Jacobs

PR24 Technical Assurance Report

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PR24 Independent Assurance Provider 6 September 2023





PR24 Technical Assurance Report

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1. Introduction

Anglian Water Services Limited (AW) engaged Jacobs UK Ltd (Jacobs) to provide independent technical assurance on its 2024 Business Plan (PR24) submission to Ofwat. The objective of our assurance activity is to provide the Company's Board with an independent opinion on the robustness of the technical information being submitted to Ofwat and to assist the Board to comply with Ofwat's Board assurance requirements.

1.1 Engagement

We engaged with AW in February 2022 to discuss AW's high level requirements for independent assurance for PR24. We maintained this engagement as Ofwat's guidance was developed and issued to the water industry in draft in the summer 2022 then as final in December 2022. The scope of our work was expanded to include audit and assurance of the Long Term Delivery Strategy (LTDS), Drainage Wastewater Management Plan (DWMP), Water Industry National Environment Programme (WINEP) and the Water Resources Management Plan (WRMP), since these are intricately linked to the overall PR24 business plan. These submissions were assured with separate assurance reports provided to AW, however as Ofwat requires the the PR24 business plan to link back to the LTDS, we have included our findings on the LTDS in this report.

AW applied seven deep dive reviews on key elements of the business plan which were carried out by the company's independent Non-Executive Directors (INED) and the chair of the Audit Committee, with a NED assigned to each of the seven reviews. These reviews sought to provide confidence in the assurance process in relation to the specified elements of PR24 by challenging the Portfolio Leads and Economic Regulation. Jacobs attended these sessions to present our assurance activity and findings to allow the opportunity for the NEDs to engage directly with the Jacobs team challenge and ask questions. Of the water companies for which Jacobs provides assurance, AW is unique in this approach where the business plan has been subject to independent deep dive challenge by the INEDs.

1.2 Scope of assurance for PR24

The requirement for assurance of the key workstreams were defined in AW's PR24 Programme Plan which included the Long Term Delivery Strategy (LTDS), although three aspects of the LTDS were outside of our scope (meeting statutory & licence objectives, customer engagement for the LTDS, and long term affordability & fairness). Our technical assurance activity was aligned with the programme plan as it progressed, and followed a structured approach agreed with AW's Assurance Manager. This formed part of AW's quality assurance process. The technical assurance process included:

- The development and agreement of the technical assurance scope and programme.
- Agreed timescales for audit scope, reporting of findings and corrective actions, requests for further information and follow-up reviews.
- 'By exception' reporting of findings and corrective actions.
- Weekly progress meetings between Jacobs and AW.
- Internal Jacobs peer review of the assurance process and findings.

The following elements of the PR24 business plan and submission were agreed as in scope for technical assurance. The list was reviewed after Ofwat published its Draft and Final Methodologies and Guidance to ensure assurance was applied in response to Ofwat's requirements emerging into the final methodology.

- 1. Investment portfolios and associated processes.
- 2. Enhancement cases.

- 3. Alignment between data tables and the business plan; extent to be agreed on initial data freeze and final data freeze.
- 4. Internal QA processes and application.
- 5. Outcomes and Performance Commitment framework.
- 6. Customer Engagement "line of sight" to inform the LTDS and business plan. Assessment of the quality and means of customer engagement was out of scope, although we had visibility of this for the LTDS.
- 7. Societal Valuation.
- 8. Affordability and vulnerability.
- 9. Assurance regarding visibility of customer engagement by the Independent Challenge Group.

1.3 Approach to assurance

We audited the elements of the submission as set out in 1.2 above on a risk and sample basis. Given the size of the PR24 submission, in the time available, we have not sought to examine every element and data point. All Jacobs' assurance activity is risk based and performed on a sample basis.

We provided risk scores to reflect our opinion on the robustness of the information, compliance with Ofwat's requirements, alignment to AW's LTDS and 'line of sight' of customer preferences. We used a set of audit tests to structure and guide our work which we adapted as appropriate to each item in scope. Our risk scores were defined as follows:

- Red: Material concerns.
 - Material concerns represent a shortcoming which in our opinion is of a serious or critical nature which should be addressed before submitting to Ofwat.
- Amber: Non-material concerns.
 - Non-material concerns represent a shortcoming which in our opinion should be addressed prior to submission.
- Blue: Observations.
 - Observations represent matters which in our opinion are unlikely to affect the submission, but which might provide opportunities to make the submission more robust or persuasive.
- Green: No concerns identified.

Alongside our scores we provided justification and, where applicable, recommendations to resolve any issues found or to make the business plan more robust. Our scores and recommendations were designed to help AW prioritise any actions.

We audited documentation, processes and data. In general, our approach was to review methodologies and relevant supporting data in advance where possible and explore further during the audit meetings.

Our work required access to the AW's teams involved in producing the PR24 business plan and submission, including external consultants engaged by AW. We required supervised access to the data sources and systems used to develop and evidence the submission.

1.4 Deliverables

Our audit findings and recommendations were recorded on Jacobs' Track Record system to which the AW teams had access. We provided assurance reports (such as this report) for AW's Board and where requested

the Independent Challenge Group. The key findings of our assurance work have been extracted from Track Record into this report.

1.5 Alignment to Ofwat Board Assurance requirements

Ofwat's PR24 guidance contains specific requirements with which AW's Board has to comply. We have set out below how our assurance activities contribute to AW's Board fulfilling Ofwat's Board Assurance requirements.

	Ofwat's Board assurance requirements	Jacobs' assurance
	The Board has satisfied itself that the systems, approach to risk management, and internal controls and processes in place to develop the data and information on which it based its decisions was appropriate and effective.	Based on sample checks, confirmation of internal challenge, review and governance, sign off by senior managers and Directors (1st and 2nd line assurance).
	The Board is confident that the overall strategy for data assurance and governance processes delivers high-quality data across all aspects of the plan and long-term delivery strategy.	Based on sample checks, confirmation of internal challenge, review and governance, sign off by senior managers and Directors (1st and 2nd line assurance).
1. General	The Board has satisfied itself that its submission will deliver operational, financial and corporate resilience over the next control period and long term.	Audits of selected enhancement cases to confirm systems are in place to identify risk and manage resilience to develop proposals to deliver operational resilience. Financial and corporate resilience are outside of Jacobs' technical assurance
	The Board has been involved with the testing of assumptions, and is fully aware of the impact that alternative assumptions may have. It has used its range of skills and experiences to test the impact of the assumptions on the wider stakeholder base.	Jacobs produced a summary of assurance activities and findings for seven deep-dive Independent Non-Executive Director (INED) meetings, which we attended to present our findings and also be challenged by the INEDs as to the depth of assurance carried out.
	That the Board has challenged and satisfied itself that the long-term delivery strategy: reflects a long-term vision and ambition that is shared by the Board and company management;	This is ultimately for the Board to do, however Jacobs' audit of the LTDS confirmed AW's long-term vision.
2. LTDS	is high quality, and represents the best possible strategy to efficiently deliver its stated long-term objectives, given future uncertainties;	Jacobs audited AW's development of strategy. It is AW's strategy so not for Jacobs to decide whether it is the best possible strategy to efficiently deliver the stated long-term objectives.
	will enable the company to meet its statutory and licence obligations, now and in the future	Jacobs audit observed that the first 5 years of the LTDS are reflective of the current statutory obligations as they are understood.
	is based on adaptive planning principles;	Jacobs had sight of the adaptive planning scenarios through the audit of the LTDS quality requirements.

	has been informed by customer engagement; and	Jacobs had sight of the customer engagement and refresh since PR19 in response to Ofwat's new requirements.
	has taken steps to secure long-term affordability and fairness between current and future customers.	Jacobs confirmed AW has taken steps to secure long-term affordability and fairness between current and future customers.
	The Board has challenged and satisfied itself	We are satisfied that the AMP 8 plan is
	that the 2025-30 business plan implements the first five years of the long-term delivery	intended to implement the first 5 years of the LTDS.
	strategy. The board should provide evidence of where it has challenged company management and an explanation of the process it has used to arrive at the view that its strategy is the best it can be.	This for the Board to do.
3. Affordability	That the Board has challenged and satisfied itself that: the full implication of the 2025-30 business plan for customers was considered and that the plan achieves value for money;	Jacobs' assurance tested affordability and the wider support offered to customers. Evidence benchmarking and cost impact was presented at audit. The plan offers value for money to the best of AW's knowledge, acknowledging that statutory requirements drive the need for the majority of enhancement investment.
a. A.	the long-term delivery strategy protects customers' ability to pay their water bill over the long term and delivers fairness between what existing customers will pay and what is paid for by future customers.	Jacobs' assurance confirmed that AW has taken steps to ensure the LTDS protects customers' ability to pay their water bill, now and for future customers.
comes	That the Board has challenged and satisfied itself that: the performance commitment levels in the plan are stretching but achievable and reflect performance improvements expected from both base and enhancement expenditure;	Audit of Outcomes and Performance Commitments/Incentives explored AW's approach to setting stretching targets. Our review recommended greater emphasis and explanation of the achievability of proposed targets. AW has responded by producing a plan on the achievability of the outcomes. Achievability of targets is however contingent on subsequent expenditure allowances allowed in the final determination.
4. Costs and outcomes	the expenditure forecasts included in the company's business plan are robust and efficient;	Out of scope for Jacobs.
	the needs for enhancement investment are not influenced by non-compliance;	Assurance of Enhancement cases reviewed current performance, and whether the enhancement case was driven by a forward looking requirement, e.g. the statutory programme for WINEP.
	or non-delivery of programmes of work (both base and enhancement) that customers have already funded;	Our sample audits did not reveal non- delivery of already funded schemes.
	the options proposed within the business plan are the best option for customers and a proper appraisal of options has taken place;	Jacobs' assurance of the Enhancement cases we were asked to assure covered the

driver, solution, benefits, costs, and optioneering. PR24 plans and the expenditure proposals Jacobs has discussed deliverability risks at a high level with the teams who compiled within them are deliverable and that the the Enhancement cases, WINEP and DWMP. company has put in place measures to ensure that they can be delivered. This Delivery risks have been considered with includes setting out the steps the Board has mitigations documented where taken to satisfy itself that supply chain risk is appropriate. These relate to the size of the manageable and delivery plans account for: investment programmes (WINEP, DWMP), - the ability of the company and its supply confidence in the strength of AW's supply chain to expand its capacity and capability at chain, experience in the use of technology the rate required to deliver the increased delivered previously on AW sites, availability of new technology and investment: - the impact of similar levels of growth appropriate site selection. Through our reviews, AW demonstrated that mitigations across the sector and any overall sector and supply chain capacity constraints; and are in place, such as advance survey work at - key supply chain risks and capacity WINEP sites with understanding of the solution to be delivered on each site, constraints, such as the availability of specialist resource or components, e.g. river identification of different delivery routes quality monitors, smart meters or SuDS based on the complexity of the solutions, and business as usual tracking of the designers. capital delivery programme which provides early sight of potential delivery delays. Other delivery mitigations are the need for partnership working with stakeholders which AW has already developed through recent AMPs, and further optioneering and consultation with local stakeholders as solutions are designed. We are satisfied that, at this stage of development of the investment programmes, AW has identified principal risks to delivery and has considered appropriate mitigations. The INEDs also challenged the teams on deliverability during the INED deep dive sessions. The plan includes price control deliverables Jacobs has reviewed and assured the covering the benefits of material formulation of the PCDs. enhancement expenditure (not covered by performance commitments); Jacobs' assurance of the LTDS confirms AW that the expenditure proposals are affordable by customers and do not raise has taken steps to balance affordability and bills higher than necessary; and bill impact. the expenditure proposals reflect customer Jacobs has confirmed "line of sight" of views, and where appropriate are supported customer preferences in the assurance of by customers. the Enhancement cases, DWMP, WINEP which are therefore informed by customer insights. Jacobs has not assured the quality and format of customer engagement.

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5. Risk and return	The Board should: provide assurance that the business plan is financeable on the basis of the notional capital structure. This assurance should take account of all components of the business plan, including our early view on the allowed return on capital for PR24 that we set out in Chapter 7, and consistent with maintaining target credit ratings at least two notches above the minimum of the investment grade. set out clearly the steps taken to provide assurance, including the consideration of the financial ratios. provide an assurance statement that the actual company is financially resilient over the 2025-2030 period and beyond under its business plan; and set out the steps it has taken to enable it to make that statement, the factors it has taken account of, and the suite of financial metrics used to ensure the company is financially resilient. We expect the plan to demonstrate the basis on which the assessment has been carried out, including how the base case and downside scenarios have been established and assessed	Not in Jacobs' scope.
6. Customer engagement	That the Board should provide assurance that the company's customer engagement and research meets the standards for high-quality research and any other relevant statements of best practice and has been used to inform its business plan and long-term delivery strategy.	Jacobs has confirmed "line of sight" of customer engagement informing proposals in the business plan. Assessment of the quality, extent and means of customer engagement is not in Jacobs' scope, although we had sight of it for in the LTDS audit.

2. Jacobs' Assurance statement

Developing the business plan is a major undertaking involving the whole business and multiple external partners. The work has been meticulously planned, controlled and monitored reflecting the continually evolving requirements, data tables and guidance from Ofwat. The final methodology and data tables have developed significantly since their draft versions and AW has accommodated these factors well in its planning. From the elements of the plan that Jacobs assured on a sample basis, together with the deep dive reviews by the independent Non-Executive Directors, in our opinion these contribute to a comprehensive plan supported by compelling evidence.

We had access to AW's management, staff, systems and where appropriate, external suppliers which enabled our assurance activity to progress in line with the programme.

Our early engagement with AW's approach to the PR24 business plan, together with our sample audits, enable us to assure that the business plan has been compiled in a logical manner and informed by AW's Long Term Delivery Strategy which sets the Company's long-term vision to 2050.

We note that that the Ofwat requirement for the LTDS requires companies to state their approach to maintaining and improving existing assets as part of base activities. It is these factors in addition to enhancement expenditure that will determine AW meeting its plan in future periods. We also note the DWMP is based on a different climate change assumption to that in the LTDS.

We found that AW's business planning methodologies and its tools for identifying needs and solutions, estimating costs and benefits and optimising expenditure were robust from a technical perspective and based upon risk-based principles using reliable asset-specific data. Assurance of AW's cost models was undertaken by a separate external third party.

Our sample audits and checks confirm that the plan is founded on reliable information resulting in a robust plan in which AW, its customers and stakeholders can have confidence.

We consider that AW has responded diligently to Ofwat's requirements for customer engagement. AW has refreshed its customer research from PR19 and has maintained its evidence base which is specific for the AW region and demographics. This is important to help AW make the case to use its own incentive rates based on its own research in four areas because Ofwat requires compelling evidence.

Through our audits we have seen evidence of customer engagement informing investment proposals and decisions. We have therefore confirmed 'line of sight' of customer preferences in most investment cases. In a small number of instances where it was lacking, we drew attention to this, and AW responded appropriately.

We have set out in section 3.0 the scope of our reviews and key findings with our assessed RAG status.

G D Hindley

Jacobs Assurance Director for Anglian Water Services Ltd

09 September 2023

3. Key findings

Throughout the assurance process, we identified issues to which we alerted the Company at audit and in our audit records held on Track Record. Key items of note are detailed below, with a summary of the scope of our review for each activity.

RAG Key:



Assurance activity/RAG	Summary findings by exception
LTDS	Our assurance covered:
	Alignment with Ofwat's guidance, including checks on Ambition, Strategy, Rationale, Foundations and Board Assurance.
	Link to Anglian Water's updated Strategic Direction Statement (SDS).
	Methodology that links strategic planning frameworks (WRMP, WRE, WINEP, Asset Health).
	Embedded adaptive planning pathways and resilience across the core strategic areas of the business.
	Definitions of scenarios including common and company-specific.
	Identification of key enhancement activities.
	Testing of investment strategy against common reference scenarios and company- specific scenarios.
	Our audit (June 2023) confirmed Ofwat's guidance was being followed in developing the LTDS and the five sections. At the time of audit the LTDS contained placeholders for certain sections, for example the Vision Statement. We reviewed the Vision Statement in August 2023 and found it complies with the guidance. The LTDS links back to the SDS which is a live document and refreshed, as is the intention for the LTDS.
	AW understands the quality of the research methodology to be followed and points back to the PR19 approach highlighting it as a solid foundation on which to build. There has been regular and robust challenge from the ICG on the engagement used and there were activities ongoing at the time of audit.
	AW described how the LTDS has been arrived at by drawing together other existing plans in order to form the emerging core pathway. The company is clearly aware of the various competing futures demanded of the company. At the time of audit, these linkages were not fully visible, however have since been progressed.
	The emerging core pathway was developed in November 2022, based on knowledge gained at that time, and produced a set of dummy tables. Iterations were tested for specific lines based on materiality. First tests against benign scenarios and then against adverse scenarios and this has been used to produce the first cut of the alternative pathways.
	Costings have been produced, each with a range of confidence; shorter term plans have been costed through C55 (high confidence); WINEP & Process Emissions - taken the best view of unit rate reduction and this is recorded on the master spreadsheet along with the assumptions taken for each pathway.

	Dates for decision-points & trigger points were being worked through with the Strategic Leads at the time of the June audit. Multiple alternative scenarios had been considered and were satisfactorily assured in August.
	AW has considered a best-value framework but consider that Ofwat is not consistent in its thinking. AW has consolidated frameworks in order to demonstrate value but also recognise at the time of the June audit that a number of the pathways did not yet contain solutions with sufficient certainty so be able to include.
	AW reported that WRMP is within the core pathway but the DWMP central pathway is different because of different assumptions in the DWMP guidance and LTDS around growth, the scenarios and definition of cost-benefit in DWMP. AW will provide a line of sight within the narrative of the LTDS to explain this. It could be seen as a discrepancy in future plans. At the time of the June audit the description of the core & alternative pathways was emerging as the team take the programme through the process. We had visibility of the pathways at the August audit.
	AW reported that considerable work had been done in customer engagement testing affordability and fairness between current and future customers. AW refreshed its customer engagement which has been in place since for the last two Price Reviews. Since PR19 the stated customer values have changed but the broad approach remains the same. 500,000 customers were engaged and 36 stakeholder groups were held. Since then, new engagement has taken place, on the WRMP and the DWMP. AW has reviewed work that had been done and identified gaps as a result. AW created a 'build-your-own LTDS' game but realised it was too complex so not rolled-out; instead there was a series of focus groups exploring ambition and intergenerational fairness through a qualitative session initially with young people and then with those struggling to pay. AW stated that the customer engagement for PR19 was first class and robust (which Jacobs supported); PR24 work has built on this and this has been fed back to the ICG twice. All customer insights have been compiled into an independent synthesis report. Other activities include engagement with the customer board and a supportability & acceptability review. More work was required on long term bill impacts. Topics being covered are those that will either influence the core pathway in the longer term or affect the alternative pathways. Conversations with customers have all been framed with the long term in mind - low risk for the short term.
Investment portfolios and associated processes	Our assurance covered: C55 system and methodology Optimisation process Justification for optimisation parameters used. Justification for exceptions and high-priority items. Use of the C55 optimisation tool.
	We found that AW's business planning methodologies and its tools for identifying needs and solutions, estimating costs and benefits and optimising expenditure were robust from a technical perspective and based upon risk-based principles using reliable asset-specific data.
	The optimisation capabilities of Predictive Analytics (a tool within AW's investment management system C55) have been effectively used to produce maintenance plans for infrastructure and non-infrastructure assets. Predictive Analytics has enabled AW to derive long-term investments for an entire asset group at a high-level of granularity, enabling optimisation of potential maintenance investments across hundreds of thousands of assets. The optimization was constrained by acceptable bill

increases, which limited the number of possible maintenance schemes to a lower The inputs to Predictive Analytics for infrastructure optimisation include deterioration models, asset inventory, unit costs, consequences assessments and budget. For non-infrastructure assets, the inputs to predictive analytics were generated from the Non Infrastructure Risk model. The use of Predictive Analytics for the business plan is an improvement to the approach used for PR19 because it enables a larger number of candidate investments to be optimised over a longer investment period. However, optimisation processes reply on the data and information that is subject to optimisation and the optimisation or heuristic algorithm's ability to solve the degrees of freedom defined in the objective function. We recommend that AW considers: The materiality of data missing from the water infrastructure consequence models and any actions that may mitigate the uncertainty associated with excluding these main from the optimisation process. Improving the optimisations for scenarios with multiple constraints and larger degrees of freedom over longer investment. Whether process improvements would reduce the risks associated with manual updating of cost functions. Our assurance was applied to 11 Enhancement cases covering: **Enhancement** Driver, Solution, Benefits, Cost, Interaction with markets and the rest of the plan CASES We reviewed the following Enhancement cases: Bioresources, Cyber, DWMP (Water Recycling capacity), DWMP (flooding), Growth (water network reinforcement), Leakage, Metering (smart meters), Metering (water efficiency programme), Net zero, Resilience (Climate vulnerable mains), s101a. Our audits confirmed the robustness of the identified needs and solutions and the selection of preferred options. We made several observations and recommendations across the 11 cases that were reviewed: **Bioresources** We recommended that AW should consider reinforcing the Enhancement case for spreading equipment. In terms of improving capacity to spread within narrowing windows it could be argued that this is within management control since other companies allow farmers to arrange their own spreading. This could point towards the greater revenues gained by AW largely due to the provision of a spreading service, which would be eliminated if farmers have to self spread. In terms of the technical requirements of spreaders, reinforce the argument that most spreading equipment accessible to farmers will not be capable of spreading very low application rates and will lack precision. For the Future Technology Accelerator, AW should reinforce the rationale behind why this might not fit with existing funding structures, such as Ofwat's own innovation fund and point to the costly failures of other water companies that have attempted to develop technologies in-house. The Future Technology Acceleration solution is discussed separately because:

Unlike the other solutions it was not previously audited as part of AW's WINEP submission. It represents a pot of funding intending to be combined with those of other industry stakeholders, rather than a physical or technological solution to be implemented by AW alone. As discussed with AW in the audit, it likely carries a greater risk of guery by Ofwat because it has not been through the same systematic process as the other solutions presented. Drivers The Future Technology Acceleration shares the same drivers as the other solutions presented. Solutions It was unclear how the solution cost had been arrived at. There needs to be evidence of stakeholder engagement or clear demonstration of alignment where AW believes this exists. Cost This was difficult to appraise since by its nature, a final technological solution is not proposed. However, a cost of doing nothing could be pointed to – at least at a high level. E.g. a worst case scenario of building incineration with landfill as a backstop in the interim. The solution helps to inform AW's future investments and asset strategy, providing further options for adaptive planning at appropriate times in the future linking to the LTDS. Cyber The evidence presented for the proposed investments is clear and unambiguous. The proposed solutions address obligations defined in Network and Information Regulations (NIS-R) and align to Ofwat's PR24 objectives. The benefits are clearly defined. At the time of audit, a cost benefit appraisal did not appear to have been used. It may not be possible to conduct such an appraisal and evidence that the solutions provide best value until specific solutions have been defined. It is also not possible to consider delivery and deployment risks in any detail until specific solutions have been defined. The scale of the third party funding requested may be appropriate, however at the time of audit, we couldn't be certain because of the lack of detailed solutions. It was unclear how costs had been derived. Given that the solutions had only been defined at a high level it may be that the costs were best estimates. Benchmarking cannot be used until specific solutions have been defined. We understand that the DWI has given verbal confirmation that it is acceptable for proposals to be very high-level at this point. However, we are not clear whether Ofwat will accept this. The Enhancement case notes that physical security systems and water recycling systems are out of scope of NIS-R, in line with DWI's guidance. The UK Government has stated that it intends to bring Water Recycling Systems within NIS-R, but not when. The portfolio leads suggested that since this will happen

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in the near future, they can include water recycling systems in their plans, although

strictly speaking they are out of scope. We recommended that AW should try to discuss this with the DWI prior to making its submission.

Regarding physical security systems, we suggested clarifying this with the DWI. Physical Security System that are connected to the AW Network such as CCTV or intruder alarms may be considered to fall under the remit of NIS-R.

DWMP (Water Recycling capacity)

The initial assessments of growth affecting networks was based on DWMP catchment modelling carried out by RPS. The DWMP modelling took into account climate change, urban creep as well as growth. Only the growth aspect has been taken forward in growth investment in PR24 in line with guidance. The DWMP identified the highest priorities through Best Value Planning.

The network sites that have been selected for PR24 investment are those facing the most significant growth. Six catchments were identified as those where growth was focussed, one of which concentrated on climate change and urban creep rather than growth specifically. Five catchments were therefore taken forward (Dereham, Cambridge, Peterborough, Southend, Upminster). The methodology for selecting the catchments for investment is reasonable as it is based on modelled output from growth forecasts. The requirement for investment is considered to be outside AW control as this is based on planned growth from ONS and LA forecasts. There may be other areas of growth besides these catchments. Changes in network capacity will be identified through the addition of flow monitoring in all 15 catchments in the DWMP.

Solutions for networks that are impacted by growth are a mix of grey/green and SUDs solutions. Grey solutions are generally attenuation tanks. The biodiversity net gain measure was considered within AW for each solution.

Cost was a major factor in determining the selection of solution, however other measures were also considered in C55, including carbon and feasibility of implementation.

The timing for delivery of networks solutions is based on growth rather than statutory deliverables. AW will monitor and reassess actual growth through flow monitoring and detailed network modelling early in the AMP to provide more accurate justification of the investment.

DWMP (flooding)

The requirement of service targets is required by Ofwat for PR24. The position is also supported by customer engagement and position statements from research. The targets for 2030 had been tested as a part of unconstrained and constrained testing which found that 50% of the target could be achieved for £60 million through identified projects.

Solutions proposed and developed are recorded in C55. This has been completed for various Annual Exceedance Probabilities (5%, 3.33% and 2%) and the greatest cost-benefit solution proposed. An example for Thorpe Market was shown in C55. Modular build options have not been directly considered within the programme, nor has an explanation been outlined of why they might not be practical.

Cost reductions to the programme have been explored through partnership working as a new delivery mechanism. For each expected partnership project, AW is proposing to offer a monetary value equal to the benefit it would receive from the scheme. This has been identified as a strategy with high risk due to unknown programme outcomes and high reliance on external parties completing projects. This risk is partly mitigated by the number of projects that are available to AW as other

	projects can be pulled forward into the next AMP to backfill potential delays on other projects.
	Costs and benefits of solutions are completed in C55, which is a well established tool used by AW for all project and programme development. The overall budget is fixed because it follows an Ofwat cost model. We reviewed the cost build-ups for Byron Avenue and Thorpe Market. We found no issues with the element build-up.
	The programme scale is justified, however it is not clear whether the programme will deliver the expected benefits due to the reliance on external stakeholders who are as yet uncommitted.
Growth (water ne	etwork reinforcement)
	AW has identified 37 'high risk zones' (those with the greatest growth / impact projections based on data from Local Authorities) to extrapolate its PR24 cost estimations. AW has used a hybrid of ONS / Local Authority and internal data to arrive at their estimate of a typical number of properties to adopt in AMP8. 'Cost' was the most influential driver used in determining the preferred solutions to maintain existing levels of service on current water supply zones. Two potential solutions have been investigated to ensure a 'no detriment' solution / 'maintain status quo'. The preferred solution has generally been selected by total cost, but consideration has been given to other influencing factors such as Constructability / Engineering challenges, Customer disruption, Services and location (e.g. railway crossings, arterial roads).
	AW has assumed the same AMP7 PCC (143 l/hd/day) for AMP8. This was discussed with respect to potential increases / decreases in future water usage. However, the WRMP shows an overall decreasing trend and the difference should be explained.
Leakage	
	AW has one of the lowest levels of leakage in the UK, so has limited options for further leakage reduction. We recommended that AW should provide more evidence that extension of existing solutions, specifically (i) additional find & fix activity and (ii) pressure management are not technically or economically feasible.
	For smart metering of shared services AW does not currently meter shared services as there is no billing or demand benefit, but there will still be a leakage benefit. The Enhancement case presents the costs and benefits of metering shared services. The solution is technically sensible and should reduce awareness time of supply pipe leakage on shared services.
	Whole DMA mains replacement, to include service pipes, should reduce leakage to low levels in these DMAs. The solution is technically sensible which will inform AW of the benefits of further roll-out of this option in future AMPs, specifically the level of leakage that can be achieved. Whole DMA mains replacement could be seen as a trial as AW is looking at only 5 DMAs. If successful, the trial could be extended in later AMPs. The solution is significantly cheaper than replacement of short lengths of distribution mains.
Meterina - smart	The scale and timing of the Enhancement case is aligned to the WRMP.
Metering - smart	
	The audit confirmed the driver is set out in the WRMP. AW trialled smart metering in AMP 6 and is now delivering its AMP 7 programme of smart meter installs. This enhancement case is to continue the programme.

	AW's trials of smart metering showed that the optimum scale is the whole region, area by area (typically town by town).
	Forecast meter install rates are based on a historic trends and current meter penetration data, which is reasonable.
	The benefits are set out in the WRMP and have been assessed there. These are primarily for leakage and per capita consumption, which are trackable.
	The costing approach is clear and straightforward with documented calculations and assumptions. These are based on the expected profile of installation types and are reasonable.
	The costs have been benchmarked against industry APR data and PR19 forecasts, including the PR19 international benchmarking exercise. The company is presenting to Ofwat using the range of evidence to demonstrate efficiency of costs including APR, PR19 and the output from a recent competitive tender exercise.
	There is a risk that AW could be locked into using the same data infrastructure provider due to the cost of creating alternative networks. Alternative networks might not be consistently available across the entire region, which could create an entry barrier to new infrastructure providers as AW may not wish to fragment its meter stock. This could increase costs to customers in future.
Metering – water	efficiency programme
	Demand reduction is an integral part of AW's WRMP. The water efficiency programme will help towards the PCC target.
	There are eight main options that fall within the water efficiency programme. Each of these options were presented to customers and stakeholders during the draft WRMP consultation. Customer feedback focused on the company doing more, which is incorporated into the Innovation Fund option.
	Although the AMP7 options are not visible in the PR24 submission, it would make the case more robust to provide narrative around the AMP7 options (and those presented in the PR19 documentation) and how they are different to the PR24 options. The changes in options from PR19 to PR24 are justified and align to the smart meter installation rate and targets, but it would be useful to explain the translation from the baseline options in AMP7 to the new options in AMP8.
	For the water efficiency programme, we confirmed the 'High' profile was selected and therefore the 'High' options were taken as preferred.
	Costs are entered into the model (CAPEX) based on supplier quotes and knowledge from the water resource team.
	The timing of the investment is profiled across the AMP, with many of the options having a consistent cohort size, and therefore cost, each year. The My Account app is linked to smart meter installations, and therefore fluctuates each year.
Net zero	
	Following the principles of the Water UK Routemap, AW has put forward a Net Zero Routemap to 2030 with focus on its main operational emissions hotspot (location-based): energy (electricity, fuels) (67%), process and fugitive emissions (23%) and transport (10%). Offsetting/insetting is considered for up to 1% of gross emissions, in line with Ofwat guidance.
	Through a Net Zero Benefits Mapping, AW has investigated in detail what activities need to be in place and the associated benefits, to allow significant progress towards the Net Zero by the 2030 target. On top of the base investment (e.g., like-for-like

direct replacement), 36 schemes are proposed focusing on three main hotspots of emissions - energy, process, transport emissions. All schemes put forward are well aligned with an Enhancement case, as they have reduction of carbon emissions (to support achieving net zero) as the primary driver for investment. It also represents a step change in the current level of service through biomethane export, Electric Vehicles and addressing process emissions, showing a shift towards long-term delivery planning, as evidenced during the audit. The team has compiled good evidence to support the benefits and cost estimates. In some cases, such as process emissions, where evidence is still limited overall, the team engaged actively with UKWIR, DEFRA and SMEs in fugitive CH4 and N2O emissions to build up the evidence and develop the methodology, considering baseline emissions, potential emission reductions and associated costs. Considerations were also taken based on the Ofwat's Net Zero Technology review paper. AW demonstrated a clear understanding of the requirements for the net zero enhancement case. Robust cost-benefit analysis was derived for the portfolio. We understand through AW's customer engagement that 47% of surveyed customers were supportive of AW's net zero strategy. Evidence was not provided during or post-audit, therefore, we could not assess if it provided sufficient information for the Enhancement case. AW could not evidence that embodied carbon was included in lines CW21.26 and CWW22.26 for the overall scheme impact (total tCO2e), although the totals aligned. Some schemes had an embodied carbon value in C55. We recommended that embodied carbon is included in tables CW21 and CWW22 for obtain the overall scheme impact (total tCO2e) or justify cases why these were not calculated. The total investment requested under the net zero Enhancement case is £199m. The costing approach and cost models were subject to separate assurance and assumed to be reliable for the audit. Capex and Opex profiles were built in C55 based on previous experience in delivering similar types of projects. Due to lack of existing cost curves for the net zero technologies proposed, AW developed the costing approach based on supplier quotes, which were then added to C55, and reviewed by the Cost Intelligence team. Costs were extrapolated for other sites based on unit costs or PE. Currency conversion and inflation were considered. The supporting information added to C55 for each type of Enhancement case were reviewed during the audit and satisfactorily traced back to the source information. The schemes were scaled and timed following a detailed benefits mapping procedure and considering previous experience in delivering similar projects. Resilience - climate vulnerable mains AW described that climate change is affecting soil moisture levels, which in turn is causing soils to shrink and swell, moving pipes, which in turn creates more bursts. This is occurring on a subset of pipes referred to as Climate Vulnerable mains. AW provided academic research which discusses the potential impact of climate change on AW's asset base. AW highlighted that, proportionally, the company has 2.5 times more Asbestos Cement mains compared to other companies. For the purposes of this Enhancement case, climate vulnerable mains are defined by: material (AC, PVC, Iron); diameter band (up to 350mm); and soil type (higher shrink swell soil types). The proposal is for a 40-year programme starting in the next AMP. There are 8,000km of climate vulnerable mains in the total asset base of 37,000km. The predicted spend in the next AMP will be £48m per year delivering 163km of replacement per year.

	AW demonstrated the significant spike in summer bursts during 2022 caused by the extreme hot weather. The academic research notes that forecasts using the UKCP18 climate data show that the high temperatures experienced in 2022 are similar to the average conditions that will be experienced in the 2050s to 2080s. AW noted that climate change is outside of management control. AW also noted that additional bursts on climate vulnerable mains are not due to pipes reaching end of life but the changes to climate, however, we note that "The exceptional summer of 2022" document states that pipe age does play a role in the susceptibility of the pipe to failure. From the information provided, we agree that there is a specific cohort of mains that are affected by high temperatures (and therefore climate change) and AW has provided academic research to evidence this.
	AW forward look of asset vulnerability indicates the need to increase proactive maintenance activities in order to align to the company's ambition for a step change focusing on asst resilience. AW demonstrated that the future is different through its predictive analytics models. Investment is being planned over the coming AMPs rather than spending reactively which should achieve a better solution long-term solution targeting the most vulnerable assets rather than investing reactively on asset failure. This is reflected in the enhancement case where AW has presented evidence of asset vulnerability with links to the impact of climatic shocks to its assets.
	We confirmed the solution aligns with Ofwat's objectives with respect to resilience and focusing on the long-term. AW evidenced clear customer support for investment in climate vulnerable mains with a majority view that investing in these mains before they start to cause significant problems is better than leaving them for a fix-on-fail approach.
	AW discussed that reducing the number of peak burst weeks is the key benefit. We agree that long term this should avoid having customers out of water during periods of extreme temperature, due to the possible inability to resource repair gangs for a relatively short period at an unpredictable time.
	The mains have been modelled using C55 Predictive Analytics, using the standard cost models within C55. The top 800km to be delivered during the next AMP have been selected from the C55 optimisation based on a "Best Value" objective.
	AW explained that this case was developed in advance of the Long Term Delivery Strategy. At the time of audit, it was not clear if the LTDS was aligned with the proposals in this Enhancement case. We recommend AW confirms this.
	In our opinion this is a credible case, however Ofwat's methodology suggests that the regulatory treatment of the case may have some uncertainty.
Section 101a – fi	rst time sewerage
	AWS has a legal obligation to provide a mains sewerage system and provide treatment of flows. The first time sewerage programme is delivered in the five year AMP periods. We sampled three schemes that are included in the AMP8 programme, and therefore this Enhancement case.
	For each scheme local options were considered (private cesspools) which provided a slightly higher whole life cost. This local solution also incurred an increase in operational costs to the proposed option and other options considered. The proposed option has more environmental benefits than the others considered. The cost profiles were generated from data in C55. We agree that the chosen options demonstrate that AW is proposing to deliver the
	right investment which meets immediate issues affecting the local customers and

environment, which aligns with Ofwat's objectives for PR24. The solutions also provide scope for other properties to connect to the sewer system. Our assurance covered: **Outcomes and** Assessing progress of the development of AMP8 ODIs to ensure that AW meets the Performance minimum quality requirements for the quality and ambition assessment (QAA) of Commitment business plans. framework The draft Board Assurance Statement (July 2023) is a comprehensive document which explains how AW's Board has challenged itself to comply with Ofwat's Board Assurance requirements. The Board must confirm that targets and outcomes are stretching and achievable reflecting performance improvements expected from Base expenditure and Enhancement expenditure. Our review recommended providing greater emphasis and explanation of the "achievable" aspects of the proposed targets and outcomes. AW has responded by detailing the achievability of the outcomes. For each PC AW has set out the percentage improvement in performance targeted in AMP8, discussed the extent to which the targets are stretching and the plans being formulated (or already in place) to achieve them. AW has considered the achievability aspect of the targets which are stretching. Achievability of targets is however contingent on funding being sanctioned in the final determination. The Board Assurance Statement's section on Costs and Outcomes contains evidence to enable the Board to support its statements. As part of our assurance activity we reviewed selected evidence such as the work Reckon LLP carried out to develop the approach to setting targets using trend analysis and econometric modelling. We carried out a separate review of the Predictive Analytics function of the C55 investment tool which estimates performance of assets for different levels of capital maintenance investment and asset deterioration. We reviewed a sample of Performance Commitments where Enhancement expenditure is proposed to understand the nature of the enhancements proposed and how a step change in performance and customer benefits has been developed. The investment tool C55 quantifies benefits via the service measures framework after the investment portfolio leads analysed risks and mitigations to service levels. Where improving performance is proposed, this is captured in C55 as Enhancement expenditure. AW engaged Oxera to carry out a critical friend review of the extent of ambition in its proposed Performance Commitments. AW has also presented its view of Affordability and Acceptability of the Performance Commitments and targets to the Independent Customer Group. This has provided a consistent view on AW's ambitions which link to the LTDS. AW is planning to accept most of Ofwat's incentive rates, however where there is a significant difference between Ofwat's rates and those derived by AW based on its own customer research, AW proposes to use its own rates. These are PCC, Business demand, Total pollution incidents and Serious pollution incidents. AW has used scenarios to understand whether the proposed Ofwat rates are material, e.g. the level of risk to the company and customers in terms of bill variability. These have been reviewed against customer priorities and values and are based on wider research. We observe that AW's proposed incentive rates for the four PCs align well to three of those used for PR19 (noting that Business Demand did not have a rate for PR19). Ofwat's rates are three to four times greater which appears disproportionately large.

Customer Engagement	For example, Ofwat prioritises internal flooding as 'high' and pollution incidents (serious and total) as 'medium'. AW's research suggests customers want the pollution and internal sewer flooding rates to be of a similar priority. If AW accepts Ofwat's incentives, tackling flooding drops down the relative priorities which appears to diverge from customers' views. AW is therefore proposing targeted use of its own customer research to ensure the incentives reflect a more equal priority to be better in line with its customers' priorities. Our assurance covered: Confirming "line of sight" of customer engagement informing investment proposals.
	For PR24, Ofwat has conducted its own central customer research specifically to explore setting incentive rates for the industry around how much customers would be prepared to be compensated for (for example) sewer flooding to be acceptable. This relates to the extent to which bills would rise to mitigate (in this example) sewer flooding.
	Notwithstanding Ofwat's own research, AW refreshed its research in response to the new requirements and in order to ensure the company maintained a robust independent view of its own customers' views and valuations. Customers are participating in the on-going valuation research and opinions are being sought to explore the total scale of incentives and how that applies to individual PCs. AW has maintained the "willingness to pay" basis of its research. At a high level, AW's Long Term Delivery Strategy informs the company's ambition from customers' views (including research for the Water Resources Management Plan and Drainage Wastewater Management Plan). Whilst Ofwat requires companies to develop stretching targets from Base expenditure, AW has also explored what customers would be willing to pay through Enhancement expenditure which can benefit PCs and maintains/builds AW's compelling evidence.
	AW has consolidated all research into a Customer Synthesis Report which produces "customer principles" as a central view of customer research. The synthesis report has been produced independently and is regularly refreshed as the research programme progresses. This helps the wider business interpret customer research from a single consistent source.
	We consider that AW has responding diligently to Ofwat's requirements. The Company has refreshed its research from PR19 and has maintained its evidence base which is specific for the AW region and demographics. This is important to help AW make the case to use its own incentive rates based on its own research in four areas because Ofwat requires compelling evidence.
	Through our audits we have seen evidence of customer engagement informing investment proposals and decisions. We have therefore confirmed 'line of sight' of customer preferences in most investment cases. In a small number of instances where it was lacking, we drew attention to this, and AW responded appropriately.
	We have not assessed the quality, means or format of the customer engagement, although we had visibility of this for the LTDS. We understand quality standards of customer research was specified in the agreements with the customer engagement suppliers/research providers and has been the central focus of the company's Independent Challenge Group.
Societal Valuation	Our assurance covered: Process – how the values were developed: as part of a coherent societal valuation strategy,

- that follows Ofwat and other best practice guidance, and
- builds on previous feedback and new data sources.

Content – the triangulated valuation outputs:

- provides robust and up-to-date societal values
- considers external macro-economic changes, and
- are appropriate and consider full range of impacts.

AW's strategy refresh clearly embeds societal values in its stated purpose and holistic decision-making approach using a six capitals framework building on existing practice. For PR24 societal valuation, AW 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.

Our assurance review of the Integrated Willingness to Pay Workstream 'A' Report is that it strongly aligns to the principles of Ofwat's guidance. There is some uncertainty and methodological challenge inherent which are considered further within triangulation. However, AW has delivered a high-quality primary research study in terms of making sure that the survey was well understood by customers to make informed choices in a neutrally designed survey, with a large and representative sample and appropriate emphasis of budget constraints and consequentiality, which led to realistic and statistically significant results. Workstream 'B' provides some complementary behavioural and valuation evidence for triangulation with the valuations from the other workstreams. It is clearly innovative. Some aspects could be further refined as additional studies are undertaken in the future.

Our assurance review of AW's Triangulation Report confirmed that it aligns to CCWater's best practice guidance. A prioritised approach means some services are more reliant on historic, secondary and benefit transfer evidence, but this is drawn from well-recognised sources. AW explored evidence originating from utility sectors but did not find any directly usable evidence. Overall, these are relatively minor concerns as there is a thorough approach to triangulating values over time, with a wide range of other internal, industry and external sources and taking a generally conservative approach to scaling and sensitivity testing in the business plan to establish materiality.

Affordability & vulnerability

Our assurance covered:

Ensuring AW has continued to have a comprehensive and adaptive approach to affordability, which shows an understanding of specific needs of different types of customers, and the approach to provision is sensitive, well-designed with flexible support and services.

Our review of the affordability analysis demonstrates that the overall approach taken by AW is robust and defensible, although at the time of audit there were still some queries outstanding. Our audit did not find any material shortcomings with the analysis undertaken. We note a significant increase in the number of customers on social tariffs between 2020-21 and 2029-30 (more than 550%) and an increase in Watersure tariffs of 27%. This means an increase in total revenue to support social tariffs increases by 440% between 2020-21 and 2029-30. This does fall within the customer WTP for social tariffs of £24 per household as reported in table SUP15 but represents a significant addition to household bills.

	The property forecast should be checked for consistency with other data tables with property numbers.
	Data are derived based on customer willingness to pay assuming sufficient demand for social tariffs will exists. It is unclear whether the maximum WTP from customers included or excluded existing subsidies being made to customers on Watersure tariff. This could be challenged by Ofwat.
Internal QA processes and application	Our assurance covered: Process used for internal challenge Sample check of process Check governance process is complete including sign-off
	AW has a comprehensive assurance framework in place which has four lines of defence for governance of data, reporting risks and associated controls.
	Level 1 The first line of defence sits with the functions within the company that own the data and manage risk and control. This is typically carried out by employees who work in the functions.
	 Level 2 The second line of defence also sits with the functions where policies, frameworks, tools and techniques support the assurance carried out by the first line.
	 Level 3 The third line of defence are functions that provide independent assurance which is typically AW's internal audit function.
	Level 4 The fourth line of defence is external bodies such as external audit or other third party assurance providers. Jacobs provides external technical assurance to AW, with PwC providing financial assurance. For PR24 AW has sought assurance on specific elements of the plan from other external provides. Other external challenge comes from the Independent Challenge Group.
	In addition to the four lines of defence, internal assurance is provided by AW's Strategic Board which oversees governance of PR24 and the PR24 Programme Board which oversees the regulatory submissions. For PR24 our assurance activity and our sample audit checks, we confirmed that the
	internal QA and governance processes have been applied appropriately.
	In addition to the internal QA and governance, AW applied seven deep dive reviews which were carried out by the company's independent Non-Executive Directors (NED) and the chair of the Audit Committee, with a NED assigned to each of the seven reviews. These reviews sought to provide confidence in the assurance process in relation to the specified elements of PR24 by challenging the Portfolio Leads and Economic Regulation. Jacobs attended these sessions to present our assurance activity and findings to allow the opportunity for the NEDs to challenge and ask questions. Of the water companies for which Jacobs provides assurance, AW is unique in this approach where the business plan has been subject to independent deep dive challenge by the NEDs.
Alignment between data	Our assurance covered: Process used to ensure alignment.

	1
tables and the	Sample check of process.
business plan	Short- and long-term forecasting.
	Check appropriateness, reliability & completeness of the data
	Data has been produced in accordance with stated planning processes and methodologies
	Trace information back to source / closest assured data point, and where appropriate use sampling
	Check reported information is compliant with Ofwat's guidance
	AW has documented methodologies for producing the PR24 data such that it complies with Ofwat's guidance. Our sample checks confirmed the methodologies were appropriate for producing the data tables in accordance with Ofwat guidance and published query responses.
	Data for many tables is sourced from AW's investment management tool C55. We have traced sample information to this source. The forecasts are based on an aggregation of investment options input by AW's Portfolio Leads. Data is input via a questionnaire which is completed by the Portfolio Leads. The questionnaires record current performance and require the Asset Planners to estimate the changes in performance that the proposed capital investments will deliver.
	During the audits we noted that the teams have carried out sense checks on the data extracted from C55. These checks included a review of C55 outputs to identify atypically high benefit values and data errors where the option does not look like the best value approach. The teams record these checks in a tracker. We recommended an additional check is introduced to ensure that a complete dataset is extracted from C55 during the table production process. This will help to ensure that the whole enhancement programme is accounted for in the table production process.
	The audits confirmed the teams were aware of the interaction between other PR24 tables.