PR24 Data Table Commentary
Section 1. Outcomes

Contents

1. Introduction

What data is being presented within the OUT Tables?

Within this section, we are displaying data on the outcomes we expect to deliver for our customers and the environment within our PR24 Business Plan.

The tables will show how we have performed historically, and what we are forecasting going forward against performance commitments (PCs) in relation to customer service, environmental and asset health. The tables will also display our outcome delivery incentive (ODI) attached to each PC.

Why are we presenting this data?

We will use this data to set performance commitment levels and ODI rates. This will enable us to develop the PR24 outcomes framework that will hold us to account for the outcomes that our customers pay for, and incentivise us to go further where it is in the interests of customers and the environment.

How does our data align with our Annual Performance Reports (APR)?

We have set definitions for common PR24 performance commitments in the final Ofwat methodology. Where these definitions remain unchanged from current annual performance reporting we intend to capture data in a format aligned with tables 3A to 3I of the annual performance report (APR). We follow a similar approach to data capture as used in the APR with table OUT1 summarising overall performance trends by performance commitment in terms of each unit of measurement. Tables OUT4 and OUT5 provide the supporting calculations for these figures, referencing data from elsewhere in the business plan tables where appropriate.

You can find our latest and historical APR submissions here:
https://www.yorkshirewater.com/about-us/reports/

2. ODI Investment Model

The base maintenance investment model (relevant to ISF, ESF, Pollution, serious pollution, discharge permit compliance and sewer collapses) was used to model a range of ODI and investment scenarios. The model has a range of costed interventions with an assumed service contribution that has been optimised to provide best value. The overall aim was to maximise our service position using the funding that is available and some key assumptions on PCL benchmarks.

We have further used the model to predict what 2035 levels of performance might be. A modelling method termed 'relative rate of improvement' has been adopted whereby assumptions are made which drives a rate of improvement within those assumptions and a funding envelope. The assumptions we have used are that the unit rate of the interventions would increase by 20-50% as we move closer to zero on the service levels and that the relative rate of improvement would decrease by 10-30%.

Further to the investment model we have used an econometric model that has made further adjustments to ISF, ESF and Storm Overflows. This model has taken into account exogenous variables such as combined sewer length and urban rainfall that impact on our ability to deliver the performance commitments and undertake operations. Further detail of how these models have been used to adjust our proposed PCLs can be found in the PC appendices.

3. Data Overview

The forecast data is appliable for the future, calculated using such models as described above and in the table methodology document. As for the historic data that is included in OUT2 and OUT5, these are either actual values, where data is not available a best estimation based on a back calculation, this is due to no records being held previously, or where the data is not available or applicable.

Using the company Turnaround Plan for 2024/25 values, a trend was calculated to determine the optimal AMP8 glide path – this is generally a linear trend forwards unless a specific glide path is relevant to the PC.

Using the allowed investment and the outturn position our Board tested the financeability and affordability of the proposed plan and agreed a set of PCLs. The business has an objective to create a best value plan for customers.

4. Relationship to PR19 Business Plan

The data has looked to build upon the PR19 business plan and subsequent performance improvements that have been made ensuring that we continue to make service improvements where cost effective and affordable to do so.

The PR24 forecast has been optimised giving business scenarios for each Performance Commitment. The scenario has been agreed with the relevant steering groups in the PR24 governance process. A range of scenarios have been generated

and costed for future performance. The business is trying to strike a balance between a stretching but achievable and affordable service objective.

5. Water supply interruptions

The data provided in table OUT4, lines 4.2, and 4.3 reports our performance against the comparable Performance Commitment for Water Supply Interruptions. This Performance Commitment measures interruptions of clean water supply to properties for a continuous duration of 3 hours or more from the time of no water to restoration of supply. The definition of 'no water' is when there is no water available at the first cold tap, or operationally equivalent to ≤3 metres pressure in the main.

We started AMP7 (2020/21-2024/25) strongly, with performance and weather remaining relatively stable enabling us to outturn only 44 seconds above the Performance Commitment target in year 1.

In year 2 of the AMP, 2021/22, we experienced a long hot summer with significantly high levels of soil moisture deficit and increased demand on the network that impacted on performance. Storm Arwen then followed this period in November where a number of pumping stations suffered from elongated power outages resulting in widespread interruptions across remote areas of Yorkshire.

The most recent year of the AMP, 2022/23, we started strongly, tracking in line with our performance commitment target line until week 19. However, in week 20 we experienced a large event due to a trunk main burst in the Ripon area, a remote single supply area with no re-zone options to restore supplies that added 63 seconds to performance. In weeks 21 and 25 we had additional, near identical events in the area bringing the total impact up to 106 seconds, which we would then struggle to recover from. Combined with this we had another summer heatwave, with areas of Yorkshire exceeding 40 degrees, putting an unprecedented demand on the network and increased levels of failure. Over the winter we experienced a significant freeze/thaw event throughout December, however the learning we implemented from the 'Beast from the East' (early 2018) and Storm Arwen allowed us to mitigate the majority of the impact on performance but still contributed to us missing the performance commitment target for the year.

During this AMP we have seen significant hot and cold weather events having an impact on performance, and the evidence suggests that we will continue to experience the effects of these weather events due to global warming. We are looking to increase our resilience by submitting recommendations from the Stantec resilience studies conducted in year 2 of this AMP into our PR24 submission for future AMPs.

We have also implemented learning from historical events and improved processes such as our winter escalation plans following the 'Beast from the East'. This has already proved a benefit in terms of planning and preparedness in year 3 where we have experienced several weather events and still seen an improvement in overall performance.

There is an ongoing Governance programme specifically for Water Supply Interruptions that meets monthly. This now includes a daily operational call, and a weekly tactical meeting. Through this governance programme key stakeholders review performance, critical factors and lead measures and put in place tactical intervention actions to improve performance and address issues.

We identified and implemented several initiatives in AMP6 to improve performance in anticipation of the challenging targets in AMP7. These included increasing our retrospective assurance resource, implementing a 24/7 duty operations team in the control room to manage interruptions, and developing a restoration team to provide continuous supplies.

There are several key ongoing interruptions prevention projects including:

AMP7 (2023/24 & 2024/25): As part of a business wide initiative a number of projects have been submitted to improve performance in the final 2 years of AMP 7 and improve readiness for AMP8.

Plans have also been submitted to renew or rehabilitate our top 6 impacting distribution maintenance areas to improve asset failure rates and overall water performance. We are targeting non preferable material mains such as CI and AC that may see a mains repair reduction of 75% in these specific areas.

In addition to the above projects there is scope to review the Field Ways of Working patterns. This will enhance our coverage out of hours and enable a quicker response to incidents that begin during these hours, which is approximately 66% of the total interruptions performance.

Arlington Trailers: Building on the success of the implementation of the restoration team a project has been delivered to procure 6 trailers to carry Arlington Tanks to deploy in interruptions events to temporarily restore properties. 3 Arlingtons can carry the same amount of water as a small tanker, and can be left in situ to temporarily restore properties whilst mains repairs are being carried out reducing the impact of interruptions on customers in particular where isolated properties in remote areas may be interrupted for longer periods of time.

Improved accuracy of schematics: There is an ongoing project to ensure all network information is accurate and up to date. This will ensure that the field technicians and engineers have the right information to hand when out in the field to improve decision

making. So far 500 schematics have been updated and are available for use with the remainder being work on throughout AMP7.

Visible Valve Status IT Update: Visible Valve status updates provide key information of how and when our network and assets have been operated. They are critical not only incident management, but in the hydraulic review process to create an accurate timeline of events. An IT Change Project is in delivery to provide critical improvements to this software, including adding 'part open/closed' functionality, expanding capability to capture the use of hydrants, and the option to manually enter the time operated if completing retrospectively to enhance our data capture.

We do not foresee any changes to the systems utilised or methodology for reporting interruptions in AMP8 at this time. However there is a risk around reporting consistency across the industry in light of the reporting guidance and data sources available.

Water Supply Interruptions (OUT4)

Total number of properties supplied is from table SUP1B for AMP8 and AMP9. Total number of properties interrupted, and Total minutes lost have been back calculated based on company's PC forecast for AMP8 and AMP9. Both lines are reducing year on year in line with the PC forecast.

Impact of historical enhancement expenditure on performance trends:

We have not included any enhancement adjustments to performance in the table for water supply interruptions.

We note that the volatility around this metric is large so assessing in-year performance can be problematic. This volatility is even more significant for the smaller water only companies whose performance can fluctuate year-on-year due to individual incidents, whilst the underlying risk may have remained the same.

6. Compliance Risk Index (CRI)

Through AMP7, it has become clear that certain asset types are consistent, major contributors to our CRI score, these primarily being iron fails in the treated water network and coliform failures at Water Treatment Works (WTW). As a result, both the AMP7 turnaround plan and AMP8 capital maintenance plans focus significantly on these areas.

Investment in AMP8 is targeted at addressing long term deterioration in our source raw waters, and enhancing the replacement rate of our water mains, whilst providing a resilient supply of drinking water to customers. This approach will provide an impact

on CRI performance through sustainably reducing the number of aesthetic service impacts.

It is estimated that Base funding is only sufficient to hold this ODI measure steady and avoid deterioration, but it cannot facilitate sustainable improvement much beyond observed AMP7 improvement rates. Additional funding to address asset health and resilience issues is required to ensure longer term improvement.

Our forecast performance shows an improvement over time which means we are proposing a stretching yet achievable target of a CRI score of 2.51 by the end of AMP8. This will be achieved through a series of fundamental improvements to filtration performance, as well as a scheme to provide enhanced chemical dosing which will provide more a more robust treatment process for customers in the future.

The improvement for this PC is 65% from Base Expenditure, therefore, OUT2 is the PC trend with Base only.

Impact of historical enhancement expenditure on performance trends:

Most enhancement expenditure in drinking water quality compliance is to address raw water deterioration or to meet new, more stringent quality standards. Whilst the former of these may result in a small number of CRI failures prior to an enhancement intervention being made, we have not included any impact of enhancement expenditure on these schemes.

There are two areas which warrant further discussion, shown below, the second of which we have included in our submission.

Lead expenditure

Our lead strategy over the last 15 years has been to target replacement or relining of lead communications pipes. Interventions have focused on vulnerable customers, properties that have had sample failures and some high-risk areas. In recent years we have gone further and lined non-company owned pipes removing further risk.

It could therefore be argued that this enhancement expenditure has influenced compliance (and therefore CRI). We have not however adjusted our table for this activity as:

a) Despite being a very important parameter from a public health perspective, lead has only a very small impact on CRI due to the way the metric is calculated.

CRI Impact	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Lead	0.00001	0	0.00001	0	0.0001	0.00001	0.1824	0.001	0.0019	0.003	0.001	0.0703	0.0048

b) The lead risk is widely dispersed across the network (any customers with lead pipes are at risk) so the incremental removal of lead only has a small impact on the CRI.

Metaldehyde Expenditure / Catchment Management

In the early 2010s the industry started to monitor for metaldehyde (the active component of slug pellets). Given certain weather conditions at certain times of year, there was a significant risk of non-compliant levels of metaldehyde entering supply (the public health risk was minimal) at some of our largest works.

Between 2013 and 2020, we spent both base and enhancement money (through WINEP Drinking Water Protected Areas drivers (supported by the DWI)) in developing a suite of tools for minimising metaldehyde risk, employing farming officers and delivering catchment management.

CRI Impact	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Metaldehyde	0.1803	3.9587	0.2839	1.9142	1.2661	1.1417	1.5201	0	0	0	0	0

We anticipate that there was an impact of c. 1 -1.5 CRI points from the interventions that were made. We have assumed that less than 50% of this impact could be ascribed to enhancement. We have therefore assumed that our performance between 2018 and 2021 would have been 0.5 CRI points higher had this enhancement activity not taken place.

It is very difficult to specifically split the metaldehyde elements of DWPA activity from the general catchment approach. AMP6 Metaldehyde activity was reported in the APR in line 4L.10 Drinking Water Protected Areas (the PR14 submission had specifically allocated c.500k Capex enhancement to metaldehyde related activity).

The key activities delivered under the Drinking Water Protected Areas enhancement driver have been:

- Employment of Catchment Sensitive Farming Officers through Natural England.
- Deployment of the Catchment Sensitive Farming Officers resource by ourselves.
- Development of more granular risk mapping and GIS tools to maximise the impact of the Catchment Sensitive Farming Officers.
- The development of predictive techniques for our Service Delivery Centre, to allow improved decision making relating to abstraction.
- Consideration of targeted PES schemes.
- Consideration of soil health advice to minimise the use of chemical control products in general and more specifically metaldehyde.
- Ways of driving best practice farming activities from the early adopters into the catchments.

- Working with the supply chain for arable products to promote metaldehyde-free approaches.
- Developing an innovative system for the "loan" of equipment, which brings significant risk reduction into catchments as a means of driving the adoption of new slug control techniques into farming.

More sustainable links with other catchment stakeholders such as the Rivers Trust and Yorkshire Wildlife Trust.

7. Customer Contacts about Water Quality

Our Resident population forecast is based the Office of National Statistics (ONS18) forecast. Our forecast is increasing year on year; however it is slightly lower than numbers stated in ONS18 due to our APR reported numbers being lower.

The forecast number of contacts for taste and odour and discolouration in future years have been back calculated based the Board approved PC forecast in AMP8 and AMP9. The numbers are reducing year on year. The proportional splits are in line with what is currently experienced.

The improvement for this PC is 70% from Base Expenditure therefore OUT2 is the PC trend with Base only.

Impact of historical enhancement expenditure on performance trends:

We have not been able to quantify any adjustment to service due to historic enhancement expenditure, however there is a known benefit from historic manganese removal plant installations (delivered through enhancement) that has allowed our base activity to drive and sustain a service improvement.

Discoloration is the main component of customer contacts with a significant proportion due to manganese (Mn) deposits that build up over time on the inside of pipes. When these deposits are disturbed (due to a redirection of water, or a burst) they become mobilised and can reach customers' taps in the form of discoloured water.

We have invested significantly in Mn removal at our treatment works through enhancement since the early 2000s which has partly contributed to our improved performance over this time. Our most recent completed interventions were in AMP5 where we invested in new processes at Rivelin and Ingbirchworth WTWs to reduce the amount of Mn entering the network. The Sheffield region which these works feed was one of our areas of highest discoloration risk.

The immediate risk was addressed following an extensive flushing programme which was then rolled out across the region. However, the unseen benefit of the Mn removal plants is that the rate of 'reseeding' of the deposits on the mains will reduce as less Mn is now entering the distribution. So, whilst the risk was addressed by flushing the mains and removing the deposits, the build-up of this risk is slower in the future allowing a sustained improvement.

NB - Mn removal processes do not entirely stop this build-up and so the risk from upland sources high in manganese is always higher than from groundwater and river sources.

8. Internal Sewer Flooding (ISF)

We will show continual improvement in our ISF performance in AMP8 and AMP9. ISF is a priority for our customers, and we are committed to making improvements. Further details on how we propose to do this are in the PC appendix. The improvements are all driven through a base outcome therefore OUT2 and OUT5 align.

The end of AMP7 forecast position has been provided based on a business decision taking into account the investment programme and funding available for the remainder of the AMP, the activity required to deliver the service and the catch up required to the PR19 FD. The proposed AMP7 end point and AMP8 entry point has been agreed with the Board in our corporate governance structure. The proposal is to enter AMP8 at 2.30 incidents per 10,000 sewer connections which equates to 547 annual incidents.

A range of scenarios have been generated and costed for future performance. The business is trying to strike a balance between stretching but achievable and affordable service objectives. We propose a performance adjustment for the ISF PCL benchmark based on exogenous variables such as urban rainfall, combined sewer length, and frequency of cellared properties and food outlets.

Our performance is below the industry upper quartile service and we do not believe this is achievable, good value or appropriate with the investment allowed for in the PR19 Final Determination (FD). The scenario for AMP8 has been optimised by the investment model using the range of interventions available. These include focussing on the areas that have cellars and installing alarms to allow us to proactively intervene when required. Also, proactive activity on the network to increase cleansing and visiting over 250,000 targeted properties to remove blockage risks on a hot spot basis.

The proposed target is stretching but achievable and we believe this should be 430 annual incidents. This is therefore the level of performance at 2030 that we have entered into OUT5.

In AMP9 the model proposes a further performance level improvement of 44 incidents by 2035 leading to 386 incidents by the end of AMP9 using the relative rate of improvement method outlined above. The split between proactive and reactive is assumed the same as AMP8.

The final entered data into OUT5 from base investment model for AMP8 is 430 ISF incidents by 2030. Using the AMP7 'turnaround plan' value of 535 incidents in 24/25 and linear glide path was created for AMP8 to 430 incidents. The table requires a split between customer proactively reported and company reactively identified e.g. through neighbouring properties from the primary identified incident. Using the long-term trend from 2011/12 to 2022/23 the ratio between the 2 report categories is 89% proactively identified and 11% reactively identified and this has been used for the projection into the future. For AMP9 386 incidents has been entered for 2034/35 again using a linear glide path from 2029/30.

Impact of historical enhancement expenditure on performance trends:

We have not included any enhancement adjustments to performance in the table for ISF. However, as described in the introductory section, there was a significant programme of expenditure allocated to enhancement at the APRs and at PR19 in 2018-2020 that was used to drive a step change in our performance when Ofwat's policy was set out to move from company specific targets to quartile level monitoring.

Our plan to improve internal flooding performance expenditure was aimed at tackling internal flooding created by other causes in discrete problem zones across our region, as well as a significant increase in proactive sewer network investigation CCTV and repair programmes of work, supported by the introduction of a larger scale defects rectification programme for more complex solutions that could not be resolved using the reactive block schemes. We also transformed the Customer Field Services teams with internal resources being used for all non-civils work and purchased additional vans, CCTV units and tankers to support these colleagues.

Whilst we did drive significant improvement in this PC with this investment, we believe there are exogenous factors that impact on our comparative performance and explain the gap between our current performance and the industry upper quartile.

Enhanced Levels of Service (EloS)

Between 2010 and 2015 we were allocated EloS investment to drive improvements in internal sewer flooding risk. This was expenditure specifically targeted at properties that were deemed to be on the DG5 register and were at unacceptable risk of flooding in a given return period. The interventions will have included storage, upsizing of sewers or alternatives where appropriate. The proposed deliverables were that properties on the "1 in 10" register reduced by 45, "2 in 10 register" reduced by 20 and the "1 in 20 register" reduced by 2.

We have not included any adjustments on this expenditure in the table. Conversion of the DG5 Risk Register into the ISF performance is not straightforward and we have assumed that the activity will have impacted all years of our reported data equally, (it would impact our relative performance).

9. External Sewer Flooding (ESF)

We plan to show a slight deterioration in ESF in AMP8 taking into account our econometric modelling and an improvement in AMP9. The improvements are all driven through a base outcome therefore OUT2 and OUT5 align.

The end of AMP7 forecast position has been provided based on a business decision taking into account the investment programme and funding available for the remainder of the AMP, the activity required to deliver the service and the catch up required to the PR19 FD. The proposed AMP7 end / AMP8 entry point has been agreed with the Board. The proposal is to enter AMP8 at 18.54 incidents per 10,000 sewer connections / 4317 annual incidents.

The forecast for ESF has been populated based on the PR24 optimised business scenario for the Performance Commitment. The scenario has been agreed with the Board in the PR24 governance process. A range of scenarios have been generated and costed for future performance. The business is trying to strike a balance between stretching but achievable and affordable service objective. The business proposes a performance adjustment for the ESF PCL benchmark based on exogenous variables such as urban rainfall, combined sewer length, and propensity of fast food outlets.

We perform well in ESF and have consistently been above the PR19 FD throughout AMP7. However, we expect Ofwat to reset the PCL for AMP8 and have put forward a case for what this should be. The scenario for AMP8 has been optimised by the base maintenance model using the range of interventions available. These include installing around 68,000 sewer monitors and alarms by the end of the AMP to allow us to proactively intervene when required.

Also, proactive activity on the network to increase cleansing and visiting over 250,000 targeted properties on a hot spot basis. The proposed scenario outturn at 2030 is 4553 incidents.

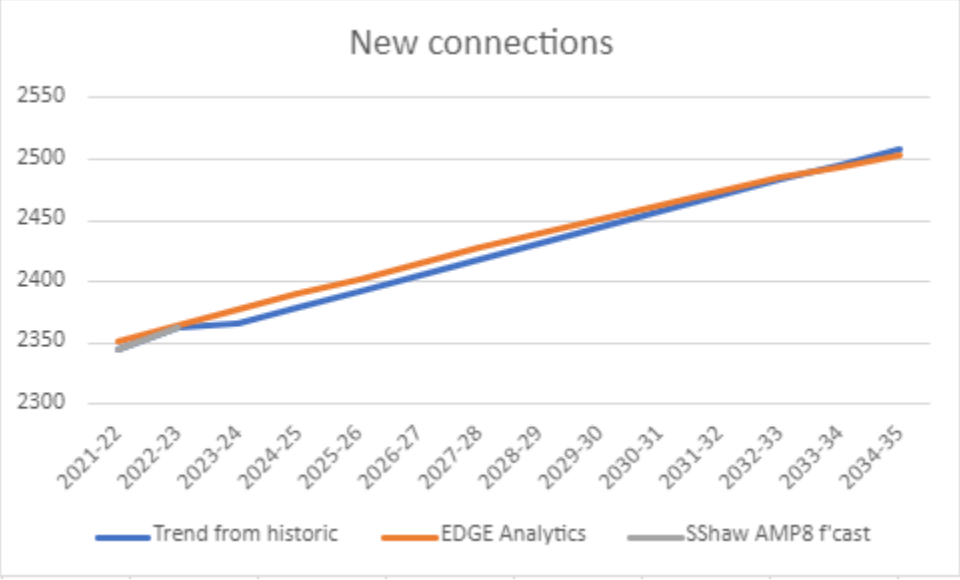
In AMP9 we propose a 2035 performance level of 3020 incidents based on the relative rate of improvement method described above.

Using the AMP7 'turnaround plan' value of 4317 incidents in 2024/25 and linear glide path was created for AMP8 to 4553 incidents. The table requires a split between customer proactively reported and company reactively identified e.g. through neighbouring properties from the primary identified incident. Using the long-term trend from 2011/12 to 2022/23 the ratio between the 2 report categories is 93% proactively identified and 7% reactively identified and this has been used for the projection into the future.

Impact of historical enhancement expenditure on performance trends:

We have not identified any specific enhancement expenditure on ESF. However the activity related to internal sewer flooding that we included as enhancement will have had some related benefit to ESF.

For both ISF and ESF, the normalisation factor derives from our connect volumes. The below shows the volume of 'New Connections' we are forecasting through to 2034/35:



10. Biodiversity

The Board have agreed an increase in Biodiversity units in AMP8 to 0.06 units per 100km2 land served by end of AMP8 and 0.12 units per 100km2 land served by end of AMP9.

The data details expectations around area of land that will be surveyed by ecologists each year of future AMPs. It covers expectations around what the baseline state of biodiversity may be shown to be present from those surveys, together with forecasts of what condition that biodiversity may change to during the AMP cycle. The data is categorised using three types of biodiversity unit as defined by DEFRA. Using data on our operational area, the table combines the unit types and averages these units by land area.

There is limited existing data, since water companies have not been obliged to collect this information previously, and it involves a significant amount of resource to do so. Some limited information exists where habitat surveys have been undertaken for other purposes (e.g. monitoring protected sites or evaluating past WINEP measures). These lines were not required within PR19 or other submissions.

The area of land surveyed is based on surveys undertaken by our biodiversity team during 2020, 2021 and 2022, where the type of survey undertaken aligns with the requirements under these data table lines. As such the accuracy of this data (row 5.15) is higher than the other lines.

The approach taken for producing the baseline biodiversity data and forecast biodiversity data has been to use the predicted AMP8 programme to identify the likely amount of biodiversity units generated, to assume a baseline of zero and a forecast outcome of the predicted units. The nature of the data (where the baseline reflects survey data at the time of survey) means that this estimate will not be updated until AMP8 or when the land can be surveyed if done in advance of that. Once the correct baseline is known, detailed management interventions can be identified to allow accurate forecasting of baseline and future biodiversity change. Once subsequent surveys are undertaken to assess the impacts of the intervention, the baseline can then be updated and reported to Ofwat.

With this Performance Commitment being new across the industry, there is likely to be significant refinement in our approach as the AMP begins and when land is 'officially' added under the PC. The current forecast is based on expected outcomes against planned investment, but the mechanism behind the PC means land is only formally added to the PC on an ad hoc basis when agreed through an external stakeholder panel, meaning the exact land areas, habitat baseline and forecast outcomes are still to be determined.

The main risks in producing this data in future are around staff resource. Undertaking the required surveys is a specialist discipline, and with the introduction of Biodiversity Net Gain as a mandatory requirement for any new projects requiring planning permission, there is presently an excess of demand over supply in the ecologist market.

11.Operational greenhouse gas emissions

The Board have agreed a net decrease in emissions in Water green house gas emissions and a net increase in emissions in Wastewater green house gas emissions, according to the final methodology.

Trends within the historical emissions data:

We began purchasing Renewable Energy Guarantees of Origin (REGO) certificates in 2021, meaning our market-based Scope 1 emissions were lower in that year than previous years. This has also benefitted us in the last year as we have transitioned away from gas oil usage, replacing it with natural gas for which we then buy Renewable Gas Guarantees of Origin (RGGO) certificate for, although this does not benefit us as much when comparing location-based emissions.

Process emissions year on year have been increasing since 2018/19 and some of this can be explained by population growth across the region, as population equivalent is used to estimate nitrogen loadings into our wastewater treatment works and the nitrous oxide emissions arising from these loadings. In 2020/21, improvements in our methodology for the measurement of sludge were incorporated which, along with an uplift from the import and treatment of third-party, waste-water sludge (for the first time that year), led to an increase in reported process emissions.

Business travel and associated emissions for our own employees and contract partners fell during the pandemic as only essential work was permitted, and with the increase in virtual meetings, less office–to–office travel occurred. These emissions continue to be low as some ways of working during the pandemic have remained in place.

Our electric vehicle (EV) fleet has continued to grow over the last year, and we aim to have 18% of current diesel fleet transitioned to EV by 2025.

Chemical Purchase Volumes:

Reporting our historic emissions arising from purchased chemicals presented several challenges and these are described below.

There were several limitations of the historical chemical usage data, including the fact that the chemical name is free text in IT systems and therefore sometimes challenging to assign chemical type. In other cases, there was not enough information to decipher which chemical was being ordered. As a result, these orders had to be excluded from the analysis, but this is not considered to be a significant issue as it covers less than 10% of the total numbers of purchase orders within the dataset.

An additional limitation is that not all chemicals had the unit of measurement listed in the order, which meant a lengthy manual process was needed to first determine the unit of weight or volume of each chemical order from the ordering catalogue and then convert the quantity of each chemical order into the required unit of Tonnes.

The emission factors for chemicals in the Carbon Accounting Workbook (CAW) are not always clear as to the underlying concentration of each chemical. Therefore, due to time restraints, the quantity of the data and the lack of detail within each chemical order we have taken the assumption that the concentrations within the CAW are those commonly used in the water industry and therefore we have not adjusted for concentrations.

We moved to the SAP Ariba ordering system in 2019, and therefore we do not have any chemical purchase data prior to this date. This means that we have had to exclude chemical information from the 2018/19 data submission.

Where we do not have a chemical emission factor in the CAW we have used publicly available data which has been shared in the UK Water Industry Research (UKWIR) CAW working group. Where we cannot find an emission factor at all we have excluded the chemical as they are assumed to be less than 10% of our total emissions. To calculate this, we used an average of the known chemical emission factors and multiplied by the quantity of chemical, these values were lower than 10% of the total chemical emissions and so were excluded.

We are currently in discussions with our colleagues on how to improve the data quality from SAP to improve confidence in the data and reduce the need for time-consuming manual data manipulation levels going forward.

Forecast Data:

Key activities to drive reduction (Water):

- Investment in solar renewables (15MWp) –roof-and ground mounted through enhancement investment in AMP8 demand.
- Base programme – like for like replacements are expected to deliver a typical 10% efficiency.

- Potential for investment in further energy efficiency – pending on-going Energy Savings Opportunity Scheme (ESOS) audit as part of base funded invest to save.
- Savings arising from e.g. water efficiency and leak reduction programmes.
- Potential for further saving via efficient use of chemicals (NB. Reporting of chemicals was confirmed by Ofwat on April 6th, 2023, and had not been investigated in detail for reductions in time to make net zero enhancement case, so investment will be via invest to save during AMP8).

Key risks (Water):

- Assumes electrification of fleet vehicles c. £15.1m is funded in base or that an alternative funding approach can be achieved e.g., sale of existing fleet and lease of EVs, fleet rationalisation or other solutions.
- Assumes a benefit from energy efficiency and chemical efficiency in base spend and investment in wider water efficiency.
- Relies on £10.5m enhancement investment being allowed at an efficient unit rate in bid challenge.
- Delivery of interventions require adequate supporting resources/capacity in the bio-resources team to project manage installation of solar systems and ensure these meet all compliance requirements required via internal and external parties.

Our commentary against 'Trends within the historical emissions data' and 'Chemical Purchase Volumes', remain consistent with our commentary written against OUT4 above.

Forecast Data:

Key activities to drive reduction (Wastewater):

- Investment in sites Knostrop, Blackburn Meadows, Esholt, Dewsbury, Hull, York, Halifax, Woodhouse Mill, Calder Vale, Old Whittington, Aldwarke, Sandall to reduce Nitrous Oxide process emissions by 5480 tco2e per year (gross).
- Investment in sites Knostrop, Blackburn Meadows, Esholt, Huddersfield, Hull, Dewsbury, Woodhouse Mill, Old Whittington, Sandall to reduce methane process emission by 18322 tco2e per year (gross)
- Investment in roof-mounted solar across our sites equivalent to install of 10MWp to reduce emissions associated with purchased electricity by an amount equivalent to a 3500tCO2e annual emission reduction (gross)

Key risks (Wastewater):

- Assumes electrification of fleet vehicles c. £15.1m is funded in base or that an alternative funding approach can be achieved. sale of existing fleet and lease of EVs, fleet rationalisation or other solutions
- Relies on £49.4m enhancement investment being allowed at an efficient unit rate in bid challenge for wastewater (not accounting for Opex savings, which are reported elsewhere in our PR24 Business Plan submission).
- There is potentially a process emission uplift for N2O that would quadruple emissions. If implemented this would improve the cost/benefit ratio, however emissions would need re-baselining.
- Delivery of interventions require adequate supporting resources/capacity in the bio-resources and wastewater teams to project manage changes and ensure these meet all compliance requirements required via internal and external parties.
- Process emission reductions will be subject to price control deliverables, and proof of reduction is dependent on baseline monitoring and on-going monitoring substantiating the reduction. Modelling work done to support high level costs has provided indicative reductions –to minimise risk the lowest estimates of reductions have been used for reduction forecast.

WINEP –the AMP7 and AMP8 WINEPs cause significant incremental increases in emissions which are greater than the savings from the planned interventions.

12. Leakage

This figure reduces year on year due to company's commitment to reduce leakage by 50% by year 2050 and is line with our WRMP and PR24 business plan. However this is subject to change following revised WRMP outputs.

Impact of historical enhancement expenditure on performance trends:

There was a significant programme of expenditure allocated to enhancement for our 2019 and 2020 APRs and at PR19 that was used to drive a step change in our performance when Ofwat's policy indicated a move from company specific targets to quartile level targets. For leakage the PCLs were eventually company specific with a common performance improvement. This reflected the differences in historic leakage targets which had been based on SELL and historic supply demand balances.

However, we progressed with this activity to move its comparative leakage performance more in line with the sector. The capex element of this expenditure was

allocated to enhancement in our APR and PR19 tables in line with RAGs (step change in performance) and would therefore be excluded from historic base modelling.

Activities in our AMP7 enhancement plan included further work to address communication pipe failures, stop tap renewals, distribution pipework fitting. and structural mains. Our programme of installation of a network of acoustic loggers continued and spent £9.7m cumulatively over the two years. By increasing the number of leakage inspectors we also invested in further fleet vehicles and a in the required hardware (laptops, mobile phones etc.) and software licences. Several other initiatives including leakage detection equipment and accommodation were undertaken.

This has not been reflected in the data tables as it was not linked to an enhancement allowance in the final determinations.

The improvement for this PC is on average 46% from Base expenditure in AMP8/9, therefore, OUT2 is the PC trend with Base only.

AMP7

We have however identified a small improvement in 2021/22 due to the initial benefit of the enhancement investment determined by the CMA4 . The enhancement allowance for the period was £28.2m (2017/18 prices). We have spent £3m of this in 2021/22 which we have identified a benefit of 3.8Ml/d for that year. The overall benefit of that spend is expected to be 4.5Ml/d each year but this value has not been reported due to the completion of the initial activity partway through the year.

The costs of this enhancement are reported in APR Table 4L Line 26. The activity delivered last year was:

- District Metered Area (DMA) optimisation and pressure management contributing to a calm network strategy by reducing pressure variances and surges. Installation of additional network assets and pressure and flow monitoring points will enhance network control and visibility and contribute to the smart network strategy.
- AI technology to analyse our acoustic logger outputs through machine learning and in further analytics systems to analyse various data sources pertinent to the water distribution network and uses these to prioritise leak detection and related network maintenance activities in near real time.

	2019/20 baseline	20/21	21/22
Leakage performance Ml/d (in year)	315.2	304.2	290.5
CMA investment Spent (£K)		0	3,054
CMA leakage benefit Ml/d (In Year year effect)		0	3.8 Ml/d
CMA leakage benefit Ml/d (Full year effect)			4.75 Ml/d

13. Per Capita Consumption (PCC)

Our PCC performance was industry leading across AMP6 and our performance has remained upper quartile in AMP7. We out-turned year 3 with the lowest PCC in the industry for both our in-year and 3-year rolling average performance.

PCC industry average is 145 l/h/d and the long-term industry target for PCC is 110l/h/d by 2050. We are on track to deliver this long-term target based on the enhancement requested in AMP8.

The table below provides both the industry and company actuals and forecasts for the per capita consumption performance commitment for both AMP7 and AMP8, as well as the PR19 final determination for this performance commitment:

Litres per person per day	**AMP7**					**AMP8**				
	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	2029/20
PR19 final determination	125.1	121.9	118.7	117.6	116.8	*n/a*	*n/a*	*n/a*	*n/a*	*n/a*
Industry upper quartile actuals and *arithmetic forecast*	142.2	141.7	144.9	*145.4*	*146.0*	*146.6*	*147.2*	*147.8*	*148.4*	*149.0*
Industry average actuals and *arithmetic forecast*	149.3	150.2	150.5	*151.4*	*152.4*	*153.4*	*154.4*	*155.4*	*156.5*	*157.6*
Company actuals, *arithmetic forecast and business plan proposed targets*	132.5	133.5	132.2	*132.7*	*128.0*	*126.3*	*124.5*	*122.8*	*121.0*	*119.3*
Proposed reduction in consumption against 2019/20 baseline	*n/a*	*n/a*	*n/a*	*n/a*	*n/a*	*-1.5%*	*-2.8%*	*-4.2%*	*-5.6%*	*-6.9%*

The table above shows that we have not met PR19 targets in the first three years of AMP7, and it is not forecast to meet these targets in years 4 and 5. Our inability to meet the PR19 targets has been driven in part by a long-term increase in water demand resulting from behaviour changes arising from the COVID-19 pandemic. However, it is worth noting that we are currently outperforming against both the industry average and the industry upper quartile. Across AMP7 and as forecast across AMP8, we are on track to reduce per capita consumption on an ongoing basis, compared with forecast increases with for both the industry average and upper quartile.

We are proposing challenging targets of a reduction in consumption to 119.3 litres per person per day by the end of AMP8. This represents a target reduction of -6.9 % against the 2019/20 baseline. This will be achieved through the implementation of a water efficiency strategy (focused on communication, education, collaboration, and innovation), the installation of smart meters, and measures such as trialling household flow regulators.

Total household consumption has been back calculated based on the Board approved PC forecast for AMP8 and AMP9. The figures are reducing year on year and aligns to WRMP.

Total household population is from SUP1A. This is based on the ONS18 Forecast.

Dry Year household consumption is from WRMP outputs, the values are stable.

The improvement for this PC is 0% from Base expenditure. OUT2 table has been populated incorrectly with zero for AMP8/9 due to misinterpretation of the guidance. The correct PC trend values are in the table below which is a roll forward of AMP7 outturn values:

2025/26	2026/27	2027/28	2028/29	2029/30	2030/31	2031/32	2032/33	2033/34	2034/35
2.57%	2.57%	2.57%	2.57%	2.57%	2.57%	2.57%	2.57%	2.57%	2.57%

Due to the above, OUT3 values are incorrectly calculated. The correct OUT3 values are in the table below:

2025/26	2026/27	2027/28	2028/29	2029/30	2030/31	2031/32	2032/33	2033/34	2034/35
0.03%	0.75%	1.40%	1.95%	2.47%	3.03%	3.60%	4.15%	4.61%	5.01%

Subject to change following final Water Resources Management Plan.

Impact of historical enhancement expenditure on performance trends:

Some PCC improvements will be delivered through our Domestic Meter Optants and the metering element of new connections which are reported under enhancement. These improvements which are incremental have not been included in our data response.

14. Total Business Demand

This has been back calculated based on the Board approved PC forecasts for AMP8 and AMP9. This number is reducing slightly year on year and aligns to WRMP.

Impact of historical enhancement expenditure on performance trends:

No enhancement has been invested to drive business demand improvements.

The improvement for this PC is 0% from Base expenditure. OUT2 table has been populated incorrectly with zero for AMP8/9 due to misinterpretation of the guidance. The correct PC trend values are in the table below which is a roll forward of AMP7 outturn values:

2025/26	2026/27	2027/28	2028/29	2029/30	2030/31	2031/32	2032/33	2033/34	2034/35
0.55%	0.55%	0.55%	0.55%	0.55%	0.55%	0.55%	0.55%	0.55%	0.55%

Due to the above, OUT3 values are incorrectly calculated. The correct OUT3 values are in the table below:

2025/26	2026/27	2027/28	2028/29	2029/30	2030/31	2031/32	2032/33	2033/34	2034/35
0.35%	0.59%	0.98%	1.46%	1.93%	2.41%	2.88%	3.34%	3.81%	4.28%

Subject to change following final Water Resources Management Plan.

15. Pollution Incidents & Serious pollution incidents

Pollution incidents are a high priority for our customers, and we are committed to having zero pollution incidents by 2050 and staying close to or at an upper quartile trajectory in AMP8 and AMP9. Our commitment is to have zero serious pollution incidents from 2025 onwards. Further details on how we propose to do this are in the PC appendix. The improvements are all driven through a base outcome therefore OUT2 and OUT5 align.

The end of AMP7 forecast position has been provided based on a business decision considering the investment programme and funding available for the remainder of the AMP, the activity required to deliver the service and the catch up required to the PR19 FD. The proposed AMP7 end / AMP8 entry point has been agreed with the Board.

The proposal is to enter AMP8 at 18.2 incidents per 10,000 km of sewer or 95 annual incidents.

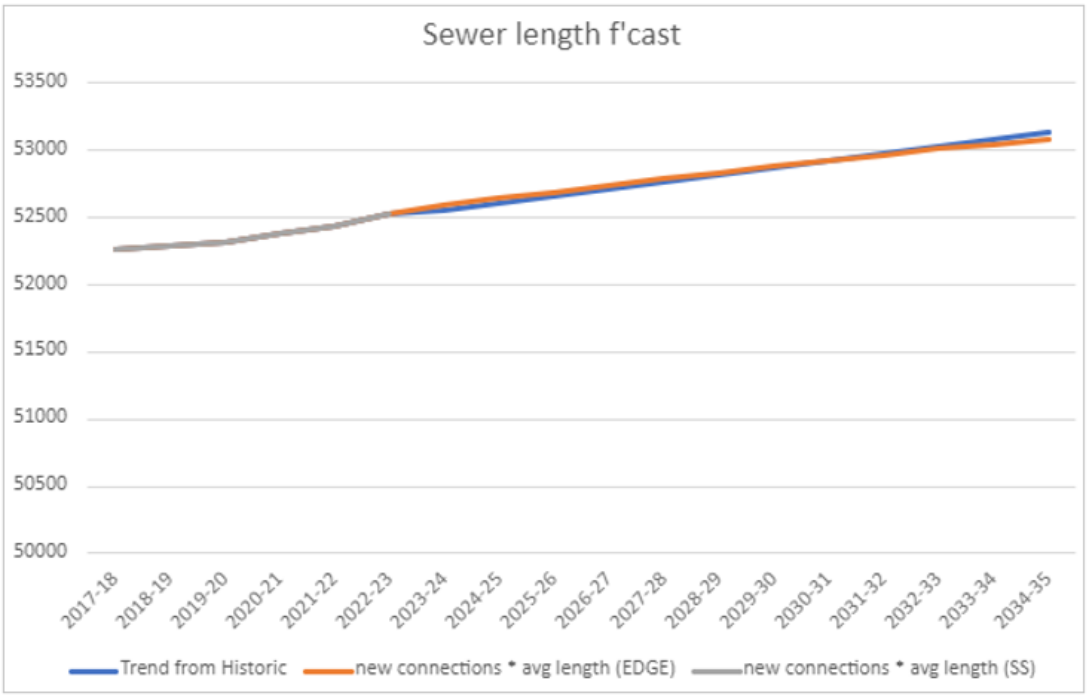
The forecast for pollution and serious pollution has been populated based on the PR24 optimised business scenario for the Performance Commitment. The scenario has been agreed with the relevant steering groups in the PR24 governance process. A range of scenarios have been generated and costed for future performance. The business is trying to strike a balance between stretching but achievable and affordable service objective.

We are performing at the FD requirement for Pollution and forecast to do so by the end of AMP7. Significant improvements in AMP7 have been made and the company forecasts to be near to the estimated UQ industry performance level. The expected entry point for AMP8 used in the scenario is 95 annual incidents. The company has modelled a stretching, but achievable scenario based on our modelled 'shadow' view of an efficient Totex allowance and the types of activities that can be delivered. These activities include a particular focus on sewage pumping stations and power resilience ensuring that pumping stations quickly start up after dips in power and the use of predictive analytics in future failure assessments. Also, a focus on critical assets such as screens, wet wells and ensuring quick resolution of faults. A focus on third party activity is also key to ensure that sewers are used appropriately, and those activities do not cause unforeseen incidents. The proposal from the base investment model is to outturn at 48 annual pollution incidents and 0 serious pollution incidents by 2030. By 2035, the model is predicting 30 annual incidents and 0 serious pollution incidents based on the relative rate of improvement approach detailed above. Both of these positions are considerably better than DWMP submission and we forecast will put us close to upper quartile performance based on current industry understanding.

The final entered data into OUT5 from the base maintenance model for AMP8 is 48 pollution incidents and 0 serious pollution incidents by 2030. Using the AMP7 'turnaround plan' value of 97 in 2024/25 and linear glide path was created for AMP8 to 48 incidents. The assumption for serious pollution (category 1 and 2 incidents on the table) is that we will operate at zero incidents throughout AMP8. This is reflected in category 1 and 2 incidents in the table reported as zero. For AMP9 our model has suggested that we will be at 30 pollution incidents by 2035, and zero serious pollution incidents.

A projection for Cat 4 pollution incidents has been entered as required. This is using the same modelling principles as cat 1-3. Our end of AMP7 forecast is 89 annual incidents, 30 annual incidents by end of AMP8 and 19 annual incidents by end of AMP9.

Pollution figures are normalised in relation to sewer length. Graphs below show the projected increase in sewer length. Calculated from the historic trends.



Impact of historical enhancement expenditure on performance trends:

2010-2015 ELoS Programme: At PR09 companies were funded to maintain service through base. Improvement could be requested where we demonstrated customer willingness to pay (WTP). We delivered a programme of 'M&E5' refurbishments or pipework replacement on small pumping stations, more substantial refurbishments on pumping stations and screening and screenings handling refurbishments on larger sites. This aimed to reduce Category 1-3 Pollution incidents by 28 (based on the definition at the time). We have assumed that the activity will have impacted all years of our reported data equally so have not included this as an adjustment in our tables (it would impact our relative performance).

2018-2020: We have not included any enhancement adjustments to performance in the table for Pollution however, as described in the introductory section, there was a significant programme of expenditure allocated to enhancement at the APRs and at PR19 in 2018-2020 that was used to drive a step change in our performance when Ofwat's policy was set out to move from company specific targets to upper quartile monitoring. The Capex element of this expenditure was reported as enhancement and therefore does not feed into Botex+ econometric models.

The activity was mainly targeted at rising main investigations at high priority sites as well as delivery of the rising main improvements at a variety of sites across the region,

and the installation of telemetry e.g. pollution loggers & 'Reach Out' controllers on SPSs as part of our wastewater asset visibility programme. It also included purchasing of additional vehicles to support new colleagues joining the organisation, and the continuation of our Pollution Mitigation Investment Challenge (PMIC) programme of works to understand where our repeat pollution risks are happening and promote low cost simple solutions to address them.

Serious pollution incidents: This PC will have been similarly influenced by the activity described for the total pollution incidents PC above.

16. Discharge permit compliance (DPC)

Ensuring our treatment operations have minimal impact on the environment is a priority for us and we are committed to the stretching target of achieving 100% compliance from 2025 onwards. . Further details on how we propose to do this are in the PC appendix. The improvements are all driven through a base outcome therefore OUT2 and OUT5 align.

The end of AMP7 forecast position has been provided based on a business decision taking into account the investment programme and funding available for the remainder of the AMP, the activity required to deliver the service and the catch up required to the PR19 FD. The proposed AMP7 end / AMP8 entry point has been agreed with Board. The proposal is to enter AMP8 at 99.98%compliance or the equivalent to 1 failing works per annum.

The forecast for DPC has been populated based on the PR24 optimised business scenario for the Performance Commitment. The scenario has been agreed with the relevant steering groups in the PR24 governance process. A range of scenarios have been generated and costed for future performance. The business is seeking to strike a balance between stretching but achievable and affordable service objective.

Our performance for DPC has been improving throughout the AMP period ranging from 98.98% compliance in 2020/21 to 99.96% compliance in 2022/23. The scenario for AMP8 has been optimised by a base investment scenario model using the range of interventions available. These include as well as the normal level of capital maintenance improved preparedness for mitigation including the deployment of mobile SAF units and the installation of final effluent monitoring which allows for pre-emptive interventions through capital or operational measures. The proposed scenario outturn in 2030 is 100% compliance.

In AMP9 we propose a continuation of the level of service at 100% compliance. The final entered data into OUT5 from the modelling is AMP8 is 100% compliance by 2030. The intention is to perform at this level throughout the AMP8 period.

Impact of historical enhancement expenditure on performance trends:

We have not included any improvements through enhancement in the table. Enhancements have primarily been completed to comply with new tighter consents or regulations. This maintains the discharge permit compliance level under more stringent requirements.

17. Bathing water quality

The Board have agreed a level of performance to achieve 82.3% compliance by end of AMP8 and 79.2% compliance by end of AMP9.

The guidance states that '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'.

In 2020, due to the governmental COVID-19 restrictions, bathing waters were not classified as adequate samples could not be taken. We would therefore believe this principle should be applied across all bathing waters in 2020 and therefore would expect to see all the 2019 weightings and classifications applied to the 2020 dataset (with the exception of Staithes (see point 2)).

The designated bathing water at Tunstall has been closed due to coastal erosion following on from the 2018 season. The data in the calculation sheet continues to calculate a percentile calculation from 2019 onwards. We believe the performance commitment principle should be applied for Tunstall following on from its closure, and it should be assessed as Excellent within the weighted average calculations. We would therefore assign Tunstall a weighting of 100% / Excellent for the remainder of AMP6 and AMP7 following on from its closure and last classification in 2018.

The definition 'If an eligible bathing water is de-designated during the period, it will continue to be included in calculating the average score and will be given a weighting based on the last classification it received.' Staithes was de-designated as a bathing water ahead of the 2016 bathing water season, and received a classification of 'Poor' in 2015. We believe Staithes should be reported as 'Poor' for the remainder of AMP6 with a 0% weighting in the calculations for AMP6 and then removed from the reporting figures at the start of AMP7 due to its de-designation within the AMP6 period.

Finally, 'Any additional bathing waters, newly designated during the 2025-2030 period, will not be eligible for the purpose of calculating performance against this performance commitment'. The River Wharfe at Cromwheel, Ilkley, was designated as a bathing water in December 2020 ahead of the 2021 bathing water season. We believe this principle applies for the Wharfe at Cromwheel, Ilkley as it has been designated within the AMP7 period, and therefore, we would exclude it from our calculations.

18. River Water Quality (Phosphorous)

The Board have agreed a 76.1% reduction in load from a 2020 baseline by 2030 and 84.15% reduction in load by 2030.

The PC load reduction calculations followed the method supplied by Ofwat in the PC definition. The calculations include WwTW continuous discharges to surface water (river). The calculations do not include WwTW continuous discharge to septic tanks, transitional, coastal or groundwater. Where available, measured flow and phosphorus water quality data were used. Where flow data was not available, permitted DWF*1.2 was used. Where no permitted DWF was available 'zero' flow was applied. Where no measured phosphorus concentration data was available, the default 5 mg/l phosphorus concentration was applied, in line with the PC definition.

For future forecasting of load removed (2023 onwards), the relevant WINEP phosphorus permit limit has been applied in lieu of measured concentration data. Future DWF was assumed to be permitted DWF*1.2 in line with the PC definition. Where no permitted DWF exists, 'zero' flow was assumed in line with the PC definition. In some cases, permitted DWF*1.2 for future predictions is greater than the previous year(s) measured flow, which shows as an increase in the predicted phosphorus load discharged. This is a theoretical increase which may not occur once measured flow data is available to replace the predicted flow.

Where a regulatory compliance date is 31st March, the load removed has not been included until the next full calendar year. Where an end of AMP regulatory date is in force, the load removed is not seen in the calculations until year one of the following AMP.

The Environment Agency have applied the EnvAct_IMP1 driver to all WFD_IMP and WFD_ND phosphorus schemes. This means all treatment must take place on WwTW land as an 'end of pipe' solution. This removes all possibility of partnership, in-catchment working. We therefore assume 'zero' load removed through partnership working.

19. Storm Overflows

The Board have agreed to be at 26.86 regional average spills by 2030 and 22.56 regional average spills by 2035.

OUT5.70 - Total number of monitored spills

For past years the data from the annual Environment Agency EDM return has been used however these are not the actual total number of spills for two reasons.

1. Monitors were not installed at all storm overflows – 100% monitoring due to be completed by the end of 2023.
2. Of those overflows monitored, monitor availability was an average of ~90%.

To forecast future spills, a baseline with assumptions of 100% monitor coverage and 100% monitor availability is required, this may give the false impression that spills will be increasing.

The current actual baseline has been calculated by a number of steps from the 2021 EDM data.

- Increase 2021 EDM spill numbers to factor for 100% availability.
- Calculate average spill count for 2021 by dividing the increased spill count by the number of overflows on the 2021 annual return.
- Multiply the average by the number of live overflows forecast for 2023.

2021 was chosen for the base year because of the years we have EDM data it is thought to be the most representative of a typical years' rainfall.

There are a number of different projects and interventions that will reduce spill counts, these are individually listed in the calculation spreadsheet with spill reductions split based on the expected delivery of the improvements.

AMP8 WINEP phasing is taken from the WINEP obligations and delivery profile. The DWMP phasing is used for AMP9 and later SORP improvements. The full benefit from improvements will not be seen in the annual monitoring returns until the calendar year following the completion of the works. This has been accounted for in the calculations.

A final conversion is required to move from the total number of spills to the total number of monitored spills, this reduction is based on the expected availability over the period.

OUT5.73 (CWW6.8) - Total Number of Storm Overflows - (APR 7C.8 + 7C.10)

The template states that this should be obtained from table line CWW6.8. However, that line only contains a subset of storm overflows and for past years will give a false impression of the average spill count as all of the overflows were not monitored. Post 2023 the numbers will align.

OUT5.74 – Storm Overflows - Average number of spills per overflow monitored

This is calculated by dividing OUT5.70 by OUT5.73. As noted previously, the value calculated for OUT5.74 on historical data will give a misleading impression of the average number of spills per overflow, this is because not all overflows are included in the total number of spills on the EDM returns and the availability in the EDM returns is solely based on the overflows included in the returns.

OUT5.75 - Uptime

Uptime has been taken to be to the sum of the unavailability and unmonitored percentages. For historical data the unmonitored percentage is significant however from 2023 (when the target is for 100% overflows monitored) the unmonitored percentage is included in the percentage unavailable figure. This is possible as the EDM return will include all the overflows counted for OUT5.73 with zero availability for those not monitored. We currently have four overflows that it has been found to be technically not possible to monitor, the details of the issues with these overflows have been shared with the Environment Agency.

We have been inspecting and improving EDM installations to increase availability of monitoring data. This has included an asset replacement program to replace older less reliable monitors with newer more reliable monitors. These measures will improve the availability of monitors from the current 90% to a target of 99% by 2030. There are a number of factors that make high availability challenging, they include; the harsh environment where the monitors are located, the lack of permanent power for many locations, the poor mobile network in many remote locations.

20. Mains Repairs

Mains length is increasing year on year as expected due to population growth.

Total mains repair number (reactive and proactive repairs) has been back calculated based on the Board approved PC forecast for AMP8 and 9. The repairs are reducing

year on year. The proportional splits between reactive and proactive remain the same as current levels.

Impact of historical enhancement expenditure on performance trends:

We have not included any specific performance impact of enhancement expenditure to target this PC. The majority of activity to reduce mains repairs is related to base maintenance although there is a complex relationship with leakage activity that makes this PC extremely difficult to analyse. We have previously shown that enhanced activity to reduce leakage results in a short-term increase in mains repairs as a core element of leakage reduction is to find leaks and repair them. However, where leakage investment results in greater structural mains repairs then there may be a longer-term benefit to asset health.

The improvement for this is PC is being delivered from 100% Base Expenditure therefore OUT2 is the same as OUT4.

21. Unplanned Outage

Peak week production forecast based on DWI and WRMP schemes planned for AMP8 and 9 and is increasing year on year. Unplanned Outage actual is back calculated based on the Board approved PC forecast for AMP8 and 9 and is reducing year on year.

In AMP7, although we have or are forecast to outperform our targets in years 1 to 4 of the AMP period, we are forecast to underperform our target in year 5. We have also underperformed in AMP7 against the industry average and upper quartile. It is worth noting that while we have underperformed in AMP7, this is against an improving performance in AMP7 from 3.87 per cent in year 1 to 2.50 per cent in year 5.

We are proposing stretching yet achievable targets for AMP8, with an AMP8 year 1 target of 2.32 per cent, falling to 1.60 per cent by the end of AMP8. We are proposing that this will be achieved through a number of initiatives including better management of critical spares, creation of a UPO hub to identify outages and their route cause, an accelerated programme of refurbishments for assets such as filters and clarifiers, and the implementation of DWI enhancement schemes at five WTWs which will have a positive impact on unplanned outage.

The improvement for this PC is 72% from Base expenditure, therefore, OUT2 is the PC trend from Base only.

Impact of historical enhancement expenditure on performance trends:

No specific service improvement through enhancement has been included for Unplanned Outage. We have achieved improvements through increased focus and assurance on our operational and reporting procedures in addition to the implementation of several initiatives. Further improvements through such activity are likely to have diminishing returns as the PC matures with further gains likely to require investment in the assets.

22. Sewer Collapses

This is a stretching target and ensures our commitment to long term asset health. The level of sewer renewals will need to increase on the future to make significant improvements to this measure, and we will need to work with Ofwat and other stakeholders to understand what an efficient cost is to achieve that. In the short term we will prioritise improving collapses by effective monitoring, the use of analytics, a focus on reporting and where we do need to intervene ensuring we get multi service benefits from out investments at an efficiency unit rate. Further details on how we propose to do this are in the PC appendix. The improvements are all driven through a base outcome therefore OUT2 and OUT5 align.

Sewer collapses will be fully funded from the base programme throughput AMP8 with no enhancement. The scenario has been agreed with the Board.

The end of AMP7 forecast position of 687 reportable sewer collapses is based on a business decision taking into account the investment programme and funding available for the remainder of the AMP, the activity required to deliver the service and assurance that the activity is deliverable. The proposed AMP7 end / AMP8 entry point has been agreed with Board.

The scenario optimised for investment using the base investment model in AMP8 is a 33% improvement over 5 years and a further 10% between 2030 and 2035 subject to level of funding. This is a higher level of improvement than what was presented in the DWMP. We believe that the scenario sets a level of performance that is both stretching but achievable. We will deliver a mixture of operational and impact-based interventions along with capital interventions within the affordability constraints set within the overall programme. Typical operational investment includes sewer alarms, proactive jetting and cleaning, surge mitigation and a focus on accurate reporting. Capital investment is a mixture of renewal and structural relining, where appropriate to do so.

Our forecast investment required to get to upper quartile runs into the billions of pounds and would not be affordable for our customers or reasonably deliverable. Local factors such as location and number of combined sewers and profile of sewers

in wet urban areas contribute to this position. We have provided evidence through the wastewater narrative that these factors contribute to our relative performance in the industry and that we should have a specific performance level that is appropriate for the company rather than a common industry target.

The final entered data into OUT5 for AMP8 is 464 sewer collapse incidents by 2030. A linear glide path was created for AMP8.

For AMP9 using the 'relative rate of improvement' method described above compared to historic and are predicting a further 10% in collapse improvements. Further significant improvements would require higher levels of capital investment e.g., relining and renewal in the network.

Impact of historical enhancement expenditure on performance trends:

No specific service improvement has been included for collapses but activity targeting other wastewater PCs will have had an impact on our performance particularly under the new definition.

Like the pollution figures, sewer collapses are normalised in relation to sewer length.

23. OUT3

OFWAT's methodology is that the table articulates benefit using the Common Performance Commitments developed for PR24 as the benefit types. Table 1 below lists the common performance commitments in Table OUT3 identified for the waste enhancement programme. OFWAT also offers the alternative of the use of the WINEP Environmental outcomes or a bespoke valuation system.

Table 1:

Common PC	PC Reference	Company Reference	Units	DPs
Biodiversity	PR24_Bio	PR24_BIO_YKY	Number	2
Operational GHG (WW)	PR24_OGWW	PR24_OGWW_YKY	Tonnes	2
Bathing Water Quality	PR24_BWQ	PR24_BWQ_YKY	%	1
River Water Quality	PR24_RWQ	PR24_RWQ_YKY	Number	4
Storm Overflows	PR24_SOF	PR24_SOF_YKW	Number	2

Our investment planning system uses a bespoke benefit identification and scoring system for cost benefit analysis. These scores are then monetised using a Six Capitals approach.

This system was developed and assured for PR19 and enhanced for PR24. Twenty four benefit impacts were identified across the whole waste enhancement portfolio compared to the 5 performance commitments in Table 1. It is not possible to easily condense these benefit metrics to map directly to the common performance commitments.

As such we propose that Table CWW15 uses the "other Category" option to list and monetise benefits. Refer to Table 2 below.

We acknowledge that this compromises the automatic calculations in Table OUT3 (columns U to AY) which will only use benefit figures from Table CWW15 mapped within the PC framework.

It should be stated that a large proportion of the Enhancement programme is driven by statutory drivers and as such not subject to a positive cost benefit to assure delivery. This is reflected in the use of the non-monetised benefit of "Legal Non Compliance-Fines and Compensation events# Number of Non Compliance Events (3DP)"

Table 2:

Service Measure and Impact # Units	Sum of Units-2025-30	Sum of Units-2030-35	Benefit-2025-30 £ mill	Benefit-2030-35 £mill
Additional Metrics-Air pollution emissions# Tonnes PM10 (tPM_{10}) (2DP)	-6.40	-11.00	£0.15	£0.27
Additional Metrics-Operational carbon# Tonnes CDE (tCO_2e) (2DP)	-64,837.00	-118,700.00	£24.14	£44.19
Avoidable Costs-Avoidable costs# £000s (3DP)	-0.28	-0.70	£0.00	£0.00
Bathing Water-Compliance failure# No of Failures (2DP)	-83.92	-109.90	£95.26	£217.10
Bathing Water-Deterioration in classification# Nr Of Bathing Waters (3DP)	-4.22	-6.02	£10.52	£24.38
DWMP overflow spills-Overflow spill frequency# number (1DP)	-3,665.00	-36,638.00	£0.79	£17.41
DWMP overflow spills-Overflow spill volume# metres cubed (2DP)	-617,872.00	-11,555,810.00	£0.79	£17.41
Final Effluent Compliance Numeric-Discharge Permit Compliance Impacting Failure# Nr of failures (2DP)	-935.00	-1,240.00	£5.35	£30.27
Flow Compliance WWTW-Failing DWF# Nr OF Failures (2DP)	-11.00	-25.00	£0.00	£0.01
Flow Compliance WWTW-Failing FFT# Nr OF Failures (2DP)	-3.60	-6.00	£0.00	£0.00
Flow Compliance WWTW-Failure to record report flow correctly# Nr OF Failures (2DP)	-15.84	-26.40	£0.01	£0.01
Flow Compliance WWTW-MCERTS failure# Nr OF Failures (2DP)	-15.84	-26.40	£0.01	£0.01
IFH-Flooding of habitable area# Nr of incidents (3DP)	-21.88	-54.70	£26.26	£65.64
Land Use-Area of additional inland wetland# Total area restored or protected (ha) (4DP)	4.12	13.36	£0.00	£0.01

Service Measure and Impact # Units	Sum of Units-2025-30	Sum of Units-2030-35	Benefit-2025-30 £ mill	Benefit-2030-35 £mill
Land Use-Area of bare ground# Total area restored or protected (ha) (4DP)	-24.45	-69.42	£0.10	£0.28
Land Use-Area of greenspace# Total area restored or protected (ha) (4DP)	16.26	44.70	£0.20	£0.54
Water Use-Surface water separated from combined# Hectares (ha) (3DP)	0.00	856.25	£0.00	£0.27
Legal Non Compliance-Fines and Compensation events# Number of Non Compliance Events (3DP)	-1,264.64	-10,165.22	£0.00	£0.00
River Quality-WINEP Bad to Poor# Km (2DP)	8.65	265.55	£0.22	£6.74
River Quality-WINEP Moderate to Good# Km (2DP)	50.79	771.10	£1.72	£26.15
River Quality-WINEP Poor to Moderate# Km (2DP)	16.91	748.43	£0.49	£21.84
Sludge Treatment and Disposal-Additional transport required more than 10percent# Tonnes Dry Solids (2DP)	0.00	-83,775.00	£0.00	£4.73
Sludge Treatment and Disposal-Loss of throughput to sites less than 10ktDs per annum# Tonnes Dry Solids (2DP)	0.00	-25,405.00	£0.00	£2.95
Sludge Treatment and Disposal-Loss of throughput to sites more than 10ktDs per annum# Tonnes Dry Solids (2DP)	0.00	-36,360.00	£0.00	£4.22
Grand Total			£166.01	£484.42

As a result of the decision to use the 'other' category of benefits, the enhancement PCs lines in OUT3 section 'Comparison of performance improvements driven by enhancement identified in tables OUT1/OUT2 and tables CW15/CWW15' has returned FALSE.

OUT3 is calculated, however we have identified an error in the formula in table 'Cumulative impact of enhancement expenditure in the 2025-30 period on performance as calculated from tables CW15 and CWW15'. For this Performance Commitment line, the cells in year 2027/28 - 2029/20 are not cumulative therefore this impacts the subsequent table 'Comparison of performance improvements driven by enhancement identified in tables OUT1/OUT2 and tables CW15/CWW15' and is showing a misalignment incorrectly.

24. OUT7

All performance commitments will have both financial underperformance and outperformance payments by default.

Outperformance and underperformance rates will be symmetrical.

Subsequent report from Ofwat detailing its top-down approach to setting ODI rates:

Step 1: for each performance commitment (PC), we (Ofwat) take the assigned RoRE allocation and multiply this by either the water or wastewater regulated equity for each company. The regulated equity is calculated using the 2022-23 RCV (regulatory capital value) at financial year average prices and a notional gearing level of 55%.

Step 2: we spread the equity at risk for each PC over a stretching but achievable performance range. We calculate this as the historic difference between actual performance and the performance commitment level (PCL).

Step 3: we divide the equity at risk for each company calculated in Step 1 by the performance range calculated in Step 2 to get an initial ODI (outcome delivery incentive) rate. Next, we un-normalise the initial ODI rate to get a unit rate. Once we have calculated the unit rate for each company, we set the consistent unit rate at the industry median.

Step 4: we re-normalise the unit rate for each company so that it is expressed in the same units as the PC.

We have checked Ofwat's process and data for calculating the outcome delivery incentive rates and we have then assumed they are correct.

The ODI rates for biodiversity and operational greenhouse gas emissions (water and wastewater) will not be decided by Ofwat until its draft determinations in September 2024 so we have left these cells blank.

We do not have any regional PCs (as we cover one region only), or bespoke PCs (see performance commitments chapter for confirmation of this), and therefore have left these cells blank.

We have taken the ODI rates exactly as given by Ofwat. We have also used the benefit sharing factor of 70% for all ODIs, whilst noting that this is no longer relevant given Ofwat's change to a top-down approach to setting ODIs. This means that the marginal benefits values in table RR30 are all implied, rather than being inputs to the ODI rate calculations.

25. OUT8

We have used the latest version of the Outcome Delivery Incentive (ODI) spreadsheets published on the Ofwat website. The PC performance levels for 2023/24 and 2024/25 have been inputted into the models in line with our Board approved forecasts for the remaining of AMP7. we have considered our current performance; our improvement plans and planned activities during Year 4 and 5 to create a forecast for each PC. The ODI calculation is an automated calculation built into the

Performance Commitment	Indicative ODI rate (£m)	Benefit sharing factor (%)	Implied marginal benefit (£m)
Internal sewer flooding	10.309608	70%	14.728011
External sewer flooding	4.615792	70%	6.593989
Bathing water quality	0.960375	70%	1.371965
Customer contacts	13.927637	70%	19.896624
CRI	1.385635	70%	1.979478
Water supply interruptions	1.417828	70%	2.025468
Mains repairs	0.281003	70%	0.401433
Unplanned outage	1.970514	70%	2.815020
Sewer collapses	1.136704	70%	1.623863
Total pollution incidents	1.181666	70%	1.688094
Serious pollution incidents	1.138106	70%	1.625866
Discharge permit compliance	2.291918	70%	3.274169
Storm overflows	1.389195	70%	1.984564
Leakage	0.364886	70%	0.521265
PCC	1.943307	70%	2.776153
Business demand	0.364886	70%	0.521265
River water quality	0.000661	70%	0.000944

ODI models, created by Ofwat.

26. OUT9

The data is setting out how much land is within our ownership (OUT9.1) and of that how much is covered by protected status (OUT9.2) and outside of this designation or other wildlife rich habitats (OUT9.3), how much expected to be covered by solar arrays (OUT0.5) by 2025, tenancies (OUT9.6-9), or other management controls, such as planning obligations (OUT9.4).

We own 275km2 of land, 113km2 of which is designated as a Protected Land. This has remained relatively static over AMP7.

Of the land which is not designated as a protected site or classed as being a wildlife rich habitat, 62 km2 is under an agricultural tenancy of more than 5 years, 10 km2 is less than 5 years and 1 km2 is under shooting tenancies.

Company land associated or expected to be associated with obligations, including planning processes, in 2025-30 is 2 km2.

There is also a significant amount of our landholding covered by protected status (i.e. SSSI) (113km2) and therefore is under the strictest controls and obligations. Outside of this designation, a further circa 28% is covered by tenancies or leases and managed by a third party on a day to day basis.

When considered against the other information in OUT9 regarding wildlife habitats and land in biodiversity plans (OUT 9.2, 9.10-18) the data is demonstrating that there is little land, if any, in our ownership that is not already being used or managed.

This data collection is a new requirement from Ofwat and there is no previous data to compare it to, or trends to report on. It was therefore not included within PR19 or any other regulatory submissions.

No information has been held to date on the extent or nature of any planning obligations, however, with Biodiversity Net Gain coming into effect from November 2023 processes are being put into place to track this.

Lines 9.10-9.15 rely on tenancy data in lines 9.4-9.9 which is provided on our Odyssey programme/SAP system and maintained by our Land and Property team. In future it would be more efficient to provide this data in a spatial format to allow a single GIS point of truth for reporting, something that is planned and should occur by AMP8. Within this data submission, basic assumptions have been made about the overlaps between these lines of data.

A single source of tenancy data, that was also linked to a GIS system, would make data collection more accurate and efficient.

27. OUT10

We do not have any bespoke performance commitments being proposed as part of PR24 and therefore the table is blank.