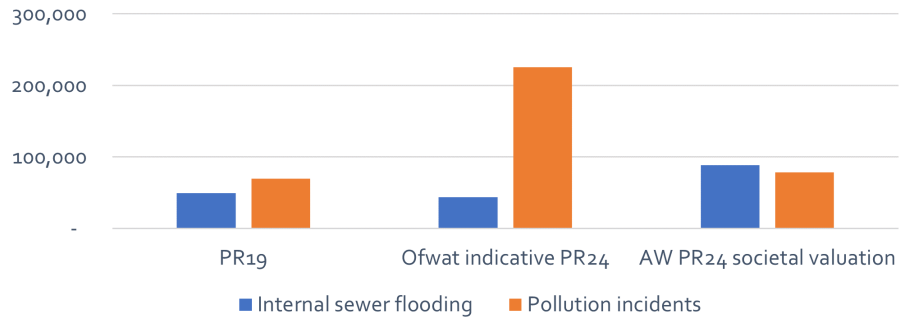
- As demonstrated above, the proposed incentives do not align to the conclusions of Ofwat's customer research which show that Total and Serious Pollution Incidents are less important to customers than Internal and External Sewer Flooding and should have lower relative incentive rates.
- The proposed indicative incentive rates for Total and Serious Pollution Incidents are materially different to our own societal valuations. The relative prioritisation of these measures is similar in our societal valuations (with flooding being valued more highly) to Ofwat's research. Therefore using our societal valuations for Total and Serious Pollution Incidents aligns our incentives in AMP8 to the views of out customers and relative prioritisation of four PCs (the two flooding PCs and two pollution PCs).
- Ofwat's valuation research clearly shows that Anglian's household customers valued sewer flooding significantly more highly than the national average (£2,355 for Anglian compared to £1,018 for England).

87 Jacobs, AW Societal Valuation assurance report
88 Professor Ken Willis,PR19 Second stage stated preference review (PR19 Annex 12j)

Comparison of indicative incentives to Ofwat's and our own customer evidence

Ofwat's approach to generating top down indicative ODIs drives a wedge between social value and incentive rates. This risks driving perverse incentives in sewerage network management as Ofwat's indicative top down ODI rates for pollution incidents are substantially above our robust social value based rates, as we show below. The figure also shows that Ofwat's indicative top down ODI rates for pollution incidents are significantly higher than the PR19 incentives, its PR24 incentive for internal sewer flooding and our own societal valuation. This is concerning as Ofwat's customer research suggests that the incentive rate for sewer flooding should be more material than pollution incidents as it is more important to customers.

Figure 45 Comparison of pollution incident and sewer flooding ODI rates, £



Customer preferences

Addressing pollution incidents are increasingly important for customers and this increase is reflected in the increase in our societal values compared to PR19 (visible in the figure above). Nonetheless, Ofwat's indicative top-down rates for pollution incidents are disproportionately high compared to the valuation derived from our societal valuations.

As summarised in Figure 45 Comparison of pollution incident and sewer flooding ODI rates, £, our comprehensive and robust customer engagement evidence demonstrates that customers want pollution and internal sewer flooding rates to be a similar priority (right hand bars).

Ofwat's indicative top down rates should be considered alongside Ofwat's evidence on customer priorities for sewer flooding and pollution incidents as these incentives risk driving inappropriate sewerage network management decisions. As set out in the table below, Ofwat's evidence demonstrates that sewer flooding remains customers top property, whereas pollution incidents are of medium customer priority as shown in Table 39 Incentive rates derived from AWS societal valuations. Both our customer valuation measures and Ofwat's own measures therefore provide compelling evidence that Ofwat's substantially increased top down indicative ODI rates for pollution incidents are not justified.

We are conscious that Ofwat's intent was to have more material incentives for internal sewer flooding than pollution incidents as noted in the table above. However the output of Ofwat's approach is to set much more material incentives for pollution incidents. This is linked to the performance ranges and targets used in Ofwat's method for setting rates rather than a conscious decision on the scale of the incentive.

In line with Ofwat's evidence, our customers are clear that sewer flooding is a higher priority for them than pollution incidents. We are, therefore, proposing to set incentives for these performance commitments based on the societal valuation of our customers. Acceptance of these rates risks dropping tackling sewer flooding down the relative priorities, going against the views stated by customers, so we are challenging to ensure the incentives reflect a more equal priority in customers interests.

Our alternative incentive rates for pollution incidents

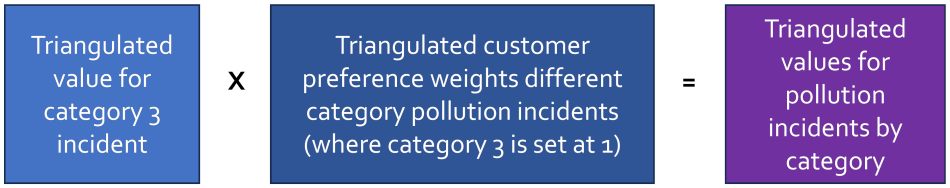
The alternative rates that we have used for pollution incidents are based on our robust societal values. The alternative rates that we have used for pollution incidents are based on our robust societal values for pollution.

Our values are based on the triangulation of eight AWS studies through valuation and triangulation programme which has been independently assured as best practice. The values have been validated and sense checked by comparing to wider data.

The marginal societal values for category 1 and 2 incidents are set relative to the triangulated value for a category 3 incident.

The results are based on customer evidence from both household and non-household customers. The values have been assessed separately for these groups of customers and aggregated. The final values for the Performance Commitments are weighted for the frequency of incidents in the region using an average of incidents in each category for the years between 2016 and 2022.

Figure 46 Producing values for different pollution categories



The resulting marginal societal values and ODI rates are shown in the table below. The ODI rates are 70% of the marginal societal values to account for the benefit sharing factor.

Table 39 Incentive rates derived from AWS societal valuations

Performance commitment	Unit	AWS Societal value per unit	ODI rate per unit
Total pollution incident	Incidents per 10,000 km of network	£0.864m	£0.605m
Serious pollution incident	Incident	£0.214m	£0.150m

The marginal societal values for category 1 and 2 incidents are set relative to the triangulated value for a category 3 incident.

The results are based on customer evidence from both household and non-household customers. The values have been assessed separately for these groups of customers and aggregated. The final values for the Performance Commitments are weighted for the frequency of incidents in the region using an average of incidents in each category for the years between 2016 and 2022.

Triangulated value for pollution

The pollution value is based on data from PR24, PR19 and PR14. This includes:

- PR24 Integrated WTP study

PR24 Investment priorities study

- PR19 Main stated preference study
- PR19 Best worst scaling stated preference study
- PR19 Water resources second stage preference study
- PR19 Online community research
- PR14 Main stage study

Our assurance processes both at PR24, PR19 and PR14 have assessed these reports as high quality:

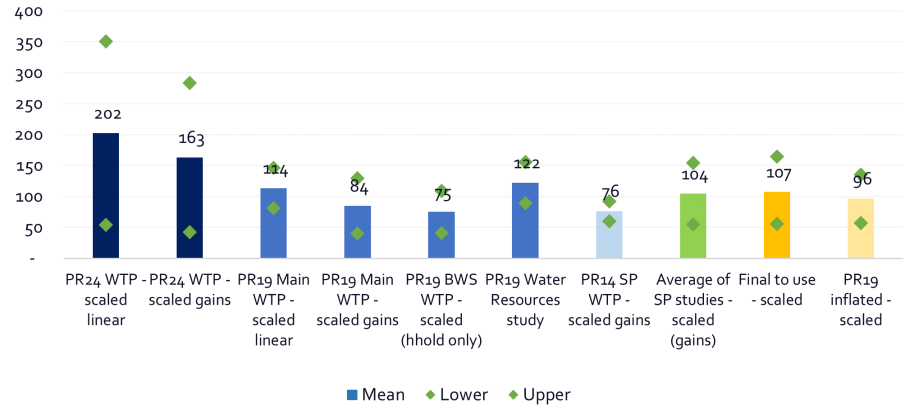
"Overall, our assurance review of Anglian Water Integrated WTP Workstream A Report is that it strongly aligns to the Ofwat guidance principles of useful and contextualised, neutrally designed, fit for purpose, inclusive, continual, shared in full with others, independently assured and ethical."[89]

Our PR19 reports were subject to peer review by Professor Ken Willis.

"The eftec & ICS willingness to pay study research is an excellent, commendable, and professional piece of research. The study conforms to current best practice in SP and DCE. The analysis is meticulous and detailed, and provides accurate and reliable information about customers' preferences and values. It provides a wealth of information on customers' WTP values which can be used in a cost-benefit analysis of investment projects to improve water supply and water quality to Anglian Water customers."[90]

The triangulated value is the long run average of the primary values (based on the PR24 integrated WTP study, three PR19 studies and the PR14 study). The PR19 and PR14 values are aligned and show a similar range. The PR24 values are higher than those observed historically. This indicates that household customers have increased the value that they place on mitigating pollution. The triangulated value is consistent with the wider evidence and is slightly higher but aligned with PR19.

Figure 47 Primary data for category three incident valuation (£000s)



Triangulated customer preference weights

Values for serious pollution incidents are set relative to a category 3 incident, drawing on robust primary research from PR14, PR19 and PR24 to understand their relative values across types of pollution incident.

Anglian Water Studies used are:

- The PR24 integrated WTP study
- PR14 Second stage environment study
- PR19 Online community research

The PR14 findings were also tested with customers at PR19 in focus groups. The resulting values have been compared to wider evidence including other water company values and the relative weights from the PR24 collaborative research project impact exercise.

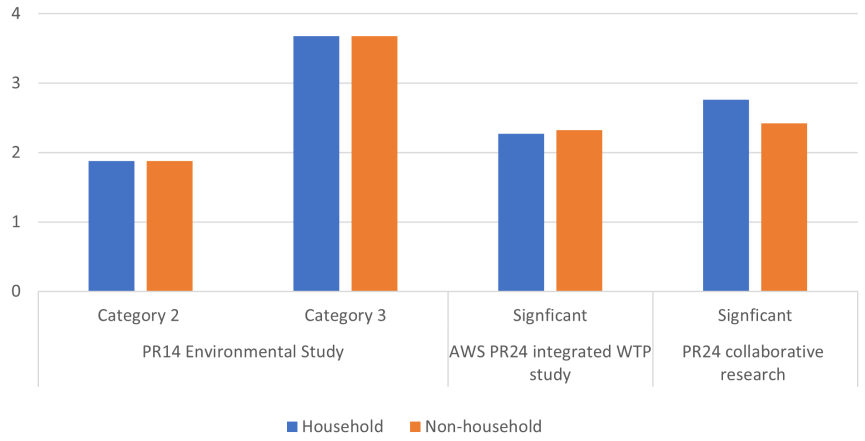
This analysis was completed separately for household and non-household customers.

The customer preference weights for different category incidents are shown in the figure below. The weights are expressed relative to a category 3 incident. This evidence is consistent both between household and non-household customers and over time.

89 Jacobs, AW Societal Valuation assurance report
90 Professor Ken Willis,PR19 Main stage Willingness to Pay review (PR19 Annex 12i)

Due to the greater level of detail and consistency the category 3 pollution incident values have been mapped to category 1 and 2 pollution incidents using weights from Anglian Water PR14 Environment Stated Preference Study. These weights were tested in the PR19 relative preference focus groups and found to be highly valid. They are also aligned with the weights for a minor/category 3 and significant incident (category 1 or 2 incident) from the PR24 study and similar weights (pollution elsewhere) from the Ofwat and CCWater PR24 collaborative research project.

Figure 48 Customer preference weights for different pollution categories



4 OUT8: PR19 outcome performance summary

The data provided in these tables are forecasts of our performance for the final two years of AMP7. The basis for these forecasts is:

- our experience of performing against the performance commitments in the first three years of the price control period,
- the impact of our proposed investments,
- our knowledge of the performance commitment levels,
- our understanding of external factors (where relevant), and
- our ambition to deliver improvements in areas that matter to our customers.

The performance payments are copied from the populated ODI performance models for 2023/24 and 2024/25.

The data provided in these tables reconcile to the "Forecast of total 2020-25 outperformance or underperformance payment" column in our 2023 APR tables 3A and 3B.There are two areas of difference:

- the Bathing Waters Attaining Excellent Status performance commitment forecasts have been updated based on more up to date information.
- we have aligned the ODI performance models to Ofwat's approach to the Per Capita Consumption performance commitment, which is to make no account for the impact of Covid-19 and to calculate penalties based on the incentives outlined in the PR19 Final Determinations. We disagree with this approach, but as the first two years of data were hardwired into the model, we considered it pragmatic to align to this approach. We set out our assessment of the impact of Covid-19 on PCC performance in years 1-3 of the price control period below.

The performance payment forecasts in OUT8 do not match the forecasts in OUT6 for 2024/25 because of the performance model's treatment of per capita consumption (PCC). The figures provided for the PCC performance payment forecasts in 2023/24 and 2024/25 are consistent with the outputs of the respective ODI performance models for those years. While 2024/25 is the only year that records an in-year performance payment not equal to zero, the 2024/25 model includes the accrued ODI payments for the other four years of AMP7. These are therefore included in OUT6 but not in OUT8.

love every drop
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